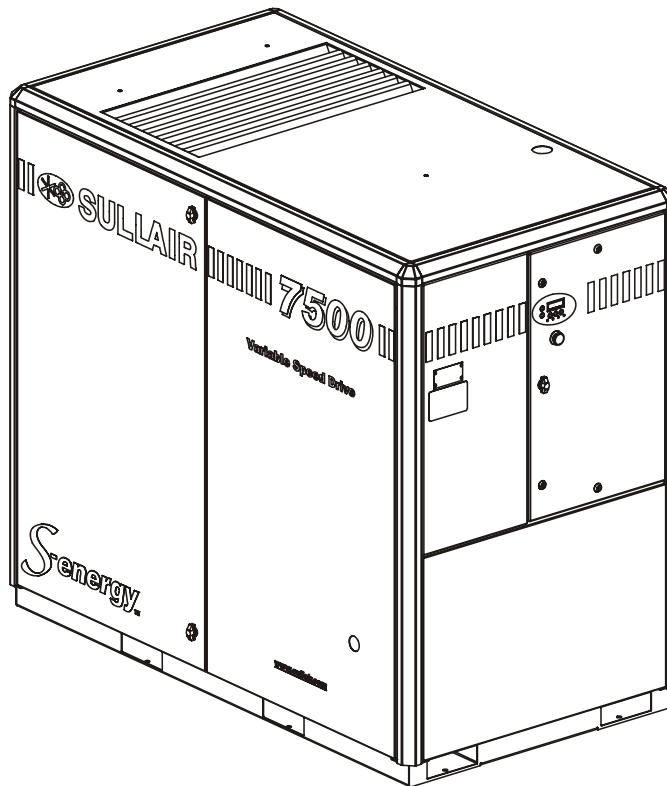


SULLAIR®

USER MANUAL

**INDUSTRIAL AIR COMPRESSOR
4500P, 5500, 7500, 4500PV,
5500V, 7500V: 45, 55 & 75 KW:60, 75 & 100 HP**



WARRANTY NOTICE

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

PART NUMBER:
02250172-980-R00

**KEEP FOR
FUTURE
REFERENCE**

©SULLAIR CORPORATION

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

200710010000

and all subsequent serial numbers.



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 Industrial compressors and compressor electrical systems are offered at regular intervals throughout the year at Sullair's corporate headquarters training facility located at Michigan City, Indiana.

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

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

Sullair Customer Care Training Department

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

- Or Write -

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



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Section 1

SAFETY

NOTE



**OPERATOR IS REQUIRED TO READ
ENTIRE INSTRUCTION MANUAL.**

1.1 GENERAL

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

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

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

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

1.2 PERSONAL PROTECTIVE EQUIPMENT

- A. Prior to installing or operating the compressor, owners, employers and users should become familiar with, and comply with, all applicable OSHA regulations and/or any applicable Federal, State and Local codes, standards, and regulations relative to personal protective equipment, such as eye and face protective equipment, respiratory protective equipment, equipment intended to protect the extremities, protective clothing, protective shields and barriers and electrical protective equipment, as well as noise exposure administrative and/or engineering controls and/or personal hearing protective equipment.

1.3 PRESSURE RELEASE

- A. Install an appropriate flow-limiting valve between the service air outlet and the shut-off (throttle) valve, either at the compressor or at any other point along the air line, when an air hose exceeding 1/2" (13mm) inside diameter is to be connected to the shut-off (throttle) valve, to reduce pressure in case of hose failure, per OSHA Standard 29 CFR 1926.302(b)(7) and/or any applicable Federal, State and Local codes, standards and regulations.
- B. When the hose is to be used to supply a manifold, install an additional appropriate flow-limiting valve between the manifold and each air hose exceeding 1/2" (13mm) inside diameter that is to be connected to the manifold to reduce pressure in case of hose failure.

- C. Provide an appropriate flow-limiting valve at the beginning of each additional 75 feet (23m) of hose in runs of air hose exceeding 1/2" (13mm) inside diameter to reduce pressure in case of hose failure.
- D. Flow-limiting valves are listed by pipe size and flow-rated. Select appropriate valves accordingly, in accordance with their manufacturer's recommendations.
- E. **DO NOT** use air tools that are rated below the maximum rating of the compressor. Select air tools, air hoses, pipes, valves, filters and other fittings accordingly. **DO NOT** exceed manufacturer's rated safe operating pressures for these items.
- F. Secure all hose connections by wire, chain or other suitable retaining device to prevent tools or hose ends from being accidentally disconnected and expelled.
- G. Open fluid filler cap only when compressor is not running and is not pressurized. Shut down the compressor and bleed the receiver tank to zero internal pressure before removing the cap.
- H. Vent all internal pressure prior to opening any line, fitting, hose, valve, drain plug, connection or other component, such as filters and line oilers, and before attempting to refill optional air line anti-icer systems with antifreeze compound.
- I. Keep personnel out of line with and away from the discharge opening of hoses or tools or other points of compressed air discharge.
- J. **DO NOT** use air at pressures higher than 2.1 bar for cleaning purposes, and then only with effective chip guarding and personal protective equipment per OSHA Standard 29 CFR 1910.242 (b) and/or any applicable Federal, State, and Local codes, standards and regulations.
- K. **DO NOT** engage in horseplay with air hoses as death or serious injury may result.

1.4 FIRE AND EXPLOSION

- A. Clean up spills of lubricant or other combustible substances immediately, if such spills occur.
- B. Shut off the compressor and allow it to cool. Then keep sparks, flames and other sources of ignition away and **DO NOT** permit smoking in the vicinity when checking or adding lubricant or when refill-

ing 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 also clothing away from couplings, fans and

other moving parts.

- B. **DO NOT** attempt to operate the compressor with the fan, coupling or other guards removed.
- C. Wear snug-fitting clothing and confine long hair when working around this compressor, especially when exposed to hot or moving parts.
- D. Keep access doors, if any, closed except when making repairs or adjustments.
- E. Make sure all personnel are out of and/or clear of the compressor prior to attempting to start or operate it.
- F. Disconnect and lock out all power at source and verify at the compressor that all circuits are de-energized to minimize the possibility of accidental start-up, or operation, prior to attempting repairs or adjustments. This is especially important when compressors are remotely controlled.
- G. Keep hands, feet, floors, controls and walking surfaces clean and free of fluid, water or other liquids to minimize the possibility of slips and falls.

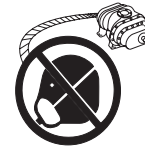
1.6 HOT SURFACES, SHARP EDGES AND SHARP CORNERS

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

1.7 TOXIC AND IRRITATING SUBSTANCES

- A. **DO NOT** use air from this compressor for respiration (breathing) except in full compliance with 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 table-

spoon 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.

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Section 2

DESCRIPTION

2.1 INTRODUCTION

The design of the Sullair 4500P, 5500, 7500, 4500PV, 5500V, 7500V: 60, 75 and 100hp / 45, 55 and 75kw line of compressor units is a single stage, positive displacement, flood lubricated one. A complete package includes the:

- Compressor unit
- Electric motor
- Starter
- Compressor inlet and discharge systems
- Compressor lubrication and cooling system
- Capacity control system
- WS Controller™
- Aftercooler
- Combination separator and trap
- Heavy gauge steel mounting frame

Some models also have a Variable Speed Drive (VSD) that is described in Sections 2.10 and 2.11. There are also optional components which allow operation in environments where the compressor is exposed to extreme temperatures, or if sea water is used as a coolant.

New compressors are shipped from the factory fully charged with that particular model's recommended lubrication fluid. The SPECIFICATIONS Sections 3.4 and 3.5 describe lubrication requirements and recommendations for each compressor package.

⚠ CAUTION

Use only one type of a recommended compressor lubricant. Adding a different one, or mixing lubricants can cause damage and/or malfunctions, and will void the compressor's warranty.

Sullair recommends that, in cases where 24KT lubricant is used, users take a sample at the first filter change and send it to the factory for a free analysis using a sample kit provided by their Sullair dealer. The results will be sent back to the user in the form of

a report with recommendations.

NOTE

The compressor requires no internal inspections or maintenance actions. Opening the compressor's housing may void its warranty. (This does not apply to the shaft seal which is replaceable.)

Although both air and water-cooled models require no inspection of the unit's internal components, external piping, connectors, and the enclosure should be inspected and maintained in accordance with the procedures and recommendations in this manual.

2.2 COMPRESSOR COMPONENT DESCRIPTION

Air-cooled models (*Figure 2-1*) use a fan to draw outside air into the enclosure, cooling the motors, the combined radiator fluid cooler, and air aftercooler. This hot air is then vented out of the top of the enclosure.

Water-cooled models (*Figure 2-2*) use two shell and tube heat exchangers to transfer heat from the coolant, and the compressed air. Both air-cooled and water cooled models have a fluid filter, air/oil separator, control valves, and an inlet air filter.

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

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

After the air/fluid mixture is discharged from the

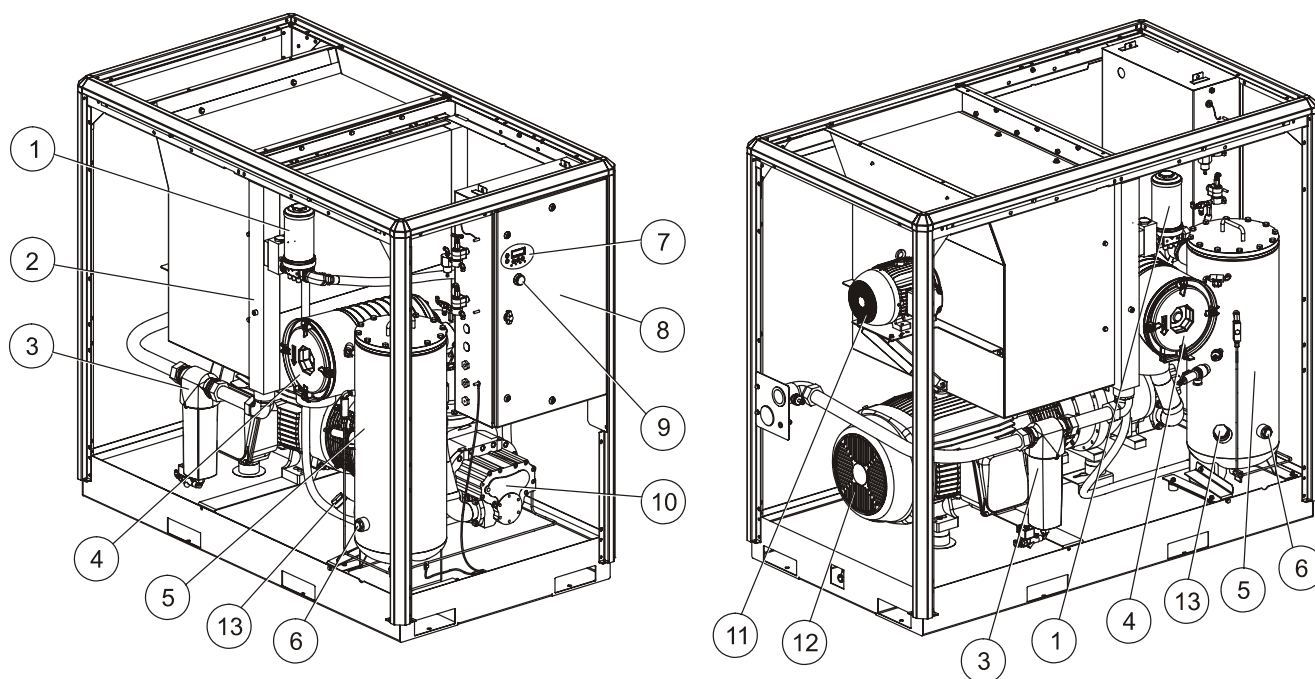


Figure 2-1: Main Components, Air-Cooled

- | | |
|---------------------------|----------------------|
| 1. Fluid Filter | 8. Starter Box |
| 2. Cooler | 9. E-Stop Button |
| 3. Moisture Separator | 10. Compressor Unit |
| 4. Air Inlet Filter | 11. Cooler Fan Motor |
| 5. Receiver Tank | 12. Motor |
| 6. Fluid Fill Sight Glass | 13. Fluid Fill |
| 7. WS Controller | |

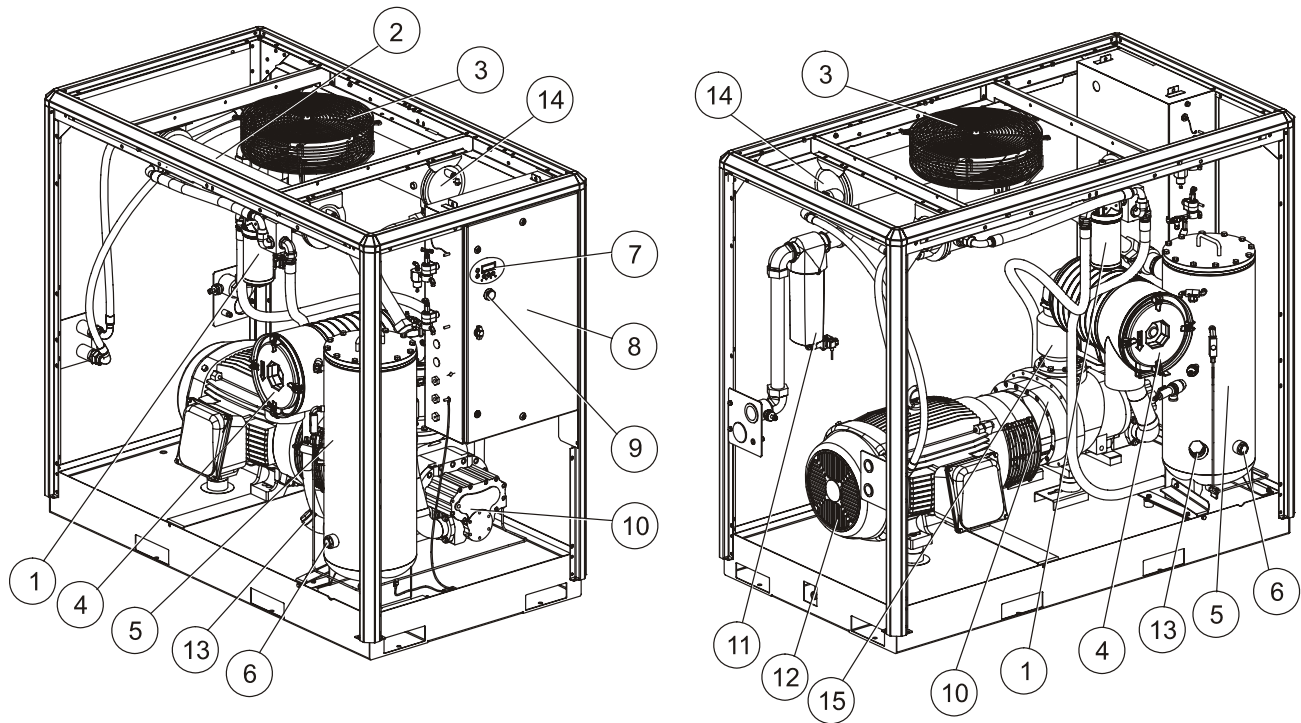


Figure 2-2: Main Components, Water-Cooled

- | | |
|---------------------------|------------------------------|
| 1. Fluid Filter | 9. E-Stop Button |
| 2. Cooler | 10. Compressor Unit |
| 3. Vent Fan | 11. Moisture Separator |
| 4. Air Inlet Filter | 12. Motor |
| 5. Receiver Tank | 13. Fluid Fill |
| 6. Fluid Fill Sight Glass | 14. Water-Cooled Aftercooler |
| 7. WS Controller | 15. Inlet Valve |
| 8. Starter Box | |

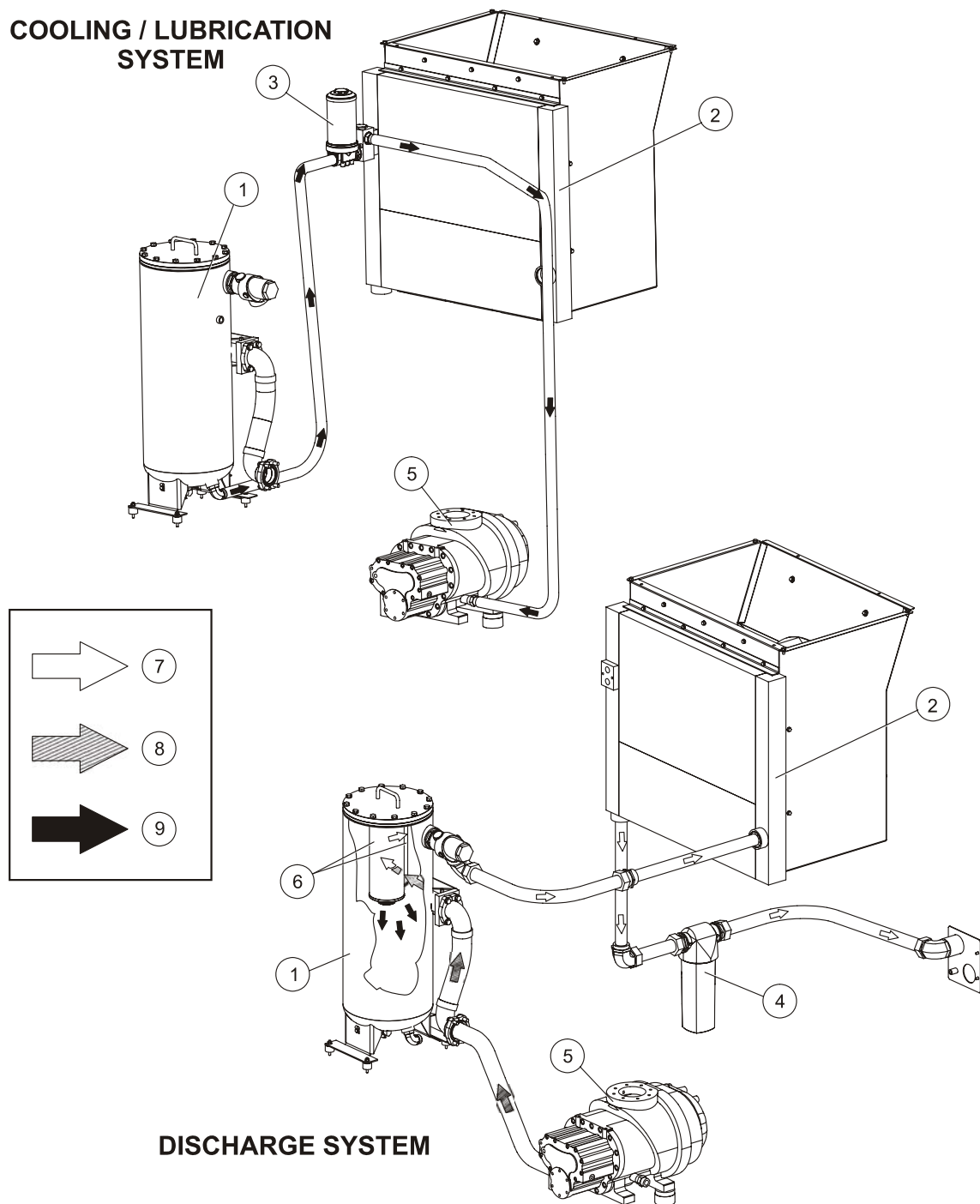
**COOLING / LUBRICATION
SYSTEM**

Figure 2-3: Air-Cooled, Cooling/Lubrication and Discharge System

- | | |
|-----------------------|-----------------------|
| 1. Receiver Tank | 6. Separator Elements |
| 2. Cooler | 7. Air |
| 3. Fluid Filter | 8. Air/Fluid Mix |
| 4. Moisture Separator | 9. Fluid |
| 5. Compressor Unit | |

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

2.3 COMPRESSOR COOLING AND LUBRICATION SYSTEM - FUNCTIONAL DESCRIPTION

Refer to *Figure 2-3* or *Figure 2-4*. The **cooling and lubrication system** (air-cooled models) consists of a **fan, fan motor, radiator aftercooler/fluid cooler, full flow fluid filter, thermal valve, and interconnecting hoses**. Water-cooled models have two shell and tube heat exchangers instead of a radiator cooler.

