



SULLAIR

ES-11 Integral

Air Compressor/Dryer & Filter

**OPERATOR'S
MANUAL AND
PARTS LIST**

**KEEP FOR
FUTURE
REFERENCE**

Part Number 02250092-573
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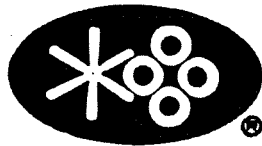
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Section 1 SAFETY

1.1 GENERAL

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

The ES-11 Integral Compressor/Air Dryer should be operated only by those who have been trained and delegated to do so, and who have read and understood this Operator's Manual. Failure to follow the instructions, procedures and safety precautions in this manual can result in accidents and injuries. Read this manual prior to startup.

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

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

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

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

1.2 PERSONAL PROTECTIVE EQUIPMENT

Prior to installing or operating the compressor/dryer, owners, employers, and users should become familiar with, and comply with, all applicable regulations and/or 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

WARNING

DO NOT remove caps, plugs and/or other components when compressor/dryer is running or pressurized. Stop compressor/dryer and relieve all internal pressure before doing so.

A. Install an appropriate flow-limiting valve between the service air outlet and the shut-off (throttle) valve, either at the compressor or at any other point along the air line, when an air hose exceeding 1/2" (13mm) inside diameter is to be connected to the shut-off (throttle) valve, to reduce pressure in case of hose failure, per all applicable Federal, State and Local codes, standards and regulations.

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

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

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

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

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

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

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

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

J. Use air at pressures less than 30 psig (2.1 bar) for cleaning purposes, and then only with effective chip guarding and personal protective equipment.

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

L. If the compressor/dryer is installed in an enclosed area, it is necessary to vent the relief valve to

Section 1 SAFETY

the outside of the structure or to an area of non-exposure.

M. DO NOT engage in horseplay with air hose as serious injury or death may result.

N. DO NOT pass air through the compressor/dryer while the compressor/dryer is in the **OFF** position.

O. DO NOT pass air through the compressor/dryer until the compressor/dryer has been stabilized. This condition exists when the refrigeration suction and discharge gauges read normal.

P. DO NOT operate a compressor/dryer at abnormal conditions. Consult the manual for normal operating conditions.

Q. Only qualified personnel should attempt to repair leaks or problems with the refrigerant system of the compressor/dryer.

R. For potential hazards of fluorocarbon refrigerants, see Table 1 (in this section).

1.4 FIRE AND EXPLOSION



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

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

B. Shut off the compressor/dryer 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 anti-freeze 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/dryer 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/dryer or of the inside of the enclosure.

E. Keep electrical wiring, including all terminals and pressure connectors in good condition. Replace any wiring that has cracked, cut, abraded or other-

wise 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/dryer.

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

J. DO NOT operate the compressor/dryer 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/dryer in any classification of hazardous environment unless the compressor/dryer has been specifically 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/dryer with the fan, coupling or other guards removed.

C. Wear snug-fitting clothing and confine long hair when working around this compressor/dryer, 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/dryer prior to attempting to start or operate it.

F. Disconnect and lock out all power at source and verify at the compressor/dryer 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 and dryers 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.

Table 1 POTENTIAL HAZARDS OF FLUOROCARBON REFRIGERANTS

⚠ WARNING Dryers contain HCFC. This substance harms the public health and environment by destroying the ozone in the upper atmosphere.

CONDITION	POTENTIAL HAZARD	SAFEGUARD
VAPORS MAY DECOMPOSE IN FLAMES OR IN CONTACT WITH HOT SURFACES.	Inhalation of Toxic Decomposition Products.	Good ventilation. Toxic decomposition products serve as warning agents. Avoid misuse. Vent refrigerant outdoors.
VAPORS ARE 4 TO 5 TIMES HEAVIER THAN AIR. HIGH CONCENTRATIONS MAY TEND TO ACCUMULATE IN LOW PLACES.	Inhalation of Concentrated Vapors Can Be Fatal.	Avoid misuse. Vent refrigerant outdoors. Forced—air ventilation at the level of vapor concentration. Individual breathing devices with air supply. Lifelines when entering tanks or other confined areas. DO NOT administer epinephrine or other similar drugs.
DELIBERATE INHALATION TO PRODUCE INTOXICATION.	Can Be Fatal.	Avoid misuse. Vent refrigerant outdoors. Forced—air ventilation at the level of vapor concentration. Individual breathing devices with air supply. Lifelines when entering tanks or other confined areas. DO NOT administer epinephrine or other similar drugs.
SOME FLUOROCARBON LIQUIDS TEND TO REMOVE NATURAL OILS FROM THE SKIN.	Irritation of Dry, Sensitive Skin.	Gloves and protective clothing.
LOWER BOILING LIQUIDS MAY BE SPLASHED ON SKIN.	Freezing of Skin.	Gloves and protective clothing.
LIQUIDS MAY BE SPLASHED INTO EYES.	Lower Boiling Liquids May Cause Freezing. Higher Boiling Liquids May Cause Temporary Irritation And If Other Chemicals Are Dissolved, May Cause Damage	Wear eye protection. Get medical attention. Flush eyes for several minutes with running water.
CONTACT WITH HIGHLY REACTIVE METALS.	Violent Explosion May Occur.	Test the proposed system and take appropriate safety precautions

CRITICAL PROPERTIES OF REFRIGERANTS

REFRIGERANT	CRITICAL TEMPERATURE		CRITICAL PRESSURE	
	°F	°C	Psia	kg/cm ²
"Freon" 22	205	96	722	50.8

Section 1 SAFETY

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

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/dryer for respiration (breathing) except in full compliance with any other Federal, State or Local codes or regulations.



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 into unventilated or other confined areas.

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

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

E. Coolants and lubricants used in this compressor are typical of the industry. Care should be taken to avoid accidental ingestion and/or skin contact. In the event of ingestion, seek medical treatment promptly. Wash with soap and water in the event of skin contact. Consult the Compressor Operator's Manual Lubrication Section for information pertaining to compressor fluid fill.

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

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

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

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

1.8 ELECTRICAL SHOCK

A. This compressor/dryer 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 who 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/dryer 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/dryer 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 the source prior to attempting repairs or adjustments to rotating machinery and prior to handling any ungrounded conductors.

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

1.9 LIFTING

A. If the compressor is provided with a lifting bail, then lift by the bail provided. If no bail is provided, then lift by sling. Compressors to be air-lifted by helicopter must not be supported by the lifting bail but by slings instead. In any event, lift and/or handle only in full compliance with Federal, State, and Local codes.

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

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

F. **DO NOT** attempt to lift in high winds.

Section 1 SAFETY

G. DO NOT lift compressor/dryer by motor—lifting eye.

H. Keep all personnel out from under and away from the compressor/dryer whenever it is suspended.

I. Lift compressor/dryer no higher than necessary.

J. Keep lift operator in constant attendance whenever compressor/dryer is suspended.

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

L. When moving compressor/dryers 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/dryer is secure and well balanced on forks before attempting to raise or transport it any significant distance.

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

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

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

1.10 ENTRAPMENT

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

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

NOTES

2.1 GENERAL

Each ES-11 Integral Compressor/Dryer is test-run at the factory before shipment. Immediately upon receipt of the equipment, remove the canopy end panel and check the unit carefully for any physical damage that may have occurred in transit.

If there is any physical damage or a refrigerant leak, please file a claim with the shipper immediately and notify your Sullair representative or the factory of the nature of the damage. The carrier is legally responsible for any damages. Your Sullair representative or Sullair Corporation will assist in any way possible to rectify problems.

After you are assured that the unit has sustained no shipping damage, the compressor/dryer is ready for installation.

2.2 MOUNTING OF INTEGRAL COMPRESSOR/ DRYER

NOTE

A foundation or mounting capable of supporting the weight of the machine, and rigid enough to maintain the frame level, is required.

The unit should be installed in an area that is clean and dry, allowing sufficient space on all sides for routine maintenance and service. The unit should be shielded from the weather elements, and in an area with an ambient temperature above 65°F (18°C) and not more than 100°F (38°C). Occasional operation at ambient temperature up to 120°F (49°C) will not damage the compressor/dryer, but will affect the capacity and dewpoint. Temperatures below 35°F (2°C) can cause freeze-ups of the condensate drains. If prolonged periods below 35°F (2°C) are expected, a heat source for these areas will have to be provided.

NOTE

Be certain the watercooler drain plugs are in place prior to start-up.

CAUTION

ES-11 integral compressor/dryers are not equipped with a refrigerant compressor crankcase heater. Installation of these compressor/dryers in areas with ambient temperatures below 65°F (18°C) can result in compressor damage.

2.3 COMPRESSOR/DRYER PIPING

WARNING

Dryer system contains HCFC-22, a substance that harms the public health and environment by destroying the ozone in the upper atmosphere.

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." (1)

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.

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

Compressed air piping should be at least of equal size to that furnished on the outlet of the compressor/dryer. Larger pipes reduced to the inlet/outlet pipe size may be used.

Make sure, when piping is connected, that undue stress is not applied on the compressor/dryer fittings.

Drain lines should be sloped adequately to drain by gravity any water accumulated after separation. Drains must be connected directly to a proper disposal system.

2.4 COMPRESSOR FLUID LEVEL CHECK

A fluid sight glass on the sump housing 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 rear compressor grill panel 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

Section 2

INSTALLATION

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 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 rear compressor grill panel 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 rotation is occurring. Disconnect the power to the starter and exchange any two of the three power input

leads. Recheck rotation as outlined above.

NOTE

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

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.

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.

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.
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.



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

1. Check incoming voltage. Be sure that the incoming voltage is the same voltage that the compressor was wired for.
2. Check starter and overload heater sizes.
3. Check all electrical connections for tightness.
4. "DRY RUN" the electrical controls by disconnecting the three (3) motor leads from the starter. En-

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.

The wiring of all functional electrical components has been designed and manufactured in accordance with the following electrical codes/practices:

NEC – National Electrical Codes

NEMA – National Electrical Manufacturers Association

UL – Underwriters Laboratories – Recognized Components

CSA – Canadian Standards Association – Recognized Components

As stated in Section 1, Safety, use a qualified electrician for all electrical wiring. Connect the power supply lines to the terminals indicated on the wiring diagram corresponding to your unit. All units are supplied with control circuit protection and a "red" power indicating light.

NOTES

3.1 INTRODUCTION

This manual provides information and recommendations for installing, operating and servicing the ES-11 Integral Compressor/Air Dryer. The unit is designed and manufactured to the highest quality standards. Units have been fully tested and inspected by the manufacturer before shipment from the factory.

The information, specifications and illustrations in this manual are in accordance with information in effect at the time of printing. The manufacturer reserves the right to change design and specifications without notice and without incurring obligations.

It is extremely important to analyze completely every system and understand the intended function of each component before attempting to determine the cause of a malfunction or failure.

The refrigerant (R-22) and air circuit can be easily followed by referring to Figure 3-2.

Refrigerant suction and discharge pressure gauges

are provided as standard equipment for analyzing the system operation and performance.

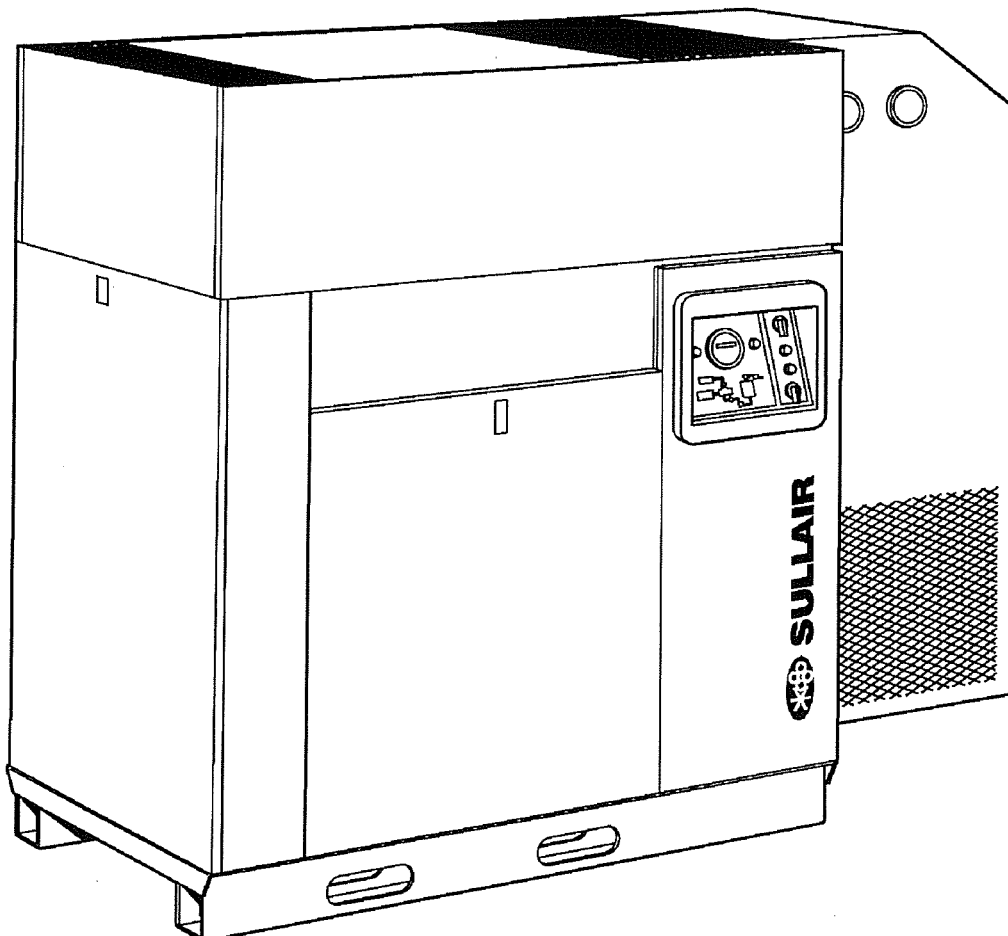
Any question or problem not covered herein can be directed to the nearest Sullair representative. Always specify the model and serial number of the compressor/dryer on all correspondence regarding service and parts.

3.2 IDENTIFICATION OF COMPONENTS

Refer to Figure 3-1. Parts can be ordered from the nearest Sullair representative. If for any reason parts cannot be obtained in this manner, contact the factory. Authorization and shipping instructions must be obtained from the factory before returning the parts to the factory. The manufacturer will not be responsible for parts returned without proper authorization or identification.

The ES-11 Integral Compressor/Air Dryer is designed for the purpose of removing moisture from compressed air by cooling to a temperature of 35°F to 39°F (2°C to 4°C).

Figure 3-1 ES-11 Integral Compressor/Air Dryer



Section 3 DESCRIPTION

3.3 REFRIGERANT CIRCUIT, FUNCTIONAL DESCRIPTION

The ES-11 Integral Dryer cools the process air by the use of a closed-loop vapor compression refrigeration cycle. Refer to Figure 3-2 for the flow schematics.

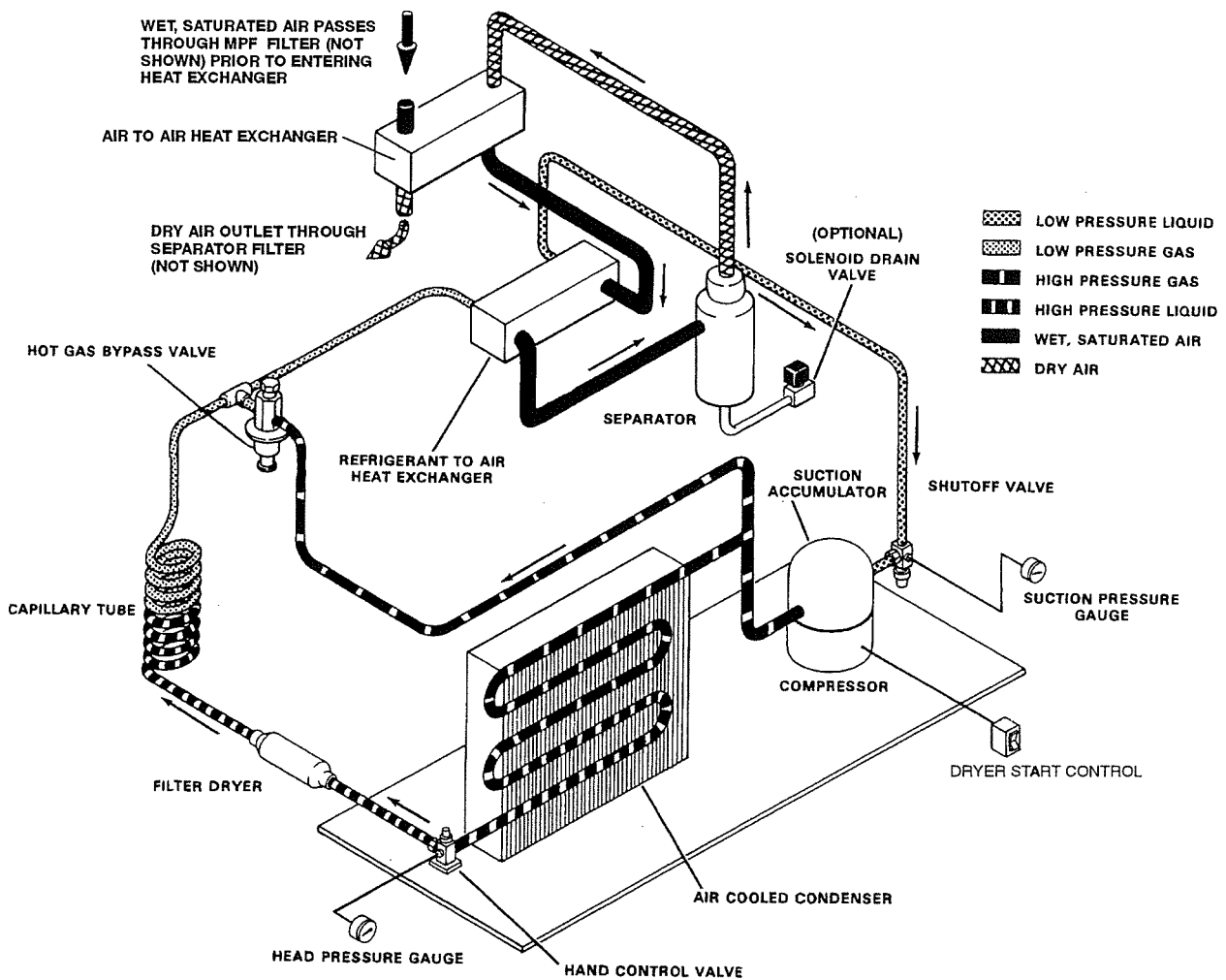
Dry R-22 vapor enters the compressor inlet and its pressure and temperature are raised at discharge. The vapor continues through a condenser, where it is cooled to its liquid state at near constant pressure. A filter dryer then removes any water and impurities that may be carried by the refrigerant. A further reduction of temperature and pressure takes place as the liquid R-22 is throttled through a capillary tube. The resulting mixture of vapor and liquid picks up heat (does cooling) as it moves through the

evaporator, where it turns back to its vapor state and routes back to the compressor inlet port.

To prevent feeding the compressor with liquid R-22 or evaporator icing during low heat load operation (i.e., partial process air flow), a pressure operated valve bypasses hot R-22 vapor to the evaporator inlet, thus assuring thorough evaporation of the refrigerant.

To insure that adequate head pressure is maintained during periods of low ambient temperatures or partial loads, a switch located at the compressor discharge cycles the condenser fan on and off. If the head pressure is too low to insure adequate flow through the hot gas bypass valve, the condenser fan is shut off.

Figure 3-2 Dryer Flow Schematic



Section 3 DESCRIPTION

3.4 COMPRESSED AIR CIRCUIT, FUNCTIONAL DESCRIPTION

The compressed air drying circuit uses an air-to-air heat exchanger which acts as a precooler/reheater, and an air-to-refrigerant heat exchanger (evaporator).

Warm, saturated, compressed air first enters the air-to-air heat exchanger, where it is precooled. By precooling the incoming air, energy is saved through the reduction of the heat load imposed on the refrigerant compressor and condenser. From the precooler, the air will enter into the evaporator further reducing its temperature to 35°F to 39°F (2°C to 4°C). Moisture is condensed, and it is then separated by a cyclone separator and discharged through a automatic drain or optional solenoid-type drain trap.

The chilled air then re-enters the air-to-air heat exchanger, where it is reheated. Reheating of the air does not affect the air's dewpoint. It prevents condensation of moisture on the outside of the air-distribution piping. The cold air flow through the air-to-air heat exchanger is in a direction opposite to the flow of the warm, saturated incoming air. This counterflow assures high temperature differential throughout the heat exchanger, resulting in a more effective heat transfer.

The compressed air leaving the compressor/dryer then passes through an MPF filter which removes particles down to 1 micron diameter, including coalesced liquid water and oil. The coalesced oil/water mixture is discharged through an automatic float-type drain trap.

3.5 REFRIGERANT SYSTEM COMPONENT, FUNCTIONAL DESCRIPTION

The refrigerant **compressor** compresses low pressure refrigerant gas into high pressure refrigerant gas.

The air-cooled **condenser** changes high pressure refrigerant gas from compressor discharge into high pressure liquid as the gas flows through.

The **filter/dryer** removes any contaminant and moisture that may be in the system.

The **capillary tube** is a non-adjustable metering device which separates the high pressure side of the system from the low pressure side. The capillary tube controls the flow of refrigerant to the evaporator in order to maintain a non-adjustable temperature difference (superheat) between the evaporator refrigerant inlet and outlet (see Figure 3-2).

The **hot gas bypass valve** (HGBV) is used to artificially load the evaporator during part-load conditions. The HGBV accomplishes this task by diverting high pressure gas from the compressor discharge to the inlet of the evaporator. The HGBV separates the high pressure side of the system from the low pressure side. The HGBV will modulate from fully open to fully closed in response to its outlet pressure setting. The HGBV is set to maintain the minimum allowable suction line pressure.

The **refrigerant-to-air heat exchanger** chills the compressed air to achieve a 35°F to 39°F (2°C to 4°C) temperature. A low pressure liquid/gas mixture enters the refrigerant side of the heat exchanger and removes heat from the warm compressed air. The refrigerant changes phases as it passes through the heat exchanger and exits as a low pressure superheated gas.

NOTES

Section 4 SPECIFICATIONS

4.1 SPECIFICATIONS – COMPRESSOR

50 Hz MODEL	kW	M ³ /MIN	BAR	LENGTH (MM)	WIDTH (MM)	HEIGHT (MM)	WEIGHT (I) (kG)	dBA (II) AIRCOOLED.
40L	30	5.3	7	1983	838	1645	975	76
40HH	30	4.1	10	1983	838	1645	975	76
40XH	30	3.1	12	1983	838	1645	975	76
50L	37	6.3	7	1983	838	1645	975	76
50HH	37	5.2	10	1983	838	1645	975	76
50XH	37	4.0	12	1983	838	1645	975	76

60 Hz MODEL	HP	ACFM	PSIG	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	WEIGHT (I) (LB)	dBA (II)
40L	43	185	100	78	33	64.75	2150	76
40H	43	163	125	78	33	64.75	2150	76
40HH	43	145	150	78	33	64.75	2150	76
40XH	42	120	175	78	33	64.75	2150	76
50L	54	231	100	78	33	64.75	2150	76
50H	55	210	125	78	33	64.75	2150	76
50HH	54	183	150	78	33	64.75	2150	76
50XH	53	155	175	78	33	64.75	2150	76

(I) Weights are approximate due to options available.

(II) Ratings for dBA at one meter.

COMPRESSOR

Type:	Single Stage Fluid Injected Screw Compressor
Minimum Full Load Operating Pressure:	60 psig (4.2 bar)
Maximum Full Load Operating Pressure:	Nameplate Pressure (I)
Bearing Type:	Anti-friction
Cooling:	Pressurized Fluid
Lubricant:	See Lubricant Specification
Sump Capacity:	3 gallons (11.4 liters)

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

MOTOR

	60Hz	50Hz
Type:	ODP, C-Flange	ODP, C-Flange
Synchronous Speed:	40 HP-1800 RPM 50 HP-1800 RPM	30kW-1500 RPM 37kW-1500 RPM
Voltage:		
Standard All Sizes:	230/460	380/415
Optional All Sizes:	200	220
Optional All Sizes:	575	
Optional Only:		
Type:		
Insulation Class:	F	F
Maximum Ambient Temp.:	40°C (104°F)	40°C (104°F)

Section 4

SPECIFICATIONS

FLUID FILTER

Type:
 Micron:
 Internal Bypass Valve Set at 25 psig (1.7 bar)

Spin on, Sullair Proprietary
 23 Microns Abs.

