



INSTRUCTION MANUAL

ZS100T, ZS150T & ZS200T SERIES II AIR COMPRESSOR SETS (MAM-870 CONTROLLER)

Thank-you and congratulations for purchasing a high quality Senator air compressor set. It has been designed and manufactured to provide many years of safe and reliable service if installed, operated and maintained in accordance with these instructions. Please read and understand this manual before operating the compressor. Failure to do so could result in death, severe injury and/or substantial property damage.

This manual should be considered a permanent part of the compressor and should remain with it if resold.



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Precautions

- a. The compressor should only be operated by authorized persons. The operators should thoroughly read and understand the manual and strictly follow the procedures and safety notes in the manual.
- b. The compressor should be far away from inflammable materials. It is not permitted to place the compressor in the site with the dust and air containing salt mist and other harmful gases. It should be far away from heat sources.
- c. The proper power supply cable should be selected. It is necessary to install the breaker switch and fuse matching the power of the compressor ahead of the lead-in power supply cable. To ensure the safe operation of electrical equipment, a grounding wire should be securely connected.
- d. Ensure the correct phase of power supply to prevent reverse rotation of the screw air end.
- e. The compressor should not be operated above the discharge pressure specified on the nameplate. Otherwise, it will result in shutdown due to motor overload.
- f. For service and maintenance, the power supply should be switched off and the compressed air should be released. In addition, warning signs should be placed to prevent accidents due to unexpected compressor operation.
- g. When the compressor is normally operating, the cabinet doors must be closed. During maintenance service, take care to prevent any body part, clothing or tools from touching the hot or moving components in the machine in order to avoid injury.
- h. It is prohibited to modify the compressor's structure or control mode without the written permission of the manufacturer.
- i. Compressed air can contain carbon monoxide, hydrocarbons and/or other poisonous contaminants that can cause death or serious injury. The air compressor is not designed, intended or approved for breathing air. Do not use compressed air for breathing air applications without proper treatment.
- j. Do not use the compressor for any gas other than air.
- k. All electrical installation or repair work must be carried out by a licensed electrician.

List of Technical Parameters

Machine Model	ZS100T	ZS150T	ZS200T
Air Discharge (m ³ /min) / Discharge Pressure (bar)	1.13 / 8	1.70 / 8	2.27 / 8
Air Discharge Temperature (°C)	≤ 110		
Shutdown Protection Temperature (°C)	110		
Oil Content in Discharge Air (ppm)	≤ 3		
Lubricating Oil Capacity (L)	4.5	9	9
Air Suction Conditions	Ambient temperature ≤ 45°C, at atmospheric pressure, and relative humidity ≤ 80%		
Driving Mode	Belt Drive		
Cooling Mode	Air Cooling		
Motor Starting Mode	Direct On Line	Y-Δ	Y-Δ
Temperature Control Mode	Control by Thermostatic Valve		
Input Power Supply (V / Ph / Hz)	415 / 3 / 50		
Input Power Supply (A)	15.4	23.5	28.6
Motor Power (hp) / (kW)	10 / 7.5	15 / 11	20 / 15
Motor Speed (rpm)	2,910	2,940	2,940
Fan Motor Power (kW)	0.12	0.25	0.25
Fan Motor Speed (rpm)	1,300	1,400	1,400
Discharge Air Pipe Connection	1" BSP Female		
Air Tank Volume (L)	250	380	380
Overall Dimensions L × W × H (mm)	1,730 × 700 × 1,220	1,800 × 760 × 1,400	1,800 × 760 × 1,400
Weight (kg)	350	470	535

Chapter 1 General Instructions

1.1 Overview

The ZST Series II compressor sets are stationary single-stage, oil-injection type screw compressors driven by electric motors. The unit is installed above the air tank. The compressor has an advanced micro-computer controller with an LCD display. It can efficiently reduce the power consumption and provide the operators with convenient operation and monitoring. The typical outside view of ZST Series II screw compressors is shown in Fig. 1-1.