The pressure in the receiver tank starts the fluid flow by forcing the fluid from the high pressure area of the tank to an area of lower pressure in the compressor. Fluid flows from the bottom of the receiver tank to the thermal valve that is fully open when the fluid temperature is below 185°F (85°C) [195°F (91°C) for 24KT and pressures rated above 150 psig]. The fluid passes through the thermal valve, the main filter, and directly to the compressor where it lubricates, cools and seals the rotors, and the compression chamber.

As the discharge temperature rises above 185°F (85°C), due to the heat of compression, the thermal valve begins to close and a portion of the fluid then flows through the cooler. From the cooler the fluid flows to the fluid filter and on to the compressor. A portion of the fluid flow to the compressor is routed to the anti-friction bearings which support the compressor rotors.

The fluid filter has a replacement element and an integral bypass valve. Refer to Section 3.6 Lubrication Change Recommendations and Maintenance, Fluid Filter and Separator on page 25.

Water-cooled models have a water pressure switch to prevent operation when the water pressure is too low.

2.4 COMPRESSOR DISCHARGE SYSTEM - FUNCTIONAL DESCRIPTION

Refer to *Figure 2-3* or *Figure 2-4*. The compressor discharges the compressed air/fluid mixture into the combination receiver tank. The receiver has three basic functions:

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

The compressed air/fluid mixture enters the receiver tank and flows through an internal baffle system that changes the flow's direction and velocity, which causes most of the fluid to fall to the bottom of the receiver tank. A small amount of fluid remaining in the compressed air collects on the surface of the separator element as the air flows through the separator.

A return line (or scavenge tube) leads from the bottom of the separator dry side to a medium pressure region in the compressor. Scavenged fluid is returned by a pressure differential between the receiver and compressor.

A visual sight glass is located on the return line to observe this flow. This return line also has an orifice (protected by a strainer) to ensure an unobstructed flow. The separator system reduces the fluid carry-over to less than 1ppm.

The WS Controller will show an abnormal pressure drop through the separator if the element becomes plugged. (Refer to Section 3.6 Lubrication Change Recommendations and Maintenance, Fluid Filter and Separator.) It will also shut down the compressor if the discharge temperature reaches 235°F (113°C).

A minimum pressure/check valve located downstream from the separator maintains the receiver pressure at 50 psig (3.4 bar) during load conditions. This pressure level is necessary for proper air/fluid separation and sufficient fluid circulation.

A terminal check valve is a sub-component of the minimum pressure/check valve that prevents compressed air in the service line from back-flowing into the receiver on shutdown or when the compressor is operating in an unload condition. Also, a pressure relief valve on the compressor's wet side opens if the receiver tank pressure exceeds its rating.

WARNING

Stop the compressor and relieve all internal pressure before removing caps, plugs, and/or other components when the compressor is running or pressurized.

Add fluid to the receiver tank through the capped

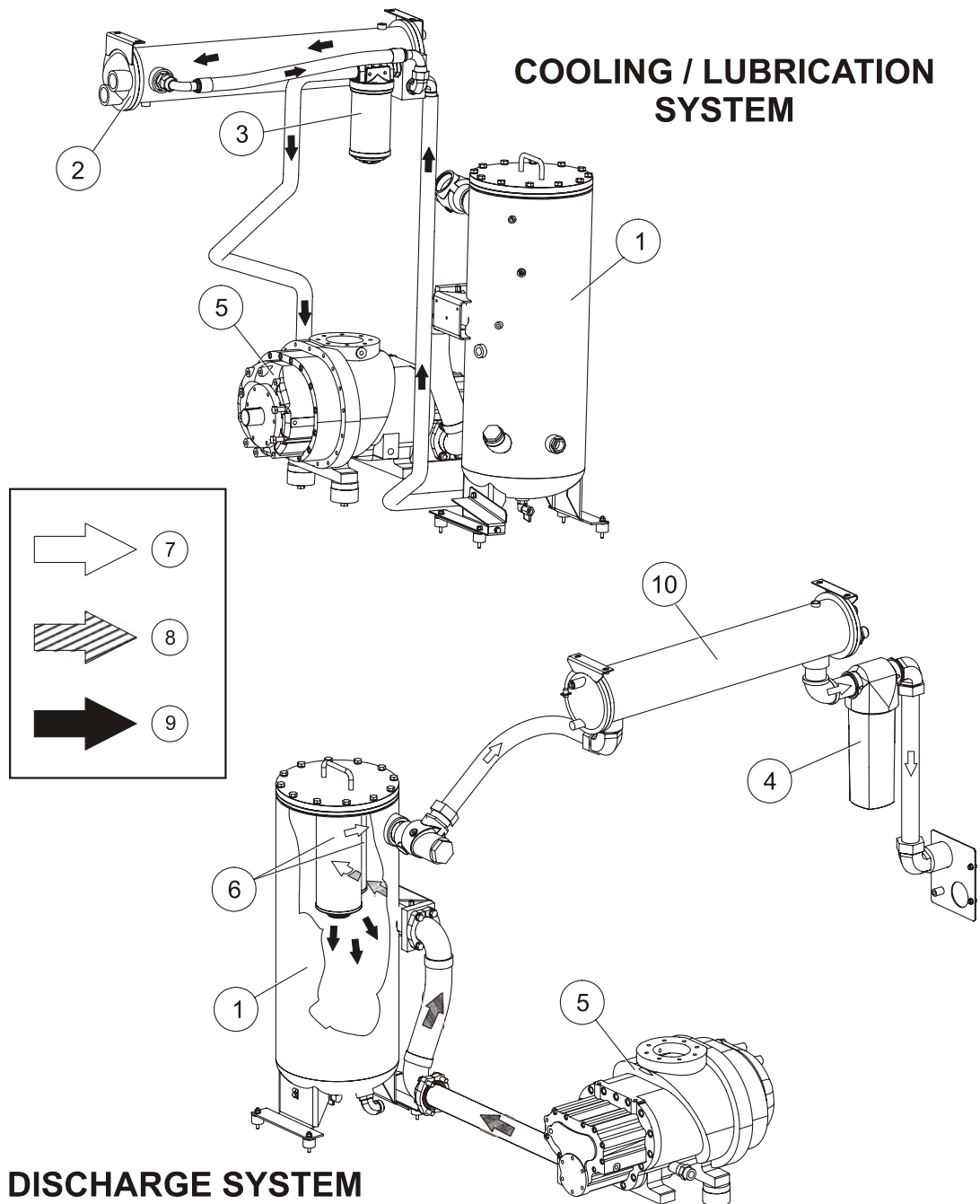


Figure 2-4: Water-Cooled, Cooling/Lubrication and Discharge System

- | | |
|-----------------------|-----------------------|
| 1. Receiver Tank | 6. Separator Elements |
| 2. Cooler | 7. Air |
| 3. Fluid Filter | 8. Air/Fluid Mix |
| 4. Moisture Separator | 9. Fluid |
| 5. Compressor Unit | 10. Aftercooler |

fluid filter port. There is also a sight glass that enables the user to check the receiver tank fluid level. See Section 4.5.

2.5 CONTROL SYSTEM - FUNCTIONAL DESCRIPTION

Refer to *Figure 2-5*. The **compressor control system** regulates its output to match the demand. This system consists of a **solenoid valve**, a **regulator** and an **inlet valve** that control the compressor's four operational modes. The following descriptions of operational modes apply to a compressor whose operating range is 100 to 110

psig (6.9 to 7.6 bar)

Other pressure settings can be selected depending on compressor application or rating.

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

There is no load on the compressor at startup, the solenoid valve is open and the inlet valve is closed. When the compressor ① (START) pad is pressed, the receiver tank pressure rises from 0 to 50 psig (0 - 3.4 bar). When it reaches its full operating speed (maximum rpm), the compressor switches to the Full Load Mode.

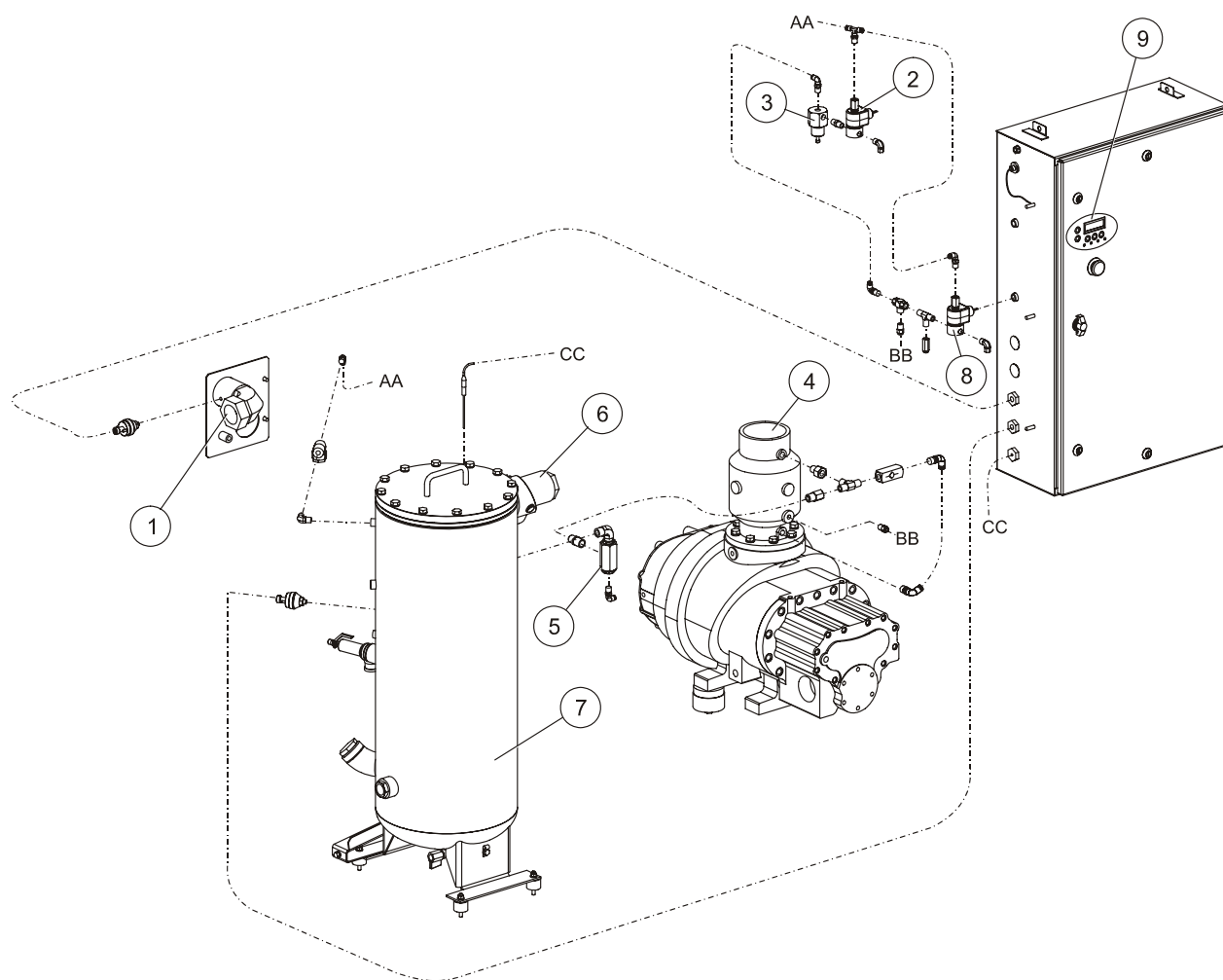


Figure 2-5: Standard Sequencing Control System

- | | |
|------------------------------|-----------------------------------|
| 1. Air Outlet | 6. Minimum Pressure / Check Valve |
| 2. Sequencing Solenoid Valve | 7. Receiver Tank |
| 3. Pressure Regulator | 8. Unload Solenoid Valve |
| 4. Air Inlet | 9. WS Controller |
| 5. Blowdown Valve | |

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 WS Controller continuously monitors the line air pressure. The pressure regulator and the solenoid valve remain closed in this mode. As long as the compressor is running at 100 psig (6.9 bar or lower), the inlet valve is fully open.

MODULATING MODE - 100 TO 110 PSIG (6.9 TO 7.6 BAR)

If the rated capacity of compressed air is less than the demand, the service line pressure rises above 100 psig (6.9 bar). The pressure regulator valve gradually opens, causing the air pressure to close the inlet control valve at the same rate, reducing the volume of air entering the compressor until it matches the demand. The control system operates continuously in this mode to accommodate variations in demand output.

The inlet valve has an orifice that directs a small amount of air to the compressor inlet when the inlet control valve is under the pressure regulator's control. The orifice also bleeds off any accumulated moisture from the control lines.

UNLOAD MODE - GREATER THAN 110 PSIG (7.6 BAR)

When there is no, or only a small demand, the service line pressure will rise. The WS Controller de-energizes the solenoid valve when the pressure exceeds 110 psig (7.6 bar) allowing the receiver tank air pressure to be supplied directly which closes the inlet valve. At the same time the solenoid valve sends a pneumatic signal to the blowdown valve on the receiver tank. This component exhausts the system pressure to the atmosphere and lowers the receiver tank pressure to approximately 14 psig (1.2 bar). A check valve in the air service line prevents air from back-flowing to the receiver tank.

When the pressure drops to the low setting: (cut-in pressure) usually 100 psig (6.9 bar) for low pressure (7 bar) compressors and 125 psig (8.6 bar) for high pressure (9 bar) compressors, 150 psig (10.3 bar) for (10 bar) compressors, 175 psig (12.0 bar) for (12 bar) compressors: the WS Controller energizes the solenoid valve and the blowdown valve closes. The solenoid valve now prevents line pressure from reaching the inlet control valve. If the pressure

begins to rise, the pressure regulator resumes its normal function.

LOAD/NO LOAD CONTROL

The compressor can be set to operate without modulation, operating in the load/no load condition. This mode is used most often with large air system volume, e.g., with a receiver or flow controller. This mode is selected using the WS Controller keypad and setting modulation to "no" from the menu. A machine rated for 100 psig (7 bar) will run in the full load mode up to 100 psig (7 bar). If the demand is less than the compressor's rated capacity, the pressure will rise above 100 psig and the WS Controller de-energizes the solenoid valve which causes the compressor to switch to the unload mode. When the system pressure decreases to 90 psig (6.3 bar), the WS Controller energizes the solenoid valve and the compressor switches back to the full load mode. The compressor's WS Controller keeps the system pressure stabilized within a range of 90 to 100 psig (6.3 to 6.9 bar).

2.6 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**.

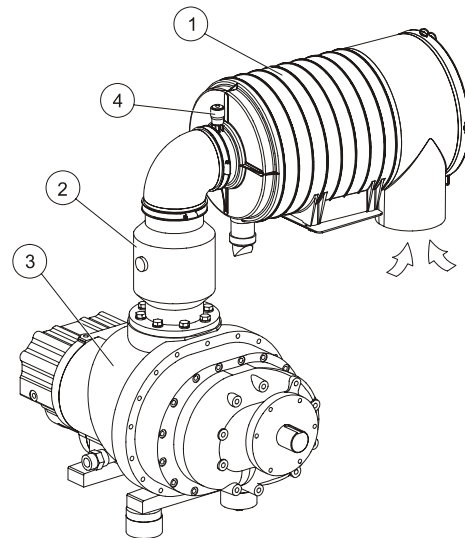


Figure 2-6: Air Inlet System

1. Air Inlet Filter	3. Compressor Unit
2. Air Inlet Valve	4. Restriction Indicator

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 controls the compressor's air intake volume. Refer to Full Load Mode - 50 to 100 psig (3.4 to 6.9 bar) on page 13. The air inlet valve also acts as a check valve to prevent 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.

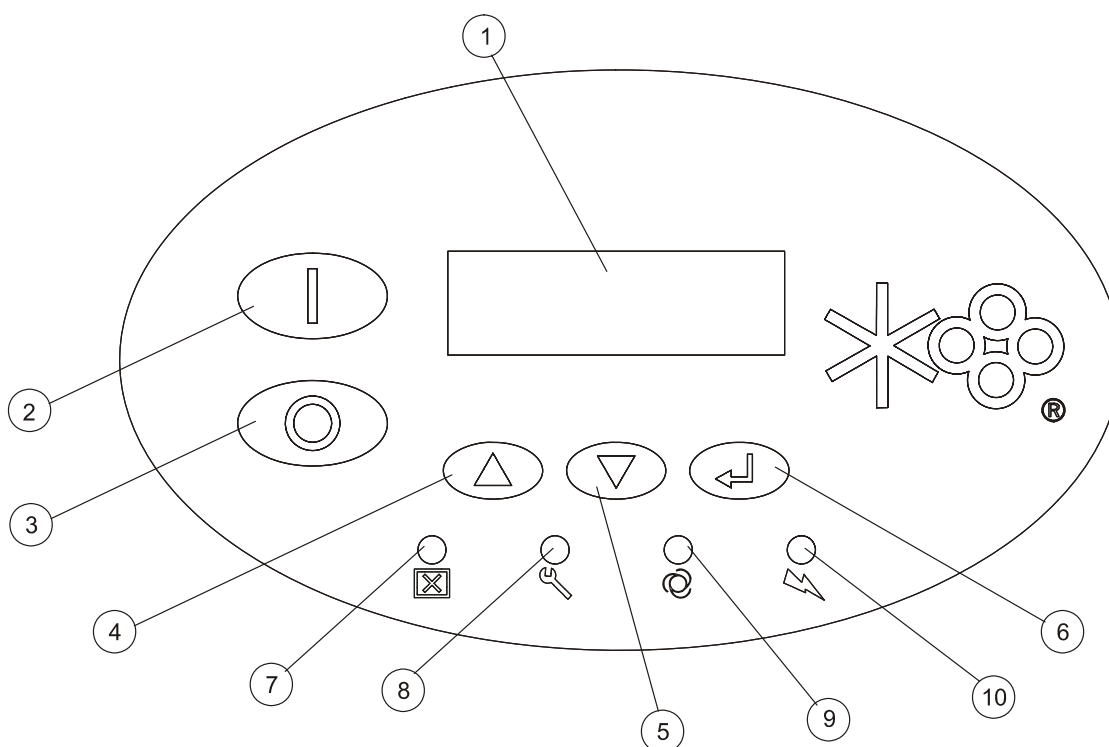





Figure 2-7: WS Controller Panel

- | | |
|-------------------|--|
| 1. Display Panel | 6. Enter Pad |
| 2. Start Pad | 7. Fault Warning Indicator Light (Red) |
| 3. Stop Pad | 8. Maintenance Indicator Light (Amber) |
| 4. Arrow Up Pad | 9. Auto Mode Indicator Light (Green) |
| 5. Arrow Down Pad | 10. Power On (Green) |

2.7 WS CONTROLLER/KEYPAD

Refer to Figure 2-7. 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.

2.8 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 2-8

Refer to Figure 2-8 and Figure 2-9. The lower line is occasionally interrupted to describe the compressor package's operating state.



Figure 2-9


Refer to Figure 2-10. If a machine fault occurs, the red fault  indicator will light up, and the display will indicate that a fault has occurred.



Figure 2-10


Refer to Figure 2-11. 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 2-11


Refer to Figure 2-12. Press the Down arrow  to display additional information about the compressor. The upper line will indicate "Compressor Status" and the name of the temperature, pressure, or other measurement. The lower line indicates the present reading.



Figure 2-12

Refer to Figure 2-13. 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 2-13






Refer to Figure 2-14. To change the setting, press the Enter pad . The display indicates that you are in a change mode with reverse characters. Use the Up  or Down  arrow keys to change the setting, and press Enter again to save the new setting.




Figure 2-14

Refer to Figure 2-14. If there is no keypad activity, the display will return to normal view in about one minute. If the Start or Stop buttons are pressed, the display also returns to normal view. If either of these occur, the setting will not be altered.

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


The list of displays may be navigated from either direction by using the Up  or Down  arrow


keys. For example, to change language from normal view, press the Up arrow pad once, press the Enter key , select your language, and press Enter again. The number of displays varies with compressor model, but will follow this pattern.


