



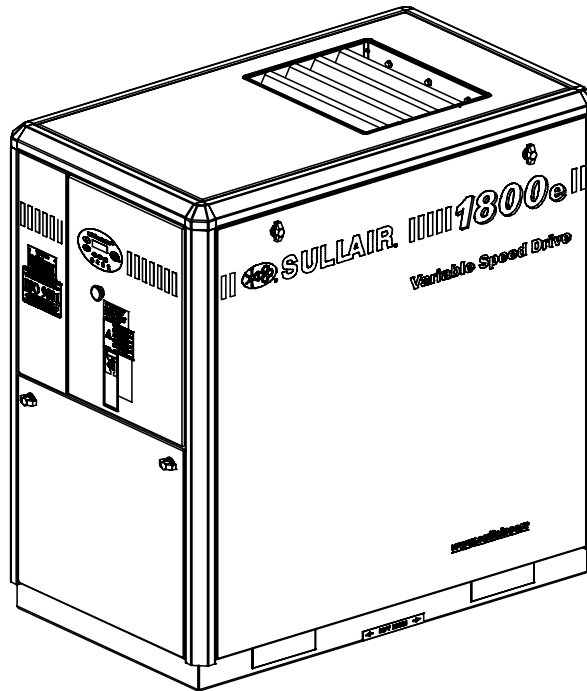
USER MANUAL

INDUSTRIAL AIR COMPRESSOR

1100E, 1500E, 1800E,

1100EV, 1500EV, 1800EV

11, 15 & 18KW/15, 20 & 25HP



WARRANTY NOTICE

Failure to follow the instructions
and procedures in this manual or,
misuse of this equipment will
VOID its warranty!

PART NUMBER:

02250176-311 R02

KEEP FOR
FUTURE
REFERENCE

©SULLAIR CORPORATION

The information in this manual is current
as of its publication date, and applies to
compressor serial number:

201003010000

and all subsequent serial numbers.



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Sullair Air Care Seminars are courses that provide hands-on instruction for the proper operation, maintenance, and servicing of Sullair products. Individual seminars on Industrial compressors and compressor electrical systems are offered at regular intervals throughout the year at Sullair's corporate headquarters training facility located at Michigan City, Indiana.

Instruction includes training on the function and installation of Sullair service parts, troubleshooting common faults and malfunctions, and actual equipment operation. These seminars are recommended for maintenance, contractor maintenance, and service personnel.

For detailed course outlines, schedule, and cost information contact:

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Attn: Service Training Department.



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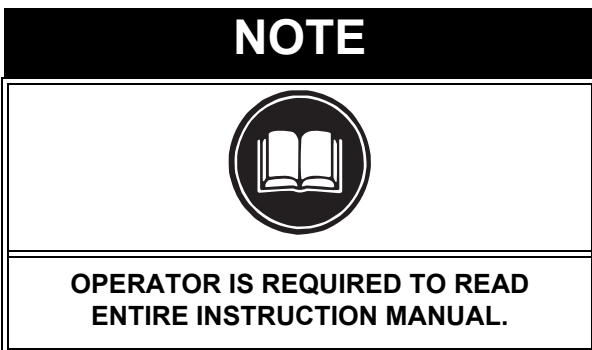
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Section 1

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 compressor should be operated only by those who have been trained and delegated to do so, and who have read and understood this Operator's Manual. Failure to follow the instructions, procedures and safety precautions in this manual may result in accidents and injuries. **NEVER** start the compressor unless it is safe to do so. **DO NOT** attempt to operate the compressor with a known unsafe condition. Tag the compressor and render it inoperative by disconnecting and locking out all power at source or otherwise disabling its prime mover so others who may not know of the unsafe condition cannot attempt to operate it until the condition is corrected.

Install, use and operate the compressor only in full compliance with all pertinent OSHA regulations and/or any applicable Federal, State, and Local codes, standards and regulations. **DO NOT** modify the compressor and/or controls in any way except with written factory approval.

While not specifically applicable to all types of compressors with all types of prime movers, most of

the precautionary statements contained herein are applicable to most compressors and the concepts behind these statements are generally applicable to all compressors.

1.2 PERSONAL PROTECTIVE EQUIPMENT

- A. Prior to installing or operating the compressor, owners, employers and users should become familiar with, and comply with, all applicable OSHA 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 RELEASE

- A. Install an appropriate flow-limiting valve between the service air outlet and the shut-off (throttle) valve, either at the compressor or at any other point along the air line, when an air hose exceeding 1/2" (13mm) inside diameter is to be connected to the shut-off (throttle) valve, to reduce pressure in case of hose failure, per OSHA Standard 29 CFR 1926.302(b)(7) and/or any 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 flow-rated. Select appropriate valves accordingly, in accordance with their manufacturer's recommendations.
- E. **DO NOT** use air tools that are rated below the maximum rating of the compressor. Select air tools, air hoses, pipes, valves, filters and other fittings accordingly. **DO NOT** exceed manufacturer's rated safe operating pressures for these items.
- F. Secure all hose connections by wire, chain or other suitable retaining device 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 receiver tank to zero internal pressure before removing the cap.
- H. Vent all internal pressure prior to opening any line, fitting, hose, valve, drain plug, connection or other component, such as filters and line oilers, and before attempting to refill optional air line anti-icer systems with antifreeze compound.
- I. Keep personnel out of line with and away from the discharge opening of hoses or tools or other points of compressed air discharge.
- J. **DO NOT** use air at pressures higher than 2.1 bar for cleaning purposes, and then only with effective chip guarding and personal protective equipment per OSHA Standard 29 CFR 1910.242 (b) and/or any applicable Federal, State, and Local codes, standards and regulations.
- K. **DO NOT** engage in horseplay with air hoses as death or serious injury may result.

1.4 FIRE AND EXPLOSION

- A. Clean up spills of lubricant or other combustible substances immediately, if such spills occur.
- B. Shut off the compressor and allow it to cool. Then keep sparks, flames and other sources of ignition away and **DO NOT** permit smoking in the vicinity when checking or adding lubricant or when refilling air line anti-icer systems with antifreeze compound.
- C. **DO NOT** permit fluids, including air line anti-icer system antifreeze compound or fluid film, to

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

- D. Disconnect and lock out all power at source prior to attempting any repairs or cleaning of the compressor or of the inside of the enclosure, if any.
- E. Keep electrical wiring, including all terminals and pressure connectors in good condition. Replace any wiring that has cracked, cut, abraded or otherwise degraded insulation, or terminals that are worn, discolored or corroded. Keep all terminals and pressure connectors clean and tight.
- F. Keep grounded and/or conductive objects such as tools away from exposed live electrical parts such as terminals to avoid arcing which might serve as a source of ignition.
- G. Remove any acoustical material or other material that may be damaged by heat or that may support combustion and is in close proximity, prior to attempting weld repairs.
- H. Keep suitable fully charged Class BC or ABC fire extinguisher or extinguishers nearby when servicing and operating the compressor.
- I. Keep oily rags, trash, leaves, litter or other combustibles out of and away from the compressor.
- J. **DO NOT** operate the compressor without proper flow of cooling air or water or with inadequate flow of lubricant or with degraded lubricant.
- K. **DO NOT** attempt to operate the compressor in any classification of hazardous environment unless the compressor has been specially designed and manufactured for that duty.

1.5 MOVING PARTS

- A. Keep hands, arms and other parts of the body and clothing away from couplings, belts, pulleys, fans and other moving parts.
- B. **DO NOT** attempt to operate the compressor with the fan, coupling or other guards removed.

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- C. Wear snug-fitting clothing and confine long hair when working around this compressor, especially when exposed to hot or moving parts.
- D. Keep access doors, if any, closed except when making repairs or adjustments.
- E. Make sure all personnel are out of and/or clear of the compressor prior to attempting to start or operate it.
- F. Disconnect and lock out all power at source and verify at the compressor that all circuits are de-energized to minimize the possibility of accidental start-up, or operation, prior to attempting repairs or adjustments. This is especially important when compressors are remotely controlled.
- G. Keep hands, feet, floors, controls and walking surfaces clean and free of fluid, water or other liquids to minimize the possibility of slips and falls.

1.6 HOT SURFACES, SHARP EDGES AND SHARP CORNERS

- A. Avoid bodily contact with hot fluid, hot coolant, hot surfaces and sharp edges and corners.
- B. Keep all parts of the body away from all points of air discharge.
- C. Wear personal protective equipment including gloves and head covering when working in, on or around the compressor.
- D. Keep a first aid kit handy. Seek medical assistance promptly in case of injury. **DO NOT** ignore small cuts and burns as they may lead to infection

1.7 TOXIC AND IRRITATING SUBSTANCES

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

 **DANGER**



Death or serious injury can result from inhaling compressed air without using proper safety equipment. See OSHA standards and/or any applicable Federal, State, and Local codes, standards and regulations on safety equipment.

- B. **DO NOT** use air line anti-icer systems in air lines supplying respirators or other breathing air utilization equipment and **DO NOT** discharge air from these systems into unventilated or other confined areas.
- C. Operate the compressor only in open or adequately ventilated areas.
- D. Locate the compressor or provide a remote inlet so that it is not likely to ingest exhaust fumes or other toxic, noxious or corrosive fumes or substances.
- E. Coolants and lubricants used in this compressor are typical of the industry. Care should be taken to avoid accidental ingestion and/or skin contact. In the event of ingestion, seek medical treatment promptly. Wash with soap and water in the event of skin contact. Consult Material Safety Data Sheet for information pertaining to fluid of 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 anti-freeze systems contains methanol and is toxic, harmful or fatal if swallowed. Avoid contact with the skin or eyes and avoid breathing the fumes. If

swallowed, induce vomiting by administering a tablespoon of salt, in each glass of clean, warm water until vomit is clear, then administer two teaspoons of baking soda in a glass of clean water. Have patient lay down and cover eyes to exclude light. Call a physician immediately.

1.8 ELECTRICAL SHOCK

- A. This compressor should be installed and maintained in full compliance with all applicable Federal, State and Local codes, standards and regulations, including those of the National Electrical Code, and also including those relative to equipment grounding conductors, and only by personnel that are trained, qualified and delegated to do so.
- B. Keep all parts of the body and any hand-held tools or other conductive objects away from exposed live parts of electrical system. Maintain dry footing, stand on insulating surfaces and **DO NOT** contact any other portion of the compressor when making adjustments or repairs to exposed live parts of the electrical system. Make all such adjustments or repairs with one hand only, so as to minimize the possibility of creating a current path through the heart.
- C. Attempt repairs in clean, dry and well lighted and ventilated areas only.
- D. **DO NOT** leave the compressor unattended with open electrical enclosures. If necessary to do so, then disconnect, lock out and tag all power at source so others will not inadvertently restore power.
- E. Disconnect, lock out, and tag all power at source prior to attempting repairs or adjustments to rotating machinery and prior to handling any ungrounded conductors.



All field equipment must be tested for electrostatic fields prior to servicing or making contact with the machine using the following or equivalent test equipment:

- **90-600 VAC: Volt detector such as Fluke Model 1AC-A**
- **600-7000 VAC: Voltage detector such as Fluke Networks Model C9970**

It is the responsibility of each organization to provide/arrange training for all their associates expected to test for electrostatic fields.

1.9 LIFTING

- A. If the compressor is provided with a lifting bail, then lift by the bail provided. If no bail is provided, then lift by sling. Compressors to be air-lifted by helicopter must not be supported by the lifting bail but by slings instead. In any event, lift and/or handle only in full compliance with OSHA standards 29 CFR 1910 subpart N and/or any applicable Federal, State, and Local codes, standards and regulations.
- B. Inspect points of attachment for cracked welds and for cracked, bent, corroded or otherwise degraded members and for loose bolts or nuts prior to lifting.
- C. Make sure entire lifting, rigging and supporting structure has been inspected, is in good condition and has a rated capacity of at least the weight of the compressor. If you are unsure of the weight, then weigh compressor before lifting.
- D. Make sure lifting hook has a functional safety latch or equivalent, and is fully engaged and latched on the bail or slings.
- E. Use guide ropes or equivalent to prevent twisting or swinging of the compressor once it has been lifted clear of the ground.
- F. **DO NOT** attempt to lift in high winds.
- G. Keep all personnel out from under and away from the compressor whenever it is suspended.
- H. Lift compressor no higher than necessary.

SECTION 1

- I. Keep lift operator in constant attendance whenever compressor is suspended.
- J. Set compressor down only on a level surface capable of safely supporting at least its weight and its loading unit.
- K. When moving the compressor by forklift truck, utilize fork pockets if provided. Otherwise, utilize pallet if provided. If neither fork pockets or pallet are provided, then make sure compressor is secure and well balanced on forks before attempting to raise or transport it any significant distance.
- L. Make sure forklift truck forks are fully engaged and tipped back prior to lifting or transporting the compressor.
- M. Forklift no higher than necessary to clear obstacles at floor level and transport and corner at minimum practical speeds.
- N. Make sure pallet-mounted compressors are firmly bolted or otherwise secured to the pallet prior to attempting to forklift or transport them. **NEVER** attempt to forklift a compressor that is not secured to its pallet, as uneven floors or sudden stops may cause the compressor to tumble off, possibly causing serious injury or property damage in the process.

1.10 ENTRAPMENT

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

NOTES

Section 2

DESCRIPTION

2.1 INTRODUCTION

Your new Sullair flood-lubricated rotary screw air compressor will provide you with a unique experience in improved reliability and simplified maintenance. Compared to other types of compressors, the Sullair rotary screw is unique in mechanical reliability, with “no wear” and “no inspection” required of the working parts within the compressor unit. Read *Maintenance* on page 53 to see how surprisingly easy it is to keep your air compressor in top operating condition.

2.2 DESCRIPTION OF COMPONENTS

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

steel frame. On air-cooled models, a fan draws air into the enclosure over the fan and main motors through the combined aftercooler and fluid cooler thereby removing the compression heat from the compressed air and the cooling fluid, and forces it out the top of the machine. This compressor model has easily accessible items such as the fluid filter air/oil separator and control valves. The inlet air filter is also easily accessible for servicing.

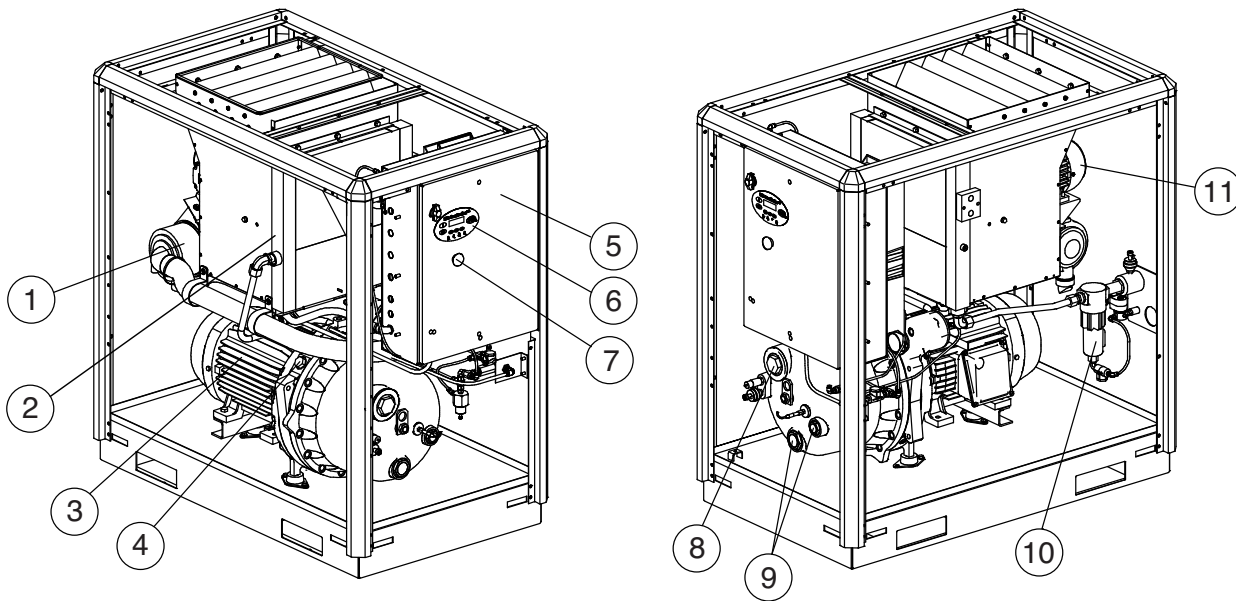


Figure 2-1: Main Component Location

- | | |
|---------------------|-----------------------------|
| 1. Air Inlet Filter | 7. E-Stop Button |
| 2. Cooler | 8. Separator Element Access |
| 3. Motor | 9. Sight Glasses |
| 4. Fluid Fill | 10. Moisture Separator |
| 5. Starter Box | 11. Fan Motor |
| 6. Controller | |

2.3 SULLAIR COMPRESSOR UNIT, FUNCTIONAL DESCRIPTION

Sullair air compressors feature the Sullair compressor unit, a single-stage, positive displacement, flood lubricated type compressor. This unit provides continuous compression to meet your needs.

