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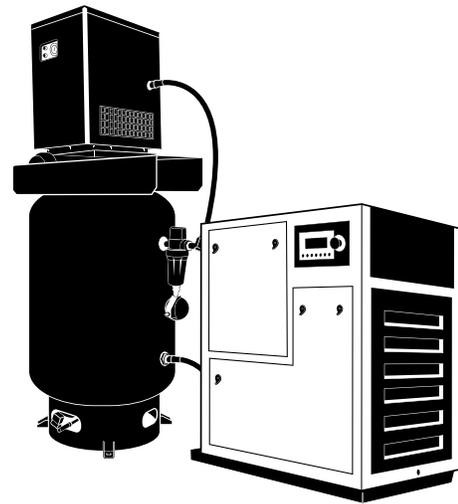
## Operating Instructions

# ROTARY SCREW COMPRESSORS

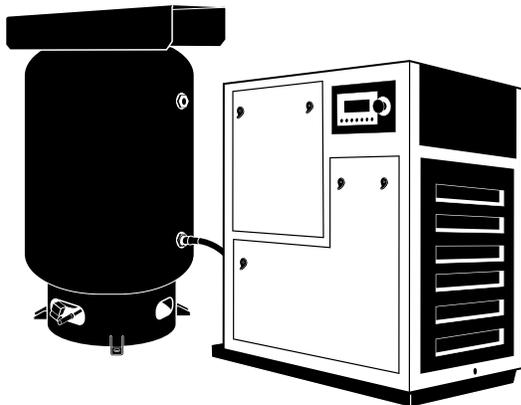
*EMAX designs and manufactures products for safe operation. However, operators and maintenance persons are responsible for maintaining safety. All safety precautions are included to provide a guideline for minimizing the possibility of accidents and property damage while equipment is in operation. **Keep these instructions for reference.***



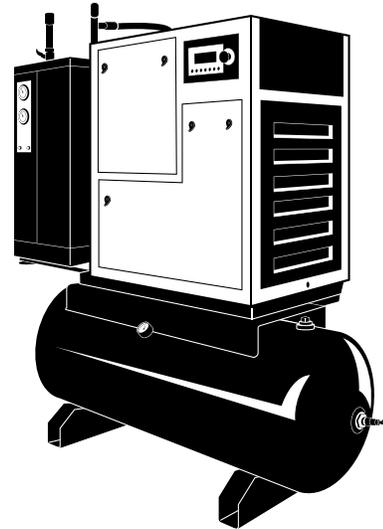
**Base mount  
Rotary Screw Compressor**



Fully packaged unit with air dryer (vertical tank)



Base mount unit with vertical auxillary air storage tank



Fully packaged unit with air dryer (horizontal tank)



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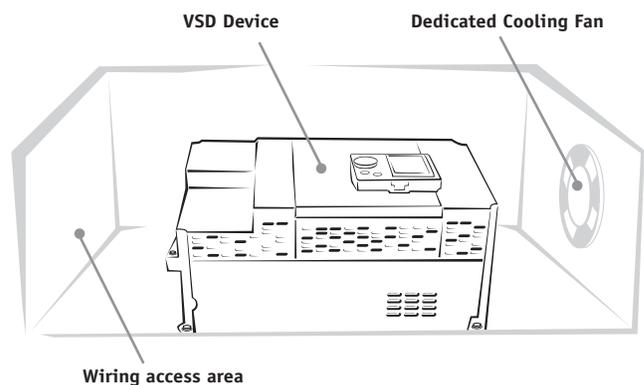
## Variable Speed Drive

The variable speed drive is an auxillary feature available on all EMAX compressors. A variable speed drive or VSD will save energy consumption and wear on the electric motor. The VSD regulates amp draw during start-up and motor speed during operation according to air demand.

All EMAX compressors are equipped with a VSD compliant motor, ventilated electrical box and adequate space in compressor cabinet for easy installation. The electronic controller (PLC) for the compressor unit, has a 4-20 milliamp control signal built-in to control VSD speed reference. The PLC can provide start/stop command and display any fault codes for the VSD device.

**NOTICE** To convert to Variable speed drive, contact EMAX customer service for more information. 1-866-294-4153.

**Be sure to install VSD in a clean, dust-free environment.**



**Each compressor cabinet has built-in VSD compartment**

EMAX Rotary Screw Systems: 5 Hp - 20 Hp (VSD Compliant)

Model No.	ERS0070001	ERS0100001	ERS0070003	ERS0100003	ERS0150003	ERS0200003
Description	Single Phase	Single Phase	Three Phase Dual Voltage	Three Phase Dual Voltage	Three Phase Dual Voltage	Three Phase Dual Voltage
Motor	7.5HP	10HP	7.5HP	10HP	15HP	20HP
Amp Draw	32	40	230V: 18 460V: 9	230V: 24 460V: 12	230V: 36 460V: 18	230V: 48 460V: 24
RPM	1750	1750	1750	1750	1750	1750
Voltage	208/230	208/230	208/230/460/575	208/230/460/575	208/230/460/575	208/230/460/575
SCFM @ 100 PSI	29	45	29	45	62	85
Start Type	Magnetic Starter	Magnetic Starter	Y-Delta & VSD	Y-Delta & VSD	Y-Delta & VSD	Y-Delta & VSD
Drive Type	Belt	Belt	Belt	Belt	Belt	Belt
Air End Model	B40	B40	B40	B40	B60	B60
Noise DB(a)	62	64	62	64	67	69
Outlet Size	NPT 3/4"	NPT 3/4"	NPT 3/4"	NPT 3/4"	NPT 1"	NPT 1"
Oil Capacity	1 gal.	1 gal.	1 gal.	1 gal.	2.5 gal.	2.5 gal.
Dimensions <sup>L*W*H</sup> (inches)	33 x 24 x 42	33 x 24 x 42	33 x 24 x 43	34 x 24 x 43	36 x 31 x 49	36 x 31 x 49
Weight (lbs.)	880	930	880	930	1210	1260
Shipping Weight	928	986	928	986	1270	1330

EMAX Rotary Screw Systems: 25 Hp - 60 Hp (VSD Compliant)

Model	ERS0250003	ERS0300003	ERS0400003	ERS0500003	ERS0600003
Description	Three Phase Dual Voltage				
Motor	25 HP	30 HP	40 HP	50 HP	60 HP
Amp Draw	230V: 60 460V: 30	230V: 72 460V: 36	230V: 96 460V: 48	230V: 120 460V: 60	230V: 144 460V: 72
RPM	1750	1750	1750	1750	1750
Voltage	208/230/460/575	208/230/460/575	208/230/460/575	208/230/460/575	208/230/460/575
SCFM @ 100 PSI	108	129	188	235	261
Start Type	Y-Delta & VSD				
Drive Type	Belt	Belt	Belt	Belt	Belt
Air End Model	B101	B101	CA116D	B170	B170
Noise DB(a)	73	75	79	79	81
Outlet Size	NPT 1"	NPT 1"	NPT 1-1/4"	NPT 1-1/4"	NPT 1-1/4"
Oil Capacity	2.5 gal.	2.5 gal.	3 gal.	4 gal.	4 gal.
Dimensions <sup>L*W*H</sup> (inches)	43 x 38 x 57	43 x 38 x 57	48 x 44 x 61	53 x 50 x 65	53 x 50 x 65
Weight (lbs.)	1440	1540	1910	2420	2860
Shipping Weight	1500	1600	1970	2490	2928

## Safety

This manual contains very important information to know and understand. This is provided for SAFETY and to PREVENT EQUIPMENT PROBLEMS. To help understand this information, observe the following:

**▲ DANGER** Danger indicates an imminently hazardous situation which, if not avoided, *will* result in death or serious injury.

**▲ WARNING** Warning indicates a potentially hazardous situation which, if not avoided, *could* result in death or serious injury.

**▲ CAUTION** Caution indicates a potentially hazardous situation which, if not avoided, *may* result in minor or moderate injury.

**NOTICE** Notice indicates important information, that if not followed, may cause damage to equipment.



Read all manuals included with this product carefully. Be thoroughly familiar with the controls and the proper use of the equipment.

## Basic Guidelines

### CALIFORNIA PROPOSITION 65

**▲ WARNING** *This product or its power cord may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.*

1. Allow only trained, authorized persons who have read and understood these operating instructions to use this compressor. Failure to follow the instructions, procedures and safety precautions in this manual can result in accidents and injuries.
2. NEVER start or operate the compressor under unsafe conditions. Tag the compressor, disconnect and lock out all power to it to prevent accidental start-up until the condition is corrected.
3. Install, use and operate the compressor only in full compliance with all pertinent OSHA regulations and all applicable Federal, State & Local Codes, standards and regulations.
4. NEVER modify the compressor and/or controls in any way.
5. Keep a first aid kit in a convenient place. Seek medical assistance promptly in case of injury. Avoid infection by caring for any small cuts and burns promptly.

