
General oil-injected screw air compressor

USER MAUNAL
(JF10-75kW)

Ma'anshan Jufeng Compressor Manufacturing Co., Ltd.

CONTENT

| | |
|--------------------------------------------------------------------|----|
| 1. Safety precautions | 4 |
| 1.1. Electrical safety precautions | 4 |
| 1.2. Transmission component precautions | 4 |
| 1.3. High temperature and high pressure precautions | 4 |
| 1.4. Notes on unit drainage: | 5 |
| 2. Inspection and handling | 5 |
| 2.1. Compressor Product Warranty | 5 |
| 2.2. Specifications and model verification | 5 |
| 2.3. Accessories and appearance inspection | 5 |
| 2.4. Precautions for handling | 6 |
| 3. Installation | 7 |
| 3.1. Environmental requirements | 7 |
| 3.2. Installation site requirements | 7 |
| 3.3. Ventilation and cooling requirements | 7 |
| 3.4. Requirements for selecting ventilation fan air volume | 9 |
| 3.5. warn | 9 |
| 3.6. Pipeline Recommendations | 10 |
| 3.7. Electrical installation precautions and control systems | 13 |
| 4. System Introduction | 17 |
| 4.1. Overall system | 17 |
| 4.2. Composition of compressor unit | 17 |
| 4.3. Lubricating oil system | 18 |
| 4.4. Oil and gas separation system | 18 |
| 5. Controller Actions | 19 |
| 5.1. Controller Interface | 19 |

| | |
|------------------------------------------------------------------|----|
| Figure 5.1 HMI-600T/800T Controller | 19 |
| Figure 5.2 HMI-600T/800T system interface | 19 |
| 5.2. System Settings | 20 |
| 5.3. Network communication instructions | 27 |
| 5.4. Function parameter | 30 |
| 5.5. Definition and wiring diagram of control terminals | 36 |
| Figure 5.3 SP600(T) frequency conversion principle diagram | 36 |
| 5.6. Frequency conversion control operation | 36 |
| 5.7. Fault Description | 37 |
| 5.8. Security Protection | 39 |
| 5.9. Inverter Operation | 40 |
| 6. System Component Functional Description | 40 |
| 6.1. Air filter | 40 |
| 6.2. Inlet valve | 40 |
| 6.3. Oil and gas barrels | 41 |
| 6.4. Oil fine separator | 41 |
| 6.5. Safety valve | 41 |
| 6.6. Pressure maintaining valve | 42 |
| 6.7. Rear cooler | 42 |
| 6.8. Oil cooler | 42 |
| 6.9. Oil filter | 42 |
| 6.10. Air temperature sensor | 43 |
| 6.11. Pressure Sensor | 43 |
| 7. Maintenance and repair | 43 |
| 7.1. Air filter | 43 |
| 7.2. Motor bearing lubrication | 44 |

| | |
|---------------------------------------------------------------------|----|
| 7.3. Compressor bearings | 45 |
| 7.4. Air compressor lubricating oil | 46 |
| 7.5. Oil fine separator | 46 |
| 7.6. Oil return line | 47 |
| 7.7. Oil filter | 47 |
| 7.8. Pipeline joints | 47 |
| 7.9. Inlet valve | 47 |
| 7.10. Pressure maintaining valve | 48 |
| 7.11. Safety valve | 48 |
| 7.12. Discharge solenoid valve | 48 |
| 7.13. Temperature Control Valve | 49 |
| 7.14. Cooler | 49 |
| 7.15. Electrical insulation | 51 |
| 7.16. Regular inspection and cleaning | 51 |
| 7.17. Inverter Maintenance | 51 |
| 8. Safety protection and warning devices | 52 |
| 8.1. Motor overload protection | 52 |
| 8.2. Exhaust temperature too high protection | 53 |
| 8.3. Other protection and warning settings and instructions | 53 |
| 8.4. Causes and solutions of failure | 53 |
| 9. Attachment: Air compressor regular maintenance cycle table | 56 |

1. Safety precautions

Before installing and using our company's air compressor, please read this manual carefully and operate according to the instructions in its contents to prevent the occurrence of dangerous events and damage to the machine.

1.1. Electrical safety precautions

- (1) As long as the air compressor is connected to the power supply, the voltage it receives is very dangerous. Only electricians and electrical engineers who have obtained national examination certification are allowed to install it. Operators must strictly follow the operating methods in this manual and national regulations and safety specifications for safe operation.
- (2) Please do not open the door of the electric control box after power is turned on, otherwise there is a risk of electric shock.
- (3) Users and installers should provide grounding and install protective circuits for compressor units in accordance with national electrical standards.
- (4) Each single machine should be equipped with a dedicated circuit breaker, and the capacity should match the NFB to avoid danger. The specific configuration is shown in Figure 3.7.
- (5) Before performing any maintenance, make sure the power switch is off to avoid accidents.
- (6) A sign saying "Do not close the switch, someone is working" is hung on the switch.
- (7) Only after confirming that the LED display light of the inverter KPC-operation keyboard is off, can the inverter be maintained and serviced. Otherwise, the residual charge on the capacitor of the inverter will cause harm to people.

1.2. Transmission component precautions

- (1) To avoid danger, do not open the sound insulation cover before the air compressor stops running completely.
- (2) Before any disassembly or assembly work, be sure to wait until the motor and fan have completely stopped, and make sure the power has been cut off.
- (3) Avoid wearing loose clothing when doing maintenance to prevent accidents.

1.3. High temperature and high pressure precautions

- (1) For some pipes or components that may generate high temperatures (the machine is labeled with obvious warning signs), it is strictly forbidden to touch them before confirming that they have completely cooled down to prevent burns.
- (2) There may be high-pressure fluid in each component and pipeline of this machine. Before disassembling or assembling, make sure that the pressure of the unit has been completely discharged. Avoid directing high-pressure fluid toward people to avoid being injured by the high-pressure fluid.
- (3) The compressed air provided by this machine is for industrial use only. Do not breathe this air without proper treatment, otherwise it will cause human injury, illness or death.

1.4. Notes on unit drainage:

- (1) Before starting the machine each time, be sure to open the drain valves of the unit's oil and gas tank and the system's gas tank to completely drain the condensed water.
- (2) To ensure that the unit oil does not emulsify and the compressor does not get stuck due to oil deterioration.
- (3) Pay attention to regularly check the drainage function of the post-processing device and the drain device to ensure that the system can operate normally.

2. Inspection and handling

Please read the contents of this chapter carefully to protect the rights of customers. When moving, please follow the method described in 2.4 to prevent accidents and damage to the unit.

2.1. Compressor Product Warranty

MAYA screw air compressors are strictly quality-controlled and performance-tested before leaving the factory. Unless otherwise specified (subject to the product warranty), the warranty period for compressors is 18 months from the date of delivery or 12 months from the date of formal commissioning (whichever expires first) . During the product warranty period, if any quality problems or malfunctions are caused by manufacturing reasons, free product service will be provided after confirmation by our company. However, if the product is caused by uncontrollable factors such as transportation, collision, natural disasters, war , etc. , or if the product is not operated and maintained in accordance with the instruction manual, or if consumables and oil products marked as MAYA original are not used , or if the product is repaired by personnel other than our company or by maintenance service personnel designated by MAYA, the product warranty will not cover the malfunction.

It is recommended that all customers who use MAYA products should immediately notify the MAYA factory or designated dealers and repairers to eliminate the fault factors if any abnormal conditions of the unit are found that cause the compressor to malfunction. Do not modify the system by yourself to force operation and cause damage to the compressor.

2.2. Specifications and model verification

Please check whether the specifications on the nameplate of this air compressor (as shown in Figure 2.1) are consistent with the requirements of your order.

2.3. Accessories and appearance inspection

After receiving the air compressor, please check whether the attached parts are complete. If there is any defect in the production, please contact us immediately. All MAYA air compressors are randomly attached with:

- (1) One operation manual
- (2) A letter of guarantee
- (3) Two door keys
- (4) The inverter model comes with an inverter manual

2.4. Precautions for handling

Please choose an appropriate forklift or crane to transport the air compressor according to its weight. During the lifting process, it is strictly forbidden to stand under the air compressor and keep a safe distance as much as possible.



Figure 2 . 2

This model of Jufeng , JF-100HP-II-5, adopts one-piece shaft direct drive, and JF-100HP-II-5 adopts coupling drive. The motor installation form is B35 , using elastic coupling to transmit power and motion, improve the torque, and also ensure the compensation of the relative displacement of the two shafts. The tolerances of the radial circular runout of the motor flange stop to the motor axis and the circular runout of the motor flange mating surface to the motor axis are specified in Table 2.1 . When the ambient temperature is 45 °C , the maximum temperature of the motor front cover should be ≤ 95 °C .

Table 2.1

| Serial number | Flange stop diameter (mm) | Circular runout tolerance (mm) |
|---------------|---------------------------|--------------------------------|
| 1 | 60~95 | 0.0800 |
| 2 | >95~230 | 0.1000 |

| | | |
|---|----------|--------|
| 3 | >230~450 | 0.1250 |
| 4 | >450~680 | 0.1600 |

3. Installation

To ensure that the machine can be installed correctly and operate reliably, be sure to read this chapter before installation.

3.1. Environmental requirements

- (1) The air compressor is best installed in a well-ventilated and well-lit room, and avoid installation in places with high dust, high humidity, corrosive gases, metal dust, direct sunlight or direct rain.
- (2) Ambient temperature range: 0°C~45°C.
- (3) When installing outdoors, keep away from boilers and any equipment that emits high heat. A rain shelter must be provided and Maintain good ventilation environment.
- (4) mm of maintenance space around the air compressor and above the exhaust fan .
- (5) The altitude should not be higher than 1000 meters.
- (6) Relative humidity should be below 95%.

3.2. Installation site requirements

The screw compressor can be placed on any floor that can bear the weight of the compressor. No special foundation is required . The ground is flat and relatively level. However, when it is placed on a steel frame, a moving ship or a vehicle, the compressor must be fixed with foundation bolts, but rubber pads should be added to reduce the vibration of the unit.

3.3. Ventilation and cooling requirements

Whether installing an air compressor indoors or outdoors, good ventilation must be maintained to avoid short-circuiting of hot air or mutual influence of heat exhaust from the machines. Therefore, the location of the ventilation pipe, the exhaust fan, and the compressor must all be carefully considered (generally there are three ways, as shown in Figure 3.1)



Figure 3.1

Note:

- (1) Figure A: When the exhaust duct is not used for ventilation, please refer to Table 3.1 Ventilation Volume (1) for the recommended exhaust fan air volume.

Install the exhaust fan as high as possible.

- (2) Figure B: When using an exhaust duct but not installing an exhaust fan, the compressor exhaust volume must be calculated.

Pressure loss: When the pressure loss is less than 20Pa, there is no need to install an exhaust fan. Please install a detachable exhaust hose directly at the compressor exhaust port. (Customers are advised to use the ventilation design shown in Figure A and Figure C).

- (3) Figure C: When the internal pressure loss of the exhaust duct is higher than 20Pa, an exhaust fan needs to be installed. The distance between the exhaust duct and the compressor exhaust port should be between 200 and 300 mm. The recommended fan exhaust volume is shown in Table 3.1 Ventilation Volume (2). When selecting an exhaust fan, pay attention to the exhaust volume, and also consider the pressure loss in the exhaust duct and the rise in exhaust temperature.

3.4. Requirements for selecting ventilation fan air volume

Table 3.1

| Unit cooling method | Air Cooling | | | | | | | | | | |
|--------------------------------------------|---------------|------|---------|------|------|------------|------|------|-----------|------|------|
| Unit motor power KW | 5.5 | 7.5 | 11 | 15 | 18.5 | twenty two | 30 | 37 | 45 | 55 | 75 |
| Ventilation volume (1) m ³ /min | 90 | 90 | 135 | 225 | 225 | 270 | 360 | 360 | 450 | 540 | 900 |
| Ventilation volume (2) m ³ /min | 55 | 55 | 55 | 90 | 90 | 170 | 170 | 170 | 170 | 240 | 340 |
| Unit motor power KW | 90 | 110 | 132 | 160 | 185 | 200 | 220 | 250 | 315 | 355 | 400 |
| Ventilation volume (1) m ³ /min | 1125 | 1350 | 1650 | 2000 | 2300 | 2500 | 2750 | 3125 | 3950 | 4450 | 5015 |
| Ventilation volume (2) m ³ /min | 470 | 500 | 500 | 750 | 750 | 750 | 1100 | 1100 | 1100 | 1400 | 1400 |
| Unit cooling method | Water Cooling | | | | | | | | | | |
| Model KW | 37 ~90 | | 110~200 | | | 220~315 | | | 355 ~ 400 | | |
| Ventilation volume (1) m ³ /min | 250 | | 500 | | | 800 | | | 1100 | | |

3.5. warn

Compressed air and electricity are dangerous!

Before performing any work on this compressor :

3.5.1. Make sure the power is off, lock the switch and hang a tag ;


3.5.2. All pressure in the entire air compressor system has been relieved.

- (1) Do not remove any caps, install or remove any joints or devices while the machine is running. The hot liquid and compressed air contained in the machine may cause serious personal injury or even death.
- (2) The motor starter electric control box of the air compressor has a high voltage hazard. All installation work should be carried out in accordance with recognized regulations. Before working on the electrical system, ensure that the system voltage can be cut off by using the manual disconnect switch. The power supply line leading to the air compressor must be equipped with a non-fuse switch. The person responsible for the installation of this equipment must provide appropriate grounding, maintenance space and lightning protection devices for all electrical components.
- (3) The air compressor must not be operated at an exhaust pressure higher than that specified on the air compressor nameplate, otherwise the motor will be overloaded, which will cause the air compressor motor

to trip.