NOTE

With a Sullair compressor, there is no maintenance or inspection of the internal parts of the compressor unit permitted in accordance with the terms of the warranty.

The 1100e through 1800e Series compressors are factory-filled with Sullube lubricant. Refer to *Specifications* on page 23 for more information on fluid fill.

Sullair 24KT compressors are filled with a fluid that rarely needs to be changed. Use only Sullair 24KT fluid in the event that a fluid change is required.

CAUTION

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

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

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

1. As coolant, it controls the rise of air temperature normally associated with the heat of compression.
2. Seals the clearance paths between the rotors and the stator and also between the rotors themselves.
3. Acts as a lubricating film between the rotors allowing one rotor to directly drive the other, which is an idler, and also lubricates the bearings.

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

2.4 COMPRESSOR COOLING AND LUBRICATION SYSTEM, FUNCTIONAL DESCRIPTION

Refer to *Figure 2-2* The Cooling and Lubrication System consists of a fan, fan motor, radiator-type aftercooler/fluid cooler, full flow fluid filter, thermal valve, and interconnecting hoses. The pressure in the separator/sump causes fluid flow by forcing the fluid from the high pressure area of the separator/sump to an area of lower pressure in the compressor unit.

Fluid flows from the bottom of the separator/sump to the thermal valve. The thermal valve is fully open when the fluid temperature is below 185°F (85°C). The fluid passes through the thermal valve, the main filter and directly to the compressor unit where it

lubricates, cools and seals the rotors and the compression chamber.

As the discharge temperature rises above 185°F (85°C), due to the heat of compression, the thermal valve begins to adjust and a portion of the fluid then flows through the cooler. From the cooler the fluid flows to the fluid filter and then on to the compressor unit.

A portion of the fluid flowing to the compressor is routed to the anti-friction bearings which support the rotors inside the compressor unit.

The fluid filter has a replacement element and an integral pressure bypass valve. A message on the WS Controller indicates when the fluid filter needs to be changed.

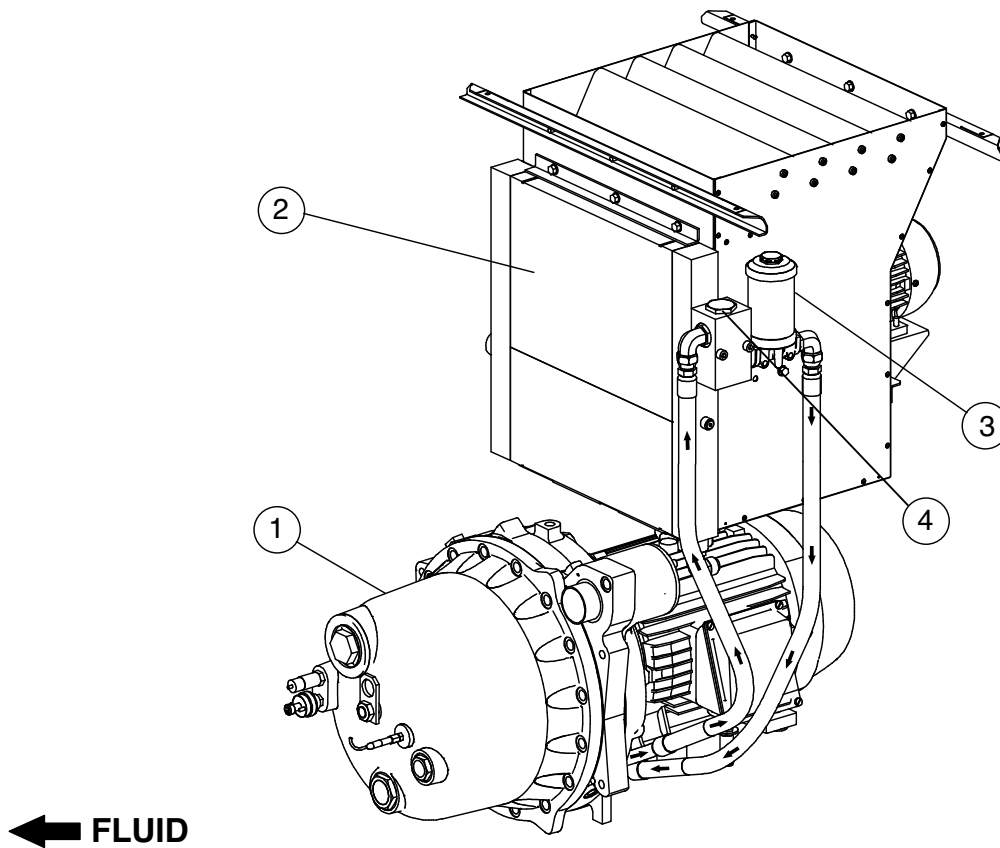


Figure 2-2: Cooling and Lubrication System

- | | |
|---------------|------------------|
| 1. Compressor | 3. Fluid Filter |
| 2. Cooler | 4. Thermal Valve |

2.5 COMPRESSOR DISCHARGE SYSTEM, FUNCTIONAL DESCRIPTION

Refer to *Figure 2-3*. The compressor unit discharges the compressed air/fluid mixture into the combination separator/sump. The separator/sump has three basic functions:

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

The compressed air/fluid mixture enters the separator/sump and flows through an internal baffle system. The direction of movement is changed and its velocity significantly reduced, thus causing large droplets of fluid to form and fall to the bottom of the separator/sump. The fractional percentage of fluid remaining in the compressed air collects on the surface of the separator element as the compressed air flows through the separator. A return line (or scavenge tube) leads from the bottom of the separator area to a medium pressure region of the compressor unit. Fluid collecting on the bottom of the separator is returned to the compressor by a pressure differential between the separator/sump and the compressor. There is also an orifice in this return line to assure proper flow. The separator system reduces the fluid carry-over to less than 1 ppm (parts per million) for Sullube or 2 ppm for 24KT at nominal rated pressures. A message develops on the WS Controller if abnormal pressure drops through the separator element. At this time, separator element replacement is necessary.

A minimum pressure/check valve, located downstream from the separator, assures a minimum separator/sump pressure of 50 psig (3.4 bar) during loaded conditions. This pressure is necessary for proper air/fluid separation and proper fluid circulation.

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

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

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.

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

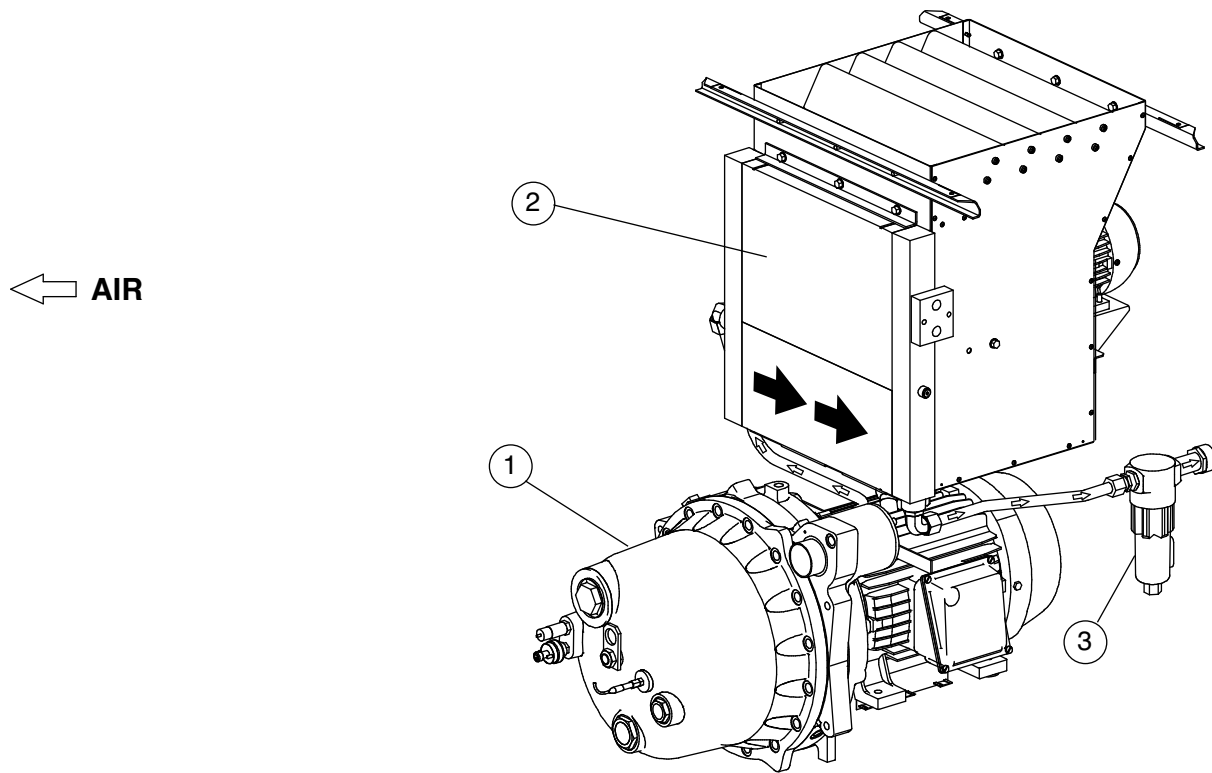


Figure 2-3: Discharge System

- 1. Compressor
- 2. Cooler
- 3. Moisture Separator

2.6 CONTROL SYSTEM, FUNCTIONAL DESCRIPTION

Refer to *Figure 2-4*. 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 four distinct phases of operation. 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 “ ” (START) pad is depressed, the separator/sump pressure will quickly rise from 0 to 50 psig (0 - 3.4 bar). The compressor initially starts unloaded with the solenoid valve open and the inlet valve closed. It then switches to full load when full rpm has been achieved. During this period, both the pressure regulator and the solenoid valve are closed, the inlet valve is fully open and the compressor pumps are at full rated capacity. The rising compressor air pressure is isolated from the service line in this phase by the minimum pressure valve set at approximately 50 psig (3.4 bar).

FULL LOAD MODE—50 TO 100 PSIG (3.4 TO 6.9 BAR)

When the compressed air pressure rises above 50 psig (3.4 bar), the minimum pressure valve opens allowing compressed air to flow into the service line. From this point on, the line air pressure is continually monitored by the WS Controller. 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 integrated inlet valve has an orifice which vents a small amount of air to the compressor inlet when the pressure regulator controls the inlet control valve. The orifice also bleeds any accumulated moisture from the control lines.

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 WS Controller control system de-energizes the solenoid valve allowing separator/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 to the atmosphere, located in the compressor intake, reducing the separator/sump pressure to approximately 17 psig (1.2 bar). The check valve in the air service line prevents line pressure from returning to the separator/sump.

When the line pressure drops to the low setting (cut-in pressure; usually 100 psig (6.9 bar) on low pressure (7 bar) compressors and 125 psig (8.6 bar) on high pressure (9 bar) compressors, 150 psig (10.3 bar) on (10 bar) compressors, 175 psig (12.0 bar) on (12 bar) compressors), the WS Controller 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.

LOAD/NO LOAD CONTROL

If desired by the customer, the compressor can be set to operate load/no load without modulating control. This control mode is often selected when a large amount of compressed air storage (air tank) is available. Using the WS Controller keypad, select “load/no load control” from the menu. On a machine rated for 100 psig (7 bar) the compressor will run in the full load mode up to 100 psig (7 bar). If less than the rated capacity is required, pressure will rise above 100 psig and the WS Controller will deenergize the solenoid valve, causing the compressor to run in the unload mode. When the system pressure falls to 90 psig (6.2 bar), the WS Controller energizes the solenoid valve, causing the compressor to return to the full load mode. The compressor will thus operate to keep the system pressure in the range of 90 to 100 psig (6.3 to 6.9 bar).

AUTOMATIC OPERATION

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

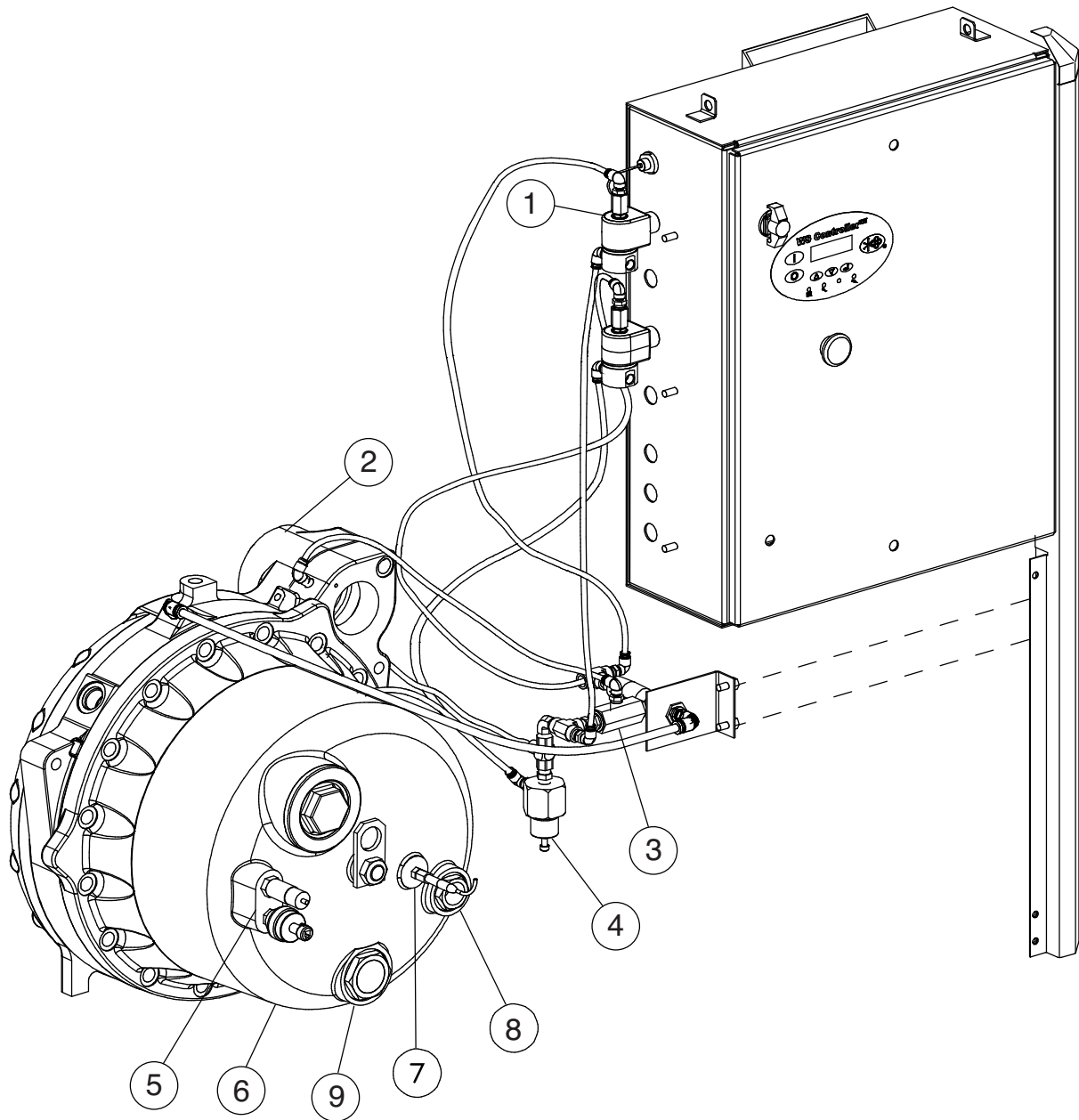


Figure 2-4: Standard Control System

- | | |
|--------------------------|------------------------------|
| 1. Solenoid Valve | 6. Separator/Sump |
| 2. Inlet Control Valve | 7. Temperature Thermistor |
| 3. Blowdown Valve | 8. Sight Glass - Upper Level |
| 4. Pressure Regulator | 9. Sight Glass - Lower Level |
| 5. Pressure Relief Valve | |

2.7 AIR INLET SYSTEM, FUNCTIONAL DESCRIPTION

Refer to *Figure 2-5*. The compressor inlet system consists of a dry-type air filter, a restriction gauge and an air inlet valve. The poppet-type modulating air inlet valve directly controls the amount of air intake to the compressor in response to the operation of the pressure regulator (see *Modulating Mode—100 to 110 PSIG (6.9 to 7.6 BAR)* on page 17). The inlet valve also acts as a check valve, thus preventing reverse rotation when the compressor is shut down.