The 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.


2.9 LED LIGHTS

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

The green Power indicator  indicates power is applied to the controller. It will blink at a noticeably slow rate 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.

NOTE

Sections 2-10 and 2-11 apply only to compressors equipped with a Variable Speed Drive.

2.10 VARIABLE SPEED DRIVE (VSD) COMPONENTS

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

2.11 VSD CONTROL SYSTEM - FUNCTIONAL DESCRIPTION

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

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

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

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

NOTE

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

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

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

Pressing the WS Controller START button (1) signals the VSD to accelerate the motor to full speed, causing the receiver 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 receiver 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 the service line. From this point on the WS Controller monitors the line pressure which controls the VSD. The pressure regulator and solenoid valves remain closed with the inlet valve fully open, running at 100 psig (6.9 bar) or lower.

VSD PART LOAD CONTROL

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

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

During low demand periods and with the VSD running at minimum speed, the line pressure can continue to rise. When the line pressure reaches 101-102 psig (approximately 7 bar), the regulator valve (Figure 2-5) 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.

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 receiver 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 receiver tank pressure. The check valve in the air service line prevents line pressure from back-flowing to the receiver tank. The compressor will shut down after the programmed unload time setting expires (the default setting is zero [0] minutes for an immediate shutdown upon unload). When the line pressure drops to the low pressure setting of 100 psig (6.9 bar) the WS Controller starts the motor and energizes the solenoid valve which closes the blowdown valve. The re-energized solenoid valve prevents line pressure from reaching the inlet control valve, thereby allowing it to fully open, and the compressor supplies compressed air to the system.

Section 3

SPECIFICATIONS

3.1 TABLE OF SPECIFICATIONS - 4500P, 5500 & 7500 SERIES MODELS

Model (I)	HP	DIMENSIONS									
		Length		Width		Height		Weight		Weight	
		in	mm	in	mm	in	mm	lbs		kg	
								ODP	TEFC	ODP	TEFC
4500P SERIES											
4507P	60	78.7	1999	43.3	1100	68.9	1750	2755	3121	1249	1415
4509P	60	78.7	1999	43.3	1100	68.9	1750	2755	3121	1249	1415
4510P	60	78.7	1999	43.3	1100	68.9	1750	2755	3121	1249	1415
5500 SERIES											
5507	75	78.7	1999	43.3	1100	68.9	1750	2826	3150	1281	1428
5509	75	78.7	1999	43.3	1100	68.9	1750	2826	3150	1281	1428
5510	75	78.7	1999	43.3	1100	68.9	1750	2826	3150	1281	1428
5512	75	78.7	1999	43.3	1100	68.9	1750	2826	3150	1281	1428
7500 SERIES											
7509	100	78.7	1999	43.3	1100	68.9	1750	3213	3432	1457	1556
7510	100	78.7	1999	43.3	1100	68.9	1750	3213	3432	1457	1556
7509	100	78.7	1999	43.3	1100	68.9	1750	3213	3432	1457	1556
7512	100	78.7	1999	43.3	1100	68.9	1750	3213	3432	1457	1556
(I) Includes standard 24KT. Rated pressure designations appearing after model number are as follows:											
07 - 100 psig (6.9 bar)							10 - 150 psig (10.3 bar)				
09 - 125 psig (8.6 bar)							12 - 175 psig (12.0 bar)				
Maximum unload pressure is the rated pressure plus 10 psig (0.7 bar).											

3.2 TABLE OF SPECIFICATIONS - VARIABLE SPEED DRIVE

VSD SERIES (I) - 4500PV (MODELS 4507PV - 4509PV)						
MOTOR	ODP			TEFC		
HZ/VOLTAGE	460/60	575/60	400/50	460/60	575/60	400/50
DRIVE AMP RATING	87	80	105	87	80	105
WEIGHT (lbs/kg)	2755/1250	3097/1404	3010/1365	3300/1497	3445/1503	3420/1551
LENGTH (in/mm)	78.7/1999	78.7/1999	78.7/1999	78.7/1999	78.7/1999	78.7/1999
WIDTH (in/mm)	43.3/1100	43.3/1100	43.3/1100	43.3/1100	43.3/1100	43.3/1100
HEIGHT (in/mm)	68.9/1750	68.9/1750	68.9/1750	68.9/1750	68.9/1750	68.9/1750
VSD SERIES (I) - 5500V (MODELS 5507V - 5512V)						
MOTOR	ODP			TEFC		
HZ/VOLTAGE	460/60	575/60	400/50	460/60	575/60	400/50
DRIVE AMP RATING	105	100	140	105	100	140
WEIGHT (lbs/kg)	2963/1344	3168/1437	3014/1367	3281/1491	3492/1584	3338/1514
LENGTH (in/mm)	78.7/1999	78.7/1999	78.7/1999	78.7/1999	78.7/1999	78.7/1999
WIDTH (in/mm)	43.3/1100	43.3/1100	43.3/1100	43.3/1100	43.3/1100	43.3/1100
HEIGHT (in/mm)	68.9/1750	68.9/1750	68.9/1750	68.9/1750	68.9/1750	68.9/1750
VSD SERIES (I) - 7500V (MODELS 7509V - 7512V)						
MOTOR	ODP			TEFC		
HZ/VOLTAGE	460/60	575/60	400/50	460/60	575/60	400/50
DRIVE AMP RATING	140	125	170	140	125	170
WEIGHT (lbs/kg)	3341/1515	3535/1603	3391/1515	3531/1601	3752/1690	3531/1601
LENGTH (in/mm)	78.7/1999	78.7/1999	78.7/1999	78.7/1999	78.7/1999	78.7/1999
WIDTH (in/mm)	43.3/1100	43.3/1100	43.3/1100	43.3/1100	43.3/1100	43.3/1100
HEIGHT (in/mm)	68.9/1750	68.9/1750	68.9/1750	68.9/1750	68.9/1750	68.9/1750
(I) Includes standard and 24KT. Rated pressure designations appearing after model number are as follows:						
07 - 100 psig (6.9 bar)			10 - 150 psig (10.3 bar)			
09 - 125 psig (8.6 bar)			12 - 175 psig (12.0 bar)			
Maximum unload pressure is the 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) / 150 psig (10.0 bar) 175 psig (12.0 bar)
Bearing Type:	Anti-friction
Ambient Temperature (Max.) (II):	104°F (40°C)
(II) Special compressors are available for operating in higher ambient temperature.	

3.4 LUBRICATION GUIDE

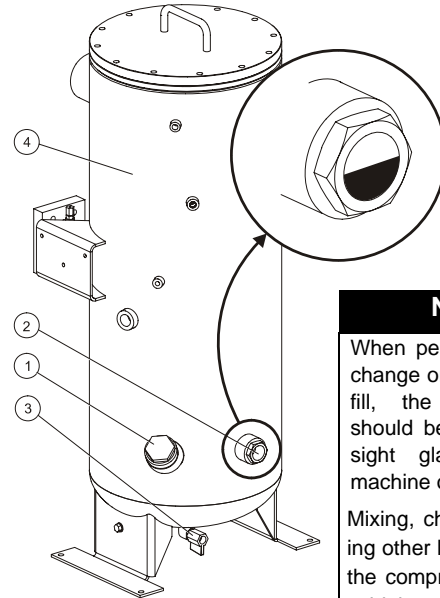
Refer to *Figure 3-1* for the fluid fill port location. Sullair's 4500P-7500 series compressors are filled and tested at the factory with Sullube lubricant.

⚠ CAUTION

Do not mix different types of lubricants. Mixing lubricants can cause malfunctions or compressor damage: will void the compressor's warranty.

⚠ CAUTION

Contamination of compressor fluids with mineral oil or other fluids can cause foaming, filter plugging, or orifice line obstruction.



NOTE

When performing a fluid change or topping off the fill, the proper level should be at half of the sight glass, with the machine off.

Mixing, changing or adding other lubricants within the compressor unit may void the air-end warranty.

3.5 APPLICATION GUIDE

Sullair encourages its customers to participate in a fluid analysis program with the fluid suppliers. In some cases the analysis results suggest a fluid change interval which differs from the User Manual. Contact a Sullair representative for details.

Figure 3-1: Fluid Fill Location

1. Fluid Fill Port	3. Fluid Drain Valve
2. Sight Glass	4. Receiver Tank

3.6 LUBRICATION CHANGE RECOMMENDATIONS AND MAINTENANCE, FLUID FILTER AND SEPARATOR

LUBRICANT	FLUID CHANGE	FLUID FILTER CHANGE	SEPARATOR CHANGE
Sullube	A, E	G, C	A, D
SRF 1/4000	B, E	G, C	B, D
24kt	F, E	G, C	A, D
CP-4600-32-F	B, E	G, C	A, D

A - 8,000 hours or once per year.

B - 4,000 hours or more frequently if conditions 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 as the result of fluid analysis or known contamination.

F - Does not require replacement under normal service conditions.

G - Every 2,000 hours.

Figure 3-2 Identification - 4500P, 5500 and 7500 Air-Cooled with Enclosure

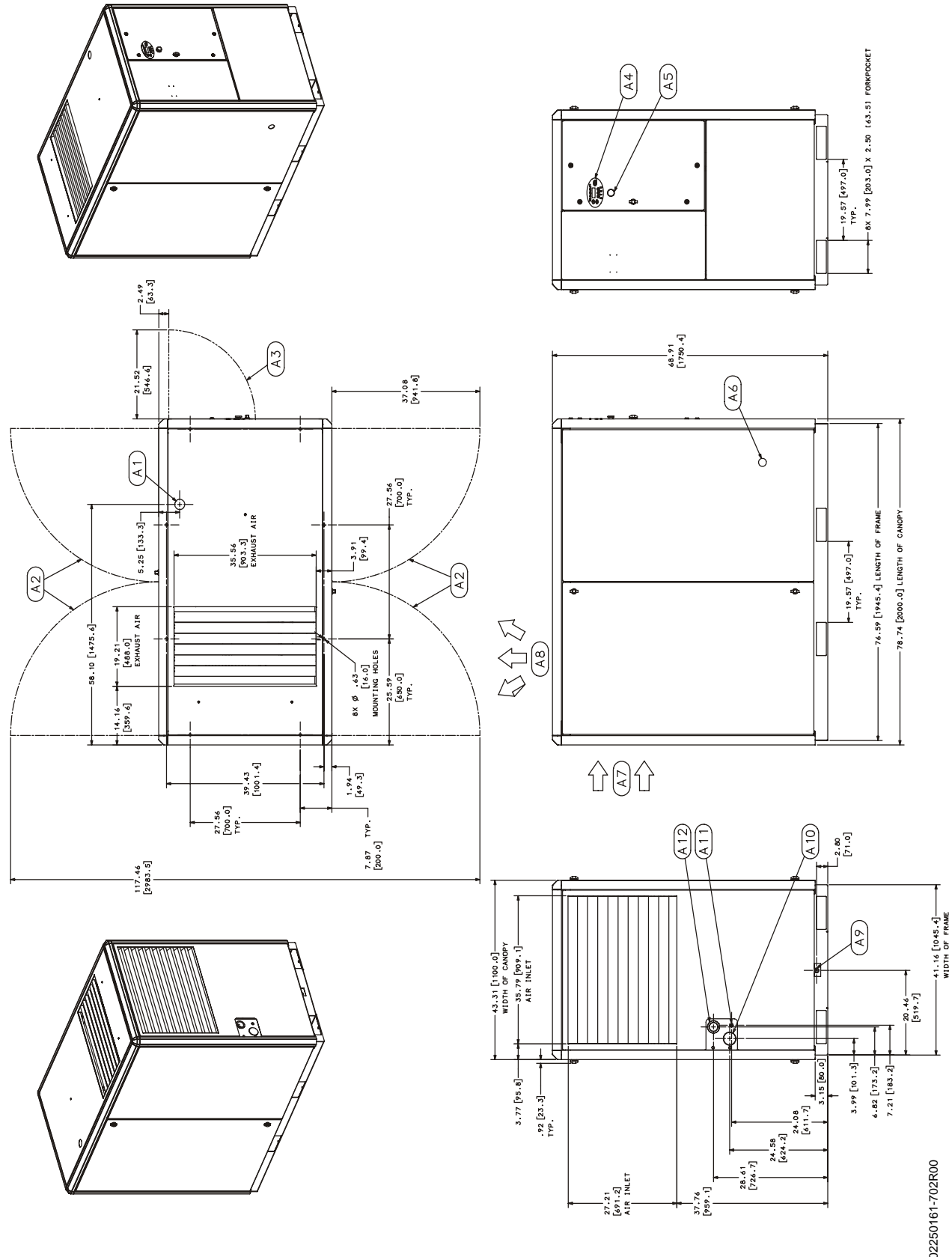


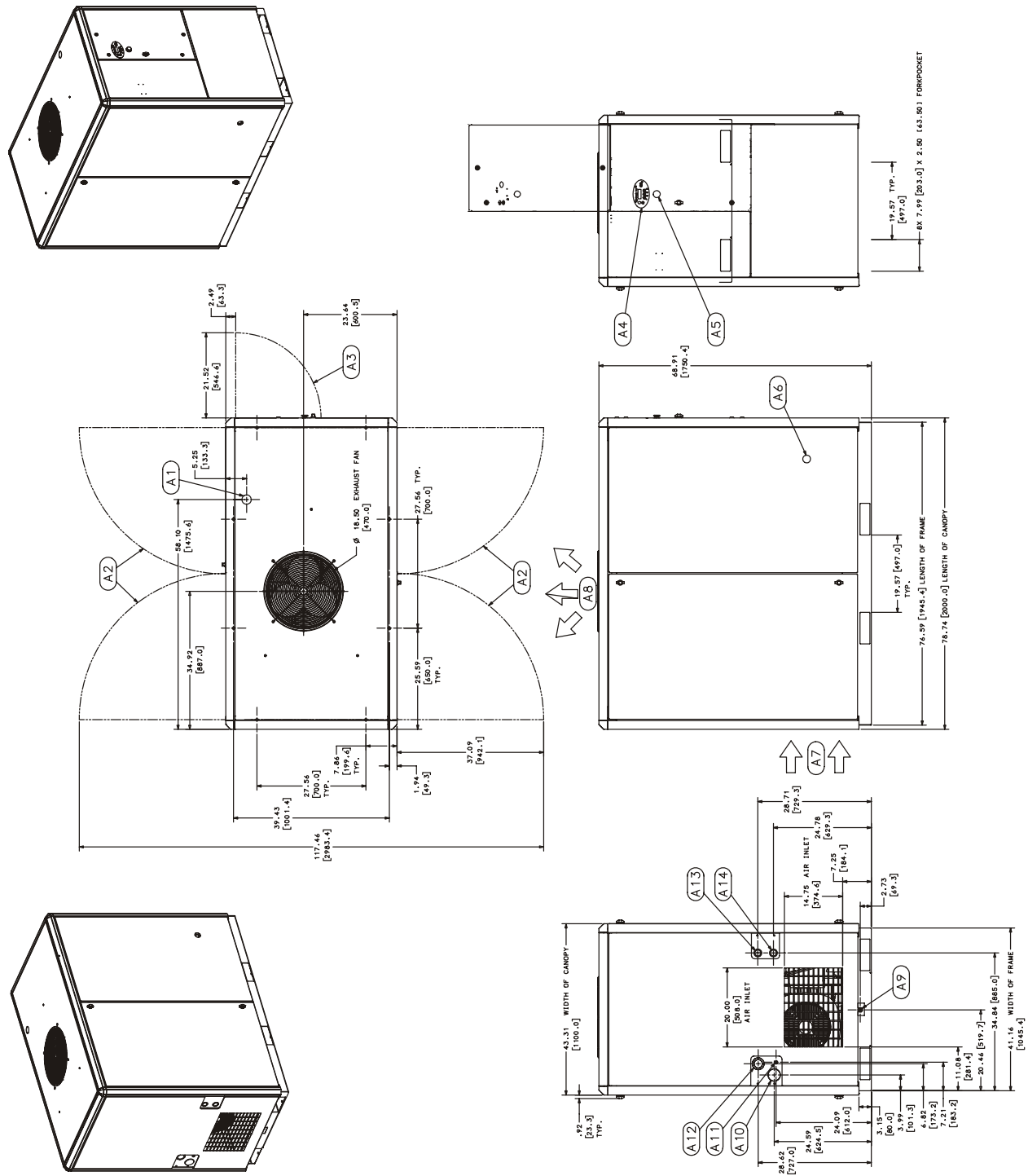
Figure 3-2 Identification - 4500P, 5500 and 7500 Air-Cooled with Enclosure (continued)

A1: ALTERNATE INCOMING POWER SUPPLY LOCATION Ø 2.50 [63.5]
 A2: SPACE REQUIRED TO OPEN DOORS TYP. SEE NOTE #6
 A3: SPACE REQUIRED TO OPEN STARTER PANEL
 A4: CONTROLLER
 A5: E-STOP
 A6: OIL LEVEL SIGHTGLASS LOCATION
 A7: AIR INLET
 A8: EXHAUST AIR OUT
 A9: CONTAINMENT PAN DRAIN
 A10: INCOMING CUSTOMER POWER SUPPLY Ø 3.0 (76.2)
 A11: MOISTURE DRAIN CONNECTION 1/4"-18 NPT
 A12: AIR OUT CONNECTION 2"-11 1/2 NPT

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.
3. All dimensions are $\pm 50"$ [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. Doors are removable using lift-off hinge pins.
7. All dimensions shown in inches with millimeter dimensions in parentheses.

Figure 3-3 Identification - 4500P, 5500 and 7500 Water-Cooled with Enclosure



02250170-715R00

Figure 3-3 Identification - 4500P, 5500 and 7500 Water-Cooled with Enclosure (continued)

- A1: ALTERNATE INCOMING POWER SUPPLY LOCATION Ø 2.50 [63.5]
- A2: SPACE REQUIRED TO OPEN DOORS TYP. SEE NOTE #6
- A3: SPACE REQUIRED TO OPEN STARTER PANEL
- A4: CONTROLLER
- A5: E-STOP
- A6: OIL LEVEL SIGHTGLASS LOCATION
- A7: AIR INLET
- A8: EXHAUST AIR OUT 2,845 CFM
- A9: CONTAINMENT PAN DRAIN
- A10: INCOMING CUSTOMER POWER SUPPLY Ø 3.0 (76.2)
- A11: MOISTURE DRAIN CONNECTION 1/4"-18 NPT
- A12: AIR OUT CONNECTION 2"-11 1/2 NPT
- A13: COOLING WATER OUT 1 1/2"-11 1/2 NPT
- A14: COOLING WATER IN 1 1/2"-11 1/2 NPT

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.
3. All dimensions are ± .50" [12.7mm]
4. Recommended incoming customer power supply is shown on drawing.
5. Doors are removable using lift-off hinge pins.
6. All dimensions shown in inches with millimeter dimensions in parentheses.