- (4) Only use safe solvents to clean the compressor and auxiliary equipment.
- (5) A manual shut-off valve (isolation type) should be installed in the exhaust pipe. If a safety valve is installed between the shut-off valve and the air compressor, the safety valve must have sufficient capacity to release the maximum continuous air flow of the air compressor.
- (6) Once pressure is released through the safety valve, it is because the pressure in the system is too high, and the cause of the high pressure must be found immediately.
- (7) If the air compressor lubricating oil enters the factory air system, it will have an adverse effect. Please correctly select and install post-processing equipment , such as cold dryers , fine filters (oil-gas separators) , etc., to minimize any liquid carryover in the air. It may be dangerous to use plastic shells without metal covers on pipeline filtration. From a safety point of view, metal shells should be used on any pressure system. For this reason, it is recommended that you check the factory gas system again.
- (8) The gas storage tank in the air compressor post-processing equipment should comply with the provisions of the "Pressure Vessel Supervision Regulations" issued by the Ministry of Labor of the People's Republic of China when installing and maintaining the gas tank.
- (9) , please read the instruction sticker on the control panel and this operation manual carefully and operate according to the specifications.
- (10) After completing routine maintenance work, various covers and casings must be reinstalled.

Notice : Do not start the machine when the cover is open.

warn 

Failure to adopt the above safety recommendations may result in mechanical failure, property damage, serious personal injury or even death. Any inlet and exhaust pipes connected to the inlet / outlet joints must consider factors such as vibration, pulse, temperature, maximum pressure, corrosion resistance and chemical resistance. In addition, it should be noted that there will always be a trace amount of lubricating oil in the compressed air produced by the oil-containing air compressor, so it is necessary to ensure the reasonable configuration and compatibility between the exhaust pipe, system post-processing device and on-site gas demand.

3.6. Pipeline Recommendations

3.6.1. Pipeline

The air cooler in the unit reduces the exhaust temperature to much below the dew point (under most environmental conditions), so a large amount of condensed water is precipitated. A condensate valve (drain device) needs to be installed near the exhaust outlet of the air compressor , and a discharge pipe should be connected to the condensate drainage device.

IMPORTANT: This drain should be tilted downward to work properly.

Note: To facilitate checking the working condition of the automatic drain valve, there should be a drain pipe (transparent hose) in the drain line.

The subsequent pipes will further cool the air and may produce condensed water, so a cooler should be

installed at a lower point in the pipe system.

Condensate drain valves and drains.

Key Points: The diameter of the exhaust pipe must be at least as large as the diameter of the exhaust pipe in the compressor housing. All pipes and joints must be

Suitable for the maximum operating temperature of the unit, its rated pressure should be at least the same as the rated pressure of the air compressor oil-gas separator.

It is important to carefully check the size of each joint of the air compressor. You must consider the appropriate pipe length, pipe size, number and type of joints, and valves to make the air compressor reach the highest efficiency. When installing a new air compressor, it is important to fully consider the air system of the entire plant to ensure the safety of the entire system. Condensation must be generated in the air pipeline during the air compression process. Because the water vapor in the environment is concentrated when pressurized, it is cooled in the subsequent air pipeline and condensed into water. Almost all air compressors need to remove moisture from the compressed air on the overall piping system. This work requires every customer to pay special attention when using the air compressor , designing the piping system , and daily maintenance . Some common problems caused by moisture :

- (1) If there is water in the internal system of the air compressor , the lubricating oil will be emulsified , causing the air compressor body to scale or even get stuck ;
- (2) If there is moisture in the pipes on the external system of the air compressor , the system will suffer from rust and scaling .
- (3) Blockage of the instrument ;
- (4) The control valve is stuck ;
- (5) Risk of freezing of outdoor air pipes in low temperature environments ;

Any of the above problems can cause partial or even complete shutdown of the plant. The compressed air dryer in the post-processing equipment can reduce the concentration of water vapor and prevent the formation of liquid water in the air pipeline. The combination of dryer with filter, aftercooler and automatic drain valve can effectively improve the air quality in the air system. To solve the problem of water content in the air system outside the compressor, two types of dryers can be used, namely refrigerated dryer and regenerative dryer. When the pressure dew point of compressed air is required to be between 1°C and 4°C , refrigerated dryer can generally be used, and when the pressure dew point must be below 1°C , regenerative dryer should be used. Please contact your designated distributor of MAYA, they will assist you in selecting the appropriate dryer.

Note: If there is no pulsation isolation device (such as a shared air tank), you cannot connect a rotary air compressor to a reciprocating air compression system. We recommend using separate air lines to connect two different types of air compressors to a common air tank.

When multiple air compressors are installed in parallel (optional) in a factory , a shut-off valve and a discharge drain valve should be provided for each air compressor before the shared air tank.

Notice :

(1) When multiple machines are connected in parallel, a drainage device must be installed , which is required to be installed at the rear end of the compressor air outlet .

(2) starting the air compressor each time, be sure to open the drain valves of the oil and gas tank inside the air compressor and the air storage tank of the air compressor external system to completely drain the condensed water to ensure that the unit oil does not emulsify and the compressor does not get stuck due to oil deterioration.

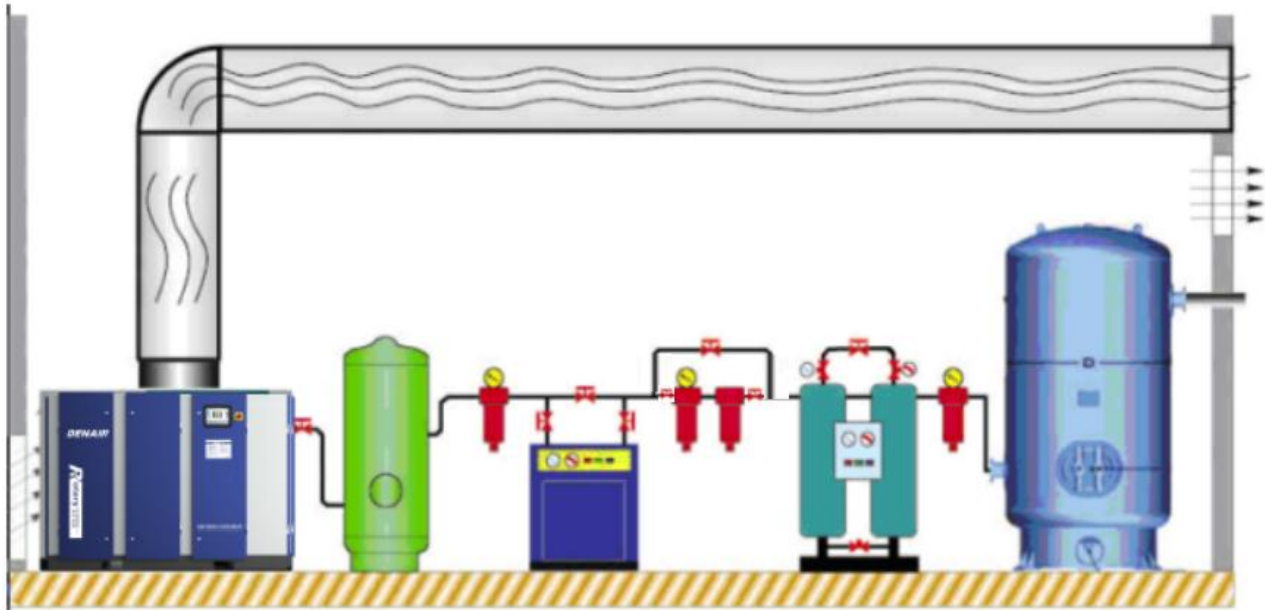
(3) the drainage function of the drain devices of various post-processing devices (equipment) in the external system of the air compressor to ensure that the internal and external systems of the entire air compressor can operate normally.

3.6.2. Recommendations for air line piping

- (1) Depending on the size of the compressor air outlet pipe, select an air compressor pipe of the same or larger size to connect the air compressor air outlet and the air storage tank to reduce pressure drop.
- (2) To facilitate future repair and maintenance, the air compressor outlet and the air tank are connected with a flange, and a shut-off valve is installed (near the air storage tank side). During future maintenance, the air compression system can be smoothly isolated without releasing the system pressure and wasting precious energy.
- (3) When implementing piping, the flexibility requirements of the pipeline should be considered to avoid the resonance of the pipeline as much as possible. The air pipeline should have a slope of at least 1/100 so that the moisture in the air pipeline can be discharged smoothly.
- (4) In order to avoid excessive condensation of water in the pipeline, which would affect the function of the equipment, a dryer with appropriate air volume is usually installed after the air barrel to remove the water and achieve the required dry air.

For the standard configuration of general air systems, please refer to the following figure.

For specific configurations for different air qualities and different applicable methods, please contact MAYA .



1 2 3 4 5 6 7 8

Figure 3.7

The numbers in the figure represent :

- | | |
|-----------------------|---------------------|
| 1. Gas tank | 5. Oil filter |
| 2. Pre-filter | 6. Adsorption dryer |
| 3. Refrigerated dryer | 7. Precision filter |
| 4. Precision filter | 8. Gas storage tank |

3.7. Electrical installation precautions and control systems

3.7.1. Control of preparatory measures for electrical installation

Before installing the electrical appliances, we recommend that you review the safety precautions at the beginning of this manual. First, find the nameplate of the compressor or the nameplate of the motor on the cover. The nameplate lists the operating pressure, maximum exhaust pressure, and the characteristics and power of the motor. Confirm that the circuit voltage is consistent with the voltage specified on the nameplate of the air compressor. Open the door of the electrical control box and confirm that all electrical appliances are connected correctly and firmly. Confirm that the control transformer supplies the correct voltage. Check whether the motor and control circuits are firmly connected. Close the door of the electrical control box again.

Please refer to the national standard JB6213.5—92 and the specifications listed in the table below to select the main power cord, grounding wire and non-fuse switch (NFB) of the air compressor with appropriate specifications to ensure the safety of electrical appliances. The power cord safety current is set under the conditions of ambient temperature of 35 °C, operating temperature below 55 °C, line length within 20 meters and 600V PVC line as the basis. When the power cord cannot meet the above setting conditions, the power cord specifications should be increased to avoid

excessive voltage drop and failure to start the air compressor, or even electrical hazards.

It is best to use an independent power system for the air compressor, and avoid using it in parallel with other power consumption systems. If used in parallel, the air compressor may be overloaded due to excessive voltage drop or unbalanced three-phase current, causing the protective device to trip. Please pay special attention to this requirement for high-power air compressors.

(1) When distributing power to the air compressor, the voltage must be correct. The grounding wire of the air compressor should be properly installed, and the grounding wire should not be directly on the air delivery pipe or cooling water pipe.

(2) The air compressor must have a grounding wire connected to the ground to prevent danger from electric leakage.

(3) Due to the size of the electric control box, a single cable should not be too thick. If the cross-sectional area of the power cable is large, two or more power cables can be used instead. When using multiple power cables, each power cable must be three-phase balanced, otherwise it will cause cable overheating and unbalanced composite voltage. The input power voltage should be kept within $\pm 10\%$ of the rated voltage, and the three-phase voltage difference must be within 3%. The air compressor must have a correct grounding wire, otherwise the noise may be connected in series to any control system and cause interference. If the grounding problem cannot be improved, the controller may experience fluctuations in temperature, current, and pressure values.

| <div>KW</div> <div>ITEM</div> | 5.5 | 7.5 | 11 | 15 | 18.5 | twenty two | 30 | 37 | 45 | 55 | 75 | 90 |
|--------------------------------------------------------|-----|------|------|------|------|---------------|-----|-----|-----|-----|-----|-----|
| Full load current A | 12 | 16.4 | 24.6 | 32.6 | 41 | 49 | 66 | 81 | 98 | 119 | 167 | 195 |
| Power line cross-sectional area mm ² | 2.5 | 4.0 | 10 | 10 | 16 | 16 | 16 | 25 | 35 | 50 | 70 | 90 |
| Ground wire cross-sectional area mm ² | 2.5 | 4.0 | 10 | 10 | 16 | 16 | 16 | 25 | 25 | 25 | 35 | 50 |
| Switch NFB (power frequency) | 50 | 50 | 70 | 70 | 100 | 100 | 125 | 125 | 200 | 225 | 300 | 300 |
| Switch NFB (Frequency Variable) | 30 | 30 | 50 | 50 | 50 | 100 | 100 | 100 | 125 | 150 | 200 | 225 |
| <div>KW</div> | 110 | 132 | 160 | 185 | 200 | 220 | 250 | 280 | 315 | 355 | 400 | / |

| ITEM | | | | | | | | | | | | |
|--------------------------------------------------------|-----|-----|-----|-----|-----|-------|-------|-------|-------|-----------|-----------|---|
| Full load current A | 235 | 280 | 336 | 377 | 432 | 460 | 521 | 588 | 655 | 738 | 830 | / |
| Power line cross-sectional area mm ² | 120 | 150 | 185 | 240 | 240 | 150*2 | 150*2 | 185*2 | 185*2 | 240* 2 | 240* 2 | / |
| Ground wire cross-sectional area mm ² | 70 | 70 | 95 | 120 | 120 | 150 | 150 | 185 | 185 | 240 | 240 | / |
| Switch NFB (power frequency) | 400 | 400 | 500 | 500 | 600 | 700 | 800 | 1000 | 1000 | 120 0 | 1200 | / |
| Switch NFB (Frequency Variable) | 250 | 400 | 400 | 500 | 500 | 500 | 600 | 700 | 800 | 900 | 1000 | / |

Note:

(1) Voltage specification: 380V, 50/60HZ

(2) For portable electrical appliances , when the grounding wire is placed together with the power cord in a hose or cable, it shall be treated in the same manner as the power cord.

