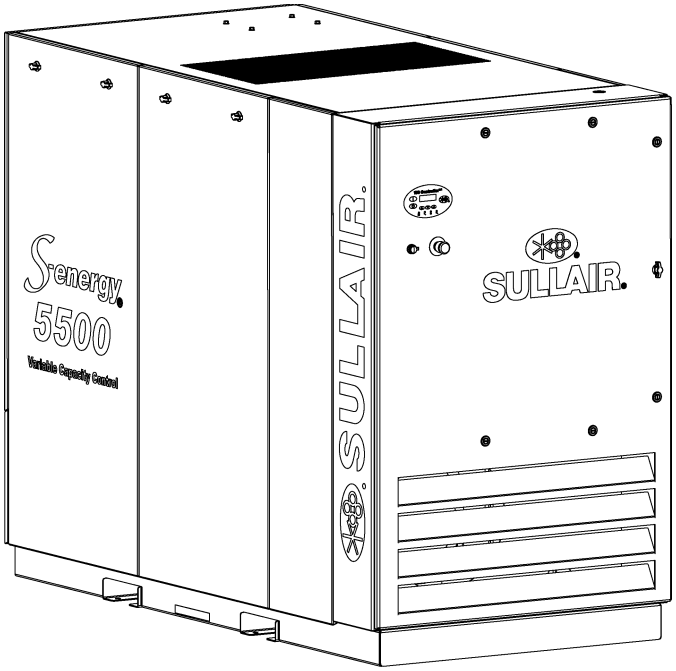
USER MANUAL

Industrial Air Compressor
4500PVB, 4500PSB, 5500B, 5500VB, 5500PSB, 7500B, 7500VB, 7500PSB, 7500PVB

60, 75 & 100 hp (45, 55 & 75 kW)



PART NUMBER:
02250219-894 R01

⚠ SAFETY WARNING

Users are required to read the entire User Manual before handling or using the product.

WARRANTY NOTICE

Failure to follow the instructions and procedures in this manual, or misuse of this equipment, will **void** its warranty.

The information in this manual is current as of its publication date and applies to compressors with **serial number**:
201511010000
and all subsequent serial numbers.

Publication date: 9/30/2015

Air Care Seminar Training

Sullair Air Care Seminars are courses that provide hands-on instruction for the proper operation, maintenance, and servicing of Sullair products. Individual seminars on Stationary compressors and compressor electrical systems are offered at regular intervals throughout the year at Sullair's 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:

Sullair Training Department

1-888-SULLAIR or
219-879-5451 (ext. 5623)
www.sullair.com
training@sullair.com

- Or Write -

Sullair, LLC
3700 E. Michigan Blvd.
Michigan City, IN 46360
Attn: Service Training Department.

SULLAIR®

Table of Contents

Notes:

02250219-894 R01

Section 1
Safety

NOTE

Operator is required to read entire instruction manual.

1.1 General

Sullair 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 ½″ (13 mm) 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 ½″ (13 mm) 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 (23 m) of hose in runs of air hose exceeding ½″ (13 mm) 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.

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.

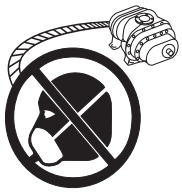
C. Wear personal protective equipment including gloves and head covering when working in, on or around the compressor.

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 antifreeze systems contains methanol and is toxic, harmful or fatal if swallowed. Avoid contact with the skin or eyes and avoid breathing the fumes. If swallowed, induce vomiting by administering a tablespoon of salt, in each glass of clean, warm water until vomit is clear, then administer two teaspoons of baking soda in a glass of clean water. Have patient lay down and

cover eyes to exclude light. Call a physician immediately.

1.8 Electrical shock

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

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

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

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

E. Disconnect, lock out, and tag all power at source prior to attempting repairs or adjustments to rotating machinery and prior to handling any ungrounded conductors.

DANGER

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.

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.

1.11 Implementation of lockout/tagout

The energy control procedure defines actions necessary to lockout a power source of any machine to be repaired, serviced or set-up, where unexpected motion, or an electrical or other energy source, would cause personal injury or equipment damage. The power source on any machine shall be locked out by each employee doing the work except when motion is necessary during setup, adjustment or trouble-shooting.

A. The established procedures for the application of energy control shall cover the following elements and actions and shall be initiated only by Authorized Persons and done in the following sequence:

1. Review the equipment or machine to be locked and tagged out.
2. Alert operator and supervisor of which machine is to be worked on, and that power and utilities will be turned off.
3. Check to make certain no one is operating the machine before turning off the power.
4. Turn off the equipment using normal shutdown procedure.
5. Disconnect the energy sources:
   a. Air and hydraulic lines should be bled, drained and cleaned out. There should be no pressure in these lines or in the reservoir tanks. Lockout or tag lines or valves.
   b. Any mechanism under tension or pressure, such as springs, should be released and locked out or tagged.
   c. Block any load or machine part prior to working under it.
   d. Electrical circuits should be checked with calibrated electrical testing equipment and stored energy and electrical capacitors should be safely discharged.
6. Lockout and/or Tagout each energy source using the proper energy isolating devices and tags. Place lockout hasp and padlock or tag at the point of power disconnect where lockout is required by each person performing work. Each person shall be provided with their own padlock and have possession of the only key. If more than one person is working on a machine *each* person *shall* affix personal lock and tag using a multi-lock device.
7. Tagout devices shall be used only when power sources are not capable of being locked out by use of padlocks and lockout hasp devices. The name of the person affixing tag to power source must be on tag along with date tag was placed on power source.
8. Release stored energy and bring the equipment to a “zero mechanical state”.
9. Verify Isolation: Before work is started, test equipment to ensure power is disconnected.

B. General Security

1. The lock shall be removed by the “Authorized” person who put the lock on the energy-isolating device. No one other than the person/persons placing padlocks and

lockout hasps on power shall remove padlock and lockout hasps and restore power. However, when the authorized person who applied the lock is unavailable to remove it his/her Supervisor may remove padlock/padlocks and lockout hasps and restore power only if it is first:

a. verified that no person will be exposed to danger.
b. verified that the “Authorized” person who applied the device is not in the facility.
c. noted that all reasonable efforts to contact the “Authorized” person have been made to inform him or her that the lockout or tagout device has been removed.
d. ensured that the “Authorized” person is notified of lock removal before returning to work.

2. Tagout System—Tags are warning devices affixed at points of power disconnect and are not to be removed by anyone other that the person placing tag on power lockout. Tags shall never be by-passed, ignored, or otherwise defeated.

1.12 Safety warnings

The following special instructions apply to VSD packages provided with electronic adjustable speed motor drives. These cautions that apply to VSD operation.

WARNING

Ground the unit following the instructions in this manual. Ungrounded units may cause electric shock and/or fire. The variable speed drive has a large capacitive leakage current during operation, which can cause enclosure parts to be above ground potential. Proper grounding, as described in this manual, is required. Failure to observe this precaution could result in death or severe injury.

WARNING

Before applying power to the variable speed drive, make sure that the front and cable covers are closed and fastened to prevent exposure to potential electrical fault conditions. Failure to observe this precaution could result in death or severe injury.

WARNING

Refer all drive service to trained technicians. This equipment should be installed, adjusted, and serviced by qualified electrical maintenance personnel familiar with the construction and operation of this type of equipment and the hazards involved and in accordance with published service manuals. Failure to observe this precaution could result in death or severe injury.

WARNING

Line terminals (L1, L2, L3), motor terminals (U, V, W) and the DC link/brake resistor terminals (-/+) are live when the drive is connected to power, even if the motor is not running. Contact with this voltage is extremely dangerous and may cause death or severe injury.

WARNING

Before opening the variable speed drive covers:

- Disconnect all power to the variable speed drive.
- Wait a minimum of 5 (five) minutes after all the lights on the keypad are off. This allows time for the DC bus capacitors to discharge.
- A hazard voltage may still remain in the DC bus capacitors even if the power has been turned off. Confirm that the capacitors have fully discharged by measuring their voltage using a multimeter set to measure DC voltage. Failure to follow the above precautions may cause death or severe injury.

CAUTION

Do not perform any megger or voltage withstand tests on any part of the variable speed drive or its components. Improper testing may result in damage. Prior to any tests or measurements of the motor or the motor cable, disconnect the motor cable at the variable speed drive output terminals (U, VW) to avoid damaging the variable speed drive during motor or cable testing.

CAUTION

Do not touch any components on the circuit boards. Static voltage discharge may damage the components.

CAUTION

Install the variable speed drive in a well ventilated room that is not subject to temperature extremes, high humidity, or condensation, and avoid locations that are directly exposed to sunlight, or have high concentrations of dust, corrosive gas, explosive gas, inflammable gas, grinding fluid mist, etc. Improper installation may result in a fire hazard.

CAUTION

Make sure that no power correction capacitors are connected to the variable speed drive output or the motor terminals to prevent variable speed drive malfunction and potential damage.

CAUTION

Make sure that the variable speed drive output terminals (U, V, W) are not connected to the utility line power as severe damage to the VSD may occur.

NOTE

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

NOTE

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

Notes:

02250219-894 R01

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 *Section 6: Maintenance* on page 59 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* and *Figure 2-2*. The components and assemblies of the air compressor are clearly shown. The complete package includes compressor, electric motor, starter, compressor inlet system, compressor discharge system, compressor lubrication and cooling system, capacity control system, 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.

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

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

2.3 Sullair compressor unit, functional description

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

Sullair compressors are factory-filled with Sullube® lubricant. For more information on fluid fill, consult *Section 3: Lubrication change recommendations and maintenance, fluid* on page 25.

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.

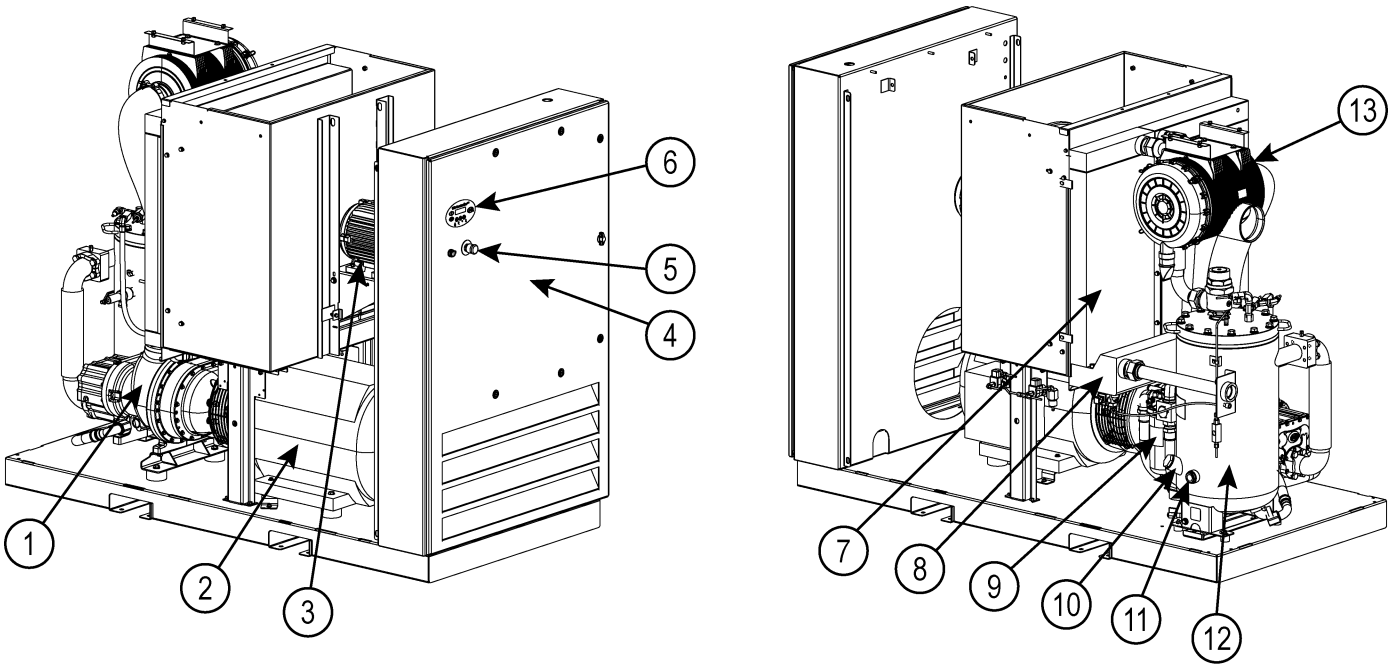
WARRANTY NOTICE

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.

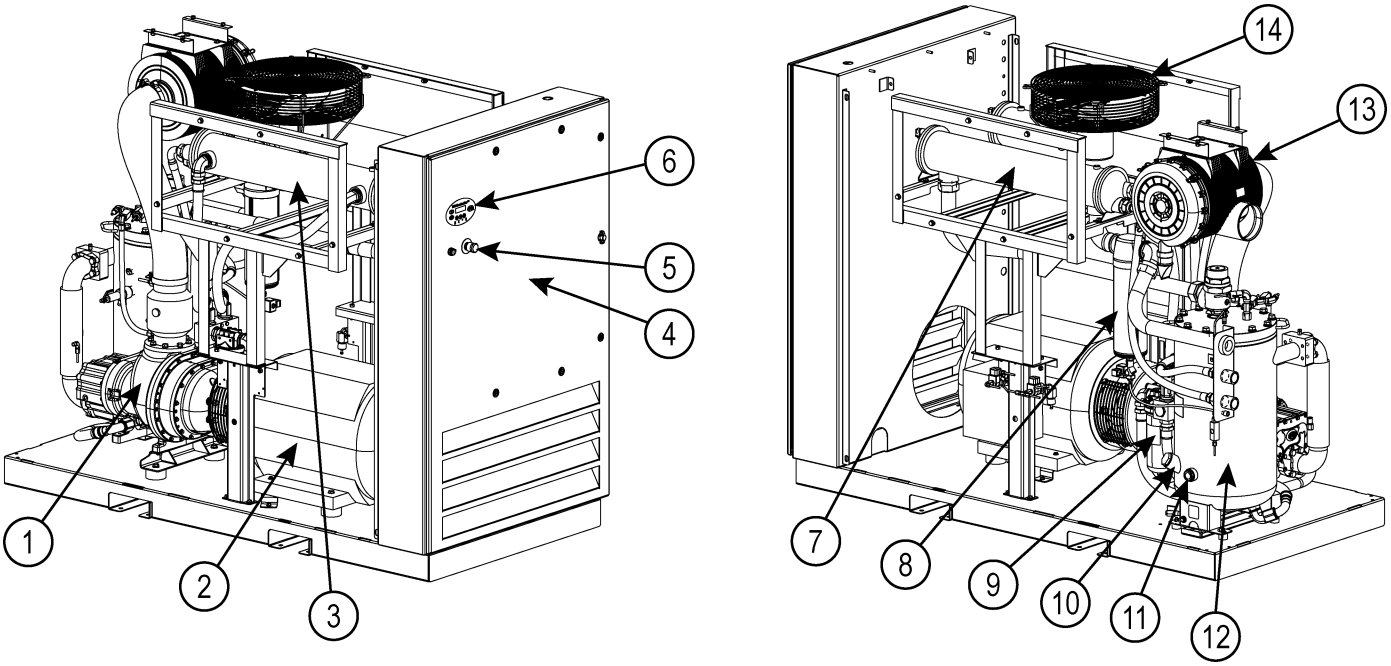
Fluid is injected into the compressor unit hoses and mixes directly with the air as the rotors turn, compressing the air. The fluid flow has three basic functions:

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



1. Compressor unit	8. Moisture separator
2. Motor	9. Fluid filter
3. Cooler fan motor	10. Fluid fill
4. Starter box	11. Fluid fill sight glass
5. E-Stop button	12. Separator/sump tank
6. WS Controller™	13. Air inlet filter
7. Cooler	

Figure 2-1: Overall component layout, air-cooled model



1. Compressor unit	8. Moisture separator
2. Motor	9. Fluid filter
3. Oil cooler	10. Fluid fill
4. Starter box	11. Fluid fill sight glass
5. E-Stop button	12. Separator/sump tank
6. WS Controller™	13. Air inlet filter
7. Aftercooler	14. Canopy vent fan

Figure 2-2: Overall component layout, water-cooled model

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 2-3* or *Figure 2-4*. The cooling and lubrication system (air-cooled version) consists of a fan, fan motor, radiator-type aftercooler/fluid cooler, full flow fluid filter, thermal valve, and interconnecting hoses. For water-cooled models, two shell and tube heat exchangers are substituted for the radiator-type cooler listed above. The pressure in the separator/sump tank causes fluid flow by forcing the fluid from the high pressure area of the separator/sump tank to an area of lower pressure in the compressor unit.

Fluid flows from the bottom of the separator/sump tank to the thermal valve. The thermal valve is fully open when the fluid temperature is below 195°F (91°C) [210°F (99°C) for 24KT® or pressures are rated above 150 psig]. 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 195°F (91 °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. Refer to *Section 3.7: Lubrication change recommendations and maintenance, fluid* on page 25.

Water-cooled models have a water pressure switch to prevent operation with inadequate water pressure.

