Kaishan
Oil-Free Rotary Screw
Air Compressor

KROF Series
Instruction Manual
125-200HP

PN: 170203

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FS/VSD

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1 - Safety Information

1.1 General

Thank you for choosing the KROF Series Compressor. Please read this instruction manual carefully before using the compressor. This manual must be kept in a safe place for future reference. Kaishan USA authorized distributors provide maintenance service for KROF Series Oil-Free Rotary Screw Compressors. A certified technician is required to ensure that the compressor is properly maintained. By adhering to the procedures outlined in this manual, users will reduce the risk of accidents and ensure safe operation throughout the service life of the equipment.

1.2 Safety Precautions

This manual describes the safety precautions, structure and functions of all systems and components, as well as the operation and maintenance methods for the KROF series air compressors. The owner and operator shall read the manual carefully. The machine should only be operated after the user thoroughly understands the machine. This manual gives you a general description of the mechanical systems, electrical systems and maintenance. However, if you have any questions about operating and maintenance of the compressor, please contact your authorized distributor or Kaishan's Technical Support Team

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.

Pressure

A properly sized pressure relief valve must be installed in the user's pipe network to protect downstream components from over pressurization or rupture. Before maintenance, disconnect, tag and lock out power sources for the compressor and ensure all internal system pressure is relieved. Do not depend on check valves to hold or prevent backpressure to the system. The unit comes with relief valves sized according to the system's operating specifications, do not modify the setpoints of the relief valves or restrict their function. Without properly sized relief valves, over pressurization of the system or internal components can occur, resulting in injury, death or property damage. Never operate the compressor at pressures in excess of its rating. Ensure all piping connections external to the unit are compatible. Never use plastic pipe, rubber hose, or soldered joints in any part of the compressed air system.

Fire and Explosion Protection

Clean up any spills of lubricant or combustible liquid immediately. Keep sparks and flame away from the compressor. Do not permit smoking during servicing, such as checking or adding fluid. Wipe down spills immediately using industrial cleaner as required. Do not use flammable material for cleaning purposes. Do not operate the compressor in a hazardous environment unless the compressor has been specially designed for that environment. Wear personal protective equipment including safety glasses and clothing while servicing the compressor. Never use a flammable or toxic solvent for cleaning the air filter or any parts.

Moving Parts

Keep hands, arms and cloths away from the coupling and fans of the compressor. Do not remove any guards or cabinet panels or attempt to service any compressor part while the compressor is operating.

Hot Surface

Do not touch any hot surface and parts during the compressor's operation. Keep all body parts away from pulsation dampeners, steel tubing, airend and after-cooler. Wear personal protective equipment including gloves while servicing the compressor.

Toxic and Irritating Substances

Unless in accordance with relevant legal provisions, the discharged air cannot be used for breathing.

There should be no toxic or corrosive gases around the compressor.

The lubricating oil used is unique to this industry and should be avoided from skin contact or ingestion. If swallowed accidentally, immediate treatment should be sought. If skin contact occurs, rinse with soap and water.

Electric-Shock Prevention

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 the source or otherwise disabling its main power source 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. Never assume it is safe to work on the compressor because it is not operating. Many installations have automatic start/stop controls, and the compressor may start at any time.

2 – Compressor Structure

2.1 Introduction

This machine is a stationary oil-free rotary screw compressor with two-stage compression, air coolers, and driven by an electric motor. When the environment's ambient temperature around unit is below 35°F or above 115°F, please consult Kaishan for solution. High ambient temperatures may result in high air temperature shutdowns. When the workplace altitude is higher than 3,200 feet, please consult Kaishan for solution.

2.2 The Compression Cycle

To improve compression efficiency and operational reliability, two-stage compression is adopted. The compressor airend is composed of a 1st Stage and 2nd Stage airend. The male rotor of both airends is driven by the motor through the main gear, while the female rotor is driven by the male rotor through the synchronous gear. The synchronous gear transmits torque to the female rotor while maintaining the correct clearance between the rotors. The surface of the rotor and casing compression chamber is coated with a protective layer to prevent corrosion and wear of the airend.

During normal operation of the compressor, a closed compression chamber is formed between the male and female rotors and the inner surface of the casing. The volume of the compression chamber continuously decreases, and the pressure of the enclosed air in the chamber continuously increases. Finally, it is connected to the discharge port of the casing, and the compressed air is discharged. The compressed air from the first stage airend is cooled and condensed water is separated before being sent to the second stage airend. After a similar compression process, the final air is compressed to the pressure required by the customer.

2.3 Compressor Lubrication, Cooling and Silencing Systems

The lubricating, cooling and silencing systems consist of an oil pump that is separate from the airend for a Variable Speed Drive (VSD) package or integrated into the airend for a Fixed Speed (FS) package, oil cooler, oil filters, intercoolers, aftercooler, pulsation dampeners (silencers) and liquid separators. The compressed air stream of the oil-free rotary screw air compressor does not contact lubricating oil, but the high-speed running gears and bearings rely on the oil circuit for lubrication. A specifically designed air seal and oil seal are used between the compression chamber and the bearing to reduce airend leakage.

Upon startup, the oil pump and airend run together. Within a specified time window, the lubrication oil must reach the required pressure to actuate the inlet valve piston, ensuring an adequate supply of lubricating oil to components before loading. During normal operation, the oil

pressure is regulated to about 35 PSI before entering the stages and higher pressure directly out of the oil pump. When the oil pressure is too high, the built-in pressure relief valve will directly bypass the lubricating oil to the inlet side of the oil pump.

The lubricating oil from the oil pump is cooled by a cooler, filtered by an oil filter, and then directed to various lubrication points of the compressor airend before returning to the oil cooler. The oil filter is a specially designed high-precision filter that ensures the cleanliness of the filtered lubricating oil and a longer service life of the filter.

To improve compression efficiency and reduce compression temperature, oil-free screw air compressors generally use two-stage compression. The high temperature compressed air discharged from the 1st stage airend passes through the first pulsation dampener and is cooled by a precooler and intercooler. Condensed water is removed before being sent to the 2nd stage airend for compression to the required air pressure for the customer. Next, the high temperature compressed air from the 2nd stage airend passes through the second pulsation dampener and the discharge check valve then enters the 2nd stage precooler and aftercooler for cooling. The cooled compressed air is separated from the liquid condensate water by the water-air separator and enters the customer's piping.

Due to the high rotational speeds and high operating noise, the compressed air from the airend enters the pulsation dampeners after each stage of compression. Kaishan's pulsation dampener adopts the impedance silencer, and the internal sound-absorbing material converts sound energy into heat, which is taken away by the air, therefore reducing noise. The function of the discharge check valve is to prevent compressed air from flowing into the compressor in the compressed air pipeline network, achieving unloading control of the compressor; At the same time, the discharge check valve can isolate the compressor from the compressed air pipeline system when the compressor starts, ensuring that the air compressor can achieve light load starting.

2.4 Inlet Valve and Filtration

The intake system includes an intake filter, inlet valve and venting silencer. The high flow, high filtration, low pressure loss and a long service life are key criteria of the inlet air filter for this machine. After the air is filtered, clean air enters the airend through the inlet valve. The inlet valve is hydraulically operated, which not only controls the intake of the compressor, but also allows the compressor to vent out internal pressure during unloading.

The hydraulic inlet valve is controlled by a series of two-position, two-way solenoid valves. When the air compressor starts, the inlet valve is closed to achieve a light load start of the air compressor. After a time delay, the inlet valve enters the loaded state. The loading solenoid

valve is electrified, and hydraulic oil enters the hydraulic chamber to push the piston to open the inlet valve, while closing the vent valve.

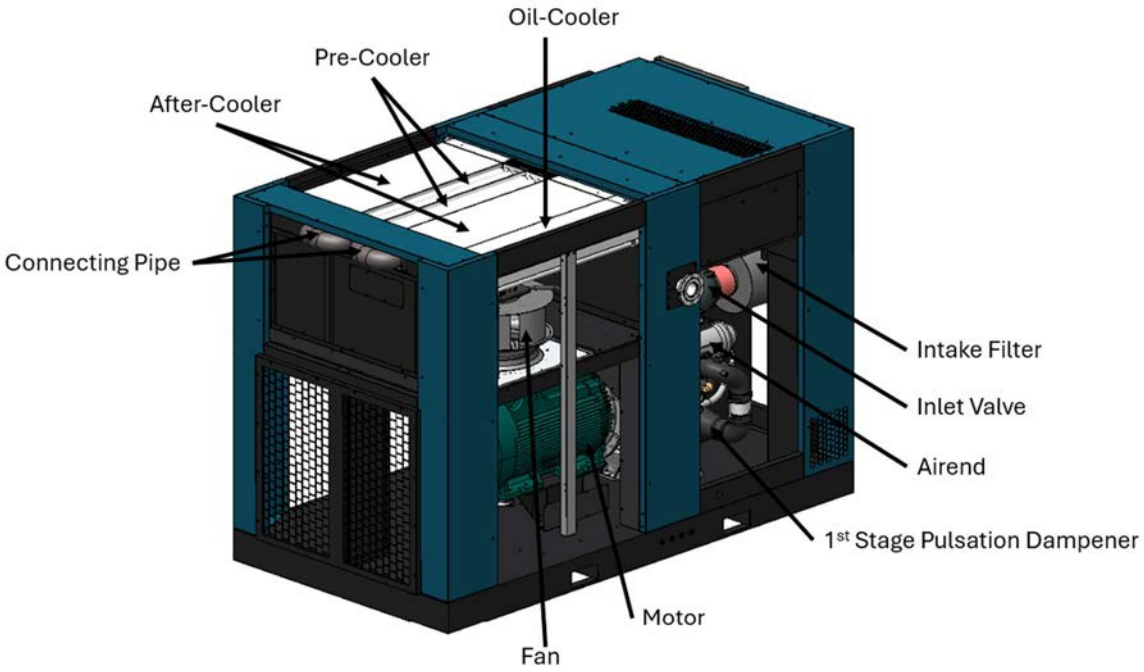
When the customer's demand for compressed air is lower than the rated discharge capacity of the compressor, the pressure in the discharge pipeline gradually increases. When the pressure reaches the unloading pressure set by the controller, the unloading solenoid valve is electrified, and the loading solenoid valve loses power. The piston moves to close the inlet valve while opening the vent valve, and the compressor enters the unloading condition. Until the compressed air in the compressed air pipeline system is consumed, the pressure in the system piping will continue to decrease. When the pressure drops to the set loading pressure of the controller, the controller controls the loading solenoid valve to be electrified. The compressor is reloaded to full load operation.