## Breathable Air

1. NEVER use air from this compressor for breathable air except in full compliance with OSHA Standards 29 CFR 1910 and any other 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 on safety equipment.*

2. DO NOT use air line anti-icer systems in air lines supplying respirators or other equipment used to produce breathable air. DO NOT discharge air from these systems in unventilated or other confined areas.

## Pressurized Components

This equipment is supplied with a ASME designed pressure vessel protected by an ASME rated relief valve. Pull the ring *before each use* to make sure the valve is functional. Refer to figure 10. DO NOT attempt to open valve while the machine is under pressure.

## Personal Protective Equipment

Be sure all operators and others around the compressor and its controls comply with all applicable OSHA, Federal, State and Local regulations, codes and standards relating to personal protective equipment. This includes respiratory protective equipment, protection for the extremities, protective clothing, protective shields and barriers, electrical protective equipment, and personal hearing protective equipment.

## Inspection

Inspect compressor prior to any use. Check for external damage that might have occurred during transit.

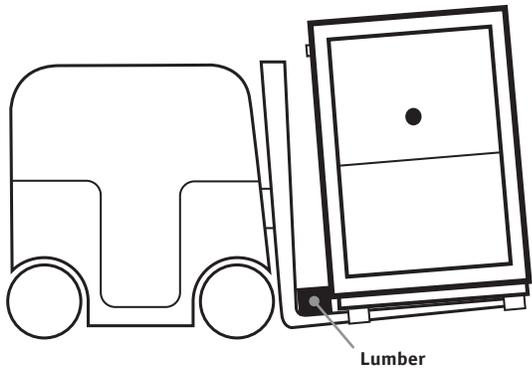
**▲ CAUTION** *Make sure pallet-mounted compressors are firmly secured to the pallet before moving. NEVER attempt to move a compressor that is not secure as serious injury or property damage could occur.*

A forklift may be necessary for unloading the EMAX compressor. Use all forklift safety measures and require a certified forklift operator. Refer to figure 1 for safe unloading procedure.

## Forklift Safety

1. Make sure lift operator stays aware while moving compressor.
2. Be sure load is secure and well balanced before moving the compressor.

3. Make sure forks are fully engaged and tipped back before lifting or moving compressor.
4. Keep load as low as possible and observe safe operating practices.



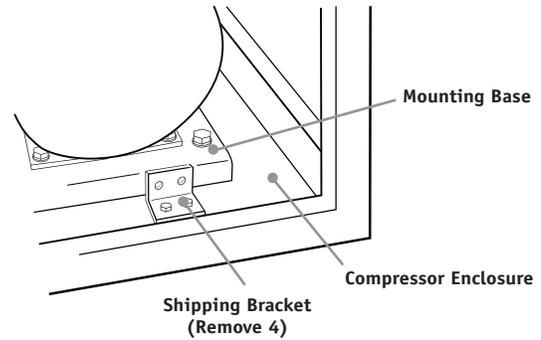
**Figure 1: Use Lumber to Protect Compressor**

### Lifting Safety

1. Carefully inspect all lifting equipment and make sure it is in good condition. Rated capacity should exceed compressor weight. Make sure lifting hook has a functional safety latch or equivalent and is properly attached to lifting feature.
2. Make sure lifting points are in good condition and tighten any loose nuts or bolts before lifting.
3. Use provided lifting feature or appropriate sling. A sling must be used when moving compressor with a helicopter or other air-borne equipment. Be sure to follow OSHA standards 29 CFR 1910 Subpart N.
4. Use guide ropes or equivalent to prevent twisting or swinging of the compressor while it is in the air and NEVER attempt to lift in high winds. Keep compressor as low to the ground as possible.
5. Keep persons away and make sure no one is under the compressor while it is lifted.
6. Only use lifting features provided for entire compressor package. NEVER use bolts or other hooks on individual components to move the compressor.
7. Make sure to put compressor on a level surface that can support the weight of the compressor and loading equipment.

**▲ WARNING** *Do not operate unit if damaged during shipping, handling or use. Damage may result in bursting and cause injury or property damage.*

**NOTICE** *Remove shipping brackets from each corner of mounting base before operating compressor. Refer to figure 2.*



**Figure 2: Remove Shipping Brackets**

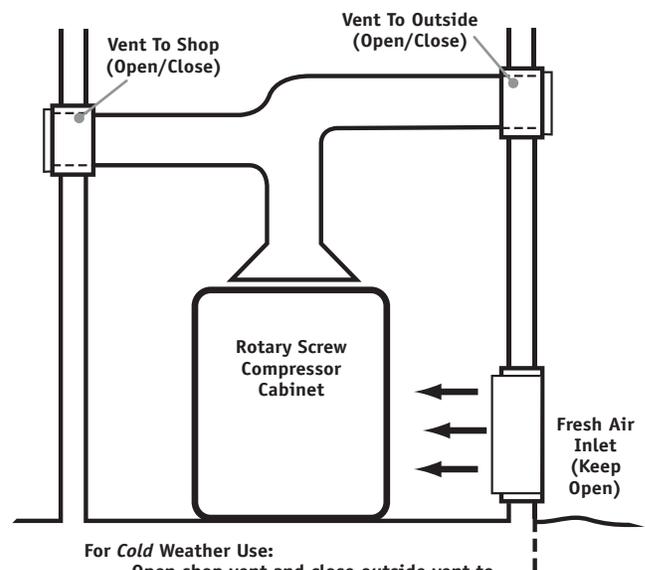
## Installation

### Area

Exhaust air from this unit can be used to supplement environment heat. Install unit in separate room then create duct system as shown in figure 3.

1. Install compressor in a clean, well ventilated and well lit area. Make sure air inlet is away from exhaust fumes or other toxic, noxious or corrosive fumes or substances. Installation area must maintain low relative humidity and a temperature range between 35° - 110° F. **This unit must be kept under roof and away from rain, snow, etc.**

**NOTICE** *In environments where fine dust is common, such as granite or concrete plants, it is imperative the installation of this compressor is in a separate area with dedicated ventilation. Failure to provide dust free operating area will void the warranty.*



**For Cold Weather Use:**  
Open shop vent and close outside vent to use exhaust heat from compressor.

**For Warm Weather Operation:**  
Close shop vent and open outside vent to divert exhaust heat outdoors.

**Figure 3: Utilize Exhaust Heat**

2. Allow at least 24 inches of clear space around the sides and back and at least 3 feet in front of the compressor.

**NOTICE** *This compressor unit is equipped with internal rubber vibration isolators. To avoid internal pump damage, DO NOT use an additional rubber mounting surface when installing compressor.*

3. Make sure compressor base is on a hard, flat surface **and anchored securely**.
4. If installation is above the first story of a building, use appropriate vibration insulation.

**NOTICE** *Tank Sizing Guideline: Tank capacity must be at least 1.2 gallons for every CFM of air produced by compressor. This will minimize wear on internal pump parts.*

**Piping**

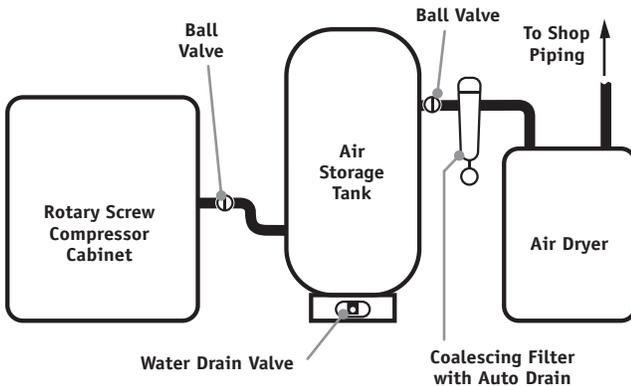
**Safety Steps**

1. Install appropriate flow-limiting valves as necessary according to pipe size(s) used and run lengths. This will reduce pressure in case of hose failure, per OSHA Standard 29 CFR 1926.302(b)(7).
2. Flow-limiting valves are listed by pipe size and rated CFM. Select appropriate valves accordingly, in accordance with the manufacturer’s recommendations.

**Installing**

1. Install piping as shown in Figure 4. Refer to figure 5 for recommended closed loop installation.
2. Make sure any tube, pipe or hose connected to the unit can withstand operating temperatures and retain pressure.