2.5 Compressor discharge system, functional description

Refer to *Figure 2-3* or *Figure 2-4*. The compressor unit discharges the compressed air/fluid mixture into the combination separator/sump tank.

The separator/sump has three basic functions:

- It acts as a primary fluid separator.
- Serves as the compressor fluid sump.
- Houses the final fluid separator.

The compressed air/fluid mixture enters the separator/sump tank 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 tank. 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 dry side of the separator/sump tank 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. A visual sight glass is located on the return line to observe this fluid flow. There is also an orifice in this return line (protected by a strainer) to assure proper flow. A message on the controller indicates if abnormal pressure drop through the separator develops. Refer to*Section 3.7: Lubrication change recommendations and maintenance, fluid* on page 25.

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.

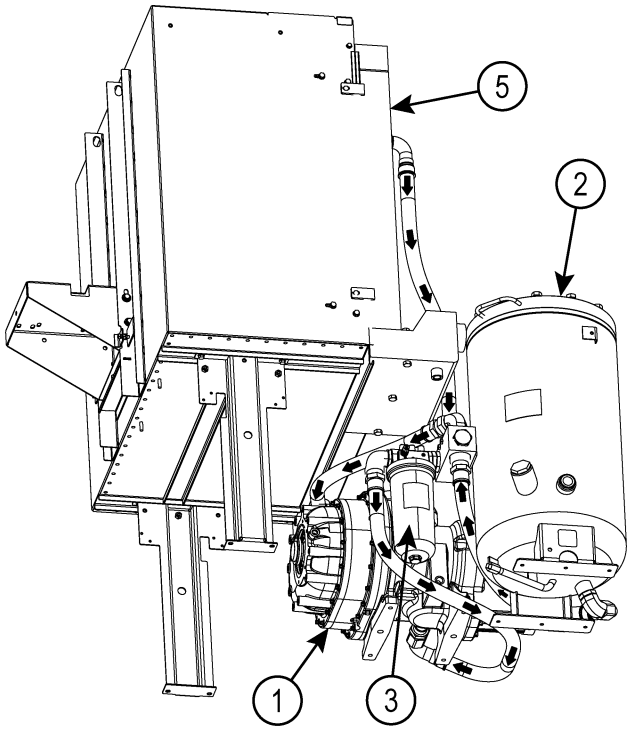
A pressure relief valve (located on the wet side of the separator) is set to open if the separator/sump tank pressure exceeds the separator/sump tank rating. The controller will shut down the compressor if the discharge temperature reaches 235°F (113°C).

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

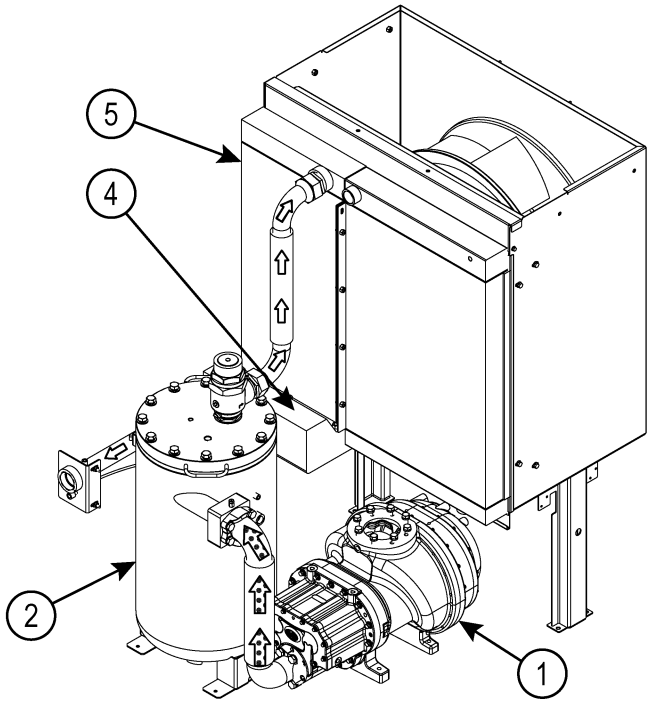
Cooling/Lubrication System



Air

Air/Fluid

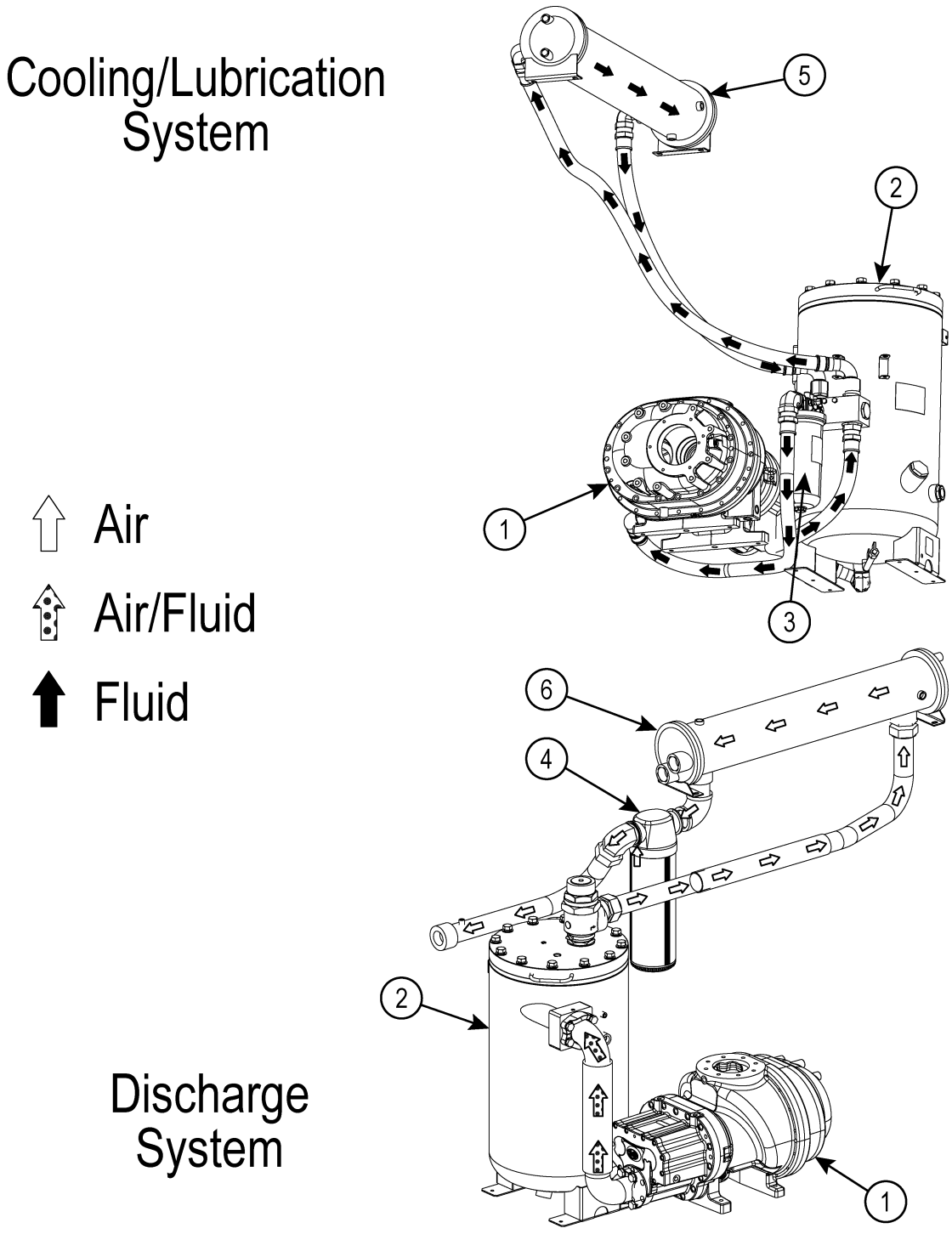
Fluid



Discharge System

1.	Compressor unit	4.	Moisture separator
2.	Separator/sump tank	5.	Cooler
3.	Fluid filter		

Figure 2-3: Air-cooled, cooling / lubrication and discharge system



1.	Compressor unit	4.	Moisture separator
2.	Separator/sump tank	5.	Oil cooler
3.	Fluid filter	6.	Aftercooler

Figure 2-4: Water-cooled, cooling / lubrication and discharge system

2.6 Control system, functional description

Refer to *Figure 2-5*. 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 controller ⓘ (Start) pad is depressed, the separator/sump tank pressure will quickly rise from 0 to 50 psig (0 to 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 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 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) [5500B, 7500B]

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.

Modulating mode with spiral valve—100 to 110 psig (6.9 to 7.6 bar) [4500PSB, 5500PSB, 7500PSB]

As air demand drops below the rated capacity of the compressor, the line pressure will rise above 100 psig (6.9 bar). As a result, the differential pressure regulator for the spiral valve gradually opens, applying air pressure to the spiral valve actuator. Air pressure at the actuator expands the diaphragm. The rack, in turn, engages with the pinion mounted on the spiral valve shaft assembly. This results in a rotary motion. As the spiral valve rotates, it starts opening the bypass ports gradually. Excess air is then being returned back internally to the suction end of the compressor unit. Now the compressor is fully compressing only that amount of air, which is being used. As air demand keeps dropping further, the spiral valve keeps opening more and more until all the bypass ports are fully open. At this point, the spiral valve has moved into the unload (minimum) position.

The spiral valve provides a modulation range from 100 to 50%. During this period, the pressure rises approximately from 100 to 105 psig (6.9 to 7.2 bar). As the air pressure exceeds 105 psig (7.2 bar), the differential pressure regulator controlling the inlet poppet valve starts opening and forcing the poppet closed, thus throttling inlet air flow to the compressor. The inlet poppet valve provides a modulation range from 50 to 40%. During this period, the pres- sure rises approximately from 106 to 110 psig (7.3 to 7.6 bar). During this range, the spiral valve remains in the unload position.

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 controller control system de- energizes the solenoid valve allowing separator/sump tank 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 separator/sump tank, reducing the separator/sump tank 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 tank.

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 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.

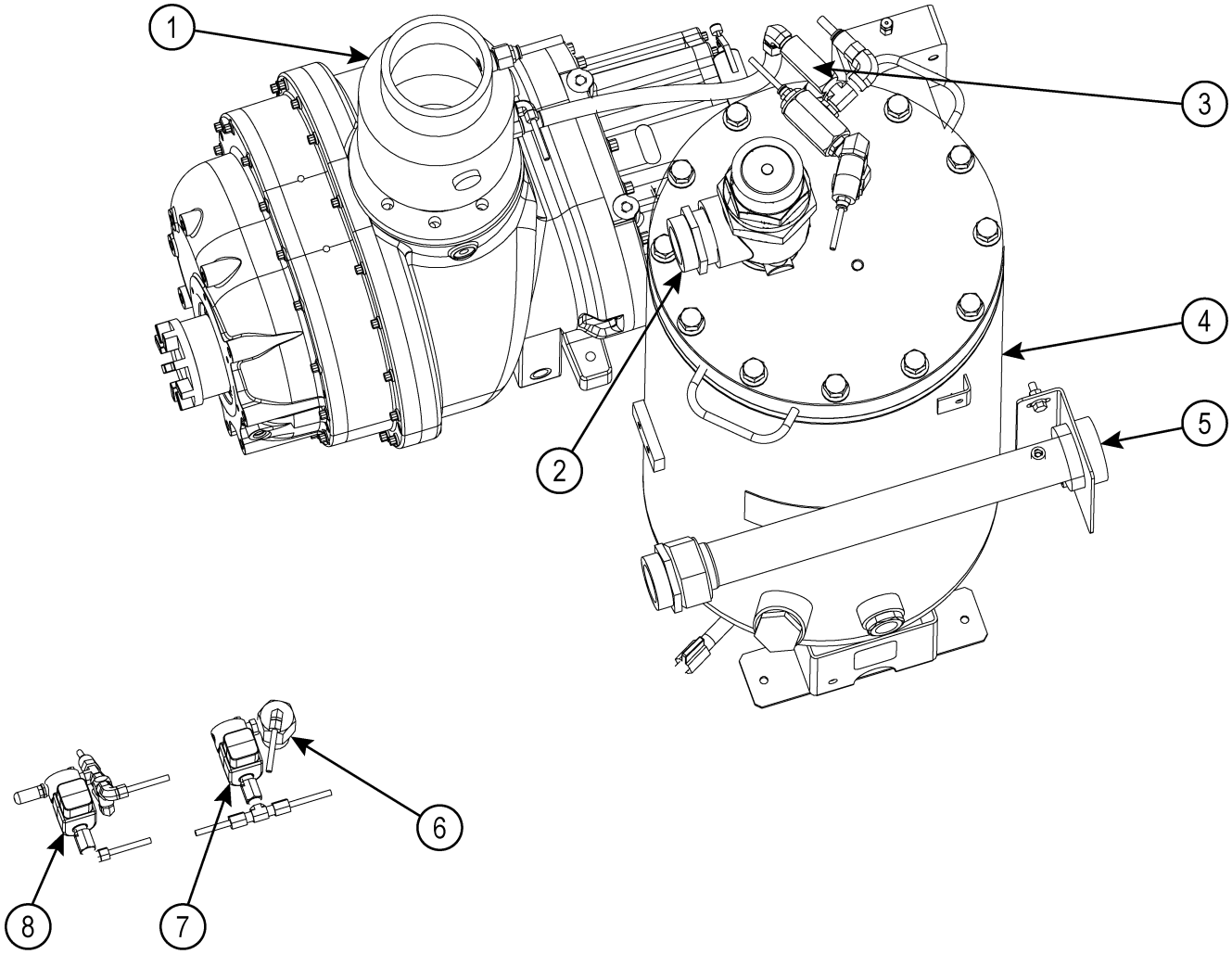
Load / no load control

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 controller keypad, select

Modulate from the menu and set it to **NO**. 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 controller will de- energize the solenoid valve, causing the compressor to run in the unload mode. When the system pressure falls to 90 psig (6.3 bar), the 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 – 100 psig (6.3 – 6.9 bar).

Automatic operation

For applications with varied periods of time when there are no air requirements, the 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.



1. Air inlet	5. Air outlet
2. Minimum pressure/check valve	6. Pressure regulator
3. Blowdown valve	7. Sequencing solenoid valve
4. Separator/sump tank	8. Unload solenoid valve

Figure 2-5: Standard pneumatic control system

02250219-894 R01

2.7 Air inlet system, functional description

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

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

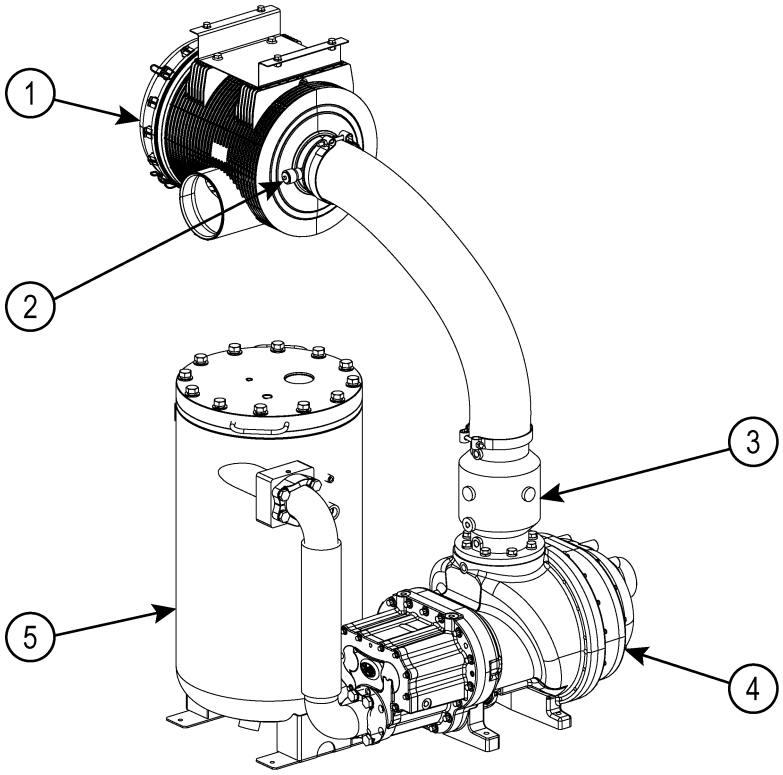
The poppet-type modulating air inlet valve directly controls the amount of air intake to the compressor in response to the operation of the pressure regulator. Refer to *Full load mode—50 to 100 psig (3.4 to 6.9 bar)* on page 15. The inlet valve also acts as a check valve, thus preventing reverse rotation 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."[1]

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.

[1]*Plastic Pipe Institute, Recommendation B. Adopted January 19, 1972.*



1.	Air inlet filter	4.	Compressor unit
2.	Restriction indicator	5.	Separator/sump tank
3.	Air inlet		

Figure 2-6: Air inlet system

2.8 Variable speed drive (VSD) components

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

2.9 VSD control system, functional description

Refer to *Figure 2-5*. The controls consist of:

- a VSD
- a solenoid valve
- a regulating valve
- 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 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 bar) 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 bar) 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 controller (Start) pad 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 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 bar) 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 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) [4500PVB, 5500VB, 7500VB]

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 2-5*) 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.