WARNING

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

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

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

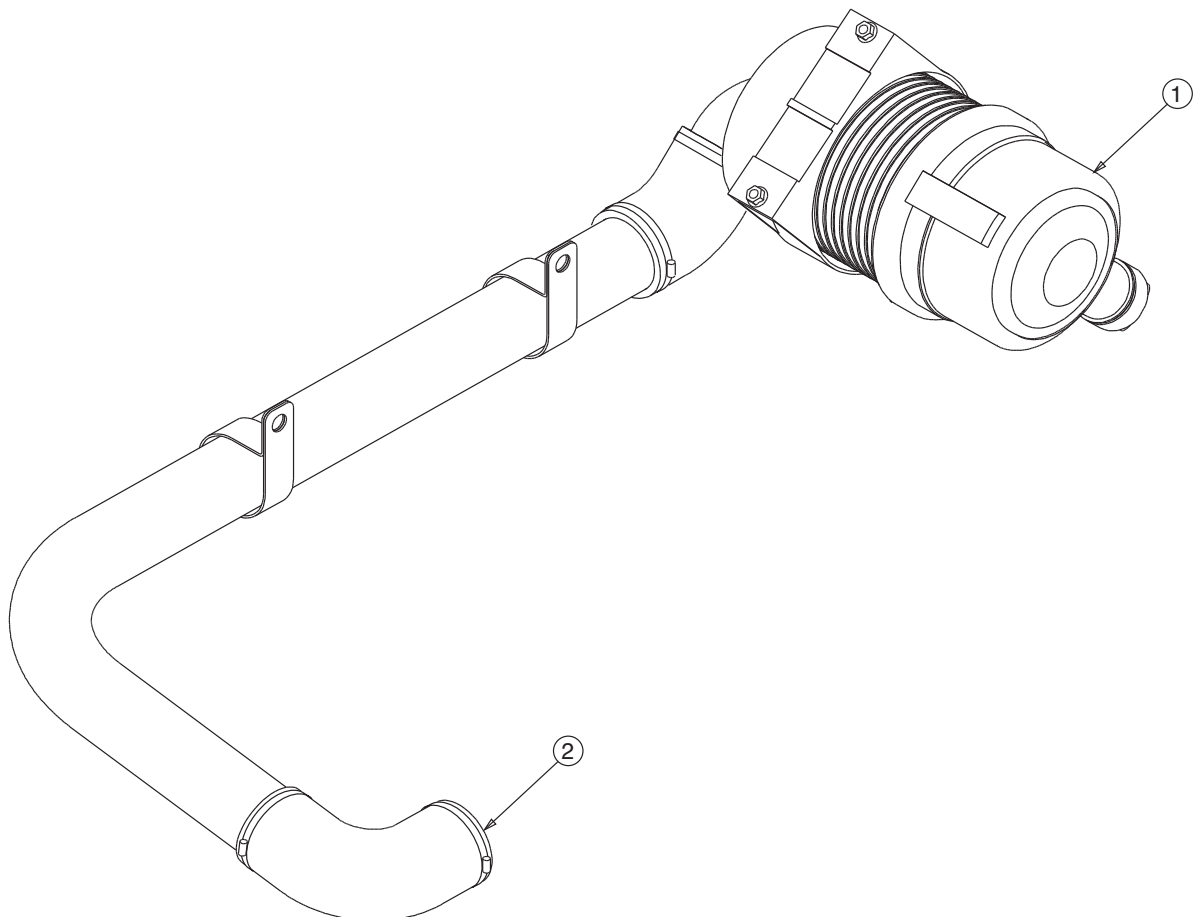


Figure 2-5: Air Inlet System

1. Air Inlet Filter

2. To Inlet Housing

2.8 INTEGRAL DRYER OPTION

An integral refrigerated dryer option is available. The integral dryer is designed to work with the compressor WS controller which controls dryer starting and stopping, condensate drain valve function and monitors dewpoint temperature and dryer warnings and faults. The dryer is fully connected from the factory and is ready to run when the compressor is installed.

Detail of dryer operation and spare parts can be found in a supplement Manual 02250174-308 which is provided with your machine.

Per the controller default settings, on initial start-up the compressor will run unloaded for 5 minutes, allowing the dryer to run and cool down. This prevents condensate from initially being allowed into the compressed air stream. It also delays the supply of compressed air from the compressor until the 5 minute cool-down period is completed. When the automatic control mode is selected, the compressor will stop after running unloaded for a prescribed time, but the dryer will continue to run to ensure there will not be a surge of condensate when the compressor re-starts. For other settings and control options, refer to the WS controller manual 02250164-411, or to your authorized Sullair servicing distributor.

In case the compressor needs to operate while the dryer is being serviced, the dryer can be bypassed, and removed if necessary for service. To bypass the dryer, disconnect the inlet hose to the dryer, disconnect the outlet hose at the main service connection, and re-connect the dryer inlet hose to the main service connection. Remove the fuses powering the dryer located in the compressor electrical box. The WS controller must be set-up for the compressor to run on dryer fault. If necessary, this can be reset by your authorized Sullair servicing distributor.

2.9 VARIABLE SPEED DRIVE (VSD) COMPONENTS

The VSD, located in the machine's electrical enclosure, works in concert with the WS Controller to allow the compressor to match its output to the current demand on the system. The drive's heat sink extends through the back of the enclosure, and is cooled by air flowing through the compressor enclosure.

2.10 VSD CONTROL SYSTEM — FUNCTIONAL DESCRIPTION

Refer to *Figure 2-4*. The controls consist of:

- a VSD
- a solenoid valve
- a regulating valve
- and an inlet valve.

Depending on the model, a compressor can be operated at a setpoint pressure from 60 to 175 psig (4.1 to 12.1 bar). The WS Controller automatically sets the frequency range based on the selected pressure. (The compressor's operating range is on its nameplate.)

The following paragraphs apply to a compressor with a 100 psig (6.9) operating pressure and a 6 psi (0.4 bar) load delta setting.

NOTE

The load delta default setting is 10 psi (0.7 bar). Sullair recommends a setting of 6 psi (0.4) for the most efficient operation.

Compressors with different pressure operating ranges perform in the same manner.

START MODE - 0 TO 50 PSIG (0 TO 3.5 BAR)

Pressing the WS Controller START button (1) signals the VSD to accelerate the motor to full speed, causing the separator/sump tank pressure to rise from 0 to 50 psig (0 to 3.4 bar). At this time both the pressure regulator and solenoid valves are closed; the inlet valve is fully open and the air-end provides a full flow to the separator/sump tank. A minimum pressure valve set at approximately 50 psig (3.4 bar) isolates the rising compressor air pressure from the service line.

FULL LOAD MODE - 50 TO 100 PSIG (3.4 TO 6.9 BAR)

When the compressed air pressure rises above 50 psig (3.4 bar) the minimum pressure valve opens allowing compressed air to flow into to the service line. From this point on the WS Controller monitors the line pressure which controls the VSD. The pressure regulator and solenoid valves remain closed with the inlet valve fully open, running at 100 psig (6.9 bar) or lower.

VSD PART LOAD CONTROL—

The service line pressure increases to a value above 100 psig (6.9) if the demand is less than the compressor's rated capacity. In this condition, the VSD slows the motor's rpm which reduces the output to match the demand. The drive continuously adjusts the motor's rpm to maintain a 100 psig (6.9 bar) line pressure. The WS Controller maintains the correct frequency when the VSD is operating in this mode.

MODULATING MODE- 100 TO 106 PSIG (7.3 TO 6.9 BAR)

During low demand periods and with the VSD running at minimum speed, the line pressure can continue to rise. When the line pressure reaches 101-102 psig (approximately 7 bar), the regulator valve (*Figure 2-4*) gradually opens, directing air pressure to the inlet control valve piston. This action causes the inlet valve to partially close, thereby reducing the air flow entering the compressor until it matches the demand. The control system functions continuously in this manner between less than 101 psig (7.0 bar) to 106 psig (7.3 bar), in response to varying system demand. 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 off any accumulated moisture from the control line. When the discharge pressure rises above 106 psig (7.3 bar), or to a preset unload pressure, the compressor unloads.

UNLOAD MODE- IN EXCESS OF 106 PSIG (7.3 BAR)

When there is no demand or it is at a minimal level, the service line pressure continues to rise. When it exceeds 106 psig (7.3 bar), or reaches a preset unload pressure value, the WS control system de-energizes the solenoid valve allowing separator/ sump tank air pressure to be supplied directly which closes the inlet valve. The solenoid valve simultaneously sends a pneumatic signal to the blow down valve which opens to the atmosphere, and reduces the separator/sump tank pressure. The check valve in the air service line prevents line pressure from back-flowing to the separator/sump tank. The compressor will shut down after the programmed unload time setting expires (the default setting is zero [0] minutes for an immediate shutdown upon unload). When the line pressure drops to the low pressure setting of 100 psig (6.9 bar) the WS Controller starts the motor and energizes the solenoid valve which closes the blowdown valve. The re-energized solenoid valve prevents line pressure from reaching the inlet control valve, thereby allowing it to fully open, and the compressor supplies compressed air to the system.

NOTES

Section 3

SPECIFICATIONS

3.1 TABLE OF SPECIFICATIONS

		DIMENSIONS							
		Length		Width		Height		Weight	
MODEL(I)	HP	in	mm	in	mm	in	mm	lbs	kg
1100 Series									
1107e	15	53.2	1351	31.5	800	53.2	1351	1044	474
1109e	15	53.2	1351	31.5	800	53.2	1351	1044	474
1112e	15	53.2	1351	31.5	800	53.2	1351	1044	474
1500 Series									
1509e	20	53.2	1351	31.5	800	53.2	1351	1098	498
1512e	20	53.2	1351	31.5	800	53.2	1351	1098	498
1800 Series									
1809e	25	53.2	1351	31.5	800	53.2	1351	1122	509
1812e	25	53.2	1351	31.5	800	53.2	1351	1122	509
(I) Includes standard and 24KT. Rated pressure designations appearing after model number are as follows:									
07 - 100 psig (6.9 bar)					10 - 150 psig (10.3 bar)				
09 - 125 psig (8.6 bar)					12 - 175 psig (12 bar)				
Maximum pressure is rated pressure plus 10 psig (0.7 bar).									

NOTE

For latest sound test data, consult Sullair Factory.

COMPRESSOR:	STANDARD MODELS:
Type:	Rotary Screw
Standard Operating Pressure:	100 psig (7 bar) 125 psig (9 bar) / 150 psig (10.0 bar) 175 psig (12.0 bar)
Bearing Type:	Anti-friction
Ambient Temperature (Max.):	104°F (40°C)
Cooling:	Pressuried Fluid
Compressor Fluid:	Sullair Sullube
Separator/Sump Capacity:	1.8 Gallons (8.8 liters)
System Capacity:	2.5 Gallons (9.5 liters)
Control:	WS Controller controller
(II) Special compressors are available for operation at higher pressures.	
(III) Special compressors are available for operation in higher ambient temperature.	

MOTOR (IV):	STANDARD MODELS:
Size:	15, 20, 25HP / 11, 15, 18KW
Standard Operating Pressure:	TEFC, Epact Efficiency, Three Phase, 230/460 Hz, 380-415 (400) 50 Hz
Ambient Temperature (Max.):	104°F (40°C)
Options Available:	200V and 575V 60 Hz, 220 50 Hz CE Approved
Starter	Full Voltage Magnetic, Wye-Delta or Solid State
Options Available:	VSD Optional, 460V, 575V, 400V 50 Hz
Speed - 15, 20, 25 HP:	1765 RPM (60 Hz) or 1455 RPM (50 Hz)
(IV) Multi-frequency and voltage motors are used. The compressors must be used only with the specified electrical frequency and voltage.	

NOTE

For latest sound test data, consult Sullair Factory.

3.2 LUBRICATION GUIDE

Refer to *Figure 3-1* for location of fluid fill port. For best value and longest uninterrupted service, the 1100e through 1800e Series compressors are factory filled and tested with Sullube lubricant.

CAUTION

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

Refer to *Lubrication Change Recommendations and Maintenance—Fluid Filter and Separator* on page 26 if fluid change is required.

WARNING

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

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

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

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

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.

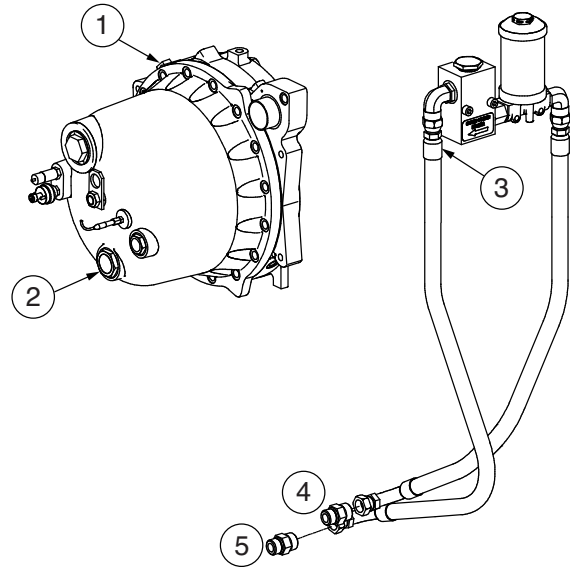


Figure 3-1: Fluid Fill Location

1. Fluid Fill Port
2. Sight Glass - Low Level (Machine Off)
3. Hose - Detach for Fluid Draining
4. From Drive Housing Oil Outlet
5. To Drive Housing Oil In Figure

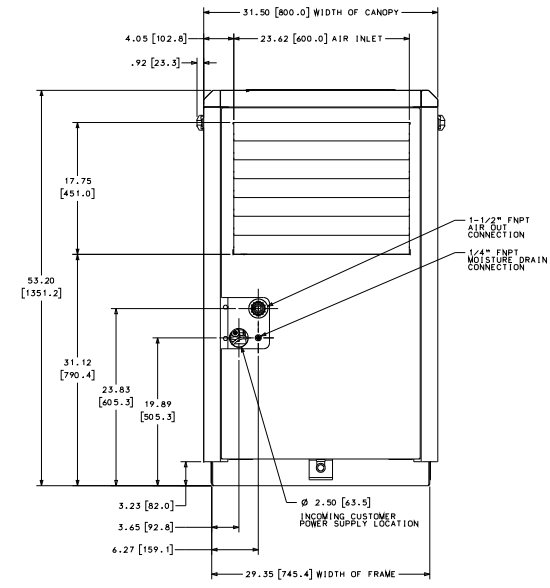
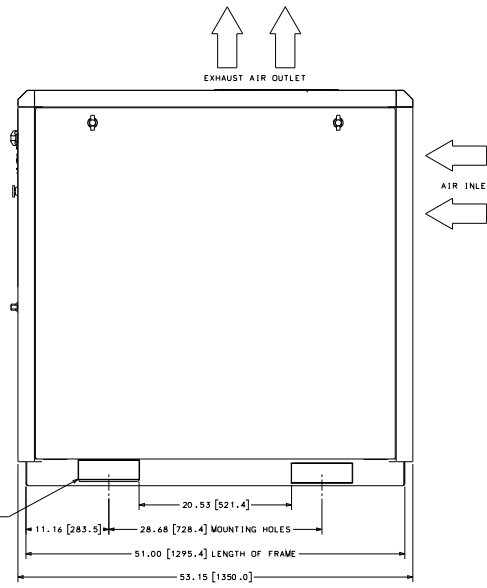
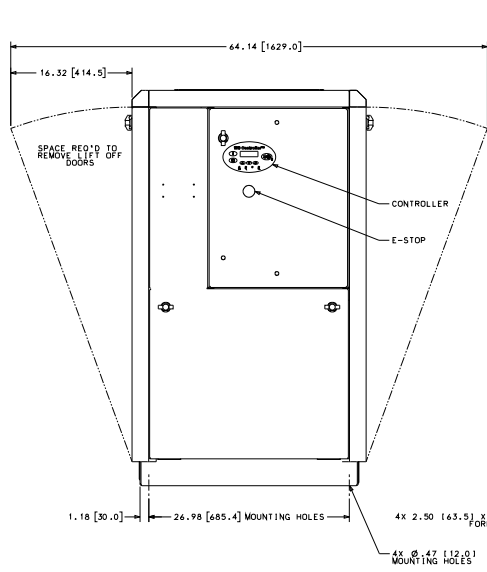
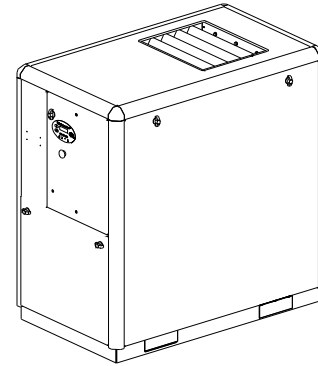
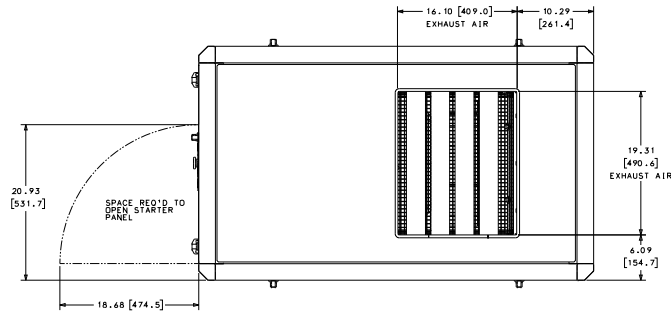
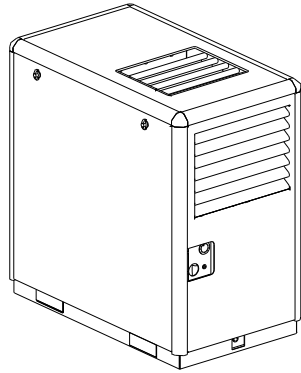
3.3 APPLICATION GUIDE