Wire diameter.

(3) The power installation of the air compressor must be completed by a professional electrician. Make sure that the power supply is a three-phase four-wire system. Please strictly check the wiring position of U, V, W, and N. If the N line (neutral line) is mistakenly connected to the live line, all control circuits will be burned .

3.7.2. Drive Motor

The correct direction of the air compressor drive motor is counterclockwise when viewed from the drive end. When checking the direction of the air compressor motor, the motor inching time should be as short as possible. After pressing the start button, immediately press the "Emergency Stop" button. If the motor rotates in the wrong direction, the main switch should be turned off, locked and a signboard " Do not close the switch, someone is working " should be hung. Open the electric control box door, swap any two connectors (R, S, T) on the starter , close and tighten the electric control box door, and check the motor direction again.

3.7.3 Fan Motor

Observe whether the fan exhausts air to the outside of the unit. If the direction is incorrect, turn off the main power switch, lock it and hang a sign saying "Do not close the switch, someone is working" . Please swap any two terminals on the fan contactor, then close and lock the electric control box door,

and check the direction.

3.7.4 Frequency conversion control system

➤ Frequency conversion start

The controller controls the inverter output frequency to increase from 0Hz to 50Hz, and the motor speed runs from 0 to the rated speed. During this period, the intake valve opens, the discharge valve closes, the discharge solenoid valve is energized, and the pressure in the oil and gas barrel increases.

➤ Frequency conversion operation

When the pressure in the oil and gas tank rises to a certain value, the pressure maintaining valve opens and air is output. The control system performs PID closed-loop control on the output frequency of the inverter based on the feedback of the set pressure and output pressure to accurately stabilize the output pressure of the air compressor.

➤ Loaded / Empty/Sleeping

When the inverter output frequency drops to the lowest frequency set by the air compressor, the pressure continues to rise until the unloading pressure setting value is reached. The discharge solenoid valve starts to release air, the air inlet valve closes, and air enters from the bypass line. The pressure in the oil and gas barrel begins to release. At this moment, the pressure maintaining valve closes quickly to isolate the system pressure. The pressure in the oil and gas barrel continues to release to a certain value, that is, the empty vehicle pressure, to provide the power required for the oil circulation. At this time, air enters from the bypass line, is compressed by the compressor, and is released by the discharge solenoid valve. This cycle is the empty vehicle operation. When the empty vehicle operation time reaches the sleep judgment time, the air compressor begins to enter the sleep state. At this time, the motor and fan stop running to save electricity. When the pressure drops to the sleep wake-up pressure, the air compressor automatically restarts and runs in this cycle.

➤ Downtime

After pressing the stop button, the release solenoid valve starts to release air, the air intake is closed, the pressure maintaining valve is closed, and the pressure in the oil and gas barrel begins to release and is isolated from the system pressure. When the pressure in the barrel is released to the empty vehicle pressure, the motor stops running, and the motor stops after 20 seconds. The pressure in the oil and gas barrel continues to release to zero.

➤ High temperature tripping or motor overload

When the exhaust temperature exceeds 105 °C or the motor is overloaded and the overcurrent protection device is activated, the power supply will be cut off and the motor will

stop immediately. At the same time, the air intake valve will be closed, the discharge valve will be fully opened, the pressure maintaining valve will be closed , and the pressure in the oil and gas tank will be released to zero. Only when an abnormal situation occurs during the operation of the unit, is it allowed to press the emergency stop button, otherwise it will easily cause system failure.

➤ **Automatic shutdown system and restart time setting for no-load idling for too long**

When the amount of air used in the system decreases, the compressor keeps running under no-load conditions. If the no-load running time exceeds the set time, the air compressor will automatically shut down and the motor will stop running. When the amount of air used in the system increases, the system pressure will decrease, and the air compressor will automatically start to replenish the air. The air compressor controller has another setting for the shutdown time when the no-load operation is too long . The air compressor can only be started again five minutes after the motor stops.

3.7.5 Electrical circuits

The electrical control of the air compressor can be divided into two systems, one is the internal control system; the other is the starter disk. The starter disk is a variable frequency starter control commonly used in general machinery. The control part is electronic control. Since the internal circuit and control of the electronic control part are relatively complex, it will not be introduced in depth in this chapter. If there is any loss or failure, please contact the MAYA Customer Service Center directly.

4. System Introduction

4.1. Overall system

This air compressor unit is a motor-driven, single-stage compression screw air compressor unit, plus the post-processing device of the external system (air storage tank , cold dryer, filter) , forming a complete internal and external system of the air compressor.

4.2. Composition of compressor unit

The internal system of the air compressor unit consists of the following main components:

- (1) Inlet filter
- (2) Motor
- (3) compressor
- (4) Oil fine separator
- (5) Pressure maintaining valve

(6) Aftercooler assembly

(7) Oil and gas barrels

Air enters the air compressor and then passes through the air intake filter and the air intake valve. The compression of the screw air compressor is generated by the meshing of a pair of spiral rotors (one male and one female). The two rotors are mounted on two parallel shafts and installed in a high-strength cast iron housing. The air inlet and outlet are located at both ends of the housing. The groove of the female rotor meshes with the male rotor and is driven by it. The exhaust end uses a bearing to avoid axial movement of the rotor. The oil-gas mixture is discharged from the main exhaust port and enters the oil-gas separation system. The system is self-contained in the oil-gas separator, removes most of the lubricating oil, returns to the system after cooling, and only leaves a few PPM of oil content, which enters the post-cooling system with the compressed air. The post-cooling system consists of a heat exchanger and a drainage device. The exhaust air is cooled, and the water vapor originally contained in the air will condense a lot and be discharged in the pipeline and equipment terminal behind the unit. When unloading operation, the air intake valve is closed, the discharge valve is opened, and the compressed air returns to the air intake valve through the bypass.

4.3. Lubricating oil system

Under pressure, the lubricating oil flows from the oil-gas separator and the oil-gas barrel to the cooler inlet and the bypass port of the thermal control valve. The thermal control valve controls the compressor exhaust temperature to be above the dew point. When the air compressor is started from a cold engine, part of the lubricating oil bypasses the cooler. When the system temperature rises above the set value of the temperature control valve, the lubricating oil will flow through the cooler. When the unit is running in a high temperature environment, all the lubricating oil flows through the cooler. The outlet temperature of the oil cooler of the air compressor is controlled to eliminate the possibility of water vapor condensing in the oil-gas separator. By maintaining a sufficiently high oil outlet temperature, the temperature of the oil-gas mixture discharged from the unit can be kept above the dew point. The temperature-controlled lubricating oil enters the body after being filtered through the oil filter under constant pressure.

4.4. Oil and gas separation system

The oil-gas separation system consists of an oil-gas barrel with a specially designed internal structure, a two-stage gathering separation core and a cooling oil recovery device. The basic working principle of the oil-gas barrel : When the oil and gas enter through the inlet, the oil droplets in the oil-gas mixture can be separated by hitting the barrel wall. The oil-gas barrel adopts the centrifugal principle and relies on the gravity of the oil droplets to separate the oil droplets with larger diameters from the gas. Oil droplets with a diameter greater than 1um can be effectively separated by the centrifugal principle.

Using the principle of centrifugal action, it can be seen that when the oil-gas mixture is acted upon by centrifugal force, the oil molecules are controlled within a certain flow rate range so that the oil droplets

fall to the bottom of the oil and gas barrel during the discharge process, which can reduce the oil content of the air discharged.

Notice :

When your air compressor is water-cooled, please install a Y-shaped filter in front of the water inlet of your air compressor, otherwise it may cause the water cooling system of your air compressor to malfunction.

5.Controller Actions

5.1. Controller Interface



Figure 5.1 HMI-600T/800T Controller

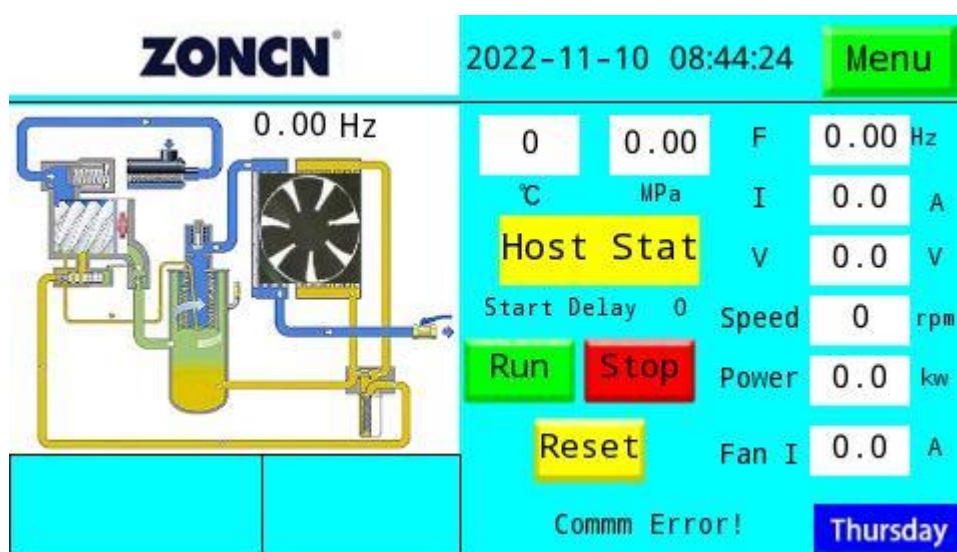


Figure 5.2 HMI-600T/800T system interface

5.2. System Settings

(1) System main interface

① After the system is started, the main interface is entered to display the main operating commands (start, stop and reset) and operating parameters (temperature, pressure, output frequency, output current, output voltage, output speed, output power, fan current) of the air compressor.

② The lower left corner has multiple fault display functions; when the communication between the touch screen and the inverter is interrupted, the communication fault is displayed at the bottom of the reset button.

③ Current time display: the lower right corner displays the current year, month, day and week. Press and hold the "year" display for 3 seconds to enter the time adjustment mode.

(2) System main menu

Click the "Menu" option in the upper right corner, and the pop-up main menu includes options such as user parameters, timing control, error records, maintenance parameters, manufacturer parameters and manufacturer information.

You need to enter a password to enter some menus, including "User Set", "Timer", "Maintain" and "Manu factor" as shown in Figure 4:

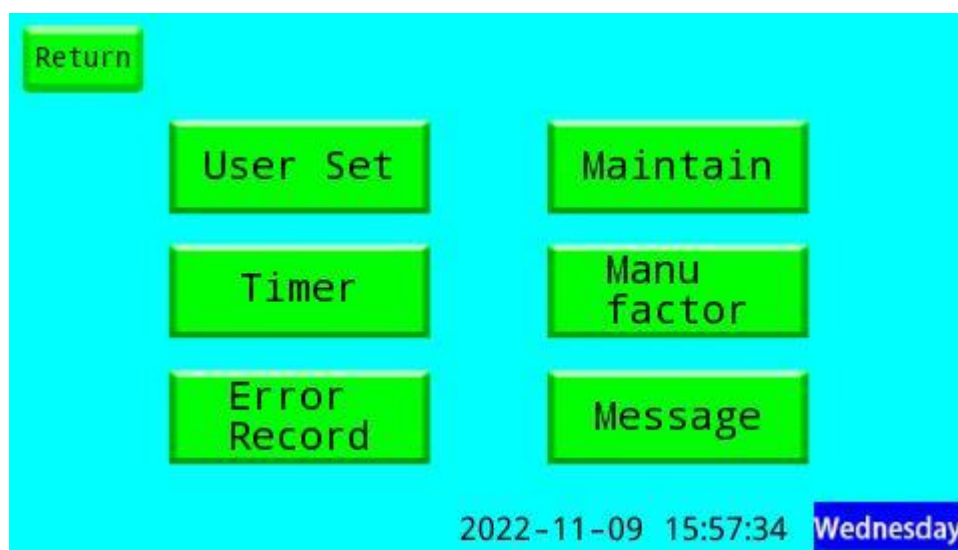


Figure 4 Main menu

(3) User parameters

Click the "User Set" option, and the "Password" interface pops up. Enter the password

to enter the parameter interface, as shown in Figure 5

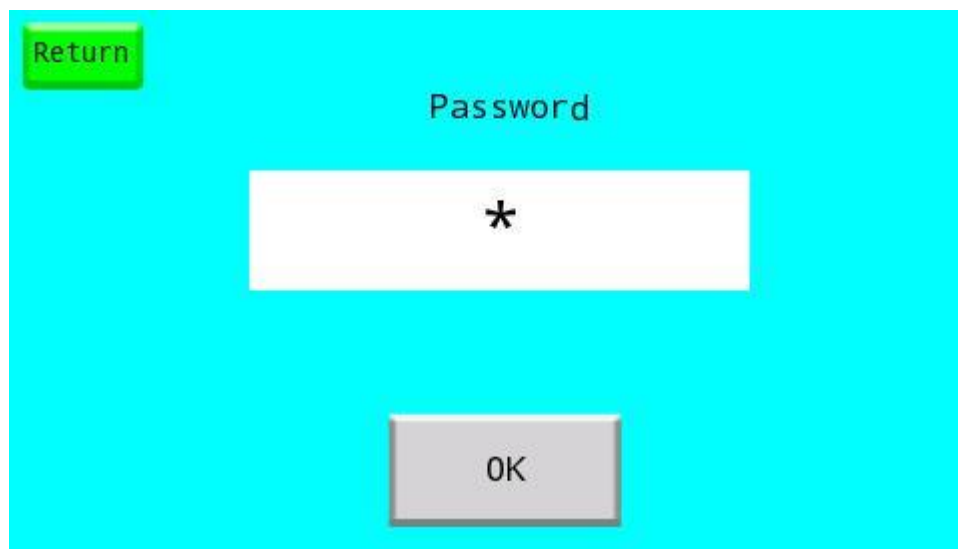


Figure 5 Password input

Enter the password to enter the "User Parameters" interface, where users can set delay, pressure and fan control parameters, as shown in Figure 6