Figure 3-4 Identification - 4500P, 5500 and 7500 Air-Cooled with Weatherhood

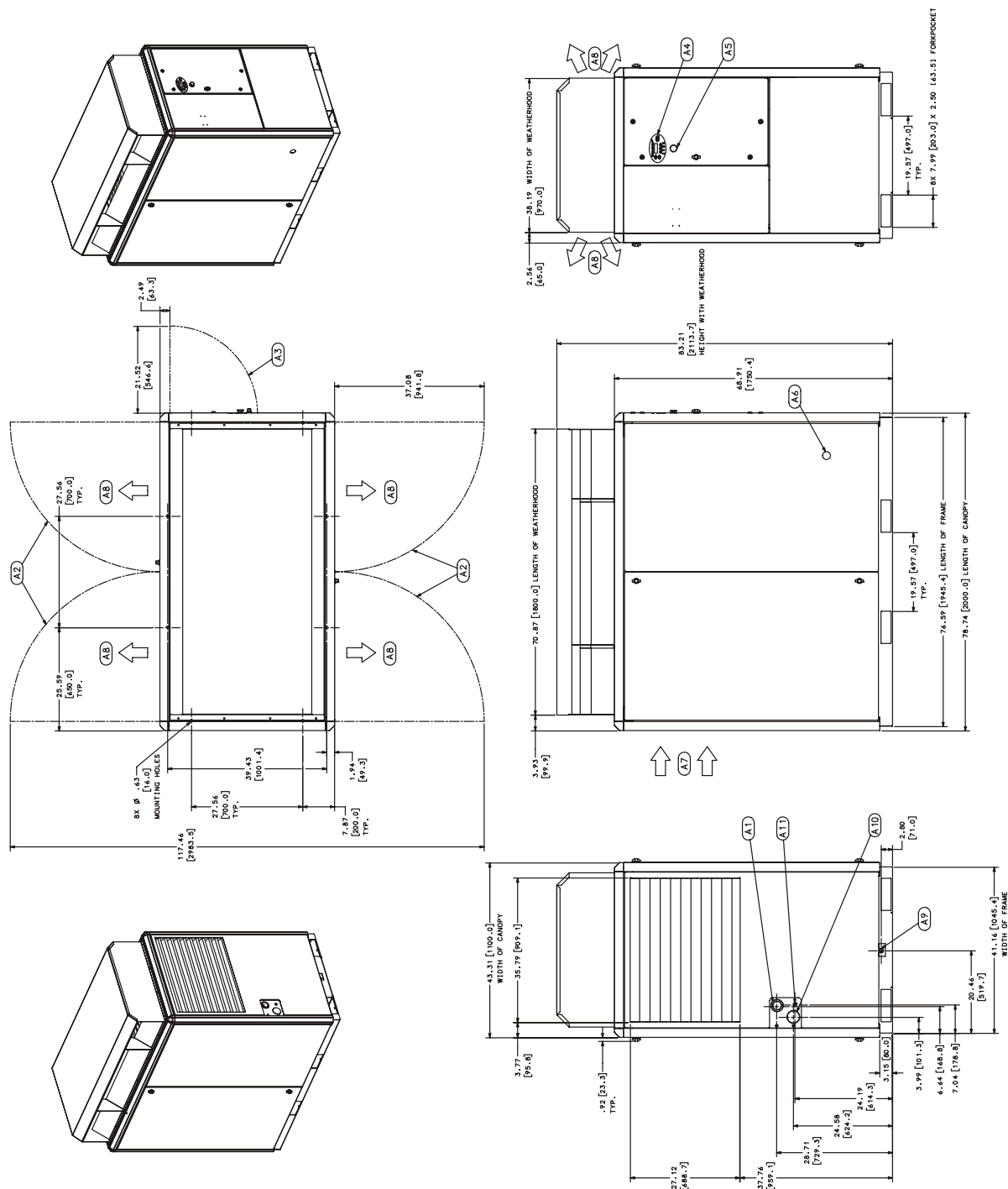


Figure 3-4 Identification - 4500P, 5500 and 7500 Air-Cooled with Weatherhood (continued)

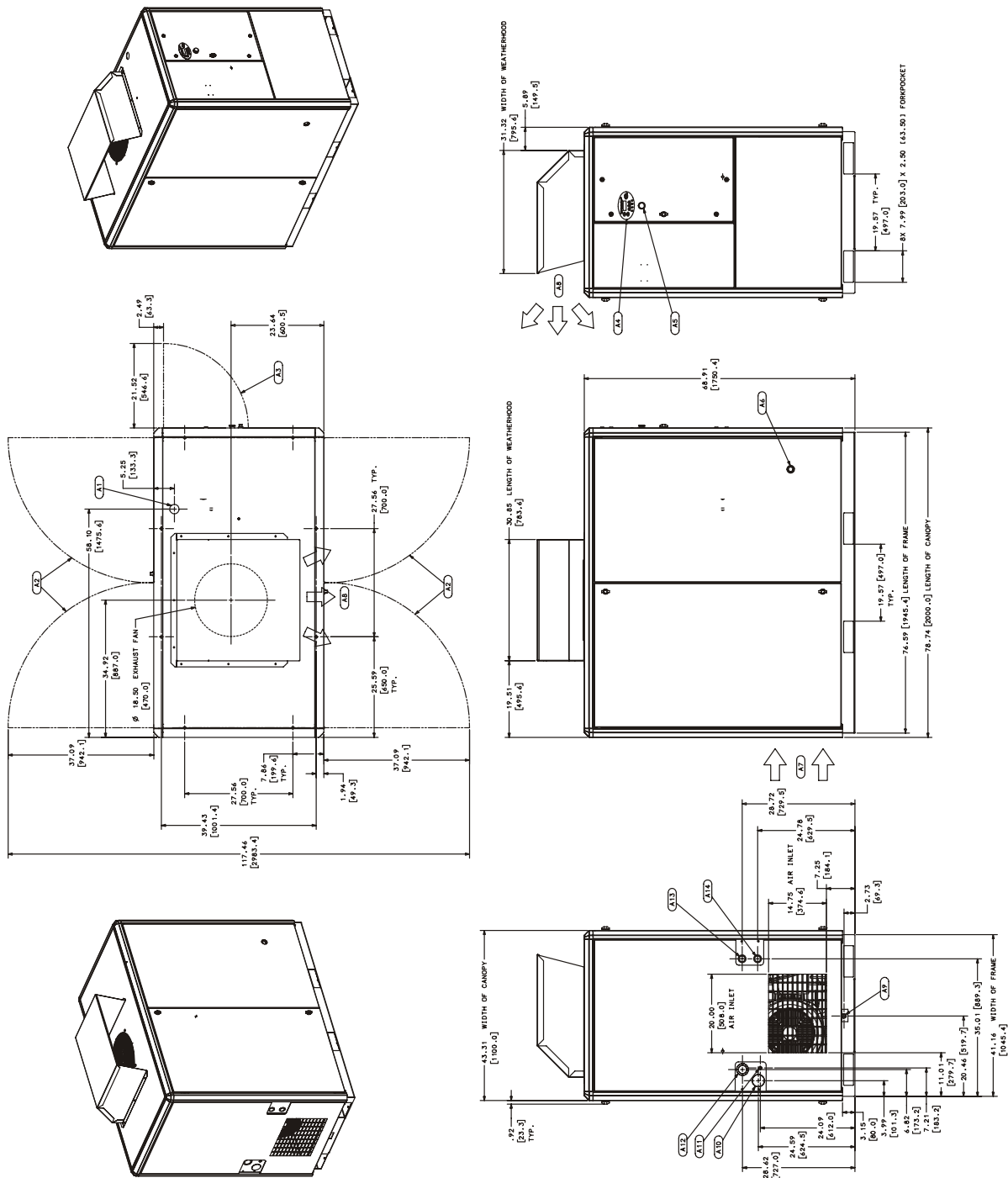
A1: AIR OUT CONNECTION 2"-11 1/2 NPT
 A2: SPACE REQUIRED TO OPEN DOORS TYP. SEE NOTE #6
 A3: SPACE REQUIRED TO OPEN STARTER PANEL
 A4: CONTROLLER
 A5: E-STOP
 A6: OIL LEVEL SIGHTGLASS
 A7: AIR INLET
 A8: EXHAUST AIR OUT
 A9: CONTAINMENT PAN DRAIN
 A10: INCOMING CUSTOMER POWER SUPPLY Ø 3.0 (76.2)
 A11: MOISTURE DRAIN CONNECTION 1/4"-18 NPT
 A12: AIR OUT CONNECTION 2"-11 1/2 NPT

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.
3. All dimensions are $\pm .50"$ [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 h o with high static fan.
6. Doors are removable using lift-off hinge pins.
7. All dimensions shown in inches with millimeter dimensions in parentheses.

ADD 97.8# (44/4KG) FOR WEIGHT OF WEATHERHOOD.

Figure 3-5 Identification - 4500P, 5500 and 7500 Water-Cooled with Weatherhood



02250171-775R00

Figure 3-5 Identification - 4500P, 5500 and 7500 Water-Cooled with Weatherhood (continued)

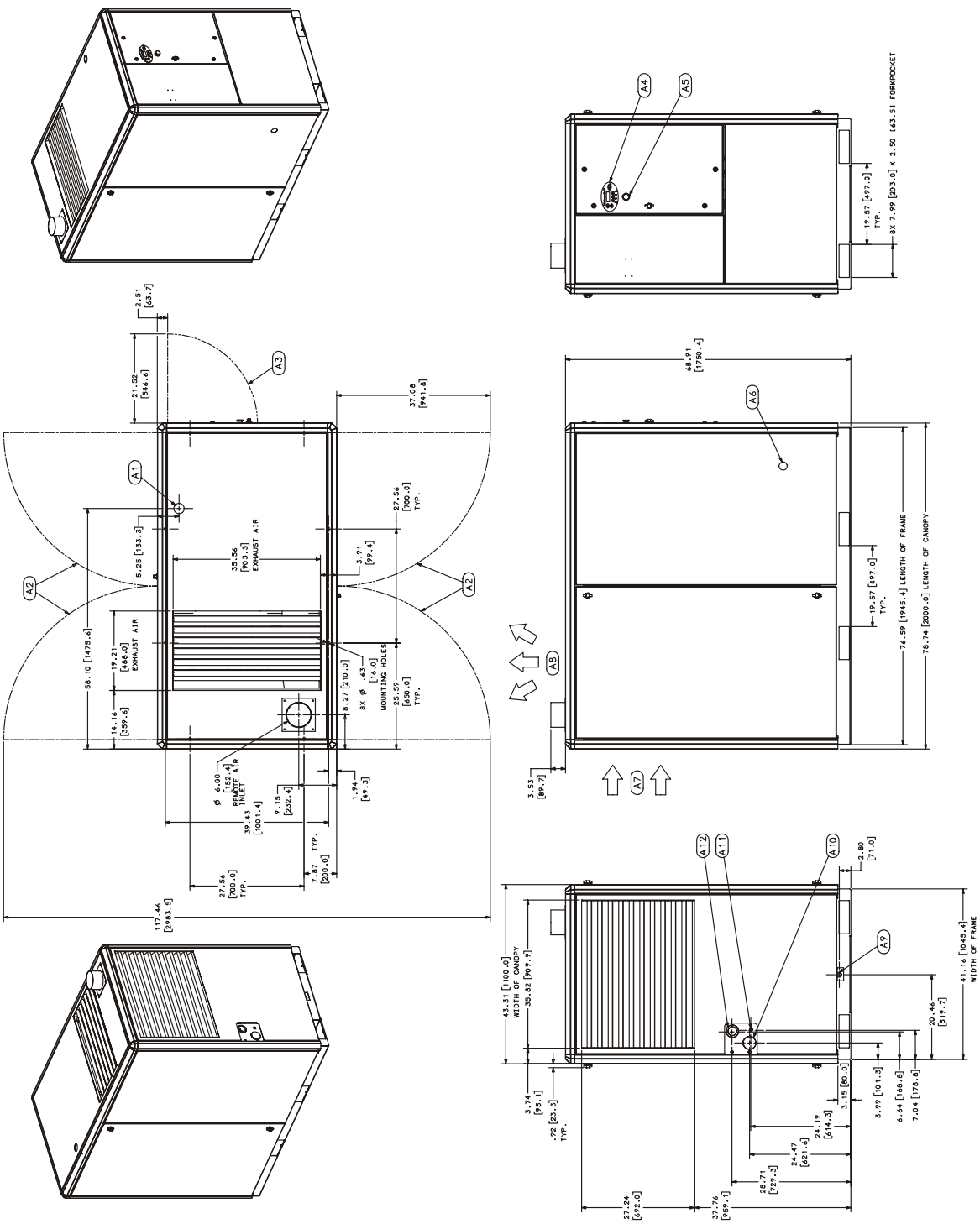
- A1: ALTERNATE INCOMING POWER SUPPLY LOCATION Ø 2.50 [63.5]
- A2: SPACE REQUIRED TO OPEN DOORS TYP. SEE NOTE #6
- A3: SPACE REQUIRED TO OPEN STARTER PANEL
- A4: CONTROLLER
- A5: E-STOP
- A6: OIL LEVEL SIGHTGLASS
- A7: AIR INLET
- A8: EXHAUST AIR OUT 2,845 CFM
- A9: CONTAINMENT PAN DRAIN
- A10: INCOMING CUSTOMER POWER SUPPLY Ø 3.0 (76.2)
- A11: MOISTURE DRAIN CONNECTION 1/4"-18 NPT
- A12: AIR OUT CONNECTION 2"-11 1/2 NPT
- A13: COOLING WATER OUT 1 1/2"-11 1/2 NPT
- A14: COOLING WATER OUT 1 1/2"-11 1/2 NPT

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.
3. All dimensions are $\pm .50"$ [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 h o with high static fan.
6. Doors are removable using lift-off hinge pins.
7. All dimensions shown in inches with millimeter dimensions in parentheses.

ADD 35.3# (16.0 KG) FOR WEIGHT OF WEATHERHOOD

Figure 3-6 Identification - 4500P, 5500 and 7500 Air-Cooled with Remote Inlet



02250171-925R00

Figure 3-6 Identification - 4500P, 5500 and 7500 Air-Cooled with Remote Inlet (continued)

16 SERIES UNIT/ AXIAL FAN MACHINE WEIGHTS			16 SERIES UNIT/CENTRIFUGAL FAN MACHINE WEIGHTS		
	MAIN MOTOR HP	WEIGHT		MAIN MOTOR HP	WEIGHT
4500	60 ODP EE	2,755 LBS (1,249 kg)	4500	60 ODP EE	2,790 LBS (1,265 kg)
4500	60 TEFC EE	3,121 LBS (1,415 kg)	4500	60 TEFC EE	3,156 LBS (1,431 kg)
5500	75 ODP EE	2,826 LBS (1,281 kg)	5500	75 ODP EE	2,861 LBS (1,297 kg)
5500	75 TEFC EE	3,150 LBS (1,428 kg)	5500	75 TEFC EE	3,185 LBS (1,444 kg)
7500	100 ODP EE	3,178 LBS (1,441 kg)	7500	100 ODP EE	3,213 LBS (1,457 kg)
7500	100 TEFC EE	3,427 LBS (1,554 kg)	7500	100 TEFC EE	3,432 LBS (1,556 kg)
4500	60 ODP PE	2,889 LBS (1,310 kg)	4500	60 ODP PE	2,924 LBS (1,326 kg)
4500	75 ODP PE	3,075 LBS (1,394 kg)	4500	60 TEFC PE	3,202 LBS (1,452 kg)
5500	75 TEFC PE	3,189 LBS (1,446 kg)	5500	75 ODP PE	3,110 LBS (1,410 kg)
7500	100 ODP PE	3,242 LBS (1,470 kg)	5500	75 TEFC PE	3,224 LBS (1,462 kg)
7500	100 TEFC PE	3,386 LBS (1,535 kg)	7500	100 ODP PE	3,277 LBS (1,463 kg)
				100 TEFC PE	3,421 LBS (1,551 kg)
18 SERIES UNIT/ AXIAL FAN MACHINE WEIGHTS			18 SERIES UNIT/ CENTRIFUGAL FAN MACHINE WEIGHTS		
	MAIN MOTOR HP	WEIGHT		MAIN MOTOR HP	WEIGHT
5500	75 ODP EE	2,798 LBS (1,269 kg)	5500	75 ODP EE	2,833 LBS (1,285 kg)
5500	75 TEFC EE	3,164 LBS (1,435 kg)	5500	75 TEFC EE	3,199 LBS (1,451 kg)
7500	100 ODP EE	2,869 LBS (1,301 kg)	7500	100 ODP EE	2,904 LBS (1,317 kg)
7500	100 TEFC EE	3,193 LBS (1,448 kg)	7500	100 TEFC EE	3,228 LBS (1,464 kg)
5500	75 ODP PE	3,221 LBS (1,461 kg)	5500	75 ODP PE	3,256 LBS (1,476 kg)
5500	75 TEFC PE	3,440 LBS (1,560 kg)	5500	75 TEFC PE	3,475 LBS (1,576 kg)
7500	100 ODP PE	3,355 LBS (1,521 kg)	7500	100 ODP PE	3,320 LBS (1,505 kg)
7500	100 TEFC PE	3,666 LBS (1,662 kg)	7500	100 TEFC PE	3,631 LBS (1,647 kg)

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.
3. All dimensions are $\pm .50"$ [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. Doors are removable using lift-off hinge pins.
7. All dimensions shown in inches with millimeter dimensions in parentheses.

A1: ALTERNATE INCOMING POWER SUPPLY LOCATION Ø 2.50 [63.5]

A2: SPACE REQUIRED TO OPEN DOORS TYP. SEE NOTE #6

A3: SPACE REQUIRED TO OPEN STARTER PANEL

A4: CONTROLLER

A5: E-STOP

A6: OIL LEVEL SIGHTGLASS

A7: AIR INLET

A8: EXHAUST AIR OUT

A9: CONTAINMENT PAN DRAIN

A10: INCOMING CUSTOMER POWER SUPPLY Ø 3.0 (76.2)

A11: MOISTURE DRAIN CONNECTION 1/4"-18 NPT

CFM COOLING AIR

CENTRIFUGAL FAN 60HZ HIGH STATIC: 8100

CENTRIFUGAL FAN 50HZ: 7300

AXIAL FAN: 8400

Figure 3-7 Identification - 4500PV, 5500V and 7500V Air-Cooled VSD with Remote Inlet

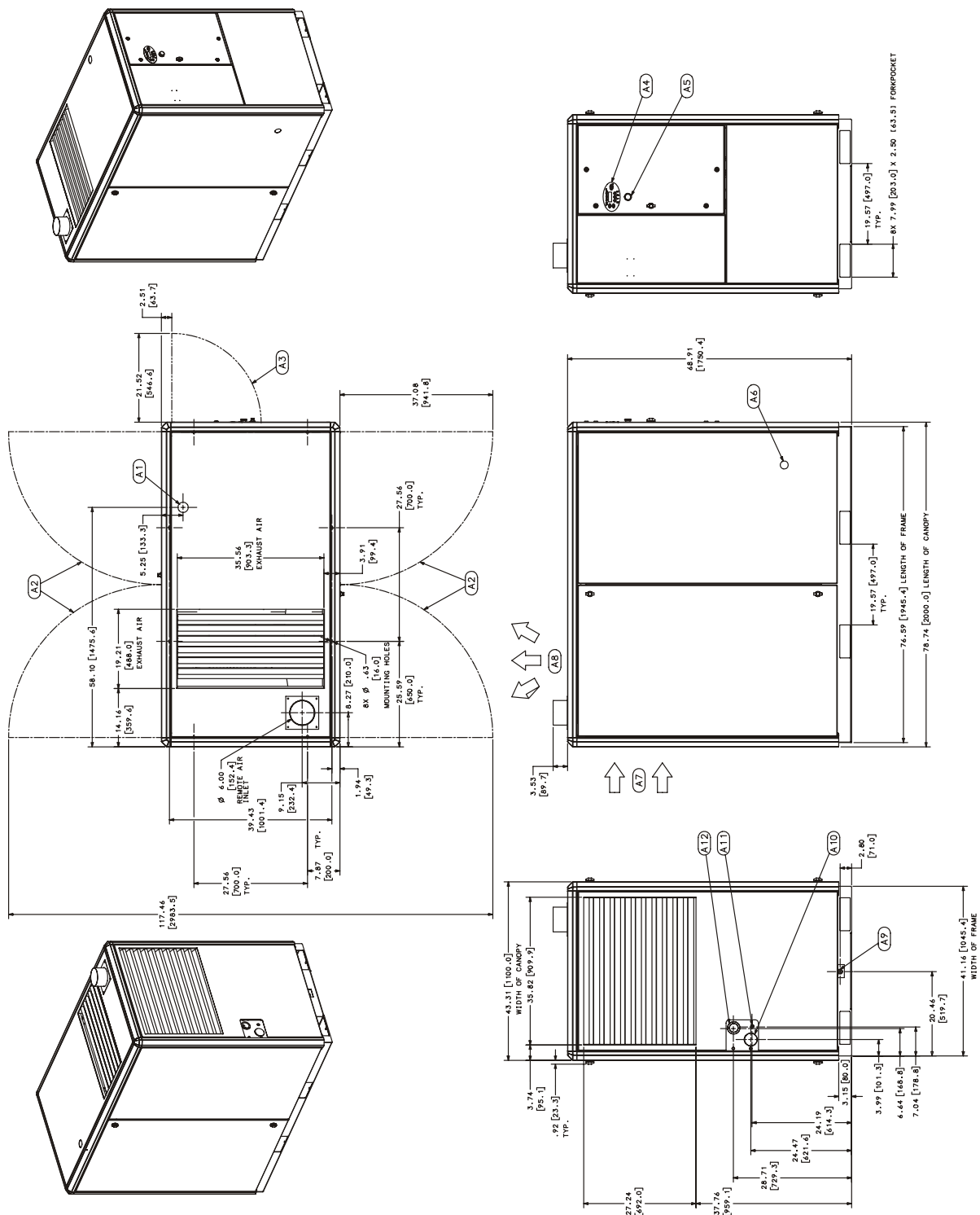


Figure 3-7 Identification - 4500PV, 5500V and 7500V Air-Cooled VSD with Remote Inlet (continued)