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

3.4 LUBRICATION CHANGE RECOMMENDATIONS AND MAINTENANCE—FLUID FILTER AND SEPARATOR

LUBRICANT	FLUID CHANGE	FLUID FILTER CHANGE	SEPARATOR CHANGE
Sullube (2.5 gal)	A,E	G,C	A,D
SRF 1/4000 (2.5 gal)	B,E	G,C	B,D
24KT (2.5 gal)	F,E	G,C	A,D
CP-4600-32-F (2.5 gal)	B,E	G,C	B,D
<p>A - 8,000 hours or once a year. B - 4,000 hours or more frequently if conditions so require. C - When measured pressure loss exceeds 20 psig (1.3 bar). D - When measured pressure loss exceeds 10 psig (0.7 bar). E - When required by fluid analysis or known contamination. F - Does not require replacement during normal service conditions. G - Every 2,000 hours.</p>			

3.5 IDENTIFICATION, AIR-COOLED



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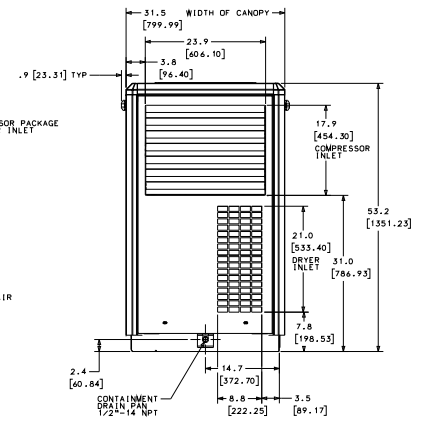
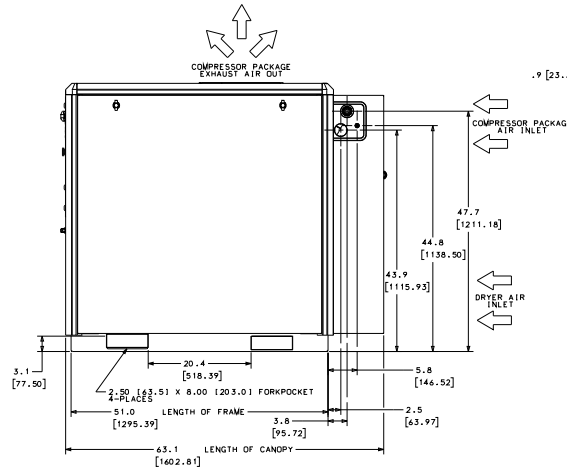
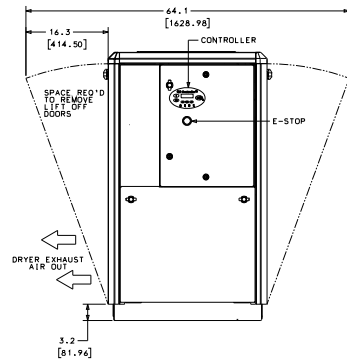
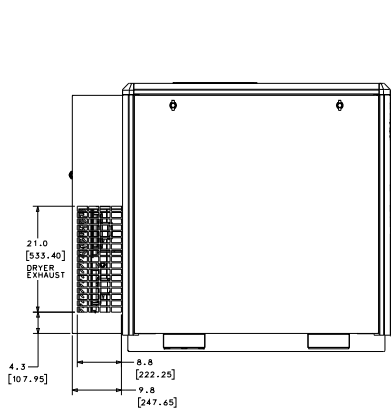
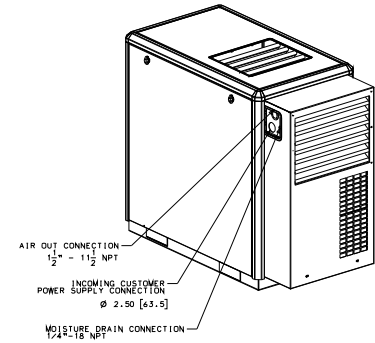
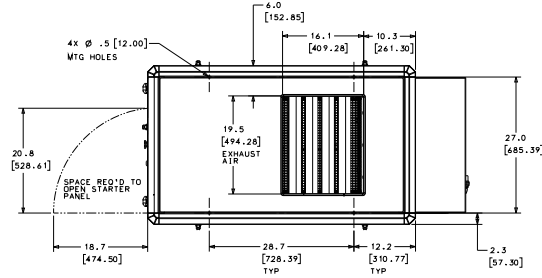
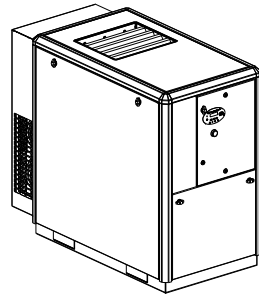
3.5 IDENTIFICATION, AIR-COOLED

Main Motor HP	Motor Type	Weight	CFM Cooling Air
15	TEFC	1044 LBS/474 KG	2000 CFM
20	TEFC	1098 LBS/498 KG	2000 CFM
25	TEFC	1122 LBS/509 KG	2000 CFM

NOTES:

1. Allow 4.00 ft. (1.25 meters) minimum clearance around machine for access and free circulation of air.
2. A foundation or mounting capable of supporting the weight of package, and rigid enough to maintain the compressor frame level is required. The compressor frame must be leveled and secured between the frame and the foundation. No piping loads must be permitted at external connections.
3. All dimensions are $\pm 1/2"$ (12.7mm).
4. Recommended incoming customer power supply is shown on drawing.
5. If ductwork is to be installed for cooling air, high static fan must be selected. Maximum allowable additional static pressure 0.4 in H₂O with high static fan.

3.5 IDENTIFICATION, AIR-COOLED WITH INTEGRAL DRYER



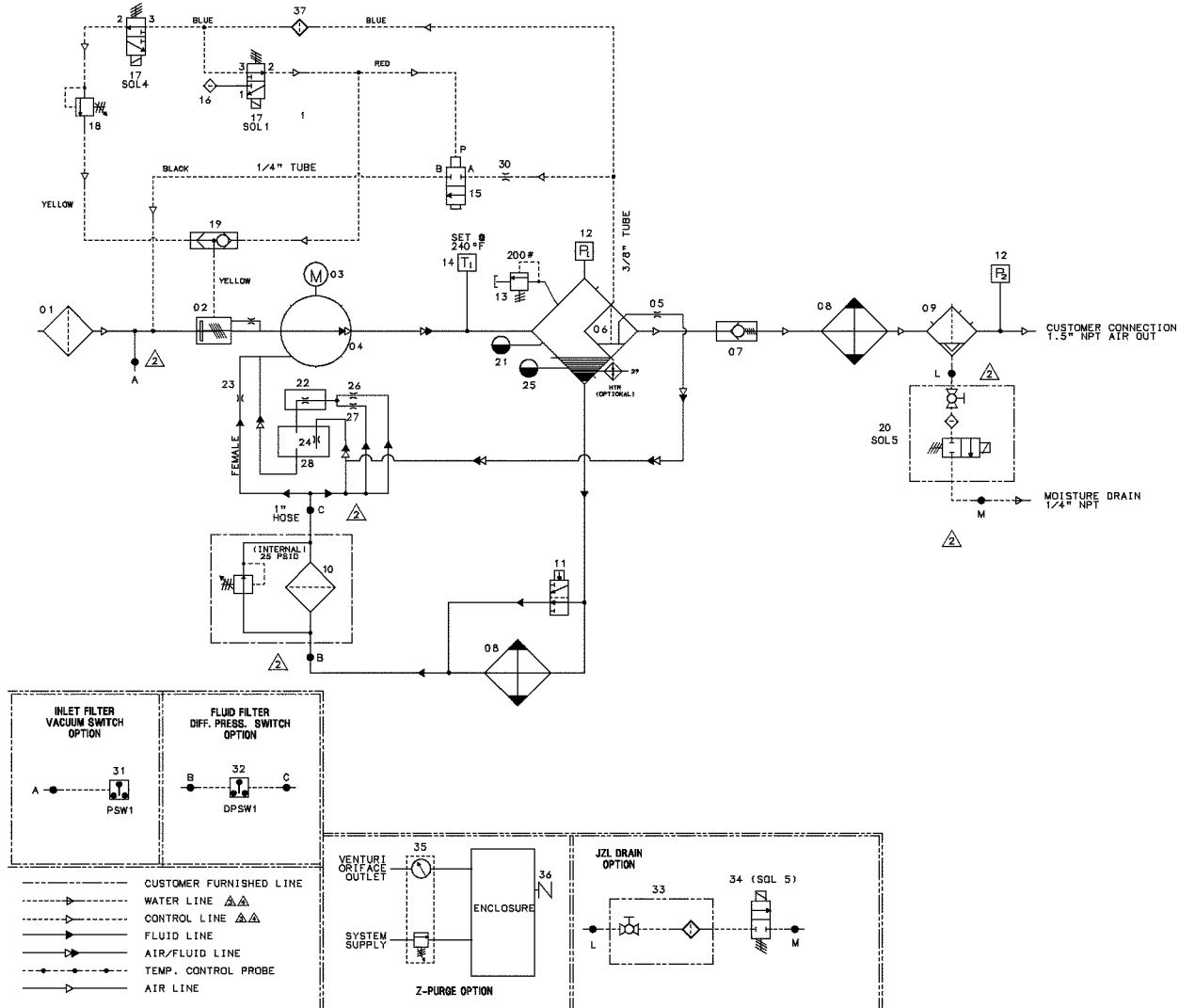
3.5 IDENTIFICATION, AIR-COOLED WITH INTEGRAL DRYER

Main Motor HP	Motor Type	Weight	CFM Cooling Air
15	TEFC	1194 LBS/542 KG	2000 CFM
20	TEFC	1248 LBS/566 KG	2000 CFM
25	TEFC	1323 LBS/600 KG	2000 CFM

NOTES:

1. Allow 4.00 ft. [1.25 Meters] minimum clearance around machine for access and free circulation of air.
2. A foundation or mounting capable of supporting the weight of package, and rigid enough to maintain the compressor frame level is required. The compressor frame must be levelled and secured between the frame and the foundation. No piping loads must be permitted at external connections.
3. All dimensions are $\pm 1/2$ " [12.7Mm].
4. Recommended incoming customer power supply is shown on drawing.
5. If ductwork is to be installed for cooling air, high static fan must be selected. Max allowable additional static pressure 0.4 In H2O with high static fan.

3.6 PIPING AND INSTRUMENTATION, AIR-COOLED



02250157-525-R06



3.6 PIPING AND INSTRUMENTATION, AIR-COOLED

KEY NO.	PART NO.	QTY	DESCRIPTION
1	02250135-365	1	FILTER, AIR 6" (PLASTIC)
2	-	1	VALVE, GROUP INLET DXX102E
3	MTR_VAR	1	MOTOR
4	-	1	COMPRESSOR
5	02250157-679	1	TUBE, SEP OIL RETURN ES8
6	02250106-789	1	ELEMENT,SEPARATOR AIR/OIL
7	02250046-338	1	VALVE, MIN PRESS GROUP EO8E
8	02250154-741	1	COOLER, AIR/OIL ES8 15-25 HP
9	02250166-732	1	SEP,WTR SCWS-85N 3/4" L/AD
10	02250156-599	1	FILTER, CORELESS M27 3"L
11	02250092-081	1	VLV,THERMAL 195F 1-1/2-18
12	02250155-174	2	XDCR,PRESS 0-250PSI 1-5VDC N4
13	250006-938	1	VALVE, RELIEF 1/2" 200#
14	02250155-175	1	PROBE,THERMISTER 3000 OHM NTC 6'L
15	02250049-634	1	VLV,BLWDN 1/4 NPT HI PRS
16	02250173-972	2	FLTR,PNEUMATIC 1/8"NPT 5MICRON
17	02250125-657	2	VALVE,SOL 3WNO 1/4 235# N4
18	250017-280	1	VALVE, PRESSURE REGULATOR
19	408893	1	VALVE, SHUTTLE 1/4" (DBL CHK)
20	02250170-783	1	VLV,DR COMBO 24 VDC
21	02250097-610	1	PLUG,SIGHT GLASS 1 5/16" SAE
22	-	1	ROTOR INLET END BEARINGS
23	-	1	FEMALE INJECTION
24	-	1	GEAR LUBE SUPPLY
25	02250097-611	1	PLUG, SIGHT GLASS 1 7/8" SAE
26	-	1	FEMALE BLOCKING
27	-	1	MALE BLOCKING
28	-	1	GEAR BOX

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

KEY NO.	PART NO.	QTY	DESCRIPTION
29	02250061-862	1	HTR, BAND SCOW 115V (OPTIONAL)
30	02250118-589	1	ORF, .125" .25FNPT*.25MNPT
31	02250078-249	1	SW,VAC 22"WV N4 6FT CABLE 5A
32	02250050-154	1	SW,DIFF PRESS 20 PSID
33	02250182-548	1	VLV,BALL/STNR COMBO-1/2"NPT
34	02250182-545	1	DRN,ZERO LOSS 115V 1/2"NPT
35	02250169-612	1	GA,DIFF PRESS Z-PRG ASY BTM
36	02250168-837	1	VENT,ENCL PROT 1/2" TOP
37	241771	1	STRAINER, V-TYPE 300PSIX1/4

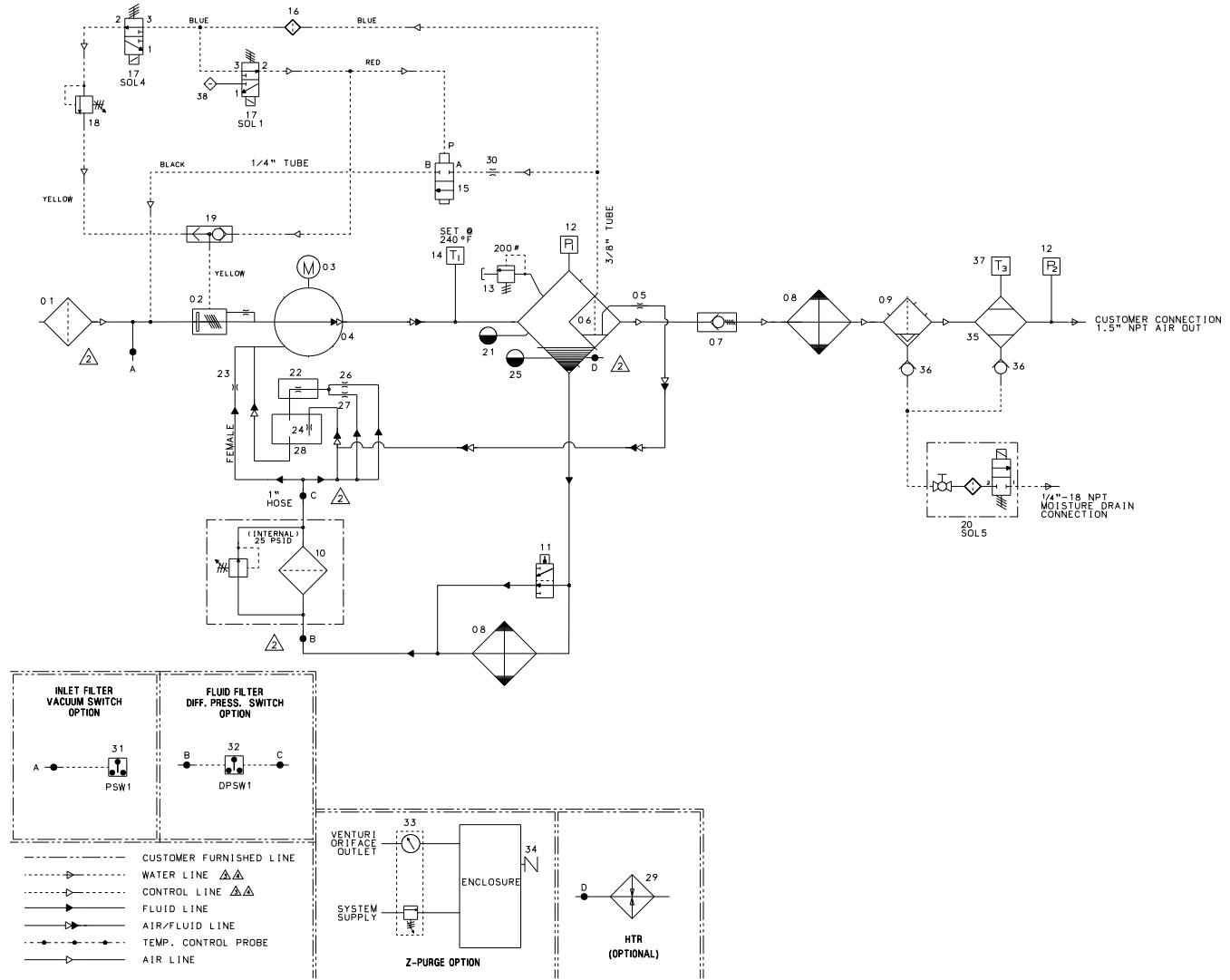
PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

COMPONENT	DESCRIPTION
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
DPSW1	FLUID FILTER DIFFERENTIAL SWITCH
PSW1	INLET AIR FILTER SWITCH 22" WC (558.9mm WC)
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	ELECTRIC DRAIN SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE

Notes:

1. Part numbers are for reference only. Refer to bill of material and or face of order for actual parts.
2. Section between lettered points are to be replaced with corresponding option pictured below, as required by face of order.
3. Control/moisture drain lines are 1/4" tubing except as noted.