FLUID SEPARATOR ELEMENT

Type:
 Efficiency at Maximum Capacity:

Push In Cartridge, Sullair Proprietary
 4PPM Maximum

4.2 LUBRICATION GUIDE

For best value and longest uninterrupted service, the ES-11 compressor/dryer 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.

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.

⚠ 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.

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.

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

4.3 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 (.7 bar)
- E - When required by fluid analysis or known contamination
- F - Does not require replacement during normal service conditions

Section 4
SPECIFICATIONS

4.4 SPECIFICATIONS – DRYER

MODEL		ES-11
Flow Capacity (I)	CFM at 39°F (4°C) Evaporator	231 (60 Hz) 193 (50 Hz)
	M ³ /min. at 4°C Outlet Air Temperature	6.5 (60 Hz) 5.5 (50 Hz)
Air Inlet/Outlet Connection (MPT)		1 1/2 in.
Drain Connection (FPT)		1/4 in.
Refrigerant Compressor HP/KW Rating		1 / .74
Maximum Heat of Rejection (BTU/HR /KCAL/HR)		8703 / 2194
Cooling Air Flow (CFM/M ³ /MIN)		712 / 20.1
Refrigerant/Charge (lbs/kg)		n.a.
Standard Voltage (Optional) (II)		208 / 230
Total Power Input – Amps/Coulombs		9.0 / 32400
Height (in./mm)		64.75 / 1645
Width (in./mm)		33 / 838
Length (in./mm)		78 / 1983
Weight (ES-11 – 50 hp / 37 kW) lbs. / kgs		2150 / 975

(I) Flow Capacity rating is based on 100 psig (6.9 bar) air outlet pressure and 80°F (26.7°C) ambient temperature.

FLUID FILTER

Type:
Micron:
Internal Bypass Valve Set at 25 psig (1.7 bar)

Spin on, Sullair Proprietary
23 Microns Abs.

FLUID SEPARATOR ELEMENT

Type:
Efficiency at Maximum Capacity:

Push In Cartridge, Sullair Proprietary
4PPM Maximum

NOTES

Section 5 COMPRESSOR SYSTEMS

5.1 INTRODUCTION

Your new Sullair flood-lubricated rotary screw air compressor/dryer will provide you with improved reliability and greatly reduced maintenance.

Compared with other types of compressor/dryers, 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 9 (Maintenance) to keep your compressor in top operating condition. Should any questions arise which cannot be answered in the following text, call your nearest Sullair office or the Sullair Corporation Service Department.

5.2 DESCRIPTION OF COMPONENTS

Refer to Figure 5-1. The components and assemblies of the ES-11 air compressor are clearly shown. The complete compressor consists of an **integrated compressor system, inlet system, discharge system, cooling and lubrication system, control system instrumentation** and optional **Supervisor II control system**.

The compact design of the ES-11 air compressor provides easy access to all serviceable components.

5.3 INTEGRATED COMPRESSOR SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figure 5-2. The integrated compressor includes **compressor unit, cooling and lubrication system, and drive motor**. The Sullair compressor unit is a single-stage positive displacement lubricated type compressor. This unit is equipped with tapered roller bearings on the discharge and cylindrical roller bearings on the inlet end for high load carrying capacity. This unit provides continuous pulse-free air compression to meet your needs. With a Sullair compressor there will be no maintenance or internal inspection of the compressor.

▲ WARNING

DONOT remove caps, plugs and/or other components when compressor is running or pressurized.

Stop compressor and relieve all internal pressure before doing so.

Fluid is injected into the compressor unit and mixes directly with the air as the rotors turn, compressing the air. The fluid flow has three main functions:

1. As coolant, it controls the rise of air temperature normally associated with the heat of compression.
2. It seals the leakage paths between the rotors and the stator and also between the rotors themselves.

3. It acts as a lubricating film between the rotors allowing one rotor to directly drive the other, which is an idler.

The air/fluid mixture discharges directly into the fluid management system.

The fluid cooler bypass valve helps assure proper cooling by directing the fluid to the fluid cooler when discharge temperature reaches the thermostat temperature setting.

During start-up in cool ambient conditions, the cooler pressure drop may cause the filter bypass valve to open up, assuring adequate fluid supply to the compressor.

All fluid entering the compressor unit passes through the replaceable fluid filter element. This replaceable filter element contains a built-in bypass valve. Under conditions of restricted flow through the element, the bypass valve helps ensure adequate compressor fluid flow, as well as helps prevent element failure.

5.4 COMPRESSOR COOLING AND LUBRICATION SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figures 5-1, 5-1A and 5-2. The cooling and lubrication system consists of a **fan, radiator-type cooler, main line filter, cooler bypass valve, inlet filter and interconnecting piping and tubing**.

The fluid flows from the receiver/sump to the thermal valve. The standard thermal valve has a nominal temperature of 170°F (77°C), 190°F (88°C) for 175 psig (12 bar) compressors. At low temperatures, the fluid passes through the thermal valve, the filter and directly to the compressor unit.

As the discharge temperature rises above 185°F (85°C) for standard compressors, 195°F (91°C) for 175 psig (12 bar) compressors, 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 to the filter, and on to the compressor unit.

For the water-cooled models, a shell and tube heat exchanger and water-flow regulating valve are substituted for the radiator-type cooler and cooler bypass valve listed above.

5.5 AIR INLET SYSTEM, FUNCTIONAL DESCRIPTION

The compressor inlet system consists of a dry-type air filter and an air control valve. Reacting on a pressure signal, the valve closes the intake for unloaded operation. The valve also acts as a check valve upon shutdown.

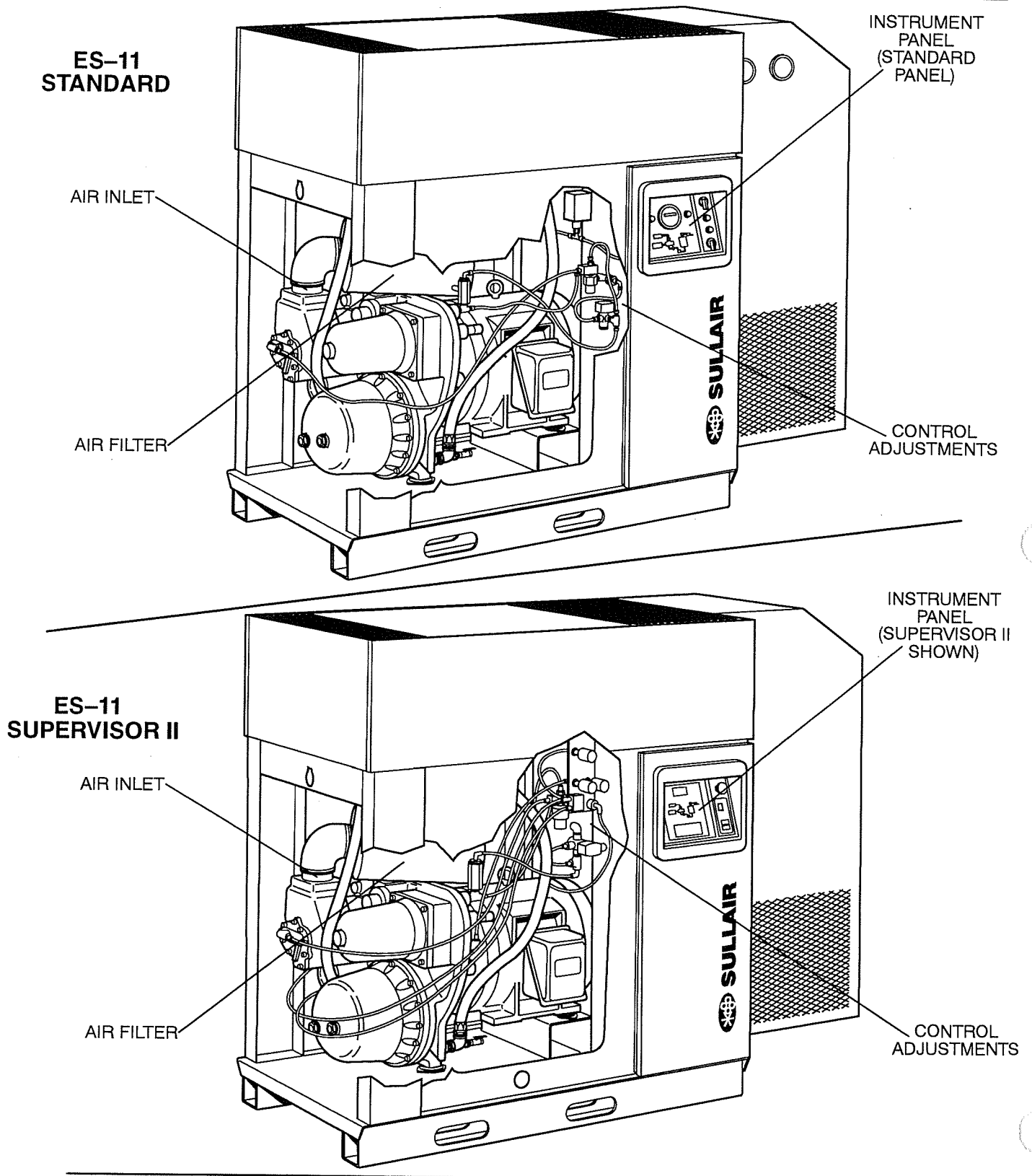
5.6 CONTROL SYSTEM, FUNCTIONAL DESCRIPTION

STANDARD ELECTRO/MECHANICAL

Refer to Figure 5-3. The purpose of the compressor control system is to regulate the compressor air

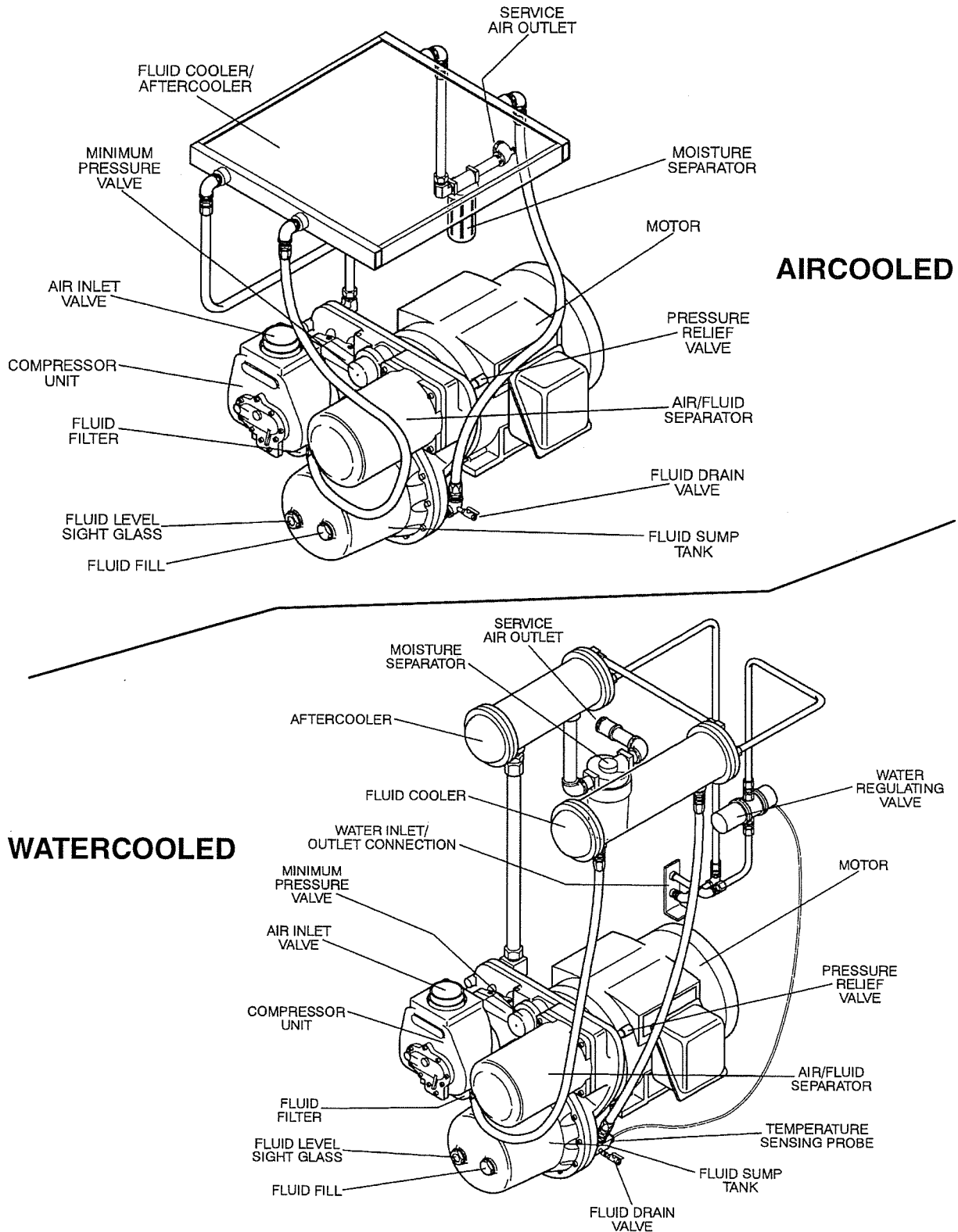
Section 5 COMPRESSOR SYSTEMS

Figure 5-1 Description of Components



Section 5 COMPRESSOR SYSTEMS

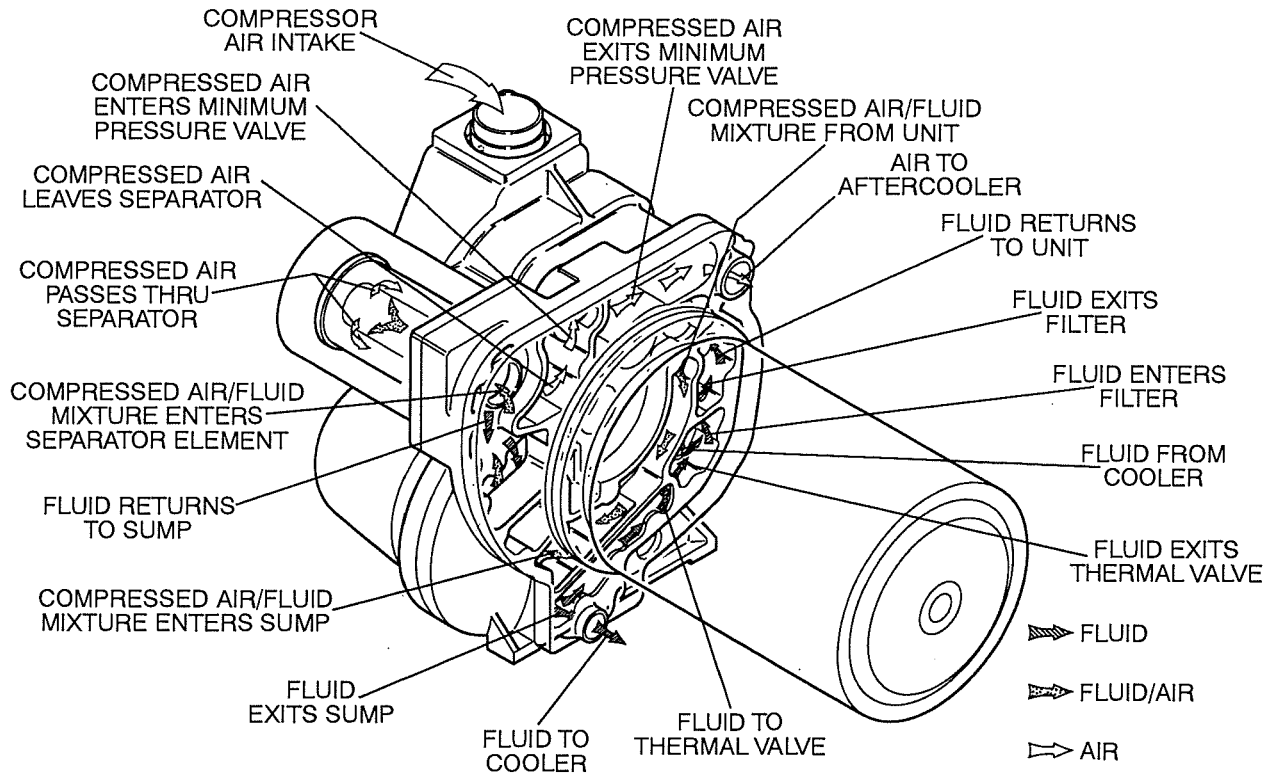
Figure 5-1A Description of Components



Section 5

COMPRESSOR SYSTEMS

Figure 5-2 Integrated Compressor System



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 system consists of an inlet valve, (located on the compressor air inlet), blowdown valve, solenoid valve, pressure switch, and a pressure regulator. The functional descriptions of the control system are given below in four distinct phases of compressor operation. The following guidelines apply to all STANDARD ES-11 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 ser-

vice 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)

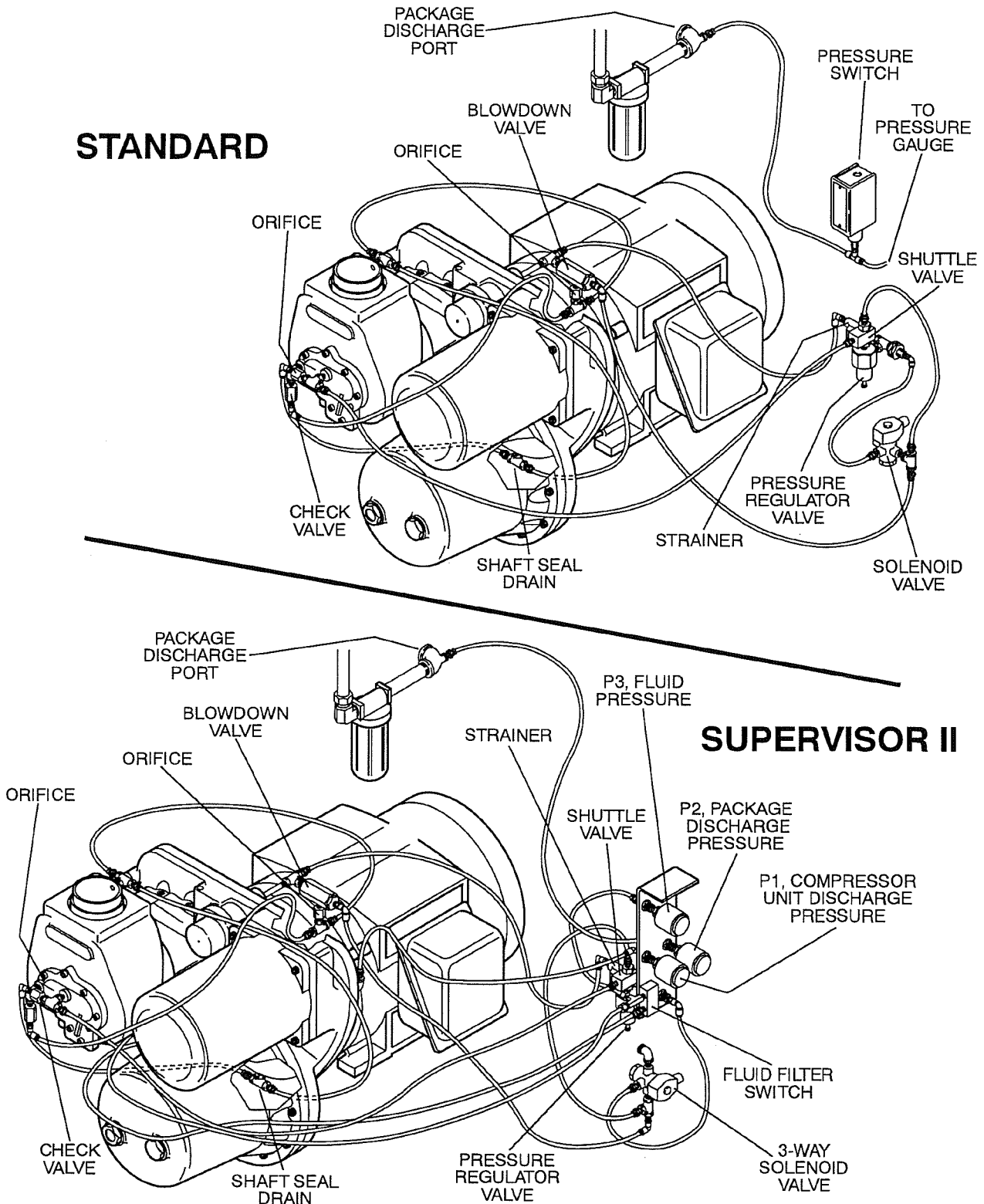
When the pressure air rises above 50 psig (3.4 bar), the minimum pressure/check valve opens and delivers compressed air to the service line. From this point on, the line air pressure is continually monitored by a line pressure gauge and a pressure switch usually set at 125 psig (8.6 bar). The pressure 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

Section 5 COMPRESSOR SYSTEMS

Figure 5-3 Pneumatic Control System -- Standard & Supervisor II



Section 5

COMPRESSOR SYSTEMS

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.

5.7 CONTROL SYSTEM, FUNCTIONAL DESCRIPTION

SUPERVISOR II

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-11 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 – 3.5 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 (3.5 bar).

FULL LOAD MODE – 50 TO 100 PSIG (3.5 TO 6.9 bar)

When the compressed air pressure rises above 50 psig (3.5 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 (6.9 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.

Section 6 COMPRESSOR OPERATION

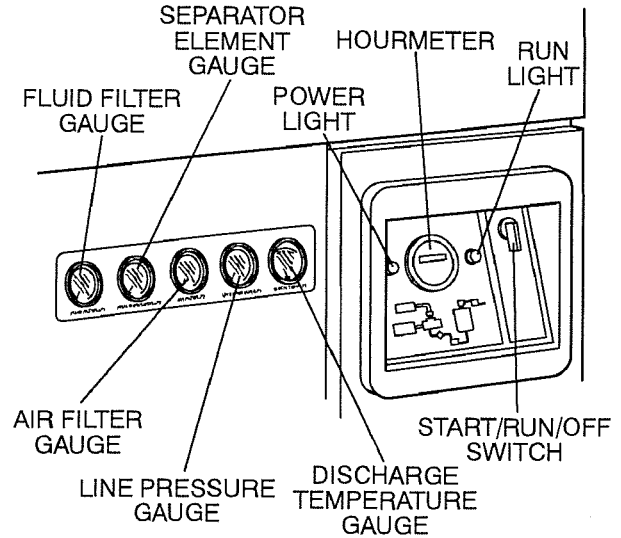
6.1 GENERAL INTRODUCTION

STANDARD ELECTRO/MECHANICAL

Refer to Figure 6-1. The instrumentation for the ES-11 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 **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**.

- 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 185°F (85°C) with 70°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 6-1 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.

6.2 PURPOSE OF CONTROLS – STANDARD

CONTROL OR INDICATOR	PURPOSE
START/RUN/STOP	<p>START/RUN – Turn switch momentarily to "I" START position to start the compressor, upon release the switch will return to the RUN position.</p> <p>STOP – Turn switch to "O" STOP position to stop compressor.</p>
HOURMETER	Records cumulative hours of compressor operation; useful for planning and logging service schedules.

Section 6

COMPRESSOR OPERATION

6.2 PURPOSE OF CONTROLS – STANDARD (continued)

CONTROL OR INDICATOR	PURPOSE
LINE PRESSURE GAUGE	Continually monitors service line air pressure.
DISCHARGE TEMPERATURE GAUGE	Monitors temperature of the air/fluid mixture discharged from the compressor unit. For air-cooled compressors normal reading is approximately 185°F (85°C) with a 70°F (21°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 185°F (85°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 185°F (85°C).

Section 6 COMPRESSOR OPERATION

6.2 PURPOSE OF CONTROLS – STANDARD (continued)

CONTROL OR INDICATOR	PURPOSE
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.
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.

6.3 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.

6.4 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.

6.5 SHUTDOWN PROCEDURE

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

6.6 GENERAL INTRODUCTION

SUPERVISOR II

Reference Supervisor II Section 8. 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.

6.7 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

COMPRESSOR OPERATION

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 se-

lected.

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 & Proto-

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col 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 (M³/min), see Sequencing & Protocol Manual for details.