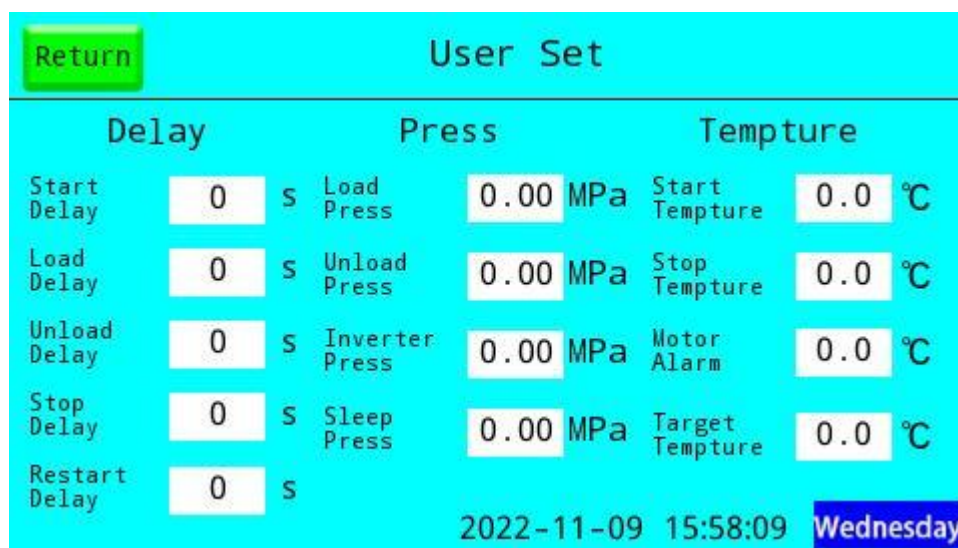


Figure 6 User parameters

(5) Timing control

The "timing control" function can set the system's scheduled startup and shutdown time in units of weeks to achieve fully automated operation of the system. After entering the time setting value in the corresponding input box, click the corresponding tick "√" to complete the setting; when this function is not used, all tick "√"s are not selected; as shown in Figure 7:

Return

Timer

| | | | | | | | | | | | |
|-----|--------------------------|----|--------------------------------|---|--------------------------------|---|-----|--------------------------------|---|--------------------------------|---|
| Mon | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |
| Tue | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |
| Wed | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |
| Thu | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |
| Fri | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |
| Sat | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |
| Sun | <input type="checkbox"/> | ON | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M | OFF | <input type="text" value="0"/> | H | <input type="text" value="0"/> | M |

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Wednesday

Figure 7 Timing control settings

(6) Fault record query

Click "Error Record" to pop up the Fault Record interface, which records the system fault type and fault time, as shown in Figure 8:

Return

Error Record

Clear Error

| | | |
|--|--|--|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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Wednesday

Figure 8 Fault record

(7) Maintenance parameters

Click the "Maintain" option, and the Password Input interface pops up. Enter the password to enter the maintenance parameter interface, as shown in Figure 9

| | SET | | CUR | | Manu. |
|-------------------|-----|----------------------|-----|---------------|-------|
| Air Filter Set | 0 | H Air Filter Used | 0 | H Load Time | 0 H |
| Oil Filter Set | 0 | H Oil Filter Used | 0 | H Unload Time | 0 H |
| Separator Set | 0 | H Separator Used | 0 | H Kwh Use | 0 kwh |
| Lubricate Oil Set | 0 | H Lubricate Oil Used | 0 | H | |
| Grease Set | 0 | H Grease Used | 0 | H | |

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Figure 9 Maintenance parameters

(8) Manufacturer parameters

Click "Manu factor" and the Password Input interface will pop up. Enter the password to enter the Manufacturer parameter interface, as shown in Figure 10

| | | Return | next page | Manu factor | Detection temp |
|------------------|----------|--------|-----------|-------------------|----------------|
| Stop Press | 0.00 MPa | | | Press Range | 0.00 MPa |
| Stop Temp | 0.0 °C | | | Temp | 0.0 % |
| Upper Limit Freq | 0.00 Hz | | | Fan motor I ratio | 0.0 % |
| Low Limit Freq | 0.00 Hz | | | Kwh Ratio | 0 % |
| Run Time | 0 H | | | Fan Motor | 0.00 A |
| Fan Min Freq | 0.00 Hz | | | Alarm | ON |

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Figure 10 Manufacturer parameters

The main functions include: motor debugging, advanced parameter setting, keyboard simulation and other parameters.

① Motor debugging

Click "Motor Debug" to enter the "Motor Debug" interface, as shown in Figure 11:

Return **Motor Debug**

| | | | | | |
|---------------|---------|------------------|---------|----------------|---------|
| Max Freq | 0.00 Hz | Upper Limit Freq | 0.00 Hz | Low Limit Freq | 0.00 Hz |
| Motor Type | 0 | Rated Power | 0.0 kW | Rated V | 0 V |
| Rated Current | 0 A | Rated Freq | 0.00 Hz | Rated Speed | 0 rpm |
| Back EMF | 0.0 V | Acc Time | 0.0 S | Dec Time | 0.0 s |
| Rs | 0 Ω | Ld | 0 mH | Lq | 0 mH |

Study **Jog On** **Jog Off** **Fan On** **Fan Off**

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Figure 11 Motor parameters

The main functions include: setting motor-related parameters, motor self-learning, inching test and fan start and stop control.

② Motor self-learning

Click "Study". When the motor is stopped, the system automatically performs self-learning on the motor. After learning is completed, the system prompts "Studying!". If learning fails, the system prompts "Study Error". The interface is shown in Figure 12:

Return **Study State** **Studying!**

| | | |
|-----------|-----|---|
| Output I: | 0.0 | A |
| Output V: | 0.0 | V |

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Figure 12 Motor self-learning

After successful learning, click the return button to enter the motor debugging interface. The "Jog On" is used to test the direction of the motor. It runs at 10Hz by default. Pay attention to whether the motor direction is correct. If the direction is wrong, click the "Jog Off" button in

time, replace the motor cable, and repeat the above steps to debug the motor.

To debug the fan, click "Fan On" and observe whether the fan direction is correct. If it works normally, click "Fan Off" to stop running and return to the main interface. If it runs in the reverse direction, swap any two fan wires.

Note: The fan debugging function works normally only for DP500 model.

③ Other parameters

Click the "Other Para" button to enter the system parameter interface for modifying the manufacturer password and user password, as shown in Figure 13:



Figure 13 System parameters

The factory information and password can be modified, and multiple languages are available.

④ Advanced parameters, as shown in Figure 14:

Return

VFB Parameters (no decimal point)

Function Code

0

Data

0

Examples:

- 1.If modifying P0.17=10.00, set "Function Code"=17 and "Data"=1000.
- 2.For P1.XX, set "Function Code"=1XX.
- 3.For PA.XX, set "Function Code"=10XX.
- 4.For PB.XX, set "Function Code"=11XX.
- 5.For PC.XX, set "Function Code"=12XX.
- 6.For LS.XX, set "Function Code"=165XX.
- 7.For D0.XX, set "Function Code"=112XX.

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Figure 14 Advanced parameters

Can simulate keyboard to modify inverter host parameters.

(9)Manufacturer information, as shown in Figure 15:

Return

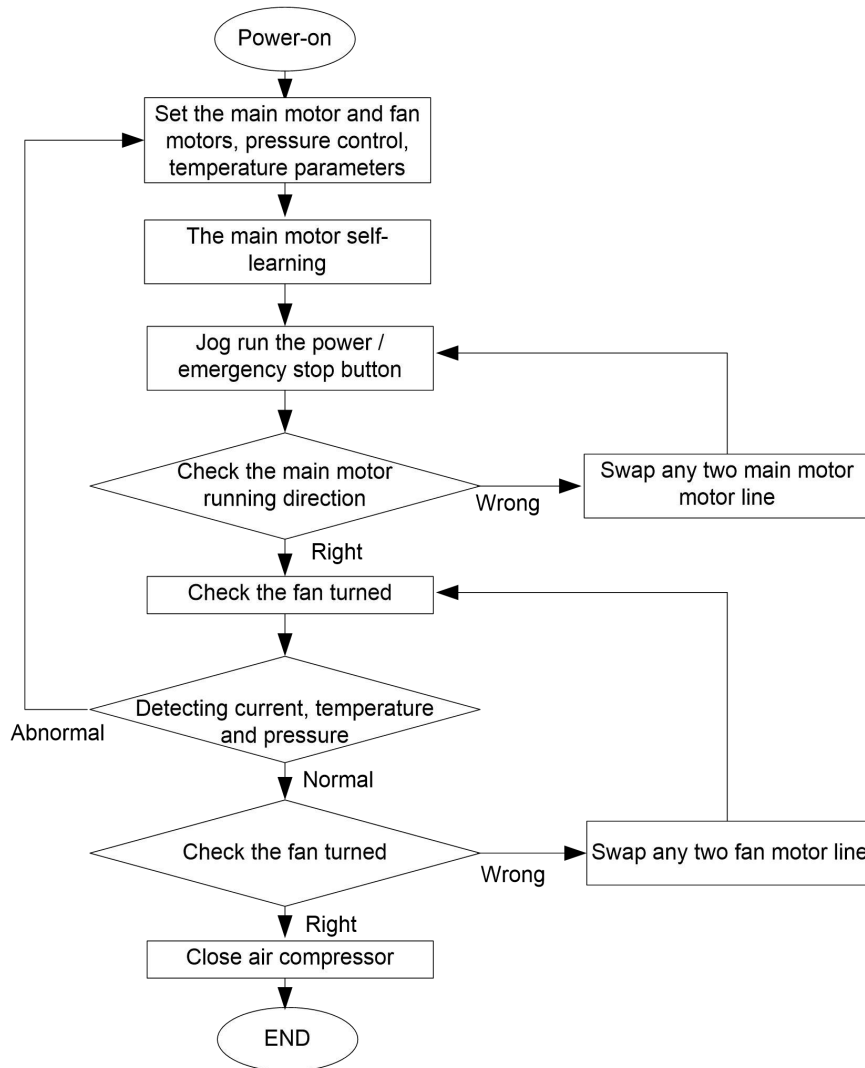
Message

| | | | | |
|--------------|-----|---|-------------------|--------|
| Running Time | 0 | H | Production Number | |
| | 0 | M | Production Date | |
| Vrs | 0.0 | V | | |
| Vst | 0.0 | V | Motor | 0.0 °C |
| Vtr | 0.0 | V | | |

V059.01
3.0.925.0
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Figure 15 Manufacturer information

System debugging/operation



5.3. Network communication instructions

The controller can be set as "linked slave" or "linked master" to perform multi-unit collaborative linkage operations. When the host encounters a shutdown failure or the rotation time is up, it selects a slave with a larger station number than the host from all online slaves and sends a "master change command" to it, setting it as the master and itself as a slave. The communication used for linkage operations is the standard Modbus RTU method. Up to 16 control units can be connected online. When the controller is set as a "linked slave", it accepts access from the host computer. When the controller is set as a "linked master", it accesses the following registers of the slave.

Expansion card hardware: RS+, RS- are A and B of 485 communication terminal respectively.