3.7 PIPING AND INSTRUMENTATION, AIR-COOLED WITH INTEGRAL DRYER



02250172-797-R01



3.7 PIPING AND INSTRUMENTATION, AIR-COOLED WITH INTEGRAL DRYER

KEY NO.	PART NO.	QTY	DESCRIPTION
1	02250125-365	1	FILTER,AIR INLET 6" (PLASTIC)
2	-	1	VALVE, GROUP INLET DXX102E
3	MTR_VAR	1	MOTOR
4	-	1	COMPRESSOR
5	02250157-679	1	TUBE, SEP OIL RETURN ES8
6	02250106-789	1	ELEMENT, SEPARATOR AIR/OIL
7	02250046-338	1	VALVE, MIN PRESS GROUP E08E
8	02250154-741	1	COOLER, AIR/OIL ES8 15-25 HP
9	02250167-115	1	SEP, WTR SCWS-85N 3/4" L/AD
10	02250156-599	1	FILTER, CORELESS M27 3" L
11	02250092-081	1	VLV, THERMAL 195F 1-1/2-18
12	02250155-174	2	XDCR, PRESS 0-250 PSI 1-5 VDC N4
13	250006-938	1	VALVE, RELIEF 1/2" 200#
14	02250155-175	1	PROBE, THERMISTER 3000 OHM NTX 6"L
15	02250049-634	1	VLV, BLWDN 1/4 HI PRES
16	241771	1	STRAINER,V-TYPE 300PSIX1/4
17	02250155-714	2	VALVE, SOL 3WNO 1/4 235# N4
18	250017-280	1	VALVE, PRESSURE REGULATOR
19	408893	1	VALVE, SHUTTLE 1/4" (DBL CHK)
20	02250170-783	1	VLV, DR COMBO 24 VDC
21	02250097-610	1	PLUG, SIGHT GLASS 1 5/16" SAE
22	-	1	ROTOR INLET END BEARINGS
23	-	1	FEMALE INJECTION
24	-	1	GEAR LUBE SUPPLY
25	02250097-611	1	PLUG, SIGHT GLASS 1 7/8" SAE
26	-	1	FEMALE BLOCKING
27	-	1	MALE BLOCKING
28	-	1	GEAR BOX
29	02250061-862	1	HTR, BAND SCOW 115V (OPTIONAL)
30	02250118-589	1	ORF, .125" .25FNPT .25 MNPT
31	02250078-249	1	SW,VAC 22"WC N4 6FT CABLE 5A
PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR			

KEY NO.	PART NO.	QTY	DESCRIPTION
32	02250050-154	1	SW, DIFF PRESS 20 PSID
33	02250169-612	1	GA,DIFF PRESS Z-PRG ASY BTM
34	02250168-837	1	VENT,ENCL PROT 1/2" TOP
35	-	1	INTEGRAL REFRIGERANT DRYER
36	044905	2	CHECK VALVE
37	02250175-087	1	STRAINER,V-TYPE 300PSIX1/4
38	02250173-972	1	FLTR,PNEUMATIC 1/8"NPT 5MICRON
PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR			

COMPONENT	DESCRIPTION
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
DPSW1	FLUID FILTER DIFFERENTIAL SWITCH
PSW1	INLET AIR FILTER SWITCH 22" WC (558.9mm WC)
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	COMBO DRAIN/JZL DRAIN SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE

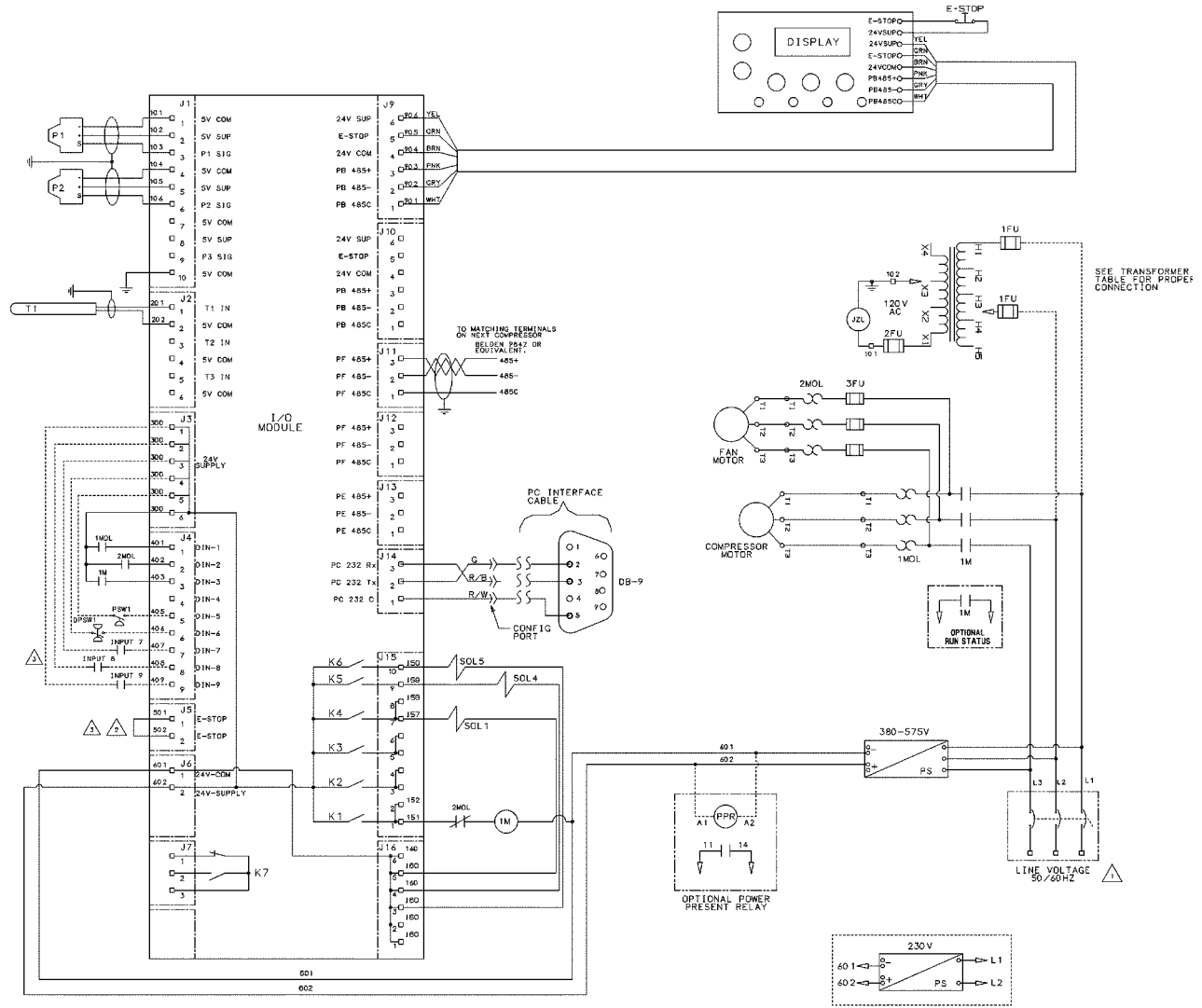
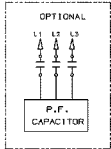
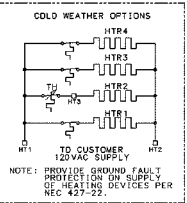
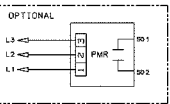
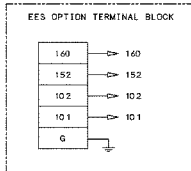
NOTES	
1	PART NUMBERS ARE FOR REFERENCE ONLY. REFER TO BILL OF MATERIAL AND OR FACE OF ORDER FOR ACTUAL PARTS.
2	SECTION BETWEEN LETTERED POINTS ARE TO BE REPLACED WITH CORRESPONDING OPTION PICTURED BELOW, AS REQUIRED BY FACE OF ORDER.
3	CONTROL/MOISTURE DRAIN LINES ARE 1/4" TUBING EXCEPT AS NOTED.
PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR	

3.8 WIRING DIAGRAM, AIR-COOLED MFV

- NOTES**
- ⚠ CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER ILLCA CODES.
 - ⚠ REMOVE JUMPER FOR AIR-STOP STRING DEVICES.
 - ⚠ USE ISOLATING RELAYS WITH WRY CONTACTS FOR ANY ADDITIONAL INPUTS TO THE WS CONTROLLER. MOUNT THE RELAY LOCALLY IN THE STARTER BOX.

TRANSFORMER CONNECTIONS

PRIMARY VOLTS	SECONDARY VOLTS	PRIMARY TAPS	SECONDARY TAPS
220	H1-H2	110	X1-X4
220	H1-H2	110	X1-X3
230	H1-H2	115	X1-X3
240	H1-H2	120	X1-X3
380	H1-H3	110	X1-X3
400	H1-H3	115	X1-X3
415	H1-H3	120	X1-X3
440	H1-H4	110	X1-X3
480	H1-H4	120	X1-X3
480	H1-H4	115	X1-X3
500	H1-H5	110	X1-X4
525	H1-H5	115	X1-X4
550	H1-H5	110	X1-X3
575	H1-H5	115	X1-X3
600	H1-H5	120	X1-X3



3.8 WIRING DIAGRAM, AIR COOLED MFV

COMP	DESCRIPTION
1MOL	COMPRESSOR OVERLOAD
1M	COMPRESSOR STARTER
2MOL	FAN MOTOR OVERLOAD
P1	WET SUMP PRESSURE SENSOR
P2	PACKAGE DISCHARGE PRESSURE SENSOR
T1	UNIT DISCHAGE TEMPERATURE PROBE
PSW1	(OPT'L)INLET AIR FILTER SWITCH 558.9 MM WC - 22 IN WC
DPSW1	(OPT'L)OIL FILTER DIFF PRESS SWITCH 20PSID
INPUT 7	REMOTE RUN/UNLOAD
INPUT 8	CUSTOMER FURNISHED FAULT
INPUT 9	CUSTOMER FURNISHED WARNING
SOL1	LOAD CONTROL SOLENOID VALVE
SOL4	SEQUENCEING SOLENOID VALVE
SOL5	ELECTRIC CONDENSATE DRAIN VALVE
PS	24VDC POWER SUPPLY
K1	INTERNAL RUN RELAY CONTACT
K2	INTERNAL Y-DELTA START RELAY
K3	INTERNAL WYE-DELTA RUN RELAY
K4	INTERNAL LOAD CONTROL RELAY
K5	INTERNAL SEQUENCE RELAY
K6	INTERNAL ELECTRIC DRAIN RELAY
K7	INTERNAL COMMON FAULT RELAY
PMR	OPT'L POWER MONITOR RELAY
PF CAP	POWER FACTOR CORRECTION CAPACITOR (OPT'L)
HTR1	(OPT'L) SUMP HEATER 800W
HTR2	(OPT'L) HEAT TRACE
HTR3	(OPT'L) TRAP HEATER 70WATTS
HTR4	(OPT'L) CONTROL PANEL HEATER 50WATTS
TH	THERMOSTAT FOR HEAT TRACE OPTION
1FU	JZL TRANSFORMER PRIMARY FUSES

COMP	DESCRIPTION
2FU	JZL TRANSFORMER SECONDARY FUSE
3FU	FAN MOTOR BRANCH FUSES
JZL	JZL DRAIN OPTION
PPR	POWER PRESENT RELAY OPTION

NOTES

- 1 CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER LOCAL CODES.
- 2 REMOVE JUMPER FOR AUXILLIARY E-STOP STRING DEVICES.
- 3 1MOL SETTING TO BE 1M FLA. PLUS 2M FLA.
- 4 USE ISOLATING RELAYS WITH DRY CONTACTS FOR ANY OPTIONAL INPUTS TO THE WS CONTROLLER. MOUNT THE RELAY LOCALLY IN THE STARTER BOX.

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

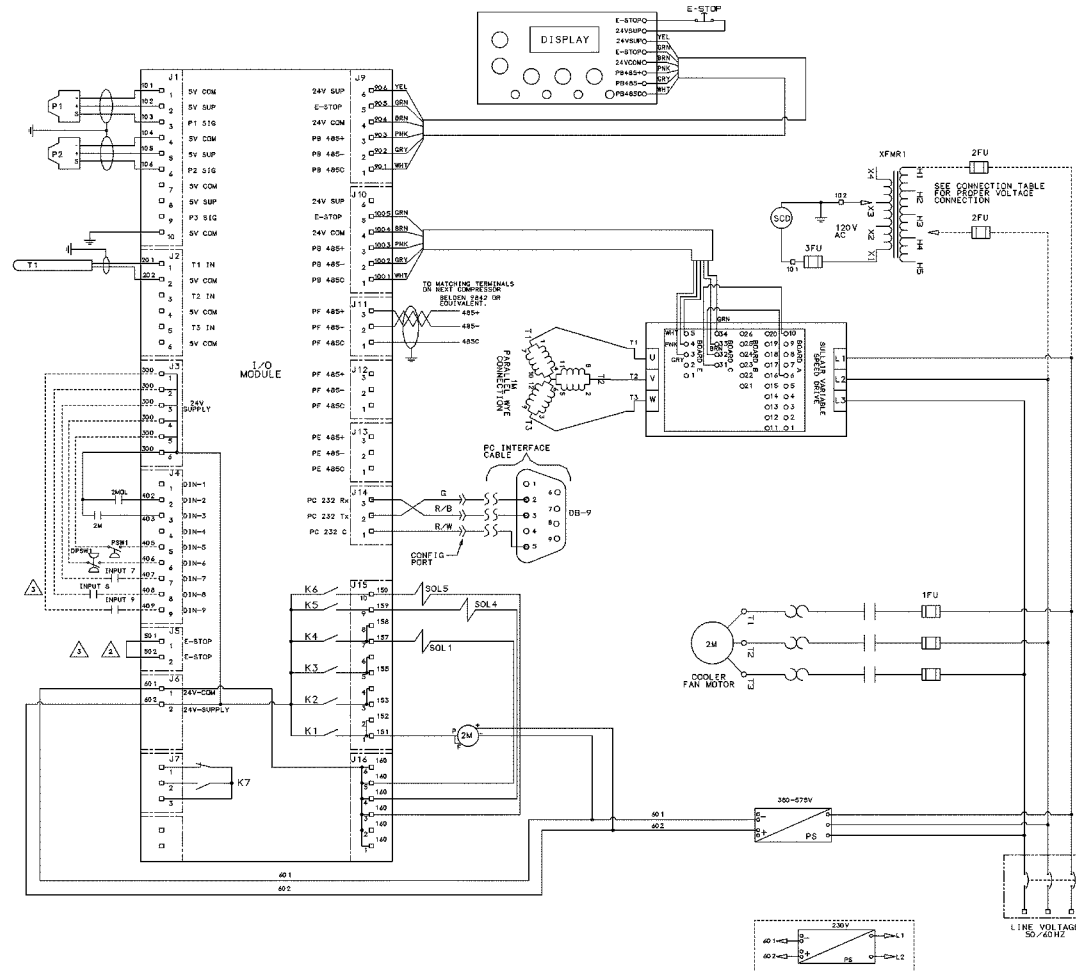
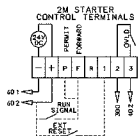
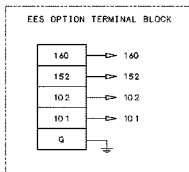
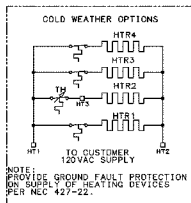
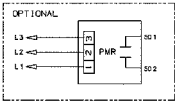
3.9 WIRING DIAGRAM, VSD PARALLEL WYE

TRANSFORMER CONNECTIONS

PRIMARY		SECONDARY	
VOLTS	TAPS	VOLTS	TAPS
200	HI-H2	110	X1-X4
220	HI-H2P	110	X1-X3
230	HI-H2	115	X1-X3
240	HI-H2	120	X1-X3
380	HI-H3	110	X1-X3
400	HI-H3	115	X1-X3
415	HI-H3	120	X1-X3
440	HI-H4	110	X1-X3
480	HI-H4	120	X1-X3
480	HI-H4	115	X1-X3
500	HI-H5	110	X1-X4
525	HI-H5	115	X1-X4
550	HI-H5	110	X1-X3
575	HI-H5	115	X1-X3
600	HI-H5	120	X1-X3

NOTES

- ⚠ CUSTOMER TO FURNISH FUSED DISCONNECT BREAKER DISCONNECT PER LOCAL CODES
- ⚠ REMOVE JUMPER FOR SIZEABLE PULSED STARTING DEVICES
- ⚠ USE ISOLATING RELAYS WITH DRY CONTACTS AND/OR OPTIONAL CONTACT INPUTS TO THE VSD CONTROLLER. MOUNT THE RELAY LOCALLY IN THE STARTER BOX.