When the OFF button is held, the controller will immediately control the unloading solenoid valve to be electrified and the loading solenoid valve to be powered off. The inlet valve is closed while the vent valve is open, causing the compressor to unload and the internal compressed air to be vented. At this point, the main motor will continue to run at no load for the time stated in User Para 1, Stop Delay when the power supply to the main motor is disconnected and the compressor stops running. This avoids the impact of compressed air inside the system on the compressor during heavy load shutdown, ensuring the long-term stable operation of the machine.

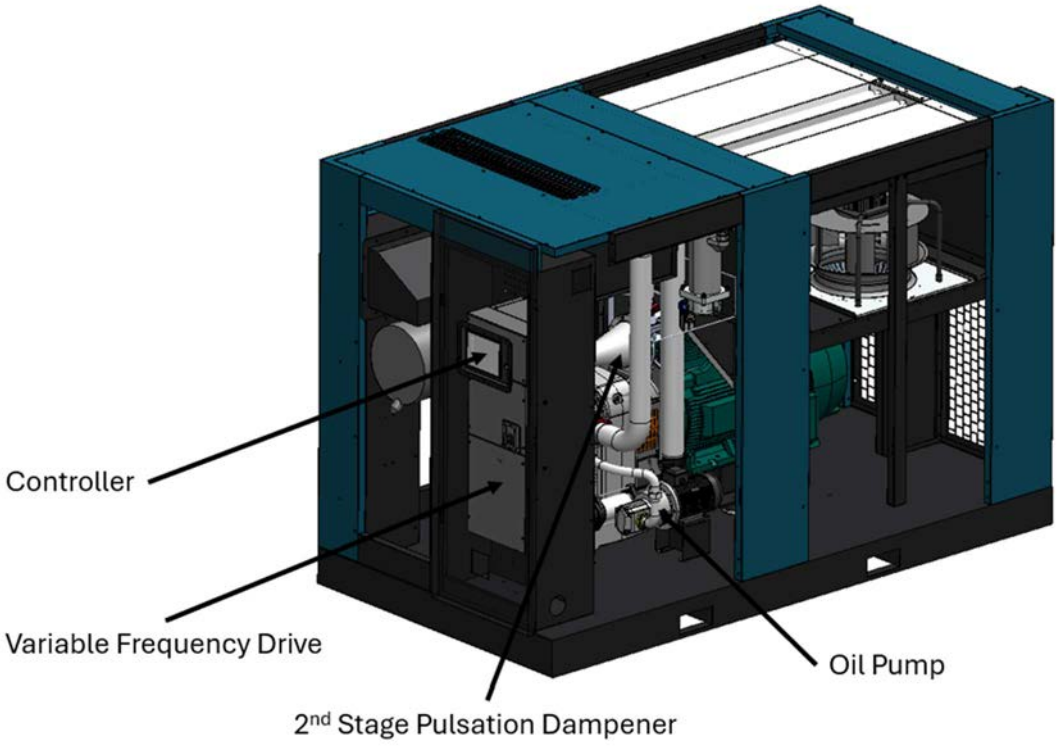
2.5 System Overview

KROF series oil-free screw compressors include a gear box and two-stage airend assembly, motor and connection / transmission with the airend, controller and electrical components, inter-cooler, after-cooler, pulsation dampener, mechanical gear oil pump, oil cooler, inlet valve, support frame and sound insulation cover. All parts are installed on a steel base, encased by a sound-attenuating enclosure. The control panel is located on the front door.

Fixed – Speed, Variable – Speed



Variable – Speed



3 - Installation

3.1 Compressor Installation

This unit needs to be installed indoors in a rain-proof and ventilated environment. If outdoor installation is required, preventive measures must be taken. Please consult the factory.

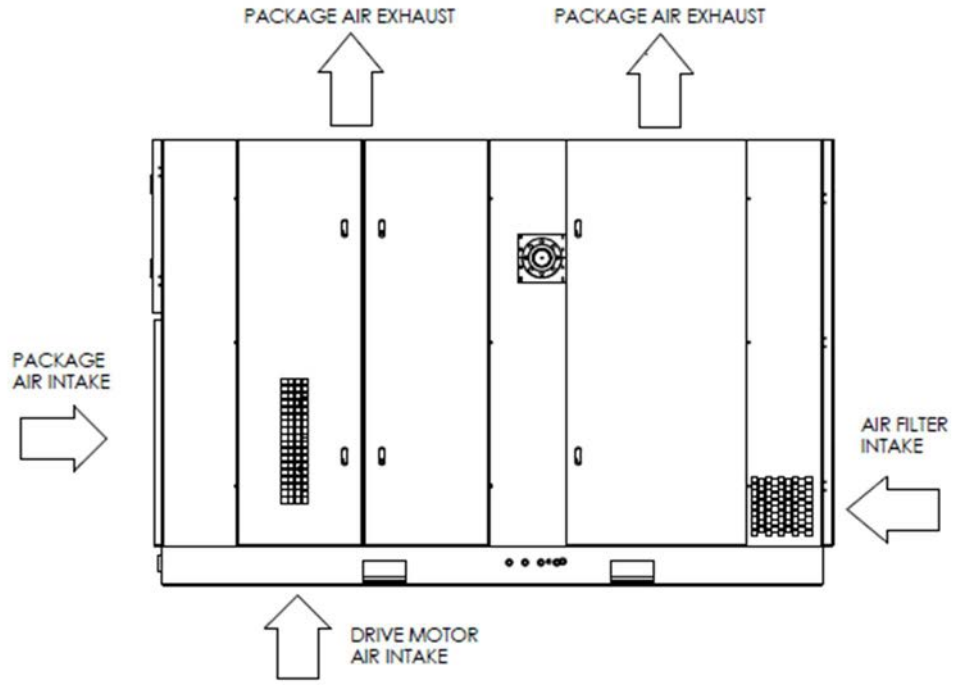
The unit should be installed on a supported surface or foundation with sufficient strength. When designing the air compressor room, users should arrange dry and clean ventilation facilities. To ensure the normal operation of the unit and reduce reflected noise, the unit should be placed horizontally on the ground surface. It is recommended that customers place a 10-20mm (7/16” – 7/8”) vibration isolators under the unit base.