16 SERIES UNIT/ AXIAL FAN MACHINE WEIGHTS			16 SERIES UNIT/CENTRIFUGAL FAN MACHINE WEIGHTS		
	MAIN MOTOR HP	WEIGHT		MAIN MOTOR HP	WEIGHT
4500	60 ODP EE	2,755 LBS (1,249 kg)	4500	60 ODP EE	2,790 LBS (1,265 kg)
4500	60 TEFC EE	3,121 LBS (1,415 kg)	4500	60 TEFC EE	3,156 LBS (1,431 kg)
5500	75 ODP EE	2,826 LBS (1,281 kg)	5500	75 ODP EE	2,861 LBS (1,297 kg)
5500	75 TEFC EE	3,150 LBS (1,428 kg)	5500	75 TEFC EE	3,185 LBS (1,444 kg)
7500	100 ODP EE	3,178 LBS (1,441 kg)	7500	100 ODP EE	3,213 LBS (1,457 kg)
7500	100 TEFC EE	3,427 LBS (1,554 kg)	7500	100 TEFC EE	3,432 LBS (1,556 kg)
4500	60 ODP PE	2,889 LBS (1,310 kg)	4500	60 ODP PE	2,924 LBS (1,326 kg)
4500	60 TEFC PE	3,167 LBS (1,436 kg)	4500	60 TEFC PE	3,202 LBS (1,452 kg)
5500	75 ODP PE	3,075 LBS (1,394 kg)	5500	75 ODP PE	3,110 LBS (1,410 kg)
5500	75 TEFC PE	3,189 LBS (1,446 kg)	5500	75 TEFC PE	3,224 LBS (1,462 kg)
7500	100 ODP PE	3,242 LBS (1,470 kg)	7500	100 ODP PE	3,277 LBS (1,463 kg)
7500	100 TEFC PE	3,386 LBS (1,535 kg)	7500	100 TEFC PE	3,421 LBS (1,551 kg)

A1: ALTERNATE INCOMING POWER SUPPLY LOCATION Ø 2.50 [63.5]

A2: SPACE REQUIRED TO OPEN DOORS TYP. SEE NOTE #6

A3: SPACE REQUIRED TO OPEN STARTER PANEL

A4: CONTROLLER

A5: E-STOP

A6: OIL LEVEL SIGHTGLASS

A7: AIR INLET

A8: EXHAUST AIR OUT

A9: CONTAINMENT PAN DRAIN

A10: INCOMING CUSTOMER POWER SUPPLY Ø 3.0 (76.2)

A11: MOISTURE DRAIN CONNECTION 1/4"-18 NPT

A12: AIR OUT CONNECTION 2"-11 1/2 NPT

CFM COOLING AIR

CENTRIFUGAL FAN 60HZ HIGH STATIC: 8100

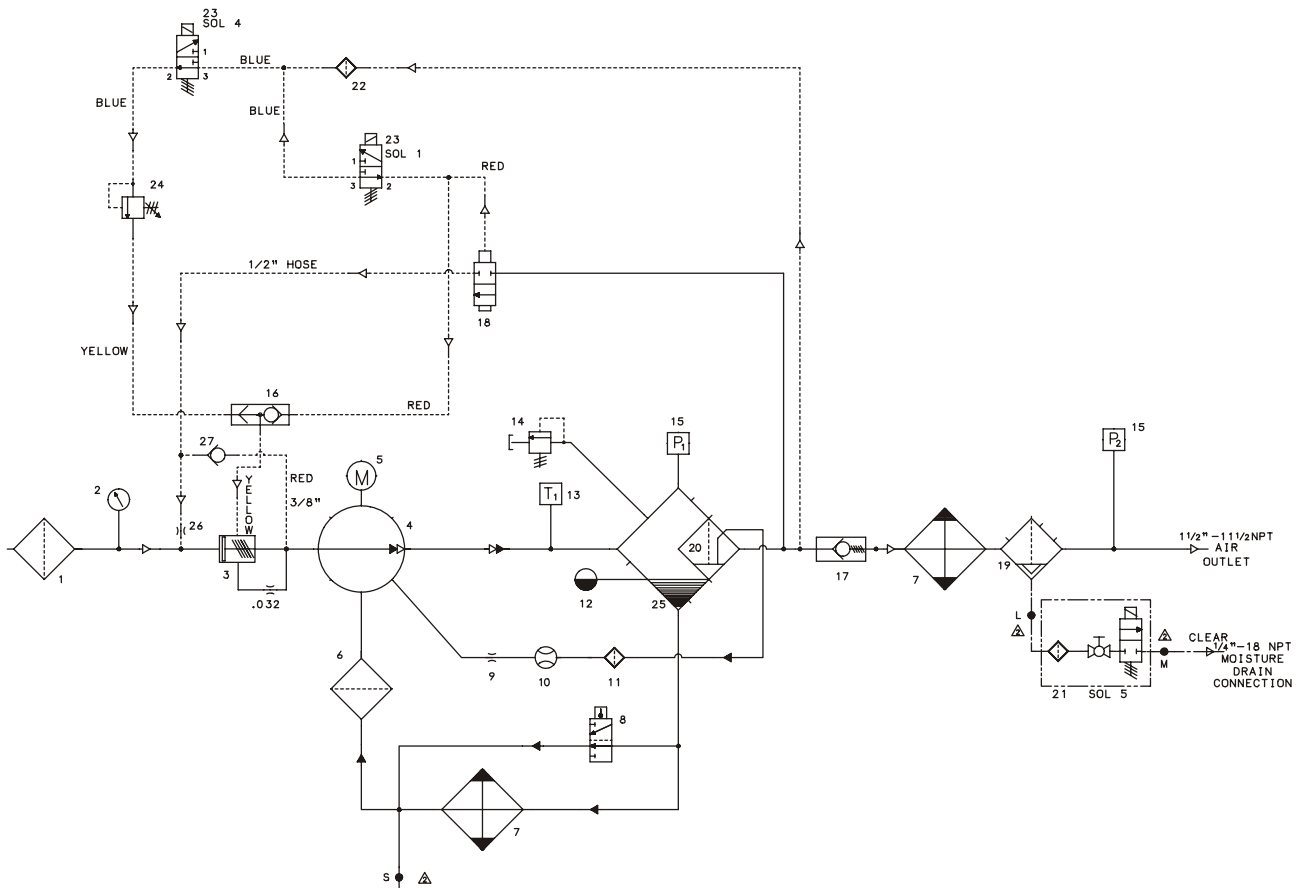
CENTRIFUGAL FAN 50HZ: 7300

AXIAL FAN: 8400

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.
3. All dimensions are $\pm .50"$ [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. Doors are removable using lift-off hinge pins.
7. All dimensions shown in inches with millimeter dimensions in parentheses.

Figure 3-8 Piping and Instrumentation - Air-Cooled Models



NOTES:

- 1 PART NUMBERS ARE FOR REFERENCE ONLY. REFER TO BILL OF MATERIAL AND OR FACE OF ORDER FOR ACTUAL PARTS.
- 2 SECTION BETWEEN LETTERED POINTS ARE TO BE REPLACED WITH CORRESPONDING OPTION PICTURED BELOW, AS REQUIRED BY FACE OF ORDER.
- 3 CONTROL/MOISTURE DRAIN LINES ARE 1/4" TUBING EXCEPT AS NOTED.
- 4 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.
- 5 PART VARIES BY MODEL.

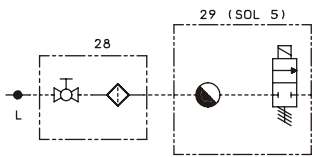
COMPONENT	DESCRIPTION
P1	WET SUMP PRESSURE
P2	LINE PRESSURE
SOL1	LOAD/UNLOAD SOLENOID VALVE
SOL4	MEC/SEQUENCING/FULL LOAD SOLENOID VALVE
SOL5	ELECTRIC DRAIN/SCD DRAIN SOLENOID VALVE
T1	WET DISCHARGE TEMPERATURE
T6	COOLER FLUID OUT TEMPERATURE

TUBING COLOR	PURPOSE
BLUE	TANK PRESSURE
YELLOW	REG PRESSURE
RED	UNLOAD PRESS
CLEAR	WATER DRAIN

FAN VSD OPTION



SCD DRAIN OPTION



Z-PURGE OPTION

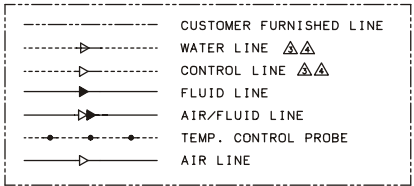
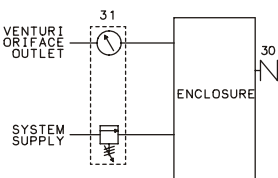


Figure 3-8 Piping and Instrumentation - Air-Cooled Models (continued)

Key No.	Description	Part Number	Qty
1	fltr,air 5" 2 stg p16/18	02250164-930	1
2	indicator, restriction	250003-869	1
3	vlv,inl 5" p16 low pilot pres	02250166-128	1
4	compressor unit	-	1
5	motor	-	1
6	filter, coreless 1" sae	02250164-928	1
7	cooler, air/oil 100hp	02250162-368	1
7	cooler, air/oil 75hp	02250163-627	1
8	valve, thermal 195deg 1-1/2"-18	02250092-081	1
8	valve, thermal 185deg 1-1/2"-18	02250078-204	1
9	orifice, 1/8 x 1/32	02250125-774	1
10	gls, sight/orf sae	02250126-129	1
11	filter, assy genesis	02250117-782	1
12	plug,sightglass 1-1/4" sae	40029	1
13	probe, thermister 3000 ohm	02250155-175	1
14	valve, relief 200#	02250097-349	1
15	xducr, 1-250# radiometric	02250155-174	2
16	valve, shuttle 1/4" double chk	408893	1
17	vlv, min pressure 100hp	02250109-817	1
17	vlv, min pressure 75hp	02250097-598	1
18	valve, blowdown 1/2" 1.8:1	02250100-042	1
19	sep,wtr scws-235n 2" l/ad	02250166-736	1
19	sep,wtr scws-235n 1 1/2" l/ad	02250166-735	1
20	elem,sep round 5.5d x 14.3lng	02250160-774	2
21	vlv,combo 24 vdc	02250170-783	1
22	strainer, v-type 300psi x 1/4	241771	1
23	vlv,sol 3wno 1/4 250# 24vdc	02250155-714	2
24	valve, pressure reg	250017-280	1
25	tank, separator	02250162-369	1
26	orf,.140" 3/8 fnpt x 3/8 mnpt	02250172-323	1
27	vlv,chk 3/8"nptf brass viton	02250172-320	1
28	vlv,ball/stnr comb 1/2f x 1/2m	02250144-842	1
29	drn,electric condensate-scd200	02250111-686	1
30	vent,encl prot 1/2" side mtg z-prg	02250112-881	1
31	ga,diff press z-purge asy regu	02250078-976	1
32	p,rtd 100ohm 90deg bend 12ft	02250048-457	1

Figure 3-9 Piping and Instrumentation - Water-Cooled Models

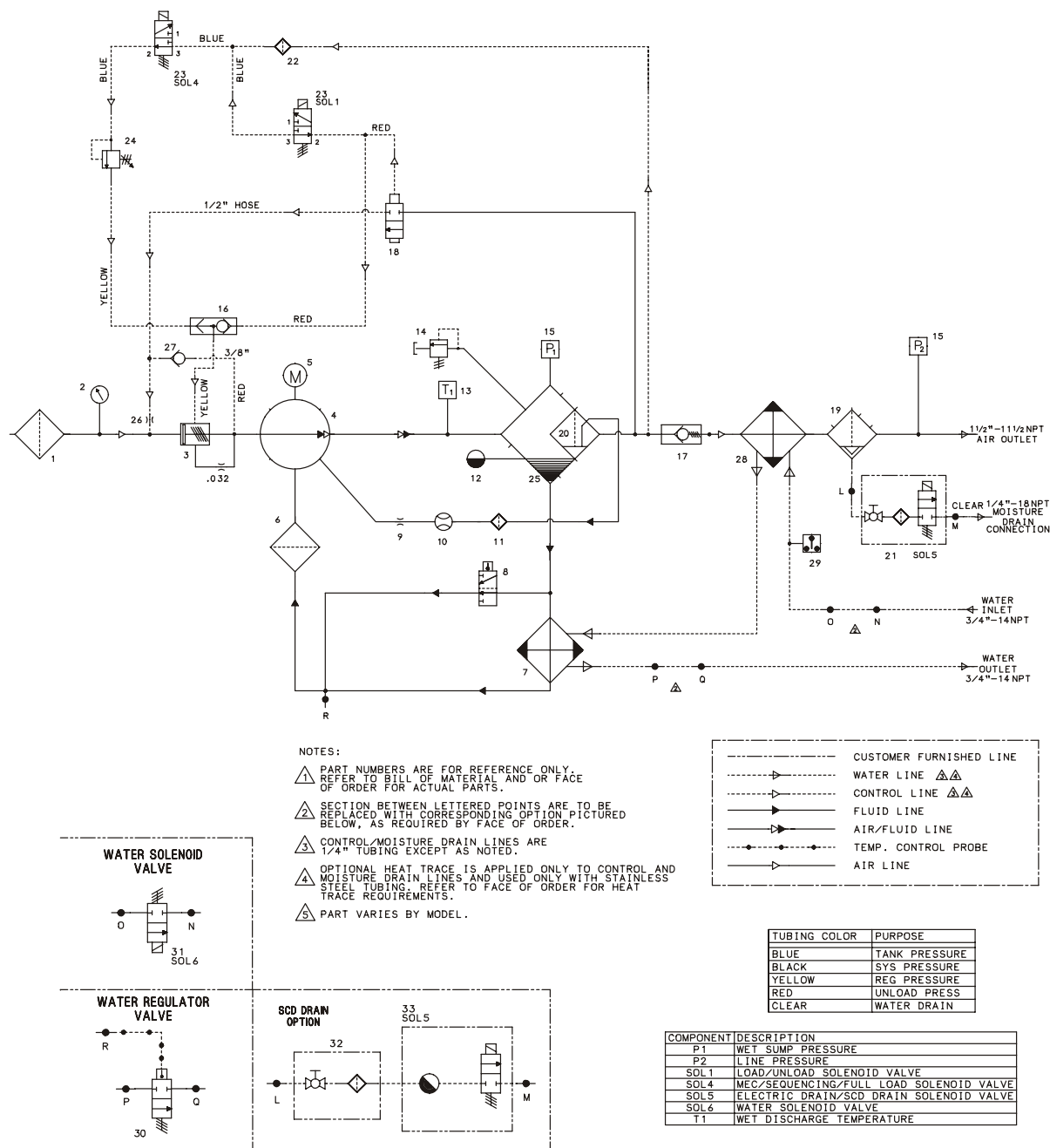


Figure 3-9 Piping and Instrumentation - Water-Cooled Models (continued)

Key No.	Description	Part Number	Qty
1	filter, air 5" plastic	02250164-930	1
2	indicator, restriction	250003-869	1
3	vlv,inl 5" p16 low pilot pressure	02250166-128	1
4	compressor unit	-	1
5	motor	-	1
6	filter, coreless 1" sae	02250164-928	1
7	clr,oil/water 6x36 1-5/8"sae	02250120-863	1
8	valve, thermal 195deg 1-1/2"-18	02250092-081	1
8	valve, thermal 185deg 1-1/2"-18	02250078-204	1
9	orifice, 1/8 x 1/32	02250125-774	1
10	gls, sight/orf sae	02250126-129	1
11	filter, assy genesis	02250117-782	1
12	plug,sightglass 1-1/4" sae	40029	1
13	probe, thermister 3000 ohm	02250155-175	1
14	valve, relief 200#	02250097-349	1
15	xducr, 1-250# radiometric	02250155-174	2
16	valve, shuttle 1/4" double chk	408893	1
17	vlv, min pressure 100hp	02250109-817	1
18	valve, blowdown 1/2" 1.8:1	02250100-042	1
19	sep,wtr scws-235n 2" l/ad	02250166-736	1
19	sep,wtr scws-235n 1 1/2" l/ad	02250166-735	1
20	elem,sep round 5.5d x 14.3lng	02250160-774	2
21	vlv,combo 24vdc	02250170-783	1
22	strainer, v-type 300psi x 1/4	241771	1
23	vlv,sol 3wno 1/4 250# 24vdc	02250155-714	2
24	valve, pressure reg	250017-280	1
25	tank, separator	02250162-369	1
26	orf,.140" 3/8 fnpt x 3/8 mnpt	02250172-323	1
27	vlv,chk 3/8"nptf brass viton	02250172-320	1
28	ht exch	43008	1
29	switch, press no 10 psi	250017-992	1
30	valve, water reg 1-1/4"160-230f	49474	1
31	vlv,sol 2wno 3/4 250# n4	250035-291	1
32	vlv,ball/stnr comb 1/2f x 1/2m	02250144-842	1
33	drn,electric condensate-scd400	02250111-686	1