Modulating mode with spiral valve—100 to 106 psig (7.3 to 6.9 bar) [7500PVB]

As demand decreases, the variable speed drive reduces motor speed to maintain the set point pressure. When the speed approaches the minimum setting, a solenoid valve opens feeding air pressure to the spiral valve actuator. This in turn expands the diaphragm and engages the pinion mounted on the spiral valve shaft assembly, resulting in a rotary motion and full opening of the spiral valve, effectively reducing the rotor length by 50%. Excess air will be returned back internally to the suction side of the compressor unit. In this mode, the VSD will modulate the motor speed within a specified range to maintain the set point pressure as follows:

- **Increasing demand condition:** If demand increases, the VSD increases the motor speed until the set point pressure is achieved. If set

point pressure is not achieved while at maximum speed, the controller will close the spiral valve, thereby eliminating internal air bypass. Consequently, the VSD will regulate the motor speed to achieve the set point pressure.

- **Decreasing demand condition:** While the spiral valve is open, if demand continues to decrease the VSD will reduce the motor speed until the set point pressure is achieved. This action will continue until the minimum speed is reached. When the system pressure reaches 106 psig (7.3 bar), or alternatively set unload pressure, the compressor unloads, or turns off.

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 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:

02250219-894 R01

Section 3
Specifications

3.1 Table of specifications—4500PSB, 5500B, 5500PSB, 7500B, 7500PSB

			Dimensions									
			Length		Width		Height		Weight			
	Power								ODP		TEFC	
Model[1]	hp	kW	in	mm	in	mm	in	mm	lbs	kg	lbs	kg
4500PSB series												
4507PSB	60	45	87.5	2223	43.4	1103	68.5	1740	3367	1527	3445	1563
4509PSB	60	45	87.5	2223	43.4	1103	68.5	1740	3367	1527	3445	1563
4510PSB	60	45	87.5	2223	43.4	1103	68.5	1740	3367	1527	3445	1563
5500B series												
5507B	75	55	87.5	2223	43.4	1103	68.5	1740	3248	1473	3313	1503
5509B	75	55	87.5	2223	43.4	1103	68.5	1740	3248	1473	3313	1503
5510B	75	55	87.5	2223	43.4	1103	68.5	1740	3248	1473	3313	1503
5512B	75	55	87.5	2223	43.4	1103	68.5	1740	3248	1473	3313	1503
5500PSB series												
5507PSB	75	55	87.5	2223	43.4	1103	68.5	1740	3390	1538	3455	1567
5509PSB	75	55	87.5	2223	43.4	1103	68.5	1740	3390	1538	3455	1567
5510PSB	75	55	87.5	2223	43.4	1103	68.5	1740	3390	1538	3455	1567
5512PSB	75	55	87.5	2223	43.4	1103	68.5	1740	3390	1538	3455	1567
7500B series												
7507B	100	75	87.5	2223	43.4	1103	68.5	1740	3476	1577	3567	1618
7509B	100	75	87.5	2223	43.4	1103	68.5	1740	3476	1577	3567	1618
7510B	100	75	87.5	2223	43.4	1103	68.5	1740	3476	1577	3567	1618
7512B	100	75	87.5	2223	43.4	1103	68.5	1740	3476	1577	3567	1618
7500PSB series												
7507PSB	100	75	87.5	2223	43.4	1103	68.5	1740	3618	1641	3709	1682
7509PSB	100	75	87.5	2223	43.4	1103	68.5	1740	3618	1641	3709	1682
7510PSB	100	75	87.5	2223	43.4	1103	68.5	1740	3618	1641	3709	1682
7512PSB	100	75	87.5	2223	43.4	1103	68.5	1740	3618	1641	3709	1682

[1]Includes standard and 24KT®. Rated pressure designations appearing after model number are as follows:
07—100 psig (6.9 bar) 09—125 psig (8.6 bar) 10—150 psig (10.3 bar) 12—175 psig (12 bar).
Maximum pressure is rated pressure plus 10 psig (0.7 bar).

3.2 Table of specifications—4500PVB, 5500VB, 7500VB, 7500PVB

Motor	voltage /Hz	Drive amp rating	Dimensions							
			Length		Width		Height		Weight	
			in	mm	in	mm	in	mm	lbs	kg
VSD series—4500PVB (models 4507PVB through 4509PVB)[1]										
ODP	460/60	88	87.5	2223	43.4	1103	68.5	1740	3323	1507
	575/60	52	87.5	2223	43.4	1103	68.5	1740	3323	1507
TEFC	460/60	58	87.5	2223	43.4	1103	68.5	1740	3401	1543
	575/60	52	87.5	2223	43.4	1103	68.5	1740	3401	1543
VSD series—5500VB (models 5507VB through 5512VB)[1]										
ODP	460/60	72	87.5	2223	43.4	1103	68.5	1740	3346	1518
	575/60	62	87.5	2223	43.4	1103	68.5	1740	3346	1518
TEFC	460/60	72	87.5	2223	43.4	1103	68.5	1740	3411	1547
	575/60	62	87.5	2223	43.4	1103	68.5	1740	3411	1547
VSD series—7500VB (models 7507VB through 7512VB)[1]										
ODP	460/60	88	87.5	2223	43.4	1103	68.5	1740	3587	1627
	575/60	77	87.5	2223	43.4	1103	68.5	1740	3587	1627
TEFC	460/60	88	87.5	2223	43.4	1103	68.5	1740	3678	1668
	575/60	77	87.5	2223	43.4	1103	68.5	1740	3678	1668
VSD series—7500PVB (models 7507PVB through 7512PVB)[1]										
ODP	460/60	88	87.5	2223	43.4	1103	68.5	1740	3587	1627
	575/60	77	87.5	2223	43.4	1103	68.5	1740	3587	1627
TEFC	460/60	88	87.5	2223	43.4	1103	68.5	1740	3678	1668
	575/60	77	87.5	2223	43.4	1103	68.5	1740	3678	1668

[1]Includes standard and 24KT®. Rated pressure designations appearing after model number are as follows:
07—100 psig (6.9 bar) 09—125 psig (8.6 bar) 10—150 psig (10.3 bar) 12—175 psig (12 bar).
Maximum pressure is rated pressure plus 10 psig (0.7 bar).

3.3 Compressor specifications

Compressor	Standard models
Type	Rotary screw
Standard operating pressure	100 psig (7 bar) 125 psig (9 bar)
Bearing type	Anti-friction
Maximum ambient temperature[1]	104°F (40°C)
Minimum ambient temperature	40°F (4.4°C)
Cooling	Pressurized fluid
Compressor fluid	Sullair Sullube®, 24KT®, PristineFG™ and SRF are optional
Separator/sump capacity	5.5 gallons (20.8 liters)
Control	WS Controller™

[1]Special compressors are available for operation in higher ambient temperature.

3.4 Motor specifications

Motor	Standard models
Size	60, 75, 100 hp / 45, 55, 75 kW
Type	C-flanged, open drip-proof, premium efficiency, three phase, 230/460V 60 Hz
VSD type	C-flanged, open drip-proof, premium efficiency, three phase, 460V 60 Hz
Maximum ambient temperature	104°F (40°C)
Minimum ambient temperature	40°F (4.4°C)
Available options	230V and 575V 60 Hz
Starter	Full voltage magnetic, wye-delta or VSD
Speed—60, 75, 100 hp (45, 55, 75 kW)	1780 rpm (60 Hz)

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

3.5 Lubrication guide

Refer to *Figure 3-1* for location of fluid fill port. For best value and longest uninterrupted service, Sullair compressors are factory filled and tested with Sullube® lubricant.

WARRANTY NOTICE

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

If fluid change is required, follow *Section 3.7: Lubrication change recommendations and maintenance, fluid* on page 25.

WARNING

"The Plastic Pipe Institute recommends against the use of thermoplastic pipe to transport compressed air or other compressed gases in exposed above ground locations, e.g. in exposed plant piping."[1]

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

[1]Plastic Pipe Institute, Recommendation B. Adopted January 19, 1972.

WARNING

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

Do not mix different types of fluids. Contamination of compressor fluid with mineral oil or other fluids may lead to operational problems such as foaming, filter plugging, orifice or line plugging.

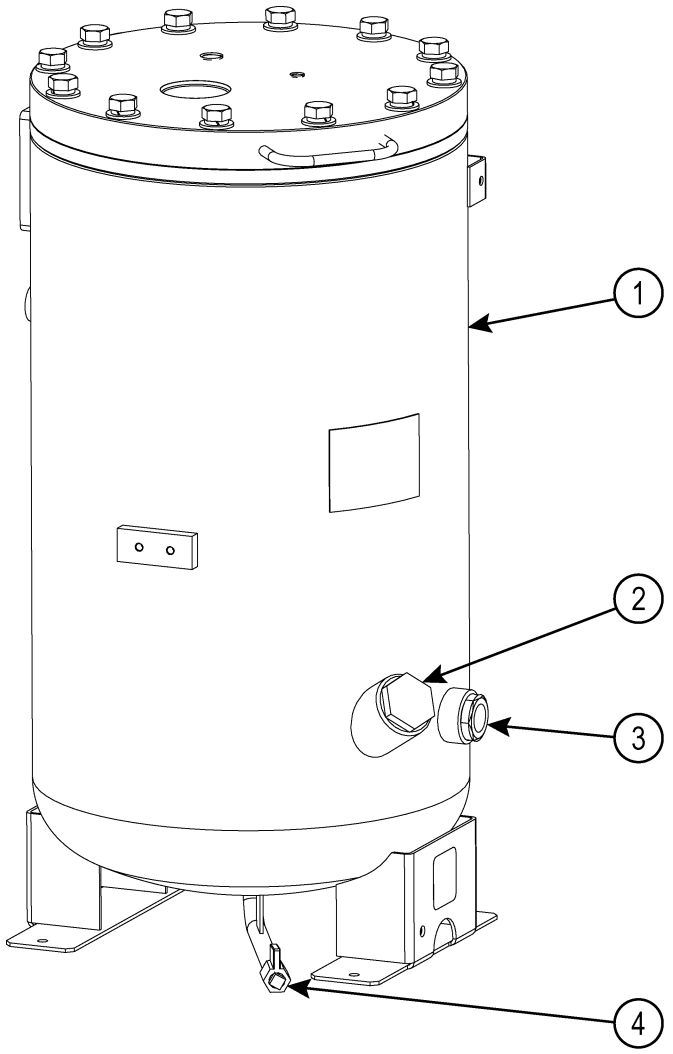
NOTE

Flush system when switching lubricant brands.

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

3.6 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.



1. Separator/sump tank
2. Fluid fill port
3. Sight glass
4. Fluid drain valve

Figure 3-1: Fluid fill location

02250219-894 R01

3.7 Lubrication change recommendations and maintenance, fluid

Lubricant	Fluid change	Fluid filter change	Separator change
Sullube® (7.2 gal / 27.3 L)	A, E	G, C	I, D
SRF 1/4000® (7.2 gal / 27.3 L)	B, E	G, C	B, D
24KT® (7.2 gal / 27.3 L)	F, E	G, C	I, D
PristineFG™ (7.2 gal / 27.3 L)	H, E	G, C	B, D

A—10,000 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.

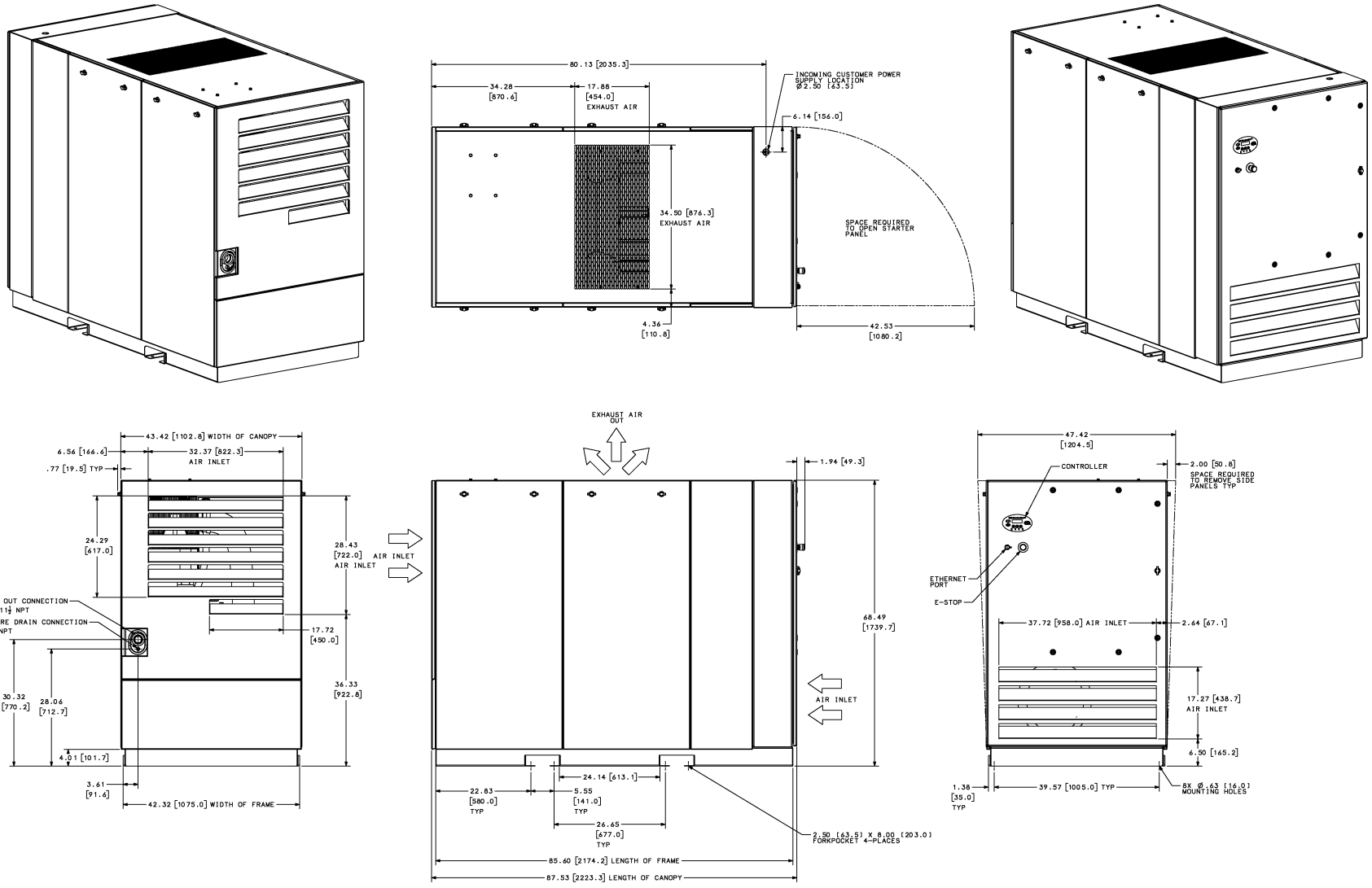
F—Does not require replacement during normal service conditions.

G—Every 2,000 hours.

H—6,000 hours or once a year.

I—8,000 hours or once a year.

3.8 Identification, air-cooled



3.8 Identification, air-cooled

Drawing notes	
1	ALLOW 4.00 FEET [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 ARE PERMITTED AT EXTERNAL CONNECTIONS.
3	ALL DIMENSIONS ARE ± .50" [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 0.75 IN H2O WITH HIGH STATIC FAN.
6	ALL DIMENSIONS SHOWN IN INCHES WITH MILLIMETER DIMENSIONS IN PARENTHESES.