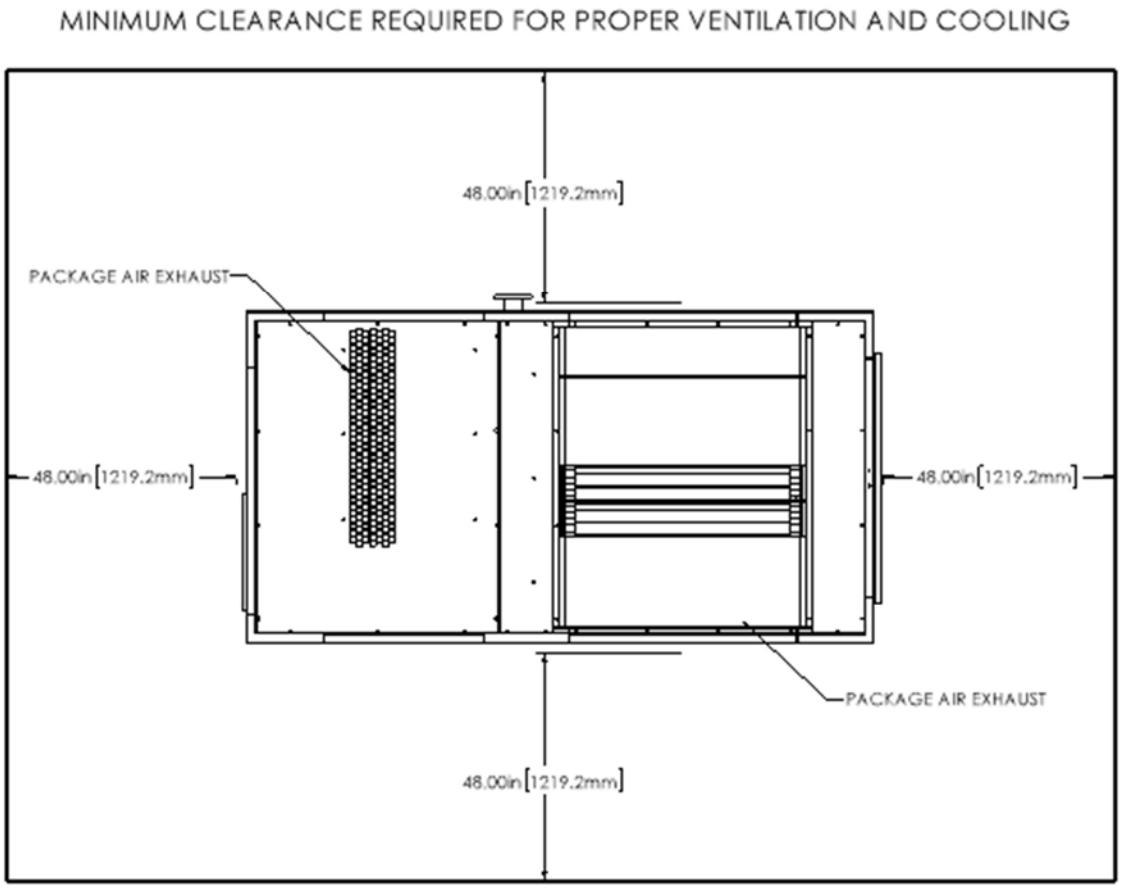
The design of the air compressor room should also meet the condition that the ambient temperature for starting and the unit startup in winter should not be lower than 35°F. If it cannot be met, please consult the factory.

If there is more than one compressor running in the air compression room, ventilation devices need to be added to ensure that the indoor temperature is ≤ 115°F.

To prevent potential damage to the unit caused during transportation, there are two red transportation supports at the motor and one under the rear of the airend. Users must ensure that the supports have been removed before starting the machine.

Installation guidelines below:





3.2 Pipe Installation

The KROF does not need foundation bolts or mounting bolts. Customer air and condensate drain connections are commonly used connections that are readily available on the market.

To prevent the compressed air in the pipeline from returning to the air compressor when the discharge check valve fails, a shut-off valve needs to be installed at the discharge port of the package. The inner diameter of the pipeline cannot be smaller than the discharge flange's inner diameter. Sharp bends should be avoided in the pipeline design to reduce restrictions on airflow, as this may result in excessive pressure loss locally. In addition, it is prohibited to install a check valve in the pipeline.

Flexible joints are allowed in pipeline design to reduce pipeline stress, but sufficient and reliable support stiffness should be ensured. The pipeline connection should be lower than the compressor discharge port to prevent condensate from returning to the inside of the compressor. If a metal hose is used for the discharge pipe, the minimum design pressure is 230 PSI, and prolonged operation should be avoided.

After the pipeline is assembled, complete a leak test to verify airtight connections.

Discharge Piping Installation Requirements:

The air out pipe must be connected to the factory air network to prevent condensate from entering the air network from the compressor in case of a moisture separator failure in the unit. Preventing water from entering the compressor from the air pipe network during shutdown.

The maximum pipeline length can be calculated using the following formula:

$L = （d^5 \text{ x } P \text{ x } Dp） / （450 \text{ x } Qc^{1.85}）$

$L = (1470 \text{ x } d^5 \text{ x } P \text{ x } Dp) / (Qc^{1.85})$

d: Inner Diameter of outlet pipeline（mm / inches）

Dp: pressure drop (bar)（suggested max. = 0.1 bar / psi ）

L: outlet pipeline length（ m / feet ）

P: Absolute pressure at discharge port of compressor（ bar(a) / psi(a))

Qc: Nominal discharge capacity（ l/s / cfs ）

Installation Guideline for Inlet and Outlet Grilles:

When installing inlet and outlet grilles (as well as indoor ventilation fans), it should be ensured to avoid any hot/cooling air re-circulation entering the compressor. The maximum air velocity through the grille is limited to 16.4 ft/s. The air temperature of the inlet grille should be between 35°F and 115°F.

3.3 Electrical Installation

All wiring and electrical connections must be performed by a qualified electrician. Installations must be in accordance with local and national regulations and code. Appropriate branch circuit protection should be installed in accordance with NEC/UL 508A. The cable size must be based on the overall power of the machine, not the rated power of the compressor. All electrical components must be grounded.

The rated voltage of the unit can be determined by the unit nameplate or electrical drawings, and the voltage fluctuation of the connected power supply should not exceed 5%. The three-phase starting ampere can be 6-10 times the normal full load current.

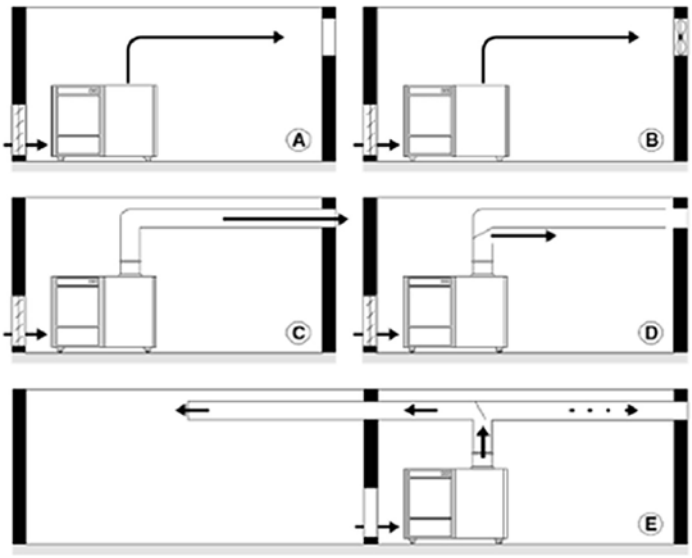
Users are responsible for ensuring all electrical installations comply with applicable local, state, and federal regulations.

3.4 Ventilation and Cooling

To ensure normal operations of the compressor, the air compressor room must have adequate ventilation. Clearance around the compressor should be at least 4 feet and a minimum of 5 feet on top of the compressor for proper cooling. Consideration should be taken to prevent hot air from recirculating into the compressor intake. When installing a hot air duct, the total pressure loss of the pipeline should not exceed a 5mm water column (0.0711 PSI). To stabilize the operating temperature of the compressor, ensure the discharged air from the compressor does not have backpressure.

In winter, hot air can be used to maintain the temperature of the compressor room. Therefore, in the design phase of the compressor room, the use of diverters and side vents can be considered.

For the design of air intake and exhaust in the compressor room, please refer to the following installation drawings:



A：External Wall for Ventilation **B**：Auxiliary Ventilation Fan

C：Direct Ventilation **D**：Winter Cycling Ventilation

E：Hot-Air Recovery or Direct Ventilation

3.5 Main Motor

The motor should be properly grounded. The grounding wire of the motor is generally led to the interior of the electrical cabinet and connected to the cabinet body. Simply connect the user's grounding wire to this point.

There are clear markings on the outgoing line of the Kaishan special motor. Wiring methods of the motor are clearly marked on the nameplate.

When the voltage and frequency of the motor meets the values specified on the nameplate, the motor can operate continuously at the rated power multiplied by the service factor. When the frequency deviation of the power supply exceeds 3% of the nameplate value or the voltage under/over voltage exceeds 10%, it's not guaranteed that the motor can continuously output its rated power.

The brand of lubricating grease can be found on the motor nameplate. After running for 16000 hours, it is necessary to inspect or replace the bearings. After replacing the bearings with new ones, please add new lubricating grease. The grade of lubricating grease varies depending on the motor, please refer to the motor nameplate for details.

Kaishan's electrical cabinet is equipped with a current detection device used as a motor overload protection component (Fixed Speed units only). There should be no abnormal sound or vibration when the motor is running with no load or no load.

4 - Operation

4.1 Initial Check

Remove the packaging of the compressor and check if there is any damage to its appearance.

Open the door, check if all mechanical and electrical parts are ok, and remove the desiccant bag from the electrical cabinet. Ensure all safety warnings, labels and instructions have been read and understood before continuing.

Remove the red transportation support brackets on the back of the motor mounts and airend.

Confirm electrical connections are secure, safe and properly grounded.

Verify the oil level. The oil level should be at 3/4 of the sight glass.

Verify the coupling, fan components and pressure connections are tight.

Verify the inlet filter is secure and properly installed relative to the airend.

Verify the rotational direction of the motor (s) check the rotation direction of the main motor and fan motor according to the instructions and requirements.

4.2 Startup

Turn on the power, check the status of the controller, hold the ON button and at the same time, verify the rotational direction of the motor (s) and fan according to labeling and requirements.

NOTE: Never allow the compressor or oil pump to reversely rotate.

Check if the cooling fan is rotating in the correct direction according to the arrow indication.
Check if all pressure values are within normal operating conditions.