3.9 WIRING DIAGRAM, VSD PARALLEL WYE

COMP	DESCRIPTION
1M	COMPRESSOR MOTOR
2M	COOLER FAN MOTOR STARTER
2MOL	FAN MOTOR OVERLOAD
1FU	FAN MOTOR BRANCH CIRCUIT FUSES
2FU	SCD TRANSFORMER PRIMARY FUSES
3FU	SCD TRANSFORMER SCONDARY FUSE
P1	WET SUMP PRESSURE SENSOR
P2	PACKAGE DISCHARGE PRESSURE SENSOR
T1	UNIT DISCHAGE TEMPERATURE PROBE
PSW1	(OPT'L)INLET AIR FILTER SWITCH 558.9 MM WC - 22 IN WC
DPSW1	(OPT'L)OIL FILTER DIFF PRESS SWITCH 20PSID
INPUT 7	REMOTE RUN/UNLOAD
INPUT 8	CUSTOMER FURNISHED FAULT
INPUT 9	CUSTOMER FURNISHED WARNING
SOL1	LOAD CONTROL SOLENOID VALVE
SOL4	SEQUENCEING SOLENOID VALVE
SOL5	ELECTRIC CONDENSATE DRAIN VALVE
PS	24VDC POWER SUPPLY
K1	INTERNAL FAN RELAY CONTACT TEMP (T1) CONTROLLED
K2	INTERNAL Y-DELTA START RELAY COMPRESSOR RUNNING
K3	INTERNAL WYE-DELTA RUN RELAY COMPRESSOR ENABLED
K4	INTERNAL LOAD CONTROL RELAY
K5	INTERNAL SEQUENCE RELAY
K6	INTERNAL ELECTRIC DRAIN RELAY
K7	INTERNAL COMMON FAULT RELAY
PMR	OPT'L POWER MONITOR RELAY
HTR1	(OPT'L) SUMP HEATER 800W
HTR2	(OPT'L) HEAT TRACE
HTR3	(OPT'L) TRAP HEATER 70WATTS

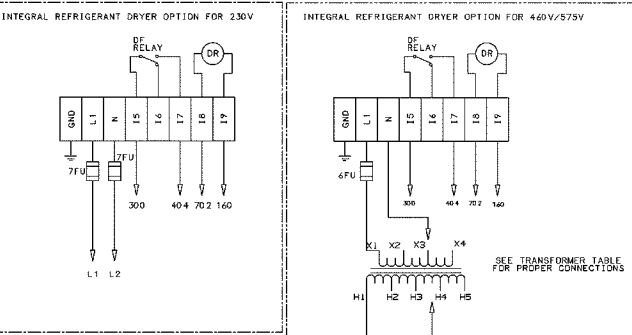
COMP	DESCRIPTION
HTR4	(OPT'L) CONTROL PANEL HEATER 50WATTS
TH	THERMOSTAT FOR HEAT TRACE OPTION
XFMR1	CONTROL TRANSFORMER FOR SCD DRAIN
SCD	(OPT'L) SCD DRAIN

NOTES

- 1 CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER LOCAL CODES.
- 2 REMOVE JUMPER FOR AUXILLIARY E-STOP STRING DEVICES.
- 3 USE ISOLATING RELAYS WITH DRY CONTACTS FOR ANY OPTIONAL INPUTS TO THE WS CONTROLLER. MOUNT THE RELAY LOCALLY IN THE STARTER BOX.

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

3.10 WIRING DIAGRAM MFV WITH INTEGRAL DRYER

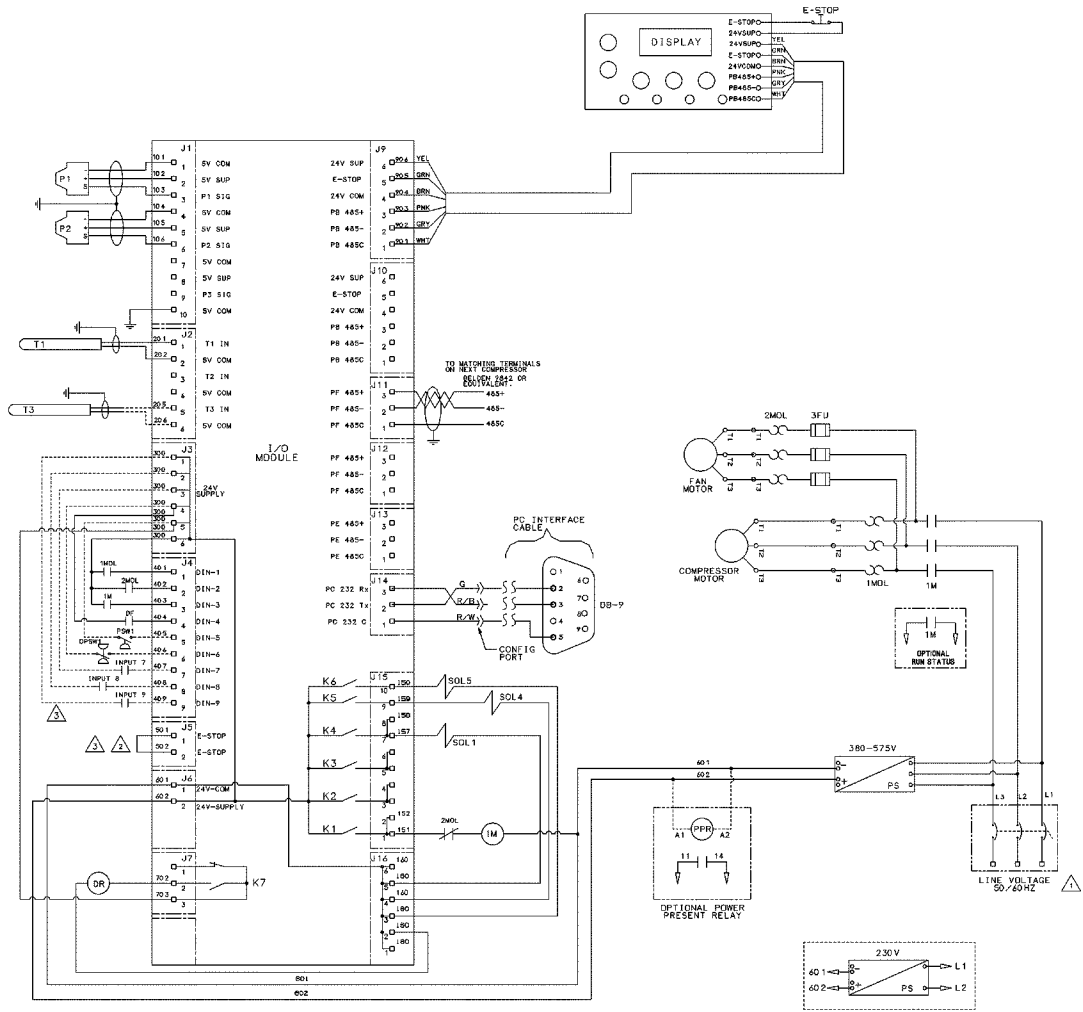
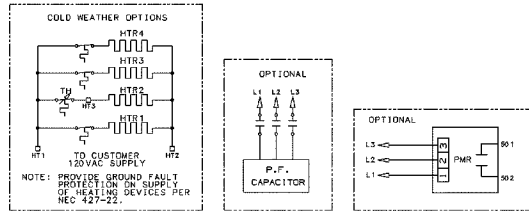


PRIMARY VOLTS	CONNECT PRIMARY LINES TO	INTERCONNECT
190	H1 & H7	H1-H6, H2-H7
200	H1 & H8	H1-H6, H3-H8
208	H1 & H9	-
230	H1 & H10	H1-H6, H5-H10
300	H1 & H7	H2 - H6
400	H1 & H8	H3 - H6
416	H1 & H9	H4 - H6
440	H1 & H10	H5 - H6
480	H1 & H4	H2 - H3
600	H1 & H6	-

SECONDARY VOLTS	CONNECT SECONDARY LINES TO	INTERCONNECT
230	X1 & X4	X2 - X3

SEE TRANSFORMER TABLE FOR PROPER CONNECTIONS

LINE VOLTAGE 60/40HZ



- NOTES
- ⚠ CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER LOCAL CODES.
 - ⚠ REMOVE JUMPER FOR AUXILIARY E-STOP STRING DEVICES.
 - ⚠ USE ISOLATING RELAYS WITH DR CONTACTS FOR ANY OPTIONAL INPUTS TO THE MC CONTROLLER. MOUNT THE RELAY LOCALLY IN THE STARTER BOX.

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3.10 WIRING DIAGRAM MFV WITH INTEGRAL DRYER

COMP	DESCRIPTION
1MOL	COMPRESSOR OVERLOAD
1M	COMPRESSOR STARTER
2MOL	FAN MOTOR OVERLOAD
P1	WET SUMP PRESSURE SENSOR
P2	PACKAGE DISCHARGE PRESSURE SENSOR
T1	UNIT DISCHARGE TEMPERATURE PROBE
T3	DRYER DEWPOINT TEMPERATURE PROBE
PSW1	(OPT'L)INLET AIR FILTER SWITCH 558.9 MM WC - 22 IN WC
DPSW1	(OPT'L)OIL FILTER DIFF PRESS SWITCH 20PSID
INPUT 7	REMOTE RUN/UNLOAD
INPUT 8	CUSTOMER FURNISHED FAULT
INPUT 9	CUSTOMER FURNISHED WARNING
SOL1	LOAD CONTROL SOLENOID VALVE
SOL4	SEQUENCEING SOLENOID VALVE
SOL5	ELECTRIC CONDENSATE DRAIN VALVE
PS	24VDC POWER SUPPLY
K1	INTERNAL RUN RELAY CONTACT
K2	INTERNAL Y-DELTA START RELAY
K3	INTERNAL WYE-DELTA RUN RELAY
K4	INTERNAL LOAD CONTROL RELAY
K5	INTERNAL SEQUENCE RELAY
K6	INTERNAL ELECTRIC DRAIN RELAY
K7	INTERNAL COMMON FAULT RELAY
PMR	OPT'L POWER MONITOR RELAY
PF CAP	POWER FACTOR CORRECTION CAPACITOR (OPT'L)
HTR1	(OPT'L) SUMP HEATER 800W
HTR2	(OPT'L) HEAT TRACE
HTR3	(OPT'L) TRAP HEATER 70WATTS
HTR4	(OPT'L) CONTROL PANEL HEATER 50WATTS
TH	THERMOSTAT FOR HEAT TRACE OPTION

COMP	DESCRIPTION
3FU	FAN MOTOR BRANCH FUSES
6FU	INTEGRAL DRYER SECONDARY FUSE
7FU	INTEGRAL DRYER PRIMARY FUSES
PPR	POWER PRESENT RELAY OPTION
DF	DRYER FAULT
DR	DRYER START RELAY

NOTES	
1	CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER LOCAL CODES.
2	REMOVE JUMPER FOR AUXILLIARY E-STOP STRING DEVICES.
3	1MOL SETTING TO BE 1M FLA. PLUS 2M FLA.
4	USE ISOLATING RELAYS WITH DRY CONTACTS FOR ANY OPTIONAL INPUTS TO THE WS CONTROLLER. MOUNT THE RELAY LOCALLY IN THE STARTER BOX.
PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR	

NOTES

Section 4

INSTALLATION

4.1 MOUNTING OF COMPRESSOR

A suitable foundation or fabricated support must be established to support the compressor. It should be rigid enough to keep the compressor frame level and maintain alignment of the compressor and motor. Tie-down bolts of sufficient size must be used to provide uniform contact between the foundation and the compressor frame. Materials such as rubber or cork can be used to provide uniform contact between the foundation and compressor frame.

- Piping loads must be eliminated through the use of flex connectors or other systems which prevent piping loads from being transmitted to the compressor.
- Special consideration should be made to meet national and local electrical codes for the required space around and in front of the electrical panel. Lighting should be provided for future service requirements.
- Accessibility for fork lift trucks, overhead cranes and maintenance vehicles should be given careful consideration in order to provide any maintenance that may be required. Adequate space around the unit should be provided for access to all components of the compressor.
- Softer surfaces in walls or ceilings will absorb sound and minimize ambient noise levels. Harder, reflective surfaces will increase ambient noise levels.

NOTE

Ambient temperatures above 104°F (40°C) require that the high ambient option is specified for the compressor.

4.2 VENTILATION AND COOLING

AIR-COOLED COMPRESSORS

- An area with adequate space must be provided for the compressor and its components. Air-cooled compressors require a minimum of 4 feet (1.25 meter) around the perimeter of the compressor.
- The location should be free from standing water and allow access to clean air that is free from exhaust and paint fumes, dust, metal filings or caustic chemicals.
- Cooling air should be removed from the area in order to prevent the re-introduction of heated exhaust air back into the compressor's cooling system.
- Reduced headroom above the compressor will require that cooling air be either ducted or in some way deflected away from the compressor. Inadequate ventilation will result in higher ambient operating temperatures.

NOTE

Systems that employ both a conventional reciprocating compressor and a screw-type axial compressor must be isolated from each other by use of a common receiver tank. Individual airlines from each compressor should be piped to the common receiver tank.

NOTE

Shipping straps are painted red in order to help identify them for removal. Be sure to remove them prior to operation of the compressor.

OUTDOOR INSTALLATION (SHELTERED)

Many times a compressor must be installed outside due to available space or other jobsite conditions. When this is necessary, there are certain items that should be incorporated into the system to help ensure trouble-free operation. The unit must be purchased with a TEFC motor. The standard machine has NEMA 4 rated controls, which are watertight.

NOTE

Variable speed drive compressors are NEMA 12 rated and must not be installed outside or exposed to the elements.

The compressor should be on a concrete pad, which is designed to drain water away from it. If the concrete pad is sloped, then the compressor must be mounted so that it is level. The base or skid must be sealed where it contacts the concrete pad.

A weatherhood option should be selected to prevent direct rain and snow from falling on the unit. If local weather conditions can be extreme such that direct rain or snow may fall on the unit, it should be in a fully enclosed room or building.

If installed under a shelter, air-cooled machines must be positioned in a way that prevents air recirculation (i.e., hot exhaust being allowed back to the system air inlet).

In installations that include more than one compressor, hot air exhaust should not be directed toward the fresh air intake of the second unit or an air dryer.

A standard machine installed outside must not be started or run if the ambient temperature in and around the compressor drops or may drop below 35°F (1.7°C).

NOTE

Compressors with integral dryers can be damaged by ambient temperatures below freezing. The dryer electrical system is Nema 12 rated and should not be installed outdoors or in an unheated space, subject to freezing temperatures.