Protocol standard: MODEBUS

Control motherboard: KB1KZ02B

Logic control software version: V20.02

Data format: 8N1 address; 1

| address | content | | Read and Write | Correspondence address |
|---------|----------------------------------------|---------------------------------------------|----------------|------------------------|
| | | | | |
| | | | | |
| | | | | |
| 2000H | In communication mode, startup command | 0AH: Startup 01H Stop 10H Reset fault | Write only | 48193 |
| | | | | |
| | | | | |

Function code 03 Read register data, 1 or more

06 Write a data to the register

The function code is the address: For example, the function code P0.13 corresponds to the customer address 40001+13

For function codes, refer to another document.

| | | | | |
|-------|-------------------------|---------|-----------|--------------|
| | | | | |
| P0.00 | Display Selection | 0-32 | Read-only | 40001 |
| P0.01 | Setting frequency | 0.01Hz | Read-only | 40002 |
| P0.02 | Output frequency | 0.1Hz | Read-only | 40003 |
| P0.03 | Output Current | 0.1A | Read-only | 40004 |
| P0.04 | Operating speed | 1rpm | Read-only | 40005 |
| P0.05 | DCV | 0.1V | Read-only | 40006 |
| P0.06 | Inverter temperature | 1°C | Read-only | 40007 |
| P0.07 | Air compressor pressure | 0.01MPa | Read-only | 40008 |
| P0.08 | Run time | 1hour | Read-only | 40009 |
| P0.09 | Output voltage | 0.1V | Read-only | 40010 |

| | | | | |
|-------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|
| P0.10 | PID stage status | 0: Start delay 1: Loading delay 2: Running 3: Pressure relief 4: Sleeping 10: Shutdown delay 11: Standby 12: Restart delay 13: Faulty | Read-only | 40011 |
| P0.11 | PID phase timing | 1s | Read-only | 40012 |
| P0.13 | Head temperature | 1℃ (PT1+/PT1-) | Read-only | 40014 |
| P0.14 | Inverter failure | Bit0: Inverter fault Bit1: Air compressor overheating Bit2: Air compressor overpressure Bit3: Emergency stop Bit4: Fan status Bit5: Phase sequence fault Bit6: Pressure sensor failure (<2Ma) Bit7: Motor overheating Bit8: Motor failure Bit9: Communication failure Bit10: Solenoid valve Bit11: Reserved Bit12: Fan motor overcurrent alarm Bit13: Fan frequency conversion alarm | Read-only | 40015 |
| P0.15 | Air filter usage time | 1hour | Read-only | 40016 |
| P0.16 | Oil filter usage time | 1hour | Read-only | 40017 |
| P0.17 | Separator used time | 1hour | Read-only | 40018 |
| P0.18 | Lubricant usage time | 1hour | Read-only | 40019 |
| P0.19 | Grease usage time | 1hour | Read-only | 40020 |
| P0.20 | power | 0.1KW | Read-only | 40021 |
| P0.21 | Motor temperature | 1℃ (PT2+/PT2-) | Read-only | 40022 |
| P0.22 | Total running time | 1hour | Read-only | 40023 |
| P0.23 | Total loading time | 1hour | Read-only | 40024 |
| P0.24 | Total uninstall time | 1hour | Read-only | 40025 |

| | | | | |
|--------------|---------------------------------|---------------------------------------------------------|------------------|-------|
| P0.25 | Fan current | 0.0A | Read-only | 40026 |
| P0.26 | Power | 1kwh | Read-only | 40027 |
| P0.27 | Fault Codes | Inverter fault code | Read-only | 40028 |
| P0.28 | Inverter status | 1: Forward operation 2: Reverse operation 3: Stop | Read-only | 40029 |
| P0.29 | Running minutes | | Read-only | 40030 |
| P0.30 | Run for 10 minutes | | Read-only | 40031 |
| P0.31 | Fan frequency | | Read-only | 40032 |
| P0.32 | Main inverter fault code | | Read-only | 40033 |
| | | | | |
| | | | | |

5.4. Function parameter

| P0 Group Monitoring parameters | | | |
|--------------------------------|-------------------------|--------------------|------------|
| Function code | Function | Accuracy | Data Types |
| P0.00 | Display Selection | 0-32 | Read-only |
| P0.01 | Setting frequency | 0.01Hz | Read-only |
| P0.02 | Output frequency | 0.1Hz | Read-only |
| P0.03 | Output Current | 0.1A | Read-only |
| P0.04 | Operating speed | 1rpm | Read-only |
| P0.05 | DCV | 0.1V | Read-only |
| P0.06 | Inverter temperature | 1℃ | Read-only |
| P0.07 | Air compressor pressure | 0.01MPa | Read-only |
| P0.08 | Run time | 1hour | Read-only |
| P0.09 | Output voltage | 0.1V | Read-only |
| P0.10 | PID Stage Status | 0: Start delay | Read-only |
| | | 1: Loading Delay | |
| | | 2: Running | |
| | | 3: Pressure relief | |
| | | 4: Sleeping | |
| | | 10: Shutdown delay | |
| | | 11: Standby | |
| | | 12: Restart delay | |
| | | 13: Faulty | |

| | | | |
|------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------|-----------|
| P0.11 | PID Timing of each stage | 1s | Read-only |
| P0.13 | Head temperature | 1℃ (PT1+/PT1-) | Read-only |
| P0.14 | Inverter failure | Bit0: Inverter fault | Read-only |
| | | Bit1: Air compressor overheating | |
| | | Bit2: Air compressor overpressure | |
| | | Bit3: Emergency stop | |
| | | Bit4: Fan status | |
| | | Bit5: Phase sequence fault | |
| | | Bit6: Pressure sensor failure (<2Ma) Bit7: Motor overheating PT100 | |
| | | Bit8: Motor failure PTC | |
| | | Bit9: Communication fault | |
| | | Bit10: solenoid valve | |
| | | Bit11: reserve | |
| | | Bit12: Fan motor overcurrent alarm Bit13: Fan frequency conversion alarm | |
| P0.15 | Air filter usage time | 1hour | Read-only |
| P0.16 | Oil filter usage time | 1hour | Read-only |
| P0.17 | Separator used time | 1hour | Read-only |
| P0.18 | Lubricant usage time | 1hour | Read-only |
| P0.19 | Grease usage time | 1hour | Read-only |
| P0.20 | power | 0.1KW | Read-only |
| P0.21 | Motor temperature | 1℃ (PT2+/PT-) | Read-only |
| P0.22 | Total running time | 1hour | Read-only |
| P0.23 | Total loading time | 1hour | Read-only |
| P0.24 | Total uninstall time | 1hour | Read-only |
| P0.25 | Fan current | 0.0A | Read-only |
| P0.26 | Power | 1kwh | Read-only |
| P0.27 | Fault Codes | Inverter fault code | Read-only |
| P0.28 | Inverter status | 1: Forward operation 2: Reverse operation 3: Stop | Read-only |
| P0.29 | Running minutes | | |
| P0.30 | Load Minutes Timing | | |
| P0.32 | Main inverter fault code | | Read-only |
| P1 Group Basic parameters of the host and motor parameters | | | |

| Function code | Function | scope | Factory value |
|------------------------------|----------------------------|-------------------------------------------|-----------------|
| P1.00 | Keyboard setting frequency | 0~P1.05 | 00.00Hz |
| P1.01 | Control method | 0: None PG Vector | 0 |
| | | 1: V/F control | |
| P1.02 | Frequency setting | 0: KEY | 0 |
| | | 1: FIC: 4-20mA | |
| | | 2: RS485 communication | |
| P1.03 | How it works | 0: KEY | 0 |
| | | 1: I/O | |
| | | 2: Communication control | |
| P1.04 | Reverse enable | 0: Disable reverse | 0 |
| | | 1: Can be reversed | |
| P1.05 | Upper frequency | 50.00Hz | 50.00Hz |
| P1.06 | Lower frequency | 00.00Hz | 00.00Hz |
| P1.07 | Acceleration time | change | 30.00s |
| P1.08 | Deceleration time | change | 30.00s |
| P1.09 | Parking options | 0-slow down and stop; 1-Free parking | 0 |
| P1.12 | Power factor | 0~200.0% | 100.00% |
| P1.13 | Carrier | 1.0-16.0k | change |
| P1.17 | Restore factory settings | Restore factory settings = 08 | 0 |
| P1.18 | Unlock Parameters | 0: Parameter unlocked 1: Parameter locked | 0 |
| P1.19 | Inverter maximum frequency | Motor rated frequency ~500.00hz | 50Hz |
| Main engine motor parameters | | | |
| P1.20 | Motor Type | 0-asynchronous; 2-synchronous | Reference motor |
| P1.21 | Motor rated power | 0.1~1000.0kW | Reference motor |
| P1.22 | Motor rated voltage | 0~690V | Reference motor |
| P1.23 | Motor rated current | 0.01~655.35A | Reference motor |
| P1.24 | Motor rated frequency | 0.00~500.00HZ | Reference motor |

| | | | |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| P1.25 | Motor rated speed | 0~65536rpm | Reference motor |
| P1.26 | Motor back EMF | 0~380V | Reference motor |
| P1.28 | Rated current of fan | When a variable frequency fan is selected, the current inverter is read. | Reference motor |
| P1.29 | Fan minimum frequency percentage | 0-100.0% | 40.00% |
| P1.30 | Motor self-learning | 1: Static 2: dynamic | 0 |
| P1.31 | Stator resistance RS | | |
| P1.32 | LD | | |
| P1.33 | LQ | | |
| P1.34 | Inverter function code | | |
| P1.35 | Inverter data | | |
| P2 Group Multi-function output | | | |
| F2.30 | Fan switch mode | 0: Automatic; 1 Open; 2 close | 0 |
| P2.34 | Motor temperature alarm threshold temperature | 0~200℃ | 125℃ |
| P2.29 | | 0: Load countdown after running and run at the minimum frequency. When the countdown is up, the loading action starts and the frequency starts to increase; | 0 |
| | | 1: Load countdown after running, PID The frequency starts to increase, and when the timer is up, | |
| | | Load Action | |
| P4 Group Multi-function input/output | | | |
| P4.00 | S1 Function | 0: No function | 8 |
| | | 1: Forward operation | |
| | | 8: Emergency stop normally closed | |
| P4.01 | S2 Function | | 0 |
| P4.02 | S3 Function | 33: Motor overheat protection | 33 |
| P4.13 | FIC Minimum input | 0.00V~P4.15 | 2.00V |
| P4.15 | FIC Maximum input | P4.13~10.00V | 10.00V |
| P5 Group air compressor constant pressure control dedicated parameters (setting P6.00=1 Valid at | | | |
| P5.00 | Frequency conversion pressure | P5.02~P5.01 | 7.00kgf/cm2 |
| P5.01 | Unloading pressure | P5.00~P5.03 | 8.00kgf/cm2 |

| | | | |
|------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------|
| P5.02 | Loading pressure | 0~P5.00 | 6.50kgf/cm2 |
| P5.03 | Stop pressure | P5.01~30.00kgf/cm2 | 10.00kgf/cm2 |
| P5.04 | Pressure gauge range | 0.00~30.00kgf/cm2 | 16.00kgf/cm2 |
| P5.05 | Wind start temperature | Wind stop temperature ~120.0C°C | 80°C |
| P5.06 | Wind stop temperature | 0~Wind start temperature | 70°C |
| P5.07 | Shutdown temperature | Wind start temperature ~180°C | 100°C |
| P5.08 | Start delay | 0~100s | 3s |
| P5.09 | Loading Delay | 0~3000s | 20s |
| P5.10 | Unload Delay | 0~3000s | 120s |
| P5.11 | Restart Delay | 0~3000s | 5s |
| P5.12 | Stop delay | 0~3000s | 30s |
| P5.22 | Fan current coefficient | | 1000 |
| P5.53 | L,N Function | 0: No function; 1: Running; 2: Failure barrier; | 10>Loading) |
| P5.54 | Three-phase 380V fan | 10: Loading; 11: Air compressor fan | 11 |
| P6 Group | | | |
| P6.00 | The constant pressure control method of air compressor is effective | 0- invalid | 0 |
| | | 1- efficient | |
| P6.02 | Fan frequency conversion temperature | | 75.0°C |
| P6.07 | PID-P | 0.0~200.0 | 100 |
| P6.08 | PID-I | 0.0~200.0s | 0.5s |
| P6.10 | PID step size | 0.00~10.00Hz | 2.50Hz |
| | | 0: No alarm; | |
| P621 | PID Feedback loss alarm mode | 1: Alarm without stopping, alarm code "20" | 0 |
| | | 2: Alarm shutdown: fault code "20" | |
| | | Range: 0-10.00V | |
| P622 | PID Feedback loss detection value | (If you select 4~20mA, Less than 2mA If the line is disconnected, set P622=2mA*500 Ohm = 0.50V) | 1.00V |
| P623 | PID Feedback loss detection time | 0.0s~20.0s | 1.0S |
| P8 Group Advanced Parameters | | | |
| P8.00 | P8 Group Lock | 0- Locked 1- Unlocked | 1 |
| P8.13 | Phase sequence | 0-1000 | 300 |

| | | | |
|--------------------------------------|-------------------------------|-------------------------------------------------|------|
| | detection times | | |
| P8.14 | Temperature correction factor | 0-200.0% | 100% |
| P8.15 | Inverter Type | 0- synchronous machine, 1- Asynchronous machine | 0 |
| P8.16 | Fan working mode | 1 | 1 |
| P9 Group | | | |
| P9.12 | Input phase loss | 0-off, 1-on | |
| P9.13 | Phase sequence protection | 0-off, 1-on | |
| Air compressor controller fault type | | | |
| H-OP | | Overpressure alarm | |
| H-OH | | Over temperature alarm | |
| NOTO | | Motor overheat protection | |
| ES | | Emergency Stop | |
| CO | | Communication fault (inverter) | |
| PHAS | | Phase sequence fault | |
| NNA | | Pressure sensor disconnection failure | |
| oeLh | | Motor over temperature alarm | |
| Host frequency conversion failure | | | |
| oC1 oC2 oC3 | | Overcurrent | |
| oU1 oU2 oU3 | | Overpressure | |
| LU | | Undervoltage | |
| CBC | | Fast current limiting timeout | |
| Lo | | Output phase loss | |
| oL1 | | Motor overload | |
| oL2 | | Inverter overload | |
| oH | | Inverter overheating | |
| IE | | Current detection abnormality | |
| CE | | Communication timeout | |
| EF | | External fault | |
| RAY | | Relay abnormality | |