**CAPACITY
100**

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

**SEQ HRS
1000**

6.8 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.

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COMPRESSOR OPERATION

- **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#.

6.9 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 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 185°F (85°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 back-flow 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.

Section 6 COMPRESSOR OPERATION

6.9 PURPOSE OF CONTROLS – SUPERVISOR II (continued)

CONTROL OR INDICATOR	PURPOSE
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 185°F (85°C).

6.10 SUPERVISOR OUTPUT RELAYS

RELAY	OPERATION
RUN RELAY (K1) *–DELTA (K2)	Contact closure energizes the compressor starter. 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.

6.11 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.

6.12 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.

6.13 SHUTDOWN PROCEDURE

To shut the compressor down, push “O” pad.

NOTES

Section 7

DRYER OPERATION

7.1 GENERAL

While Sullair has built into this compressor/dryer controls and indicators to assist you in determining if it is operating properly, it will be necessary to recognize and interpret the condition which will call for

service or indicate the beginning of a malfunction. Before starting the Sullair compressor/dryer, read this section thoroughly and familiarize yourself with the controls and indicators – their purpose, location and use.

7.2 PURPOSE OF CONTROLS – STANDARD

CONTROL OR INDICATOR	PURPOSE
REFRIGERANT SUCTION PRESSURE GAUGE	Indicates the refrigerant pressure as it enters the compressor. Before start-up, it is equivalent to the ambient temperature converted to pressure e.g. at 70°F (21°C) ambient temperature, R-22 suction pressure is 121 psig (8.3 bar) (See Figure 7-2, Temperature Pressure Chart).
REFRIGERANT HEAD PRESSURE GAUGE	Indicates the refrigerant pressure as it enters the compressor. Before start-up, it is equivalent to the ambient temperature converted to pressure e.g. at 70°F (21°C) ambient temperature, R-22 suction pressure is 121 psig (8.3 bar) (See Figure 7-2, Temperature Pressure Chart).

7.3 INITIAL DRYER START-UP PROCEDURE

STANDARD ELECTRO/MECHANICAL

After the installation has been completed, the following items should be checked.

1. Check main electrical supply for proper input voltage.

⚠ CAUTION

Make certain that all shut-off valves in the refrigerant circuit are open. Starting the dryer with a valve closed could burn up the refrigerant compressor. Rotate valve clockwise to open. Do not backseat the shut-off valves. If the shut-off valve is backseated the refrigerant pressure signal to the gauges will be restricted.

2. Turn on the power switch to the dryer, which is located in the air compressor control panel. The power indicating light will be on.

⚠ CAUTION

ES-11 Integral Dryers are not equipped with a crankcase heater. Installation of these compressor/dryers in areas with ambient temperatures below 65°F (18°C) can result in compressor damage.

3. Check the refrigerant suction pressure. This should be checked with no air flowing through the compressor/dryer, with a head pressure of 170 psig (11.7 bar), and without the condenser fan cycling.
 - a) The suction pressure should be 58–60 psig (4.0 to 4.1 bar). It is normal for the dryer to cycle between these pressures. During this

cycling the suction pressure should not fall below 58 psig (4 bar).

- b) If the fan cycles during the checking of the suction pressure, a jumper wire may be installed around the fan cycling switch to temporarily prevent cycling.
- c) To achieve the proper head pressure for checking the suction pressure, the following should be done. To increase the head pressure increase the ambient air temperature or temporarily restrict the air flow to the condenser. To reduce the head pressure, the ambient temperature must be reduced.
- d) Allow the dryer to run at least 15 minutes for stabilization when checking and adjusting the suction pressure.
- e) If necessary, adjust the hot gas bypass valve (HGBV) to change the suction pressure. Turn clockwise to increase the suction pressure and counterclockwise to decrease the suction pressure.
- f) Remove the jumper wire which was installed around the fan cycling switch in Step “b” above.

NOTE

If the suction pressure was set or checked at a head pressure greater than 170 psig (11.7 bar), a suction pressure lower than 58 psig (4.0 bar) may result, which could result in evaporator icing.

4. Check the refrigerant suction pressure for normal operating conditions. See Section 7.5.
 - a) If necessary, take corrective action as described in the dryer troubleshooting section of this manual (See 11.3 Troubleshooting—Dryer).

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DRYER OPERATION

NOTE

The hot gas bypass valve is preset at the factory. However, it may require readjustment at initial installation and periodically to help assure the suction pressure remains in the specified range, as stated in this Operator's Manual. If the suction pressure is too low, icing of the evaporator is possible.

7.4 SUBSEQUENT START-UP PROCEDURE

1. Turn on the power switch on the compressor/dryer.
2. With the air shutoff valve closed, check the suction pressure for a normal operating condition. If it is not within the normal unload range of 58 – 60 psig (4.0 to 4.1 bar), immediately take corrective action utilizing the dryer troubleshooting section of this manual.
3. Open the air shutoff valve slowly and apply load to the compressor/dryer. Check the suction pressure, head pressure, sight glass and moisture indicator for normal operating conditions as shown in Section 7.5 of this manual.

7.5 NORMAL OPERATING CONDITIONS

After the compressor/dryer has been started under rated load, let the compressor/dryer run for at least

15 minutes to allow stabilization of the system.

The gauge readings should be as follows:

REFRIGERANT SUCTION PRESSURE

R-22 fully loaded is 65 psig (4.5 bar) and unloaded is 58 psig (4.0 bar).

NOTE

Add 1 psig (0.7 bar) to the minimum allowable suction pressures referred to in manual for each 2,000 ft. (610m) elevation above sea level.

REFRIGERANT HEAD PRESSURE

To the ambient temperature add 25°F to 30°F (15°C to 18°C) then convert to pressure using the Temperature Pressure Chart (Figure 7-2). For proper compressor/dryer operation, the minimum discharge head pressure required is 170 psig (11.7 bar).

NOTE

If compressor is run without dryer being started, the compressor will deliver compressed air through the dryer without any drying being achieved.

7.6 PURPOSE OF CONTROLS – SUPERVISOR II

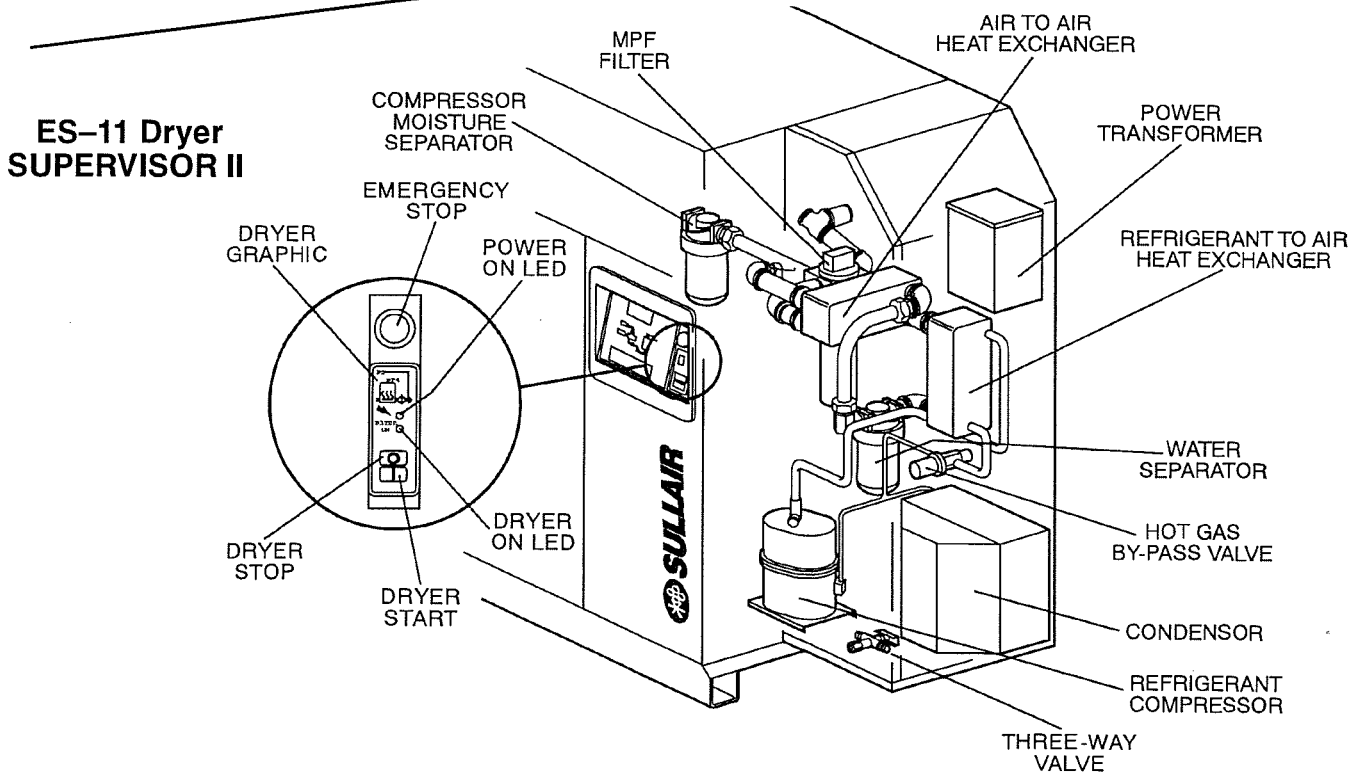
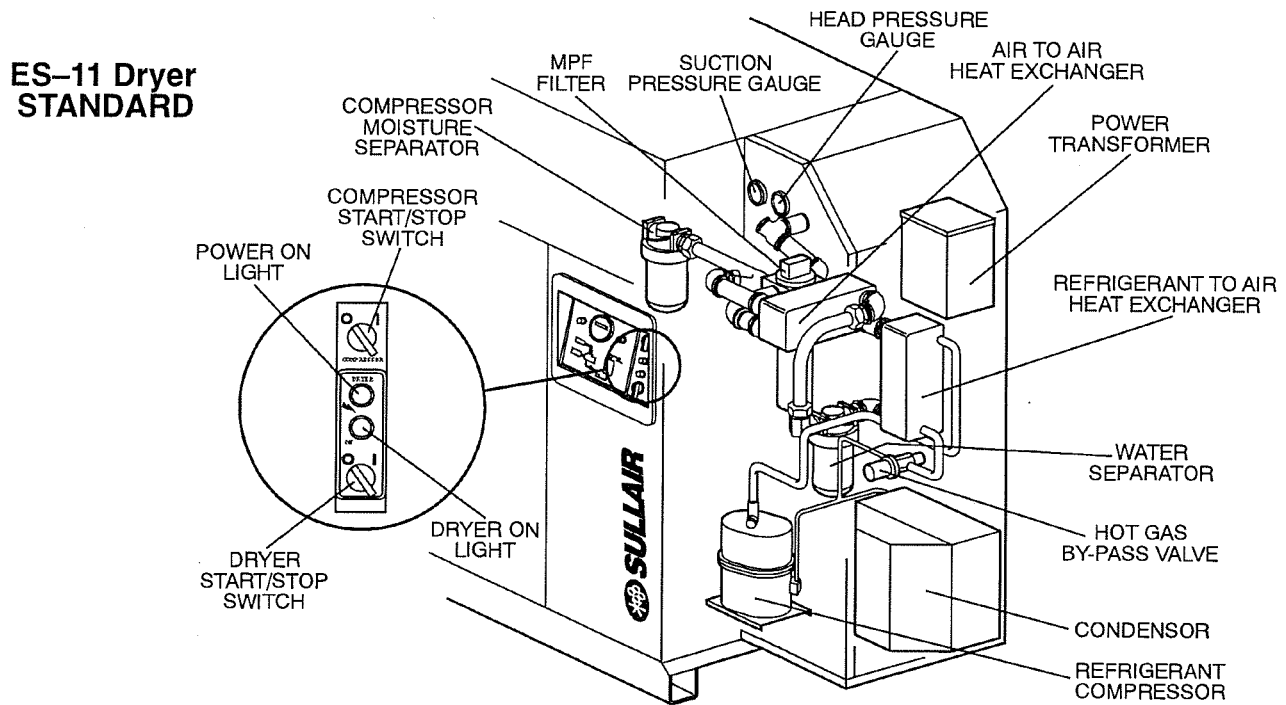
CONTROL OR INDICATOR	PURPOSE
THREE WAY VALVE	Connects Supervisor pressure sensor (P4) to either suction or discharge side of the refrigerant compression system.
REFRIGERANT SUCTION PRESSURE – P4	BEFORE READING PRESSURE, SWITCH THREE WAY VALVE TO THE SUCTION SIDE OF REFRIGERANT SYSTEM. Indicates the refrigerant pressure as it enters the compressor. Before start-up, it is equivalent to the ambient temperature converted to pressure e.g. at 70°F (21°C) ambient temperature, R-22 suction pressure is 121 psig (8.3 bar) (See Figure 7-2, Temperature Pressure Chart).
REFRIGERANT HEAD PRESSURE – P4	BEFORE READING PRESSURE, SWITCH THREE WAY VALVE TO THE DISCHARGE PRESSURE POSITION. Indicates the refrigerant pressure as it leaves the condenser. Before start-up, it is equivalent to the ambient temperature converted to pressure e.g. at 70°F (21°C) ambient temperature, R-22 suction pressure is 121 psig (8.3 bar) (See Figure 7-2, Temperature Pressure Chart).

NOTE

Valve must be kept switched to the suction side of the three way position at all times except when checking discharge side pressure. This enables the low suction pressure protection logic to stop compressor in case of refrigerant leak.

Section 7 DRYER OPERATION

Figure 7-1 Description of Components



Section 7

DRYER OPERATION

7.7 INITIAL DRYER START-UP PROCEDURE

SUPERVISOR II

After the installation has been completed, the following items should be checked.

1. Check main electrical supply for proper input voltage. The Power On LED should be lit.

▲ CAUTION

Make certain that all shut-off valves in the refrigerant circuit are open. Starting the dryer with a valve closed could burn up the refrigerant compressor. Rotate valve clockwise to open. Do not backseat the shut-off valves. If the shut-off valve is backseated the refrigerant pressure signal to the gauges will be restricted.

2. Press the "I" keypad to the dryer, which is located in the air compressor control panel. The Power On LED will be on.

▲ CAUTION

ES-11 Integral Dryers are not equipped with a crankcase heater. Installation of these compressor/dryers in areas with ambient temperatures below 65°F (18°C) can result in compressor damage.

3. Check the refrigerant suction pressure. This should be checked with no air flowing through the compressor/dryer, with a head pressure of 170 psig (11.7 bar), and without the condenser fan cycling.
 - a) The suction pressure should be 58–60 psig (4.0 to 4.1 bar). It is normal for the dryer to cycle between these pressures. During this cycling the suction pressure should not fall below 58 psig (4 bar).
 - b) If the fan cycles during the checking of the suction pressure, a jumper wire may be installed around the fan cycling switch to temporarily prevent cycling.
 - c) To achieve the proper head pressure for checking the suction pressure, the following should be done. To increase the head pressure increase the ambient air temperature or temporarily restrict the air flow to the condenser. To reduce the head pressure, the ambient temperature must be reduced.
 - d) Allow the dryer to run at least 15 minutes for stabilization when checking and adjusting the suction pressure.
 - e) If necessary, adjust the hot gas bypass valve (HGBV) to change the suction pressure. Turn clockwise to increase the suction pressure and counterclockwise to decrease the suction pressure.
 - f) Remove the jumper wire which was installed around the fan cycling switch in Step "b" above.

NOTE

If the suction pressure was set or checked at a head pressure greater than 170 psig (11.7 bar), a suction pressure lower than 58 psig (4.0 bar) may result, which could result in evaporator icing.

4. Check the refrigerant suction pressure for normal operating conditions. See Section 7.5.
 - a) If necessary, take corrective action as described in the dryer troubleshooting section of this manual (See 11.3 Troubleshooting-Dryer).

7.8 SUBSEQUENT START-UP PROCEDURE

1. Press the "I" keypad to the dryer.
2. With the air shutoff valve closed, check the suction pressure for a normal operating condition. If it is not within the normal unload range of 58 – 60 psig (4.0 to 4.1 bar), immediately take corrective action utilizing the dryer troubleshooting section of this manual.
3. Open the air shutoff valve slowly and apply load to the compressor/dryer. Check the suction pressure, head pressure, sight glass and moisture indicator for normal operating conditions as shown in Section 7.5 of this manual.

7.9 NORMAL OPERATING CONDITIONS

After the compressor/dryer has been started under rated load, let the compressor/dryer run for at least 15 minutes to allow stabilization of the system.

The readings should be as follows:

REFRIGERANT SUCTION PRESSURE

R-22 fully loaded is 65 psig (4.5 bar) and unloaded is 58 psig (4.0 bar).

NOTE

Add 1 psig (0.7 bar) to the minimum allowable suction pressures referred to in manual for each 2,000 ft. (610m) elevation above sea level.

REFRIGERANT HEAD PRESSURE

To the ambient temperature add 25°F to 30°F (15°C to 18°C) then convert to pressure using the Temperature Pressure Chart (Figure 7-2). For proper compressor/dryer operation, the minimum discharge head pressure required is 170 psig (11.7 bar).

NOTE

If compressor is run without dryer being started, the compressor will deliver compressed air through the dryer without any drying being achieved.

Section 7 DRYER OPERATION

Figure 7–1 Temperature Pressure Chart

Temperature (°F/°C)	(psig/bar) R–22	Temperature (°F/°C)	(psig/bar) R–22
20/–7	43/3.0	70/21	121/8.3
22/–6	45/3.1	75/24	132/9.1
24/–4	48/3.3	80/27	144/9.9
26/–3	50/3.5	85/29	156/10.8
28/–2	52/3.6	90/32	168/11.6
30/–1	55/3.8	95/35	182/12.6
32/0	58/4.0	100/38	195/13.4
34/1	60/4.1	105/41	211/14.6
36/2	63/4.4	110/43	226/15.6
38/3	66/4.6	115/46	243/16.8
40/4	69/4.8	120/49	260/17.9
45/7	76/5.2	125/52	278/19.1
50/10	84/5.8	130/54	297/20.5
55/13	93/6.4	140/60	337/23.2
60/16	102/7.0	150/66	381/26.3
65/18	111/7.7	160/71	430/29.7

NOTES

8.1 INTRODUCTION—SUPERVISOR II

Refer to Figure 8–1 and Section 6 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.

8.2 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.



8.3 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:

Section 8

SUPERVISOR II

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.

ΔP1 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 occurred.

T1 HI
@1 234

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

T1 HI
@2 204

8.4 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.

ΔP1 – If lit steady, signifies that ΔP1 is being displayed, if flashing denotes replacement of separator is needed.

ΔP2 – 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 ΔP2

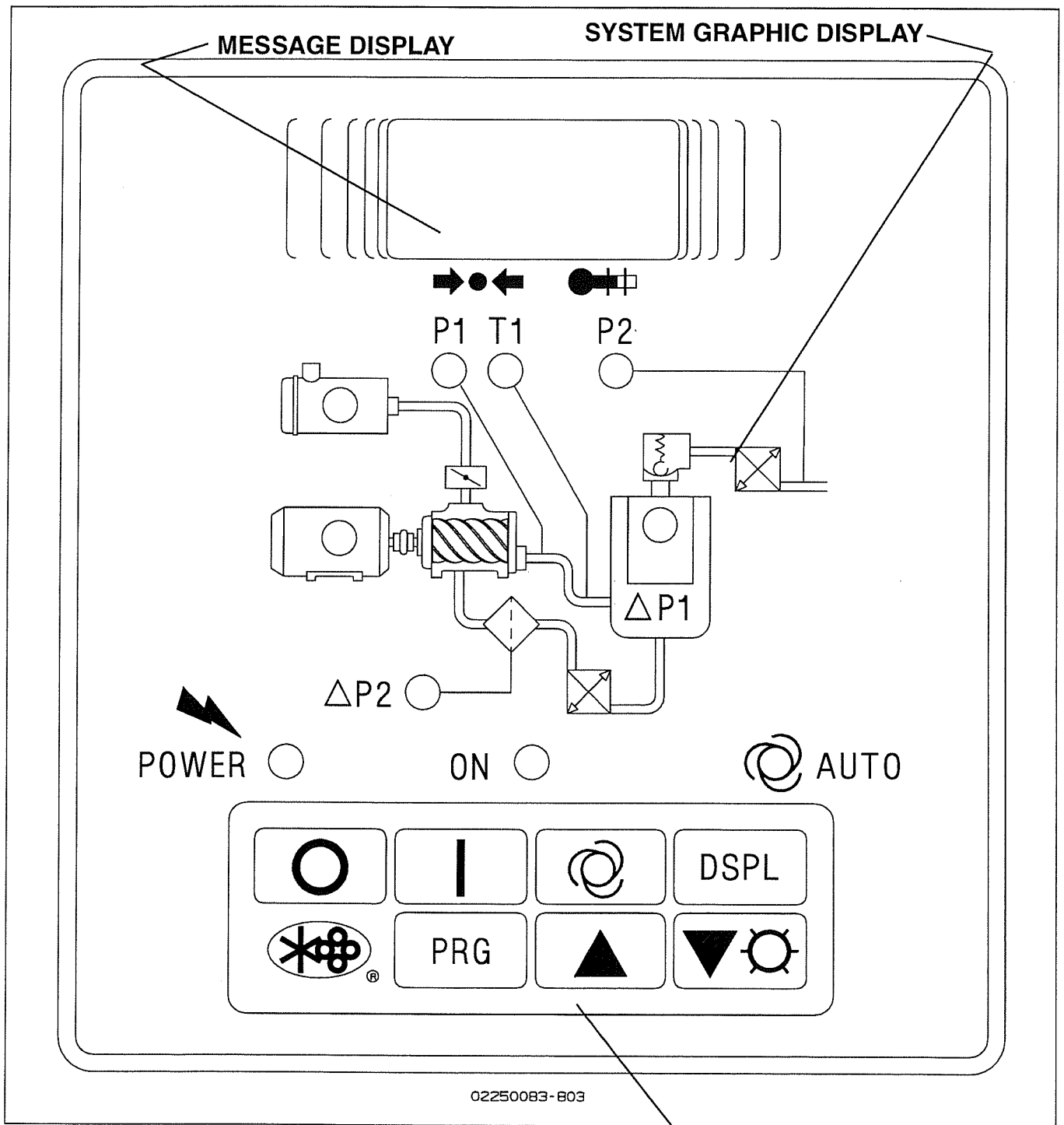
MOTOR – If flashing, indicates the motor overload contact has opened.

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.

Figure 8-1 Supervisor II Panel



KEYPADS

NOTES

Section 9 MAINTENANCE – COMPRESSOR

9.1 INTRODUCTION

⚠ 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.

As you proceed in reading this section, it will be easy to see that the maintenance program for the air compressor is quite minimal. If your compressor is equipped with the optional Supervisor II, it will monitor the status of the separator element. When maintenance to this device is required, the Supervisor will display the appropriate maintenance message and flash the location LED on the graphics map as a visual reminder. See instructions for each item in Section 9.6, Parts Replacement and Adjustment procedures.

⚠ WARNING

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

Stop compressor and relieve all internal pressure before doing so.

9.2 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 minor problem has developed which is causing this excessive loss. For proper fluid selection and change schedule see Section 4. See the Troubleshooting Section under Excessive Fluid Consumption for probable cause and remedy.

After a routine start has been made, a general check of the overall compressor should be made to assure that the compressor is running properly.

9.3 MOTOR BEARING LUBRICATION

⚠ 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.

See motor manufacturer's lubrication instructions.

9.4 FLUID FILTER MAINTENANCE

⚠ WARNING

Fluid filter has internal bypass. DO NOT SUBSTITUTE.

Replace the fluid filter element under any of the following conditions:

1. As recommended in the Lubrication Guide in the Specification Section.
2. Every year.
3. Every fluid change.
4. Refer to Lubricant Change table in Section 3.

9.5 COOLER MAINTENANCE

If cooler becomes restricted, use standard spray degreaser/cleaner and brush to clean cooler. Use air pressure to blow cooler clean. Care must be taken as not to damage cooler fins.

⚠ 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.

9.6 PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES

⚠ 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.

PRESSURE RELIEF VALVE

Check the relief valve at least weekly to see that it is functional. DO NOT tamper with the preset factory pressure setting of the valve. DO NOT plug the valve for any reason; should it leak, have it replaced.

FLUID FILTER REPLACEMENT

Refer to Figure 9–1.