Figure 3-10 Wiring Diagram - Air-cooled MFV NC+

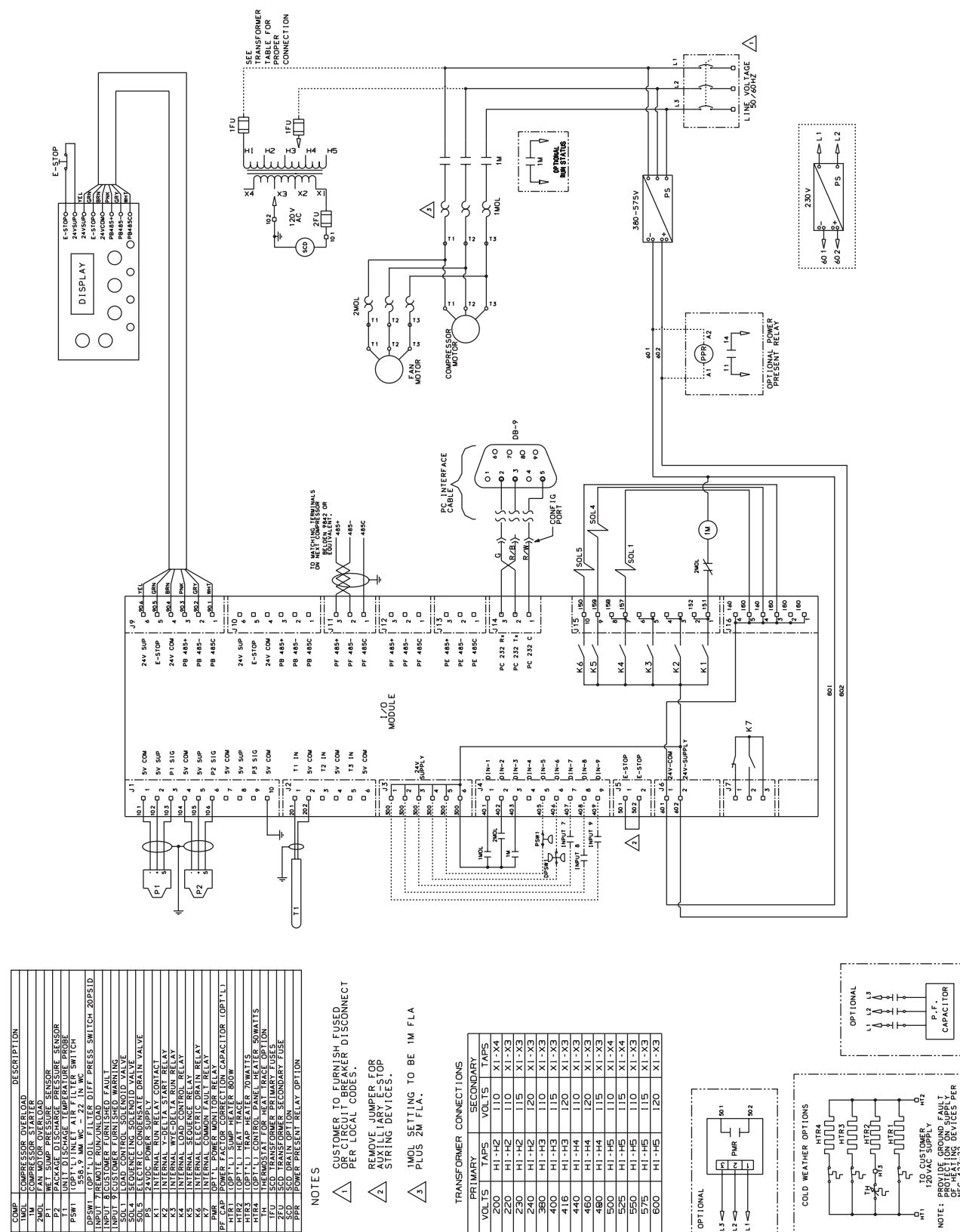
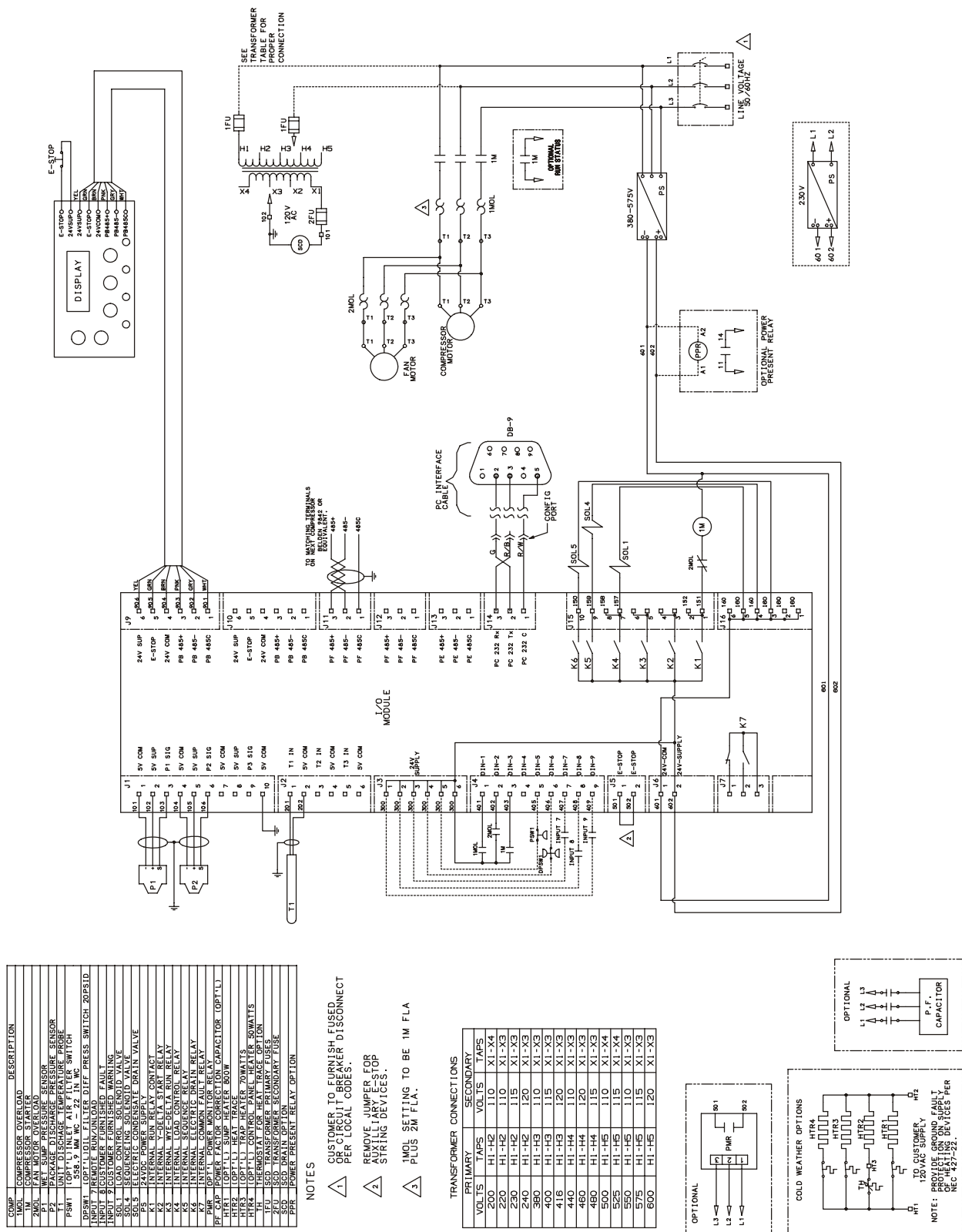


Figure 3-11 Wiring Diagram - VSD



02250171-211R00



Figure 3-12 Wiring Diagram - Air-Cooled SSRV

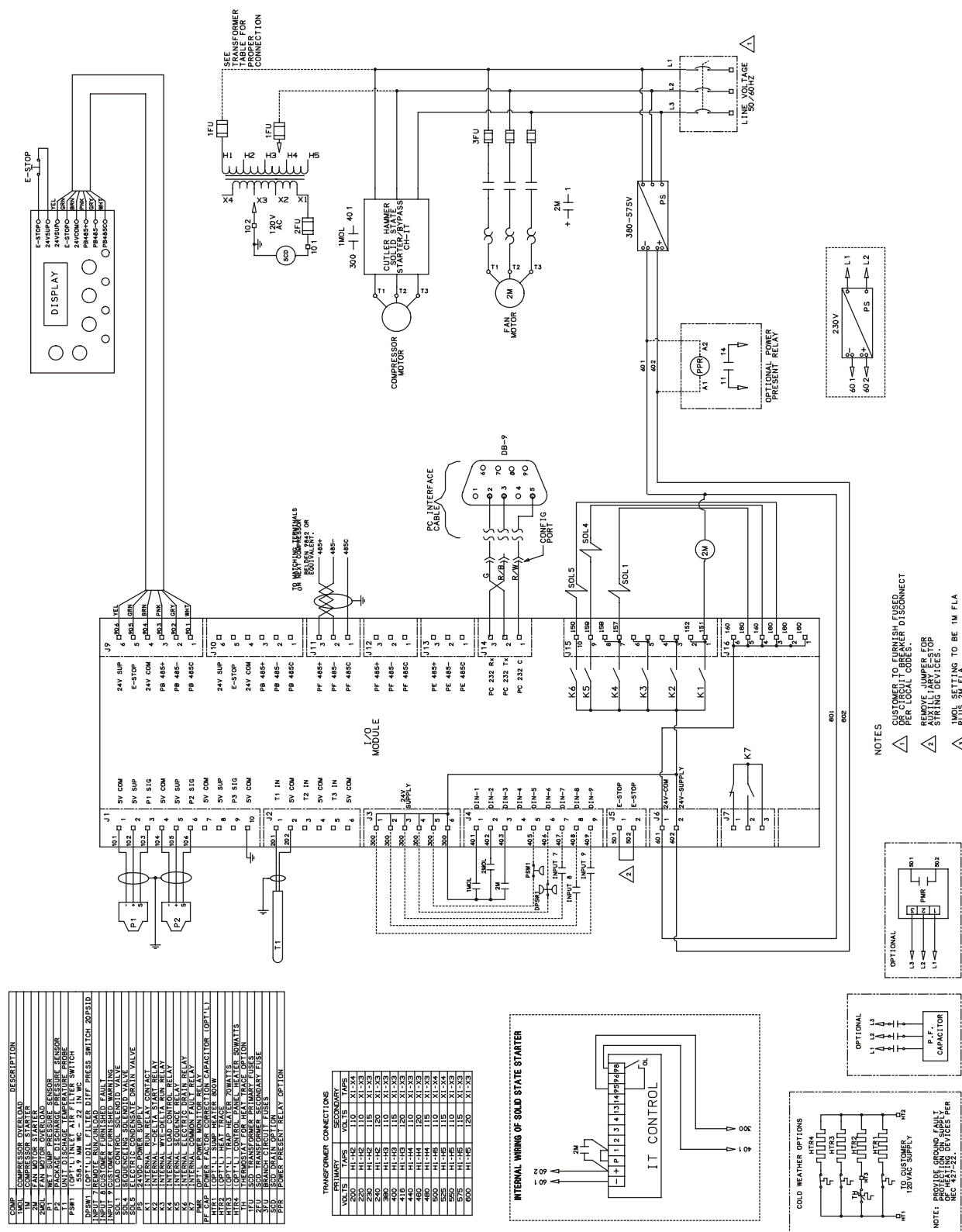


Figure 3-13 Wiring Diagram - Air-Cooled MFV NC AUX XFMR

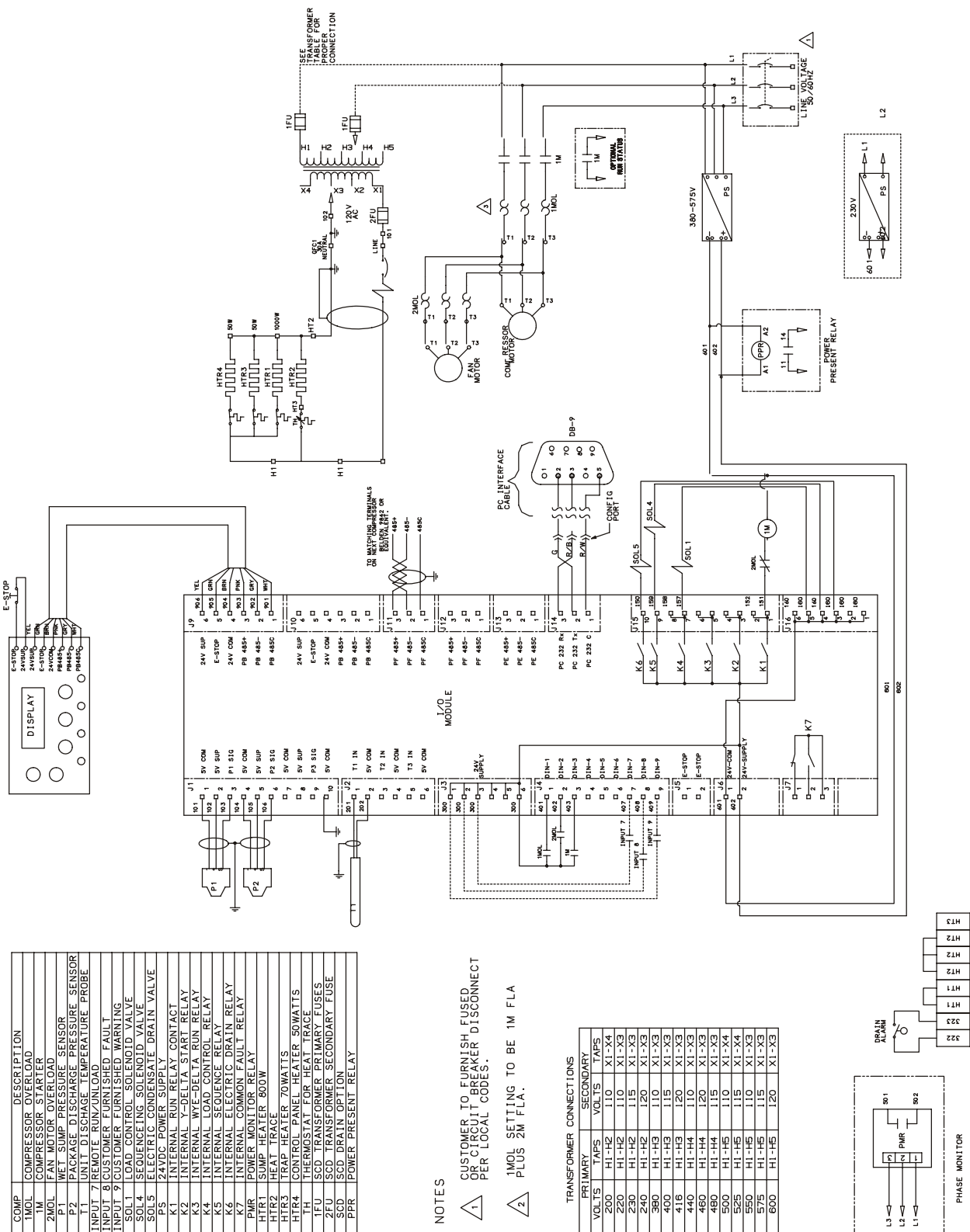


Figure 3-15 Wiring Diagram - Water-Cooled Wye-delta NC

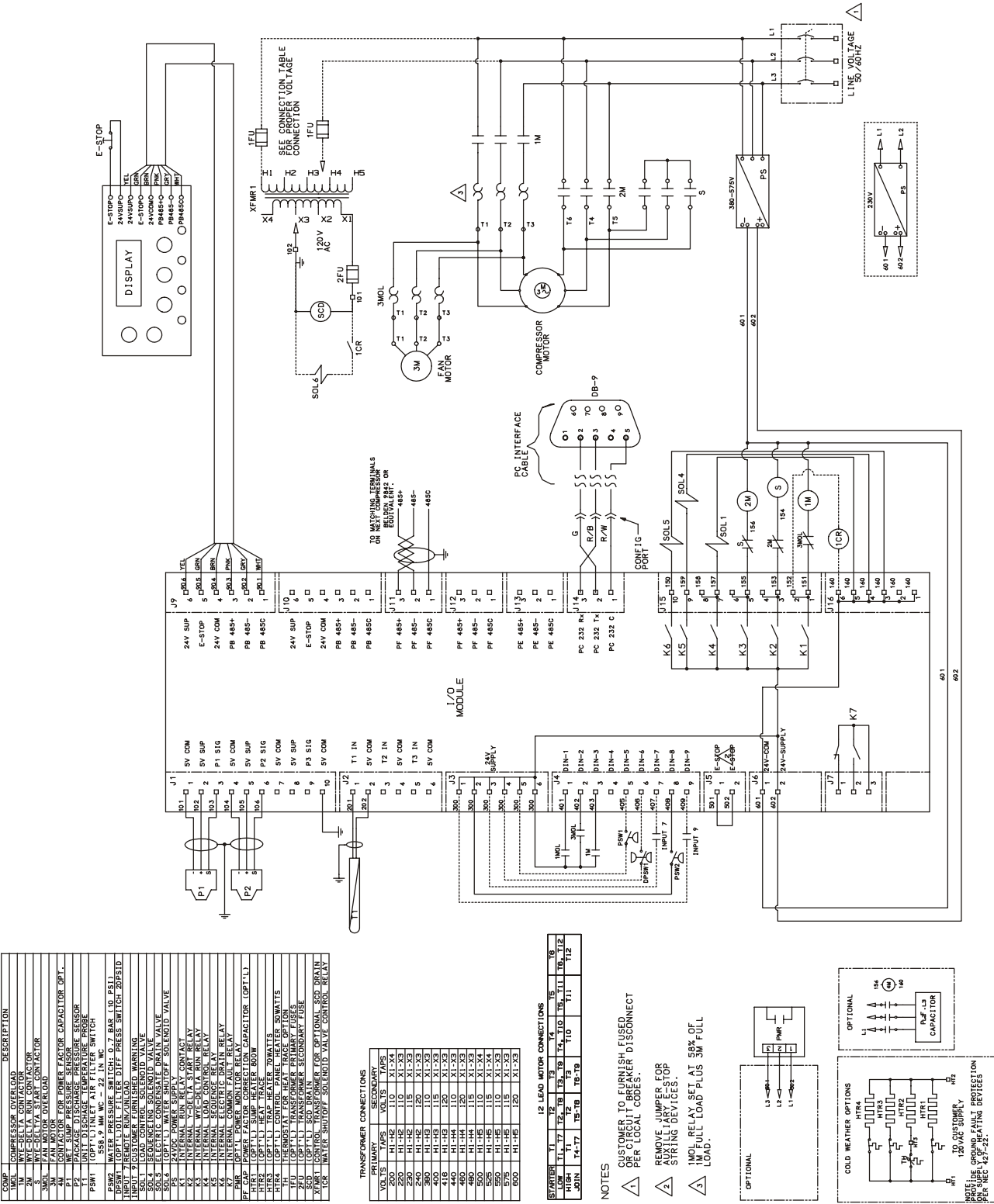
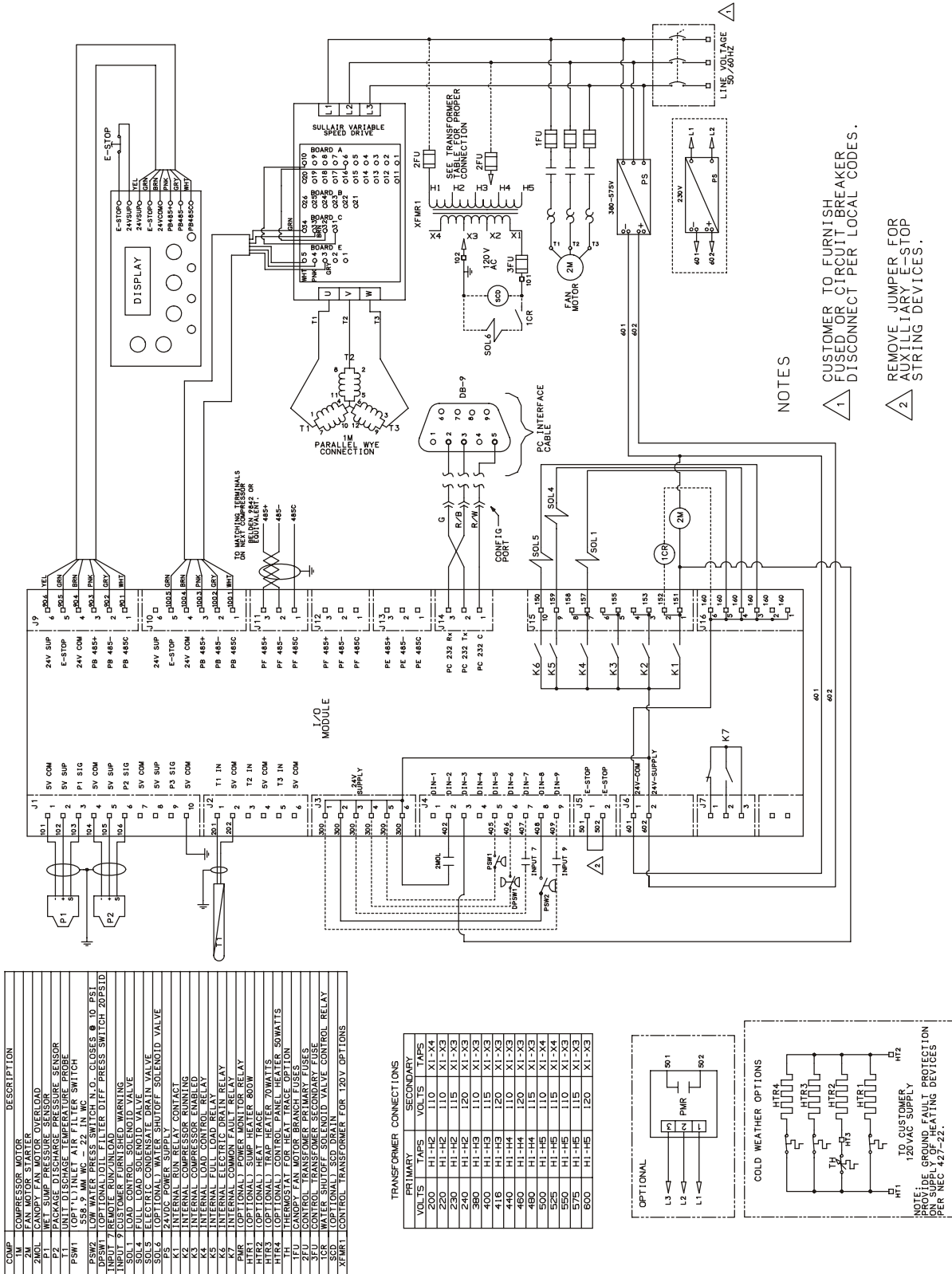


Figure 3-16 Wiring Diagram - Water-Cooled VSD



02250172-291R00

Section 4

INSTALLATION

4.1 COMPRESSOR MOUNTING - SUPPORT AND LOCATION

The compressor must have a stable firm foundation, or mounting structure that is rigid enough to keep the compressor frame level, and maintain the alignment of the compressor and motor. Tie-down bolts of sufficient size must be used to ensure that the compressor frame is firmly anchored to its foundation. Rubber, cork, or other pliable materials can be inserted between the foundation and compressor frame to provide a uniform contact surface.