4.3 Commissioning

Close the discharge valve (customer supplied) and allow the unit to unload. Check if there are any oil or air leaks, abnormal noise, etc.

Check if the unloading pressure setting is correct, measure and record the amperes of all three phases.

Open the discharge valve, run the compressor to full load and check if the working amperes are within the qualified range.

When the compressor is running at full load, the oil level may drop to the middle position of the liquid level gauge as oil fills the circuit, which is normal.

Monitor the operating temperature of the compressor: After running for 1 hour, check if there is any abnormal temperature deviation, leaks or abnormal conditions.

Set the pressure value according to customer requirements.

Run & control with the help of customer designated personnel.

4.4 Operation Status

Pipe Network Pressure

The downstream air-pressure of the compressor discharge check valve is called the pipe network pressure. The compressor control system directly monitors pressure through sensors located at the discharge pipe of the entire compressor. If the compressor is in sequence control, the central sensor is usually set in the pipeline network or air receiver tank.

To form vacuum in the gearbox, the unit uses dry compressed air from either the interstage or discharge piping. The oil and air in the gearbox are sucked out by the vacuum generator with an ejector. After being coalesced by a filter, the clean air is discharged, and the gear oil returns to the gearbox.

According to the parameter settings of the controller and the pipeline pressure, all fixed compressors are based on three operating states:

Loading Status

When the customer consumes a large amount of air, the pressure of the pipe network is less than the unloading pressure and the inlet valve is fully opened. At this point the compressor consumes the most power.

Unloading Status

When the pipe network pressure reaches or exceeds the set upper limit pressure, the inlet valve closes, and the internal pressure of the unit is released. The compressor will continue to operate in this unloaded status, accounting for approximately 30% of the rated power.

Automatic Standby

If the pipeline network pressure is stable and there is no demand for compressed air, the compressor will enter automatic standby mode, and the main motor will be turned off. To prevent frequent shutdowns and starts, the compressor controller stipulates a timer between starts to allow the motor to cool down. If the network pressure drops to a lower set point (LSP), the compressor will start and return to the loading state. If the compressor runs unloaded for a long time, this causes unnecessary energy waste.

4.5 Variable Frequency Drive Control

The KROF compressor package can be purchased as either fixed-speed control or variable frequency drive (VFD). The air capacity regulation of VFD compressors is based on the amount of customer air consumption, and the VFD module is used to change the motor speed to match the constantly changing air demand to achieve a balance between supply and demand.

Each VFD compressor sets the maximum output frequency of the VFD and the maximum motor speed according to different models. When the customer's air consumption is equal to the rated discharge capacity of the unit, the VFD compressor will operate at full load, and at this time, the speed of the variable-frequency motor is the highest speed. When the air consumption is less than the discharge capacity, the VFD compressor will reduce the airend speed by reducing the speed of the variable frequency motor, correspondingly reducing the discharge capacity. When the customer stops consuming compressed air, the speed of the variable frequency motor decreases to the lowest and the inlet valve is closed to stop compressing air. At this point, the compressor will operate at a lower speed and be in the unloaded status.

If you need to adjust the parameters of the VFD, please contact the after-sales service department of Kaishan Company for onsite guidance.

4.6 Shutdown

When the air compressor needs to be stopped, hold the OFF button in the controller to enter the shutdown process of the unit. Wait until the pressure in the discharge pipeline is completely released and then cut off the power supply.

If encountering a prolonged shutdown, units should be unloaded for at least 15 minutes to dry the pipeline.

5 – Service and Maintenance

5.1 General

Except for daily/weekly inspections, the maintenance work required for this machine is minimal. Components such as air filters, oil filters, and lubricating oil are monitored by a monitor. If a problem occurs, the monitor will issue a corresponding maintenance signal and display it through the indicator light on the panel. The after-sales department of Kaishan can provide air compressor inspection and maintenance plans and preventive maintenance service plans according to agreements with customers.

NOTE:

- All maintenance parts must comply with the requirements specified in the user manual.
- The use of non-genuine parts and lubricants will affect the warranty terms.

Daily Operation

Before starting, the oil level must be checked. If the oil level is too low, an appropriate amount of lubricating oil should be added.

After starting up, it is necessary to conduct a general inspection of the unit to check whether the values displayed are normal and ensure that the unit is in normal operating status.

After the unit warms up, check the operation of each system to see if there are any leaks or abnormal sounds. Check whether the drainage of the condensate valve is normal and whether the condensate water contains oil. Check if the vacuum generation system (ejector) is working properly and if there is any oil and air escaping from the gearbox check valve.

5.2 Maintenance Schedule

Item	Servicing Details
2000 Hours / Every Quarter	
Zero Loss Condensate Drains	Check
Air Filter	Clean if Necessary but Replacement Recommended for Optimal Performance
Oil Filter	Check or Replace if Necessary
Cooling System	Check
Grease for Motor	Replace with New or Add More if Necessary
Air/Oil Leakage	Verify Connections and Inspect for Leaks
Airend – Motor Coupling	Verify Condition, Replace if Necessary
4000 Hours / Six Months	
Including 2000 Hours / Every Quarter Items	
Pulsation Dampener	Inspect and Clean
Air Filter Element	Replace
8000 Hours / Yearly	
Including 4000 Hours / Six-Month Items	
Coolers	Clean
Inlet Valve	Inspect and Service with Repair Kit if Necessary
Relief Valve	Verify Open/Close Functions Normally
Oil Filter	Replace
Lubricating Oil	Replace
Solenoid Valves (5)	Inspect and Service with Repair Kit if Necessary
Ejector/Gearbox Vent	Replace
16000 Hours / Every Two Years	
Including 8000 Hours / Yearly Items	
Inlet Valve	Replace
Discharge Check Valve	Replace
Motor Bearing	Inspect and Replace if Necessary

Item	Servicing Details
Airend – Motor Coupling	Inspect and Replace if Necessary
Inlet Valve Muffler	Inspect and Replace if Necessary
32000 Hours / Every Four Years	
Rubber/Flexible Hoses	Overhaul Servicing
Pulsation Dampeners	Overhaul Servicing
40000 Hours / Every Five Years	
1st Stage Airend	Overhaul Servicing
2nd Stage Airend	Overhaul Servicing
Oil Pump	Overhaul Servicing

5.3 Critical Component Replacement and Maintenance

Lubricating Oil and Oil Filter

After initial 150 hours of operation and then after every 8000 hours or six months of operation, the oil filter and oil needs to be replaced:

(1) Before replacing the lubricating oil and oil filter, run the compressor until the lubricating oil temperature reaches normal operating temperatures.

(2) Turn the machine off, cut off the power supply, open the refueling plug, open the oil drain valve at the bottom of the gearbox, and drain the lubricating oil in the compressor thoroughly. Remove the oil filter.

(3) Replace the oil filter element and lubricating oil. Add lubricating oil to 3/4 of the oil tank sight glass. Confirm that the oil filter and oil filler cap are installed correctly. Restart the compressor.

(4) Confirm that there is no leakage in the oil filter or oil filter plug. Verify that the oil level is at a normal level during operation (if necessary, stop the machine to replenish lubricating oil).

The KROF series oil-free screw air compressor is factory tested and filled with Kaishan lubricating oil. Be sure to use factory genuine lubricating oil, KTL-GL. This lubricating oil has excellent performance and long service life, suitable for various working environments. In general, after every six months or 8000 operating hours (whichever comes first), the lubricating oil needs to be replaced. If the ambient environment is poor, such as long-term high temperature and high humidity environments or corrosive or strong oxidizing gases are present, the inspection or replacement time of lubricating oil will be correspondingly reduced.

NOTE: The use of non-genuine parts or lubricants affects the warranty terms.

Air Filter

Every 4000 hours of operation or when the air filter differential pressure indicator shows that maintenance is required, the air filter element should be replaced.

Replacement of the Air Filter Element:

1) First, turn off the compressor and release the pressure.

2) Remove the old filter element and clean the air filter housing.

3) Install a new air filter element.

4) Reinstall the air filter cover and reset the indicator.

Checking the Air Filter Element:

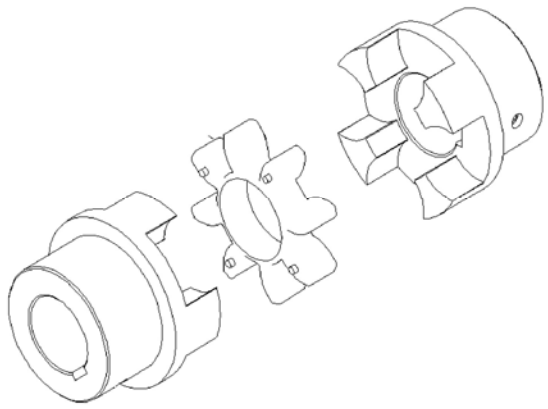
1) Place a bright light inside the filter element. If damaged, light will pass through the element.

2) Check all gaskets and contacting surfaces, replace immediately if damage is fine.

3) Spare air filter elements should be stored in a clean and dry environment.

4) After installation, please tighten and check all connecting components before use.