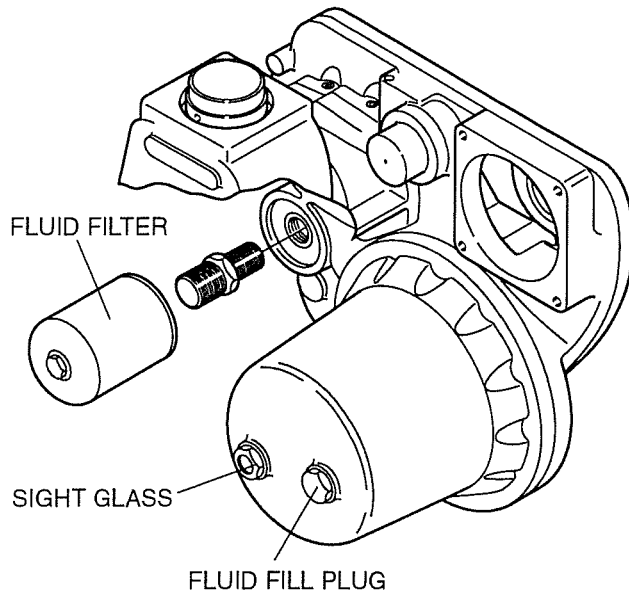
1. To prevent spillage and loss of reusable fluid, place a contaminant-free fluid receptacle beneath fluid drain valve and fluid filter.
2. Drain fluid by opening drain valve located beneath compressor (for complete fluid change, drain fluid from cooler).
3. Remove the old element and gasket.
4. Clean gasket seating surface.
5. Apply a light film of fluid to the new gasket.
6. Hand tighten new element until gasket is seated.
7. Continue tightening element an additional 1/2 to 3/4 turn.
8. Replace fluid. Fill sump to the bottom of the fluid fill plug hole. DO NOT OVERFILL.
9. Restart compressor and check for leaks.

AIR FILTER MAINTENANCE

Refer to Figure 9–2. Air filter maintenance should be performed every 6 months, 4000 hours, or more frequently if conditions so require.

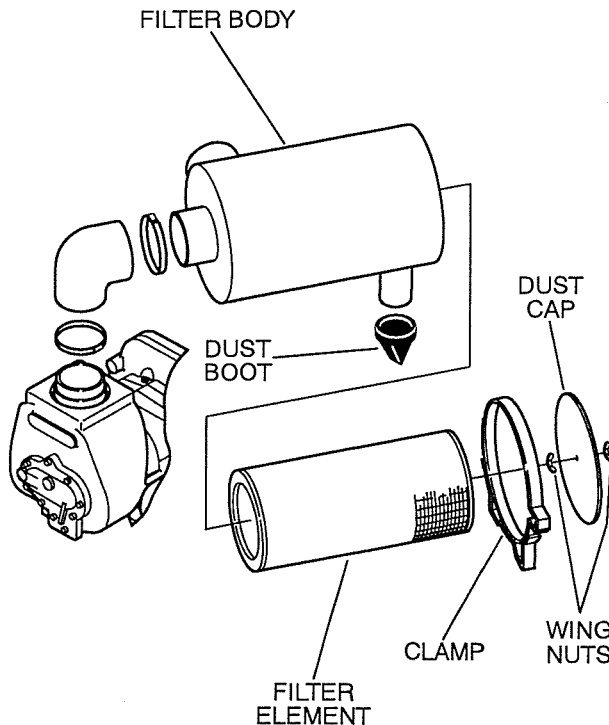
Section 9 MAINTENANCE – COMPRESSOR

Figure 9–1 Fluid Filter (P/N 250078–544)



Replacement Element Kit P/N 02250083–656

Figure 9–2 Air Filter



Replacement Element Kit P/N 02250087–420

⚠ 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.

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 locate 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 (if necessary) all air inlet connections prior to resuming operation.

FLUID SEPARATOR ELEMENT REPLACEMENT

Refer to Figure 9–3. Check maintenance schedule in Section 4. Follow the procedure explained below for element replacement.

⚠ 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.

1. Remove the separator maintenance gauge line and fluid return line from their connections, if equipped.
2. Remove the 4 capscrews that secure the separator housing to the compressor. Remove housing.
3. Remove old separator element and o-ring.
4. Clean all surfaces. Install new element and o-ring into compressor main housing.
5. Install new o-ring on the separator housing and attach separator housing to compressor main housing using the 4 capscrews. Torque capscrews to 148 ft. lb. (200 Nm).
6. Replace the separator maintenance gauge line and fluid return line from their connections, if equipped.

MOISTURE SEPARATOR ELEMENT REPLACEMENT

The moisture separator element should be changed every 4000 hours or when the pressure differential across the filter unit exceeds 10 psig (.7 bar).

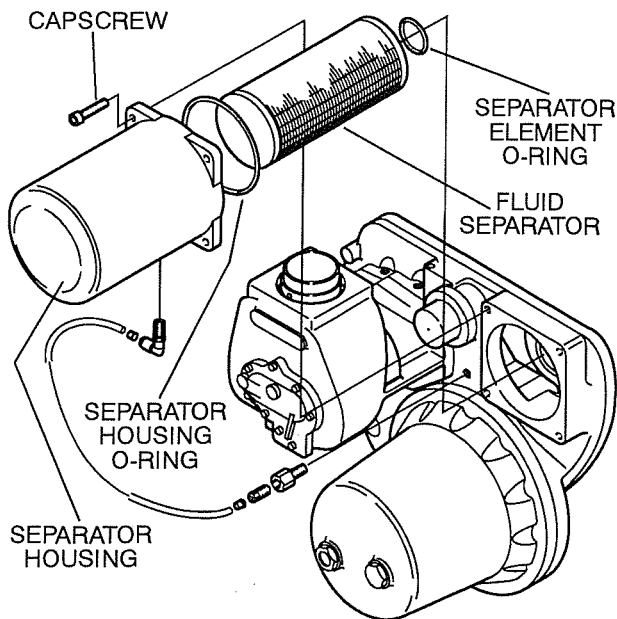
⚠ WARNING

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.

Section 9

MAINTENANCE – COMPRESSOR

Figure 9-3 Separator Element (P/N 02250091-385)



Replacement Element Kit P/N 02250083-659

1. Remove the separator gauge line, from its connection, if equipped.
2. Unscrew and remove the threaded bowl and bowl seal.
3. Unscrew lower baffle and remove filter element and gaskets (2).
4. Clean all internal parts before reassembling.
5. Install element and gaskets (2).
6. Attach lower baffle and tighten firmly.
7. Replace bowl seal.
8. Screw bowl into body and tighten firmly.

NOTE

Be certain to connect a water drain line, leading away from compressor, at the moisture drain outlet located on the side of the compressor package below compressor air discharge pipe.

CONTROL SYSTEM ADJUSTMENT

STANDARD ELECTRO/MECHANICAL

Refer to Figure 9-4. 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 100 to 110 psig (6.9 to 7.6 bar). This information will apply to a compressor with any other operating range excepting the stated pressures.

Remove the cover of the pressure switch, pressure regulator and inlet valve as required. 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 110 psig (7.6 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 9-4).

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 (0.7 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 103 psig (7.1 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 103 psig (7.1 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 103 psig (7.1 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 110 psig. (7.6 bar), 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.

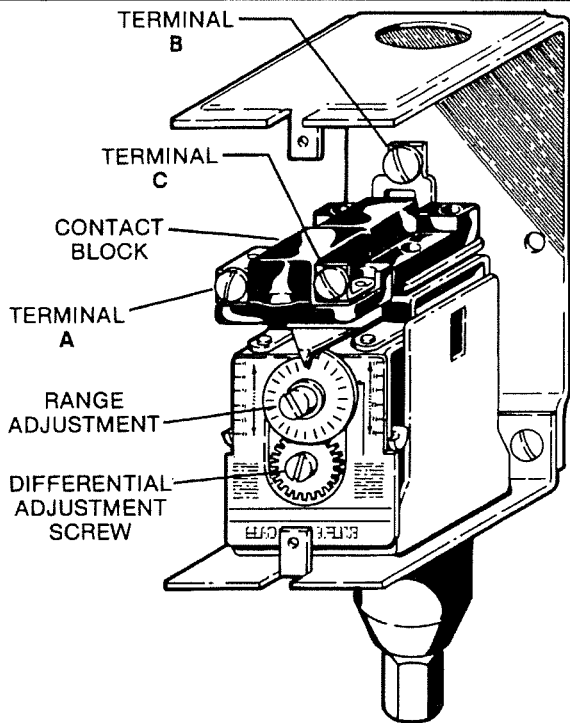
Section 9

MAINTENANCE – COMPRESSOR

- Open the service valve so the line pressure is 100 psig (6.9 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 110 psig (7.6 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 electrician’s tape to make sure that it does not come in contact with any metallic surface.

Figure 9–4 Pressure Switch (P/N 040694)



⚠ 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.

⚠ 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.

CONTROL SYSTEM ADJUSTMENT

SUPERVISOR II

All components in the Control System are designed and manufactured to close tolerances to help eliminate any need for adjustments.

⚠ DANGER

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

PRESSURE VALVE ADJUSTMENT

SUPERVISOR II

If pressure valve adjustment is required the adjustment procedure below should be followed:

- Start compressor.
- Lower line pressure (P_2) until machine goes on load.
- Loosen hex nut on the regulator valve to adjust machine modulation. Adjust screw in or out until on load/off load modulation of compressor takes place.
- Close service valve downstream from receiver tank. The pressure will increase depending on the regulator valve adjustment screw setting. Adjust screw until line pressure (P_2) rises to the Supervisor II preprogrammed off load setting. Tighten hex nut.
- Open service valve and observe correct on load/off load modulation.

INLET CONTROL VALVE

Refer to Figure 9–5. The inlet control valve normal maintenance requires only the replacement of the o-rings. Use repair kit no. 02250083–661 and follow the procedure below for proper disassembly and assembly procedures.

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MAINTENANCE – COMPRESSOR

⚠ WARNING

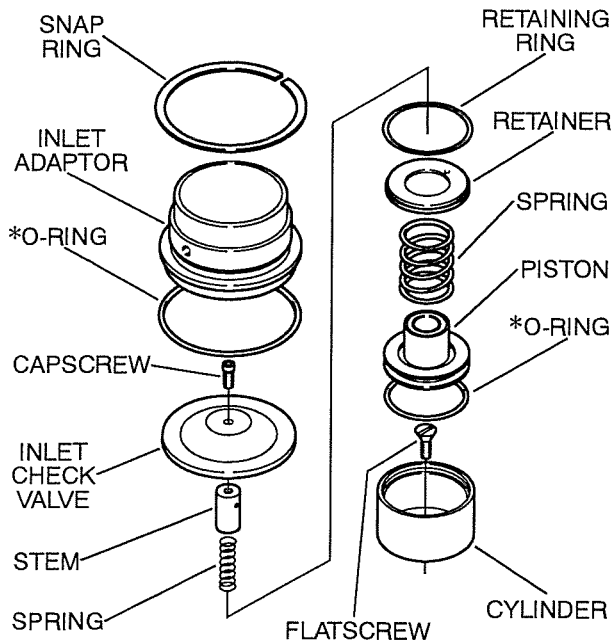
Before doing compressor maintenance, disconnect compressor from power source and lock out power source. Isolate compressor from line pressure by closing recommended discharge shut-off valve and releasing all internal pressure from compressor.

⚠ WARNING

Assure that line pressure gauge on compressor indicates "ZERO" pressure before any work is done. Failure to comply can cause injury.

1. Remove access panels and air filter.
2. Identify and tag plastic lines connected to the inlet adapter and disconnect.
3. Remove snap ring.
4. Remove inlet adapter and o-ring.
5. Remove inlet valve and spring.
6. Remove retaining ring.

Figure 7-5 Inlet Control Valve



* Repair Kit P/N 02250083-661

NOTE

While removing the snap ring, push the spring retainer down to overcome the force created by the spring.

7. Remove retainer, piston and spring.
8. Inspect and clean all parts.
9. Oil and install new piston o-ring; reinstall piston spring and retainer. Secure with retaining ring.
10. Reinstall inlet valve and spring.
11. Oil and install o-ring. Install inlet adapter; secure with snap ring.

NOTE

After installation, make sure the snap ring is properly seated into the groove.

12. Reconnect the plastic lines to the appropriate fittings on the inlet adapter.
13. Reassemble other parts removed earlier.

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 Section 12. 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 filter support bracket 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 main compressor body hole.

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

⚠ WARNING

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

Section 9

MAINTENANCE – COMPRESSOR

COMPRESSOR COOLER CLEANING – AIR-COOLED

Refer to Figure 9–6

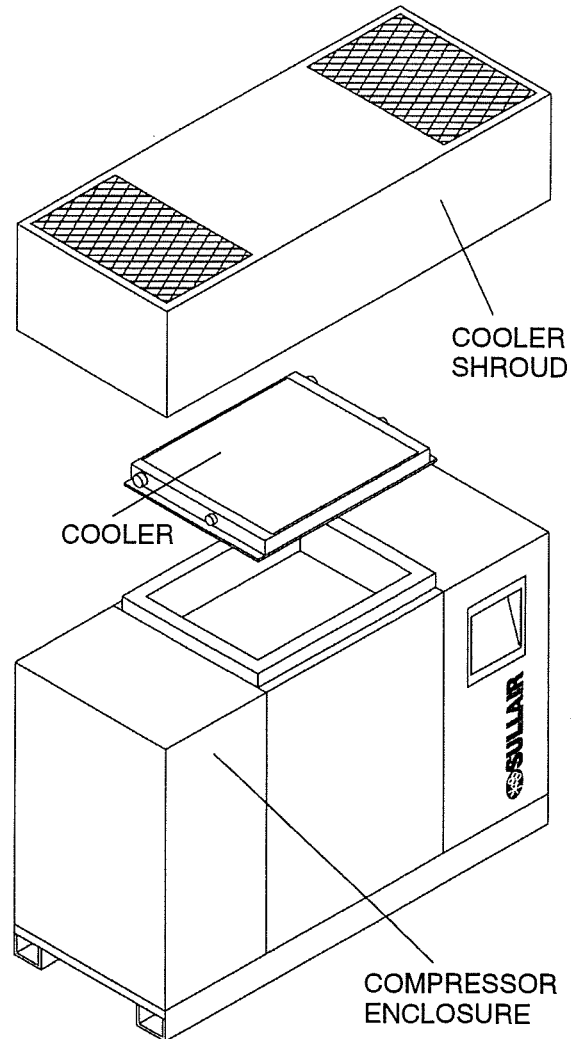
⚠ WARNING

Before doing compressor maintenance, disconnect compressor from power 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 9–6 Cooler Cleaning



NOTES

TROUBLESHOOTING – COMPRESSOR

10.1 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.

10.2 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.

Section 10

TROUBLESHOOTING – COMPRESSOR

10.2 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

Section 10

TROUBLESHOOTING – COMPRESSOR

10.2 TROUBLESHOOTING (Continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
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.

10.3 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.

10.4 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) Fluid Level in Sump is Too Low Thermal Valve Malfunctioned Cooler Fins are Dirty (air-cooled only) Water Flow is Low (water-cooled packages only) Water Temperature is High (water-cooled packages only) Cooler is Plugged (water-cooled packages only)	Improve local ventilation (i.e., remote intake of process and/or cooling air). Check/correct fluid level. Check/replace thermal valve. Clean cooler fins. Check cooling water supply (i.e., closed valves). Increase water flow, lower water temperature. 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.

Section 10

TROUBLESHOOTING – COMPRESSOR

10.4 TROUBLESHOOTING (Continued)

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

Section 10

TROUBLESHOOTING – COMPRESSOR

10.4 TROUBLESHOOTING (Continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
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.

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.

10.5 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

Section 11

MAINTENANCE AND TROUBLESHOOTING – DRYER

11.1 GENERAL

As you proceed in reading this section, it will be easy to see that Maintenance Program for the dryer is quite minimal. The use of service indicators will alert you when service maintenance is required. Checks on the dryer on a regular basis will help insure that all items are functioning properly.

11.2 ROUTINE MAINTENANCE

Check automatic condensate traps on a regular basis to insure that they are operating properly or the emulsion will back up into the compressed air system. Proper drain trap and valve maintenance is the owners responsibility and is not covered by the warranty.

The condenser fins may need to be periodically cleaned to remove dust, lint, etc., to assure efficient heat transfer. High head pressure or a visual check will determine the need for cleaning.

Check the gauge readings periodically for good

system operation.

11.3 TROUBLESHOOTING INTRODUCTION (DRY-ER)

Before working on the refrigerant system, read the Safety Section 1.3 pertaining to pressure.

The dryer consists of three basic systems: Air, Refrigerant, and Electrical. An air leak at 100 psig (6.9 bar) will provide an audible signal indicating where there is a problem; R-22 has no color or odor, therefore a small refrigerant leak is difficult to find. However, it can be detected by a bubble test, halide torch (with a flame which changes from red-orange to blue on contact with refrigerant) or an electrical detector.

The electrical system consists of transformers, starters, switches, relays, etc. The use of a volt-ohm meter or similar equipment is required for checking continuity, amperage and voltage.

11.4 TROUBLESHOOTING – DRYER

SYMPTOM	PROBABLE CAUSE	REMEDY
UNIT DOES NOT RUN	No Line Voltage	Follow wiring diagram and check voltage from compressor terminal to the power source to find where the circuit was interrupted. Inspect electrical components such as switches, controls, motors, transformers, etc. The supply power voltage, frequency and phase must coincide with unit's nameplate.
	Improperly Wired	Check wiring against wiring diagram and tighten any loose connection.
	Breaker Fuse or Tripped Circuit Breaker	Check for amperage draw of unit.
HEAD PRESSURE TOO HIGH	Refrigerant Overcharge	Excess refrigerant; check unit's nameplate for total system refrigerant charge. Refrigerant overcharge may cause system not to perform properly and efficiently.
	Condenser Fouled and Dirty	Dismantle and clean condenser. Clogged fins in air-cooled condenser will reduce heat transfer efficiently. Fins should be periodically checked and cleaned.
	Defective Fan Control Switch	Fan control cuts in at 215 psig (14.8 bar) and cuts out at 170 psig (11.7 bar). Replace.
	Defective Fan Motor	Replace.
	Dryer Location Too Hot (high ambient)	Cool ambient or relocate the unit (see Section 4.2 Mounting of Integral Compressor/Dryer).
	Compressed Air Leaks to Refrigerant	Evacuate, repair leak and recharge with refrigerant. System. Repair or replace evaporator.

Section 11 MAINTENANCE AND TROUBLESHOOTING – DRYER

11.4 TROUBLESHOOTING – DRYER (continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
HEAD PRESSURE TOO LOW	Low Ambient Temperature	Increase ambient temperature. If ambient temperature is too low, dryer freeze-up can take place. Add some type of head pressure control.
	Refrigerant Shortage	Check for leaks in system; repair and recharge with proper amount—see Section 3, Specifications.
	Defective Fan Control Switch	Replace. Fan should cut out at 170 psig (11.7 bar).
SUCTION PRESSURE TOO LOW	Hot Gas Bypass Valve Out of Adjustment or Defective	Adjust or replace. Turn clockwise to increase suction pressure; See Section 8.5 for normal operating conditions.
	Refrigerant Shortage	Add enough refrigerant to maintain desired suction pressure. Also check amperage draw.
	Excessive Pressure Drop in High Side	Check for any restriction (plugged filter dryer). Suction pressure should be steady and vary only 1 to 3 psig (0.07 to 0.2 bar) from high to low at this condition.
	Head Pressure Too Low Due to Defective Fan Control Switch	Replace.
SUCTION PRESSURE TOO HIGH	Hot Gas Bypass Valve Out of Adjustment or Defective	Turn counterclockwise to lower suction pressure to desired reading. Compressed air dewpoint will rise as the suction pressure increases.
	Refrigerant Overcharge	Excess refrigerant; check unit's nameplate for total system refrigerant charge. Refrigerant overcharge may cause system not to perform properly and efficiently.
WATER IN THE COMPRESSED AIR SYSTEM	Drain Traps Clogged	Disassemble and clean traps to restore free flow of drainage. Check drain lines. Automatic drain traps are ballfloat type and do not need priming. They should be disassembled and cleaned after two weeks of operation.
	Improperly Set or Malfunctioning Hot Gas Bypass Valve, or Cycling Switch	Will be indicated by suction pressure being too high. Adjust or replace.
	Ambient Temperature is Too High	Reduce ambient or improve ventilation.

ILLUSTRATIONS AND PARTS LIST

12.1 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) 874-1805 (Service)

SULLAIR ASIA, LTD.
 Chiwan Supply Base
 Bldg A5-1 Chiwan
 Shenzhen, Guangdong PRV.
 P.R.C. Post Code 518068
 Telephone: 755-6694982
 FAX: 755-6694313

SULLAIR EUROPE, S.A.
 Chemin de Genas BP 639
 69800 Saint Priest, France
 Telephone: 33-72232425
 FAX: 33-78907168

12.2A RECOMMENDED SPARE PARTS LIST – ES-11 COMPRESSOR

DESCRIPTION	KIT NUMBER	QUANTITY
repair kit for fluid filter	02250083-656	1
repair kit for air/fluid separator	02250083-659	1
repair kit for air filter	02250087-420	1
repair kit for shaft seal	02250087-455	1
tool kit, shaft seal	02250087-456	1
replacement element for thermal valve 185°F (85°C)	02250087-457	1
replacement element for thermal valve 195°F (91°C)	02250090-838	1
répair kit for blowdown valve 250025-655	250031-772	1
repair kit for pressure regulator valve 250017-280	250019-453	1
repair kit for inlet control valve	02250083-661	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/check valve	02250087-458	1
repair kit for moisture separator 02250078-841	02250087-423	1
drain kit for moisture separator 02250078-841	02250087-422	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.