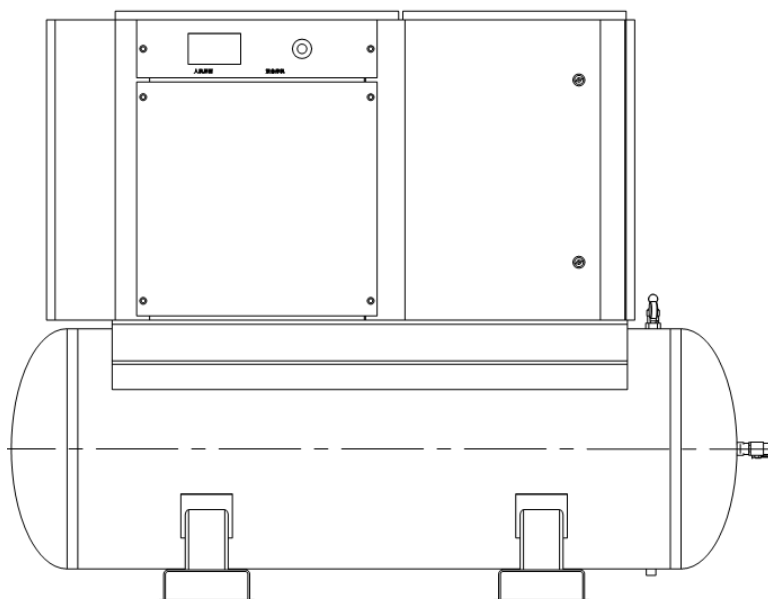


Fig. 1-1 Outside View of ZST Series II Screw Compressor

1.2 System Flow

The unit primarily consists of the screw air end, motor, oil-air separator, oil pipeline system, cooling system, air pipeline system, electrical control system and other parts and components.

The system flow of the unit is shown in Fig. 1-3.

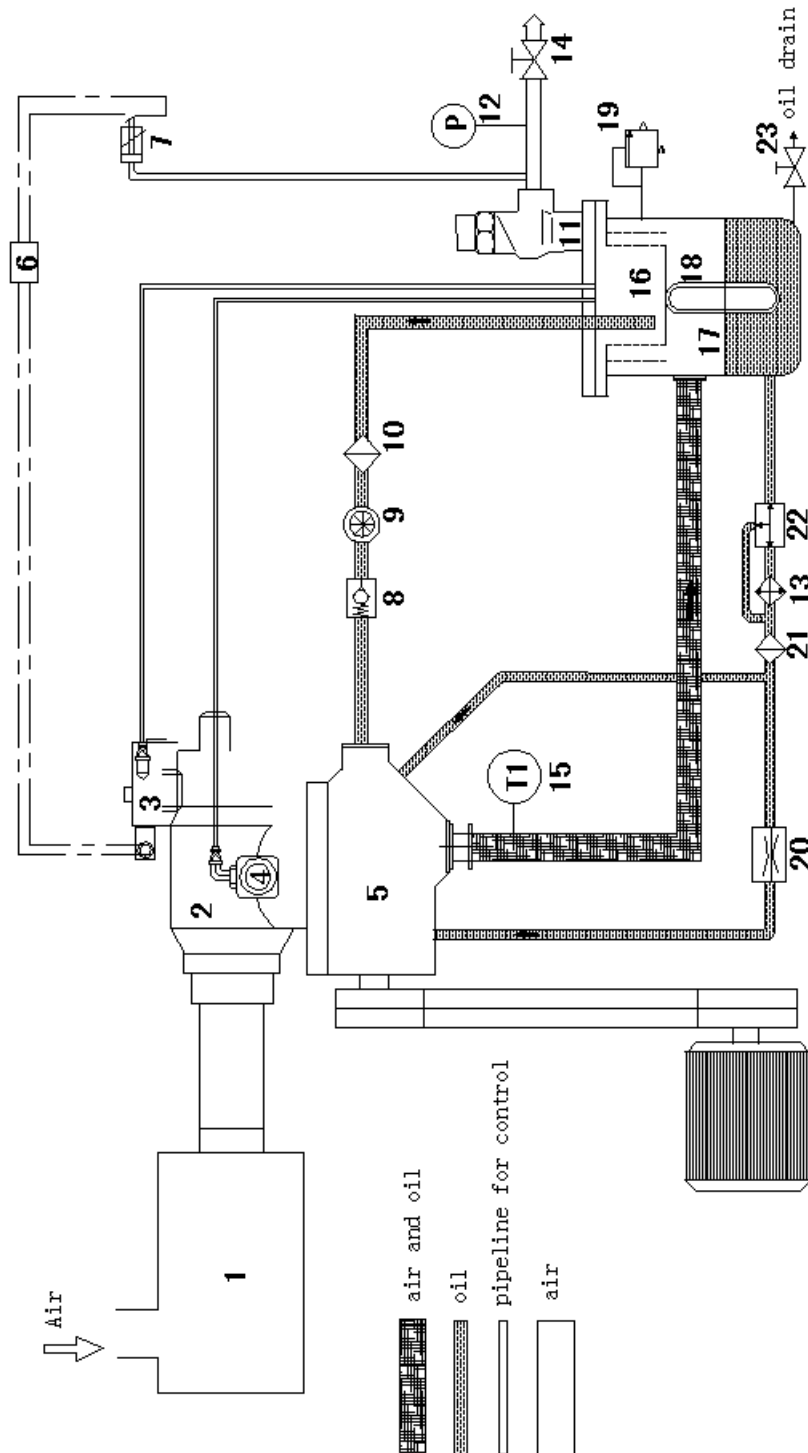


Fig. 1-3 System Flowchart

1.2.1 Air System

The typical internal structure of ZST Series II screw air compressors is shown in Fig.1-4.