5.5. Definition and wiring diagram of control terminals

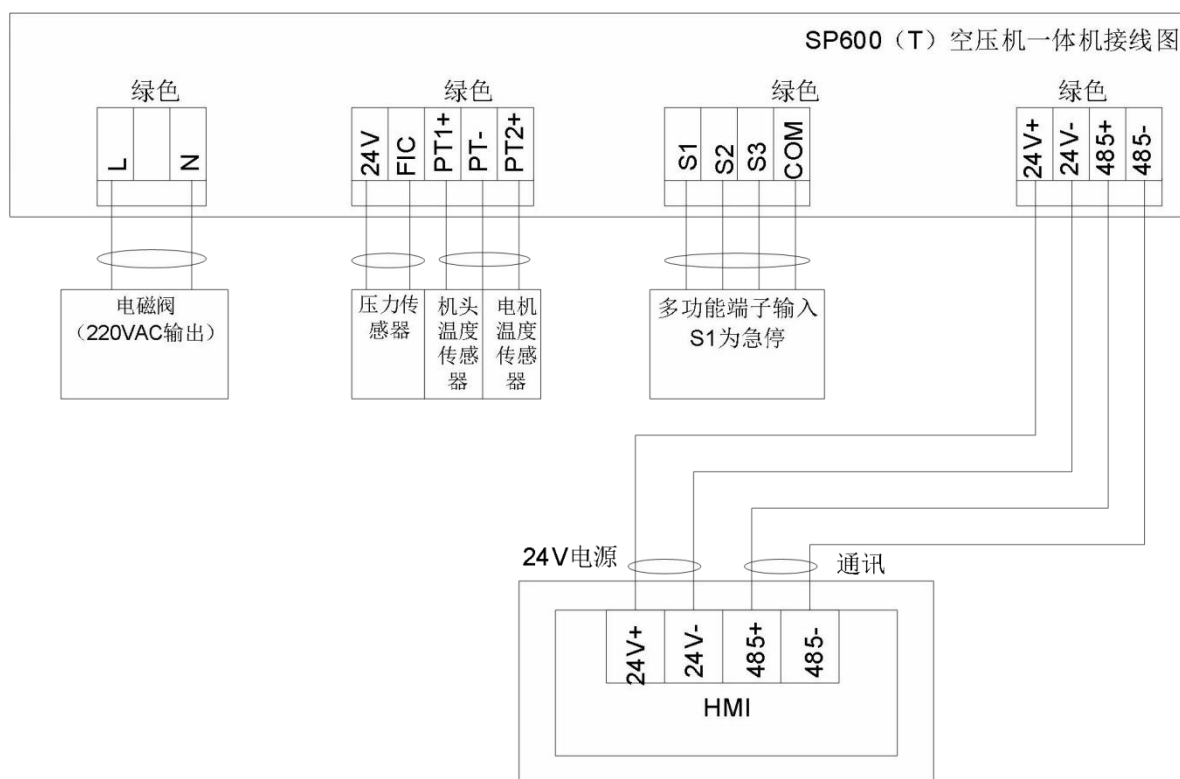


Figure 5.3 SP600(T) frequency conversion principle diagram

Note: 1) PT2+, PT- It is a motorPT100If the wiring terminals are not connected, please short-circuit them, otherwise the motor will report an overheating fault.

2) S3It is a motorPTCIf the terminal is not connected, pleaseCOMShort circuit (or setP402=0), otherwise the motor overheat fault will be reported.

5.6. Frequency conversion control operation

5.6.1. Press the "Start" button to start

The controller has a self-test after power-on, and it cannot be started by pressing the "Start" key. After the self-test is completed, press the "Start" key to start the host. The inverter output frequency accelerates from 0Hz to 50Hz within the set time to achieve a smooth start.

5.6.2. Automatic operation control

After the inverter is started, after a delay, the discharge solenoid valve is energized, the air compressor starts to load, and the pressure of the oil and gas barrel begins to rise. When

the air pressure rises and exceeds the pressure setting value, the controller controls the inverter to reduce the frequency to reach the pressure setting value. The control system performs PID control on the output frequency of the inverter according to the feedback of the set pressure and output pressure to accurately stabilize the output pressure of the air compressor. When the output frequency of the inverter is reduced to the minimum frequency setting value, if the pressure at the gas end does not drop, the pressure rises until the pressure reaches the upper limit of the gas supply pressure, the discharge solenoid valve loses power, and the air compressor runs empty. If the air pressure drops to the set lower limit pressure (loading pressure value) within the specified time (sleep judgment time), the discharge solenoid valve is energized again, the compressor compresses air normally, and the oil and gas barrel pressure is increased. If the system pressure does not drop to the lower limit pressure when the vehicle is empty, the controller will automatically stop the motor and realize the air compressor sleep. Only when the pressure drops to the sleep wake-up pressure, the motor automatically starts to run according to the start-up process, and rotates back and forth like this.

5.6.3. Normal shutdown

Press the "Stop" button, the discharge solenoid valve loses power, and after a delay of a period of time (stop delay), the host stops running. It can only be restarted by pressing the "Stop" button.

5.6.4. Prevention of frequent startup control

The motor cannot be started immediately when the motor stops rotating due to "stop", idling for too long, or fault. A certain delay is required. The time display window of this controller counts down and displays the remaining delay time (such as 199 seconds) in various stop states. The motor can only be started when the delay time reaches zero.

5.6.5. Fault shutdown and emergency shutdown

When an electrical fault or high exhaust temperature occurs during the operation of the unit, the controller immediately stops the motor. The motor can only be restarted after the fault is eliminated. In case of emergency, press the emergency switch button.

5.7. Fault Description

When the controller detects the following faults, it will alarm without stopping the machine, and the corresponding fault name will be displayed on the display. The panel alarm LED will light up and the buzzer will sound. After the fault is eliminated, the display will return to normal.

| Non-shutdown fault name | Common treatment methods | Common causes of failure |
|------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Air filter clogged | Replace the air filter | The state of the corresponding input point of the controller changes. This point is normally open. |
| Oil-gas separator is clogged | Replace the separator | The state of the corresponding input point of the controller changes. This point is normally open. |
| Oil filter clogged | Replace the oil filter | The state of the corresponding input point of the controller changes. This point is normally open. |
| Air filter expired | Replace the filter and reset the air filter usage time to zero. | The controller usage time exceeds the set allowable usage time. |
| Oil and gas separator expired | Replace the separator and set the oil-gas separator usage time to zero. | The controller usage time exceeds the set allowable usage time. |
| Oil filter expired | Replace the filter and reset the oil filter usage time to zero. | The controller usage time exceeds the set allowable usage time. |
| Lubricant expired | Replace the lubricating oil and set the lubricating oil usage time to zero. | The controller usage time exceeds the set allowable usage time. |
| Grease expired | Replace the grease and set the grease usage time to zero. | The controller usage time exceeds the set allowable usage time. |
| Belt expired | Replace the belt and reset the belt usage time to zero. | The controller usage time exceeds the set allowable usage time. |
| Exhaust temperature high (warning) | Ambient temperature is too high, oil shortage? Fan damage? | The corresponding input point of the controller is opened. |
| Exhaust pressure high (warning) | Check pressure fluctuations and exhaust blockage | Poor grounding when there is strong interference |

When the controller detects the following faults, it will alarm, stop the machine, and the corresponding fault name will be displayed on the display. The panel alarm LED will light up and the buzzer will sound. After the fault is eliminated, the display will return to normal.

| Shutdown fault name | Common treatment methods | Common causes of failure |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| High exhaust pressure | Refer to the air compressor manual | The pressure detected exceeds the maximum pressure/pressure sensor failure/ pressure sensor drift is not calibrated |
| Exhaust temperature over | Refer to the air compressor manual | Over temperature protection contact opens |
| High exhaust temperature | Refer to the air compressor manual | The temperature detected exceeds the maximum temperature |
| Host overload | Refer to the air compressor manual | The corresponding protection contact is closed |
| Host current overload | Check and troubleshoot, then restart and observe | The current exceeds the rated current and lasts for a period of time |
| Fan overload | Refer to the air compressor manual | The corresponding protection contact is closed |
| Fan current overload | Check and troubleshoot, then restart and observe | The current exceeds the rated current and lasts for a period of time |
| Phase loss | The current of the host A and B phases is zero | Check the motor and circuit, such as whether the contactor contacts are conductive. |
| Phase imbalance | Check the three-phase voltage of the host, remove the large single-phase load on the line, and replace the bad motor | The host AB phase current detection value difference is too large |
| Fan phase unbalance | Check the three-phase voltage of the fan, the fan contactor, remove the large single-phase load on the line/replace the bad motor | The difference between the detected current values of the fan AB phase is too large |
| Phase sequence error | Any two phases of the power supply line are exchanged | The ABC three-phase sequence of the power supply line is different from the ABC sequence of the motor |
| Temperature sensor failure | Is the temperature sensor short-circuited or open-circuited? | Replace the sensor |

| | | |
|--------------------------------|-------------------------------------------------------------------------------|--------------------------|
| Large temperature fluctuations | Is the temperature sensor signal line short-circuited to the shielding layer? | Replace the sensor |
| Pressure sensor failure | Is the pressure sensor short-circuited or open-circuited? | Replace the sensor |
| Run time exceeded | Procedural issues | Consult the manufacturer |

When the fan is overloaded, the fan current is overloaded, or the fan phase is unbalanced, the fault record will record the fan current. In other faults, the host current will be recorded.

5.8. Security Protection

5.8.1. Motor protection items

The air compressor controller protects the motor from short circuit, stall, overload, phase loss and imbalance.

| Electrical Failure | Controller fault display | Cause |
|--------------------|---------------------------------------------------------|-------------------------------------------------------------------|
| Short Circuit | Indicates that the host or fan is short-circuited | There is a short circuit or the rated current is set incorrectly. |
| Stall | Indicates that the host or fan is blocked | Excessive load, bearing wear, other mechanical failures |
| overload | Indicates that the host or fan is overloaded | Excessive load, bearing wear, other mechanical failures |
| Phase loss | Indicates that one of the host or fan phases is missing | Power supply, contactor, motor phase loss |
| unbalanced | Displays host or fan current imbalance | The contactor is in poor contact and the motor has an open loop. |

5.8.2. Temperature protection

Exhaust temperature protection: When the exhaust temperature is higher than the set exhaust temperature protection value, the controller alarms and shuts down, and the display shows that the exhaust temperature is too high.

5.8.3. Air compressor anti -reverse protection

When the phase sequence of the three-phase power supply connected to the air compressor is different from the controller setting, it indicates a phase error and the controller cannot start the motor. At this time, you only need to swap two phases of the power line and observe the direction of the motor.

5.8.4. Supply pressure overpressure protection

When the exhaust pressure is higher than the set high pressure limit, the controller alarms and shuts down, and the exhaust pressure is high on the display.

5.8.5. Sensor failure protection

When the pressure sensor or temperature sensor is disconnected, the controller will shut down and alarm and prompt that the sensor is failed.

5.9. Inverter Operation

For details on the inverter's safety precautions, operating procedures, operating instructions, troubleshooting, etc., please refer to the inverter operating manual.

6. System Component Functional Description

6.1. Air filter

It is a dry paper filter, which is used to filter the air entering the compressor. The filtering effect directly affects the life of the oil, oil filter, oil fine separator and the bearing of the machine body. If the air intake filter is blocked, the air intake volume will be reduced, which will affect the air supply volume. During each inspection, MAYA service personnel will recommend replacing a new product based on the air intake dust condition of the on-site working environment and the use time displayed on the controller. The controller is also set with a maximum use time. When the controller warning message appears, the air compressor unit must replace the new air intake filter.



6.2. Inlet valve

The type is piston type, which uses the air source entering from the bottom of the piston to drive the piston displacement to control the amount of air intake. The more the controlled air source enters, the greater the piston displacement, making the air inlet smaller and reducing the air intake. Conversely, the air intake increases.



6.3. Oil and gas barrels

In addition to storing lubricating oil, the oil-gas separator uses the principle of centrifugal force to make a preliminary separation of the incoming oil-gas mixture. The separation effect will affect the separation effect of the oil fine separator, and then affect the oil content in the air. An oil level indicator is installed on the side of the barrel, which can directly show the oil level. There is an oil drain valve at the bottom for discharging condensed water in the oil-gas barrel before starting the air compressor and for regular maintenance and replacement of lubricating oil.



6.4. Oil fine separator

It is composed of two layers of fine glass fibers, which can filter out the floating oil molecules contained in the compressed air. The filtered oil is concentrated in the central groove and flows back to the compressor through an oil return pipe to avoid being discharged with the air. Under normal operation at the rated pressure, the oil content in the air can be controlled below 3PPM. The dust pollution degree of the working environment, the quality of the lubricating oil, the filtering effect of the oil filter, and whether the water in the oil and gas barrel is actually removed before starting up have a great impact on the life and separation effect of the oil fine separator. When blocked or the separation effect is not good, the oil content of the compressed air produced increases, causing oil throwing. During each inspection service, MAYA service personnel will make a comprehensive judgment based on the on-site working environment, the dust condition of the intake air, the quality of the lubricating oil, and the total hours of use displayed by the controller, and then recommend whether the customer should replace the new product. The controller is also set with a maximum usage time. When the controller warning message appears, the air compressor unit must replace the new oil fine separator.