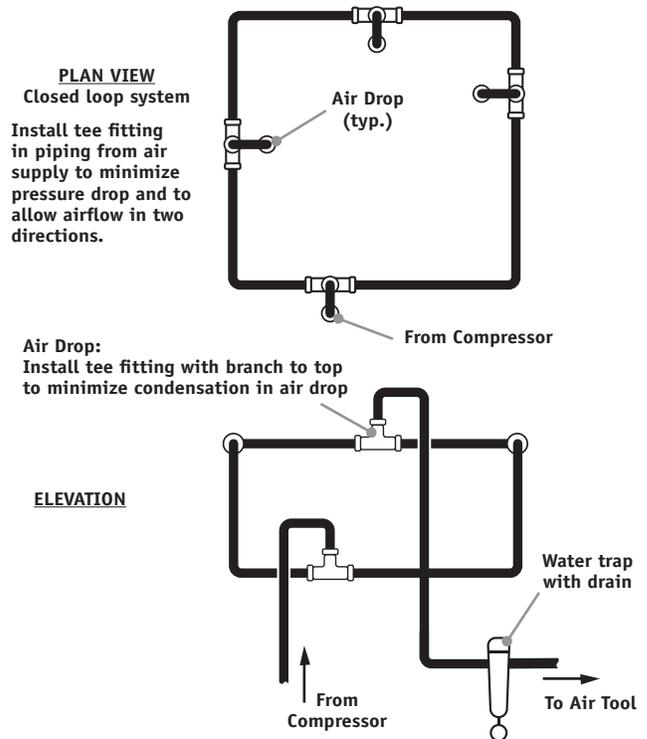
**⚠ WARNING** *Never use plastic (PVC) pipe for compressed air. Serious injury or death could result.*



**Figure 4: Basic Piping Diagram**

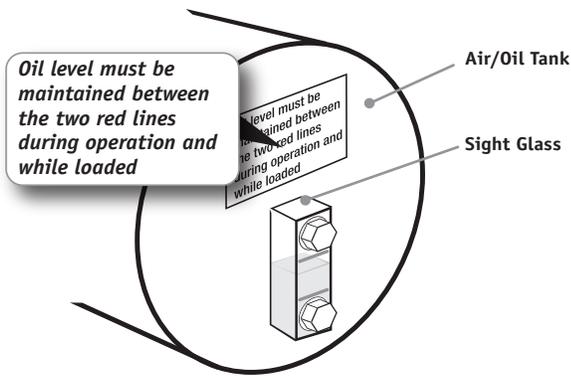
**Minimum Pipe Size For Compressed Air Lines**  
(Pipe size shown in inches)

SCFM	Length Of Piping System			
	25 ft.	50 ft.	100 ft.	250 ft.
20	3/4	3/4	3/4	1
40	3/4	1	1	1
60	3/4	1	1	1
100	1	1	1	1-1/4
125	1-1/4	1-1/4	1-1/2	1-1/2
150	1-1/2	2	2	2
200	2	2	2	2



**Figure 5: Closed Loop Installation**

3. Install appropriate ASME code safety valves and make sure piping system is equipped with adequate condensate drains.
4. Never use reducers in discharge piping. Keep all piping and fittings the same size in the piping system.
5. For permanent installations of compressed air systems, determine total length of system and select correct pipe size. Make sure underground lines are buried below frost line and avoid areas where condensation could build up and freeze.
6. Test entire piping system *before* underground lines are buried. Be sure to find and repair all leaks before using compressor.



**Figure 6: Sight Glass for Lubricating Oil**

### Oil Check

This unit is shipped with oil in it and should be ready to operate. Be sure to check for proper oil level before operating the compressor. Compressor must be off at least 45 min. - 1 hr. before checking to ensure accurate reading. Refer to figure 6.

#### NOTICE

*Use only EMAX oil, model no. AROL8000G1. For food manufacturing applications, use model no. AROLFOODG1. Use of any other product will cause product damage and void the warranty. Refer to warranty statement for oil requirements.*

### Electrical Installation

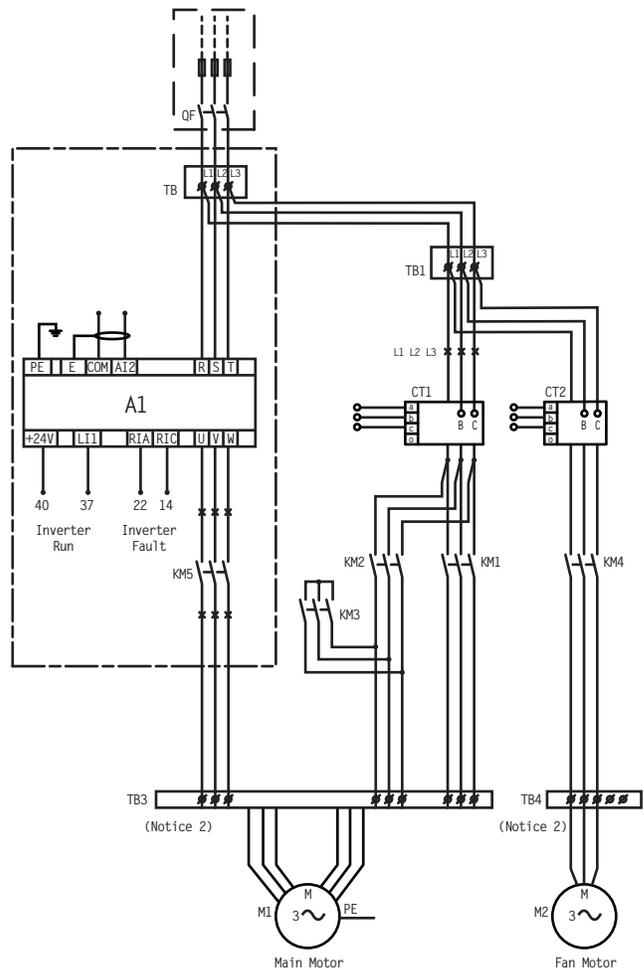
#### ⚠ DANGER



*Be sure only trained and authorized personnel install and maintain this compressor in accordance with all applicable federal, state and local codes, standards and regulations. Follow*

*all NEC (National Electric Code) standards especially those concerning equipment grounding conductors.*

1. Follow all NEC and local codes for electrical wiring. Allow only authorized EMAX service person or certified electrician to install electrical components.
2. Put unit on dedicated circuit and make sure no other electrical equipment is wired into it. Failure to wire unit on independent circuit can cause circuit overload and/or imbalance in motor phasing. Install proper No Fuse Breaker (NFB) according to kW output of compressor.
3. Ensure incoming service has adequate ampere rating.
4. Ensure supply line has the same electrical characteristics (voltage, cycles and phase) as the machine.



**Figure 7: Wiring Diagram**

5. Refer to amp load information on motor tag and use correctly sized wiring. **Be sure to consider distance between power supply and machine.**
6. Install surge protection device between power supply and compressor electrical cabinet.
7. Make sure to install properly sized breakers and fuses.
8. The unit must be properly grounded. **DO NOT** connect ground wire to air or cooling lines. Connect ground wire to grounding lug in the compressor electrical cabinet.

#### ⚠ DANGER



*Improperly grounded electrical components are shock hazards. Make sure all the components are properly grounded to prevent death or serious injury.*

9. Make sure proper overload protection for the motor is installed.

### Motor Rotation

After electrical installation is complete, check the direction of the motor rotation.

1. Lightly push START and STOP buttons on the instrument panel. View unit while facing the drive pulleys (from the back). Pulleys should turn counter clockwise.
2. If motor shaft is not turning counter clockwise, disconnect power to terminal block then exchange any two of the three power leads. Re-check rotation.

### System Description

The EMAX compressor is highly efficient and provides reliable performance with low wear parts, low vibration and quiet operation. An electric motor, which is controlled by a Programmable Logisitical Controller (PLC), runs the compressor and is actuated with a belt drive system. The belt drive system utilizes pulleys to connect the motor to the main rotor shaft.

### Air Process

Air enters the system through the suction valve which has a suction filter to remove dust. The air is mixed with the lubricating oil and flows into the air/oil separator tank. It passes through an air/oil separator filter then through a minimum pressure check valve. Air then passes through an air cooled after cooler then into storage tank.

### Lubrication Process

Pressure in the oil / air separator presses lubricating oil into the oil cooler. The oil is cooled and filtered then divided into two parts. One part is injected into the compression chamber from the lower end of the rotary compressor body to cool the compressed air. The other part passes through the two ends of the compressor body and is used to lubricate internal roller bearings of rotary compressor pump and gear drive. The two parts meet at the bottom of the compression chamber and are drained out with the compressed air.