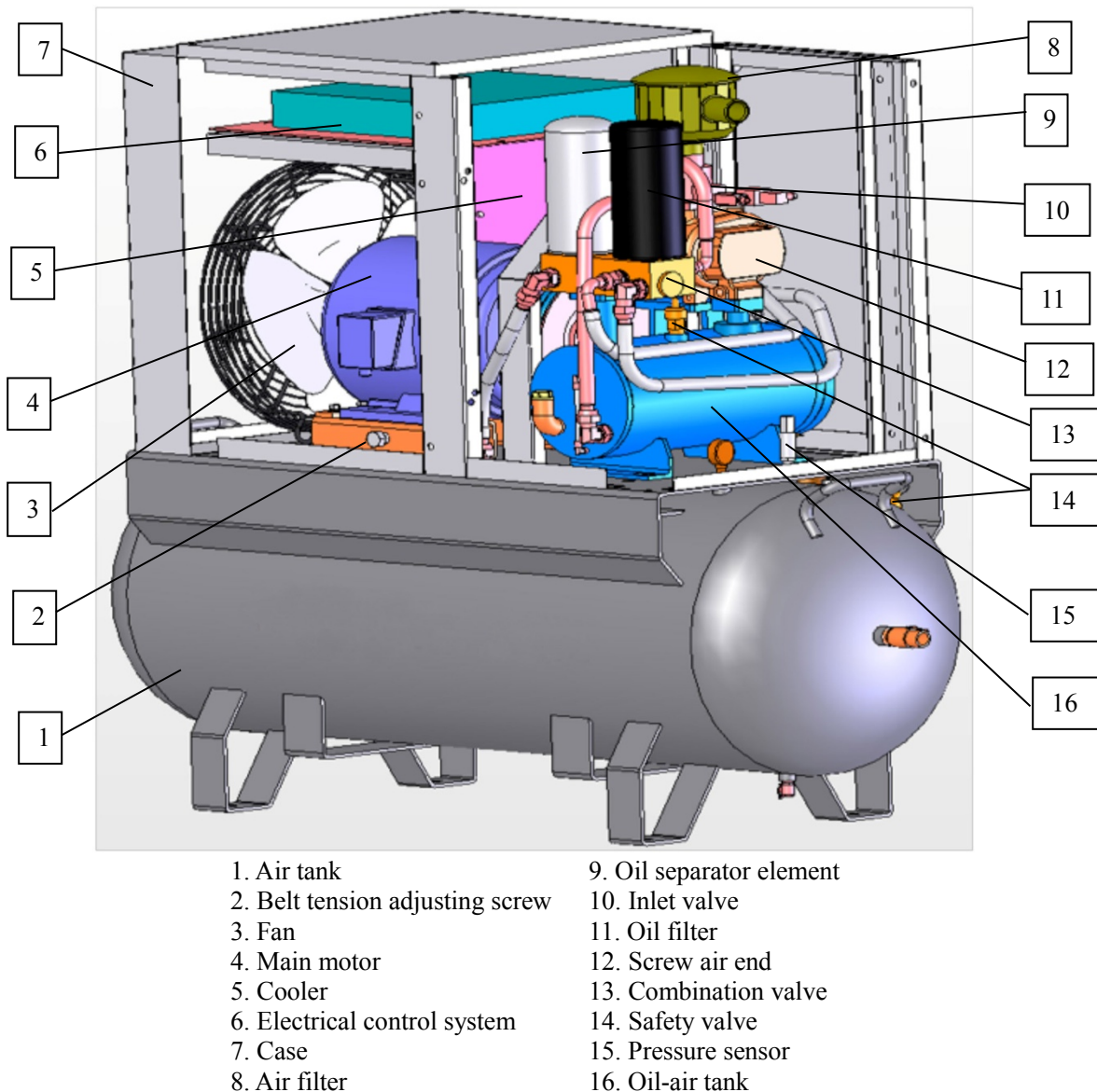


Fig. 1-4 Structure of ZST Series II Low Noise Screw Compressor

The air is sucked through the air filter and flows into the main machine of compressor through the inlet valve for compression. The compressed oil-air mixture flows into the oil-air tank for preliminary separation, and then into the fine oil separator. After the oil-air separation, the compressed air flows through the minimum pressure valve and air tank, and then it will be discharged out of the compressor and into the pipeline network of the user.