Coupling Assy



1) Install the airend coupling and the motor coupling onto their respective shafts. The airend coupling should have good contact with the shaft surface of airend. Next, insert the coupling rubber into the shaft sleeve to complete the installation.

2) After installing the coupling assembly, ensure that the gap between the two shaft sleeves surface is 2-3mm (about 1/16” – 3/32”).

3) Tighten the set screws on each of the couplings.

Main Motor

1) The operating environment of the motor should be kept dry, the surface of the motor should be kept clean, and the motor air inlet should not be obstructed by dust, fibers, etc.

2) When the overload protection device malfunctions, the source of the malfunction should be checked and eliminated before it can be restarted.

3) It should be ensured that the bearings have adequate lubrication while the motor is operating. Generally, the motor should be replenished or replaced with lubricating grease after running for about 2000 hours. The brand of lubricating grease can be found on the motor nameplate. After running for 16000 hours, it is necessary to inspect or replace the bearings. After replacing the bearings with new ones, please add new lubricating grease. The grade of lubricating grease varies depending on the motor, please refer to the motor nameplate for details.

4) When the bearing life ends, the vibration and noise of the motor during operation will significantly increase, and the bearing should be replaced at this time. Timely replacement of bearings can prevent more serious motor failures.

Routine Check for Motor

1) Inspect the motor for any signs of bearing grease or liquid from the bearing cover plate.

2) Verify there are no signs of condensation.

3) Check that the motor cables, insulation, contactors, etc. are in good condition and there are no signs of overheating or arcing.

4) Verify all nuts and bolts are secure.

5) Verify the motor cover is dust-free.

6) Verify the cooling fan inside the motor is in good condition.

5.4 Unattended Shutdown and Long-Term Storage

Run the air compressor twice a week until it warms up. After shutdown, use dry air to blow the unit pipeline from the secondary suction pipe port until the pipeline is dry. This process should last for at least 15 minutes.

If you need to store the air compressor without starting it, please consult the factory for the necessary protective measures.

6 - Controller

6.1 Basic Operation

6.1.1 Controller Face Plate

 —— Run：

➢Compressor is on standby mode, and press it to start the operation

➢Communication Mode sets as link-control and sets 1 as address, press it to start the operation & also activate link-control function.

 ——Stop：

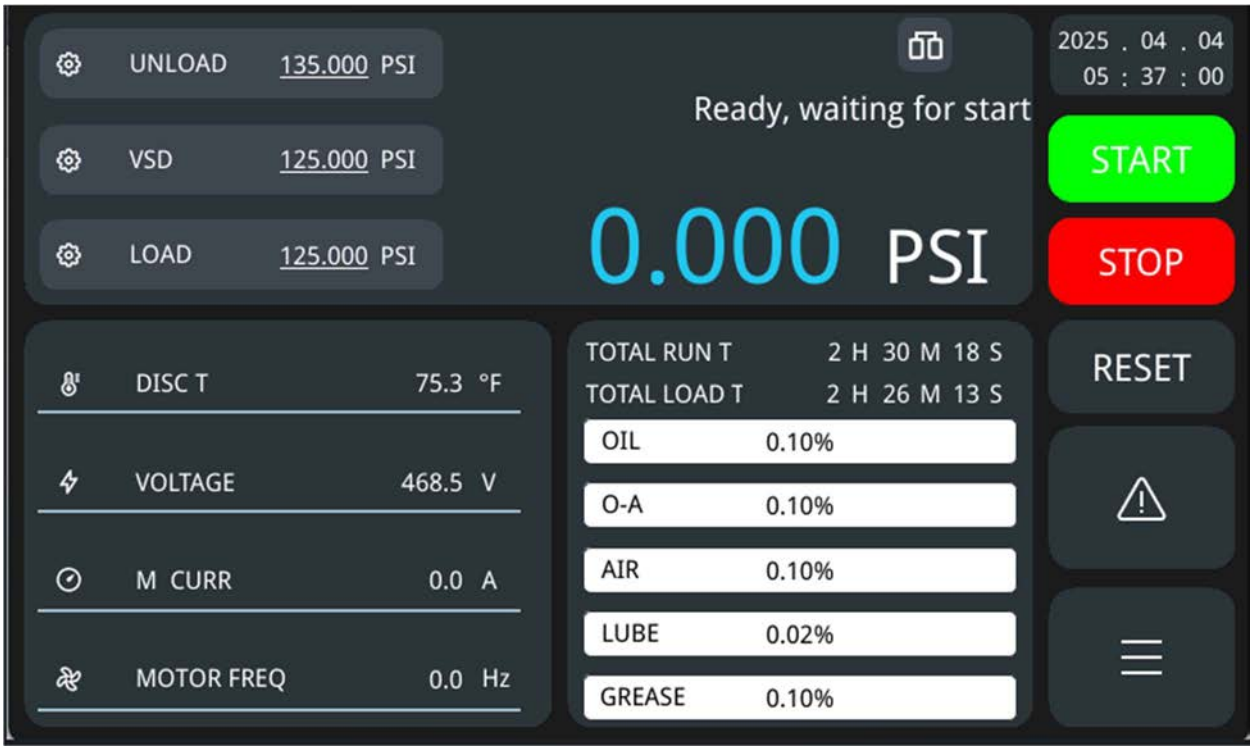
➢Compressor is on standby mode, press it to stop the operation.

➢Communication Mode sets as link-control and sets 1 as address, press it to stop the operation & also the host will not send command to the slave unit.

PWR——Power：

The indictor lights up after the controller is powered on。

6.1.2 Home Screen



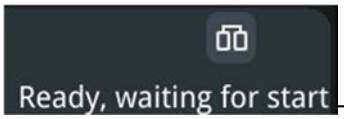
——Run：This button must be depressed for 3 seconds to initiate the Start sequence.

——Stop：This button must be depressed for 3 seconds to initiate the Stop sequence.

——Reset：This button will illuminate in yellow when there is a Reset required. This button must be depressed for 3 seconds to acknowledge or reset a fault. *Note: If the fault is still active this will not reset.*

——Alarm：This button will take you to the alarm screen. If this button is flashing red, there is an active alarm, or the alarm was not acknowledged. It will be solid red if the alarm is active and acknowledged but not a Fault. If the alarm or fault is not active the red will go away once the reset is made. If there is an active Fault this will continue to flash until the Fault is cleared regardless of the reset being pushed.

——Menu：This button will take you to the Main Menu.



——Function Select：This area will list icons that when depressed will take you directly to their menu. The icons will only appear here when they are activated through the various menus. The one shown is a default and on all models which display the User Parameter menu. *Note: These are subject to password protection.*

6.1.3 Main Menu

RUN PARA: This screen monitors all the machine running parameters. There are no settable fields in this screen.

USER PARA: Consisting of 4 pages where selectable running and operational parameters in temperature, pressure, units, and timers for functions. *Note: Some parameters are for machines that may have different configurations for their functions.*

MAIN PARA: These are Maintenance **Parameters, primarily timers for oil, air, and lube times as well as production date and machine serial number**.

FACT PARA: Consisting of 4 pages that set machine limits for Warnings, Alarms, and critical machine functions. *Note: These parameters should not be changed without the approval of qualified personnel.*

BLOCK: This is to set up multiple machines that are tied together in the same process. *Note: This needs to be configured by qualified personnel.*

ALARM: Takes you to the Warning/Alarm screen. There are no settable fields.

SCH PRES: Not applicable for Oil-Free Models.

CALIB PARA: For all analog data being read by the PLC these 3 pages give the ability to set Zero and span Coefficients to calibrate these values. They consist of temperatures, pressures, and electrical power values.

SCH WORK: Not applicable for Oil-Free Models.

CONFIG: Three pages that allow you to set the function of the PLC I/O. Page 1 are the digital inputs, page 2 the digital outputs and page 3 the analog inputs.

MOTOR VSD: These 3 pages are settings for the main motor VFD. This includes the VFD Hz limits, PID and motor control parameters.

PREAJUSTE: This sets up the VFDs for the main motor and fan motors by setting the type of VFD, communication of the VFD and calibration of the controller to match the VFD power values.

FAN VSD: These 2 pages are settings for the cooling fan VFD. This includes Hz limits, PID, temperature limits, and motor control parameters.

MODEL SET: This sets the controller up with the software for the selected model machine. Note: *This screen is meant for qualified personnel only. Warning: If you make any changes to this screen (including selecting the same model) you will delete ALL selectable parameters from other menus. Essentially resetting the controller and starting from default parameters.*

IP ADDRES: This is where you set the controllers network IP address and date and time.

APN: Access Point Name account, which provides the necessary settings for this device to connect to the internet through a mobile network.

6.1.3.1 USER PARA

LOAD P: Load pressure setpoint.

UNLD P: Pressure that the machine will Unload.

FAN RUN T: Temperature that the cooling fan will turn ON.

FAN STOP T: Temperature that the cooling fan will turn OFF.