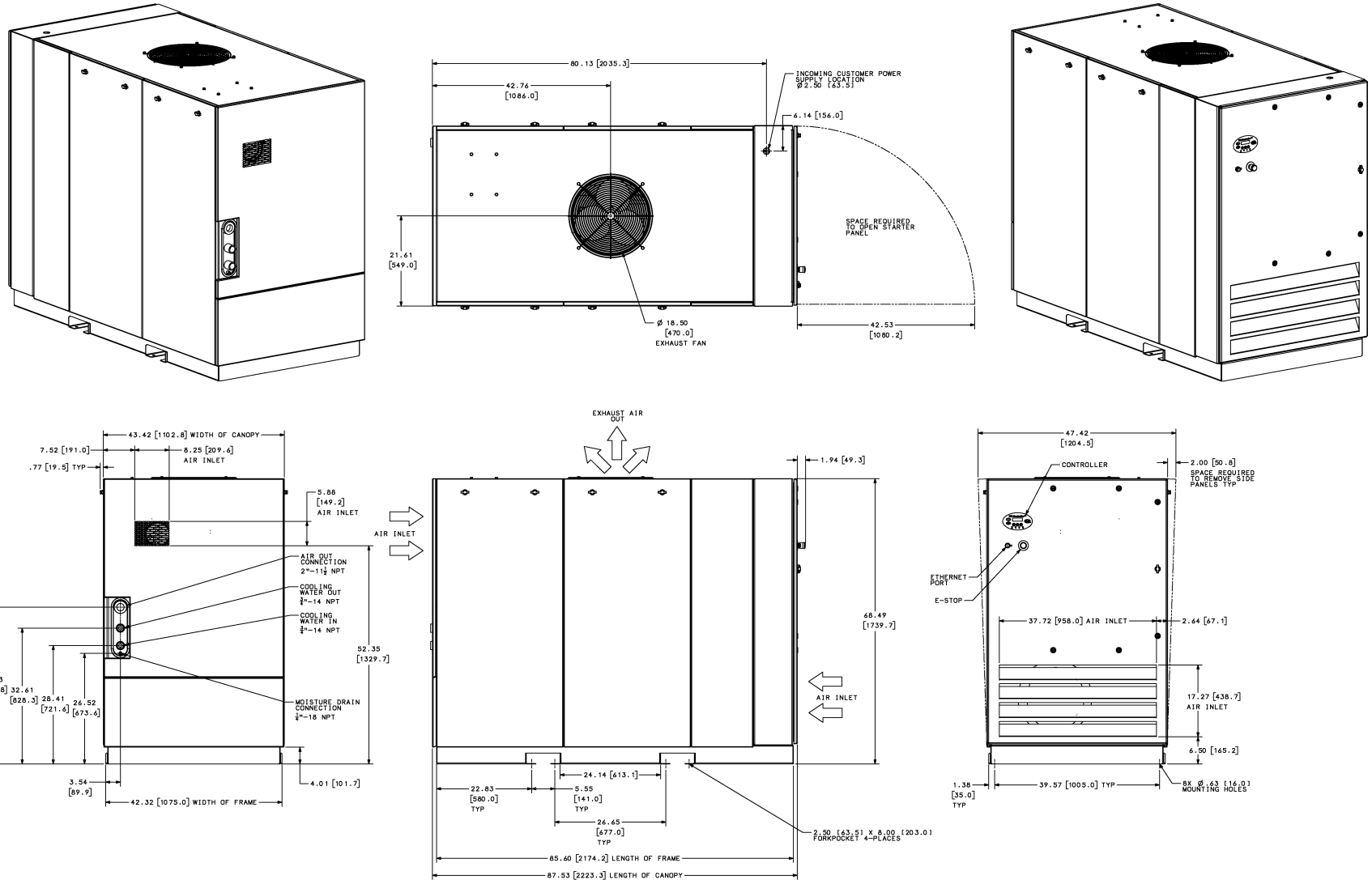
Machine weights—non-spiral valve

Model	Main motor (hp)	Motor type	Weight	Cooling air
4500P	60	ODP	3225 LBS/1463 kg	6000 CFM/10194 M3/HR
		TEFC	3303 LBS/1498 kg	6000 CFM/10194 M3/HR
5500	75	ODP	3248 LBS/1473 kg	6000 CFM/10194 M3/HR
		TEFC	3313 LBS/1503 kg	6000 CFM/10194 M3/HR
7500	100	ODP	3476 LBS/1577 kg	8200 CFM/13932 M3/HR
		TEFC	3567 LBS/1618 kg	8200 CFM/13932 M3/HR

Machine weights—spiral valve

Model	Main motor (hp)	Motor type	Weight	Cooling air
4500PS	60	ODP	3367 LBS/1527 kg	6000 CFM/10194 M3/HR
		TEFC	3445 LBS/1563 kg	6000 CFM/10194 M3/HR
5500PS	75	ODP	3390 LBS/1538 kg	6000 CFM/10194 M3/HR
		TEFC	3455 LBS/1567 kg	6000 CFM/10194 M3/HR
7500PS	100	ODP	3618 LBS/1641 kg	8200 CFM/13932 M3/HR
		TEFC	3709 LBS/1682 kg	8200 CFM/13932 M3/HR

3.9 Identification, water-cooled



SULLAIR

3.9 Identification, water-cooled

Drawing notes	
1	ALLOW 4.00 FEET [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 ARE PERMITTED AT EXTERNAL CONNECTIONS.
3	ALL DIMENSIONS ARE ± .50" [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 0.75 IN H2O WITH HIGH STATIC FAN.
6	ALL DIMENSIONS SHOWN IN INCHES WITH MILLIMETER DIMENSIONS IN PARENTHESES.

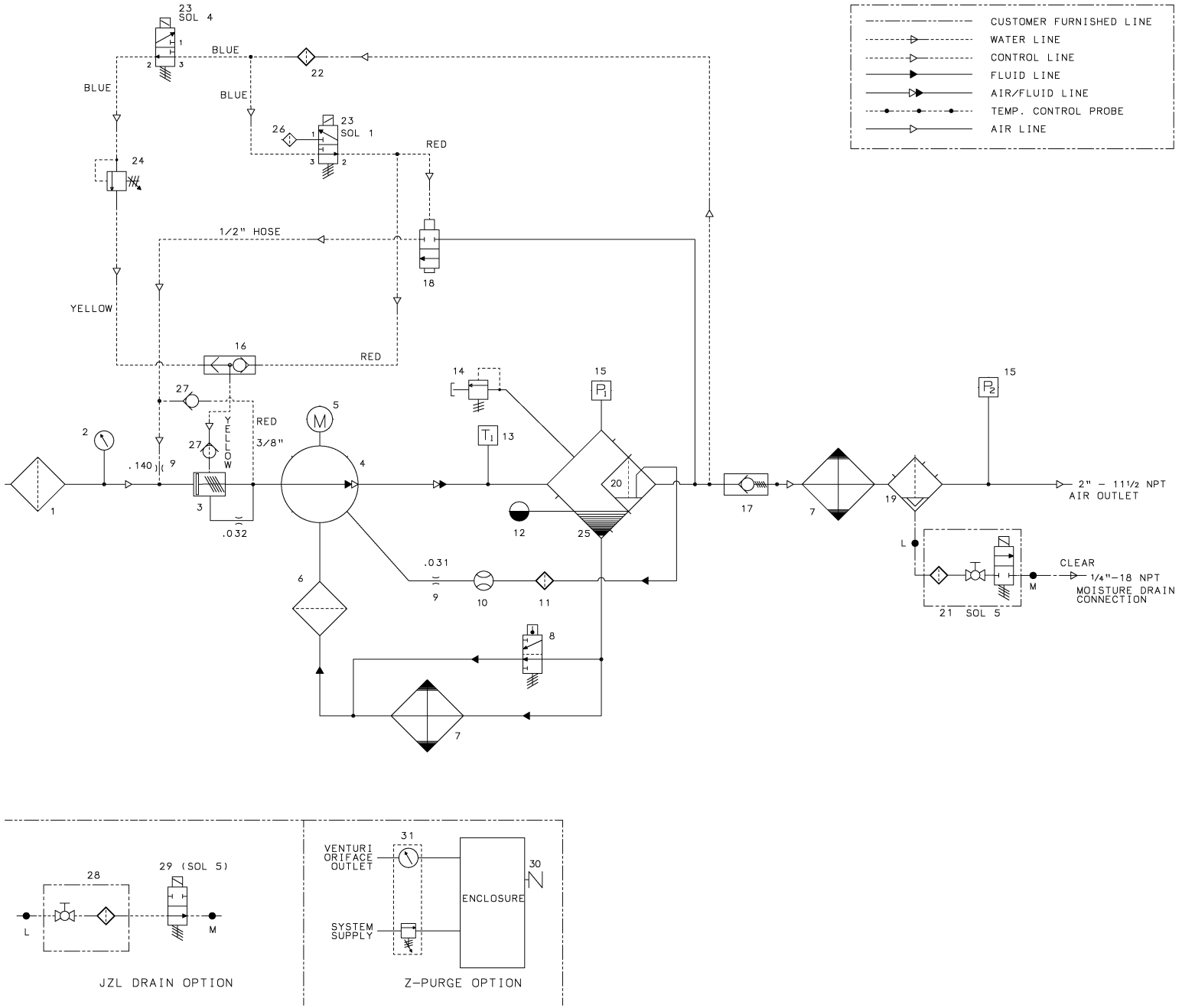
Machine weights—non-spiral valve

Model	Main motor (hp)	Motor type	Weight	Cooling air
4500P	60	ODP	3185 LBS/1445 kg	2845 CFM/4834 M3/HR
		TEFC	3263 LBS/1480 kg	2845 CFM/4834 M3/HR
5500	75	ODP	3208 LBS/1455 kg	2845 CFM/4834 M3/HR
		TEFC	3273 LBS/1485 kg	2845 CFM/4834 M3/HR
7500	100	ODP	3436 LBS/1559 kg	2845 CFM/4834 M3/HR
		TEFC	3527 LBS/1600 kg	2845 CFM/4834 M3/HR

Machine weight—spiral valve

Model	Main motor (hp)	Motor type	Weight	Cooling air
4500PS	60	ODP	3327 LBS/1509 kg	2845 CFM/4834 M3/HR
		TEFC	3405 LBS/1545 kg	2845 CFM/4834 M3/HR
5500PS	75	ODP	3350 LBS/1520 kg	2845 CFM/4834 M3/HR
		TEFC	3415 LBS/1549 kg	2845 CFM/4834 M3/HR
7500PS	100	ODP	3578 LBS/1623 kg	2845 CFM/4834 M3/HR
		TEFC	3669 LBS/1664 kg	2845 CFM/4834 M3/HR

3.10 Piping & instrumentation, air-cooled—4500PVB, 5500B, 5500VB, 7500B, 7500VB



02250218-394 R00

3.10 Piping & instrumentation, air-cooled—4500PVB, 5500B, 5500VB, 7500B, 7500VB

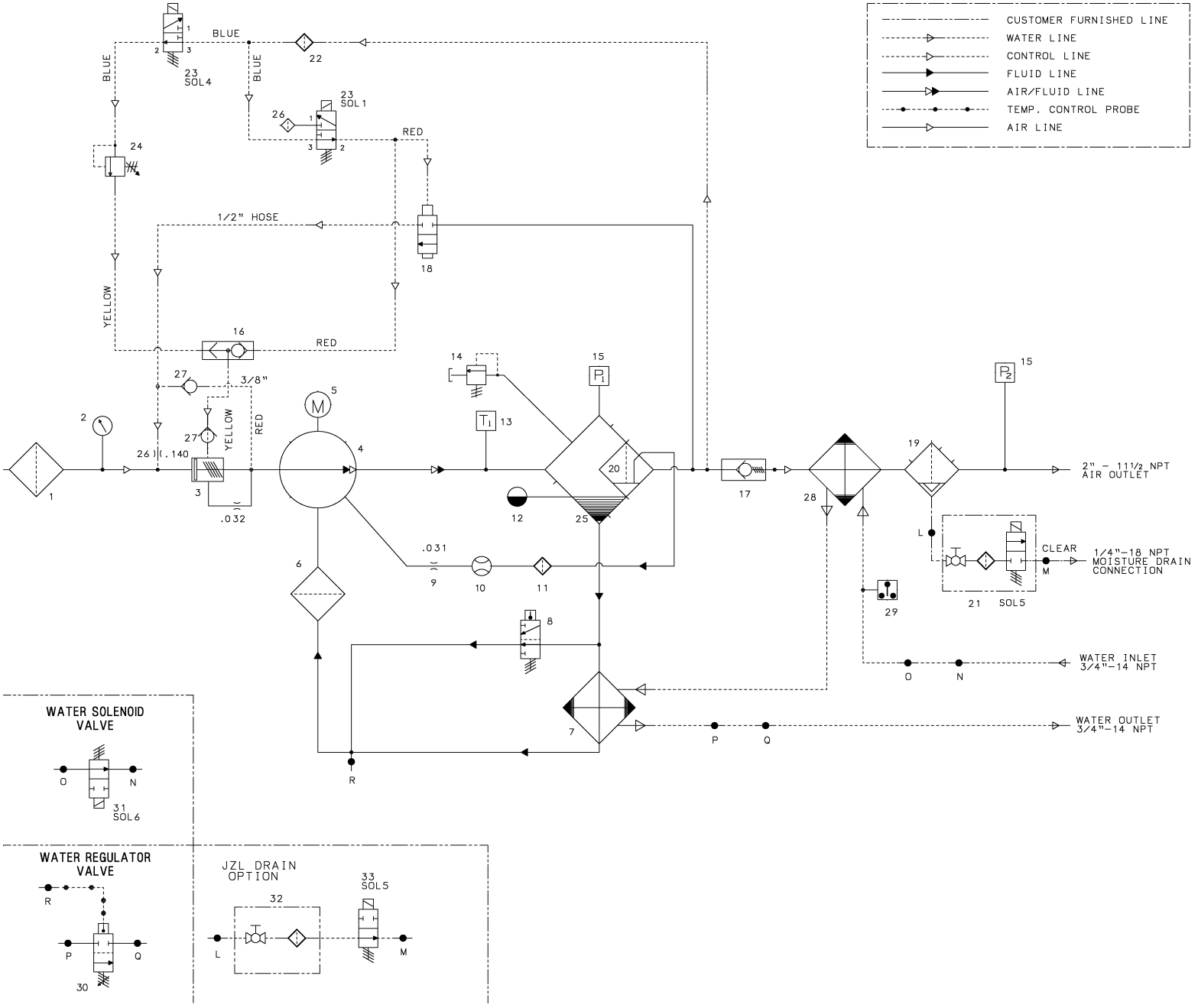
Key	Description	Qty
1	FILTER,AIR	1
2	INDICATOR, RESTRICTION	1
3	VALVE,INLET	1
4	COMPRESSOR UNIT	1
5	MOTOR	1
6	FILTER, OIL	1
7	COOLER, AIR/OIL	1
8	VALVE, THERMAL	1
9	ORIFICE	2
10	GLASS, SIGHT/ORF SAE	1
11	FILTER,ASSY	1
12	PLUG,SIGHT GLASS	1
13	PROBE, THERMISTER	1
14	VALVE, RELIEF	1
15	TRANSDUCER, PRESSURE	2
16	VALVE, SHUTTLE	1
17	VALVE,MINIMUM PRESSURE CHK	1
18	VALVE, BLOWDOWN	1
19	SEPARATOR,WTR	1
20	ELEMENT,SEP	1
21	VALVE, COMBO	1
22	STRAINER, VTYPE	1
23	VALVE,SOLENOID	2
24	VALVE, PRESSURE REG	1
25	TANK, SEPARATOR	1
26	FILTER,PNEUMATIC	1
27	VALVE,CHECK	1
28	VALVE BALL/STNR COMBO	1
29	DRAIN	1
30	VENTILATOR	1
31	GAUGE,DIFF PRESS	1

Key	Description	Qty
Drawing notes		
1	CONTROL/MOISTURE DRAIN LINES ARE 1/4" TUBING EXCEPT AS NOTED.	
2	OPTIONAL HEAT TRACE IS APPLIED ONLY TO CONTROL AND MOISTURE DRAIN LINES AND USED ONLY WITH STAINLESS STEEL TUBING. REFER TO FACE OF ORDER FOR HEAT TRACE REQUIREMENTS.	
3	PARTS VARY BY MODEL.	