6.5. Safety valve

Abnormal operation of the air compressor or failure of the pressure sensor may cause the pressure in the oil and gas barrel to continue to rise. When the pressure reaches the safety setting value, the safety valve installed on the oil and gas barrel will automatically open to release the pressure and spray out the lubricating oil. The purpose is to reduce the pressure in the oil



and gas barrel and ensure the safety of the unit . To avoid accidents , the pressure setting value of the safety valve has been calibrated before leaving the factory and no one can adjust it at will.

6.6. Pressure maintaining valve

Its functions are described as follows

A When starting, the pressure required for the circulation of lubricating oil is easy to establish, ensuring the lubrication of machine parts.

B Maintain the pressure in the oil and gas tank at a minimum pressure value to protect the oil fine separator from damage due to excessive pressure difference, and to achieve the best separation effect of oil and gas, reducing the oil content of exhaust gas.

C When the vehicle is empty or shut down, the isolation system and the oil-gas separator can prevent the backflow of compressed air and condensed water in the pipeline.



6.7. Rear cooler

It is used to cool the compressed air and control the exhaust outlet temperature, which can avoid damage or poor effect of the dryer configured in the external system due to excessive temperature. If the cooler is blocked or fouled, the efficiency will be reduced , so it is important to keep the cooler clean during daily maintenance to ensure the cooling effect.

6.8. Oil cooler

Used to cool the engine oil. If the oil cooler's efficiency is reduced due to blockage or fouling, the exhaust temperature will be too high and the engine will trip. Therefore, be sure to keep the cooler clean during daily maintenance to ensure the cooling effect.

6.9. Oil filter

It is a paper filter that can remove impurities in the oil, improve the lubrication effect , and reduce damage to the compressor bearings and some parts. MAYA service personnel will measure the pressure before and after the oil filter during each inspection service , observe the quality of the lubricating oil , and recommend customers whether to replace it with a new one after comprehensive judgment. The controller is also set with a maximum usage time . When

the controller warning message appears, the air compressor unit must replace the new oil filter. If it is blocked and not replaced, the oil in the lubricating oil pipeline system will be insufficient, resulting in excessively high exhaust temperature or insufficient lubrication of important parts , components , and bearings, which will shorten the life. In severe cases, it will cause the compressor to burn out.

6.10. Air temperature sensor

Its function is to detect the exhaust temperature of the compressor and transmit the information to the controller to maintain the normal operation of the compressor. If the exhaust temperature is detected to be too high, the controller will stop the air compressor to avoid damage to the machine and accidents.

6.11. Pressure Sensor

This machine has an air supply pressure sensor, which transmits information to the controller for processing and judgment, so that the air compressor can maintain normal operation under perfect protection.

7. Maintenance and repair

Before any disassembly or assembly work, be sure to wait until the motor and fan have completely stopped, and make sure that the power supply has been cut off. When repairing or maintaining the air compressor, a sign should be placed on the starting device, stating "Warning: Under repair, no start". When repairing pressurized parts, the internal compressed air should be exhausted before construction.

7.1. Air filter

When the maintenance indicator light flashes, it needs to be replaced. Its service life is about 3000 hours, which depends on the ambient air quality. The quality of the intake filter will directly affect the life of the oil filter and oil separator. The replacement method is as follows: Remove the intake filter fixing bolts and replace with a new one. Note that the intake filter gasket must be effectively attached to the fixing seat.

7.2. Motor bearing lubrication

Oil-filled bearings must be oiled regularly according to the motor instructions or the table below.

7.2.1. Grease replenishment quantity and interval table.

| Power (kW) | Initial filling quantity g Note (1) | Supply quantity g Note (2) | Replenishment interval based on 24-hour operation (hours) |
|------------|----------------------------------------|-------------------------------|--------------------------------------------------------------|
| 18.5 | 100 | 30 | 1500 |
| twenty two | 100 | 30 | 1500 |
| 37 | 100 | 30 | 1500 |
| 45 | 200 | 30 | 1500 |
| 55 | 200 | 30 | 1500 |
| 75 | 200 | 30 | 1500 |
| 90 | 200 | 30 | 1500 |
| 110 | 200 | 40 | 1500 |
| 132 | 200 | 40 | 1500 |
| 160 | 200 | 40 | 1500 |
| 185 | 200 | 40 | 1500 |
| 200 | 250 | 50 | 1500 |
| 220 | 250 | 50 | 1500 |
| 250 | 250 | 50 | 1500 |
| 280 | 250 | 50 | 1500 |
| 315 | 250 | 50 | 1500 |
| 355 | 280 | 60 | 1500 |
| 400 | 280 | 60 | 1500 |

Note:

(1) The initial filling volume is the new filling volume after the bearing is disassembled and cleaned. The bearing is filled with about 1/3 and the rest is filled with

In the inner bearing cover (filled by the motor manufacturer before leaving the factory).

(2) The replenishment amount is the amount of grease injected into the bearing at each replenishment interval. Please replenish in a timely manner according to the operating hours of the unit.

(3) Please note: Adding more supply at one time will not extend the supply period. Please follow the specifications in the table above.

(4) If grease accumulates in the "grease discharge storage area", the bearing may be subjected to stirring resistance and may overheat and leak grease. Please open the discharge port cover at appropriate times (approximately once after 2 to 3 injections) to drain the grease.

(5) The amount of oil added must be in accordance with the standard value. Adding too much will cause damage to the motor.

(6) The grease replacement cycle depends on the size of the motor, usage and working environment.

The recommended grease replacement cycle and

The amount of grease added shall be in accordance with the requirements of the oil filling label on the motor.

7.2.2. Grease quality specifications

Upon delivery, all bearings are filled with grease of the following specifications. Please purchase and use grease of the same quality specifications to ensure the service life of the bearings.

| | |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marketability | The largest grease manufacturer, easy to purchase. |
| Allowable temperature | The general grease has a temperature range of -20℃ to 120℃. Grease outside this range must be used for low or high temperature. |
| For high speed and large diameter bearings | Good pressure resistance (oil film strength). Hard ones are preferred. Soft ones are preferred when good sound, vibration, and discharge effects are desired. [Avoid using silicone grease.] |
| Load resistance | For belts, gears and other heavy loads, choose those with good pressure resistance. (Avoid using silicone grease). |
| Water resistance | Avoid using Na and Ca based grease in high humidity locations. |
| Consistency | Due to their similar hardness, the softer ones are better in terms of rolling noise, abnormal vibration, lubricity in cold weather, good or bad discharge effect and temperature rise during injection. |
| Lubricity | Please use grease with good oiliness and understand the advantages and disadvantages of grease before choosing. |

7.3. Compressor bearings

The compressor bearings are consumables (recommended to be replaced every 30,000 working hours). Their service life will be reduced due to normal or abnormal wear and the quality of the intake air (dust conditions, etc.), the quality of the lubricating oil, the oil filtration effect and other comprehensive conditions, which will cause greater noise and vibration during operation. When this happens, MAYA service personnel will determine whether it is necessary to return to the factory to replace the bearings.

7.4. Air compressor lubricating oil

The lubricating oil of screw compressor is a special oil. Except for the oil specified by MAYA, other oils cannot be added or replaced at will, otherwise it will cause serious damage to the air compressor. When replacing new oil, the old oil in the system must be completely removed, otherwise it will easily shorten the life of the new oil. Usually, when changing lubricating oil, the oil filter and oil fine separator must be replaced at the same time. The oil change method is as follows: confirm that the power switch of the compressor is turned off, release the pressure of the oil and gas separator, open the oil drain valve of the oil and gas barrel and the cooler under no pressure to receive the oil pan, and completely drain the old oil in the oil and gas barrel and the cooler. After closing the oil drain valve, turn on the power, start the air compressor again, run for about 3 seconds, stop, turn off the power, make sure that the oil and gas barrel is under no pressure, and then open the oil drain valve to drain the residual oil. When refueling, pay attention to tighten the oil and gas barrel and the oil drain valve of the cooler to receive the oil pan. The first time, the oil and gas barrel should be filled with lubricating oil, which can be observed through the oil level tube. When the oil and gas tank is full, the machine should be started again to check whether the oil level is at the halfway point of the oil level tube. If it is lower than the halfway point of the oil level tube, the machine should be stopped and an appropriate amount of lubricating oil should be added. However, please note that it should not be filled too full.

7.5. Oil fine separator

After a period of use, the filter will gradually become clogged, causing a certain pressure drop. The cleanliness of the oil separator will affect the quality of the oil filter. Excessive blockage will increase the oil content of the outlet air, increase the normal amount of lubricating oil replenishment, and increase power consumption. The general life of the oil separator is

about 3000 to 6000 hours, depending on factors such as environmental quality and dust, whether the intake filter is often cleaned and replaced regularly, and the use of oil filters and lubricating oil .

7.6. Oil return line

Regularly check whether the oil return pipe entering the machine body is smooth. It is normal for the temperature of the oil return pipe to be higher during operation. If it is blocked, you can feel that there is no temperature on the surface of the pipe or if you find that the discharged condensed water contains too much oil, you must clean the pipe. The inspection method is as follows: Check whether the oil separator, oil return pipe, joint, check valve, and the oil return flow limiting hole of the machine body are blocked, and clear them.

7.7. Oil filter

According to the maintenance instructions, the filter life is about 2000~3000 hours. The usage hours will increase or decrease according to the operating environment, dust, air filter efficiency, daily cleaning and maintenance of the unit, etc. However, if the oil filtering effect is poor, it must be replaced to avoid damage to the unit.

The replacement method is as follows: Use the oil filter special disassembly and assembly tool to disassemble and assemble to avoid deformation of the shell and affect the function. When disassembling, place the oil pan under the filter to receive the overflowing oil. Before installing the new product, clean the oil filter and apply oil to the new product's sealing gasket before tightening it.

7.8. Pipeline joints

The compressor should be regularly inspected for leaks at all pipe joints and aging and cracking of hoses. Gaskets, O-rings, hoses or re-sealants should be replaced according to the problem. If any peripheral parts are loose during maintenance or replacement of parts, they must be re-locked and re-sealed if necessary . MAYA service personnel will recommend customers to purchase repair kits and replace necessary small accessories and hoses during inspections .

7.9. Inlet valve

Regularly disassemble the intake valve piston to clean the dirt, and re-grease or replace the piston ring to ensure the sensitivity of the piston in controlling the air

volume.

7.10. Pressure maintaining valve

The pressure maintaining valve must be disassembled regularly to remove dirt and re-grease. If the O-ring or valve sealing ring is damaged, it must be replaced. Regularly testing the sealing of the valve can reduce the loss caused by leakage.

7.11. Safety valve

- (1) The safety valve has been calibrated at the factory, please do not adjust it again.
- (2) the safety valve 's action must be tested regularly. Increase the air compressor pressure to the corresponding safety valve opening pressure to confirm that the blow- off is normal and not stuck.

7.12. Discharge solenoid valve

- (1) If the air compressor unit is frequently operated with empty or loaded vehicles, please ask the user or service personnel to reasonably set the loading and unloading pressure according to the gas consumption, otherwise the life of the unloading solenoid valve will be halved;
- (2) Malfunction of the discharge solenoid valve will directly affect the normal use of the user, so regular inspection is very important
- (3) Items that should be checked regularly when discharging the solenoid valve
 - a Check whether there are any particles or debris inside the solenoid valve (disassemble and check)
 - b. Check whether the solenoid valve coil rod is normally closed (you can use a tool like an electric pen to check on the coil rod).
 - c. Whether the empty and loaded vehicle moves normally (there is a switching sound when the empty and loaded vehicle is moving)

7.13. Temperature Control Valve

Under normal circumstances, when the oil temperature is high, the thermal control valve bypass is closed. When the oil temperature is low, the thermal control valve bypass is open. This method can be used to check whether the thermal control valve is normal.

7.14. Cooler

7.14.1. Clean

After using the air-cooled cooler for a period of time, dirt and dust will adhere to the surface, causing poor heat dissipation and increasing the exhaust temperature. Regular cleaning and blowing away dust with high-pressure gas to enhance the heat exchange effect are necessary and important tasks. The ambient air quality will affect the length of the maintenance period.

7.14.2. Water-cooled chillers

(1) Before using the water cooler, please confirm the following:

- A. Before starting the hydraulic system, are there any leaks in the joints of the pipe?
- B. Are the valves of the two fluids passing through the oil cooler opened?
- C. Is there any leakage in the sealing parts of each flange?
- D. Is there any leakage at the discharge port and plug?
- F. It is recommended to have water treatment equipment for cooling water . Otherwise, after a period of use , the cooler needs to be disassembled regularly according to the instructions and the inside cleaned.

(2) After the above inspections are completed, you can start the machine. At this time, you should pay full attention to vibration and use it under the condition of using pressure below. Do a good job of daily cleaning and regular inspections . When installing outdoors, there must be a canopy and pay attention to the impact of environmental ventilation quality.

- A. Regular inspections must be carried out thoroughly at least once every six

months or a year.

B. Remove the water return cap to clearly check the dirt inside the cooler pipe.

C. In winter, when the working environment temperature is below zero , the cooling water may freeze and cause the cooler to burst . Therefore, every time the unit is shut down , it is necessary to implement the working habit of draining the cooling water.

(3) To minimize corrosion and prevent leakage, please clean, repair, disassemble, assemble and inspect regularly.