MOTOR START DELAY: The delay that the motor will start after the START Button is actuated. *Note: During this time the Main Motor overcurrent protection is not active.*

FAN START DELAY: The delay after the Cooling Fan(s) were actuated. *Note: During this time the Main Motor overcurrent protection is not active.*

STAR DELAY: The time that the Main Motor, first sequence of the Star (wye) in a Wye-Delta start system is engaged. This will start in wye for this amount of time then switch to a delta power mode. *Note: The switch from why to delta should occur when the motor has just reached full speed in the wye configuration.*

LOAD DELAY: The time delay for the compressor to start Loading. This timer starts when the Start button is depressed. *Note: The loading should take place after the wye to delta transfer and the motor has reached full speed in delta mode.*

STANDBY DELAY: A count down timer that the compressor is running but not Loading at which the compressor idles.

STOP DELAY: The time between when the Stop button is pressed and the Main Motor stops. *Note: This allows time for unloading.*

RESTART DELAY: A timer that locks out any restart of the Main Motor. This is to prevent overheating the motor windings due to consecutive restarts.

COM ADDRESS: These 5 parameters should not be changed without a certified technician.

BAUD: They are communication required fields.

STOP BIT: For network communication.

DATA BIT: For network communication.

CHECK BIT: For network communication.

WORK BACKLIGHT: Is the backlight brightness of the touch screen in percent.

LANGUAGE: Set screen display language.

POWER UNIT: Set units of power.

P UNIT: Set units for pressure.

T UNIT: Set units for temperature.

START STOP MODE: LOCAL (at compressor) or REMOTE (distant control station).

LOAD MODE: AUTO (plc programming determined) or MANUAL (push button determined).

M START MODE: Select the Main Motor start mode (wye-delta, VFD, soft start).

FAN START MODE: Select Fan motor start mode (PLC, VFD).

AFTER PF FAN: After cooler fixed speed fan Normally Open or Normally Closed signal.

1st DRAIN VALVE: Used only when a non-self-contained condensate system is installed.

2ND DRAIN VALVE: Used only when a non-self-contained condensate system is installed.

OIL STOP DELAY: Shut off oil valve to prevent emptying cooler (nontypical design).

DRAIN OPEN TIME: Time to keep condensate drain open (nonautonomous design).

DRAIN CLOSE TIME: Time to keep condensate drain closed (nonautonomous design).

Run Parameter

Click “Run Parameters" to view the following data and settings related to Run Parameters.

Menu	Function Description
Supply Pressure	The supplied-air pressure displays
Interstage Pressure	The interstage pressure displays
Oil-feed Pressure	The oil-feed pressure from oil-return displays
Discharge TMP	The air-discharge temperature displays
Oil TMP	The oil temperature displays
2nd-Stage Discharge TMP	The 2nd-stage air-discharge temperature displays
S/N	Manufacturing Serial No. displays
2nd-Stage Suction TMP	The 2nd-stage Air-suction temperature displays
1st -Stage Discharge TMP	The 1st-stage Air-discharge temperature displays
Oil-Filter T	Accumulated use time of oil filter
Oil-Separator T	Accumulated use time of Oil Separator
Air-Filter T	Accumulated use time of Air Filter
Oil T	Accumulated use time of lubricant oil
Grease T	Accumulated use time of lubricant grease
EXW Date	The manufacturing date or ex-factory date
Host Amp	The motor electric current (ampere) displays
F/M Amp	Fan-motor electric current (ampere) displays
Running time	Run time of the compressor displays
Loading time	Loading time of the compressor displays
Input-Port Status	X0 X1 X2 X3 X4 X5 X6 X7 X10 ● ● ● ● ● ● ● ● ●
Output-Port Status	Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y10 Y11 Y12 Y13 ● ● ● ● ● ● ● ● ● ● ● ●
Fixed-Speed Airend U*I	(The real-time ampere * real-time voltage) collected by
This power-consume of fixed-	When it’s fixed-speed model, the power consumption of the

Menu	Function Description
Accumulated Power-Consume of Fix-Speed Airend	The fixed-speed operation and cumulative electricity consumption of the air compressor calculated by the controller displays. (For reference only)
This Power-Consume of Fixed-Speed F/M	When fixed-speed fan motor is operating, this cumulative electricity consumption calculated by the controller displays (For reference only).
Accumulated Power-Consume of Fixed-Speed F/M	The fixed-speed operation and cumulative electricity consumption of the fan motor calculated by the controller displays. (For reference only)
Airend RPM	Based on the motor frequency reading, the real-time motor rotate per minute calculated by controller displays
Airend Output Hz	The output frequency of the current airend VFD displays
Airend Output Amp.	The output ampere of the current airend VFD displays
Airend Output Voltage	The output voltage of the current airend VFD displays
Airend Output Power	The real-time output power of the current airend VFD displays
Supply-Pressure	Supplied-air pressure displays
Airend Write Hz	Airend frequency value obtained through PID calculation displays here
Airend Status Text	the operating status register value obtained by the controller from the airend VFD displays in the displays area of the airend-status-text
Fault Text	The fault status register value obtained by controller from the airend VFD displays in the Fault-Text display area
The Power-Consume of VFD Airend	According to the real-time power output by airend VFD, the cumulative electricity consumption of the motor during this operation displays
Accumulated Power-Consume of VFD Airend	According to the real-time power output by airend VFD, the cumulative electricity consumption of motor total operation displays

F/M RPM	According to the reading of fan motor frequency, the calculated real-time rotate per minute of fan motor displays
F/M Output Hz	The output frequency of current fan motor VFD displays
F/M Output Amp.	The output ampere of the current fan motor VFD displays
F/M Output Voltage	The output voltage of the current fan motor VFD displays
F/M Output Power	The real-time output power of the current fan motor VFD displays
Discharge TMP	Air discharge temperature displays
Write Hz	The frequency value obtained by the controller through PID calculation displays in the display area of Write-Frequency-Value.
Air Supply Load Pressure（MPa/PSI)	1. LOAD sets to automatic. When the air compressor is in the automatic unloading operation state, the pressure below this value controls the automatic loading operation of the air compressor. When the air compressor is shut down for a long time, if the pressure is lower than this value and the operating conditions are met, the controller will automatically start the operation of the air compressor
Air-Supply Unload Pressure（MPa/PSI)	Control the unloading operation of the air compressor, when the pressure is higher than this value and is in the loading operation state. The set value of "air supply load pressure" cannot be greater than this value, and the "air supply unload pressure" is limited by the "high limit of unload pressure" in the manufacturer's parameter
Airend Start Delay (s)	Set the motor start time and start timing when the airends start. During this time, there is no protection against current overload of airend
F/M Start Delay (s)	Set fan motor starts time and start timing when the fan motor starts. During this time, there is no protection against fan-motor current overload
Start-Delta Delay (s)	Delay time of reduced-voltage star-delta start for airend.
Load Delay (s)	After the airend starts, delay the loading time for loading. If fixed-speed, this time should be more than the airend start delay

Idling Delay (s)	The allowed maximum continuous no-load running time of the air compressor, after which it automatically stops running and enters a state of prolonged idle shutdown.
Stop Delay (s)	In normal shutdown, the air compressor immediately runs with zero-load, and after this set time stops running.
Restart Delay (s)	After normal stop, prolonged idle stop, or malfunction stop, it is necessary to delay the time set here before restarting the air compressor.
Airend Start Mode	Users can choose the airend startup method based on their needs. According to the selected model, refer to the corresponding electric wiring diagram
F/M Start Mode	Users can choose the fan motor startup method based on their needs. According to the selected model, refer to the corresponding electric wiring diagram.
Load Mode	Manual mode: Automatically unload when the pressure exceeds the "unloading pressure"; Other situations are controlled by the loading and unloading keys. Automatic mode: The controller automatically controls the loading and unloading of the air compressor based on the pressure and the set loading and unloading pressure
ON/OFF Mode	Local Mode: Remote start terminal has no function Remote start terminal function is effective
Comm. Add	When the communication mode is computer or link-control, the communication address of the controller
Backlight Adjust	Adjust the backlight brightness. The higher the value, the stronger the brightness. (Level 1-99 brightness adjustable)
EN/CN Select	When set to Chinese, the interface displays in Chinese. When set to English, the interface displays in English; (Standby)
Airend VFD Pressure（MPa/PSI)	When the time is between the "pressure start time" and the "pressure end time", set the air-supply pressure for stable operation of the variable-frequency-drive air compressor. When the pressure fluctuates around this pressure, the controller adjusts the operating frequency of the VFD to make the air supply pressure close to the set value. (This parameter only works when the airend is set as VFD)

F/M VFD TEMP （℃/°F）	Set the discharge temperature during stable operation of the air compressor. When the discharge temperature fluctuates around this value, the controller adjusts the operating frequency of the fan variable-frequency to make the discharge temperature close to the set value. (This parameter only works when the mode sets as (main) fan variable frequency)
Drain Timed-Open Cycle（min）	During automatic drainage control, it is to set drainage interval time (standby)
Drain Delay-Close Cycle（ms）	During automatic drainage control, it is to set the drainage delay time (standby)
Power Unit	Set kW means all parameter related to power displays in kW Set HP means all parameter related to power displays in HP
Pressure Unit	Set Mpa means all parameter related to pressure displays in Mpa Set PSI means all parameters related to pressure displays in PSI (Standby) Set BAR means all parameters related to pressure displays in BAR (Standby)
Temperature Unit	Set ℃ means all parameter related to temperature displays in ℃ means all parameter related to temperature displays in °F (standby)