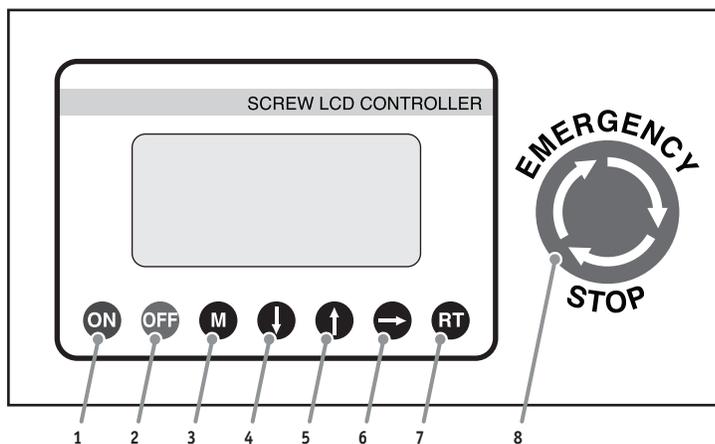
### System Components

#### PLC (Programmable Logisitical Controller)

The PLC is the compressor controller and has a display screen for system information. The electric circuitry of the PLC can be divided into two systems. One is for the starting panel to configure Y Delta starting. The other is for internal computer controls and is explained in more detail in the PLC manual. If there is *any* failure, contact EMAX service department. Refer to figure 8 for explanation of buttons.

#### Maintenance Notifications

There are five automatic maintenance notifications built into the EMAX compressor system designed to signify when maintenance is due for certain components. An alarm will sound and a message will be displayed on the control panel. Refer to the following chart for the components that have automatic maintenance notifications and their factory set lifetimes.



- 1 **ON Button:** Press this button to start compressor.
- 2 **OFF Button:** Press this button to stop compressor.
- 3 **M (Save Data):** Press this button to confirm and save input after changes have been made.
- 4 **Down Scroll Menu:** Press this button to scroll down through menus while changing settings or making menu selections.
- 5 **Up Scroll Menu:** Press this button to scroll up through menus while changing settings or making menu selections.
- 6 **Cursor/Confirm Button:** This button can be used as a cursor while changing settings and to confirm a menu selection.
- 7 **RT Return/Reset Button:** Press this button to return to a previous menu OR press and hold for approximately 5 seconds to reset any fault or error codes.
- 8 **Emergency Stop:** Use only for emergency to stop compressor immediately. Use normal stop at all other times.

**Factory Set Password: 0518**

**Figure 8: PLC Control Buttons**

Maintenance Notifications		
Component	(PLC Name)	Lifetime
Oil Filter	(Oil)	0600 hrs.*
Air/Oil Separator Filter	(O-G)	4000 hrs.
Air Filter	(Gas)	0600 hrs.
Lubricating Oil	(Lube)	0600 hrs.*
Motor Bearing Grease	(Grease)	2000 hrs.

\* Values shown above are factory set for max. lifetime parameters. After initial oil change, max. lifetime parameters can be reset. Refer to PLC manual for more details.

Following replacement times is important for safe operation. Remember to clear lifetime and reset to 0 hours after replacements are made. The menu selection needed for this setting is found by scrolling to: "Customer Parameter" then, "Clear Lifetime" Refer to PLC manual for more details.

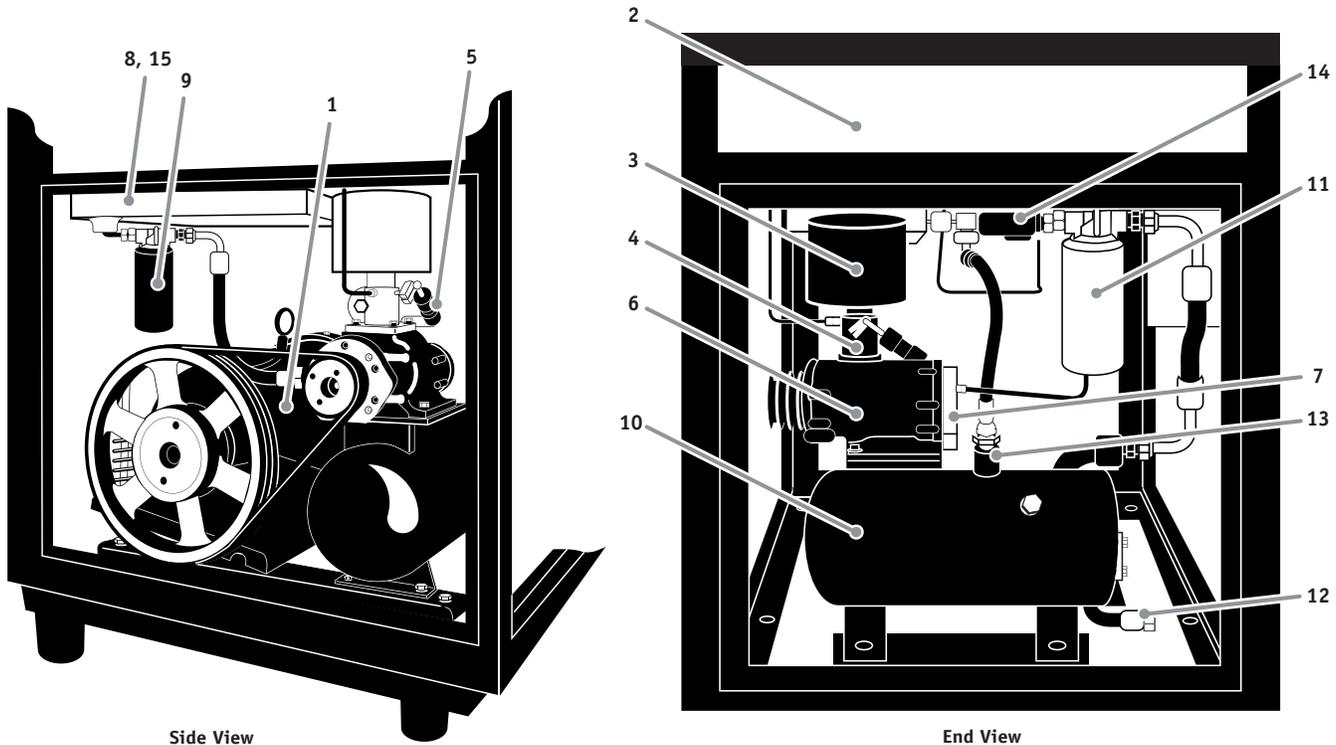


Figure 9: Mechanical System Components

## Mechanical Components

### 1. Drive Motor

Drive motor is 4 pole with low RPM (1750). This motor is also capable of variable speed drive as a standard feature. The motor is 12 lead, Y delta soft starting for low amp draw. Overload protection is installed for safety. Normal electric current can fluctuate slightly for various reasons but if the current spikes, the overload protection will cause the motor(s) to stop. If this happens, the motors must be reset manually.

Some reasons for overload protection:

- a) Operator error: Improper regulation of air exhaust pressure or other parts of the system.
- b) Mechanical failures:
  - Internal motor failure
  - Improper motor phasing

- System setting error
- Blocked air/oil separator filter.

If motor overload protection is caused by any other reason, contact EMAX immediately.

### 2. Variable Speed Drive (Energy saving device) Ready Cabinet

This cabinet has allocated space and cooling fan to house variable speed drive component. To convert to Variable speed drive, contact EMAX customer service for more information. 1-866-294-4153.

### 3. Air Suction Filter (Air Intake)

A dry type paper filter with filtration of 10 ppm. Replace after first 600 hours of operation; then every 500-600 hours, depending on environment. Refer to the computer controls of the compressor to monitor operating time and remember to reset counter to 0 when filter is replaced. There is an automatic alarm that can be set to remind operator of service times.

#### 4. Suction Valve

A butterfly valve that opens and closes during operation. When PLC calls for air, the suction valve opens through a solenoid valve to allow compressor to operate. When air pressure reaches preset max level, the PLC closes the suction valve allowing compressor to pull vacuum and not compress air.

#### 5. Regulation Modulation Control

This device is included on all 25-200 hp models as an energy saving feature for applications with duty cycles of 50% or more. The device keeps amp load lower by maintaining motor operation so consistent air pressure is delivered under heavy work loads. Units with lower duty cycles should use online/offline (min./max. pressure) control. Both control methods are available so appropriate feature can be selected for different air demands. *It is important to monitor air demand since it takes 15% more power to operate compressor for every 10 PSI of pressure increase.*

#### 6. Air End

The air end has two rotor shafts mounted on bearings parallel to each other in the machine casing. The casing has an air inlet at the top and an air outlet at the bottom. The shafts have precisely machined, helical shaped screw threads which work together to compress air. Air compression occurs through a four course process:

##### 1. Absorption

The position and shape of the rotor shafts allow maximum air intake from the inlet port. As the shafts turn, the air is forced to move between the grooves of the screw threads.