Component	Description
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	COMBO DRAIN/JZL DRAIN SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE

Tubing color	Purpose
BLUE	TANK PRESSURE
YELLOW	REGULATOR PRESSURE
RED	UNLOAD PRESS
CLEAR	WATER DRAIN

3.11 Piping & instrumentation, water-cooled—4500PVB, 5500B, 5500VB, 7500PB, 7500VB



02250218-395 R00

SULLAIR

3.11 Piping & instrumentation, water-cooled—4500PVB, 5500B, 5500VB, 7500PB, 7500VB

Key	Description	Qty
1	FILTER, AIR	1
2	INDICATOR, RESTRICTION	1
3	VALVE,INLET	1
4	COMPRESSOR UNIT	1
5	MOTOR	1
6	FILTER, OIL	1
7	COOLER,OIL/WATER	1
8	VALVE, THERMAL	1
9	ORIFICE	2
10	GLASS,SIGHT/ORF	1
11	FILTER, ASSY	1
12	PLUG,SIGHTGLASS	1
13	PROBE, THERMISTER	1
14	VALVE, RELIEF	1
15	TRANSDUCER, PRESSURE	1
16	VALVE, SHUTTLE	1
17	VALVE, MIN PRESSURE	1
18	VALVE, BLOWDOWN	1
19	SEPARATOR,WTR	1
20	ELEMENT,SEP	1
21	VALVE,COMBO	1
22	STRAINER, V-TYPE	1
23	VALVE,SOLENOID 3WNO	2
24	VALVE, PRESSURE REG	1
25	TANK, SEPARATOR	1
26	FILTER,PNEUMATIC	1
27	VALVE,CHECK	2
28	HEAT EXCHANGER	1
29	SWITCH, PRESS	1
30	VALVE, WATER REG	1
31	VALVE,SOLENOID 2WNC	1
32	VALVE,BALL/STNR COMBO	1
33	DRAIN,ZERO LOSS	1

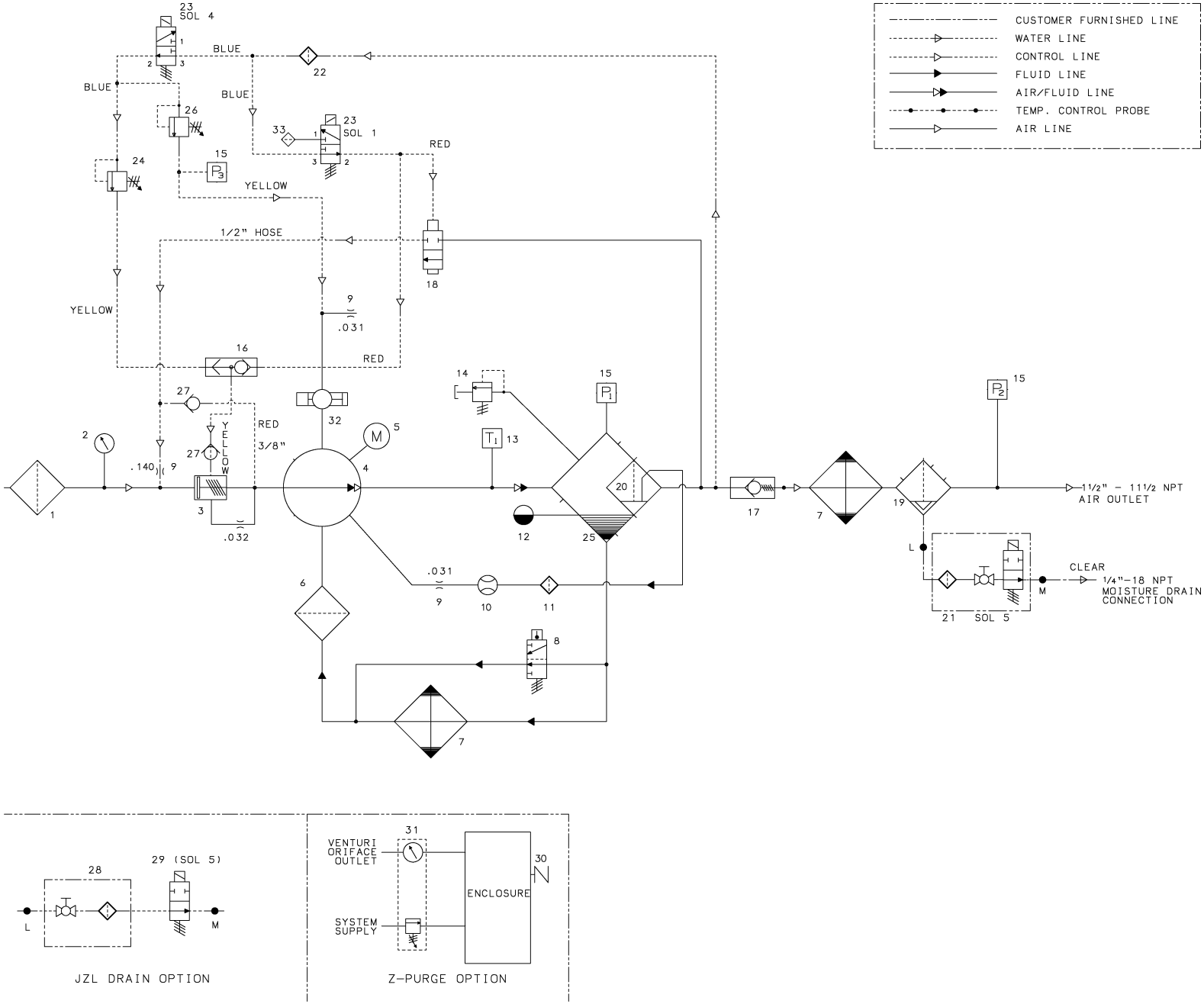
Drawing notes

1	CONTROL/MOISTURE DRAIN LINES ARE 1/4" TUBING EXCEPT AS NOTED.
2	OPTIONAL HEAT TRACE IS APPLIED ONLY TO CONTROL AND MOISTURE DRAIN LINES AND USED ONLY WITH STAINLESS STEEL TUBING. REFER TO FACE OF ORDER FOR HEAT TRACE REQUIREMENTS.
3	PARTS VARY BY MODEL.

Component	Description
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	COMBO DRAIN/JZL DRAIN SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE

Tubing color	Purpose
BLUE	TANK PRESSURE
YELLOW	REGULATOR PRESSURE
RED	UNLOAD PRESS
CLEAR	MOISTURE DRAIN

3.12 Piping & instrumentation, air-cooled—4500PSB, 5500PSB, 7500PSB



02250218-396 R00

SULLAIR

3.12 Piping & instrumentation, air-cooled—4500PSB, 5500PSB, 7500PSB

Key	Description	Qty
1	FILTER,AIR	1
2	INDICATOR, RESTRICTION	1
3	INLET	1
4	COMPRESSOR UNIT	1
5	MOTOR	1
6	FILTER, OIL	1
7	COOLER, AIR/OIL	1
8	VALVE, THERMAL	1
9	ORIFICE	3
10	SIGHTGLASS	1
11	FILTER, ASSY	1
12	PLUG, SIGHT GLASS	1
13	PROBE, THERMISTER	1
14	VALVE, RELIEF	1
15	TRANSDUCER, PRESSURE	3
16	VALVE, SHUTTLE	1
17	VALVE, MIN PRESSURE	1
18	VALVE, BLOWDOWN	1
19	SEPARATOR,WTR	1
20	ELEMENT,SEP	1
21	VALVE,COMBO	1
22	STRAINER, V-TYPE	1
23	VALVE,SOLENOID 3WNO 1/4	2
24	VALVE, PRESSURE REG	1
25	TANK, SEPARATOR	1
26	VALVE, PRESSURE REG	1
27	VALVE,CHECK	2
28	VALVE,BALL/STNR COMBO	1
29	DRAIN,ZERO LOSS	1
30	VENTILATOR,ENCL	1
31	GAUGE,DIFF PRESS	1
32	SPIRAL VALVE	1

Key	Description	Qty
33	FILTER, PNEUMATIC	1

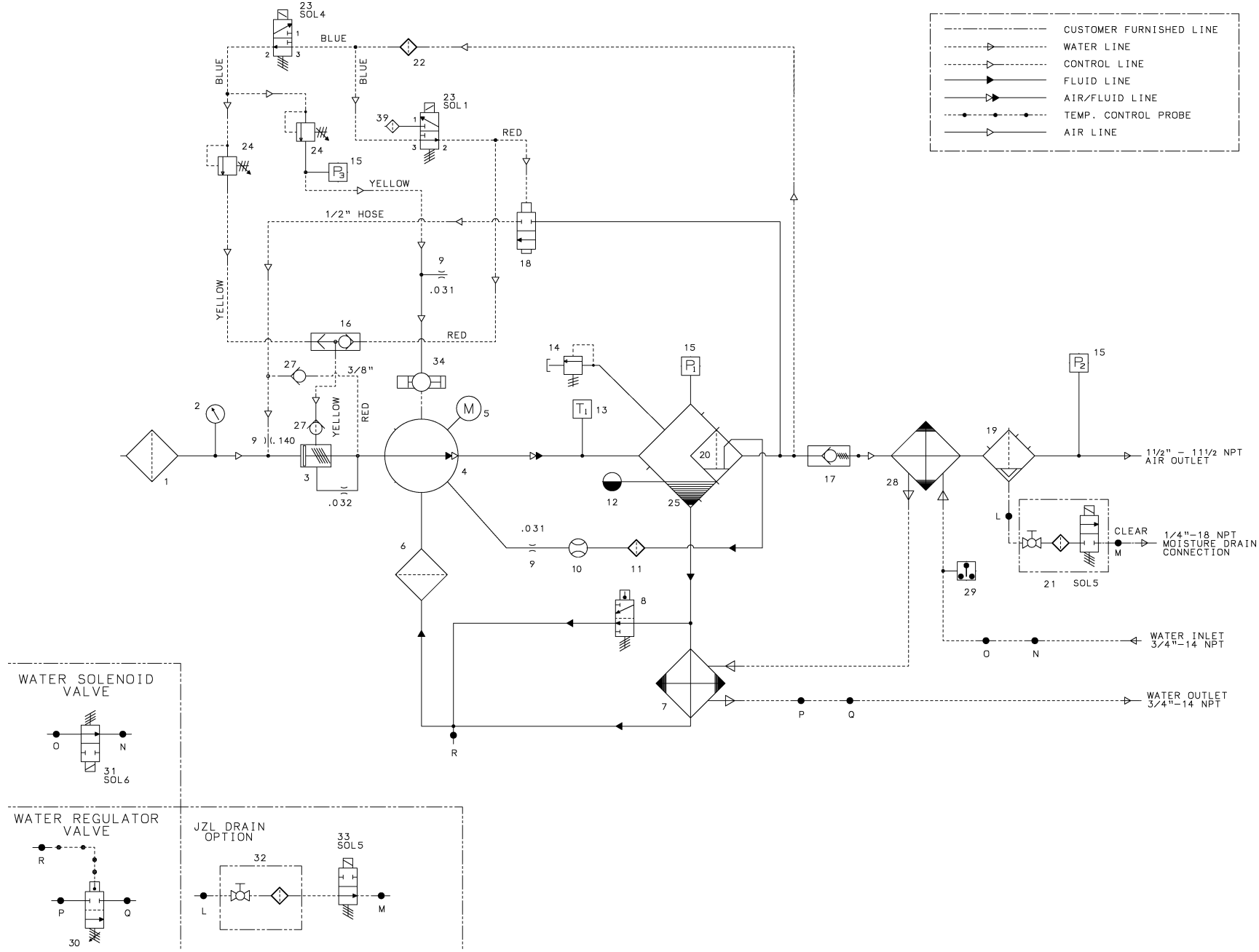
Drawing notes

1	CONTROL/MOISTURE DRAIN LINES ARE 1/4" TUBING EXCEPT AS NOTED.
2	OPTIONAL HEAT TRACE IS APPLIED ONLY TO CONTROL AND MOISTURE DRAIN LINES AND USED ONLY WITH STAINLESS STEEL TUBING. REFER TO FACE OF ORDER FOR HEAT TRACE REQUIREMENTS.
3	PARTS VARY BY MODEL.

Component	Description
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
P3	SPIRAL VALVE CONTROL PRESSURE
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	COMBO DRAIN/JZL DRAIN SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE

Tubing color	Purpose
BLUE	TANK PRESSURE
YELLOW	REGULATOR PRESSURE
RED	UNLOAD PRESS
CLEAR	MOISTURE DRAIN

3.13 Piping & instrumentation, water-cooled—4500PSB, 5500PSB, 7500PSB



02250218-399 R01

3.13 Piping & instrumentation, water-cooled—4500PSB, 5500PSB, 7500PSB

Key	Description	Qty
1	FILTER, AIR	1
2	INDICATOR, RESTRICTION	1
3	INLET	1
4	COMPRESSOR UNIT	1
5	MOTOR	1
6	FILTER, OIL	1
7	COOLER,OIL/WATER	1
8	VALVE, THERMAL	1
9	ORIFICE,	3
10	GLASS, SIGHT/ORF	1
11	FILTER, ASSY	1
12	PLUG,SIGHT GLASS	1
13	PROBE, THERMISTER	1
14	VALVE, RELIEF	1
15	TRANSDUCER, PRESSURE	3
16	VALVE, SHUTTLE	1
17	VALVE, MIN PRESSURE	1
18	VALVE, BLOWDOWN	1
19	SEPARATOR,WTR	1
20	ELEMENT,SEP	1
21	VALVE,COMBO	1
22	STRAINER, V-TYPE	1
23	VALVE,SOLENOID 3WNO	2
24	VALVE, PRESSURE REG	1
25	TANK, SEPARATOR	1
26	FILTER,PNEUMATIC	1
27	VALVE,CHECK	2
28	HEAT EXCHANGER	1
29	SWITCH, PRESS	1
30	VALVE, WATER REG	1
31	VALVE,SOLENOID 2WNC	1
32	VALVE,BALL/STNR COMBO	1
33	DRAIN,ZERO LOSS	1
34	SPIRAL VALVE	1

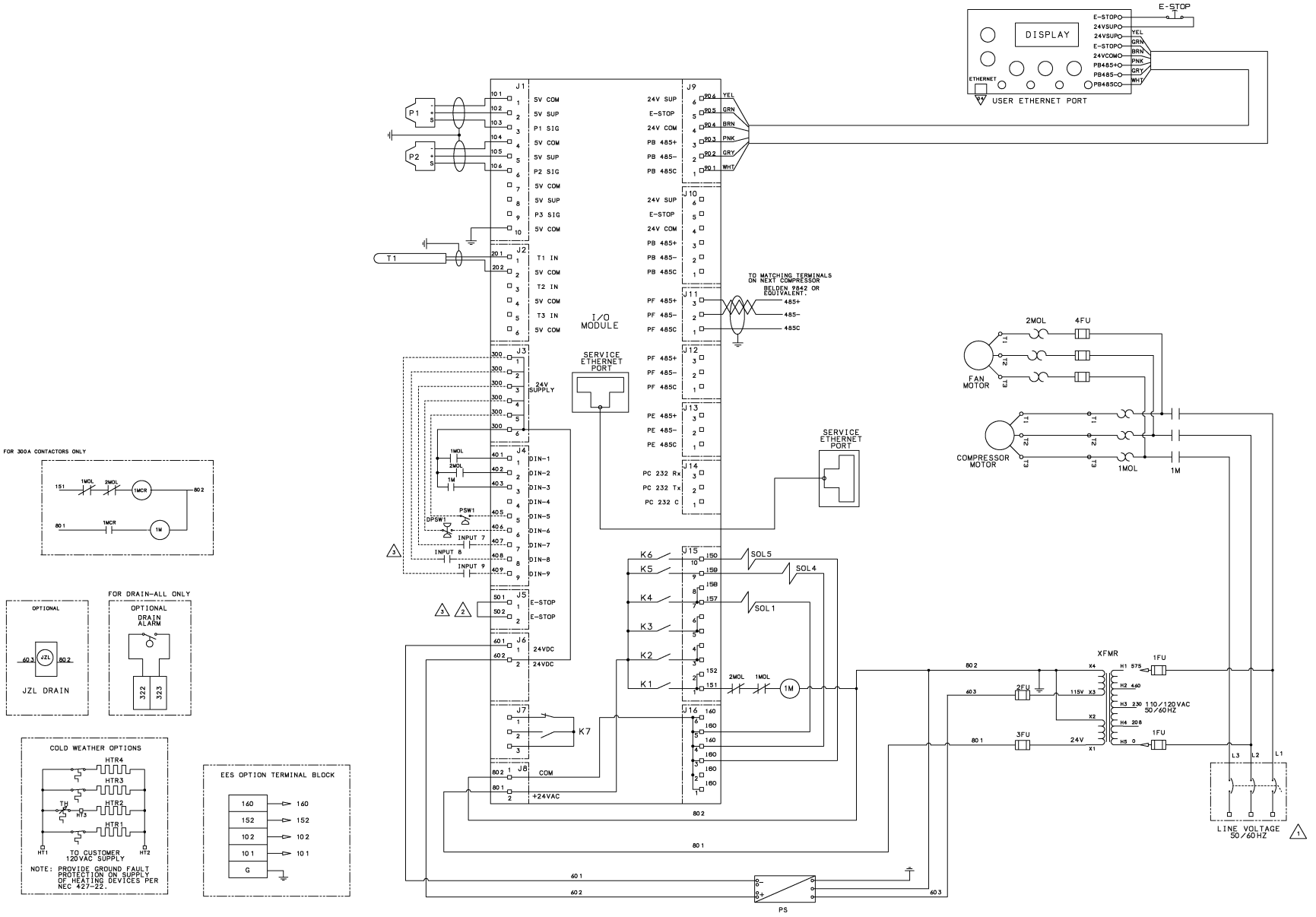
Drawing notes

1	CONTROL/MOISTURE DRAIN LINES ARE 1/4" TUBING EXCEPT AS NOTED.
2	OPTIONAL HEAT TRACE IS APPLIED ONLY TO CONTROL AND MOISTURE DRAIN LINES AND USED ONLY WITH STAINLESS STEEL TUBING. REFER TO FACE OF ORDER FOR HEAT TRACE REQUIREMENTS.
3	PARTS VARY BY MODEL.