Section 12

ILLUSTRATIONS AND PARTS LIST

12.2B RECOMMENDED SPARE PARTS LIST – DRYER

DESCRIPTION	KIT NUMBER	QUANTITY
repair kit for moisture separator 02250078–841	02250087–423	1
drain kit for moisture separator 02250078–841	02250087–422	1
repair kit for MPF–300 02250081–750	250024–427	2
repair kit for regulator valve 250017–280	250019–453	1
repair kit for blowdown valve 250025–655	250031–772	1
repair kit for solenoid valve 250030–164	250038–849	1
replacement coil for solenoid valve 250030–164	250035–292	1

12.2C RECOMMENDED SPARE PARTS LIST – CONDENSING UNIT

DESCRIPTION	KIT NUMBER	QUANTITY
compressor	02250061–502	1
fan motor	250033–895	1
fan blade	406112	1
condenser	250033–907	1

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

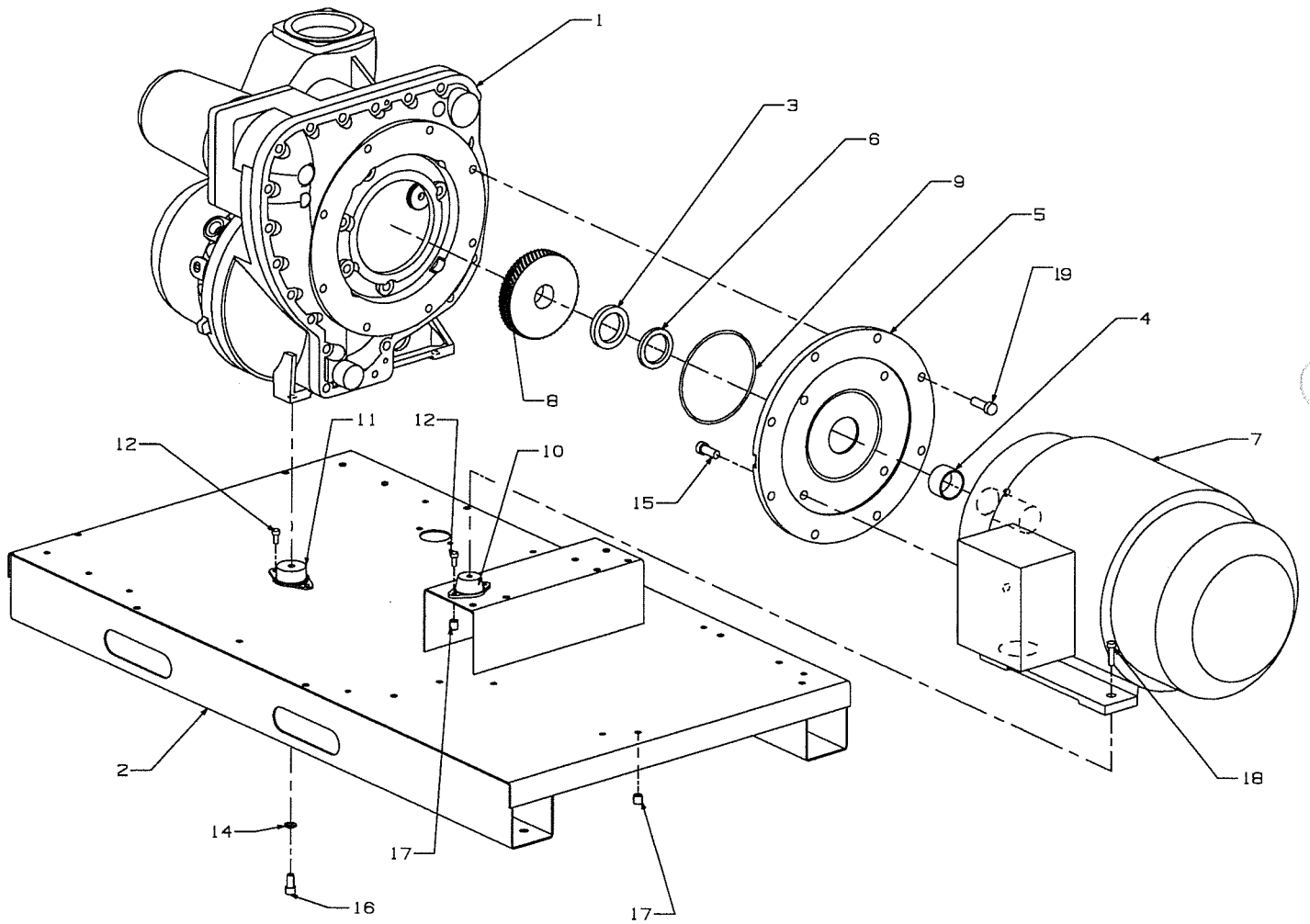
ILLUSTRATIONS AND PARTS LIST

NOTES

Section 12

ILLUSTRATIONS AND PARTS LIST

12.3 FRAME, MOTOR, COMPRESSOR AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.3 FRAME, MOTOR, COMPRESSOR AND PARTS

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	unit, compressor	02250085-319	1
2	frame, assembly main	02250084-321	2
3	seal, shaft (double lip) (I) (II)	02250078-044	1
4	sleeve, wear (I) (II)	02250078-472	1
5	housing, es11 adapter	02250075-043	1
6	seal, shaft (single lip) (I) (II)	02250077-851	1
7	motor, drive	Consult factory	1
8	gear,drive	Consult factory	1
9	o-ring	826502-366	1
10	isolator, vibration	02250085-254	2
11	isolator, vibration	02250085-255	2
12	screw	829705-075	8
13	screw	829316-040	8
14	washer, lock	838812-250	2
15	capscrew,gr5	828610-150	4
16	capscrew	828012-076	2
17	insert, steel	02250043-765	32
18	screw	829706-150	2
19	screw	829316-045	8

(I) For maintenance on ES-11 shaft seal, order tool kit part number 02250087-456 (Note: Items not sold separately).

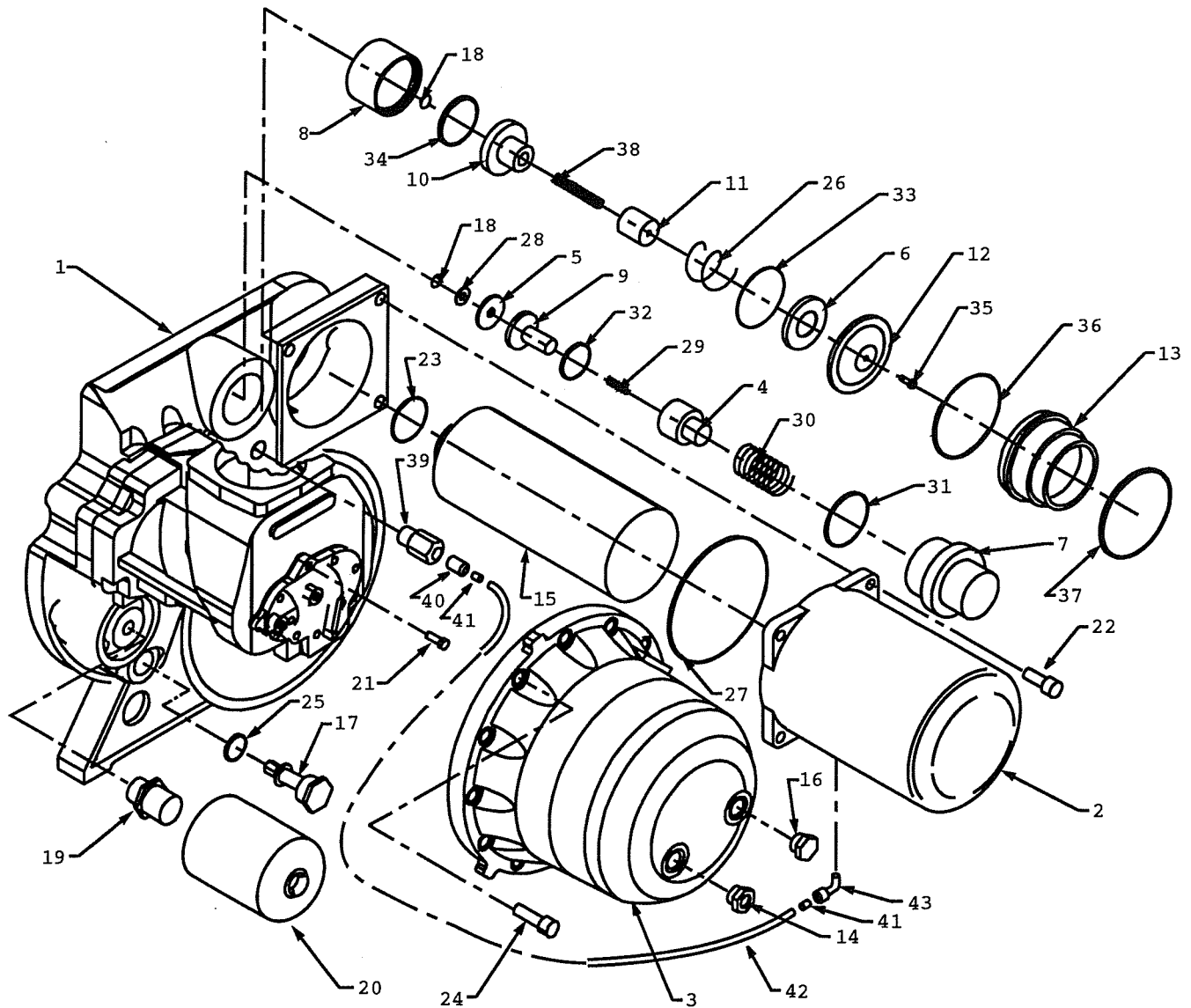
(II) For maintenance on ES-11 shaft seal, order repair kit part number 02250087-455 (Note: Items not sold separately).

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.4 COMPRESSOR AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.4 COMPRESSOR AND PARTS

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	unit, assembly (I) (II) (VI)	Consult factory	1
2	cover,separator	02250086-168	1
3	housing, bell	02250064-668	1
4	piston	02250075-038	1
5	seat	02250075-042	1
6	retainer	02250073-424	1
7	cap	02250064-663	1
8	cylinder,inlet valve	02250073-422	1
9	stem	02250075-037	1
10	piston	02250073-423	1
11	stem	02250073-668	1
12	valve,inlet check	02250073-425	1
13	adapter,inlet	02250078-381	1
14	sight, glass	250025-420	1
15	element,separator (III)	02250091-385	1
16	plug, fluid fill	250039-359	1
17	valve, thermal 185°F (85°C) (IV)	02250078-204	1
	•valve, thermal 195°F (91°C) (V)	02250092-081	1
18	screw	865010-012	2
19	adapter, oil filter	0225077-706	1
20	element	02250078-544	1
21	screw	829310-025	9
22	screw	829316-045	4
23	o-ring	826502-144	1
24	screw	829316-055	12
25	o-ring	02250078-405	1
26	spring,piston	02250064-666	1

(Continued on page 57)

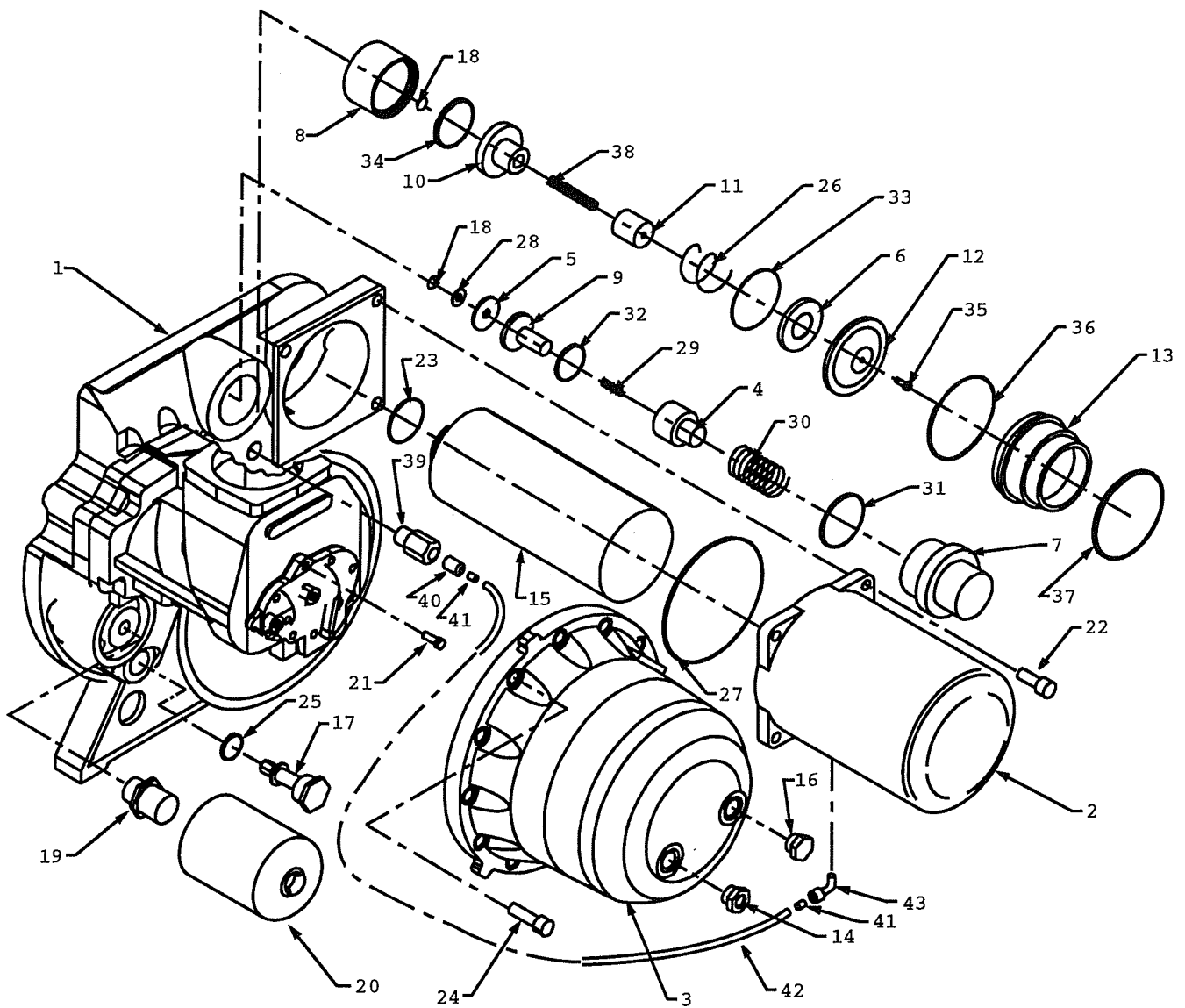
- (I) For maintenance on minimum pressure valve, order kit no. 02250087-458 (Note: Items not sold separately).
- (II) For maintenance on inlet control valve, order kit no. 02250083-661 (Note: Items not sold separately).
- (III) For maintenance on separator element, order kit no. 02250083-659.
- (IV) For maintenance on thermal valve part no. 02250078-204, order kit no. 02250087-457.
- (V) For maintenance on thermal valve part no. 02250090-839, order kit no. 02250090-838.
- (VI) Consult Factory for unit assembly exchange program,

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.4 COMPRESSOR AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.4 COMPRESSOR AND PARTS (cont.)

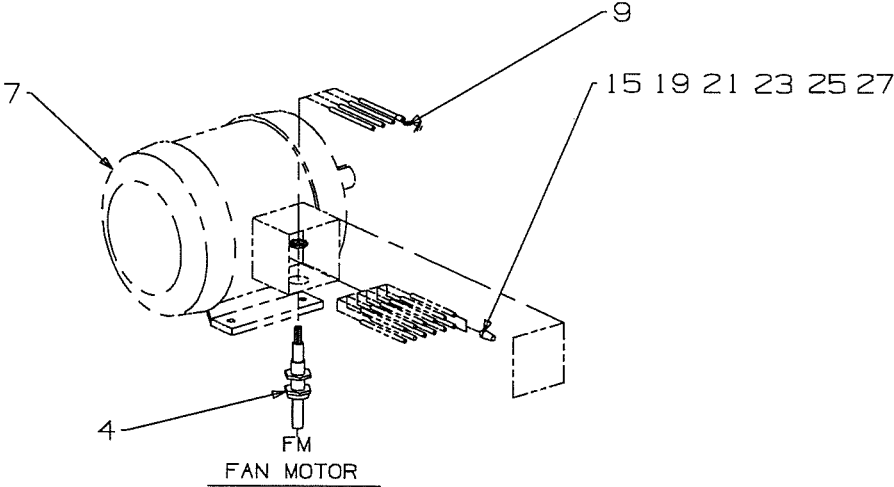
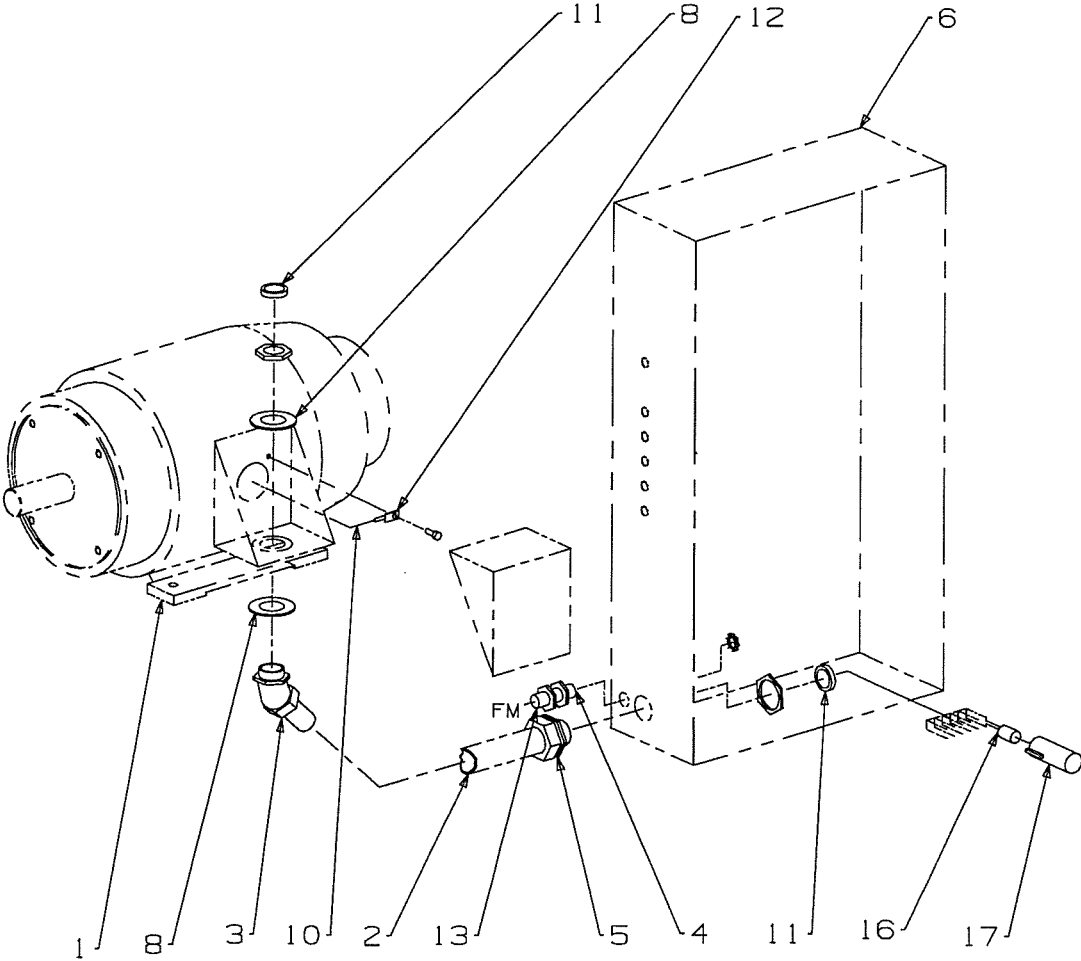
<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
27	o-ring	826502-263	1
28	washer	837206-071	1
29	spring	02250077-764	1
30	spring	02250077-765	1
31	o-ring	826502-234	1
32	o-ring	826502-226	1
33	ring,retaining	02250064-664	1
34	o-ring	826502-334	1
35	screw	829306-016	1
36	o-ring	826502-248	1
37	ring,retaining-inlet	836369-500	1
38	spring,check	02250064-665	1
39	orifice	02250091-395	1
40	connector	250025-859	1
41	insert	02250052-841	2
42	hose, nylon	842215-004	1
43	elbow	250025-842	1

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.5 MOTOR, AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.5 MOTOR AND PARTS

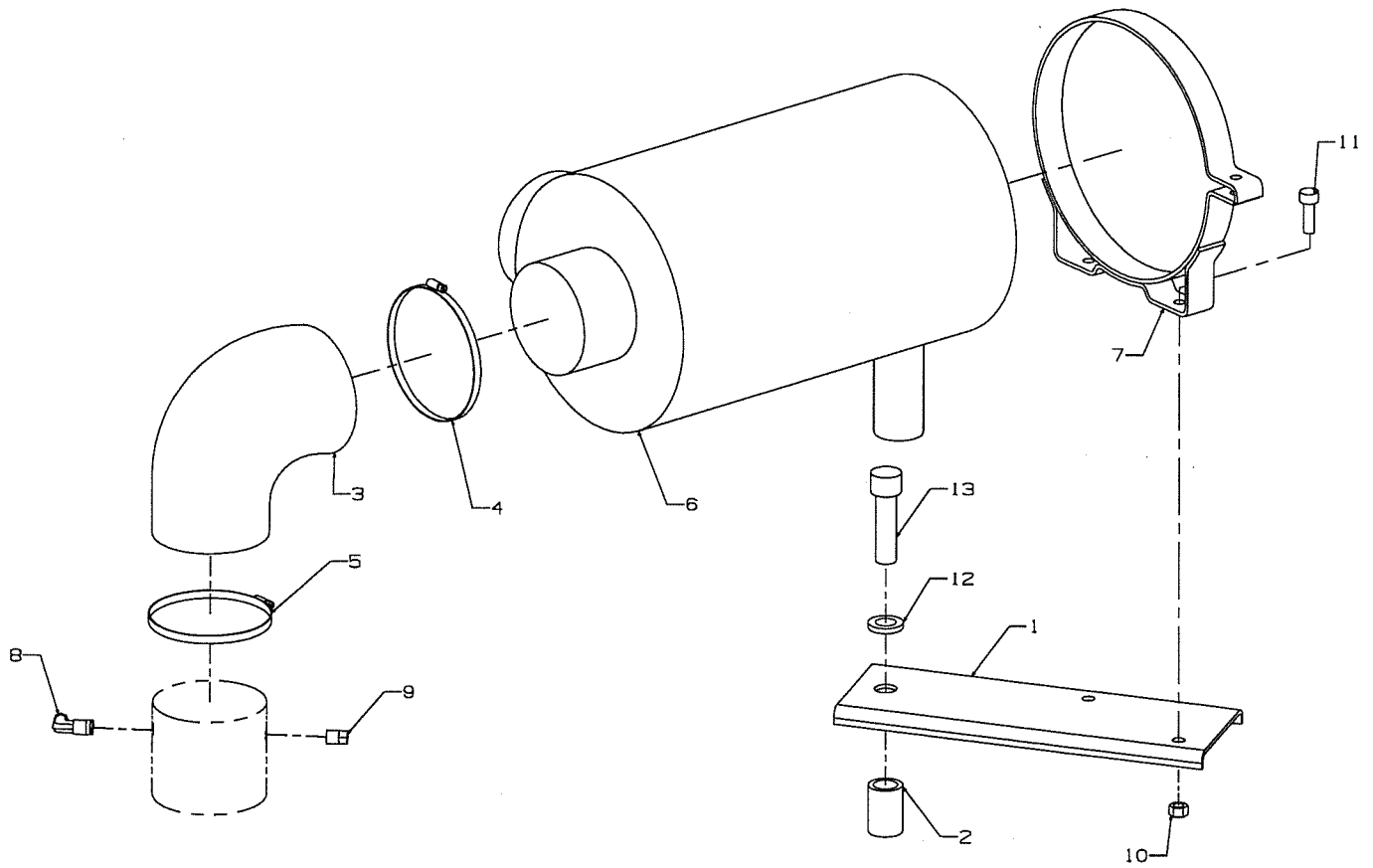
<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	motor, main drive	Consult factory	1
2	conduit	846315-150	1
3	elbow	846500-150	1
4	cord grip	250018-497	2
5	fitting	846400-150	1
6	enclosure	Consult factory	1
7	motor, fan	Consult factory	1
8	washer, conduit	847008-060	2
9	ring, terminal	849304-010	1
10	wire	850215-010	2
11	bushing, conduit	848815-150	2
12	ring, terminal	849302-010	1
13	wire	850604-012	1
15	connector, wire yellow	851000-074	3
16	joint	250006-065	3
17	insulator, splice t&p mscl	250006-112	3
19	connector, wire yellow	851000-074	3
21	connector, wire yellow	851000-074	4
23	connector, wire yellow	851000-074	4
25	connector, wire yellow	851000-074	6
27	connector, wire yellow	851000-074	3

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.6 INLET FILTER AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.6 INLET FILTER AND PARTS

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	support,air filter	02250085-565	1
2	spacer,inlet filter	02250085-595	1
3	elbow,rubber	049307	1
4	clamp,hose	040642	1
5	clamp, hose	041993	1
6	filter,inlet (I)	02250085-253	1
7	band, mounting	040598	1
8	elbow	250025-849	1
9	plug, pipe	807800-005	1
10	nut	825305-283	2
11	screw	829705-100	2
12	washer	838816-350	1
13	capscrew, hx 8.8 m16 x 60mm (II)	828016-060	1

(I) For maintenance on air filter no. 02250085-253 order repair kit no. 02250087-420.