Consumables Parameter

The consumables parameter is used to set the consumables time. Before reviewing or modifying consumables parameters, it is required to verify consumables password verification. The main functions are shown in the table below:

Menu	Function Description
Oil Filter T	It's cumulative use time of the oil filter. Manually reset to zero after replacing it with a new oil filter
Oil-Separator T	It's cumulative use time of the oil separator. Manually reset to zero after replacing with a new oil separator
Air-Filter T	It's cumulative use time of the air filter. Manually reset to zero after replacing with a new air filter
Oil T	It's cumulative use time of the oil. Manually reset to zero after replacing with new oil
Grease T	It's cumulative use time of the lubricating grease. Manually reset to zero after replacing with new grease
Oil Filter Max. T	1. If the cumulative use time of the oil filter exceeds the set value here, the controller will give an alarm. 2. When set to "0000", disable the oil filter warning function
Air Filter Max. T	1. If the cumulative use time of the air filter exceeds the set value here, the controller will give an alarm. 2. When set to "0000", disable the air filter warning function
Oil Max T	1. If the cumulative use time of the oil exceeds the set value here, the controller will give an alarm. 2. When set to "0000", disable the oil warning function
Grease Max. T	1. If the cumulative use time of the lubricating grease exceeds the set value here, the controller will give an alarm. 2. When set to "0000", disable the grease warning function
Dynamic Factor	It's to offer servicing parameter dynamic password. 0 means no dynamic password set

Time Set Pressure

It's to set timed pressure value. Before setting, the timed pressure password should be verified first

Menu	Function Description
Timed Load Pressure（Mpa）	When the time is between the "pressure start time" and the "pressure end time", compressor will load if the pressure is lower than this set value
Timed Unload Pressure（Mpa）	When the time is between the "pressure start time" and the "pressure end time", compressor will unload if the pressure is higher than this set value

Menu	Function Description
Timed （Mpa）	When the time is between the "pressure start time" and the "pressure end time", the air supply pressure is set for stable operation of the VFD air compressor. When the pressure fluctuates around this pressure, the controller adjusts operating frequency of the VFD to make the air supply pressure close to the set value here. (This parameter only works when the model set as airend VFD variable or main fan VFD)
Pressure Start	Pressure start time
Pressure Stop	Start ending time
Time-Share Pressure	When set ABLE, the function is activated

Timed Start-Stop

Timed start/stop is used to set a weekly scheduled start/stop, and four times of timed start/stop can be set per day. If a timed start /stop is required, this function should be set ABLE

Fault Record

Record all historic fault information to find the root cause and offer trouble shooting.

6.2 Prewarning

The KAC7070T air compressor controller has complete prewarning functions, including air filter prewarning, oil filter prewarning, lubricating oil prewarning, lubricating grease prewarning, air-discharge temperature prewarning, air-intake temperature prewarning, oil temperature prewarning, oil pressure prewarning, interstage pressure prewarning, etc.

Air Filter Prewarning

a) Detect air filter blockage.

After detecting that the pressure-differential switch of the air filter is closed, the text displays "Air filter blocked".

b) Air filter use time prewarning

The air filter usage reaches the set time, and the text displays "Air filter needs replacing".

The default use time of the air filter is 4000 hours

Oil Filter Prewarning

a) Detect oil filter blockage.

After detecting that the pressure-differential switch of the oil filter is closed, the text displays "Oil filter blocked".

b) Oil filter use time prewarning

The oil filter usage reaches the set time, and the text displays "Oil filter needs replacing".

The default use time of the oil filter is 4000 hours

Lubricating Oil Prewarning

The oil usage reaches the set time, and the text displays "Oil separator needs replacing".

The default use time of the lubricating oil is 8000 hours

Lubricating Grease Prewarning

The lubricating grease usage reaches the set time, and the text displays "Grease needs replacing".

The default use time of the lubricating grease is 2000 hours

High Discharge Temperature Prewarning

When the system detects that the discharge temperature exceeds the "discharge temperature prewarning" value set in the manufacturer's parameters, the text displays "discharge temperature is high".

The set value for the high discharge temperature prewarning of 1st stage is 428°F, and the high discharge temperature prewarning of 2nd stage is 410°F.

Oil High Temperature Prewarning

When the system detects that the temperature of the lubricating oil exceeds the "oil temperature prewarning" value set in the manufacturer's parameters, the text displays "high oil temperature".

The set value for the high oil temperature prewarning is 160°F.

Oil High-Pressure Prewarning

When the system detects that the pressure of the lubricating oil exceeds the "oil pressure prewarning" value set in the manufacturer's parameters, the text displays "high oil pressure".

The set value for the high oil pressure prewarning is 48 PSI.

6.3 Safety Protection

Protection for Motor

The KAC7070T air compressor controller has all around protection to motor / fan motor including overload, open phase, imbalance, high and low voltage.

FAULT	TEXT DISPLAY	ROOT CAUSE
Overload	Motor or F/M ampere overload	Over-heavy load bearing worn-out, or another mechanical fault
Open Phase	Motor in Open Phase	Open phase in Power supply, contactor, or motor
Unbalance	Motor unbalance	Poor contact of Contactor, Open loop inside the motor
High Voltage	Voltage over high	Power supply is high voltage
Low Voltage	Voltage low	power supply is low voltage

Air Discharge Over Temperature Protection

If the discharge temperature exceeds the set limit, the controller will alarm and shut down, and the onsite fault displays "discharge TEMP is high".

The first stage air discharge overtemperature setting is 446°F, and the second stage air discharge overtemperature default setting is 428°F.

Air Compressor Anti-Rotation Protection

When the air compressor stops and a phase sequence error is detected, the on-site fault displays "phase sequence error 1" and it is not allowed to start the air compressor. At this stage, just exchange any two-phase power lines and watch the motor rotation direction.

Air Compressor Anti-Phase Failure Protection

When the air compressor stops and the phase sequence of power supply is detected to lack of phase, the on-site fault displays "phase sequence error 2" and it is not allowed to start the air compressor. At this stage, check all three-phase incoming lines of the controller.

Air Supply Overpressure Protection

When the air supply pressure is higher than the set high limit, the controller will alarm and stop, and the on-site fault displays "High air supply pressure".

Sensor Failure Protection

When the pressure sensor or temperature sensor is in open circuit, the controller will alarm and shut down. The on-site fault displays' * * fault '.

Oil Overpressure Protection

When the lubricating oil pressure sensor detects that the oil pressure exceeds the set value, the controller alarms and shuts down.

Oil Overtemperature Protection

When the lubricating oil temperature sensor detects that the oil temperature exceeds the set value, the controller alarms and shuts down.

6.4 Troubleshooting for Ordinary Electrical Faults

FAULT	ROOT CAUSE	CORRECTIVE ACTION
Temperature Sensor Failure	Line is off; PT100 failure	Check the line and PT100
Over Pressure	Actual over-pressure, inaccurate sensor	Check the actual pressure inside the compressor and pressure sensor

Pressure Sensor Failure	Sensor line is off; senor is down, or sensor line reversely connects	Check the line connection and sensor itself
Open Phase	Power supply open phase, contactor problem	Check power supply or contactor itself
Overload	Low voltage, pipeline blocks, bearing worn out, other mechanical fault, incorrect data setting	Check the data, power supply, bearing, pipeline, and other mechanical function
Unbalance	Power supply unbalance, contactor failure, open loop inside the motor	Check power supply, contactor, motor
Wrong Phase Sequence	Phase sequence reversely connected, phase failure	Check the line connection
Motor overload @ startup	Motor start time is less than star-delta delay set time	Re-set the motor start time ＞ star-delta delay + 2seconds
Contact Frequently Acts	Emergency button loose; controller interfering	Check the wring; The output coils connect surge absorber or not
VFD Communication Fault	The communication parameters between the controller and Variable-frequency-drive are incorrect, the communication line is not properly connected, and the communication parameters of VFD are incorrect.	Check the parameter data and communication lines

7 - Troubleshooting

7.1 General

There are multiple causes of compressor failure, so before repairing or replacing components, a comprehensive and systematic analysis should be conducted on the various possible causes of the failure. The machine should not be dismantled arbitrarily. To avoid unnecessary damage and injury, the machine should be carefully inspected first. The following points should usually be kept in mind:

A. Check if the wire connections are loose or detached.

B. Check if the pipeline is damaged.

C. Check if any of the parts have been damaged due to overheating or short circuits. The most obvious symptoms are discoloration or a burning smell.

7.2 Faults and Troubleshooting Guide

Potential faults and troubleshooting methods are shown in the table below (this table may not cover all the causes of the faults).

Fault	Possible Cause	Troubleshooting
Compressor Cannot Start	Compressor is not powered on	Latch the power supply
	Emergency button pressed	Reset the emergency button (pull out)
	Other faults	Eliminated the trouble accordingly
Motor Overload	Motor Protection Switch in-proper set	Reset the value
	Low Power supply voltage	Check power grid capacity and power lines voltage-drop
	Ventilation not adequate	Check the ambient temperature and ventilation in the compressor room
	Air discharge in high resistance	Check if there is any blockage in intercooler, aftercooler, silencer, discharge check valve, moisture separator.