Component	Description
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
P3	SPIRAL VALVE CONTROL PRESSURE
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	COMBO DRAIN/JZL DRAIN SOLENOID VALVE
SOL6	WATER SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE

Tubing color	Purpose
BLUE	TANK PRESSURE
YELLOW	REGULATOR PRESSURE
RED	UNLOAD PRESS
CLEAR	MOISTURE DRAIN

3.14 Wiring diagram, air-cooled MFV



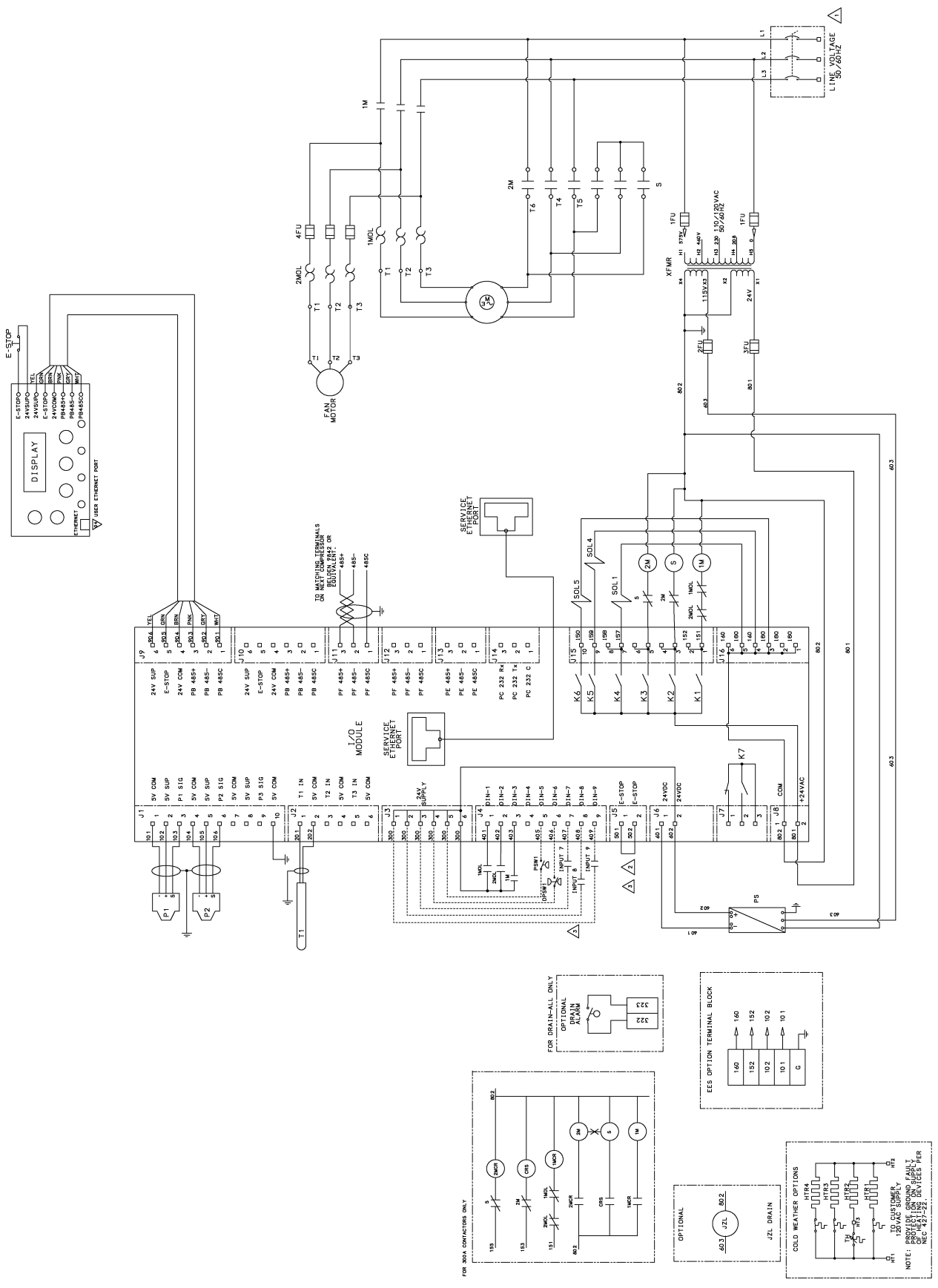
3.14 Wiring diagram, air-cooled MFV

Component	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
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	TRANSFORMER PRIMARY FUSES
2FU	TRANSFORMER SECONDARY FUSE 115V
3FU	TRANSFORMER SECONDARY FUSES 24V
4FU	FAN MOTOR BRANCH FUSES
JZL	JZL DRAIN OPTION
XFMR	UNIVERSAL TRANSFORMER
1MCR	CONTROL RELAY FOR 300A CONTACTORS

Drawing notes

1	CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER LOCAL CODES.
2	REMOVE JUMPER FOR AUXILIARY 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.

3.15 Wiring diagram, wye-delta



02250214-098 R03

SULLAIR

3.15 Wiring diagram, wye-delta

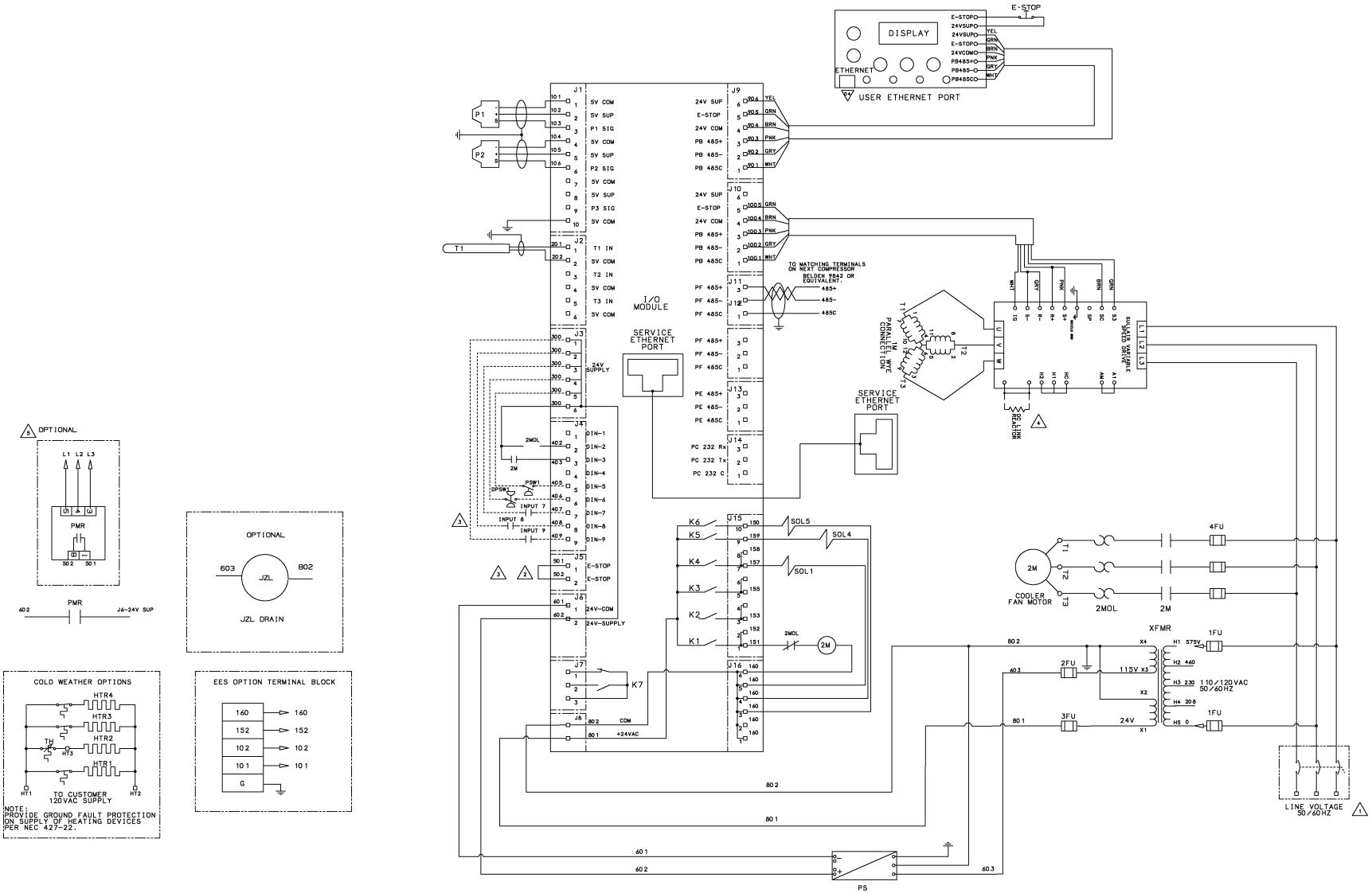
Component	Description
1MOL	COMPRESSOR OVERLOAD
1M	WYE-DELTA STARTER
2M	WYE-DELTA RUN CONTACTOR
S	WYE-DELTYA START CONTACTOR
3MOL	FAN MOTOR OVERLOAD
4M	CONTACTOR FOR POWER FACTOR CAPACITOR OPT.
P1	WET SUMP PRESSURE SENSOR
P2	PACKAGE DISCHARGE PRESSURE SENSOR
T1	UNIT DISCHAGE TEMPERATURE PROBE
PSW1	(OPT'L)INLET 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
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	TRANSFORMER PRIMARY FUSES
2FU	TRANSFORMER SECONDARY FUSE 115V
3FU	TRANSFORMER SECONDARY FUSES 24V
4FU	FAN MOTOR BRANCH FUSES
JZL	(OPT'L) JZL DRAIN
XFMR	UNIVERSAL TRANSFORMER
1MCR	CONTROL RELAY FOR 300A CONTACTORS
2MCR	CONTROL RELAY FOR 300A CONTACTORS
CRS	CONTROL RELAY FOR 300A CONTACTORS

Drawing notes

1	CUSTOMER TO FURNISH FUSED OR CIRCUIT BREAKER DISCONNECT PER LOCAL CODES.
2	REMOVE JUMPER FOR AUXILIARY 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.

Starter	T1	T2	T3	T4	T5	T6
Low	T1,T7	T2,T8	T3,T9	T4,T10	T5,T11	T6,T12
High	T1	T2	T3	T10	T11	T12
Join	T4-T7	T5-T8	T6-T9			

3.16 Wiring diagram, VSD air-cooled parallel wye A1000 (460V only)



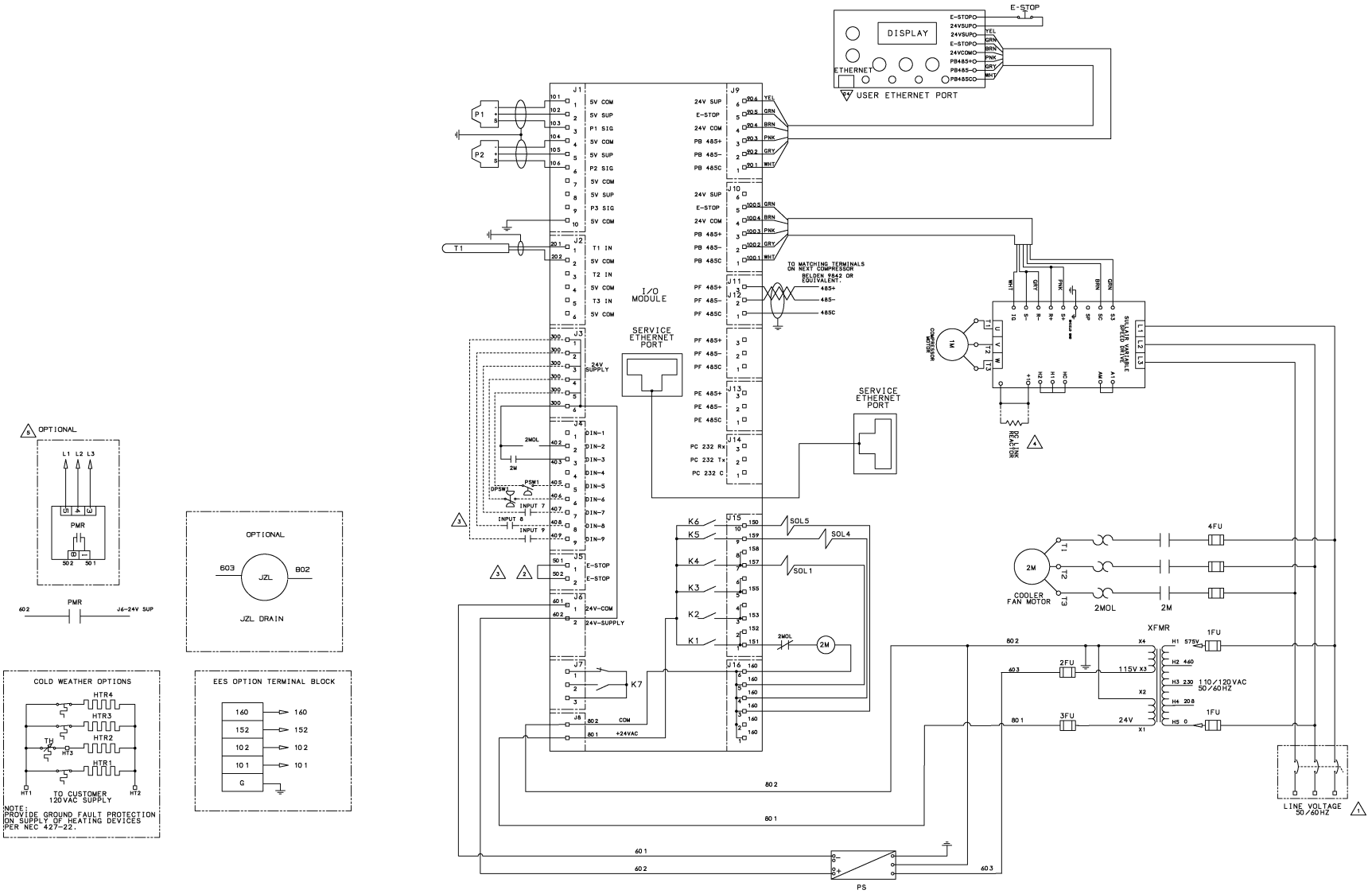
3.16 Wiring diagram, VSD air-cooled parallel wye A1000 (460V only)

Component	Description
1M	COMPRESSOR MOTOR
2M	COOLER FAN MOTOR STARTER
2MOL	FAN MOTOR OVERLOAD
1FU	TRANSFORMER PRIMARY FUSES
2FU	TRANSFORMER SCONDARY FUSE 115V
3FU	TRANSFORMER SECONDARY FUSES 24V
4FU	FAN MOTOR BRANCH CIRCUIT FUSES
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
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
JZL	(OPT'L) JZL DRAIN
PPR	POWER PRESENT RELAY OPTION
XFMR	UNIVERSAL 250VAC TRANSFORMER
Drawing 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.
4	SHORTING BAR IS STANDARD. REMOVE IF ADDING EXTERNAL DC LINK REACTOR.
5	PHASE MONITOR RELAY OPTION: THE PMR TYPICALLY ACTS AS A FAULT SIGNAL IN THE EVENT OF A POWER INTERRUPTION, REQUIRING MANUAL RESET. FOR USE WITH POWER AUTO RESTART (PFAR) LOGIC ENABLED, WIRE IT IN SERIES AS SHOWN IN PFAR CONNECTION.

NOTE

The VSD air-cooled parallel wye A1000 is 460V only. It cannot be wired for 230/575V.

3.17 Wiring diagram, VSD air-cooled series delta A1000 (230/575V only)



02250219-894 R01
02250216-829 R02

SULLAIR

3.17 Wiring diagram, VSD air-cooled series delta A1000 (230/575V only)

Component	Description
1M	COMPRESSOR MOTOR
2M	COOLER FAN MOTOR STARTER
2MOL	FAN MOTOR OVERLOAD
1FU	TRANSFORMER PRIMARY FUSES
2FU	TRANSFORMER SCONDARY FUSE 115V
3FU	TRANSFORMER SECONDARY FUSES 24V
4FU	FAN MOTOR BRANCH CIRCUIT FUSES
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
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
JZL	(OPT'L) JZL DRAIN
PPR	POWER PRESENT RELAY OPTION
XFMR	UNIVERSAL 250VAC TRANSFORMER
Drawing 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.
4	SHORTING BAR IS STANDARD. REMOVE IF ADDING EXTERNAL DC LINK REACTOR.
5	PHASE MONITOR RELAY OPTION: THE PMR TYPICALLY ACTS AS A FAULT SIGNAL IN THE EVENT OF A POWER INTERRUPTION, REQUIRING MANUAL RESET. FOR USE WITH POWER AUTO RESTART(PFAR) LOGIC ENABLED, WIRE IT IN SERIES AS SHOWN IN PFAR CONNECTION.

NOTE

The VSD air-cooled series delta A1000 is 230/575V only. It cannot be wired for 460V.

Notes:

02250219-894 R01

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.

Water-cooled compressors must have provisions for cooling water supply and drainage available.

NOTE

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

4.2 Ventilation & cooling

4.2.1 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 meters) 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.

If discharge/inlet ductwork is added to the compressor package, then remove the louvers from the compressor package.

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 drive assembly.

4.2.2 Water-cooled compressors

Adequate cooling water flow must be supplied to water-cooled compressors. Water delivery must be verified to assure constant delivery of the volumes outlined in *Table 4-1: Water flow requirements*. The cleaning of piping and water coolers is the customer's responsibility. Inspect all piping for deposits and clean as necessary. Refer to *Section 4.2.5: Water quality recommendations* on page 49. The figures shown are for full-load operation

utilizing an aftercooler. Cooler water will reduce water-flow requirements and warmer water will increase water-flow requirements.