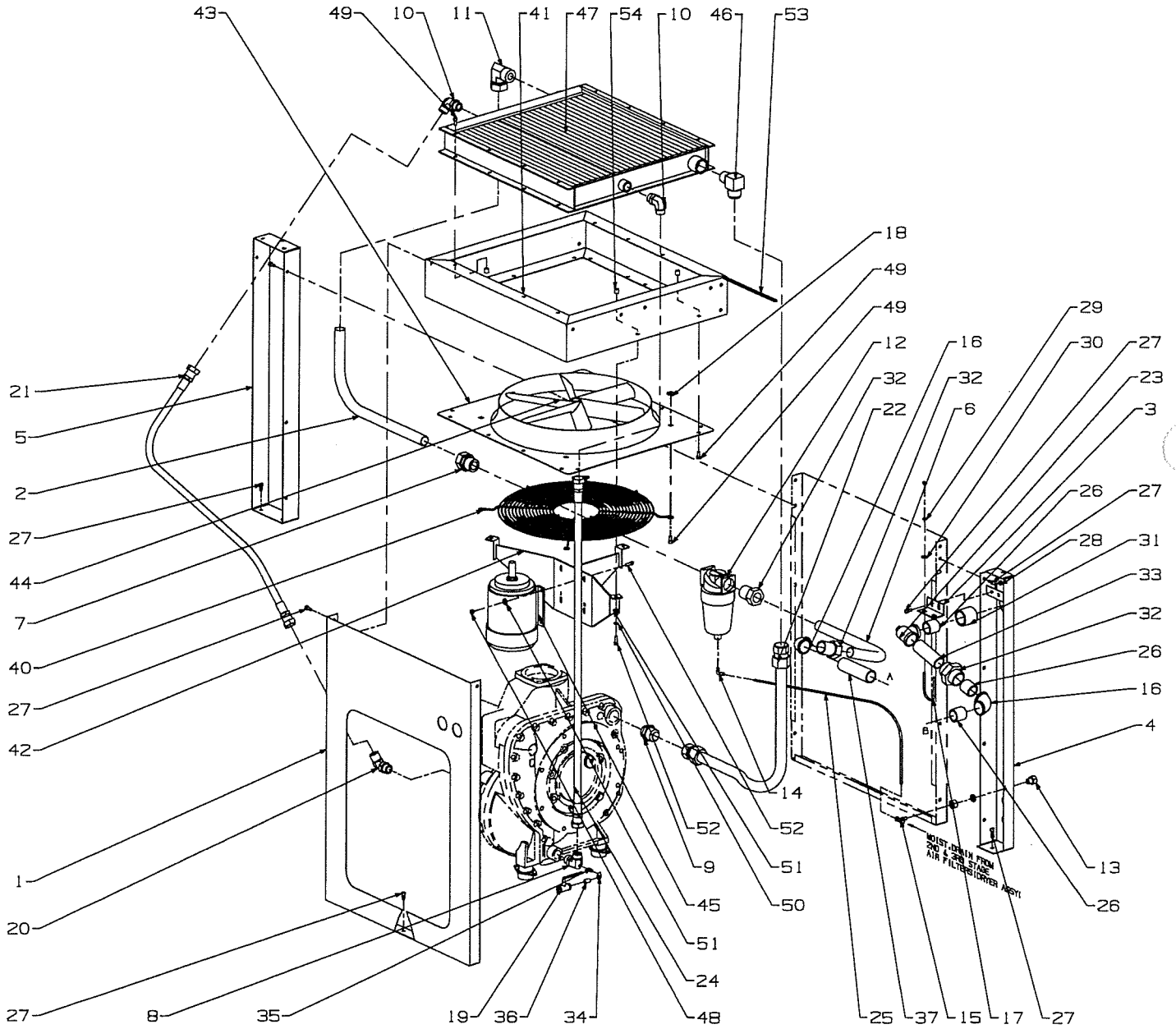
(II) NOTE: HOLE LOCATION FOR PRIMARY COMPRESSOR/MOTOR ASSEMBLY LIFTING DEVICE ATTACHMENT.

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.7 COOLING SYSTEM AND PARTS – AIRCOOLED



Section 12

ILLUSTRATIONS AND PARTS LIST

12.7 COOLING SYSTEM AND PARTS – AIRCOOLED

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	panel, front •standard •deluxe •Supervisor II	02250084-224 02250084-283 02250083-892	1 1 1
2	tube,clr – moist sep es11–ststl	02250091-095	1
3	angle,air piping supt es11	02250086-227	1
4	panel, louver side 4" wide es11	02250085-868	2
5	panel,corner–comp.end rear	02250083-859	1
6	tube,1.5" moist sep to axa	02250088-260	1
7	connector, tube–m 1-1/2 x 1-1/2"	810224-150	4
8	elbow,90sae x orfs 1"w/.125npt	02250087-076	1
9	connector,37fl–sae 1-1/2 x 1-1/2	02250085-144	1
10	elbow, 90 sae x orfs 1.00"	02250087-070	2
11	elbow, tube–m 1-1/2 x 1-1/2"	810524-150	1
12	separator,moisture 1-1/2" (I)	02250078-841	1
13	bulkhead, pipe 1/4" npt	841500-004	1
14	elbow,90deg m–swvl 1/4x1/8"	250025-849	1
15	tee,m–br swvl 1/4t x 1/4p	250025-835	1
16	elbow,pipe galv 90 1-1/2"	803515-060	2
17	u–bolt,5/16 x 1-1/2" pipe	829005-150	1
18	nut,retainer–5/16"	861405-092	4
19	valve,ball 1/4" npt	047115	1
20	elbow, 45 deg sae x orfs 1.00"	02250087-073	1
21	hose, medium pressure orfs f–swvl end 1	02250087-169	1
22	hose, medium pressure 250psi 1.5 x 46"	02250051-453	1
23	tee,red 1.5 x .5 x 1.5 galv	02250053-609	1
24	hose, medium pressure orfs f–swvl 1 x 5	02250087-166	1
25	tube,plastic 1/4" o.d. (ft)	250025-745	1
26	nipple,galv xs 1-1/2 x cls	823224-000	3
27	screw, ser wash 5/16x3/4"	829705-075	11
28	nut,hex flanged 5/16	825305-283	2
29	washer, lock reg 5/16"	837505-078	1
30	washer, pl b r 5/16"	837205-071	1

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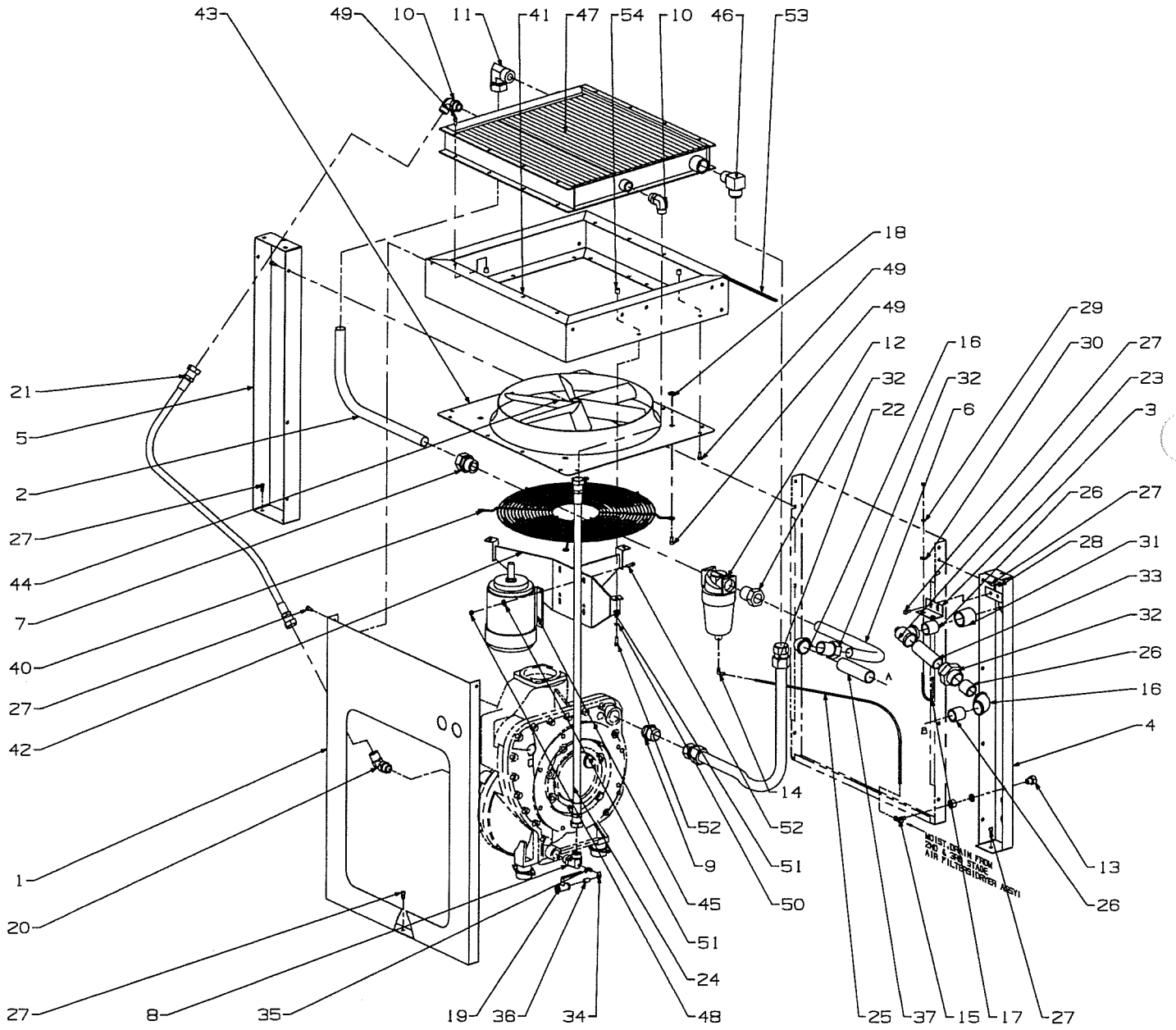
(I) For maintenance on moisture separator no. 02250078-841 order repair kit no. 02250087-423. For maintenance on moisture separator drain, order repair kit no. 02250087-422.

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.7 COOLING SYSTEM AND PARTS – AIRCOOLED



Section 12
ILLUSTRATIONS AND PARTS LIST

12.7 COOLING SYSTEM AND PARTS – AIRCOOLED (cont.)

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
31	coupling, pipe galv 1–1/2"	803215–060	1
32	union, pipe galv 1–1/2"	802315–060	1
33	nipple, galv–xs 1–1/2 x 5.0	823124–050	1
34	elbow, red 1/4x1/8 150#	801601–005	1
35	nipple, pipe 1/8 x cl sc 80	822202–000	1
36	nipple, pipe 1/4 x cl sc 80	822204–000	1
37	nipple, galv–xs 1–1/2 x 6.5	823124–065	1
38	connector, tube m 1 1/2 x 1 1/2	810224–150	4
40	guard, fan		
	• 22 in. (56 cm)	241501	1
	• 24 in. (61 cm)	241079	1
41	adapter, venturi/cooler	02250087–273	1
42	support, fan motor		
	• 2 hp (1.5kW)	02250087–475	1
	• 3 hp (2.2kW)	02250087–271	1
43	venturi, panel		1
	• 22 in. (56 cm)	02250087–272	1
	• 24 in. (61 cm)	250018–329	1
44	fan, cooling		
	• 22 in. (56 cm)	241390	1
	• 24 in. (61 cm)	049971	1
45	motor, fan	Consult factory	1
46	elbow	860224–150	1
47	cooler	02250081–393	1
48	nut	825505–166	4
49	screw	829705–075	24
50	washer, lock reg 5/16"	837505–078	3
51	washer, pl b r 5/16"	837205–071	7
52	capscrew, hx gr 5 5/16 x 1"	828605–100	7
53	weatherstrip, 3/16 x 3/8 ft.	250022–436	11
54	insert, 5/16" steel	02250043–765	42

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

Section 12
ILLUSTRATIONS AND PARTS LIST

12.9B CONTROL BOX AND PARTS – SUPERVISOR II

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	block, term deplug 07 20pt	02250051-765	1
2	harness, wire dx pwr reg	02250054-328	1
3	harness, wire dx ctl reg	02250054-329	1
4	plate,es11 aux pnl (bezel version)	Consult Factory	1
5	starter, assy	Consult Factory	1
6	gasket,es11 aux ctl pnl w/bezel	02250086-269	1
7	transducer, pressure 0 – 250psi 1-5vdc	02250078-933	3
8	grip, cord n4 .187 – .250 x 1/2”:	02250071-380	4
9	connector,male 1/4 tube x 1/4	250025-859	2
10	elbow,90deg swvl 1/4t x 1/4	250025-850	2
11	sw,pb oper red40mm push-twist	02250085-504	1
12	block, contact 1 n.c.	250027-125	2
13	block, contact aux ino-1nc mot/prot	02250057-765	1
14	start, man. motor prot.	Consult Factory	1
15	valve,blowdown 1/4” (I)	250025-655	1
16	grip, cord n4 .125 – .187 x 1/2”	02250071-379	2
17	controller,assy es11 super2 dlx 256k	02250083-801	1
18	locknut,cond seal n4 1/2”	02250071-362	2
19	bulkhead,pipe 1/8” npt	841500-002	3
20	sw,vac 22”wc n4 6ft cable	02250078-249	1
21	silencer, 1/4”	044916	1
22	terminal,ring tng 3/8 x 14-16	849306-014	1
23	sw,diff pr 20psid 12ft	02250050-154	1
24	orifice,1/4m x 1/4f x .094	250030-627	1
25	connector,male 1/4 tube x 1/8	250025-858	4
26	elbow,90deg m-swvl 1/4t x 1/8 npt	250025-849	3
27	conduit,flex 1/2” (ft)	846315-050	6
28	connector,straight liq-tite 1/2”	846400-050	1
29	switch, press 10 psi n.o.	250017-992	1
30	orifice,pipe plug 1/4” .031 id	232874	1

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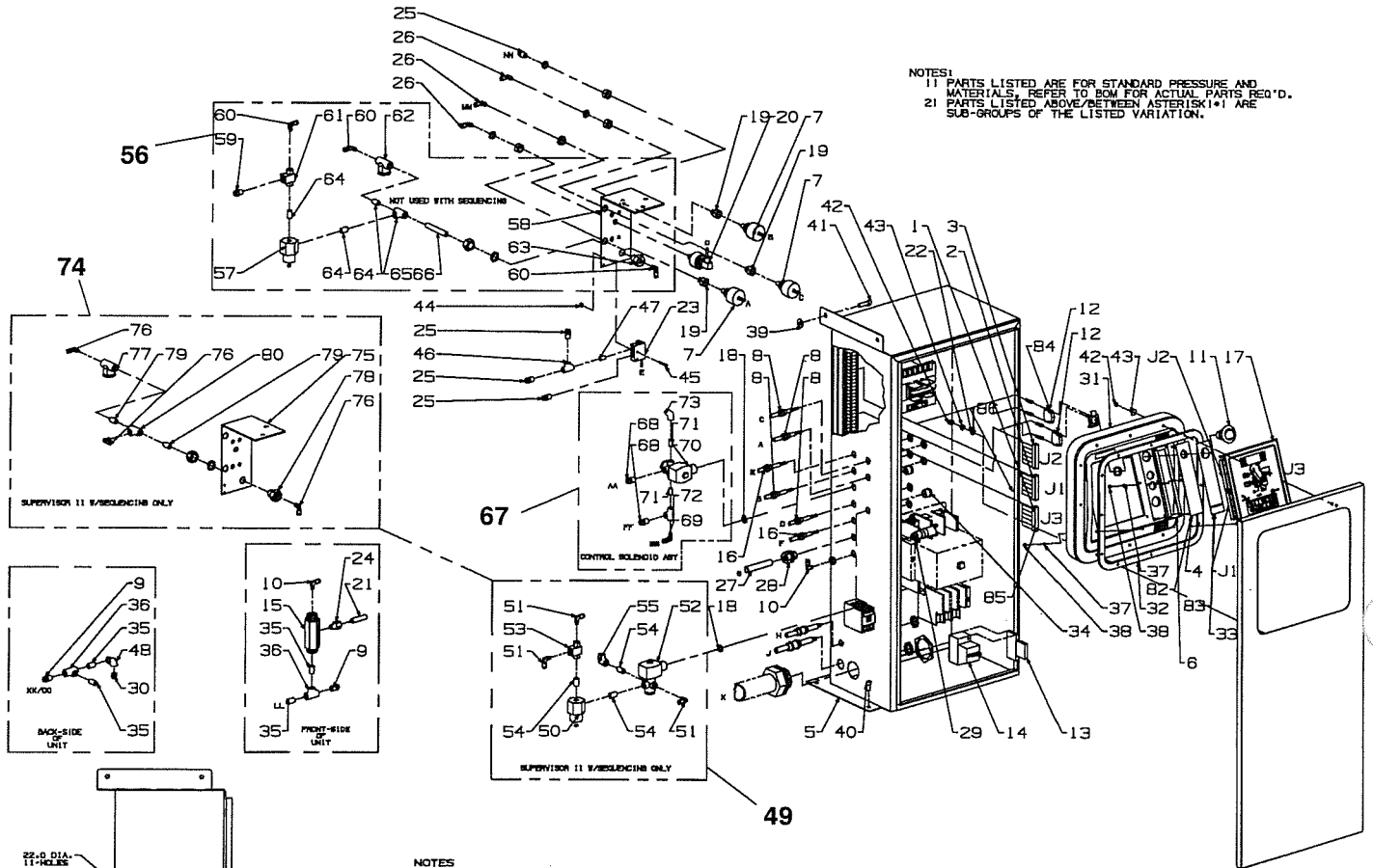
(I) For maintenance on blowdown valve no. 250025-655, order repair kit no. 250031-772.

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

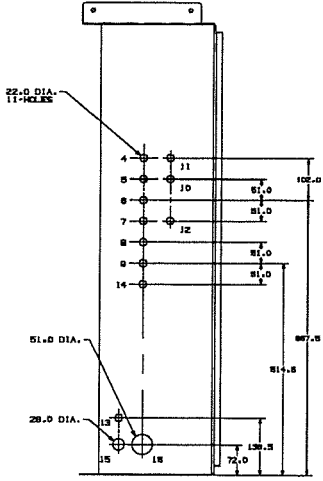
Section 12

ILLUSTRATIONS AND PARTS LIST

12.9B CONTROL BOX AND PARTS – SUPERVISOR II

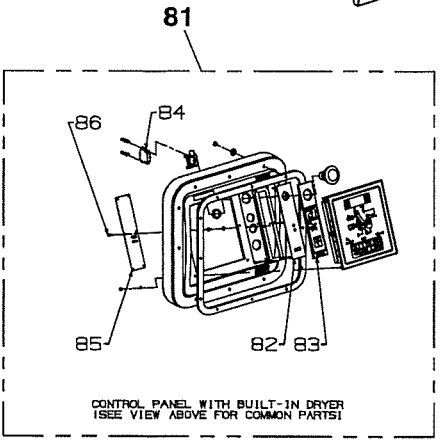


NOTES:
 11 PARTS LISTED ARE FOR STANDARD PRESSURE AND MATERIALS. REFER TO BOM FOR ACTUAL PARTS REQ'D.
 21 PARTS LISTED ABOVE/BETWEEN ASTERISK(*) ARE SUB-GROUPS OF THE LISTED VARIATION.



- 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 = RTD LEAD - TEMP. DISCHARGE
 G = ELECTRIC DRAIN VALVE
 H = W.C. COOLING FAN
 I = A.C. COOLING FAN
 K = MAIN MOTOR
2. TUBING CONNECTIONS:
 HH = TO WET SIDE OF SUMP
 LL = TO DRY SIDE OF SUMP
 KK/DD = TO BACK SIDE OF UNIT (INLET CTL VLV.)
 JJ = 'DELTA P' LOW SIDE OF OIL FILTER
 MM = 'DELTA P' HIGH SIDE OF OIL FILTER
 NN = TO INLET CONTROL VALVE
 PP = TO WATER PIPING (W.C. PACKAGE ONLY)

- 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



Section 12
ILLUSTRATIONS AND PARTS LIST

12.9B CONTROL BOX AND PARTS – SUPERVISOR II (cont.)

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
31	panel, central box bezel es11	02250089-302	1
32	gasket,es11 ctl pnl	02250090-872	1
33	decal,aux s2 w/o dryer	02250086-259	1
34	nipple,chase cond 1/2	847815-050	2
35	nipple,pipe 1/4 x cl sc 80 ga	823204-000	4
36	tee, pipe 1/4" galv	804415-010	2
37	washer, sprlock reg m4	838804-090	14
38	nut,hex metric m4 x .7	825904-070	14
39	washer, pl br 5/16"	837205-071	1
40	screw, ser wash 5/16x3/4"	829705-075	4
41	screw, ser wash 5/16-18 x 1-1/4	829705-125	2
42	nut,hex pltd sae #10-32	825801-130	13
43	washer, lock ext tooth 10	838402-025	13
44	nut,hex flanged #10	825301-219	2
45	screw, hx ser wash #10-24 x 1"	829702-100	2
46	tee, straight 1/8 galv	804415-005	1
47	nipple,pipe 1/8 x cl sc 80 ga	823202-000	1
48	elbow, pipe 1/4 galv	803515-010	1
49	sequencing valve variation		
50	valve, pressure regulator (II)	250017-280	1
51	elbow,90deg swvl 1/4t x 1/4	250025-850	3
52	valve,sol 3w no 150psi pnlmtd (III)	250038-674	1
53	valve,shuttle 1/4"	408893	1
54	nipple,pipe 1/4 x cl sc 80 ga	823204-000	3
55	elbow, pipe 1/4 galv	803515-010	1
56	assy for non-seq. operation		
57	valve, pressure regulator (II)	250017-280	1
58	supt, brkt press trans/switch	02250084-823	1
59	connector,male 1/4 tube x 1/4	250025-859	1
60	elbow,90deg swvl 1/4t x 1/4	250025-850	3

(Continued on page 71)

(II) For maintenance on pressure regular valve no. 250017-280, order repair kit no. 250019-453.

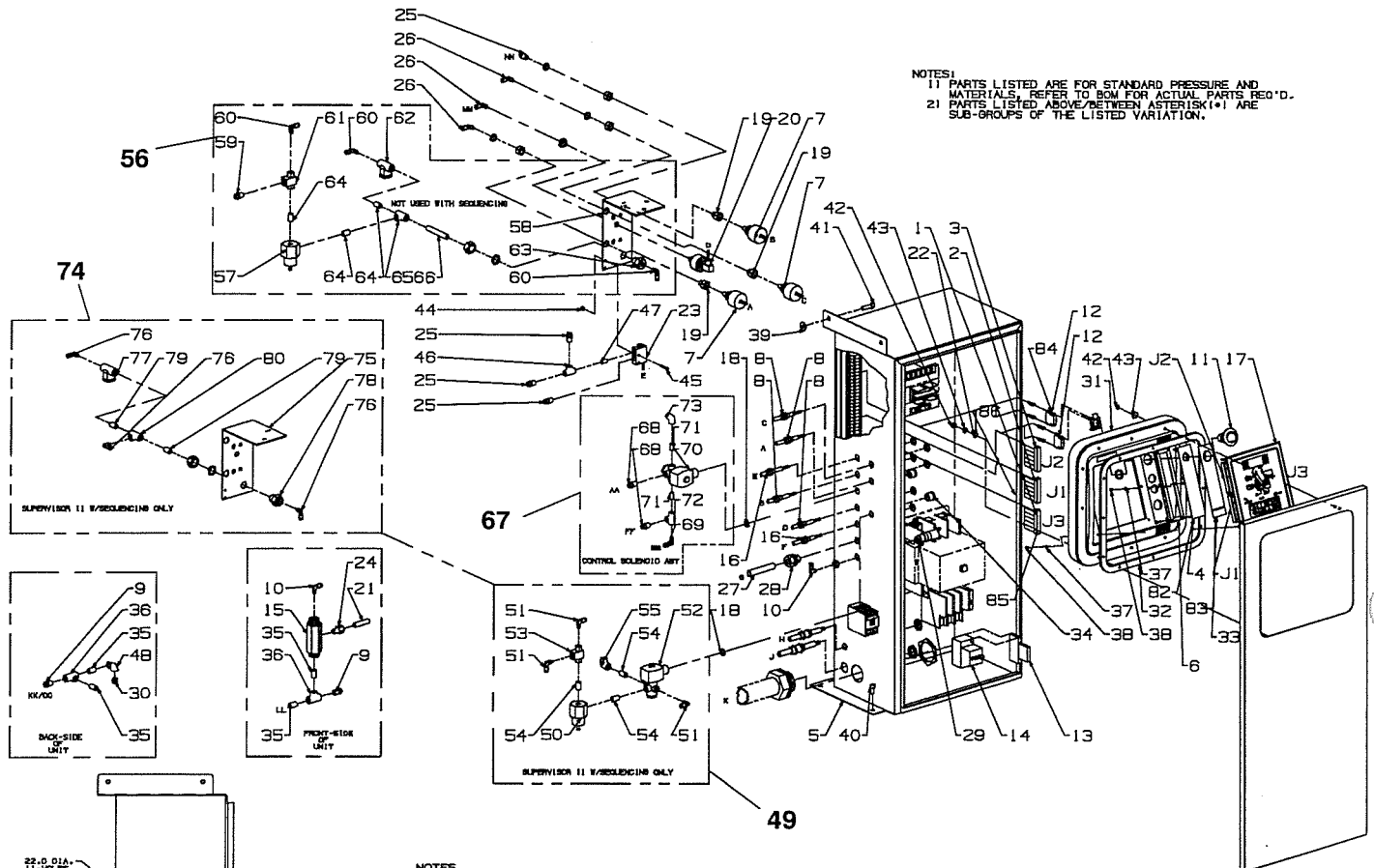
(III) For maintenance on solenoid valve no. 250038-674, order repair kit no. 02250055-940 and replacement coil no. 250031-738 .