A. Decomposition Method

Completely seal the inlet and outlet of the two fluids and stop the circulation. Drain the two fluids from the pipe connection and the oil cooler. For easy reassembly, please mark the connection. Disassemble the external part to make the oil cooler in a decomposable single state. Unscrew the nut on the support frame, remove the fastening ring, and move the oil cooler to a place where it is easy to operate (if it is not removed, it can also be cleaned and inspected, so it is not necessary to remove it). Remove the water cover on the return side and the water inlet side, take out the seal and the sealing pressure ring (steel parts), stand the cooling core and the cylinder, and pull the outer cylinder upward. When pulling it out, it should be vertically upward to avoid scratching the sealing surface of the floating tube plate. After the outer cylinder is pulled out, the disassembly work is completed, and then please thoroughly clean the inside and outside of the cooling tube, the inside of the tube, and the various connections and inlet and outlet oil ports. The cleaning method depends on the degree of contamination, using cleaning oil, steam, hot kerosene, cleaning agent, etc. If there are many pollutants in the cooling pipe, you can use a nylon brush or iron rod to clean each pipe one by one. Be careful not to damage the sealing surface when cleaning. When cleaning with liquid containing water, it should be fully dried afterwards to remove the water. (Note: If there is no absolute need, try to avoid removing the cooling core.)

B. Assembly Method

Assembly can be carried out in the reverse order of disassembly. At this time, the sealing ring should be replaced with a new one. Install the sealing ring on the tube

sheet and align the interface mark on the water cover before installing it. Move the assembled oil cooler back to its original position and fix it on the support frame with a fastening ring.

C. Inspection After assembly is completed, pressure inspection must be carried out. The order is as follows: Fill the tube with oil and seal the oil port on one side. Apply pressure, 10Kg/ cm^2G for 5 minutes, then increase to 15Kg/ cm^2G , please keep it for 20-30 minutes. After confirming that the indicator on the pressure gauge is 15Kg / cm^2G , drain the oil and assemble it back to the original installation position.

7.15. Electrical insulation

Regularly measure the insulation value of the compressor motor and fan motor to avoid motor burnout without warning. The minimum safe insulation value is 500VDC , 5 M Ω . If insulation deteriorates, the cause must be identified and handled as soon as possible.

7.16. Regular inspection and cleaning

After the air compressor has been running for a certain period of time, the parts should be inspected and cleaned regularly according to the " Air Compressor Regular Maintenance Periodic Table " . The qualified service personnel of MAYA and the designated regional maintenance providers will conduct regular inspections and cleaning services for the above parts.

7.17. Inverter Maintenance

(1) Daily maintenance

Due to the influence of environmental temperature, humidity, dust and vibration, the components inside the inverter may age, leading to potential failures of the inverter or reducing the service life of the inverter. Therefore, it is necessary to perform daily and regular maintenance on the inverter.

warn:

After disconnecting the power supply, there is still a high voltage on the filter capacitor, so the inverter cannot be maintained or serviced immediately. It is necessary to wait until the inverter operation panel display screen is displayed and the bus voltage is measured with a multimeter to ensure that it does not exceed 36V.

Daily inspection items:

- 1) Is there any abnormal change in the sound during the operation of the motor?
- 2) Is there any vibration during the operation of the motor?
- 3) Has the inverter installation environment changed?
- 4) Is the inverter cooling fan working normally?
- 5) Is the inverter overheated?

Daily cleaning:

- 1) Always keep the inverter clean
- 2) Effectively remove dust on the surface of the inverter to prevent dust from entering the inverter, especially metal dust
- 3) Effectively remove oil stains from inverter cooling fans

(2) Regular inspection: Please regularly inspect areas that are difficult to inspect during operation.

Regular inspection items:

- 1) Check the air duct and clean it regularly
- 2) Check if the screws are loose
- 3) Check the inverter for corrosion
- 4) Check whether there are any arcing marks on the terminals.
- 5) Main circuit insulation test

Reminder: When using a megohmmeter (please use a DC 500V megohmmeter) to measure insulation resistance, disconnect the main circuit line from the inverter. Do not use an insulation resistance meter to test the insulation of the control circuit.

8. Safety protection and warning devices

8.1. Motor overload protection

There are two main motors in the air compressor system, one is the main motor for driving the air

compressor, and the other is the cooling circulation fan motor. Under normal circumstances, the operating current of the main motor should not exceed the setting value of the microcomputer controller (for example, due to voltage drop, three-phase imbalance, etc.) . When the motor operating current exceeds the upper limit set by the power protection device, the microcomputer controller will automatically cut off the main power supply and the air compressor will stop. At this time, unless the power is restored, the air compressor cannot be started. The reset method is to press the setting switch manually.

Remember: voltage fluctuation should be controlled within the range of $\leq (-10\% \sim +10\%)$, and the voltage imbalance between phases should not exceed 3% , otherwise the temperature in the motor will rise sharply. For example: when the voltage imbalance reaches 3.5% , the temperature of the motor will rise by about 25% .

Common causes of motor overload:

- (1) Human operational errors: such as self-adjustment of exhaust pressure, improper system adjustment, etc.
- (2) Mechanical failure : such as internal loss of the motor, motor phase loss, safety valve failure, system setting failure, oil separator blockage, etc.

If the motor is found to be overloaded during operation, please contact MAYA or the designated regional maintenance service provider immediately for inspection to find out the cause. Otherwise, the motor burnout will cause great trouble to the on-site gas demand and maintenance costs.

8.2. Exhaust temperature too high protection

The maximum exhaust temperature set by the system is 105 Celsius. If it exceeds 105 Celsius , the system will automatically cut off the power supply. There are many reasons for the exhaust temperature to be too high, but the most common reason is the failure of the oil cooler. If the cooling fins of the air-cooled oil cooler are blocked by dust, the cold air cannot pass through the cooler freely, and the lubricating oil temperature will gradually rise, causing shutdown due to high temperature. Therefore, low-pressure air must be used to remove dust on the cooling fins at regular intervals. If the blockage on the fins cannot be blown clean, it is best to use cleaning fluid or solvent to clean it. The maximum ambient temperature designed for the air compressor is 45 o C. The higher the ambient temperature, the higher the exhaust temperature. Therefore, it is necessary to choose a place with low ambient temperature and good ventilation to place the air compressor.

8.3. Other protection and warning settings and instructions

Check 5.7 of this manual for details .

8.4. Causes and solutions of failure

| Failure scenarios | reason | Processing |
|-------------------|-------------------------|--------------------------------------------------|
| Startup failure | Control voltage failure | Check control voltage specifications, fuses, and |

| | | |
|--------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| | | wiring |
| | Emergency switch actuation | Check whether the emergency switch is activated or the contact is loose. |
| | Power is not on | Check whether the power switch is turned on |
| | | Check the motor power supply and controller power supply |
| | Voltage is too low | Wiring is too small/change wire diameter |
| | | The power supply voltage is too low/adjust the correct voltage |
| System pressure is too low | System air demand exceeds compressor capacity | Add air compressor |
| | Intake valve malfunction | Maintenance |
| | System air leak | Maintenance pipeline |
| | Belt slippage | Adjusting belt tension |
| | Intake filter is too dirty | Replace the air intake filter |
| | Controller pressure setting too low | Check the setting value and pressure detector accuracy |
| | The discharge solenoid valve cannot be closed | Check whether the solenoid valve is energized and whether the valve is stuck, Whether the controller outputs a signal (wiring or relay) |
| | The air pipeline is blocked and the valve is not fully opened | Check the pressure of each part of the air compressor, remove obstacles or open the valve |
| Too much water in the system | Improper installation of the drain pipe of the air compressor pipeline | Correct incorrect drainage pipe arrangement |
| | Cooler heat dissipation is poor | The cooler is too dirty, clean the cooler |
| | No air dryer installed | Install the dryer Turn on the air dryer |
| | Air dryer not turned on | |
| Large pressure fluctuations | The air demand changes too much in an instant | Increase the capacity of the gas tank |
| | Empty/loaded vehicle set pressure range is too large | Changing the pressure setting |
| Exhaust oil content is too high and fuel consumption is high | Lubricating oil system leak | Check the oil circuit and oil seal for oil leakage/stop leakage or replace parts |
| | Oil fine separator blocked | Replace the oil separator |
| | Oil fine separator leakage | Check the oil separator |

| | | |
|-------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Oil return line blocked | Check all components of the oil return line and remove any foreign matter |
| | The compressor is running below the set pressure. | Reduce gas consumption or increase air compressor adjustment to restore operation at rated pressure |
| Excessive vibration and noise | Transmission abnormality | Belt slipping/re-adjust tension or replace belt |
| | | Pulley misalignment/recalibration |
| | Compressor body bearing damage | If the product is returned to the factory for replacement, the cause of the damage must be identified and handled simultaneously. |
| | Motor bearing damage | When returning to the factory for replacement, the cause of abnormal wear must be identified |
| | Loose parts | Locking and fixing |
| | Improper installation of air compressor | The installation plane support point is not stable |
| | | Poor installation of water or air pipes causing vibration |
| | Abnormal operation of compressor Shaft seal wear | Low oil pressure, oil loss or extremely high temperature operation/eliminate the factors of oil loss, high temperature and low oil pressure, and replace with new ones |
| Safety valve action | The controller pressure setting value is incorrect | Adjusting the setpoint |
| | Pressure sensor failure | The pressure detected by the sensor is lower than the actual value |
| | | Sensor connection line blocked/cleared |
| | Controller failure | Controller I/O failure/repair |
| | Safety valve failure | Replace the safety valve |
| Lubricant life is too short | Mixing of different oils | Clear all the oil from the system and add new oil |
| | The old oil has not been cleaned out | When replacing, all residual oil must be cleaned out and new oil must be added. |
| | The compressor is running too high | If the temperature is too high, the oil life will be shortened. Adjust the exhaust temperature to normal temperature. |
| | The compressor is running too low | When operating below the pressure dew point, too much condensed water in the oil and gas tank causes the oil to emulsify. |

| | | |
|--|--------------------------|----------------------------------------------------------------------------------------------------------------------------|
| | Insufficient oil quality | Different grades of air compressor oil have different service lives. Choose the oil that is suitable for the service life. |
|--|--------------------------|----------------------------------------------------------------------------------------------------------------------------|

9.Attachment: Air compressor regular maintenance cycle table

This maintenance cycle is a recommended value and may be modified depending on the actual environment and working conditions !

○ Cleaning ◎ Adjustment, inspection ● Replacement

| project | Job Description | dail y | wee kly | 500 | 1500 | 3000 | 6000 | 12000 | 18000 | 30000 | Rem ark |
|-----------------------------------|--------------------------------------------|-----------|------------|------------------|---------------|------------------------|--------------|-----------------------|-------------------------|------------------------|------------|
| | | | | per mont h | Quart erly | Every six months | each year | Every two years | Every three years | Every five years | |
| Instrument panel indicator lights | Check if there are any abnormal indicators | ◎ | | | | | | | | | |
| Exhaust temperature | Inspection (temperature range 70~95℃) | ◎ | | | | | | | | | |
| Oil and gas barrel condensate | drain | ◎ | | | | | | | | | |
| Oil level | examine | ◎ | | | | | | | | | |
| Transparent hose and core sleeve | Check/Replace | ◎ | | | | | ● | | | | |
| Inlet connection hose | Check/Replace | | | | | ◎ | | ● | | | |
| Pipe (rubber/metal) | Check/Replace | ◎ | | | | | | ● | | | |
| Pipe fittings | Leak test | | | | | | ◎ | | | | |
| Cooler | Cleaning/Inspection | | ○ | | | | | | ◎ | | |
| Cooling fan | clean | | ○ | | | | | | | | |
| Inlet filter | Clean / Check / Replace | | ○ | | ◎ | ● | | | | | |
| Pre-filter | clean | | ○ | | | | | | | | |
| Electromagnetic switch contacts | Clean / Check / Replace | | ○ | | | | ◎ | | ● | | |
| Coupling/Elastomer | Check/Replace | | | | | | ◎ | | | ● | |
| Oil filter | replace | | | | | ● | | | | | |
| Motor | Fill bearing grease | | | | ◎ | ● | | | | | |
| Compressor shaft seal | Check/Replace | | | | | ◎ | | | | ● | |
| Air Compressor Oil | Add/Change Oil | | | | ◎ | | | | | | |

| | | | | | | | | | | | |
|----------------------------|----------------------------------------|--|--|--|--|---|---|---|---|---|--|
| Semi-synthetic oil | | | | | | • | | | | | |
| Fully synthetic oil | | | | | | | • | | | | |
| Oil fine separator | Check/Replace | | | | | • | | | | | |
| Electrical insulation | Check all electrical phases and ground | | | | | | ⊙ | | | | |
| Thermal Control Valve | Check/Replace | | | | | | ⊙ | • | | | |
| Intake valve | Check/Replace | | | | | | ⊙ | • | | | |
| Pressure maintaining valve | Check/Replace | | | | | | ⊙ | • | | | |
| Proportional valve | Check/Replace | | | | | | ⊙ | • | | | |
| Safety valve | Check/Replace | | | | | | ⊙ | • | | | |
| Discharge solenoid valve | Check/Replace | | | | | ⊙ | | • | | | |
| Pressure Sensors | Calibration Check/Replacement | | | | | | ⊙ | | • | | |
| Temperature Sensor | Calibration Check/Replacement | | | | | | ⊙ | | • | | |
| Compressor bearings | Check/Replace | | | | | | | ⊙ | | • | |

Address: Huangchi Industrial Park, Huangchi Town, Dangtu County, Ma'anshan City

Manual number: ERG -DELTA1 8 A

The parameters in this manual are subject to change without prior notice.