##### 2. Sealing and Conveyance

The air is sealed within the grooves of the screw threads and conveyed, or moved, through the machine casing toward the air outlet.

##### 3. Compression and Lubrication

The rotor shaft screw threads are designed with decreasing space between the grooves. As the air is moved through them, it becomes pressurized and actuates the lubrication process. Lubricating oil is pressurized and injected into the compression chamber during operation for the following reasons:

- a. To form protective film on rotors to avoid contact and reduce friction.
- b. To seal in the compressed air to improve compressor efficiency.
- c. To absorb heat to maintain optimal power.
- d. To reduce operating noise.

#### 4. Exhaust

When the air has reached the end of the rotor shafts, it is fully pressurized and exhausted into the air tank. As the rotors turn, the compression process continues.

#### 7. Exhaust Probe

The probe is temperature sensitive and located at the air outlet of the rotary screw casing. When exhaust temperature exceeds 210°F (98.8°C), the system will automatically power OFF. The temperature of the air exhaust can be read on a display panel located on the PLC. Common reasons for excessive exhaust temperatures:

- low oil level
- inoperable exhaust fan
- improper ventilation causing ambient air temperature to be too hot
- clogged oil filter

It is important to keep the circulating fan and cooler fins clean to prevent the compressor from shutting down. Low air pressure can be used to blow them off or if needed, use water-based solvent to clean.

#### 8. Oil Cooler

The oil cooler function is to cool the hot oil from compressor pump and return oil to the air oil separator tank. It is important to keep the cooler fins clean to prevent the compressor from high temperature shut down. Low air pressure can be used to blow them off or if needed, use water-based solvent to clean.

#### 9. Oil Filter

The oil filter is a paper filter with a filtration of 10 PPM. It removes impurities and protects the bearings and rotors. The filter core should be replaced every 2000 hours or annually, whichever comes first. Replace oil and filter after first 600 hours of operation. Refer to the computer controls of the compressor to monitor operating time and remember to reset to 0 when filter is replaced. There is an automatic alarm that can be set to remind operator of service times.

#### 10. Air/Oil Separator Tank

The air/oil separator tank is a steel pressure vessel used to store lubricating oil and to separate the compressed air and the lubricating oil. An oil sight gauge is installed on one end of the air/oil separator tank. Make sure oil level is at high oil level in-

indicator when unit is shut down. During operation, the oil level should stay between the high oil level line and the lowest oil level line. A drain valve is installed under the air/oil separator tank. Open drain valve after machine has been shut down for an hour slightly to drain condensed water in the tank. This drain valve can also be used to gather oil for oil analysis. *Refer to warranty statement for analysis requirements.*

Replace lubricating oil after first 600 hours of operation, then every 4000 hours or more often if needed. Refer to the computer controls of the compressor to monitor operating time and remember to reset to 0 when filter is replaced. There is an automatic alarm that can be set to remind operator of service times.

**NOTICE** *Use only EMAX oil, model no. AROL800G1. For food manufacturing applications, use model no. AROLFOODG1. Use of any other product will cause product damage and void the warranty. Refer to warranty statement for oil requirements.*

#### 11. Air/Oil Separator Filter

During the process of air compression from pump, air and oil are mixed together to lubricate, seal and cool compressor rotors. This air and oil is transferred to air/oil separator tank and then the air/oil separator filter removes oil mist from the compressed air. The filter core is made of multiple-layer fine glass fibers. The filter reduces the oil particle size and can lower content to less than 3 PPM. During normal operation, the air/oil separator filter can be used for about 4000 hours or annually, whichever comes first. Refer to the computer controls of the compressor to monitor operating time and remember to reset to 0 when filter is replaced. There is an automatic alarm that can be set to remind operator of service times.

#### 12. Safety Valve

The ASME certified safety valve on the air/oil separator tank is set to open when the pressure exceeds 175 PSI (12.1 bar). NEVER attempt to operate machine without ASME safety valve.

#### 13. Blow Down Valve

The blow down valve is a two-way valve normally open. When the machine is shut down or the compressor is empty, the vent valve opens and relieves pressure in the air/oil separator tank to ensure the compressor will not be started under load.

#### 14. Check Valve

A minimum pressure check valve is installed after the air oil separator filter. The starting pressure is set at over 43.5 PSI (3 bar). The functions of the minimum pressure valve are as follows:

- a) Assures oil lubrication of the air end.
- b) Regulates air flow through the air separator filter to prevent damage to the separator filter element. Air flow begins when pressure in the air / oil separator tank reaches 43.5 PSI (3 bar).
- c) Prevents back flow from the air receiver tank into the air / oil separator tank. This component serves as a built-in check valve. No additional check valve is needed for installation.

#### 15. After Cooler

The air flows through the check valve then enters the after cooler. The fan on the air cooled after cooler radiator draws in ambient air and blows it through the radiator cores to reduce heat in the compressed air and lubricating oil exhausted from the rotary screw pump. The heat absorbed in the radiator cores is discharged from the screw cabinet because of the cooling fan and generally reduces air temperature by 60°F (15°C). If ambient air temperature exceeds 112°F (45°C), the system may overheat. It is important to operate the compressor in a well ventilated area for the cooling process to be effective.

#### 16. Air Storage Tank (optional, not shown)

The air storage tank can serve as cushion to keep output pressure relatively stable. It can also reduce operating temperature, remove moisture content, provide cleaner air and reduce the load of the dryer. A larger tank also reduces the cycling of the suction valve. As a guideline, for every CFM the compressor produces, a minimum of 1.2 gal. of air storage is needed.

#### 17. Refrigerated Dryer/Coalescing Filter (optional, not shown)

The refrigerated dryer removes moisture content. The coalescing filter removes oil droplets and impurities in the compressed air. The refrigerated dryer / coalescing filter operates best with an automatic drain that removes water condensation collected during the air drying process.

## Operation

### Safety Rules

1. Make sure all operators receive product training, read and understand all instructions.

#### ▲ WARNING



**Keep all flammable, combustible, poisonous and noxious materials away from operating area. Make sure there are no oily rags, trash, leaves, litter or other combustible materials in operating area. Keep**

**suitable, fully charged fire extinguishers nearby when servicing and operating the compressor.**

2. **NEVER** allow modifications to compressor structure or controls.
3. Keep all ignition sources away from exposed live electrical parts.
4. Keep all persons clear of compressor during start-up and operation.

#### ▲ WARNING



**This unit can automatically start! Before attempting any repairs or adjustments, disconnect, lock out and verify all power is off to all circuits to minimize the possibility of accidental start-up**

**or operation. This is especially important for remotely controlled compressors.**

5. NEVER operate the compressor with the fan, coupling or other guards removed or with access doors open.
6. DO NOT engage in horseplay with air hoses as death or serious injury may result.
7. Make sure to provide adequate ventilation and use proper lubricant while operating the compressor. If lubricant or other combustible substances are spilled, clean up immediately.
8. When checking or adding lubricant or when refilling air line anti-icer systems with antifreeze compound, shut off compressor and allow it to cool. Keep sparks, flames and other ignition sources away and DO NOT permit smoking in the vicinity.
9. Stop compressor and disconnect power if a hazardous condition arises.
10. Wear snug fitting clothing and confine long hair when around compressor. Keep all body parts and clothing away from couplings, fans and other moving parts of the equipment.
11. Keep hands, feet, floor controls and walking surfaces clean and dry.

#### ▲ WARNING



**Keep all persons away from the discharge opening of hoses or tools or other points of compressed air discharge. If the machine is installed in an enclosed area, be sure to vent the relief**

**valve outside of the structure or to an unoccupied area.**

12. 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.
13. Make sure all hose connections are adequately secured to prevent tools or hose ends from being accidentally disconnected.
14. Coolants and lubricants used in this compressor contain chemicals that can harmful or fatal. Take care to avoid accidental ingestion and/or skin contact. In case of ingestion, seek medical treatment promptly. Wash with soap and water after skin contact.
15. Antifreeze compound used in air line anti-icer systems contains methanol which is harmful or fatal if swallowed. Avoid contact with the skin or eyes and avoid breathing the fumes. Wear goggles or a full face shield when adding antifreeze compound to air line anti-icer systems.
  - If swallowed, induce vomiting and call a physician immediately.
  - In case of eye contact, wash eyes with plenty of clean water for 15 minutes then contact eye doctor immediately.
  - Never store antifreeze compound in confined areas.

### Initial Checks

Be sure to make physical checks of the compressor to avoid serious failure before start up.