- Use flex connectors to prevent piping loads from being transmitted to the compressor.
- National and local electrical codes specifying the required clearances for the area around the electrical panel must be complied with.
- Ensure the lighting at the compressor's location is sufficient for safe operation and maintenance.
- The compressor's location should be one that allows access for maintenance vehicles and lifting equipment.
- The clearances around the compressor should permit easy access to all compressor components.
- Walls and ceilings with soft or porous surfaces absorb sound and reduce ambient noise levels. Hard surfaces reflect noise and have little effect on ambient noise levels.

NOTE

Do not install compressors where the machine will be exposed to temperatures lower than 32°F (0°C). Contact Sullair Customer Care regarding operation in sub-freezing temperatures.

- Water-cooled compressors must be located where a cooling water supply and drainage

are available.

NOTE

Compressors operated in environments where ambient temperatures average above 104°F (40°C) must be equipped with the high-ambient option.

4.2 VENTILATION AND COOLING

AIR-COOLED COMPRESSORS

- Air-cooled compressors require a three foot (one meter) clearance around their perimeter.
- The location should be free from standing water.
- Clean air should be supplied to the compressor, free from exhaust and paint fumes, dust, metal particles, or caustic chemical vapors.
- Hot exhaust air should be vented out of the area to prevent its recirculation back into the compressor's cooling system.
- Ducting or some other means must be used to ensure that hot exhaust air is vented away from the compressor if the compressor's housing has minimal overhead clearance.

NOTE

Systems using both reciprocating and rotary screw compressors must isolate the two types from each other through the use of a common receiver tank. Air lines from each individual compressor should be connected directly to the common receiver tank.

NOTE

Remove the red shipping straps before operating the drive assembly.

NOTE

The required flow rate depends upon the cooling water's temperature before it enters the cooling system. The higher the initial temperature, the higher the required flow rate: the lower the initial temperature, the lower the required flow rate.

NOTE

The "waste heat" from air-cooled compressors can be used for local space heating. If it is used for this purpose, the additional static pressure drop across the fan should not exceed 0.2 in. H₂O. The high static fan option is required if ductwork is added. Contact Sullair Custom Care for additional information.

NOTE

Housing the compressor in an inadequately ventilated enclosure will cause higher compressor operating temperatures.

WATER-COOLED COMPRESSORS

- Water-cooled compressors require a cooling water supply delivered at a constant rate and volume. (See *Table 4-1 Water Flow Requirements*. The table data applies to full load operation using an aftercooler.)
- Compressor input and return lines must be one inch in diameter minimum, and have isolation valves with side drains. The input water line should have a 2mm strainer installed in-line. A solenoid valve (normally closed), controlled by the compressor control circuit, should be connected to the compressor's water outlet. (Contact Sullair Customer Care for assistance.)

Table 4-1: Water Flow Requirements

Water Temp °F/°C	Water Flow Gallons Per Minute /Liters Per Minute (l)		
	60hp/45kw	75hp/55kw	100hp/75kw
70/21	9.0 / 34.1	10.5 / 39.7	14 / 53.0
80/27	11.2 / 42.4	13 / 49.2	18.8 / 71.2

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

- Cooling water quality is a critical factor effecting proper machine cooling. Excessive deposit build-ups, such as lime or scale, restrict the water flow and act as thermal insulators. These deposits can increase the compressor's operating temperature by reducing the cooling system's efficiency.
- Regularly inspect and clean all water piping and coolers.
- Table 4-2 Ventilation Requirements* specifies the minimum ventilation required for compressor operation at normal temperatures. The fan air requirement applies to the volume of air that must pass through the compressor to ensure proper ventilation. The heat rejection requirement applies the amount of heat generated by the compressor which must be removed to maintain a normal operating temperature.
- If the compressor has a water regulating valve, it can be used to adjust the compressor temperature to maintain a minimum of 185°F (82.2°C); 195°F (87.8°C) for 24 KT machines.
- Temperature and pressure gauges should be installed for water system troubleshooting.

NOTE

Water pressure should normally range from 25 to 75 psig (1.7 to 5.2 bar), but must not go over 145 psig (10.0 bar).

WATER SYSTEM VENTING

Vent the system after installation, or after draining the system at startup:

- Open the water valve(s).
- Open the vent cocks (located on top of the aftercooler and lubricant cooler) and let air escape from the system. Close the vent cocks when water is visible at their location - at this point the system has been vented.

DRAINING THE WATER SYSTEM

To drain the system completely:

- Disconnect both the inlets and discharge water lines located at the rear of the compressor.

Table 4-2: Ventilation Requirements

Cooling Type	Air-Cooled with Aftercooler			Water-Cooled		
Motor HP/KW	60 / 45	75 / 55	100 / 75	60 / 45	75 / 55	100 / 75
Fan Air cfm/m ³ /hr	7,300 / 12,400	7,300 / 12,400	8,100 / 13,800	2,845 / 4,835	2,845 / 4,835	2,845 / 4,835
Ventilating Air/ Heat Rejection BTU/hr	170,300	213,000	286,000	16,000	20,000	26,800
KCal/hr	46,000	57,500	77,300	4,300	5,400	7,200
Cooling Water/ Heat Rejection BTU/hr				170,300	213,000	286,000
KCal/hr				46,000	57,500	77,300

- Remove the drain plugs that are located at the bottom of the aftercooler and the lubricant cooler end caps.
- Allow the system to drain completely.

WATER QUALITY RECOMMENDATIONS

Water quality can significantly effect the efficiency of the water cooling system. Dissolved minerals, gases, and pH values are factors that contribute to the formation of deposits and corrosion which can form on the interior of cooling system pipes and heat exchangers.

Scale can be a problem if the water supply has a

high concentration of calcium carbonate. It forms lime scale deposits which act as thermal insulators and restrict the water flow through the cooling system. If scale is allowed to build up over time, it will reduce the system's ability to remove heat and the compressor can be damaged. Scale buildup can be controlled with proper water treatment.

NOTE

In some cases a thin lime scale coating can inhibit corrosion.

Corrosion damages pipes and reduces their strength. This type of damage is more likely if the water supply

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.	Langelier 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

has a high amount of dissolved oxygen and a low pH level.

Biological/organic fouling (slime) is relatively uncommon since the compressor's cooling fluids are hot enough to generally prevent this type of problem. Chemical treatments are available to rid the system of biological contaminants.

NOTE

Seawater-cooled systems must be installed with the optional copper-nickel coolers.

NOTE

Routine water testing will extend the compressor's operational life and help maintain an acceptable performance level. Refer to Table 4-3: Water Tests.

SEAWATER-COOLED SYSTEMS

A strainer must be installed the system's inlet piping to ensure the supply water is clean. Sullair also recommends installing a solenoid valve (normally open) on the system's outlet side. Both inlet and outlet lines should have isolation valves with side drains installed.

NOTE

The maximum recommended flow rate cannot be exceeded. An excessive flow rate can cause rapid system failure.

An orifice plate must be installed in the piping at least 3.3 feet (1M) before the cooler. The orifice's diameter must be properly sized to ensure that the recommended flow rate is not exceeded (See Table 4-4).

Table 4-4: Orifice Plate Diameters for Seawater Flow

Seawater Pressure psi (bar)	Orifice diameter in inches (mm) to give a maximum seawater flow of 58 US gal/ min (220 l/min)
25 (1.7)	0.81 (20.5)
35 (2.4)	0.75 (19)
45 (3.1)	0.70 (18)
55 (3.8)	0.67 (17)
65 (4.5)	0.64 (16.3)
75 (5.2)	0.62 (15.7)

The cooling system should be set up to limit damage from oil cooler leaks:

- Maintain the minimum system oil pressure at a level higher than the cooling seawater pressure. This will prevent oil contamination in the event of a leak.
- Isolate the coolers from the input line (seawater) when the hydraulic system is not in use.
- The cooler's seawater outlet pipe should have an open path to the waste piping.

OUTDOOR INSTALLATION (SHELTERED)

Compressor packages installed in locations where they will be exposed to outside elements must be equipped with a TEFC motor. Standard compressors have water tight controls that are NEMA 4 rated and are suitable for this type of installation.

NOTE

VSD compressors are NEMA 12 rated which makes them unsuitable for outside installation or in locations where they will be exposed to outside elements.

The compressor should be mounted on a concrete pad. If the pad is not level, the compressor must be mounted in such a manner that its base or skid is level in relation to the pad's surface and fully supported.

An optional weather hood should be installed to protect the compressor from precipitation. If the compressor will be exposed to blowing rain or snow, it should be housed in a covered, four-walled enclosure.

- Sheltered air-cooled machines must have their exhaust air vented outside of the enclosure.
- Installations consisting of more than one compressor should be done in such a manner that each compressor's exhaust is directed away from the air intakes of other compressors or air dryers.
- A standard compressor should not be started if the ambient temperature is 35°F (1.7°C) or lower, or may decrease below that point.
- Compressor's operated in sub-freezing conditions must utilize the cold weather package. Consult the factory for further information.

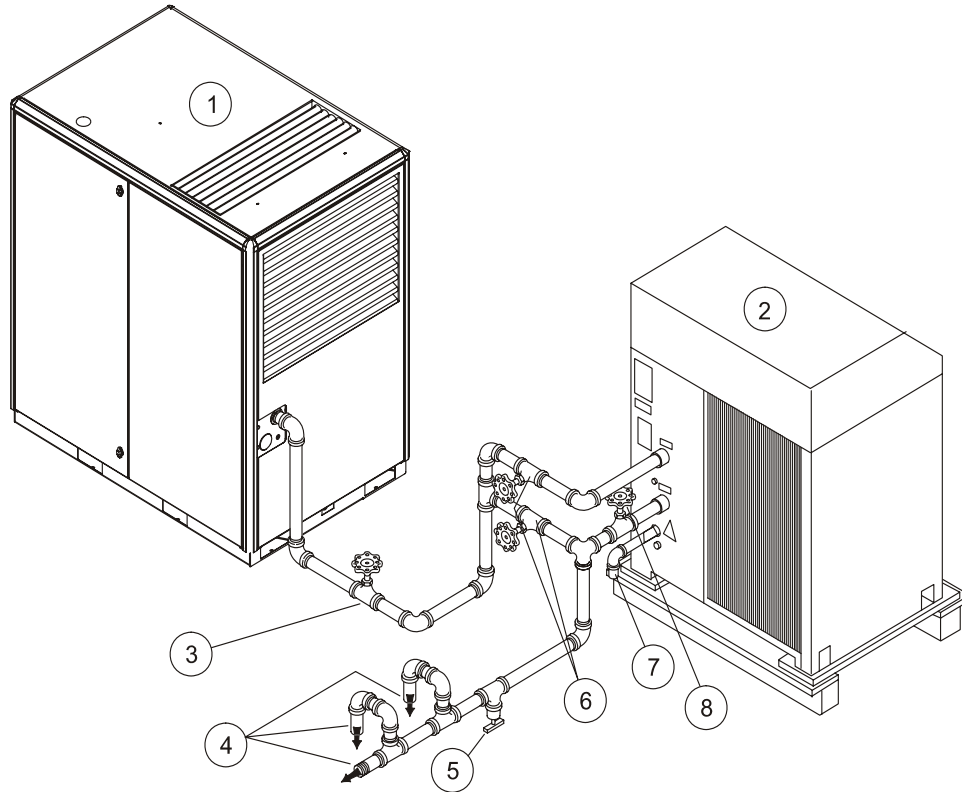


Figure 4-1 Typical Service Air Piping

- | | |
|--|---|
| 1. Compressor | 4. Air Outlets (Never Take Air From Bottom of Pipe) |
| 2. Sullair Dryer | 5. Water Leg |
| 3. Shut-Off Valve (Gate Valve Recommended) | 6. By-Pass Gate Valves |

4.3 SERVICE AIR PIPING

Before installing the compressor, review the service air system's layout including: pipe sizes, auxiliary receiver, drip legs, line filter(s), and isolation valves (See Figure 4-1).

PIPE SIZING

Pipes should be sized as a minimum to match the dimensions of the compressor's discharge connection. All piping and fittings should be rated for the discharge pressure.

AUXILIARY RECEIVER TANK

An Auxiliary receiver tank should be installed in systems where large demand fluctuations will occur.

ISOLATION VALVES

Install isolation valves where isolation of the compressor from the service lines is required. These

valves should have drip legs that drain at an angle downward from the base. A vent to the piping should be installed downstream of the compressor outlet connection.

When two compressors are installed to operate in parallel with a common receiver tank, an isolation valve and drain trap for each compressor should be installed before the common receiver.

Compressors have built-in aftercoolers and are equipped with a condensate drain located next to the air outlet connection. A drain line should be installed to remove the condensate, which builds up during compressor operation. See Figure 4-2.

NOTE

Compressors not equipped with an auxiliary receiver tank may need to have their response times adjusted. Contact Sullair Customer Care for assistance.

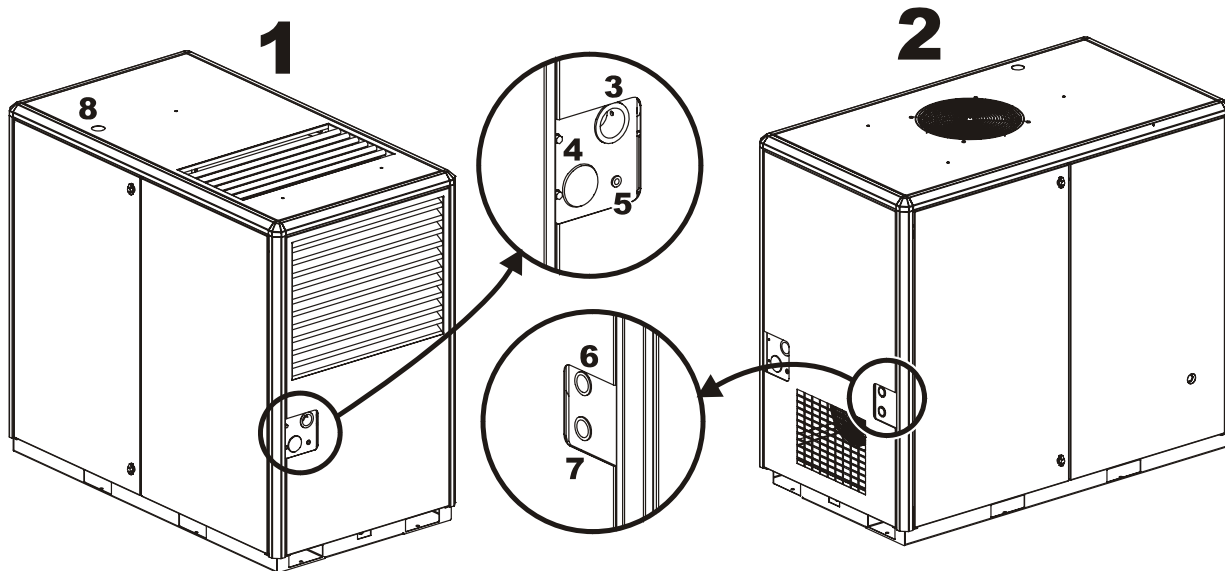


Figure 4-2: Connection Locations

- | | |
|----------------------------|--------------------------------------|
| 1. Air-Cooled | 5. Condensate Drain 2" NPT |
| 2. Water-Cooled | 6. Cooling Water Out 1-1/2" NPT |
| 3. Air Connection 2" NPT | 7. Cooling Water In 1-1/2" NPT |
| 4. Incoming Power Location | 8. Alternate Incoming Power Location |

FLUID CONTAINMENT

Compressors have a fluid containment pan to collect fluid leaks or spills. The pan has a drain located on the air intake side of the machine.

The drain pan on indoor installations should be plugged.

Outdoor installations require a separate customer supplied system to allow for the drainage of rainwater or accumulated compressor fluid.

4.4 COUPLING ALIGNMENT CHECK

No coupling alignment check is required.

4.5 FLUID LEVEL CHECK

The compressor is shipped fully charged with the proper amount of fluid. However, it is necessary to check the fluid level at the time of installation and during compressor operation. Check the fluid level 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 receiver tank (See Figure 3-1). The full level is at half the sight glass. Add fluid if fluid level is not visible in the sight

glass when machine is shut down.

4.6 ELECTRICAL PREPARATION

Interior electrical wiring is installed 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 codes applying to isolation switches, fused disconnects, etc. Refer to Figures 4-2 and 4-3. Sullair provides a wiring diagram for use by the installer. An electrical check should be made to ensure that the first start-up will be successful. The compressor and drive should be properly grounded/earthed in accordance with applicable codes, regulations, and requirements.

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 power source is critical because voltage drops can adversely effect the performance of the compressor. Cable sizes may vary considerably so the mains terminals will accept up to 120 mm² (4/0 awg) (75kw) cable.

Feeder cable connections to incoming terminals L1-

L2-L3 should be tight and clean.

The applied voltage must conform to the motor and compressor data plate ratings.

A starter hole is provided for an 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 with a sealed plug.

⚠ WARNING

Energized internal components are a potentially FATAL SHOCK HAZARD. Disconnect all power before performing any work on the compressor's electrical system.

1. Check incoming voltage. The incoming voltage must match the compressor's wire rating/specifications.
2. Check motor starter and overload heater sizes.
3. Check all electrical connections for tightness.

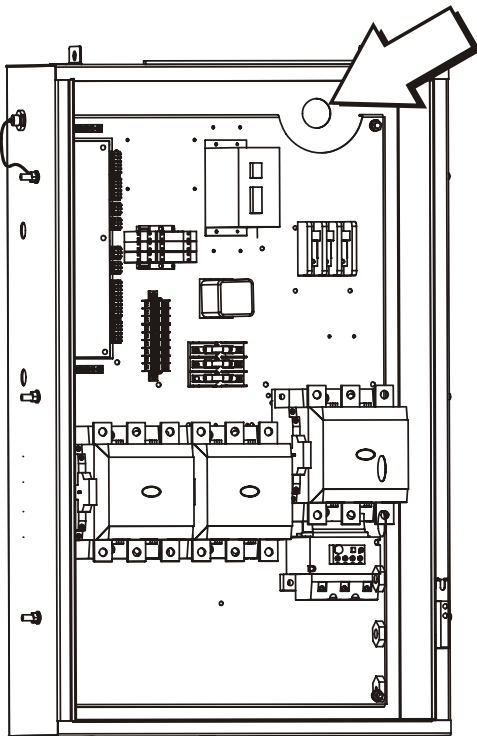


Figure 4-3: Incoming Power Location

4.7 MOTOR ROTATION DIRECTION CHECK

Motor rotation check must be done at compressor start-up after the wiring has been installed. 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. Pull out the EMERGENCY STOP button and press once, quickly and in succession, the **(I)** (START) and **(O)** (STOP) pads. This action will bump start the motor. When looking at the motor from the end opposite the compressor unit, the shaft should turn clockwise. If reverse rotation occurs, 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 receiver tank pressure. Pull out the EMERGENCY STOP button and press once, quickly and in succession, the **(I)** (START) and **(O)** (STOP) pads. This action will bump start the motor. If motor rotation is correct there will be an immediate pressure indication. If no pressure is present, the motor is operating in reverse. Disconnect the power to the starter and exchange any two of the three power input leads and recheck the rotation.