Fault	Possible Cause	Troubleshooting
Air Supply Lower than Rated Discharge Pressure	Actual air consumption is higher than air-supply quantity	Reduce air consumption; check if there is any leakage in the pipeline transit
	Air filter blockage	Replace air filter element
	Inlet valve cannot fully open	Check controlling pipe, inlet valve, solenoid valve.
	Pressure sensor failure	Check the contact of sensor; If its contact is ok, replace it with a new sensor
	Venting valve does not close firmly or not in good sealing	Check inlet valve, venting valve
	Airend leakage	Check with Kaishan
Air Discharge Temperature High	High ambient temperature or bad ventilation of air compressor	Check the ambient temperature, or ventilation of air compressor itself
	Temperature sensor failure	Check the sensor connection, calibrate the sensor, or replace it with a new sensor
	Air discharge in high resistance	Check the silencer, discharge pipelines or cooler
	Bad cooling effectiveness	Clean the cooler and check the ventilation
	Unload pressure set incorrect	Calibrate once more
High Oil Temperature	Oil cooler blockage, leading to bad heat-exchange	Clean or replace with a new cooler

Fault	Possible Cause	Troubleshooting
High Oil Temperature	Oil Filter blockage	Check pressure-diff. gauge of oil filter, or replace with a new oil filter
	Temperature sensor failure	Check the sensor connection, calibrate the sensor, or replace it with a new sensor
Low Oil Temperature	Oil tank temperature is lower	Check ambient temperature
	Temperature sensor failure	Check the sensor connection, calibrate the sensor, or replace it with a new sensor
	Temperature sensor failure	Check the sensor connection, calibrate the sensor, or replace it with a new sensor
Low Oil Pressure	Low oil level	Add more oil
	oil filter blockage	Replace with a new oil filter
	Sensor failure	Check the sensor connection, calibrate the sensor, or replace it with a new sensor
No Condensate Discharge	Drain blockage	Check and clean
	Drain valve failure	Replace with a new one
	Drain pipeline blockage	Check and clean

Standard Terms and Conditions

These terms and conditions govern the sale of Products ("Rotary Screw Air Compressors and parts") and provisions of services by Kaishan Compressor USA (Seller) and its authorized representative or buyer. These terms and conditions ("Agreement") take precedence over Buyer's supplemental or conflicting terms and conditions to which notice of objection is hereby given. Neither Seller's commencement of performance or delivery shall be deemed or construed as acceptance of Buyer's supplemental or conflicting terms and conditions. Kaishan Compressor USA's failure to object to conflicting or additional terms will not change or add to the terms of this agreement. Buyer's acceptance of the Products and/or Services from Seller shall be deemed to constitute acceptance of the terms and conditions contained herein.

Orders: All orders placed by Buyer are subject to acceptance by Seller. Orders may not be

canceled or rescheduled without Seller's written consent. All orders must identify the products, unit quantities, part numbers, applicable prices and requested delivery dates of the Products being purchased. Seller may at its sole discretion allocate Product among its Buyer. Seller may designate certain Products and Services as non-cancelable, non-returnable and the sale of such Products shall be subject to the special terms and conditions contained in Seller's Customer Acknowledgement or Non-Returnable Product Form, which shall prevail and supersede any inconsistent terms and conditions contained herein or elsewhere.

Prices: The prices of the Products are those prices specified on the front of the invoice or contained within an agreed written contract. Price quotations shall automatically expire in thirty (30) days from the date issued, or as otherwise stated in the quotation.

Taxes: Unless otherwise agreed to in writing by Seller, all prices quoted are exclusive of transportation and insurance costs, duties, and all taxes including federal, state and local sales, excise and value added, goods and services taxes, and any other taxes. Buyer agrees to indemnify and hold Seller harmless for any liability for tax in connection with the sale, as well as the collection or withholding thereof, including penalties and interest thereon. When applicable, transportation and taxes shall appear as separate items on Seller's invoice.

Payment: Payment may be made by check, money order, credit card, or wire transfer (all fees are borne by the Buyer). Where Seller has extended credit to Buyer, terms of payment shall be net thirty (30) days from date of invoice, without offset or deduction. On any past due invoice, Seller may impose a monthly interest rate. If Buyer fails to make the required payments the Seller will impose the interest rate each month. If Buyer fails to make each payment when it is due, Seller reserves the right to withdraw credit and thereby suspend or cancel performance under any or all purchase orders or agreements in which Seller has extended credit to Buyer. In the event of default by Buyer, Seller shall be entitled to costs, fees, and expenses including but not limited to recovery of attorney fees, court costs and fees, and collections costs.

Delivery and Title: The locations of shipment delivery will be made according to the Seller and Buyer agreement. Title and risk of loss pass to the Buyer upon delivery of the Product to the carrier. Seller's delivery dates are estimates only and Seller is not liable for delays in delivery or for failure to perform due to causes beyond the reasonable control of the Seller, nor shall the carrier be deemed an agent of the Seller. A delayed delivery of any part of an Order does not entitle Buyer to cancel other deliveries. Kaishan Compressor USA will comply with various federal, state and local laws and regulation concerning occupational health, safety and environment concerns. Buyer has full responsibility to comply with those laws and regulations during the installation and operation of the equipment.

Acceptance / Returns: Shipments will be deemed to have been accepted by Buyer upon delivery of the said shipments to Buyer unless rejected upon receipt. Buyer shall perform all inspections and tests. Buyer deems necessary as promptly as possible but in no event later than 7 days after receipt of Products, at which time Buyer will be deemed to have irrevocably accepted the Products. Any discrepancy in shipment quantity must be reported within 7 days after receipt of Products. Buyer may not return Products without a Return Material Authorization ("RMA") number. RMA's valid for 30 days from the date issued.

Standard Warranty: Buyer will honor Product warranties and indemnities authorized by the manufacturer, including any transferable. 90 days warranty is given for service parts from receipt date. Seller warrants to Buyer that Products purchased hereunder will conform to the applicable manufacturer's specifications for such products and that any value-added work performed by Seller on such Products will conform to applicable Buyer's specifications. If Seller breaches this warranty, Buyer's remedy is limited to (at Seller's election) (1) refund of Buyer's purchase price for such Product (without interest), (2) repair of such Products, or (3) replacement of such Products provided that such Products must be returned to Seller, along with acceptable evidence of purchase within 13 days from date of delivery, transportation charges prepaid. No warranty will apply if the Product has been subject to misuse, neglect, accident or modification.

Limitation of Liabilities: Buyer shall not be entitled to, and Seller shall not be liable for, loss of profit or revenue, promotional or manufacturing expenses, overheads expenses, business interruption cost, loss of data, removal or reinstallation costs, injury to reputation of buyer, punitive damages, loss of contractor orders or any indirect, special, incidental or consequential damages of any nature. Buyer's recovery from seller for any claim shall not exceed the purchase price paid for the affected products irrespective of the nature of the claim whether in contract, tort, warranty, or otherwise. Buyer will indemnify, defend and hold seller harmless from any claims based on (a) Seller's compliance with buyer's designs, specifications, or instructions, (b) Modification of any products by anyone other than Seller, or (c) use in combination with other products not supplied by seller.

Use of Products: Unless otherwise specified. Products sold by Seller are not designed, intended or authorized for use in life support, life sustaining, nuclear, or other applications in which the failure of such Products could reasonably be expected to result in personal injury, loss of life or catastrophic property damage. If buyer uses or sales the Products for use in any such applications: (1) Buyer acknowledges that such use or sale is at Buyer's sole risk; (2) Buyer agrees that Seller and the manufacturer of the Products are not liable, in whole or in part, for any claim or damage arising from such use; and (3) Buyer agrees to indemnify, defend and hold Seller and the manufacturer of the Products harmless from and against any and all claims, damages, losses, costs, expenses and liabilities arising out of or in connection with such use or sale.

Force Majeure: Seller is not liable for failure to fulfill its obligations for any accepted Order or for delays in delivery due to causes beyond Seller's reasonable control including, but not limited to, acts of God, natural or artificial disaster, riot, war, strike, delay by carrier, shortage of Product, acts or omissions of other parties, acts or omissions of civil or military authority, Government priorities, changes in law, material shortages, fire, strikes, floods, epidemics, quarantine restrictions, acts of terrorism, delays in transportation or inability to obtain labor, materials or products through its regular sources, which shall be considered as an event of force majeure excusing Seller from performance and barring remedies for non-performance. In an event of force majeure condition, the Seller's time for performance shall be extended for a period equal to the time lost as a consequence of the force majeure condition without subjecting Seller to any liability or penalty. Seller may, at its option, cancel the remaining performance, without any liability or penalty, by giving notice of such cancellation to the Buyer.

General: (a) Seller will comply with state law for any dispute from buyer. (b) Buyer may not assign this Agreement without the prior written consent of Seller. Seller or its affiliates may perform the obligations under this Agreement. This Agreement is binding on successor and assigns, (c) Products, including software or other intellectual property, are subject to any applicable rights of third parties, such as patents, copyrights and/or user licenses.

Contact Information

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