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.9B CONTROL BOX AND PARTS – SUPERVISOR II



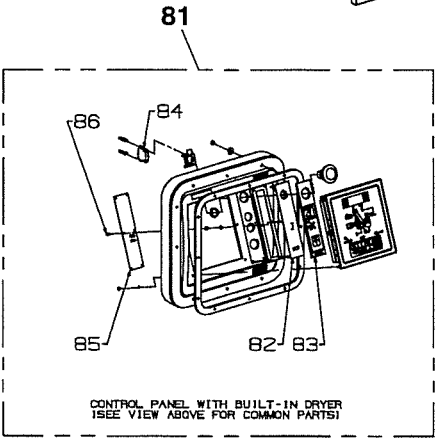
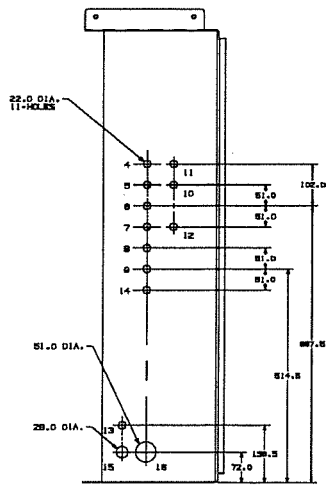
NOTES:
 1) PARTS LISTED ARE FOR STANDARD PRESSURE AND MATERIALS; REFER TO BOM FOR ACTUAL PARTS REQ'D.
 2) PARTS LISTED ABOVE/BETWEEN ASTERISKS(*) ARE SUB-GROUPS OF THE LISTED VARIATION.

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
 - I = A.C. COOLING FAN
 - K = MAIN MOTOR
2. TUBING CONNECTIONS:
 - HH = TO WET SIDE OF SUMP
 - LL = TO DRY SIDE OF SUMP
 - KK/DD = TO BACK SIDE OF UNIT (INLET CTL VLV.)
 - J1 = 'DELTA P' LOW SIDE OF OIL FILTER
 - J2 = 'DELTA P' HIGH SIDE OF OIL FILTER
 - NN = TO INLET CONTROL VALVE
 - PP = LINE PRESSURE
 - QQ = TO WATER PIPING (W.C. PACKAGE ONLY)

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



ILLUSTRATIONS AND PARTS LIST**12.9B CONTROL BOX AND PARTS – SUPERVISOR II (cont.)**

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
61	valve,shuttle 1/4"	408893	1
62	strainer,v-type 300psi 1/4" (IV)	241771	1
63	bulkhead,pipe 1/4" npt	841500-004	1
64	nipple,pipe 1/4 x cl sc 80 ga	823204-000	3
65	tee, pipe 1/4" galv	804415-010	1
66	nipple,galv 1/4 x 3-1/2"	823104-035	1
67	std pneumatic assy		
68	connector,male 1/4 tube x 1/4	250025-859	2
69	elbow,90deg swvl 1/4t x 1/4	250025-850	1
70	valve,sol 3w no 150psi pnlmtd (III)	250038-674	1
71	nipple,pipe galv 1/4 x cls sch 80	823204-000	2
72	tee, pipe 1/4" galv	804415-010	1
73	elbow, pipe 1/4 galv	803515-010	1
74	seq. variation assy		
75	supt, brkt press trans/switch	02250084-823	1
76	elbow,90deg swvl 1/4t x 1/4	250025-850	3
77	strainer,v-type 300psi 1/4" (IV)	241771	1
78	bulkhead,pipe 1/4"	841500-004	1
79	nipple,pipe 1/4 x cl sc 80 ga	823204-000	2
80	tee, pipe 1/4" galv	804415-010	1
81	bezel ctl pnl for dryer var.		
82	plate,es11 aux pnl s2 w/dryer	02250086-268	1
83	keypad,es11 s2 dryer ctl	02250086-264	1
84	block, contact 1 n.c.	250027-125	1
85	board, pc dryer control(es11)	02250088-098	1
86	nut,hex metric m4 x .7	825904-070	6

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

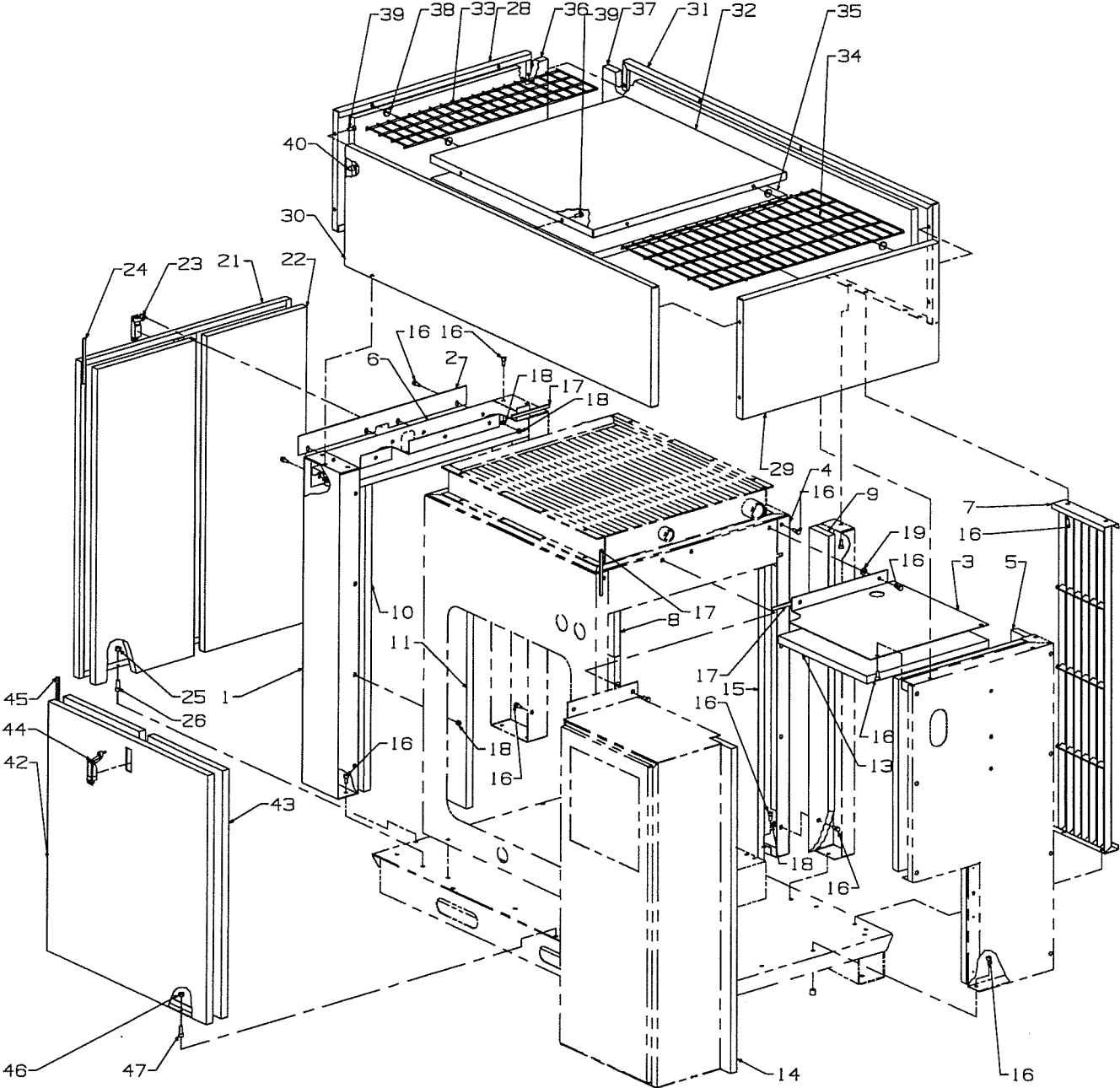
(IV) For maintenance on strainer no. 241771, order repair kit no. 241772.

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.10 CANOPY, ACOUSTICAL PANELS & PARTS – AIRCOOLED



ILLUSTRATIONS AND PARTS LIST

12.10 CANOPY, ACOUSTICAL PANELS & PARTS – AIRCOOLED

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	panel,corner—comp.end front	02250083—858	1
2	panel,seal plate—comp end—es11	02250091—256	1
3	panel, top—motor end	02250085—252	1
4	panel,clr supt. assy rear	02250083—863	1
5	panel,acoustical insulation	02250081—399	1
6	panel,top—comp.end—es11 ac	02250091—236	1
7	panel,louver assy—rear	02250084—344	1
8	panel,acoustical insulation	02250084—763	1
9	panel,acoustical insulation	02250081—401	1
10	panel,acoustical insulation	02250084—758	2
11	panel,acoustical insulation	02250084—761	2
12	panel,acoustical insulation	02250081—396	1
13	panel,acoustical insulation	02250081—477	1
14	panel,acoustical insulation	02250081—400	1
15	panel,acoustical insulation	02250081—395	1
16	screw, ser wash 5/16x3/4"	829705—075	45
17	weatherstrip,3/16 x 3/8 ft.	250022—436	9
18	nut,hex flanged 5/16	825305—283	19
19	washer, pl b r 5/16"	837205—071	2
20	panel,asc sa comp end—es11	02250085—412	1
21	panel,access—compr. end	02250077—997	1
22	panel,acoustical insulation	02250081—389	2
23	catch,access panel	049764	1
24	weatherstrip,3/16 x 3/8 ft.	250022—436	13
25	nut,hex flanged 5/16"	825305—283	2
26	capscrew, socket ny 5/16—18 x 1"	828905—100	2
27	canopy, sa es11—top cap	02250085—404	1
28	panel,roof—compr. end	02250083—921	1
29	panel,roof—motor end	02250083—920	1
30	panel,roof—front side	02250083—864	1

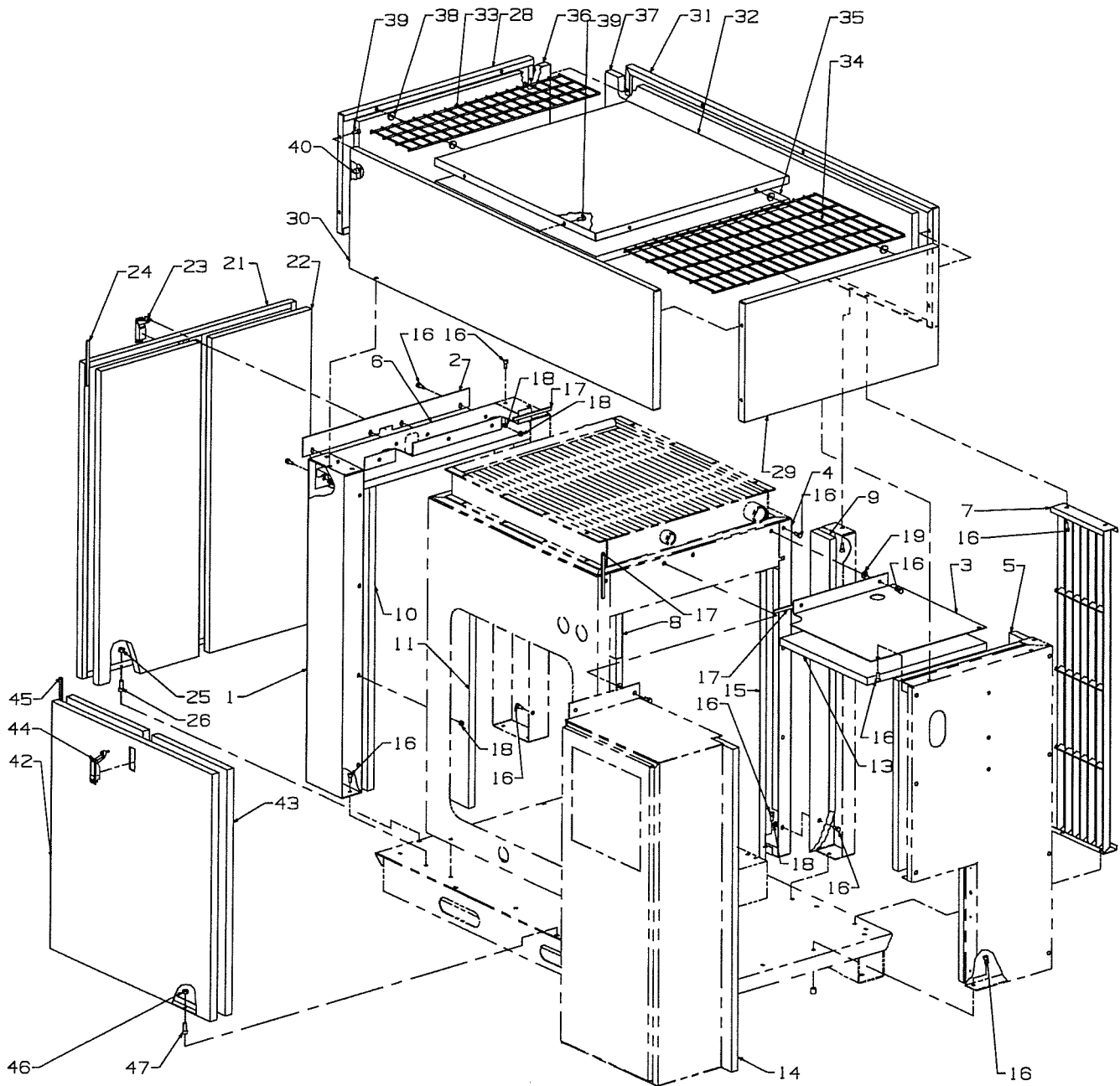
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PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

Section 12

ILLUSTRATIONS AND PARTS LIST

12.10 CANOPY, ACOUSTICAL PANELS & PARTS – AIRCOOLED



Section 12

ILLUSTRATIONS AND PARTS LIST

12.10 CANOPY, ACOUSTICAL PANELS & PARTS – AIRCOOLED (cont.)

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
31	panel,roof–rear side	02250083–865	1
32	panel,roof–top	02250083–919	1
33	grille,roof–air exh.–l.h.	02250084–537	1
34	grille,roof–air exh.–r.h.	02250078–578	1
35	panel,acoustical insulation	02250084–762	1
36	panel,acoustical insulation	02250081–398	2
37	panel,acoustical insulation	02250081–397	2
38	grommet,rubber–1/4"	040125	8
39	screw, ser wash 5/16x3/4"	829705–075	12
40	insert, 5/16" steel	02250043–765	20
41	panel,acs sa front side–es11	02250085–413	1
42	panel,access–front	02250084–226	1
43	panel,acoustical insulation	02250084–759	2
44	catch,access panel	049764	1
45	weatherstrip,3/16 x 3/8 ft.	250022–436	11
46	nut,hex flanged 5/16"	825305–283	2
47	capscrew, socket ny 5/16–18 x 1"	828905–100	2

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

ILLUSTRATIONS AND PARTS LIST

12.11 DRYER AND PARTS

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	tube,5/8" refr compr suction	02250088-469	1
2	supt,3rd stg-dryer--es11	02250086-738	1
3	supt,refr ht exch es11 w/dryer	02250086-273	1
4	u-bolt, clr mtg srd190 fxa r22	250040-331	1
6	tube,3/8" refr hgbv-cond	02250088-471	1
7	tube,3/8" refr compr disch	02250088-470	1
8	tube,5/8" refr suct from evap	02250088-472	1
9	tube,1-1/2" moist sep to axa	02250088-480	1
10	valve, access tee-1/4"	250032-322	3
11	dryer,filter pdc-170 w/capila	250022-166	1
12	valve, access strt ext 1/4" sld	250023-191	1
13	tubing,copper sft an 1/4" (ft)	840215-004	1
14	nut,short forged 45fl 1/4	805604-260	2
15	tubing,copper sft an 7/8" (ft)	840215-014	1
16	elbow, red-90-cr 7/8 x 5/8	804714-062	2
17	u-bolt, 1/4 x 1-1/2" pipe	829004-150	1
18	panel, right hand side-dryer es11	02250087-982	1
19	elbow,tube-m 1-1/2 x 1-1/2"	810524-150	1
20	elbow,pipe-galv 90 1-1/2"	803515-060	3
21	panel, roof	02250087-980	1
22	tubing,copper sft an 5/8" (ft)	840215-010	2
23	connector, tube-m 1-1/2 x 1-1/2"	810224-150	1
24	nipple,pipe-xs galv 1-1/2 x 2-1/2"	823124-025	1
25	nipple,pipe-xs galv 1-1/2 x 5"	823124-050	1
26	nipple,pipe-xs galv 1-1/2 x cls	823124-000	1
27	union, pipe 1-1/2" galv	802315-060	1
28	nipple,pipe-xs galv. 1-1/2 x 3"	823124-030	1
29	elbow, solder-90-cr 5/8	804600-062	2
30	bushing,red 5/8 x 3/8	803805-038	1

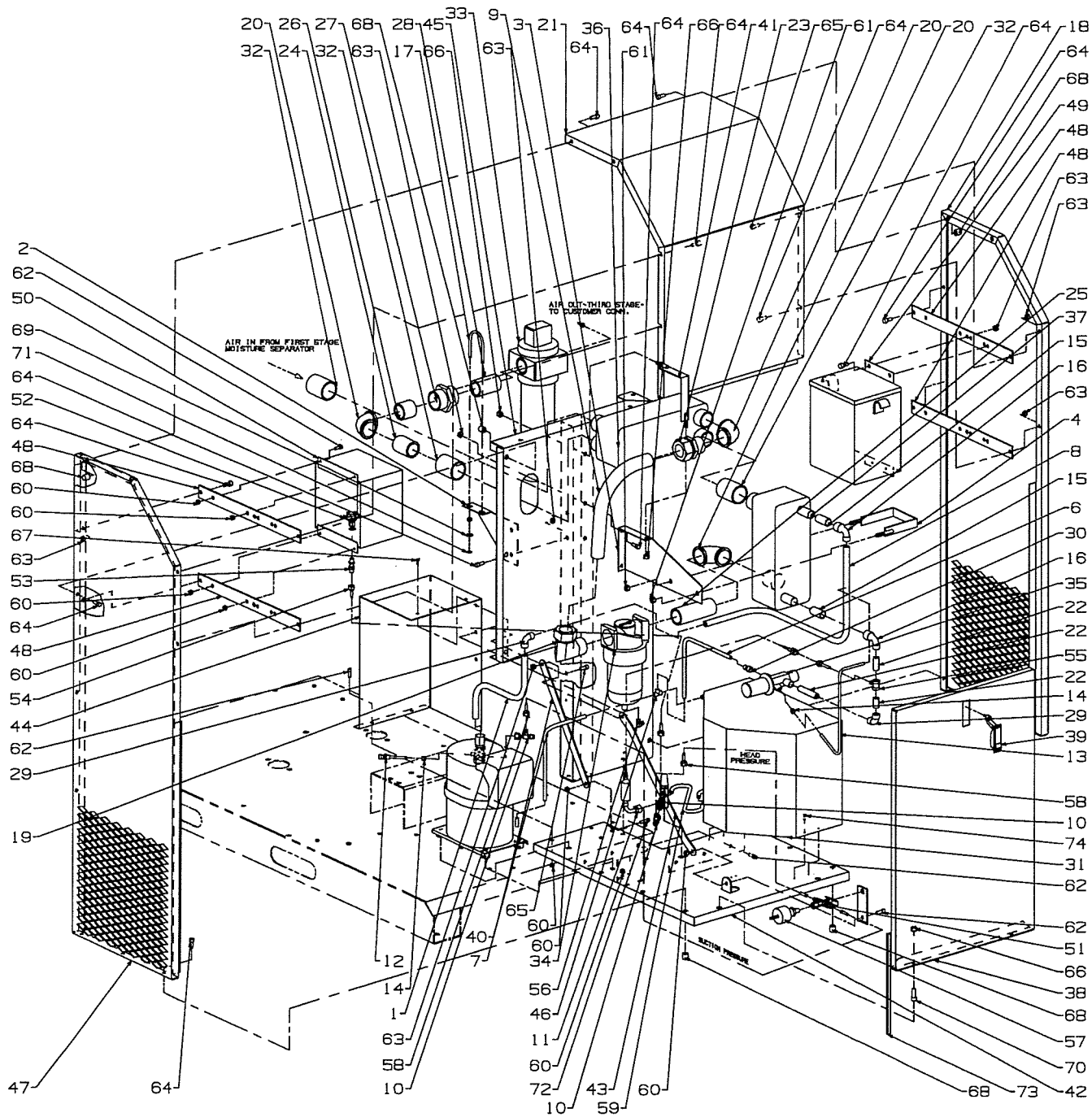
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PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

Section 12

ILLUSTRATIONS AND PARTS LIST

12.11 DRYER AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.11 DRYER AND PARTS (con't)

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
31	unit,cond 1.ohp ac 208-230v	250040-294	1
32	coupling,pipe 1-1/2" 300 ex hvj	250040-353	3
33	filter,mpf 300n (I)	02250081-750	1
34	sep, moisture 1 1/2"fpt es11 (II)	02250078-841	1
35	valve, hot gas pdc-500	406464-009	1
36	ht exch, axa pltseal 300 scfm	250027-257	1
37	evaperator,fxa pltseal 190 scfm	250027-268	1
38	sa,access panel es11 dryer	02250087-579	1
39	catch,adjust,trigger-lock	046764	1
40	supt,mbres11 dryer base frame	02250086-310	1
41	supt,ht exch axa es11 w/dryer	022550086-272	1
42	plate, mounting refr assy es11	022550086-276	1
43	supt,mbres11 dryer base frame	02250086-309	1
44	box,refr compressor isolation	02250086-277	1
45	panel,asy rh-mtr end es11/dryer	02250086-981	1
46	tee, solder 3/8	805400-038	1
47	panel, left hand side dryer - es11	Consult Factory	
48	supt, brkt es11 xfrm/ctl pnl	02250088-211	4
49	transformer,control(400,460,575v)	xfrmr_var	1
50	panel, electrical es-11 8x8x6 n12	02250088-212	1
51	valve,3-w 1/4"dbl frl x 1/4"fpt	02250087-575	1
52	sw,press 230/150psi 120-480vno	02250055-160	1
53	union, blkhd 1/4"t w/nut 45sae	232290	1
54	line, gage refrig-60"	250032-255	1
55	tee, sldr red 5/8 x 5/8 x 1/4	805510-104	1
56	elbow,90deg m-swvl 1/4 x 1/8"	250025-849	1
57	transducer, pressure 0-250psi 1-5vdc n4	02250078-933	1
58	line,gauge refrig r-22 30"	250022-040	2
59	tubing,copper sft an 3/8 (ft)	840215-006	1
60	nut,hex flgd pltd 1/4-20	825304-236	11

(Continued on page 81)

(I) For maintenance on filter no. 02250081-750, order repair kit no. 02250024-427 .