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

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Section 5

OPERATION

5.1 ROUTINE OPERATION

Before starting the compressor, check the fluid level in the receiver tank. If the fluid level is not showing in the sight glass, add the required amount of fluid up to the mid-point to bring it to its proper level. Frequent addition of fluid indicates the presence of a leak or a condition causing excessive fluid consumption. See the Troubleshooting Guide Section under EXCESSIVE COMPRESSOR FLUID CONSUMPTION for a probable cause and corrective action.

WARNING

HIGH-PRESSURE HAZARD!

DO NOT remove caps, plugs, and/or other components when compressor is running or pressurized. Stop compressor and relieve all internal pressure before doing so. Failure to comply could result in death or serious injury.

After a routine start, observe the controller display for the proper indications for this phase of operation. After the compressor has warmed up, check all compressor operation indications to ensure that it is running properly.

NOTE

Sections 2.7 through 2.11 provide detailed information pertaining to the operation of the WS Controller and the VSD (not all compressors have a VSD).

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Section 6

MAINTENANCE

6.1 GENERAL

This compressor requires a minimal amount of inspections and maintenance. The WS Controller and other indicators alert the operator to situations requiring maintenance, or fault conditions.

6.2 MAINTENANCE AFTER INITIAL 50 HOURS OF OPERATION

After the initial 50 hours of operation, a few maintenance actions are required to clean the system of any foreign materials. Perform the following maintenance operations:

1. Clean the return line strainer. Refer to Maintenance Every 2000 Hours for location.
2. Clean the return line orifice.

6.3 MAINTENANCE EVERY 2000 HOURS

After 2000 hours of operation:

1. Clean the return line strainer. Refer to Discharge, Receiver and Piping System.
2. Replace the fluid filter element.

6.4 FLUID MAINTENANCE

Drain the receiver tank and change the compressor fluid using instructions shown in the Lubrication Guide.

6.5 FILTER MAINTENANCE

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

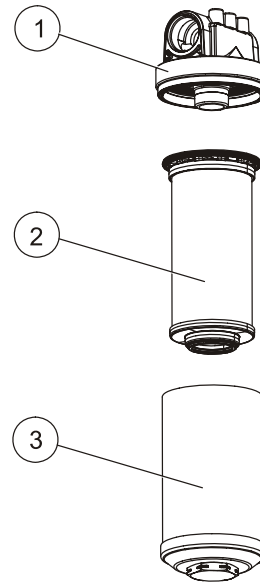


Figure 6-1: Fluid Filter Assembly

1. Filter Head	2. Element (I)	3. Canister
(I) Replacement Element Kit P/N 02250168-084		

1. Every 2000 hours a display on the WS Controller indicates the need for replacement.
2. Every fluid change.

FLUID FILTER ELEMENT REPLACEMENT

Refer to Figure 6-1.

1. Use a wrench to remove the filter canister.
2. Remove and dispose of filter element properly.

NOTE

Dispose of fluids in accordance with applicable federal, state and local regulations.

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 20 ft-lb (27.1 Nm).
7. Restart compressor and check for leaks.

6.6 AIR FILTER MAINTENANCE

Refer to Figure 6-2. Air filter maintenance should be performed when the maintenance gauge shows red with the compressor running full load, or once a year, whichever comes first.

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.

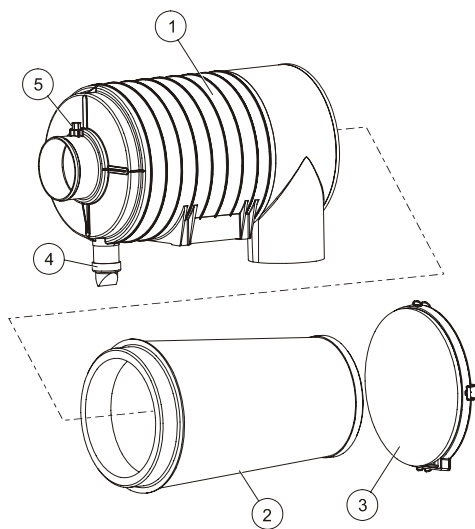


Figure 6-2: Air Filter Assembly

1. Housing	3. Cover
2. Element (I)	4. Vacuator Valve (II)
(I) Element Replacement Kit P/N 02250168-053	
(II) Vacuator Valve Replacement Kit P/N 02250125-376	

6.7 SEPARATOR MAINTENANCE

Replace the separator elements when shown by the WS Controller indications, or after one 1 year, whichever comes first. The separator elements must be replaced. **DO NOT** attempt to clean and reinstall the separator elements.

SEPARATOR ELEMENT REPLACEMENT

Refer to Figure 6-3. The separator elements must be changed when WS indications show the requirement, or once a year, whichever occurs first. Use the following procedure below to change the separator:

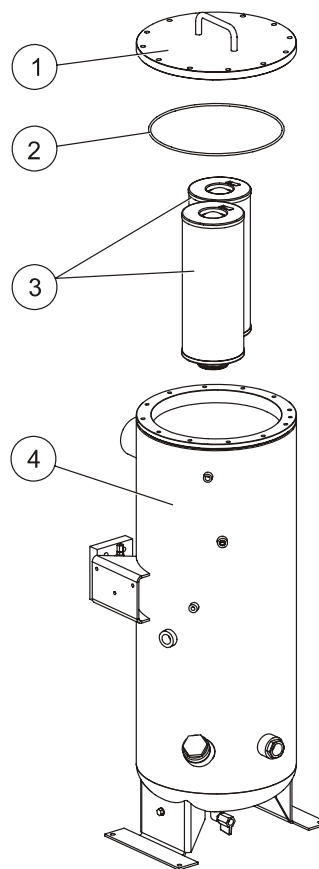


Figure 6-3: Separator Element Assembly

1. Cover	3. Elements (I)
2. Cover Gasket (I)	4. Receiver Tank
(I) Element Replacement Kit P/N 02250169-993	

⚠ CAUTION!

Relieve all pressure from the receiver tank and all compressor lines.

1. Loosen and remove the eight (8) hex head capscrews (M12 x 40mm) from the cover plate.
2. Lift the cover plate from the receiver tank.
3. Remove the separator elements.
4. Inspect the receiver tank for rust, contamination, or damage.
5. Reinsert the separator elements into the receiver tank taking care not to dent the element against the tank opening.
6. Install a new lubricated O-ring in the O-ring groove on the underside of the receiver tank cover.
7. Replace the cover plate, washers and capscrews. Torque to 89 ft-lbs. (121 Nm).
8. Clean the return line strainer before restarting the compressor.

FLUID RETURN/SIGHT GLASS MAINTENANCE

Refer to Figure 6-4. The fluid return/sight glass subassembly is located on the side of the separator tank. Fluid return/sight glass maintenance should be performed along with that of the fluid filter. Fluid return/sight glass usually results from 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 the new assembly.
4. Inspect and clean the orifice inside the sight glass blocks. Remove the orifice with an allen wrench.
5. Coat/lubricate the O-rings with silicone grease.
6. Re-attach the connectors to the sight glass/orifice blocks.

PRESSURE REGULATOR ADJUSTMENT

Refer to Figure 6-5. Start the compressor and adjust the service valve to maintain service air pressure at approximately 1 psi over its rated pressure. Turn the inlet valve regulator adjusting screw until air just begins to escape from the control air orifice, located at the bottom of the

regulator. Lock the adjusting screw in place with the locknut. The regulator is now properly set.

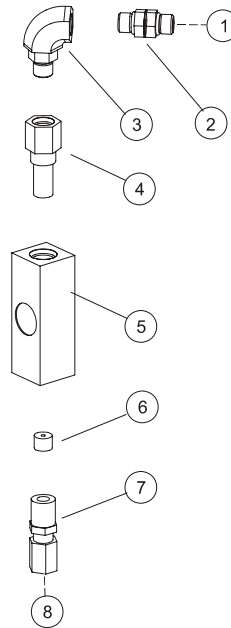


Figure 6-4: Fluid Return / Sight Glass

1. To Sump Tank	3. 90° Elbow	5. Sight Glass / Orifice Block	7. Female Tube Connector
2. Male Tube Connector	4. Filter Assembly (I)	6. Brass Plug Orifice	8. To Unit
(I) Fluid Return Filter Replacement Kit P/N 02250117-782			

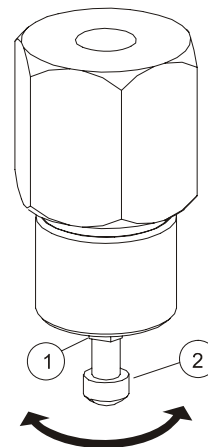


Figure 6-5: Pressure Regulator Adjustment

1. Locking Nut	2. Adjustment Screw
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WATER CONDENSATE DRAIN MAINTENANCE

If the compressor is fitted with the standard solenoid condensate drain valve, it is necessary to periodically clean the strainer. Remove the knurled 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 (02250171-245).

CONTROL LINE STRAINER

The regulator and solenoid valve(s), which control the compressor, are protected by a strainer. Clean the strainer every 12 months. 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 (241772).

SHAFT COUPLING MAINTENANCE

The compressor unit and motor are rigidly connected through the mounting adapter housing. This arrangement makes coupling alignment unnecessary. The coupling is a jaw type in shear. If the elastomeric (rubber) element requires replacement due to wear or damage, order a replacement element and perform 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 secure by tightening the two screws to 45 in-lbs (5 Nm).
6. Reinstall the protective grill.

HOSE MAINTENANCE

Lubrication and blowdown hose replacement is recommended after three (3) years or 16,000 hours of operation. Order hose kit 02250171-102 for air-cooled, or 02250171-103 for water-cooled machines.

6.8 TROUBLESHOOTING – INTRODUCTION

The information in the Troubleshooting Guide describe symptoms and usual causes for the listed discrepancies. However, **DO NOT** assume that these are the only malfunctions or fault conditions that may occur.

NOTE

For additional troubleshooting guidelines, consult the WS Controller manual.

TABLE 6-1: TROUBLE SHOOTING 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 - if fault persists, check motor contacts for proper function.
	Low incoming line voltage	Check voltage - in the case of low voltage, check power source, or contact local power company.
Compressor shuts down under service load conditions	Loss of control voltage	Check 24V DC power supply for correct output - replace power supply if necessary.
	Low incoming line voltage	Check voltage - in the case of low voltage, check power source, or contact local power company.
	High operating pressure	Reset - if fault persists, check line pressure and ensure that it does not exceed the compressor's maximum operating pressure (specified on nameplate - See Figure 7-1).

TABLE 6-1: TROUBLE SHOOTING GUIDE (CONTINUED)

SYMPTOM	PROBABLE CAUSE	REMEDY
Compressor shuts down under service load conditions (continued)	WS Controller indicates separator requires maintenance	Replace separator.
	Compressor pressure setting incorrect	Reprogram using WSPC equipped laptop.
	Defective Regulator Valve	Regulator may be defective - repair it if the inlet valve does not close when the pressure switch contacts open.
	Defective blowdown valve	Blowdown valve should exhaust receiver tank pressure to 14 psig (1.0 bar) at maximum operating pressure - repair the regulator if defective.
	Insufficient cooling water flow	Check water lines and valves (water-cooled models only).
	Cooler obstructed/plugged	Clean tubes - if obstruction persists, install a water conditioner (water-cooled only).
	Cooling air flow restricted	Clean cooler and check for proper ventilation.
	Ambient temperature too high	Check ventilation and increase if too low.
	Low fluid level	Add fluid.
	Clogged filter	Change the fluid filter element.
	Thermal valve malfunction	Replace element.
	Water flow regulating valve malfunction	Change valve (water-cooled only).
Compressor cannot produce full discharge pressure	Air demand too high	Check service lines for leaks or open valves.
	Dirty air filter	Check the filter indicator and inspect, and/or change the element if required.
	Inlet valve bleed orifice obstructed/plugged	Check the control line bleed orifice inside the inlet valve for blockage or obstructions.
	Pressure regulator out of adjustment	Adjust the regulator (see adjustment instructions in the Maintenance Section of this manual).
	Defective pressure regulator	Replace regulator.
	Defective unload solenoid valve	Check the valve - if it does not operate when energized, replace the valve coil or the entire valve if defective.
Line pressure rises above unload pressure set-point	Control system leak causing loss of pressure signals	Check for leaks.
	Inlet valve stuck open	Remove the intake hose and check the inlet valve for proper operation.
	Defective unload solenoid valve	Check the valve for proper operation - open when energized - replace if necessary
	Plugged/obstructed control line strainer	Clean or replace strainer

TABLE 6-1: TROUBLE SHOOTING GUIDE (CONTINUED)		
SYMPTOM	PROBABLE CAUSE	REMEDY
Line pressure rises above unload pressure set-point (continued)	Defective blowdown valve	Check the receiver tank to ensure that it is exhausting air to the atmosphere when the solenoid opens - repair or replace if necessary.
High compressor fluid consumption	Clogged return line or orifice	Clean or replace the strainer.
	Separator element damaged or malfunctioning	Change separator.
	Lubrication system leak	Check all pipes, connections, and components.
	Excess fluid foaming	Drain fluid 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 frequently	Pressure relief valve defective	Replace.
	Plugged/obstructed separator	Check separator differential.
Liquid water in compressed air lines	Plugged/obstructed strainer in the moisture drain line	Clean the strainer located in the line off of the bottom of the water separator.
	Defective solenoid drain valve	Ensure that the valve opens when it receives a signal from the WS Controller.
	Improper drain timer settings	Check WS Controller drain interval and drain time settings, and adjust to match the conditions - settings will vary with the humidity.
	Water vapor condensation can be caused by the cooling/compression operation if the compressor and ambient conditions (temperature and humidity)	Install a compressed air dryer that can supply the proper amount of moisture reduction for the compressor's output - if required, install filters to remove particulates, liquid oil aerosols, or oil vapors - check and maintain all drain traps.

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Section 7

MAINTENANCE PARTS LISTING

7.1 PROCEDURE FOR ORDERING PARTS

Parts should be ordered from the nearest Sullair Representative or the Representative from whom the compressor was purchased. If for any reason parts cannot be obtained in this manner, contact the factory directly at the address, phone numbers or fax numbers below.

Refer to Figure 7-1. When ordering parts always indicate the Serial Number of the compressor. This can be obtained from the Bill of Lading for the compressor or from the Serial Number Plate located on the compressor.

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

SULLAIR CORPORATION 3700 East Michigan Boulevard Michigan City, Indiana 46360 U.S.A. www.sullair.com Telephone: 1-800-SULLAIR (U.S.A. Only) or 1-219-879-5451 Fax: (219) 874-1273	
PARTS DEPARTMENT Telephone: 1-888-SULLAIR Fax: (219) 874-1835 www.sullair.com	SERVICE DEPARTMENT Telephone: 1-888-SULLAIR [785-5247] (U.S.A. & Canada Only) Fax: (219) 874-1205 www.sullair.com

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Shenzhen, Guangdong PRV.
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Telephone: 755-6851686
Fax: 755-6853473
www.sullair-asia.com

CHAMPION COMPRESSORS, LTD.

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Telephone: 1-800-810-015 (for Australia
-wide Branch Network Only)
Telephone: 61-3-9796-4000
Fax: 61-3-9703-8053
www.championcompressors.com.au

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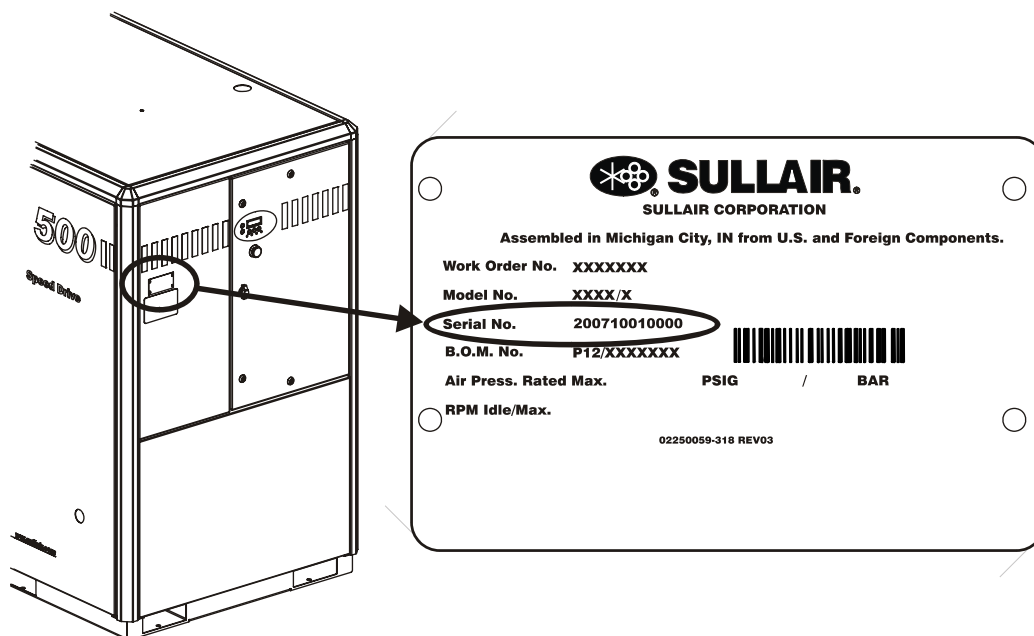


Figure 7-1 Serial Plate Serial Number Location

7.1 MAINTENANCE PARTS LIST

Key No.	Description	Kit Number to Order	Note	Qty
ELEMENTS				
1	element, compressor fluid filter 02250164-928	02250168-084		1
2	element, air filter assembly 02250164-930	02250168-053		1
3	element, replacement for separator 02250160-774	02250169-993		1
KITS				
4	kit, vacuator valve for air filter assembly 02250164-930	02250125-376		1
5	kit, repair for minimum pressure / check valve 02250109-817 (100hp)	250018-456		1
6	kit, repair for minimum pressure / check valve 02250097-598 (60 & 75hp)	02250110-727		1
7	kit, repair for thermal valve (195°F) 02250092-081	02250144-327		1
8	kit, repair for thermal valve (185°F) 02250078-204	02250144-326		1
9	kit, repair for pressure regulator 250017-280	250019-453		1
10	kit, repair for blowdown valve 02250100-042	02250100-042		1
11	kit, repair for control solenoid valve 02250155-714	02250157-500		1
12	kit, coil replacement for control solenoid valve 02250155-714	02250157-502		1

CONTINUED

7.2 MAINTENANCE PARTS LIST (CONTINUED)

Key No.	Description	Kit Number to Order	Note	Qty
KITS (Continued)				
13	kit, repair for condensate drain solenoid valve 02250170-783	02250171-245		1
14	kit, coil replacement for condensate drain solenoid valve 02250170-783	02250171-243		1
15	kit, seal inlet valve 0250166-128	02250166-220		1
16	kit, rebuild inlet valve 0250166-128	02250166-230		1
17	kit, repair for v-type strainer 241771	241772		1
18	kit, repair for shaft seal	02250050-364		1
19	kit, tool for shaft seal installation	602542-001		1
20	filter, scavenge line 02250117-782	02250117-782		2
21	kit, seal replacement for separator trap 02250166-735	02250166-758		1
22	kit, seal replacement for separator trap 02250166-736	02250166-758		1
23	kit, strainer assembly for condensate drain 02250170-783	02250174-245		1
24	hoses, air-cooled	02250171-102		1
25	hoses, water-cooled	02250171-103		1
LUBRICATION				
26	fluid, SRF 1/4000 (5 gal/19 liter)	250019-662	(I)	
27	lubricant, Sullube (Std.) (5 gal/19 liter)	250022-669	(I)	
28	lubricant, 24 KT (5 gal/19 liter)	02250051-153	(I)	
29	lubricant, Food Grade (5 gal/19 liter)	250029-008	(I)	

(I) For proper amount of fluid fill, please consult Lubrication Guide in Section 3, Specifications.

CAUTION!

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

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