Table 4-1: Water flow requirements

Motor size	Water temperature and required water flow[1]			
	70°F (21°C)		80°F (27°C)	
	gal/min	L/min	gal/min	L/min
60 hp (45 kW)	9.0	34.1	11.2	42.4
75 hp (55 KW)	10.5	39.7	13.0	49.2
100 hp (75 kW)	14.0	53.0	18.8	71.2

[1] Water pressure should be maintained between 25 and 75 psig (1.7 and 5.2 bar), but not to exceed 145 psig (10 bar).

Water piping to and from the compressor unit must be a minimum of 1 inch diameter. Isolation valves with side drains should be installed on both input and return lines. Input water should have a 2 mm strainer installed in-line. A normally closed solenoid valve should be connected to the water outlet of the compressor. The compressor control circuit switches this circuit. Consult the Sullair Service Department for assistance in these setups.

Water quality is critical to proper cooling of the compressor. Excessive build-up of lime, scale or other deposits can restrict the flow of water to the compressor. These deposits act as a thermal insulator and reduce the efficiency of the water cooler.

The cleaning of piping and water coolers is the customer's responsibility. Inspect all piping for deposits and clean as necessary. Refer to *Section 4.2.5: Water quality recommendations* on page 49.

Table 4-2: Ventilation requirements indicates the minimum ventilation requirements necessary to keep the compressor running at its normal operating temperature. The fan air requirement is the amount of air, which must flow through the compressor for proper ventilation. The heat rejection requirement is the amount of heat that is radiated by the compressor. This heat must be removed to assure a normal operating temperature. With air-cooled compressors it is possible to use this heat for space heating, providing additional pressure drop across the fan does not exceed 0.2 in H_2O. Consult a Sullair office for assistance in utilizing this heat. If ductwork is added, the high static fan option is required.

Do not install a water-cooled or an air-cooled/after-cooled compressor where it will be exposed to temperatures less than 32°F (0°C). Consult factory for machine operation in ambient temperature less than 32°F (0°C).

If machine is equipped with water regulating valve, use the water regulating valve to adjust compressor temperature to maintain a minimum of 195°F (91°C) [210°F (99°C) for 24KT® or pressures are rated above 150 psig].

Temperature and pressure gauges should be installed in the water piping for use in troubleshooting of the water system. Water pressure should ideally be between 25 and 75 psig (1.7 and 5.2 bar) but must not be above 145 psi (10 bar).

4.2.3 Water system venting

Vent the system upon installation or after draining the system on start-up:

1. Open the water valve(s) allowing water to flow to the system.
2. Open the vent cocks (located on top of the aftercooler and the lubricant cooler) and allow all air to escape from the system. When water is observed at the vent cocks, close them.

The system is now vented.

4.2.4 Draining the water system

If the system needs to drained completely, follow the steps outlined below:

Table 4-2: Ventilation requirements

Cooling type	Motor size	Fan air		Ventilating air—heat rejection		Cooling water—heat rejection	
		cfm	m^3/h	BTU/h	kcal/h	BTU/h	kcal/h
Air-cooled with aftercooler	60 hp (45 kW)	6,000	10,194	170,300	42,915	—	—
	75 hp (55 kW)	6,000	10,194	213,000	53,675	—	—
	100 hp (75 kW)	8,200	13,932	286,000	72,071	—	—
Water-cooled	60 hp (45 kW)	2,845	4,834	10,600	2,671	170,300	42,915
	75 hp (55 kW)	2,845	4,834	13,300	3,352	213,000	53,675
	100 hp (75 kW)	2,845	4,834	15,800	3,982	286,000	72,071

1. At the rear of the unit. Disconnect both the inlets and discharge water lines.
2. Remove the drain plugs located at the bottom of the aftercooler and lubricant cooler.
3. Allow the system to drain completely.

4.2.5 Water quality recommendations

Water quality considerations are crucial to the effective operation of a water-cooled compressor and yet are the most often ignored. Premature failure of components can often be traced to a reduction in heat-transfer rate that has resulted from a reduced flow rate due to scale build-up in water-cooling lines or the coolers themselves.

To ensure maximum life expectancy and best performance of the compressor cooling system, refer to *Table 4-3: Water tests*.

4.2.5.1 Scale

Scale is formed from calcium carbonate, which precipitates out of water. Calcium content tends to be higher in water taken from wells than water taken from the surface of lakes. A higher pH value will also assist in the formation of lime scale. In all cases calcium will form scale when water that has dissolved calcium is heated. It then forms lime-scale on surfaces such as the inside of pipes and the tubing that comprises water coolers. Scale formation on the inside of pipes and inside of heat exchangers acts as a thermal insulator. This causes coolers to be less effective, and piping to have reduced water flow, making them less effective. Over time lime scale build-up can reduce water flow by 80% or greater. This renders the cooling system ineffective and will damage the system. Scale can be controlled with water treatment.

4.2.5.2 Corrosion

As contrasted to lime scale build-up, corrosion eventually causes a reduction in the wall thickness of pipes. High levels of dissolved oxygen and low pH levels assist in the creation of corrosive scale. A thin coating of lime scale is often beneficial in helping to prevent corrosion from forming.

4.2.5.3 Biological and organic fouling (slime)

The heightened temperatures of compressor cooling operations help to reduce the likelihood that organic fouling will become a major concern. In the event of an infestation, commercial chemical shock treatments are available to control any outbreaks.

4.2.6 Seawater-cooled units

NOTE

If seawater is to be used for cooling, optional copper-nickel coolers must be selected.

Water cleanliness is critical for operation of the compressor. A strainer must be installed in the inlet piping of the water system. It is also recommended that a solenoid valve (normally closed) be installed into the water outlet side of the compressor system. Consult the Sullair Service Department for assistance in setting up these recommended precautionary functions. In addition, be aware that cleaning of coolers as a result of fouling is a customer responsibility.

Isolation valves with side drains should be installed on both the inlet and outlet lines.

The recommended flow rate cannot be exceeded. An orifice plate must be installed in the pipe-work at least 3.3 ft

Table 4-3: Water tests

Substances	Test interval	Acceptable concentration
Corrosivity hardness, pH, total dissolved solids, temperature at inlet, alkalinity	Monthly. If stable for 3 to 4 months, analyze quarterly.	Langerlier index 0 to 1
Iron	Monthly	< 2 ppm
Sulphate	Monthly	< 50 ppm
Chloride	Monthly	< 50 ppm
Nitrate	Monthly	< 2 ppm
Silica	Monthly	< 100 ppm
Desolated oxygen	Daily. If stable, analyze weekly.	0 ppm (as low as possible)
Oil & grease	Monthly	< 5 ppm
Ammonia	Monthly	< 1 ppm

(1 m) before the cooler. The orifice size must be calculated to ensure that the maximum seawater flow rate cannot be exceeded. Without these precautions, the seawater flow rate through the cooler may be several times the recommended maximum, which will lead to rapid system failure.

Seawater pressure	Orifice diameter for maximum seawater flow (or 40 US gal/min [152 L/min])	
	in	mm
25 psi (1.7 bar)	0.675	17
35 psi (2.4 bar)	0.62	16
45 psi (3.1 bar)	0.58	15
55 psi (3.8 bar)	0.55	14
65 psi (4.5 bar)	0.53	13.5
75 psi (5.2 bar)	0.51	13

No oil cooler manufacturer can guarantee that its products will have an indefinite life and for this reason, we suggest that the cooling system be designed to minimize any damage caused by oil cooler leaking. This can be achieved as follows:

- The oil pressure should be maintained at a pressure higher than the seawater pressure. In the event of a leak occurring, the oil will be prevented from becoming contaminated.
- When the hydraulic system is not in use, the coolers should be isolated from incoming seawater under pressure.
- The seawater outlet pipe from the cooler should have an open run to waste piping.

4.3 Outdoor installation (sheltered)

Many times a compressor must be installed outside due to available space or other job site 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 and optional NEMA 4 controls, which are watertight. The standard machine has NEMA 12 rated controls, which are dust-tight.

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 fully supported 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 40°F (4.4°C).

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

4.4 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. Downstream filters and an air dryer can remove any carryover.

WARNING

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."[1]

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.

[1]*Plastic Pipe Institute, Recommendation B. Adopted January 19, 1972.*

4.4.1 Pipe sizing

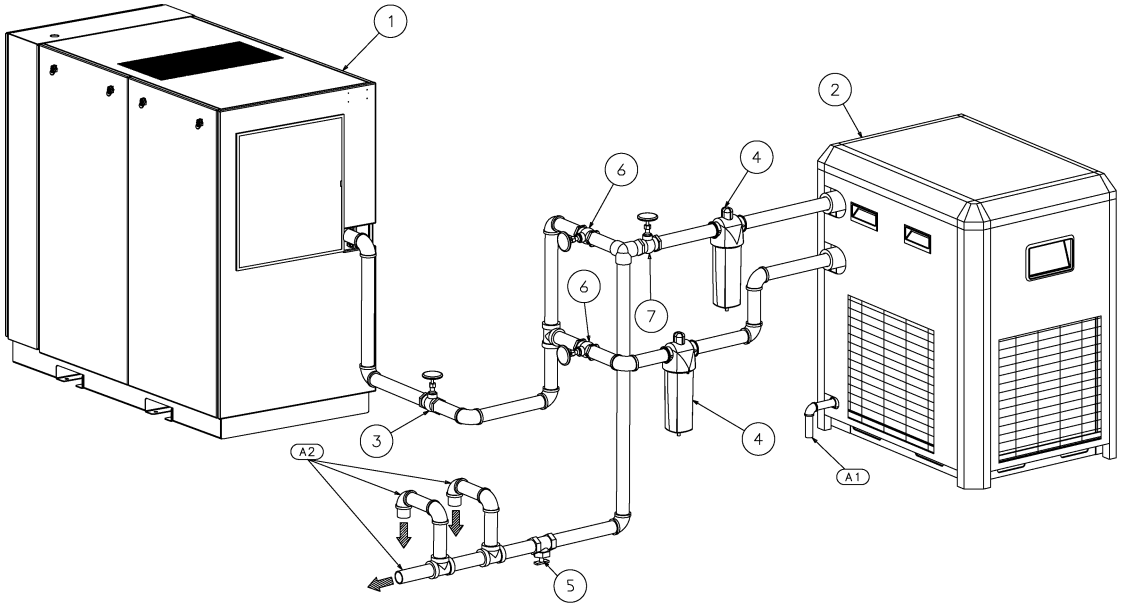
Pipe should be sized at least as large as the discharge connection of the compressor. Piping and fittings should all be suitably rated for the discharge pressure.

4.4.2 Use of auxiliary receiver tank

An auxiliary receiver tank should be used in cases where large demand swings are expected. 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 compressor outlet connection.

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

A built-in aftercooler 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 aftercooler is supplied with a combination condensate separator/



1. Sullair compressor	4. Sullair filter	7. Standard gate valve
2. Sullair dryer	5. Water leg drain valve	A1. Customer connections
3. Shut-off gate valve	6. By-pass gate valve	A2. Customer connections

Figure 4-1: Service air piping—typical installation

trap. A drain line should be installed on the condensate drain.

NOTE

For low-volume systems that do not require an auxiliary separator/sump, compressor response time may need to be adjusted. Consult the Sullair Service Department for assistance.

4.5 Coupling alignment check

No coupling alignment is required.

4.6 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 tank. To be able to see the fluid level it may be necessary to start the machine and build the separator/sump tank pressure up to 10/20 psi and then shut down. Wait a few minutes to check oil level. 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 tank to the maximum allowable fluid level, which is center of the sight glass.

4.7 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 Electric Code and/or any applicable local electrical code concerning isolation switches, fused disconnects, etc. Sullair provides a wiring diagram for use by the installer. An electrical check should be made to help assure that the first start-up will be trouble-free. The compressor and drive should be properly grounded/earthed in accordance with Local and National Code 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 circuit is balanced and not overloaded by other electrical equipment. The length of wiring from a suitable electrical feed point is critical as voltage drops may impair the performance of the compressor. Cable sizes may vary considerably so the mains terminals will accept up to 50 mm2 (1 awg) (37/4 Sk & 50/60 H) and up to 90 mm2 (3/0 awg) (55/75 k & 75/100 H) cable.

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 within the box. If another hole is used, the original hole must be blocked off.

DANGER

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

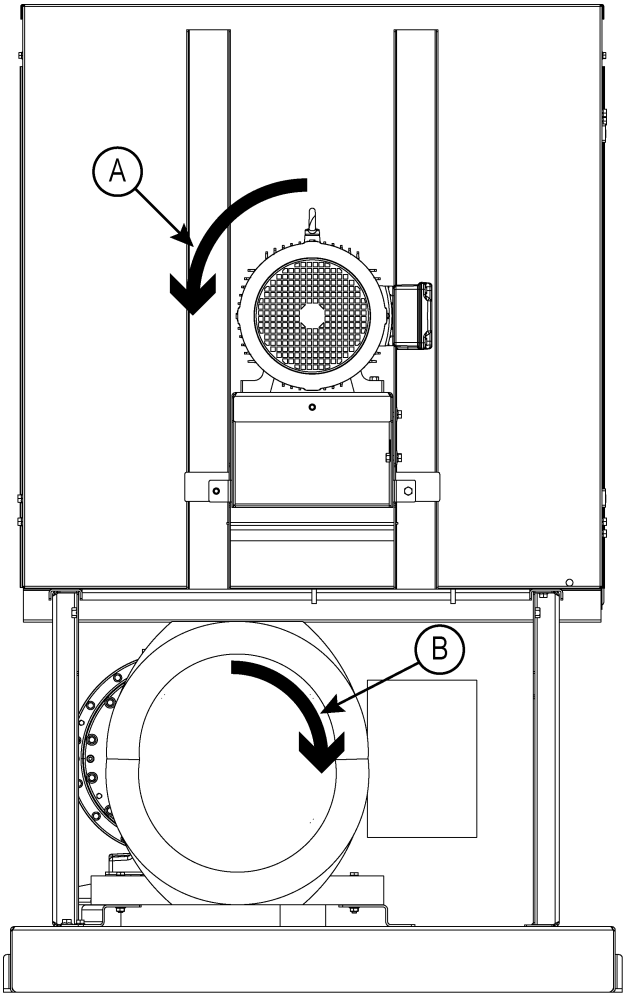
1. Check incoming voltage. Be sure that the incoming voltage is the same voltage that the compressor was wired for.
2. Check motor starter and overload heater sizes.
3. Check all electrical connections for tightness.
4. Check the electrical controls by disconnecting the three (3) motor leads from the starter. Energize the control circuits by pushing the ⓘ (Start) pad and check all protective devices to be sure that they will de-energize the starter coil when tripped.
5. Reconnect the three (3) motor leads and jog the motor for a direction of rotation check, as explained in *Section 4.8: Motor rotation direction check* on page 52.

4.8 Motor rotation direction check

Motor rotation check must be made at compressor start-up. The compressor can be damaged if it runs in the wrong direction for more than a few seconds. Motor rotation can be viewed through the opening in the drive adapter housing. 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 tank 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.

Fan motor rotation should also be checked. It should rotate counter-clockwise when viewing the fan motor from the backside of the motor.



A. Fan motor rotation direction
B. Main motor rotation direction

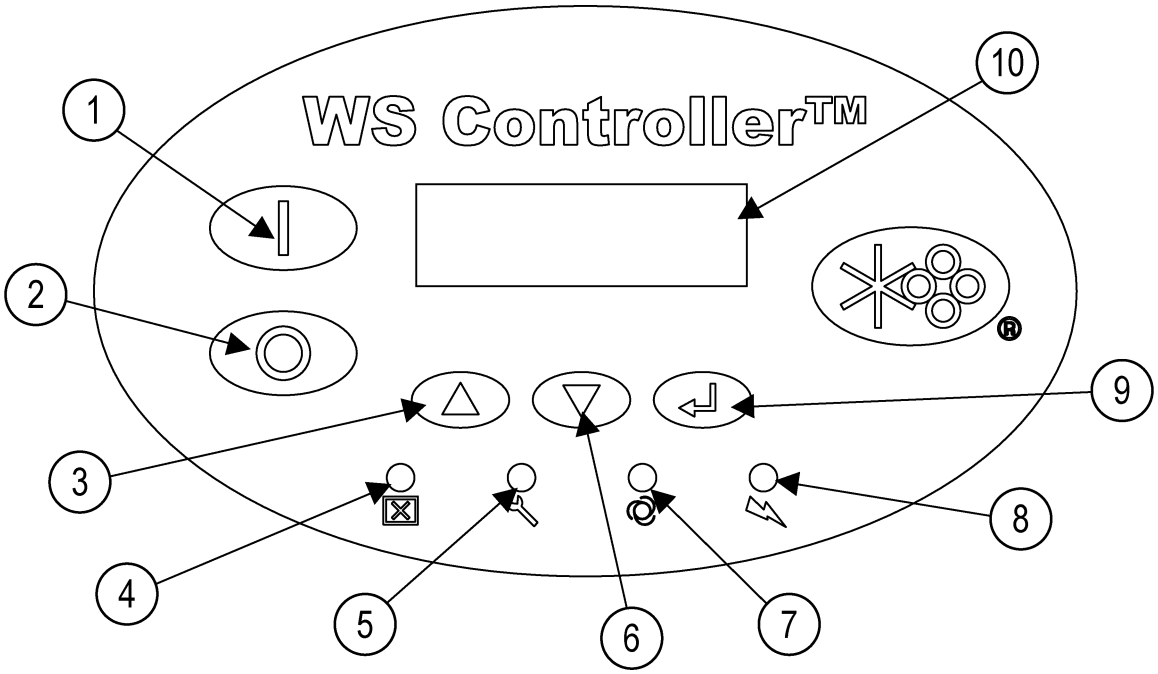
Figure 4-2: Motor rotation direction

Notes:

02250219-894 R01

Section 5
WS Controller™

5.1 Controller layout



1. Start pad	6. Down arrow pad
2. Stop pad	7. Run mode indicator
3. Up arrow pad	8. Power indicator
4. Fault indicator	9. Enter pad
5. Maintenance indicator	10. LCD display

Figure 5-1: WS Controller

5.2 Controller keypad

See the WS Controller manual (P/N 02250202-046) for complete operation capabilities. The WS Controller keypad has two main pads for compressor control.