For installation in a below freezing climate, a low ambient option with heat tracing and a separator/ sump heater must be installed.

4.3 SERVICE AIR PIPING

Review carefully the total air system before installing a new compressor. Items to consider for the total air system include liquid carryover, pipe sizing, and the use of an auxiliary receiver tank. The installation of a drip leg or multiple drip legs, installation of a line filter(s) and the installation of isolation valve or valves. These considerations are important to ensure a safe and effective system. See *Figure 4-1*.

NOTE

Discharged air contains a very small amount of compressor lubricating oil, and care should be taken to ensure that this oil would not interfere with downstream equipment.

PIPE SIZING

Pipe should be sized at least as large as the discharge connection of the compressor. Piping and fittings should all be suitably rated for the discharge pressure.

Use of Auxiliary Receiver Tank

An auxiliary receiver tank should be used in cases where large demand swings are expected. This is not necessary with a variable speed design.

ISOLATION VALVE(S)

If isolation of the compressor from the service lines is required, isolation valves should be installed close to the discharge of the compressor. They should be installed with drip legs that drain sloping downward from the base in order to drain properly. Install a vent to the piping downstream of the minimum pressure check valve on the separator, and upstream of the first isolation valve.

When two compressors are operated in parallel, provide an isolation valve and a drain trap for each compressor before the common separator/sump.

A built-in after-cooler reduces the discharge air temperature below the dew point. For most ambient conditions, considerable water vapor is condensed. To remove the condensation, each compressor with built-in after-cooler is supplied with a combination condensate separator/trap. A drain line should be installed on the condensate drain.

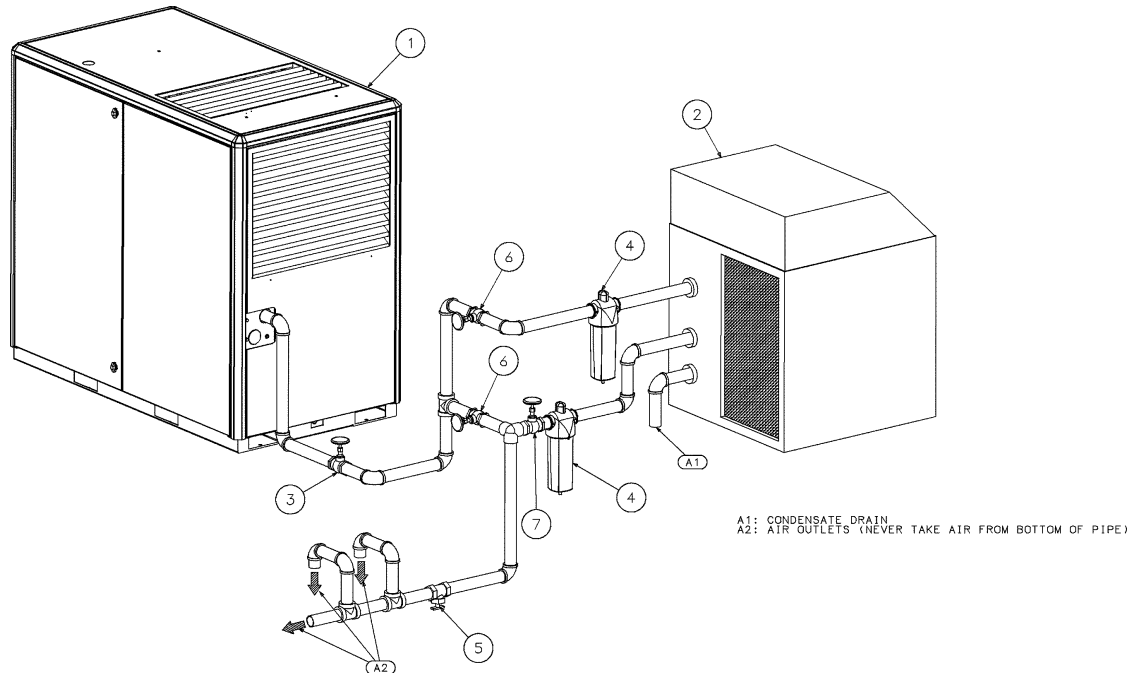


Figure 4-1: Service Air Piping, Typical Installation

- | | |
|------------------------|--------------------------|
| 1. Sullair Compressor | 5. Water Leg Drain Valve |
| 2. Sullair Dryer | 6. By-Pass Gate Valve |
| 3. Shut-Off Gate Valve | 7. Standard Gate Valve |
| 4. Sullair Filter | |

FLUID CONTAINMENT

Compressors are equipped with a fluid containment pan to catch any fluid in the event of a leak or spill. The drain for the pan is located on the air intake end of the machine. For indoor installations, the drain should be plugged to contain fluids. For outdoor applications, the drain must be connected to a separate, customer supplied system to allow rainwater or any accumulated compressor fluid to drain out.

4.4 COUPLING ALIGNMENT CHECK

No coupling alignment is required; this machine is directly driven.

4.5 FLUID LEVEL CHECK

The air compressor is shipped with the proper amount of fluid installed. However, it is necessary to

check the fluid level at the time of installation and during continued operation of the compressor. The fluid level is to be checked when the compressor is in the SHUT DOWN MODE (fluid level may not be visible when operating), and by looking at the sight glass on the separator/sump. To be able to see the fluid level it may be necessary to start the machine and build the separator/sump pressure up to 10/20 psi and then shut down. If no fluid level is seen in the sight glass add fluid to the center of the glass. Do not overfill in any case. When a complete fluid change is performed, fill the separator/sump to the maximum allowable fluid level.

4.6 ELECTRICAL PREPARATION

Interior electrical wiring is performed at the factory. Required customer wiring 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.

⚠ CAUTION

The use of plastic bowls on line filters and other plastic airline components without metal guards can be hazardous. Synthetic coolants or the additives used in mineral oils can alter their structural integrity and create hazardous conditions. Metal bowls should be used on any pressurized system for safety concerns.

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

Sullube should not be used with PVC piping systems. It may affect the bond at cemented joints. Certain other plastic materials may also be affected. (I) Plastic Pipe Institute, Recommendation B, Adopted January 19, 1972.

NOTE

Customer must provide electrical supply power disconnect within sight of machine. The fuse protecting the circuit and the compressor must be selected in accordance with the data provided in the general information section.

- The compressor and drive should be provided with a proper grounding conductor/earthed in accordance with both local and National Electrical Code (NEC) requirements.
- Installation of this compressor must be in accordance with recognized electrical codes and any local Health and Safety Codes.
- Feeder cables should be sized by the customer/ electrical contractor to ensure that the electrical circuit the system is connected to is balanced and not overloaded by any other electrical equipment. The length of wiring from a suitable electrical feed point is critical as voltage drop may impair the performance of the compressor.

- Feeder cable connections to incoming terminals L1- L2-L3 should be tight and clean.

The applied voltage must be compatible with the motor and compressor data plate ratings.

- A starter hole is provided for incoming power connection. If it is necessary to make a hole in the control box in a different location, care should be taken to not allow metal shavings to enter the starter and other electrical components. If another hole is used, the original hole must be blocked off with a suitable knockout seal.
- A few electrical checks should be made to help assure that the first start-up will be trouble-free.

⚠ DANGER

Lethal shock hazards exist inside. Disconnect all power at source and lock out before opening or servicing.

1. Check incoming voltage. Be sure that the compressor is wired for the correct incoming voltage.
2. Check the motor starter for correct size, properly sized overload relay, and correct heaters for the load.
3. Check all electrical connections for tightness. Check all grounding connection for bond.
4. "DRY RUN" the electrical controls by disconnecting the three (3) motor leads from the starter. Energize the control circuits by pressing the "I" (START) pad, and check all protective devices to be sure that they will de-energize the starter coil when tripped.
5. Reconnect the motor leads and jog the motor for a direction of rotation check as explained in *MOTOR ROTATION DIRECTION CHECK* on page 47. Wiring diagram for standard compressors is supplied with the machine.

4.7 MOTOR ROTATION DIRECTION CHECK

Motor rotation check must be made at compressor startup. See *Figure 4-3*. The compressor will not operate correctly if it runs in the wrong direction. Open the compressor door to view the 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 “**ⓘ**” (START) and “**Ⓞ**” (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 drive housing to show proper motor/compressor rotation. An alternative to this procedure is to set the WS Controller to display P1 separator/ sump pressure. Pull out the EMERGENCY STOP button and press once, quickly and in succession, the “**ⓘ**” (START) and “**Ⓞ**” (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.

4.8 FAN MOTOR ROTATION CHECK

On initial start-up check that the fan is rotating in the proper direction. For correct rotation, see *Figure 4-2* and *Figure 4-3*.

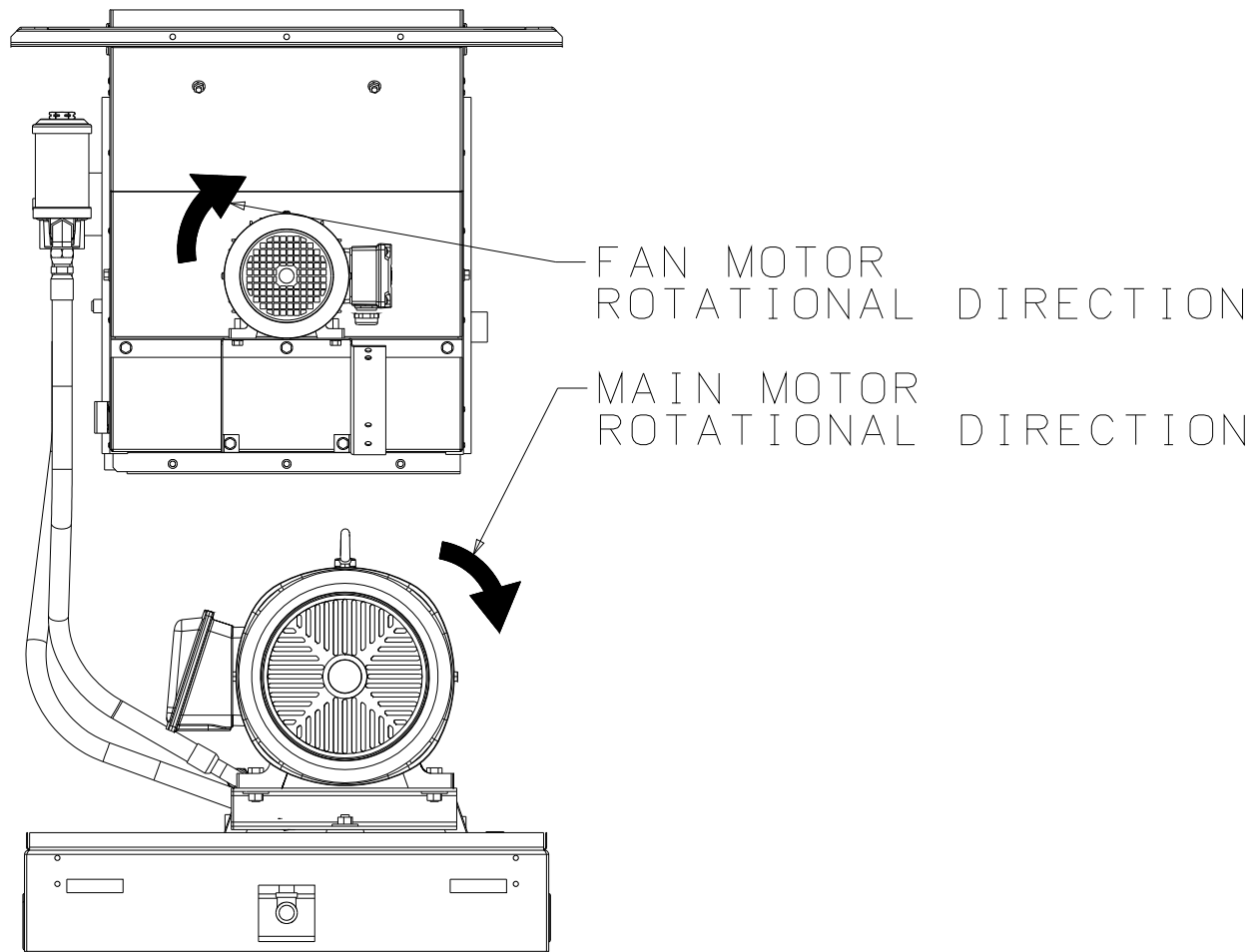
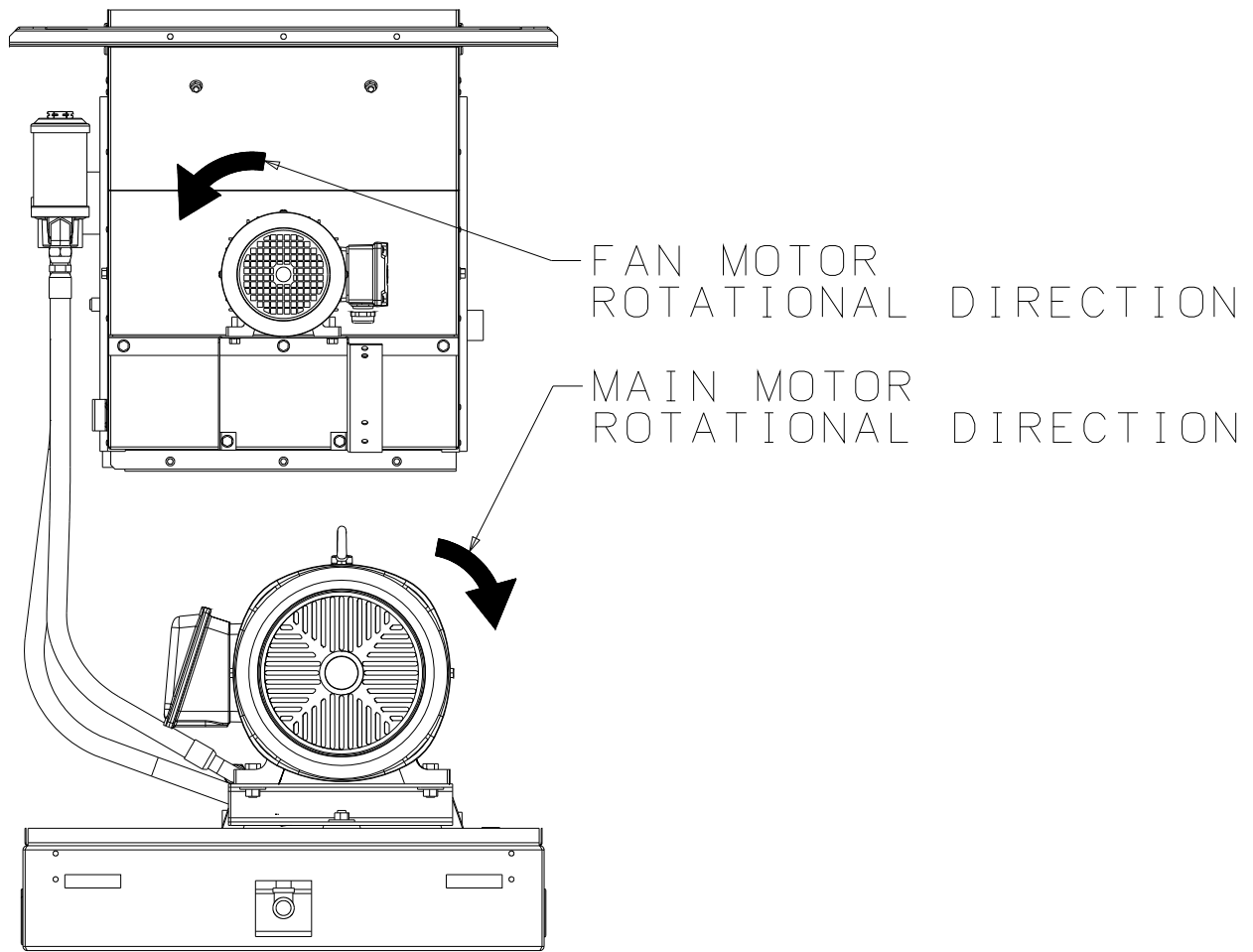


Figure 4-2: Fan Motor/Main Motor Rotational Direction
50Hz 15HP/11KW, 50Hz 20HP/15KW, 50HZ or 60HZ 25HP/18KW



**Figure 4-3: Fan Motor/Main Motor Rotational Direction
60HZ 15HP/11KW, 60HZ 20HP/15KW**

5.3 LCD DISPLAY

The display's normal view shows the compressor package's discharge pressure, internal temperature, and the operating mode. The modes are MANUAL, OFF, AUTOMATIC, or FAULTED.



Figure 5-2:

Refer to *Figure 5-2* and *Figure 5-3*. The lower line is occasionally interrupted to describe the compressor package's operating state.