1. Make sure compressor is properly grounded and verify voltage is correct, especially when using a three phase motor.
2. Double check internal control transformer before applying power to unit. Make sure wiring is correct to avoid damage to circuitry and PLC. Refer to wiring diagram, figure 7.
3. Check for correct oil level. To avoid overfilling, check for correct oil level after machine has been stopped for at least 10 minutes. If

oil needs to be added, make sure all pressure is relieved before opening fill port. Use only EMAX lubricating oil. Also make sure oil level does not drop below low level line on site glass during operation. If it does, stop compressor immediately, let rest for 10 minutes, then add oil.

**▲ WARNING**



***Air/Oil Separator tank is a pressurized component. To avoid serious injury, be sure system pressure is relieved before removing fill plug. Be aware oil temperature may be very hot. Use***

***caution when opening fill plug.***

**NOTICE**

***Use only EMAX oil, model no. AROL8000G1. For food manufacturing applications, use model no. AROLFOODG1. Use of any other product will cause product damage and void the warranty. Refer to warranty statement for oil requirements.***

4. If compressor has sat idle for some time, add approx. 0.5 L of EMAX Rotary Screw lubricating oil to suction valve. Then hand rotate compressor several times to prevent equipment damage. Check to ensure no foreign matter has entered the system.
5. Make sure shipping brackets have been removed. Refer to figure 2 in installation section.
6. Ensure all pipes and plugs are tight before starting compressor.

**Start Up**

1. Slightly open drain valve on air/oil separator tank to drain any condensed water. Failure to do this will shorten service life of lubricating oil and destroy the bearings. Be sure to close valve after draining water.
2. Check "Emergency Stop" function by pressing the button shortly after pressing ON button.
3. Do not operate the machine if there is any abnormal noise or vibration during operation. Call EMAX service for assistance.
4. Press ON button to begin operation. After unit starts, a time delay of approximately 5 seconds will occur and a "LOADING" message will display on PLC screen. This means the pump is operating and the compressor is building pressure.
5. Monitor display panel for normal readings such as amp draw and voltage. Push OFF but-

ton if there are any abnormal sounds, vibration or oil leakage.

6. Check that oil exhaust temperature is maintained between 160° - 180° F (70° - 95° C). Cooling fan will cycle as needed to cool oil temperature.
7. After OFF button is pressed, the motor will continue to run for approx. 10-15 seconds and blow down valve will automatically discharge pressure from air/oil separator tank. This is to prevent the air compressor from stopping under heavy-load.
8. Record these instrument readings on a regular basis and retain for future reference:
  - Voltage
  - Current
  - Air pressure
  - Air exhaust temperature
  - Oil level
  - Maintenance parameter

**Storage**

1. If the machine is stopped for over **three weeks:**
  - a) Wrap electrical equipment such as the control panel with plastic or oil paper to avoid condensation.
  - b) Completely drain water in the oil cooler, the back cooler and the oil/air separator tank.
  - c) Make sure any unsafe conditions are clearly stated or repaired.
2. If the machine is not run for more than **two months:**
  - a) Seal all ports to prevent moisture or dust accumulation.
  - b) Wrap safety valve and control panel with oil paper or an equivalent to avoid rust.
  - c) Replace lubricating oil then run machine for 30 minutes. Drain condensed water in the oil / air separator tank and the oil cooler 2-3 days later.
  - d) Move machine to a clean, dry place.

**Restarting Procedure**

1. Remove any wrappings from system components.
2. Ensure electric motor is properly insulated.
3. Perform initial checks then follow procedures for start up.

## Maintenance

### Safety Steps

#### ▲ WARNING



**Disconnect, tag and lock out power source then release all pressure from the system before attempting to install, service, relocate or perform ANY maintenance.**

#### ▲ WARNING



**When performing service in any enclosure large enough to hold a man, inform others then be sure to tag and keep open any access doors. Before closing and latching access doors, make sure all**

**persons are clear from enclosure.**

1. Make sure repairs are done in a clean, dry, well lighted and ventilated area.
2. When cleaning, use air pressure less than 30 psig (2.1bar). Also use effective chip guarding and personal protective equipment per OSHA standard 29 CFR 1910.242 (b).
3. Relieve 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 refilling optional air line anti-icer systems with antifreeze compound.
4. Keep sound reducing material, any external surfaces of the air compressor or internal surfaces of the enclosure free from fluids and build-up. Clean with water based industrial cleaner or steam clean as necessary. Remove then replace sound reducing materials as needed to clean all surfaces. Immediately replace any sound reducing material with torn or punctured protective covering to prevent accumulation of liquids or build-up inside the material. **NEVER use flammable solvents for cleaning purposes.**
5. Keep electrical wiring, including all terminals and pressure connectors in good condition. Replace any wiring that has cracked, cut, or otherwise damaged insulation. Replace terminals that are worn, discolored or corroded. Keep all terminals and pressure connectors clean and tight.
6. Keep all body parts and any hand-held tools or other conductive objects away from

exposed live parts of the electrical system. When making repairs or adjustments, stand on a dry, insulated surface and DO NOT contact any other portion of the compressor.

7. DO NOT leave compressor unattended with exposed electrical components. Be sure to tag and disconnect all power if temporary absence is necessary.

#### ▲ CAUTION



**Compressor components can become hot during operation. Avoid bodily contact with hot liquids, hot surfaces and sharp edges and corners.**

### Lubricating Oil

To avoid water condensation during operation, keep oil temperature between 160-180° F. Failure to do so will cause pump damage. Contact EMAX service if temperature drops below 160° F.

### Changing Oil:

1. Shut down compressor and allow machine to set for 5-10 minutes.

#### ▲ WARNING



**Air/Oil Separator tank is a pressurized component. To avoid serious injury, be sure system pressure is relieved before removing fill cap. Be aware oil temperature may be very hot. Use**

**caution when changing oil.**

2. Drain oil completely. Be sure to include oil in system piping, cooler and air/oil separator tank. Close drain valve.
3. Remember to remove and change oil filter. Be careful to avoid hot oil during replacement.
4. Open oil fill port and add new oil.

#### NOTICE

**Use only EMAX oil, model no. AROL8000G1. For food manufacturing applications, use model no. AROLFOODG1. Use of any other product will cause product damage and void the warranty. Refer to warranty statement for oil requirements.**

#### NOTICE

**Failure to perform regular oil changes may cause equipment damage and will void warranty. Oil must be changed annually regardless of hours used.**

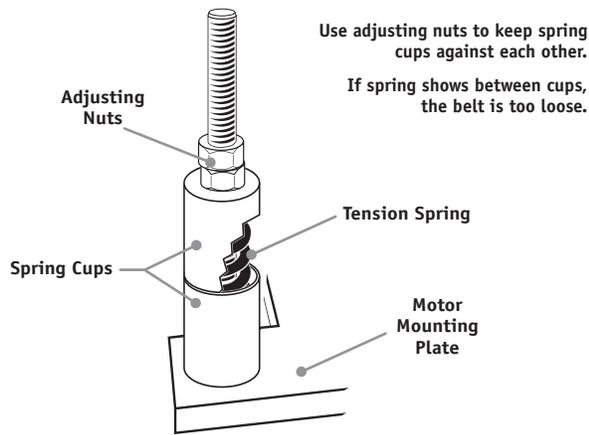


Figure 10: Belt Tensioner

**Belt**

**▲ WARNING**



*Be sure to relieve all system pressure then lock out power and tag compressor to prevent unexpected movement of the unit.*

Inspect belt tension after first 30 hours of operation then at every 1,000 hours.

1. Check belt tensioner to make sure spring cups totally enclose spring. When cups are touching, the belt is adjusted properly.
2. Always replace all belts with the same brand, at the same time. Make sure belts are uni-matched. Do not replace belts independently.
3. Do not splash lubricating oil on belts or pulleys when adjusting or replacing belts.

**System Pressure**

System pressure is factory set but can be regulated depending on operating conditions. Refer to computer control specifications for setting adjustments or PLC operating manual.

**Notes**

**Safety Valve**

**▲ DANGER**



*NEVER attempt to regulate or tamper with safety valve. Valve is sealed and certified by ASME code and is designed to relieve system pressure when necessary.*

Check proper operation of safety valve before each use. Refer to figure 11. If valve does not open manually, **replace immediately**. Discharge pressure is generally set at 175 PSI (12.1 bar). DO NOT attempt to open valve while machine is under pressure.

**Air/Oil Separator Filter**

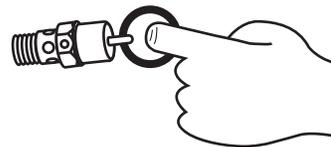
**▲ WARNING**



*Air/Oil Separator tank is a pressurized component. To avoid serious injury, be sure system pressure is relieved before removing filter. Be aware oil temperature may be very hot. Use caution when changing filter.*

*caution when changing filter.*

1. Relieve all air pressure from air/oil separator tank, then wait approximately 5-10 minutes before replacing filter.
2. Replace air/oil separator filter. Do not attempt to clean.