- To start the compressor operation, press the green (Start) pad.
- To stop compressor operation, press the red (Stop) pad.
- The RUN mode indicator lights up whenever the control is in an operating mode.

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.

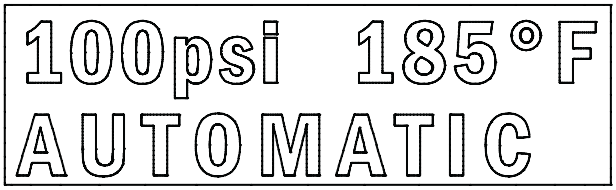


Figure 5-2:

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.

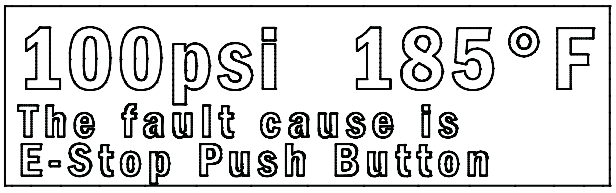


Figure 5-5:

Refer to *Figure 5-6*. Press the ▽ (Down arrow) pad 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.

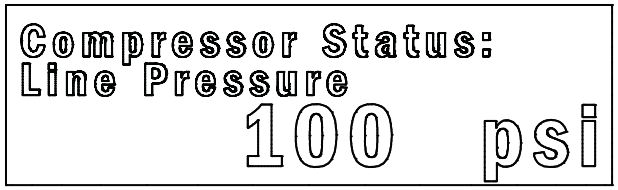


Figure 5-6:

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.

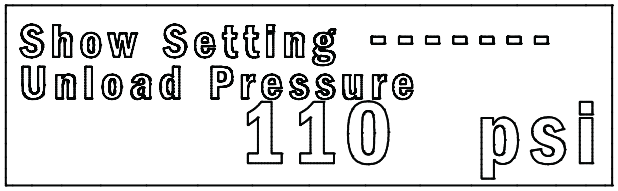


Figure 5-7:

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 arrow) and ▽ (Down arrow) pads to change the setting, and press the ↵ (Enter) pad again to save the new setting.

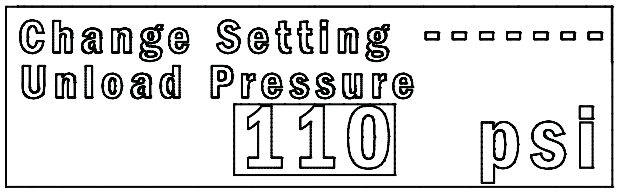


Figure 5-8:

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) pads 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.

02250219-894 R01

The list of displays may be navigated from either direction by using the (Up arrow) or Down arrow pads. For example, to change language from normal view, press the (Up arrow) pad once, press the (Enter) pad to select your language, and press the (Enter) pad 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 blue 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.

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 *Section 6.6: Filter maintenance* on page 60.

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.

6.2 Daily operation

Prior to starting the compressor, it is necessary to check the fluid level in the separator/sump tank. 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 *Section 6.14.2: Troubleshooting guide* on page 63 under "Excessive compressor fluid consumption" for a probable cause and remedy.

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 after initial 50 hours of operation

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

- Clean the return line strainer. Refer to *Discharge, separator/sump and piping system* of the Parts Manual for location.
- Clean the return line orifice.

6.4 Maintenance every 2000 hours

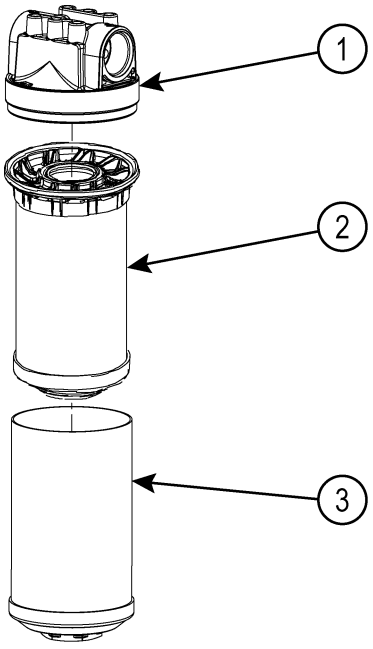
After 2000 hours of operation, it will be necessary to perform the following:

- Clean the return line strainer. Refer to *Discharge, separator/sump and piping system* of the Parts Manual for location.
- Replace the fluid filter element.
- Pull oil sample for analysis.
- Check air filter. Change if necessary.

6.5 Fluid maintenance

For Sullube®, change fluid every 10,000 hours or 1 year, whichever comes first. Drain the separator/sump tank and change the compressor fluid using instructions shown in *Section 3.7: Lubrication change recommendations and maintenance, fluid* on page 25.

6.6 Filter maintenance



1.	Fluid filter assembly
2.	Element[1]
3.	Body

[1]Fluid filter replacement kit: P/N: 02250168-084

Fluid filter assembly P/N: 02250197-189

Figure 6-1: Fluid filter assembly

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

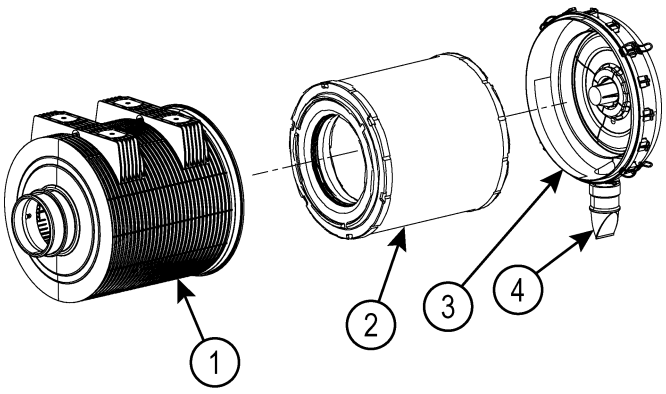
- As indicated by the WS Controller™.
- Every fluid change.

6.6.1 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 30 to 35 ft•lb (40.5 to 47.3 N·m).
7. Restart compressor and check for leaks.

6.7 Air filter maintenance



1.	Housing	3.	Cover
2.	Element[1]	4.	Vacuator valve

[1]Replacement air filter element kit P/N: 02250215-315

Air filter assembly P/N: 02250214-305

Figure 6-2: Air filter assembly

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.

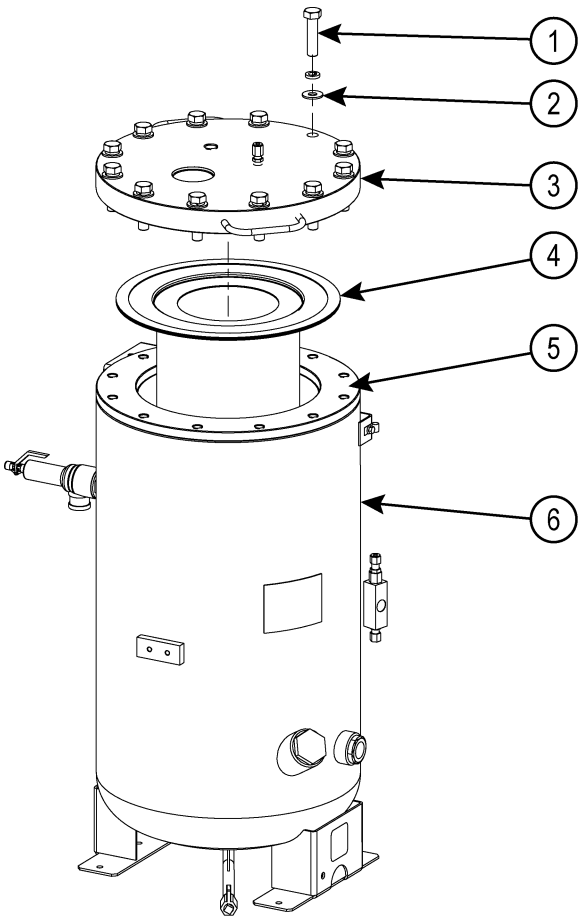
6.7.1 Air filter element replacement

1. Clean the air filter's exterior housing.
2. Release the hold-down clips and remove the end cover.
3. Remove the air filter element by pulling it out of the housing.
4. Clean the housing interior with a damp cloth. **Do not** blow dirt out with compressed air.
5. Replace the element.
6. Reassemble in the reverse order.

6.8 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.

6.8.1 Separator element replacement



1. Capscrew
2. Lock washer
3. Cover plate
4. Separator element[1]
5. Separator/sump tank flange
6. Separator/sump tank

[1]Separator element replacement kit P/N: 02250218-061
Separator element P/N: 02250214-961

Figure 6-3: Separator element assembly

Refer to *Figure 6-3*. The separator element must be changed when indicated by the WS Controller, or once a year, whichever occurs first. Follow the procedure explained below for separator element replacement.

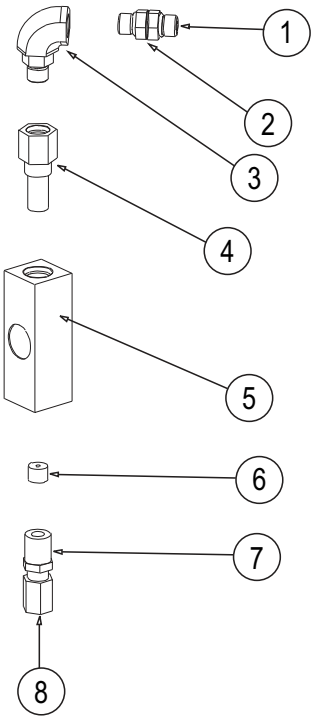
WARNING

High-pressure hazard.

Relieve all pressure from the separator/sump tank and all compressor lines.

1. Disconnect all piping connected to the separator cover plate.
2. Loosen and remove the twelve (12) hex head capscrews (⅝ in × 2½ in) and lock washers from the cover plate.
   - **Always** discard the lock washers.
3. Lift the cover plate from the separator/sump tank.
4. Remove the separator element.
5. Scrape any old gasket material from the underside of the cover plate and the separator/sump tank flange
   - **Do not** let any scraps fall into the separator/sump tank.
6. Inspect the separator/sump tank for rust, dirt, etc.
7. Insert a new separator element into the separator/sump tank taking care not to dent the element against the tank opening.
   - **Do not** remove the staples from the separator element.
   - **Do not** use any type of gasket eliminator.
8. Replace the cover plate, lock washers and capscrews. Torque to 140 ft·lbs. (190 N·m).
   - **Always** use new lock washers.
9. Verify continuity between the separator element and the separator/sump tank.
10. Reconnect all piping.
    - The fluid return line tube should extend to ⅛″ above the bottom of the separator element to ensure proper return line flow.
11. Clean the return line strainer before restarting the compressor.

6.9 Oil return / sight glass maintenance



1. To separator/sump tank
2. Male tube connector
3. 90° pipe elbow
4. Filter assembly[1]
5. Sight glass / orifice block
6. Brass plug orifice
7. Female tube connector
8. To unit

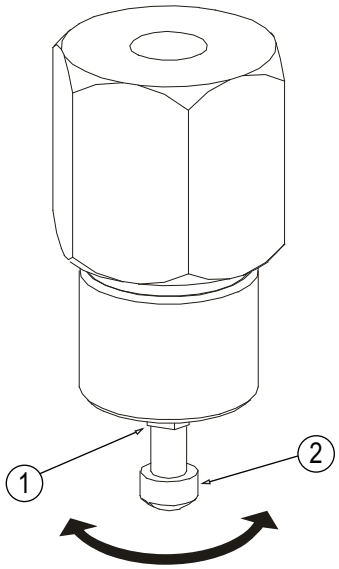
[1]Oil return filter replacement kit P/N: 02250117-782

Figure 6-4: Oil return / sight glass

Refer to *Figure 6-4*. The oil return/sight glass subassembly is attached to the side of the separator tank. Oil return/sight glass maintenance should be performed on a routine basis parallel to that of the fluid filter, or as indicated in the troubleshooting section of this manual. The maintenance on an oil return/sight glass is mainly concerned with the condition of the filter assembly. Order filter assembly No. 02250117-782, and use the following instructions as a guide.

1. Disconnect the tube at bottom of sight glass.
2. Unscrew the sight glass assembly where the elbow fitting joins the strainer/filter.
3. Remove used filter assembly, and replace with new assembly.
4. Inspect and clean the orifice inside the sight glass blocks. The orifice must be removed with an allen wrench.
5. Coat/lubricate the O-rings with silicone grease.
6. Reattach the connectors to the sight glass/ orifice blocks.

6.10 Pressure regulator adjustment



1. Locking nut
2. Adjustment screw

Figure 6-5: Regulator adjustment

Refer to *Figure 6-5*. Start the compressor and adjust the service valve to maintain service air pressure approximately at 1 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.

6.11 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).

6.12 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).

6.13 Shaft coupling maintenance

The compressor unit and motor are rigidly connected via a mounting adapter housing. This arrangement makes coupling alignment unnecessary. The coupling is a jaw type in shear. If the elastomeric element requires replacement due to wear or breakage, order replacement element no. 02250152-670, and follow the following steps.

1. Remove the protective grill from the adapter housing.
2. Loosen the retaining screw located on the outer sleeve. Slide the sleeve to one side, exposing the coupling element.
3. Unwrap the coupling element from the coupling jaws.
4. Install the new element by wrapping it around the jaws, engaging the cogs on the element into the jaws.
5. Reinstall the outer sleeve and the protective grill. Secure the outer sleeve by tightening the two screws to 45 in·lbs (5 N·m).

6.14 Troubleshooting

6.14.1 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:

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

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

6.14.2 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.

Symptom	Probable cause	Remedy
Compressor shuts down with air demand present	Loss of control voltage	Check power supply for 24V DC output. Replace power supply if necessary.
	Low incoming voltage	Consult power company.
	Excessive operating pressure	Reset. If trouble persists, check that line pressure does not exceed maximum operating pressure of the compressor (specified on nameplate).
	Separator requires maintenance indicated by WS Controller™	Replace separator.
	Machine programmed for wrong pressure setting	Reprogram with WSPC equipped laptop.
	Defective regulator 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 separator/ sump tank pressure to 18 psig (1.2 bar) when maximum operating pressure is reached. Repair if defective.
	Cooling water temperature too high	Reduce water temperature to 85°F (29.4°C) or less. Water-cooled only.
	Cooling water flow insufficient	Check water lines and valves (water-cooled only).
	Cooler plugged	Clean tubes. If plugging persists, install water conditioner (water-cooled only).
	Cooling air flow restricted	Clean cooler and check for proper ventilation.
	Ambient temperature is too high	Provide sufficient ventilation.
	Low fluid level	Add fluid.
	Clogged filter	Change the fluid filter element.
	Thermal valve not functioning properly	Replace element.
	Water flow regulating valve not functioning properly	Change (water-cooled only).
Compressor will not build full discharge pressure	Air demand is too great	Check service lines for leaks or open valves.
	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 inside inlet valve is not plugged.
	Pressure regulator out of adjustment	Adjust regulator according to control adjustment instructions in the Maintenance section.
	Defective pressure regulator	Replace regulator.
	Defective unload solenoid valve	Check that the valve closes when energized. Replace the coil or the complete valve if defective.

Symptom	Probable cause	Remedy
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 de-energized. Replace if necessary.
	Plugged control line strainer	Clean strainer (screen and O-ring replacement kit available).
	Defective blowdown valve	Check that separator/sump tank pressure is exhausted to the atmosphere when the solenoid valve opens. Repair or replace if necessary (kit available).
Excessive compressor fluid consumption	Clogged return line or orifice	Clean strainer (screen and O-ring replacement kit available).
		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. Check that the compressor temperature has not dropped below 170°F (76.7°C).
Pressure relief valve opens repeatedly	Defective pressure relief valve	Replace.
	Plugged separator	Check separator differential.
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™.
	Inadequate drain timer settings	Check WS Controller control drain interval and drain time, and adjust accordingly. High humidity conditions require longer drain times or more frequent openings.

Notes:

02250219-894 R01

SULLAIR®

a division of Accudyne Industries

Sullair, LLC
3700 East Michigan Boulevard
Michigan City, IN 46360 USA
www.sullair.com
1-800-SULLAIR (USA only)
1-219-879-5451 (non-USA)