Figure 5-3:

Refer to *Figure 5-4*. If a machine fault occurs, the red fault " " indicator will light up, and the display will indicate that a fault has occurred.



Figure 5-4:

Refer to *Figure 5-5*. The lower line periodically will display the cause of the fault. Refer to service instructions to correct the cause. Press the Stop pad " " to reset the controller.

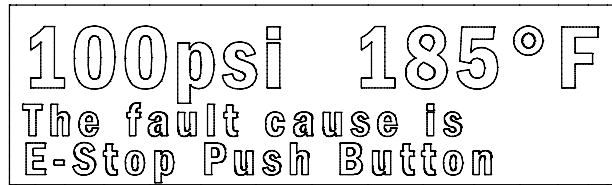


Figure 5-5:

Refer to *Figure 5-6*. Press the Down arrow " " to display additional information about the compressor. The upper line will indicate "Compressor Status" and the name of the temperature, pressure, or other measurement. The lower line indicates the present reading.

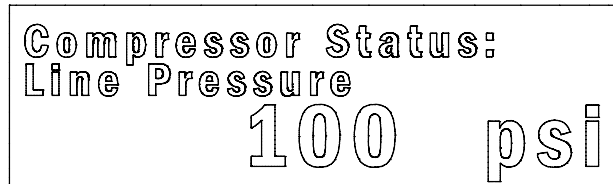


Figure 5-6:

Refer to *Figure 5-7*. When you continue beyond the status information, the display will show a list of control settings. The upper line will indicate "Show Setting" and the name of the setting. The lower line shows the present value.

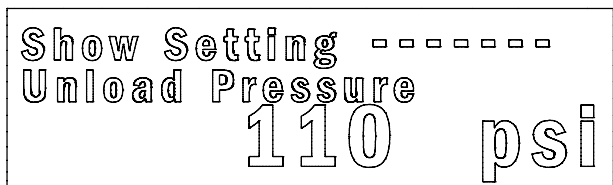


Figure 5-7:

Refer to *Figure 5-8*. To change the setting, press the Enter pad " ". The display indicates that you are in a change mode with reverse characters. Use the Up " " or Down " " arrow keys to change the setting, and press Enter again to save the new setting.

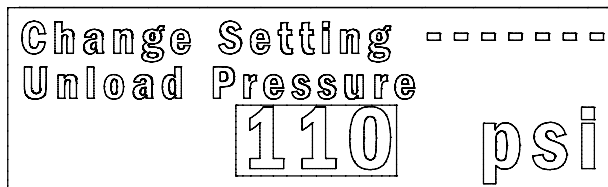





Figure 5-8:

Refer to *Figure 5-8*. If there is no keypad activity, the display will return to normal view in about one minute. If the Start or Stop buttons are pressed, the display also returns to normal view. If either of these occur, the setting will not be altered.


If there are any warnings or recommended service instructions, these will be periodically displayed on the normal view.


The list of displays may be navigated from either direction by using the Up "" or Down "" arrow keys. For example, to change language from normal view, press the Up arrow pad once, press the Enter key "", select your language, and press Enter again. The number of displays varies with compressor model, but will follow this pattern.


The large Emergency Stop button located near the controller overrides all electronic functions to turn off the control devices. The controller senses this, and will display E-stop. To reset, twist and pull out the Emergency Stop button, then press the Stop pad to reset the WS Controller.


5.4 LED LIGHTS

The four LED lights indicate the general condition of the machine.

The green Power indicator "" simply indicates that power is applied to the controller. It will blink very slowly if the WS Controller is set up to automatically restart after power failure.

The green Run mode indicator "" indicates compressor operation is enabled. It lights steadily if the motor is running. If the motor stops while in Automatic mode, this LED will blink to indicate that the motor may restart.

The yellow Maintenance indicator "" comes on whenever there is recommended maintenance or a warning. The text display will periodically indicate the recommended actions or the cause of the warning.

The red Fault indicator "" indicates that a compressor fault has occurred and needs to be repaired before further operation. The text display will indicate the cause of the fault.

The PC support program for the WS controller provides additional information about compressor operation and advanced setup adjustments to optimize operation.

Software part numbers are shown in the display following a power interruption or other interruption of communication with the controller. The P/N remains on the display until satisfactory communications are established with the Input/Output module.f

NOTES

Section 6

MAINTENANCE

6.1 GENERAL

WARNING

Before any repairs are attempted, refer to Section 1: Safety before proceeding.

As you proceed in reading this section, it will be easy to see that the Maintenance Program for the air compressor is quite simple. The use of the service indicators provided for the fluid filter, air filter and fluid separator will alert you when service maintenance is required. When the WS Controller display indicates service, maintenance for that specific item is required. See instructions for each item in *FLUID FILTER MAINTENANCE* on page 54.

6.2 DAILY OPERATION

Prior to starting the compressor, it is necessary to check the fluid level in the separator/sump. Should the level be low, simply add the necessary amount. If the addition of fluid becomes too frequent, a simple problem has developed which is causing this excessive loss. See the *Troubleshooting Guide* on page 57 under EXCESSIVE COMPRESSOR FLUID CONSUMPTION for a probable cause and remedy.

WARNING



WARNING

HIGH-PRESSURE HAZARD!

- 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.
- Failure to comply could result in death or serious injury.

After a routine start has been made, observe the controller display and be sure it monitors the correct readings for their particular phase of operation. After the compressor has warmed up, it is recommended that a general check on the overall compressor be made to assure that the compressor is running properly.

6.3 MAINTENANCE EVERY 2000 HOURS

After 2000 hours of operation, it will be necessary to perform the following:

1. Replace the fluid filter element.
2. Pull oil sample for analysis
3. Check air filter. Change if necessary.

6.4 FLUID MAINTENANCE

Drain the separator/sump and change the compressor fluid using instructions shown in Lubrication Guide, Application Guide and Lubrication Change Recommendations and Maintenance—Fluid Filter and Separator.

6.5 FLUID FILTER MAINTENANCE

Refer to *Figure 6-1*. Replace your fluid filter element under any of the following conditions, whichever occurs first:

1. As indicated by the WS Controller.
2. Every fluid change.

FLUID FILTER ELEMENT REPLACEMENT

Refer to *Figure 6-1*.

1. Using a wrench, remove the filter canister.
2. Remove and dispose of filter element. Observe all laws and regulations for filter disposal.
3. Clean gasket seating surface.
4. Apply a light film of fluid to the element seal.
5. Install the element into the filter canister.
6. Screw the canister to the filter head. Tighten to 10 to 12 ft-lb. (13.5 to 16.0 N·m)
7. Restart compressor and check for leaks.

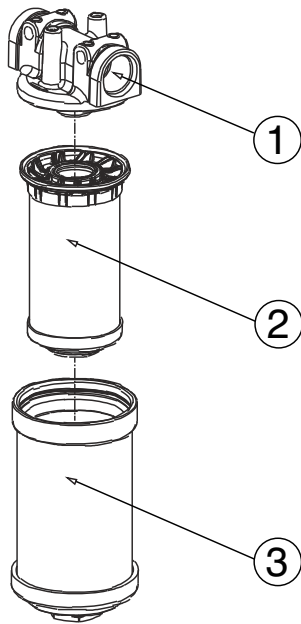


Figure 6-1: Fluid Filter Assembly

1. Filter Head
2. Element*
3. Body
Fluid Filter: 02250156-599
*Fluid Filter Repair Kit: 02250156-601

6.6 AIR FILTER MAINTENANCE

Refer to *Figure 6-2*. Air filter maintenance should be performed when the maintenance gauge shows red with the compressor running full load, or once a year, whichever comes first. If the filter needs to be replaced, order a replacement element. Below you will find procedures on how to replace the air filter element.

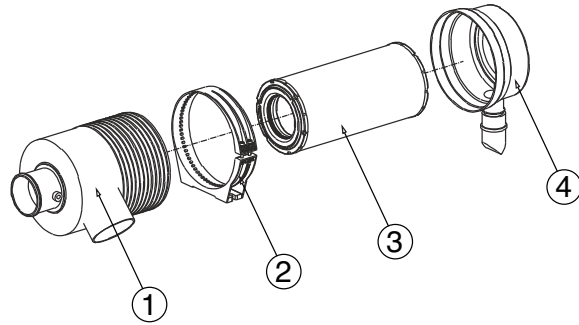


Figure 6-2: Air Filter Assembly

1. Housing
2. Clamp
3. Element*
4. Cover
Air Filter: 02250125-370
*Replacement Element: 02250125-365

AIR FILTER ELEMENT REPLACEMENT

1. Pull the yellow latch to release the cover.
2. Clean exterior of air filter housing.
3. Rotate end cover counterclockwise and remove
4. Remove air filter element by pulling it out of the housing.
5. Clean interior of housing using a damp cloth. DO NOT blow dirt out with compressed air.
6. At this time replace the element.
7. Reassemble in the reverse order of the disassembly.

6.7 SEPARATOR MAINTENANCE

Replace the separator element when indicated by the WS Controller or after one (1) year, whichever comes first. The separator element must be replaced. DO NOT attempt to clean the separator element.

SEPARATOR ELEMENT REPLACEMENT

Refer to *Figure 6-3*. The separator should be changed once a year. Follow the procedure explained below for element replacement:

WARNING

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

1. Insert a 100mm maximum length, 6mm diameter pin into the radial-drilled hole in the separator cap. Loosen and rotate counter-clockwise to remove the cap.
2. Pull out the old element by gripping the end of the element with channel lock pliers or a similar tool.
3. Remove the separator element.

4. Once the separator is removed, the separator fluid return line can be accessed for removal and cleaning.
5. Install the new O-rings on the separator cap and separator element filter. Oil lightly to make installation easier.
6. Insert and push the new element into place.
7. Reinstall the cap. Hand-tighten using a 100mm maximum length, 6mm diameter pin in the radial-drilled hole.

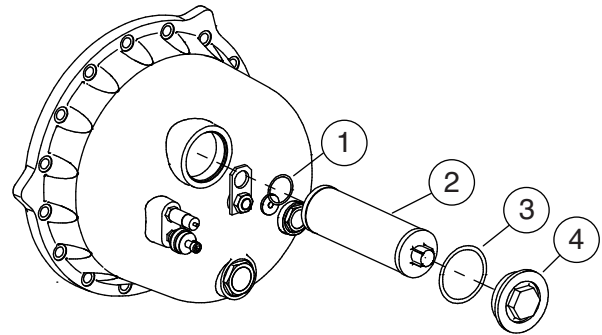


Figure 6-3: Separator Element Assembly

1. O-ring*
2. Separator Element
3. O-ring*
4. Cap
Separator Element: 02250160-776
*Separator Replacement Kit: 02250160-774

PRESSURE REGULATOR ADJUSTMENT

Refer to *Figure 6-4*. Start the compressor and adjust the service valve to maintain service air pressure approximately at 5 psi over rated pressure. Turn the inlet valve regulator adjusting screw until air just begins to escape from the control air orifice (located at the bottom of the regulator). Lock the adjusting screw in place with the locknut. The regulator is now properly set.

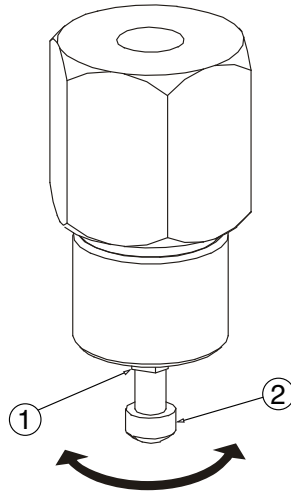


Figure 6-4: Regulator Adjustment

1. Locking Nut
2. Adjustment Screw

WATER CONDENSATE DRAIN MAINTENANCE

If your compressor is fitted with the standard solenoid condensate drain valve, it is necessary to periodically clean the strainer. Remove the hex cap from the strainer and remove the strainer screen. Clean the screen and reinstall. If the screen is damaged, the strainer assembly must be replaced (P/N 241772).

CONTROL LINE STRAINER

The regulator and solenoid valve(s), which control the compressor, are protected by a strainer. Every 12 months it is necessary to clean the strainer. Remove the hex cap from the strainer and remove the strainer screen. Clean the screen and reinstall. If the screen is damaged, the strainer assembly must be replaced (P/N 241772).

6.8 TROUBLESHOOTING—INTRODUCTION

The information contained in the Troubleshooting Guide has been compiled from field report data and factory experience. It contains symptoms and usual causes for the described problems. However, DO NOT assume that these are the only problems that may occur. All available data concerning a problem should be systematically analyzed before undertaking any repairs or component replacement procedures.

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

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

Should your problem persist after making the recommended check, consult your nearest Sullair representative.

6.9 TROUBLESHOOTING GUIDE		
SYMPTOM	PROBABLE CAUSE	REMEDY
Compressor will not start	Main disconnect switch open	Close switch.
	Line fuse blown	Replace fuse.
	Motor starter overload 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 line voltage	Consult power company.
	Excessive Operating Pressure	Separator requires maintenance; Check maintenance indicator under full load conditions.
		High pressure setting in WS Controller set wrong; reset.
		Defective valve; regulator valve should cause inlet valve to close when the pressure switch contacts open. Repair if defective.
		Defective blowdown valve; blowdown valve should exhaust the separator/sump pressure to 25 psig (1.7 bar) when maximum operating pressure is reached. Repair if defective.
	Discharge Temperature Switch Open	Cooling air flow restricted
		Ambient temperature is too high
		Low fluid level
		Clogged filter
		Thermal valve not functioning properly
		Clean cooler and check for proper ventilation.
Provide sufficient ventilation.		
Add fluid.		
Change the fluid filter element.		
Replace element.		

6.9 TROUBLESHOOTING GUIDE		
SYMPTOM	PROBABLE CAUSE	REMEDY
Compressor Will Not Build Full Discharge Pressure	Air Demand is Too Great	Check service lines for leaks or open valves up.
	Dirty Air Filter	Check the filter indicator and inspect and/or change element if required.
	Inlet Valve Bleed Orifice Plugged	Ensure control line bleed orifice located in assembly on top of air end is not plugged.
	Pressure Regulator Out of Adjustment	Adjust regulator according to control adjustment instructions in <i>Pressure Regulator Adjustment</i> on page 56.
	Defective Pressure Regulator	Check diaphragm and replace if necessary (kit available). Check that the valve closes when energized. Replace the coil or the complete valve if defective.
Line Pressure Rises Above Unload Pressure Set-Point	Leak in Control System Causing Loss of Pressure Signals	Check for leaks.
	Inlet Valve Stuck Open	Remove the intake hose and check for inlet valve operation.
	Defective Unload Solenoid Valve	Check that the valve is open when deenergized. Replace if necessary.
		Clean strainer (screen and O-ring replacement kit available).
Defective Blowdown Valve	Check that separator/sump pressure is exhausted to the atmosphere when the solenoid valve opens. Repair or replace if necessary (kit available).	
Excessive Compressor Fluid Consumption	Clogged Return Tube or Orifice	Clean orifice.
	Separator Element Damaged or Not Functioning Properly	Change separator.
	Leak in the Lubrication System	Check all pipes, connections and components.
	Excess Fluid Foaming	Drain and change.
	Fluid Level Too High	Drain and change.
Pressure Relief Valve Opens Repeatedly	Defective Pressure Relief Valve	Replace.
	Plugged Separator	Check separator differential.

6.9 TROUBLESHOOTING GUIDE		
SYMPTOM	PROBABLE CAUSE	REMEDY
Liquid Water In Compressed Air Lines	Plugged Strainer in Moisture Drain Line	Clean and service strainer located in the line off the bottom of the water separator.
	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.
	Defective Drain Solenoid Valve	Ensure valve opens and closes as signaled by the WS Controller.
	Ensure valve opens and closes as signaled by the WS Controller.	Check WS Controller control drain interval and drain time, and adjust accordingly. High humidity conditions require longer drain times or more frequent openings.

NOTES



WORLDWIDE SALES AND SERVICE

SULLAIR ASIA, LTD.

Zuo Pao Tai Road, No. 1
Chiwan, Shekou
Shenzen, Guangdong PRV.
PRC POST CODE 518068
Telephone: 755-6851686
Fax: 755-6853473
www.sullair-asia.com

SULLAIR CORPORATION

3700 East Michigan Boulevard
Michigan City, Indiana, 46360 U.S.A.
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SULLAIR EUROPE, S.A.

Zone Des Granges BP 82
42602 Montbrison, France
Telephone: 33-477968470
Fax: 33-477968499
www.sullaireurope.com

Champion Compressors, LTD.

324-332 Frankston Dandenong Road
Dandenong VIC
Australia 3175
Ph: +61397039000
Fx: +61397039053
www.championcompressors.com.au

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