Pull ring on safety valve before each use.

Figure 11: Safety Valve

## Maintenance Schedule

<b>Daily</b>	<input type="checkbox"/> Check oil level <input type="checkbox"/> Check coolant level	<input type="checkbox"/> Check safety valve <input type="checkbox"/> Drain condensed water
<b>Weekly</b>	<input type="checkbox"/> Clean air filter <input type="checkbox"/> Check belt tension	<input type="checkbox"/> General unit cleaning
<b>500 hrs.</b>	<input type="checkbox"/> Change lubricating oil ( <i>after first 500 hrs.</i> ) <input type="checkbox"/> Replace oil filter	<input type="checkbox"/> Grease electric motor bearings <input type="checkbox"/> Blow out radiator
<b>1000 hrs.</b>	<input type="checkbox"/> Inspect and lubricate suction valve <input type="checkbox"/> Check belt tension	<input type="checkbox"/> Clean/replace air filter <input type="checkbox"/> Replace oil filter
<b>2000 hrs. / 6 months</b>	<input type="checkbox"/> Change air filter <input type="checkbox"/> Blow out radiator <input type="checkbox"/> Grease electric motor bearings <input type="checkbox"/> Check and tighten all electrical connections/terminals	<input type="checkbox"/> Check belt tension <input type="checkbox"/> Inspect all piping <input type="checkbox"/> Thoroughly clean sight glasses
<b>4000 hrs. / 1 year</b>	<input type="checkbox"/> Change oil and replace filter <input type="checkbox"/> Replace air filter <input type="checkbox"/> Replace air/oil separator filter <input type="checkbox"/> Grease electric motor bearings <input type="checkbox"/> Blow out radiator <input type="checkbox"/> Check belt tension <input type="checkbox"/> Check and tighten all electrical connections/terminals	<input type="checkbox"/> Clean suction valve <input type="checkbox"/> Inspect 3 direction magnetic valve <input type="checkbox"/> Inspect minimum pressure valve <input type="checkbox"/> Inspect motion of magnetic contactor

## Notes

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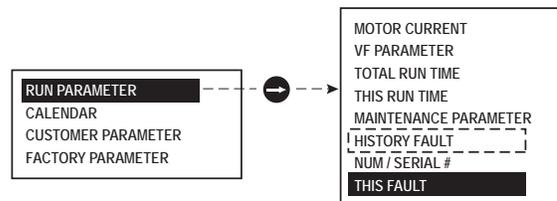
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## Troubleshooting Chart

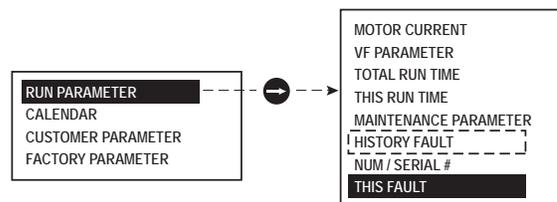
Problem	Possible Causes	Resolutions
Compressor will not start ( <i>Electric failure lamp is on</i> )	1. Power supply problem	1. Check complete circuit for proper voltage, ensure all electrical connections are secure
	2. Blown circuit fuse and/or internal fuse	2. Replace fuse(s) as needed
	3. Insufficient power to PLC	3. Check for correct voltage and make sure all fuses are functioning
	4. Fault is present	4. Check fault history on PLC: Arrow down to RUN PARAMETER, then choose fault function. <i>Refer to PLC manual for fault listing and resolution.</i>
	5. Poor contact on START pushbutton	5. Have electrician or EMAX dealer inspect and replace pushbutton
	6. Failed electric motor	6. Have electrician or EMAX dealer inspect and replace motor
	7. Failed compressor pump	7. Attempt to move by hand to check for free movement of pump. If not possible, contact EMAX service



**⚠ WARNING** *TURN OFF POWER before attempting to move pump. Watch for moving parts. Do not pinch fingers in pulley.*



Compressor shuts down under compression mode/ while loading	1. Fault is present	1. Check fault history on PLC: Arrow down to RUN PARAMETER, then choose fault function.
	2. Loss of Control Voltage	2. Reset. If trouble persists, check line pressure does not exceed maximum operating pressure of the compressor (specified on nameplate)
	3. Low Incoming Voltage	3. Wire size for power supply too small, Contact local power company



*Refer to PLC manual for fault listing and resolution.*

## Troubleshooting Chart

Problem	Possible Causes	Resolutions
Air pressure is too low	<ol style="list-style-type: none"> <li>1. Air demand too high</li> <li>2. Blocked air filter</li> <li>3. Suction valve not opening properly which reduces incoming air flow</li> <li>4. Improperly adjusted pressure regulator</li> <li>5. Load solenoid not operating properly</li> <li>6. Improper maintenance/Failed to reset hours</li> </ol>	<ol style="list-style-type: none"> <li>1. Decrease air consumption or increase number of compressors in system</li> <li>2. Clean or replace air filter</li> <li>3. Disassemble and clean suction valve. Apply lubricating oil to valve</li> <li>4. Adjust pressure regulator to proper settings. Refer to PLC manual</li> <li>5. Disassemble and clean solenoid valve. Replace if needed. Check for proper voltage - 220V required</li> <li>6. Check maintenance parameter. Make sure operating time does not exceed preset limit. Reset CLR lifetime parameter after proper maintenance is performed. Ensure CLR lifetime does not exceed MAX lifetime</li> </ol>
Line pressure exceeds upper preset safety limit	<ol style="list-style-type: none"> <li>1. Control system leak causing pressure signals to be lost.</li> <li>2. Defective pressure sensor</li> <li>3. Defective solenoid valve</li> <li>4. Defective blow down valve</li> <li>5. High pressure shut down preset is incorrectly programmed</li> <li>6. Additional compressor piped into system causing preset to be exceeded</li> </ol>	<ol style="list-style-type: none"> <li>1. Check pressure sensor for leaks and/or air restriction. Repair as needed</li> <li>2. Check for damage to diaphragm and contacts. Replace if necessary</li> <li>3. Replace valve</li> <li>4. Check that sump pressure is exhausted to the atmosphere when machine is unloaded. Repair or replace if necessary</li> <li>5. Reset to proper setting. Refer to PLC manual</li> <li>6. Reset additional compressor pressure settings to 145 psi or lower</li> </ol>
Air exhaust temperature is lower than normal	<ol style="list-style-type: none"> <li>1. Compressor has run under no-load excessively</li> <li>2. Fan temperature parameter in PLC is not set correctly</li> <li>3. Temperature sensor malfunction</li> </ol>	<ol style="list-style-type: none"> <li>1. Reset motor shut-down time in PLC</li> <li>2. Reset to proper setting. Refer to PLC manual</li> <li>3. Replace temperature sensor</li> </ol>
Air exhaust temperature is excessive causing compressor to shut-down	<ol style="list-style-type: none"> <li>1. Low oil level</li> <li>2. Incorrect oil used</li> <li>3. Blocked oil filter</li> <li>4. Surrounding temperature is too high</li> <li>5. Blocked cooler</li> </ol>	<ol style="list-style-type: none"> <li>1. Add oil</li> <li>2. Drain all oil and replace with EMAX compressor oil only</li> <li>3. Replace oil filter</li> <li>4. Make sure air exhaust is not blocked. Increase area ventilation</li> <li>5. Clean cooler</li> </ol>

## Troubleshooting Chart

Problem	Possible Causes	Resolutions
Air exhaust temperature is excessive causing compressor to shut-down <i>(continued)</i>	<ul style="list-style-type: none"> <li>6. Cooling fan failure</li> <li>7. Temperature sensor malfunction</li> </ul>	<ul style="list-style-type: none"> <li>6. Replace cooling fan</li> <li>7. Replace temperature sensor</li> </ul>
Excessive oil consumption	<ul style="list-style-type: none"> <li>1. Clogged return/scavage line or orifice</li> <li>2. Damaged or improperly functioning air/oil separator filter</li> <li>3. Lubrication system leak</li> <li>4. Excessive foaming</li> <li>5. Oil level too high</li> </ul>	<ul style="list-style-type: none"> <li>1. Clear blockage, clean orifice</li> <li>2. Change air/oil separator filter</li> <li>3. Check all pipes, connections and components. Repair as needed</li> <li>4. Drain and change. <b><i>Use only EMAX oil, model no. AROL8000G1. For food manufacturing applications, use model no. AROLFOODG1. Use of any other product will cause product damage and void the warranty. Refer to warranty statement for oil requirements.</i></b></li> <li>5. Drain oil then check at sight glass for proper level</li> </ul>
Pressure relief valve opens repeatedly	<ul style="list-style-type: none"> <li>1. High pressure shut-down preset is improperly programmed</li> <li>2. Defective pressure relief valve</li> <li>3. Clogged air/oil separator filter</li> </ul>	<ul style="list-style-type: none"> <li>1. Re-program high pressure safety setting to 155 psi (10.7bar)</li> <li>2. Replace valve</li> <li>3. Replace filter</li> </ul>