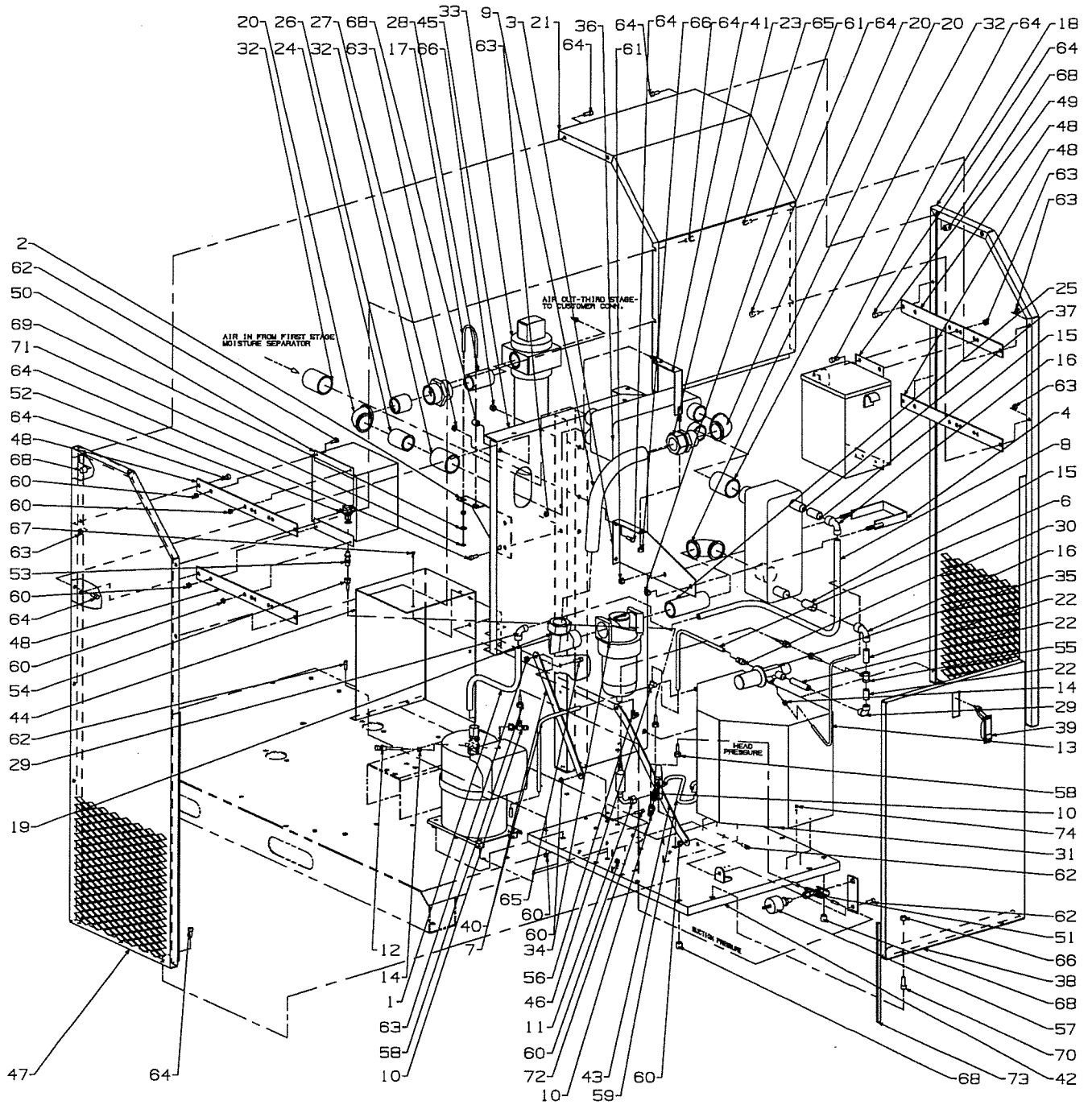
(II) For maintenance on moisture separator no. 02250078-841, order repair kit no. 02250087-423 and drain kit no. 02250087-422 .

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

Section 12

ILLUSTRATIONS AND PARTS LIST

12.11 DRYER AND PARTS



Section 12

ILLUSTRATIONS AND PARTS LIST

12.11 DRYER AND PARTS (con't)

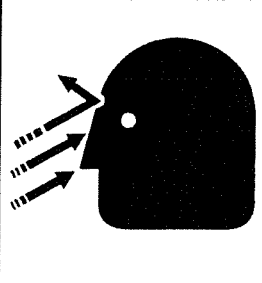
<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
61	nut,hex 3/8	824206-337	2
62	screw, hx ser wash 1/4 x 3/4	829704-075	10
63	nut,hex flgd pltd 5/16-18	825305-283	13
64	screw,hx ser wash 5/16 x 3/4	829705-075	26
65	capscrew, hex gr5 5/16-18 x 3/4"	828605-075	2
66	nut,hex flanged 3/8	825306-347	4
67	screw, tc-f hex 5/16-18 x 3/4"	834205-075	4
68	insert,5/16 - 18 thrd blnd	02250043-765	16
69	washer, pl-b reg pltd 1/4"	838204-071	2
70	capscrew, socket hd nylok 3/8 x 1"	828906-100	2
71	washer, sprlock reg 1/4"	837504-062	2
72	screw, ser wash 1/4-20 x 1.00lg	829704-100	1
73	weatherstrip, 3/16 x 3/8 ft	250022-436	9
74	screw, tc-f rd 8-32 x 1/2	835701-050	2

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

ILLUSTRATIONS AND PARTS LIST

12.12 DECAL GROUP

⚠ 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.

049685

⚠ DANGER



Lethal shock hazard inside.

Disconnect all power at source, before opening or servicing.

49350

⚠ WARNING



Hot surfaces.

To avoid burns, keep hands and all parts of the body away.

47742


⚠ DANGER



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

234027-123

⚠ WARNING



Do not permit air from this equipment to contact food stuff except in full compliance with FDA Standard 21CFR178.3570, and all other applicable federal, state and local, codes, standards and regulations.

234025-144

CAUTION: This machine is equipped with Automatic Stop/Start Control System.

DO NOT ATTEMPT to make any adjustment without disconnecting both main line and control circuit electrical power.

0431065

← DIRECTION OF ROTATION

4972

ILLUSTRATIONS AND PARTS LIST

12.12 DECAL GROUP

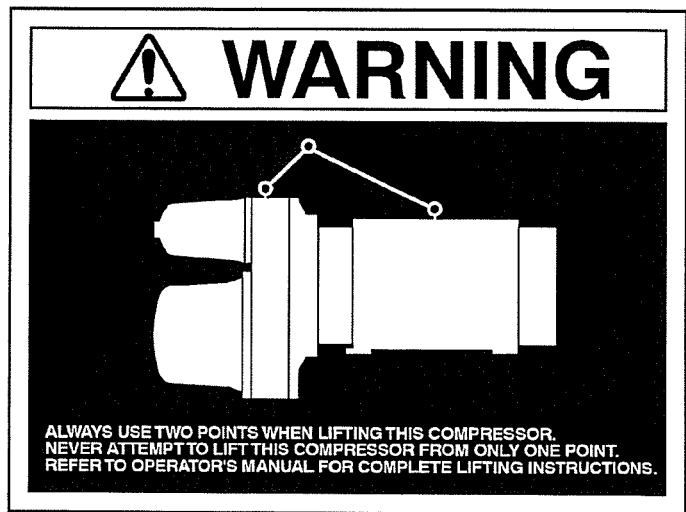
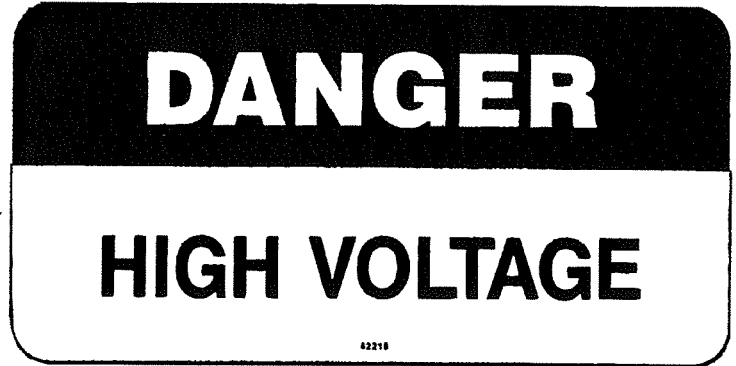
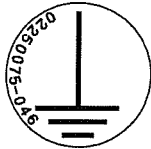
<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
1	sign, warning – compressor fluid fill cap	049685	1
2	sign, danger electrocution	049850	1
3	sign, warning – hot surfaces	407408	1
4	decal, warning auto start	041065	1
5	decal, danger breath air	250027–935	1
6	sign, warning “food grade” lube	250003–144	1
7	decal, rotation direction	040745	1

(Continued on page 85)

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

ILLUSTRATIONS AND PARTS LIST

12.12 DECAL GROUP



ILLUSTRATIONS AND PARTS LIST

12.12 DECAL GROUP (cont.)

<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
8	decal, compressor fluid SRF 1/4000 (I)	02250069-391	1
9	decal, earth ground	02250075-046	2
	•decal, protective earth ground (not shown)	02250075-045	1
	•decal, PE designation (not shown)	02250075-540	1
10	decal, danger hi voltage	042218	1
11	sign, warning ground fault	049852	1
12	decal, ISO 9001	02250059-288	1
13	decal, ES-11 warning lift	02250091-200	1
14	decal, ES-11 Supervisor II dlx info (not shown)	Consult factory	1
15	decal, ES-11 Supervisor II front (See Figure 6-1 in Operator's Section)	02250083-803	1

(Continued on page 87)

(I) Decal will change with fluid requirement.

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

ILLUSTRATIONS AND PARTS LIST

12.12 DECAL GROUP

	AIR INLET	AIR OUTLET	DRAIN	HOT GAS BYPASS VALVE
16	REFRIGERANT HEAD PRESSURE	REFRIGERANT SUCTION PRESSURE	THERMAL EXPANSION VALVE	ELECTRICAL ENTRANCE
	INLET AIR PRESSURE	OUTLET AIR PRESSURE	INLET AIR TEMPERATURE	250038-179

NORMAL OPERATING CONDITIONS

REFRIGERANT 22

REFRIGERANT SUCTION PRESSURE
59 TO 65 PSIG

IF DIFFERENT FROM NORMAL, ADJUST HOT GAS BYPASS VALVE TO RETURN TO NORMAL, SEE MANUAL. ADD 1 PSIG TO MINIMUM SUCTION PRESSURE PER 2000 FT. OF ALTITUDE.

REFRIGERANT HEAD PRESSURE

AIRCOOLED
296 PSIG MAX.

IF HEAD PRESSURE REMAINS CONSISTENTLY ABOVE NORMAL READINGS, REFER TO THE TROUBLE SHOOTING SECTION OF YOUR OPERATORS MANUAL.

IMPORTANT

FOR SRD 300-3100, ENERGIZE CRANKCASE HEATER (12) TWELVE HOURS PRIOR TO STARTING THE DRYER, (I.E. POWER TO THE LINE SIDE TERMINALS OF STARTER). FAILURE TO FOLLOW ABOVE INSTRUCTIONS MAY VOID WARRANTY.

02250046-816

! WARNING

Contains (HCFC-22), a substance that harms the public health and environment by destroying the ozone in the upper atmosphere.

02250054-320

18

17

Section 12

ILLUSTRATIONS AND PARTS LIST

12.12 DECAL GROUP (cont.)

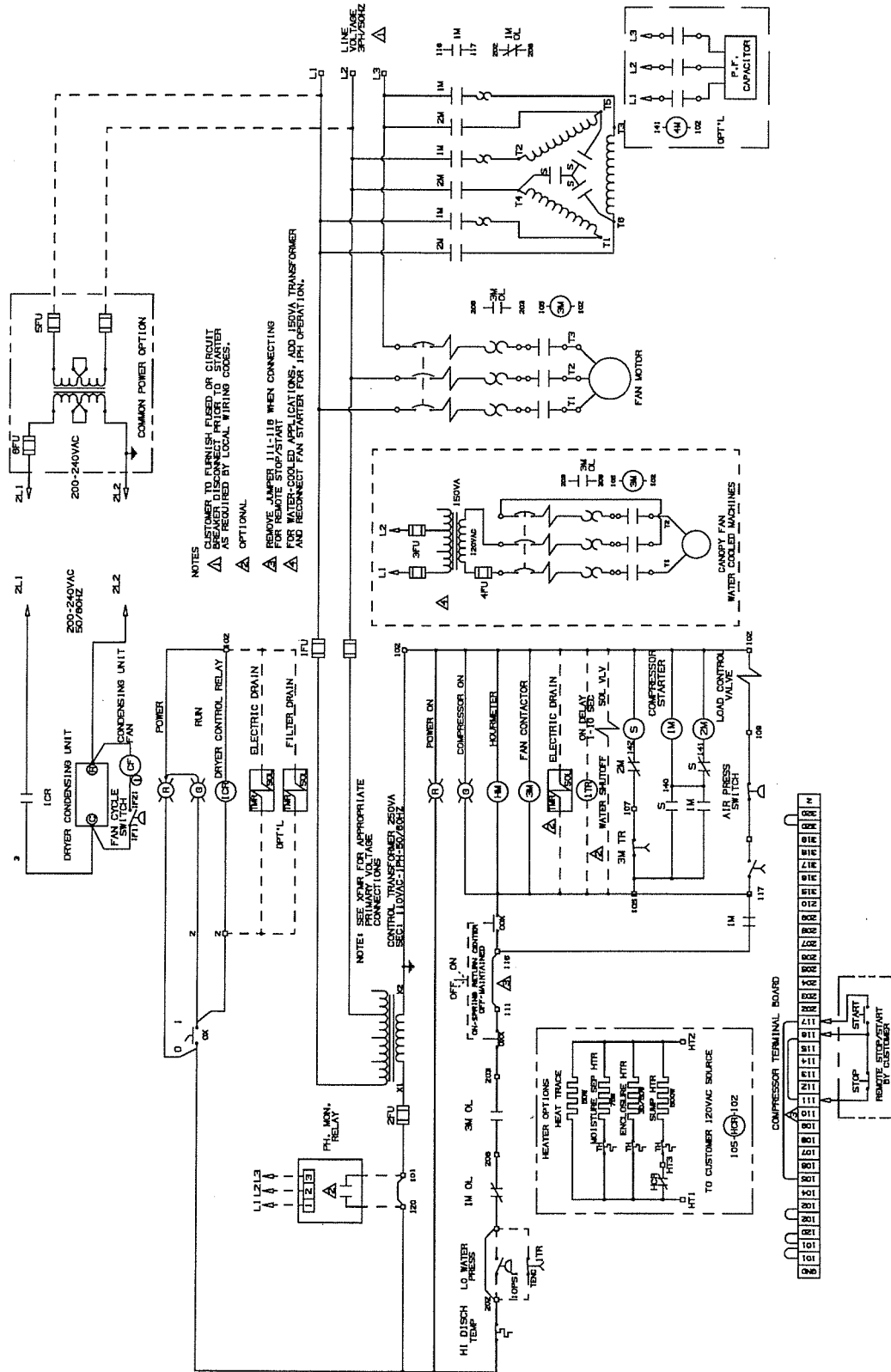
<i>key number</i>	<i>description</i>	<i>part number</i>	<i>quantity</i>
16	kit, decal dryer	250038-179	1
17	decal, warning HCFC 22	02250054-320	1
18	decal, normal operating conditions	02250046-916	1
19	decal, standard dryer control (not shown)	02250086-263	1
20	keypad, super II dryer control (not shown)	02250086-264	1

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

Section 12

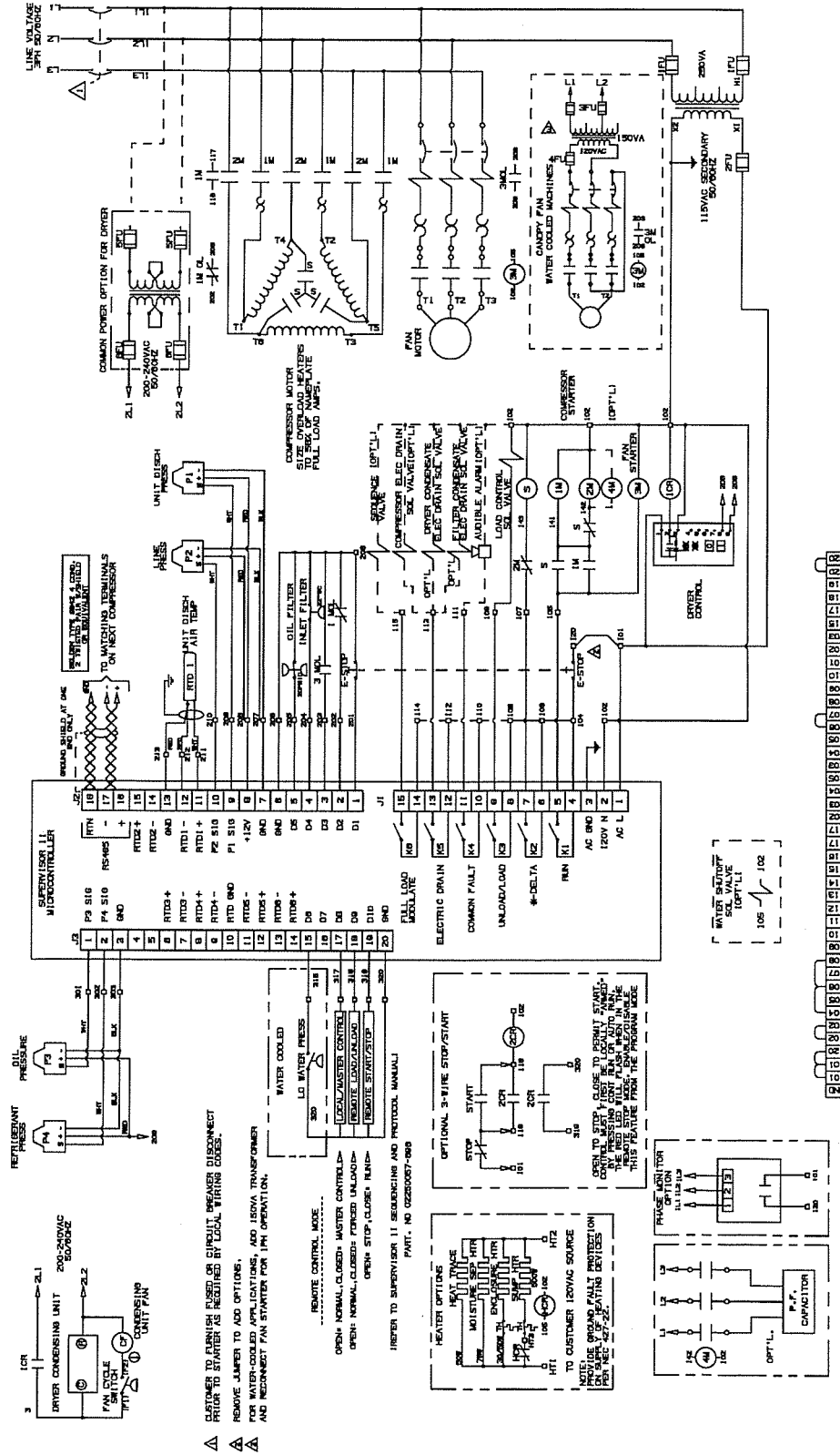
ILLUSTRATIONS AND PARTS LIST

12.15 WIRING DIAGRAM – WYE DELTA 50/60 HZ – ELECTRO/MECHANICAL



Section 12 ILLUSTRATIONS AND PARTS LIST

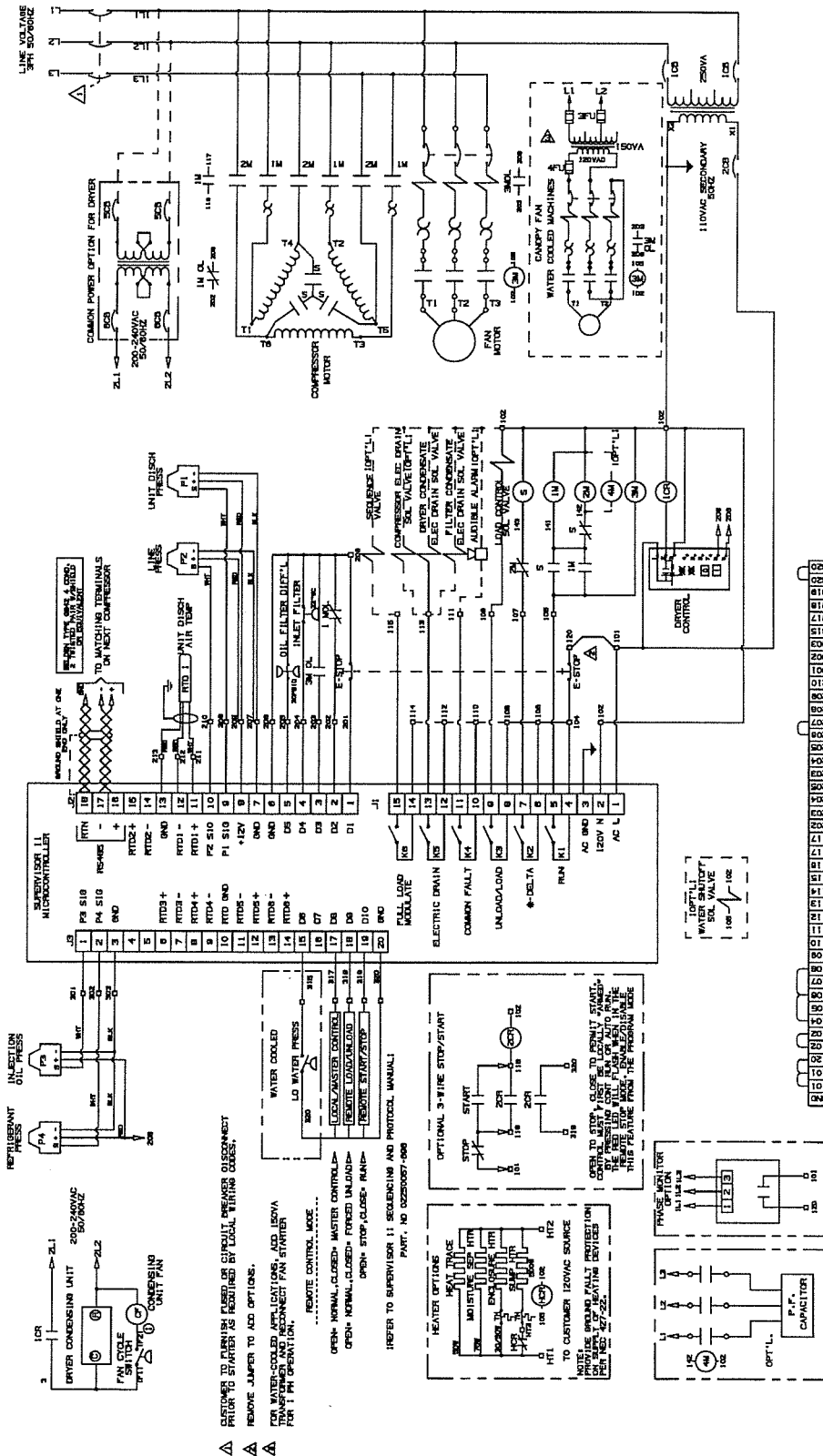
12.16 WIRING DIAGRAM – WYE DELTA 50/60 HZ – SUPERVISOR II



Section 12

ILLUSTRATIONS AND PARTS LIST

12.18 WIRING DIAGRAM – WYE DELTA 50 HZ (EUROPE) – SUPERVISOR II



- △ CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PRIOR TO STARTUP AS REQUIRED BY LOCAL WIRING CODES.
- △ REMOVE JUMPER TO ADD OPTIONS.
- △ FOR WATER-COOLED APPLICATIONS, ADD 182VA TRANSFORMER AND RECONNECT FAN STARTER FOR 1 PH OPERATION.

- REMOVE CONTROL WIRE...
- OPEN- NORMAL-CLOSED- MASTER CONTROL-
- OPEN- NORMAL-CLOSED- FORCED UNLOAD-
- OPEN- STOP-CLOSED- MANUAL-
- REFER TO SUPERVISOR II SCHEDULES AND WIRING MANUAL.
- PART. NO. 0228087-000

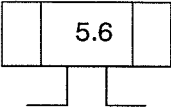
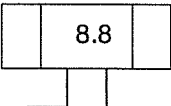
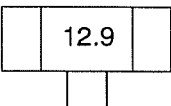
001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020
021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040
041	042	043	044	045	046	047	048	049	050	051	052	053	054	055	056	057	058	059	060
061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080
081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100

Section 12
ILLUSTRATIONS AND PARTS LIST

12.19 TORQUE TABLE FOR METRIC FASTENERS (+/- 10%)

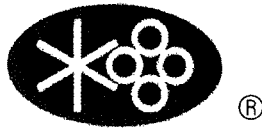
SIZE	PROPERTY CLASS 5.6			PROPERTY CLASS 8.8			PROPERTY CLASS 12.9		
	CLAMP LOAD (kN)	TIGHTENING TORQUE (N•m)		CLAMP LOAD (kN)	TIGHTENING TORQUE (N•m)		CLAMP LOAD (kN)	TIGHTENING TORQUE (N•m)	
		DRY	LUB.		DRY	LUB.		DRY	LUB.
M3x0,5	1.06	.9	.7	2.19	1.8	1.4	3.66	3	2.4
M4x0,7	1.84	2	1.6	3.82	4.2	3.3	6.39	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 (IN²) 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	Thru 39	5.6 
8.8	ISO 898-1 1988 (E)	800 830		580 600	< = 16 > 16 Thru 39	8.8 
12.9	ISO 898-1 1988 (E)	1220		970	Thru 39	12.9 

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Printed in U.S.A.

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