## Notes

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## Warranty Statement

Emax, INC. (also known as EATON-MAX, Inc. and each of its subsidiaries) makes the following Warranties:

1. THAT EACH **ROTARY SCREW AIR COMPRESSOR PUMP** TO BE FREE FROM DEFECTS IN MATERIAL, WORKMANSHIP, AND PARTS FOR 10 YEARS ON THE ROTARY SCREW AIR COMPRESSOR PUMP FROM THE DATE OF PURCHASE. Emax (and each of its subsidiaries) is not responsible for downtime during warranty service. If downtime is necessary, it is the Purchaser's discretion and obligation (at Purchaser's expense) to have a redundant UNIT. This warranty applies to rotary screw rotors and bearings. The electric motor carries a five year warranty and a 2 year warranty on the rest of the compressor unit. The screw compressor MUST have Emax, Inc. Lubricant Synthetic exclusively, the same which must be purchased from Emax, Inc. (Mixing different brands of oil will void this warranty and cause the rotors to varnish). All air filters, oil filters, and oil separator filters must be purchased from Emax, Inc. and the screw compressor must have Emax, Inc. Synthetic Rotary Screw oil, purchased exclusively from Emax, or an Emax dealer, for this warranty to apply.

Annual participation in all oil programs are required by original purchaser of the unit outlined by the following:

- a) Purchase an oil sample kit for oil analysis by Emax or Emax Dealer.
- b) Oil sample kit contains 20 oil sample containers. One (1) oil sample is to be sent for analysis by an Emax oil analysis laboratory every six (6) months so oil can be tested twice yearly.
- c) Oil samples are obtained by draining 4 ozs. of oil into container then mailing sample container to laboratory address provided in oil sample kit.
- d) The laboratory will perform an oil analysis then email a report to email address required when oil sample is provided.
- e) Provide annual proof of purchase for oil/filter service kit.
- f) Maintain proper oil level in unit at all times. If the unit runs out of oil, this warranty is void.

### **Failure of original purchaser to comply with any of the above conditions pertaining to oil analysis with void the complete unit warranty.**

A full detailed maintenance schedule must be sent to Emax, Inc. once a year with the total service completed quarterly, outlining each air filter, oil filter and oil change with the total hours on the unit after each maintenance was performed.

Failure to fully comply with this warranty and fully comply with the manual herein will void this warranty.

Exclusions to this warranty also include all normal wear and tear items, including, but not limited to the bearings, rotors, valves, belts, shaft seal and load/unload solenoids.

2. THAT EACH **BARE COMPRESSOR PUMP UNIT** TO BE FREE FROM DEFECTS IN MATERIAL, WORKMANSHIP, AND PARTS FOR 5 YEARS FOR THE UNIT FROM THE DATE OF PURCHASE. Emax (and each of its subsidiaries) is not responsible for downtime during warranty service. If downtime is necessary, it is the Purchaser's discretion and obligation (at Purchaser's expense) to have a redundant UNIT. Warranty repairs shall not include freight costs. Purchaser is responsible for returning unit to Emax, Inc. This pump must have Emax Inc, lubricant Synthetic exclusively, the same which must be purchased from Emax Inc. (Mixing different brands of oils will void the pump warranty). A service kit must be purchased from Emax or an Emax dealer for this warranty to apply. Service kits contain an air filter and synthetic oil that must be changed annually. Annual proof of purchase of all oil programs must be maintained by the original purchaser of the compressor pump. If the unit runs out of oil, this warranty is void. Failure to fully comply with this warranty and fully comply with the manual herein will void this warranty.

Exclusions include: service such as OIL CHANGES, FILTER REPLACEMENTS, GASKET TIGHTENING TO CORRECT OIL SEEPAGE or DRIVE BELT TIGHTENING and VALVE CLEANING and are not covered under warranty.

Warranty shall be void under the following conditions: Failure to routinely change oil and to maintain a clean filter, or **exceeding 70% duty cycle resulting in overheating and excessive wear and tear**, or exposing electrical components to rain or water, or installing the unit in a hostile environment such as acid vapors or any caustic or abrasive matter that may be ingested into the pump, or installing the unit in an enclosed area where lack of cooling ventilation is present, such as in boiler or equipment rooms where the ambient air exceeds 100°F.

3. THAT EACH **COMPRESSOR UNIT** TO BE FREE FROM DEFECTS IN MATERIAL, WORKMANSHIP, AND PARTS FOR 5 YEARS FOR THE COMPRESSOR PUMP AND 2 YEARS ON THE REMAINDER OF THE UNIT FROM THE DATE OF PURCHASE. The UNIT also carries a 1-year labor warranty. Emax (and each of its subsidiaries) is not responsible for downtime during warranty service. If downtime is necessary, it is the Purchaser's discretion and obligation (at Purchaser's expense) to have a redundant compressor. Warranty repairs shall not include freight costs. Purchaser is responsible for returning unit to Emax, Inc. This pump MUST have Emax Inc. Lubricant Synthetic exclusively, the same which must be purchased from Emax, Inc. (Mixing different brands of oil will void this warranty). A service kit must be purchased from Emax or an Emax dealer for this warranty to apply. Service kits contain an air filter and synthetic oil that must be changed annually. Annual proof of purchase of all oil programs must be maintained by the original purchaser of the compressor unit. If the unit runs out of oil, this warranty is void. Failure to fully comply with this warranty and fully comply with the manual herein will void this warranty.

Exclusions include: service such as OIL CHANGES, FILTER REPLACEMENTS, GASKET TIGHTENING TO CORRECT OIL SEEPAGE or DRIVE BELT TIGHTENING and VALVE CLEANING and are not covered under warranty.

Warranty shall be void under the following conditions: Failure to routinely change oil and to maintain a clean filter, or **exceeding 70% duty cycle resulting in overheating and excessive wear and tear**, or exposing electrical components to rain or water, or installing the unit in a hostile environment such as acid vapors or any caustic or abrasive matter that may be ingested into the pump, or installing the unit in an enclosed area where lack of cooling ventilation is present, such as in boiler or equipment rooms where the ambient air exceeds 100°F.

4. THAT EACH **DRYER UNIT** TO BE FREE FROM DEFECTS IN MATERIAL, WORKMANSHIP, AND PARTS FOR 5 YEARS on the HEAT EXCHANGER AND 2 YEARS ON THE DRYER UNIT FROM THE DATE OF PURCHASE. Emax (and each of its subsidiaries) is not responsible for downtime during warranty service. If downtime is necessary, it is the Purchaser's discretion and obligation (at Purchaser's expense) to have a redundant DRYER UNIT. Warranty repairs shall not include freight costs. Purchaser is responsible for returning unit to Emax, Inc. Each **DRYER UNIT** must have a coalescing filter attached to the intake of the dryer to remove any oil or dirt before air enters the dryer. Failure to install coalescing filter will void the warranty.

5. GENERAL PROVISIONS: Emax (and each of its subsidiaries) is not responsible for downtime during warranty service. If downtime is necessary, it is the Purchaser's discretion and obligation (at Purchaser's expense) to have a redundant compressor. Warranty repairs shall not include freight costs. If necessary, the Purchaser is responsible for returning unit and/or applicable part(s) to Emax, Inc.

Exclusions include: service such as OIL CHANGES, FILTER REPLACEMENTS, GASKET TIGHTENING TO CORRECT OIL SEEPAGE or DRIVE BELT TIGHTENING and VALVE CLEANING and are not covered under warranty.

Further Exclusions include failure to fully and completely follow the guidelines set forth in the manual. Of specific note is where a product is used where granite and/or concrete work is performed or conditions are dusty and the product is required to be housed in a separate room from the adverse conditions where the product has access to fresh air intake.

**Parts used for warranty purposes must be supplied by Emax, Inc. Warranty work will be performed by an approved Emax, Inc. Technician. If any maintenance (other than routine maintenance) is performed by a non-approved Emax, Inc. Technician, written pre-approval must be obtained from Emax, Inc. to prevent voiding this Warranty. Failure to fully comply with this warranty and fully comply with the manual herein will void this warranty.**

All warranties are nontransferable.

The Oil Purchase Program is effective as of January 1, 2011.