The function of the air filter is to filter the foreign matter in the air to ensure that only clean air enters into the compressor's screw air end. The inlet valve can adjust the air

input of the compressor automatically according to the air consumption, ensuring the balance between demand and supply and thus saving energy. In addition, the inlet valve will be closed for start-up at reduced load when the unit is started. When the unit is shut down, the inlet valve will be closed to prevent compressed air and lubricating oil in the separator from flowing backwards and being ejected out of the air inlet.

The minimum pressure valve can ensure that the pressure in oil-air tank is not below 0.35 MPa, which will enable the lubricating oil to normally flow in the system. In addition, when the compressor is unloaded or shut down, the minimum pressure valve can prevent the compressed air in the pipeline network of the user from flowing backwards.

The automatic vent valve is located beside the inlet valve. When the compressor is unloaded or shut down, the vent valve will automatically open to drain out the air and release the pressure.

1.2.2 Lubrication System

The compressed oil-air mixture is injected into the oil-air tank and collides with its inner wall. Most lubricating oil will be separated from the oil-air mixture in the collision and will settle down in the lower part of the oil-air tank; the remaining oil will be separated via the fine oil separator and led to the screw air end via the oil return pipe.

During operation of the compressor, if the temperature of the lubricating oil is below 71°C, the thermostatic valve will automatically open the bypass circuit and the circulating oil from the oil-air tank will be directly injected under air pressure to the screw air end and individual lubricating points via the lubricating pipe and oil filter. If the temperature rises to 71°C, the thermostatic valve will gradually shut off the bypass circuit and at the same time it will gradually open the circuit going to oil cooler through which a part of lubricating oil will be cooled down. If the temperature rises to 85°C, the bypass circuit will be completely shut off, and the lubricating oil will completely cool down through the oil cooler and then enter into the main machine.

The function of the thermostatic valve is to maintain the constant temperature and viscosity of lubricating oil and to allow the system to reach the optimal operating temperature as soon as possible while at the same time and subsequently maintaining the temperature to prevent water vapour in the system from condensing. The function of lubricating oil filter is to remove the metal particles and lubricating oil cracking products in the lubricating oil to reduce the wear of bearing and male and female rotors and increase their service life.

1.3 Cooling System

This is how the cooling system functions: The cooling air is sucked from the outside of the unit by the fan and then blown through the radiator fin of cooler where it will have the heat exchange with the lubricating oil flowing through the cooler for the cooling effect. The maximum temperature of cooling air in the cooling system is

45°C. If it exceeds 45°C, excessively high air discharge temperature will be caused in the compressor.

1.4 Control Protection System

For intelligent automatic control, the compressor has a micro-computer controller which can adjust the operating state of the compressor according to the actual air consumption conditions of the user's application.

If the air consumption of the user is low or the air application is paused, the main inlet valve will be shut off to allow the compressor to operate at light load and turn into the unloading state, consequently realizing the energy-saving target. After the air consumption is recommenced, the micro-computer controller will open the main inlet valve again to enable the compressor to operate at the full load and recover the loading operation state. At the same time, the micro-computer controller will monitor the unit. If any abnormal condition - such as motor overload, air discharge over-temperature, etc. - occurs to the unit, it will automatically shut down the compressor to protect it against damage.

A safety valve is installed in the oil-air tank. If the pressure inside the oil-air tank exceeds the setting, the safety valve will automatically open to quickly discharge the air and release the pressure, ensuring the safety of the unit. The unit has the ideal pressure relief function. Therefore, the safety valve will not open in normal operation.

1.5 Electrical System

The electrical system consists of the main motor, electrical control cabinet assembly, solenoid valve, temperature sensor, pressure sensor, and operation panel.

To further protect the main motor against overheating damage due to abnormal conditions, the operating current of main motor will be monitored by the controller. If the motor current exceeds the allowable current, the compressor controller will perform immediate shutdown protection, and the motor overload will be shown on the operation panel at the same time.

The electrical schematic diagrams are shown in Fig's 1-5 and 1-6.

Caution: The user should provide the necessary short circuit protection and other safety devices ahead of the lead-in power supply cable of the compressor, and the secure grounding wire should be present.

Warning: It is prohibited to remove and install the connecting lines inside the electrical control cabinet and from it to individual motors without permission!

1.6 Compressor Controller and Operation Panel

The compressor micro-computer controller configured in the unit as well as its supporting operation panel is the integrated controller covering the operation control and protection, temperature indication and protection, phase-sequence protection, motor protection, pressure control, operation record and so on.

To ensure normal operation of the unit, the user should be familiar with the functions and meanings of individual buttons, display windows and indicating lights on the controller and operation panel, and have the proper decision on the indicated parameters and signals.

Please refer to the separate MAM-870 Compressor Controller Operation Manual.

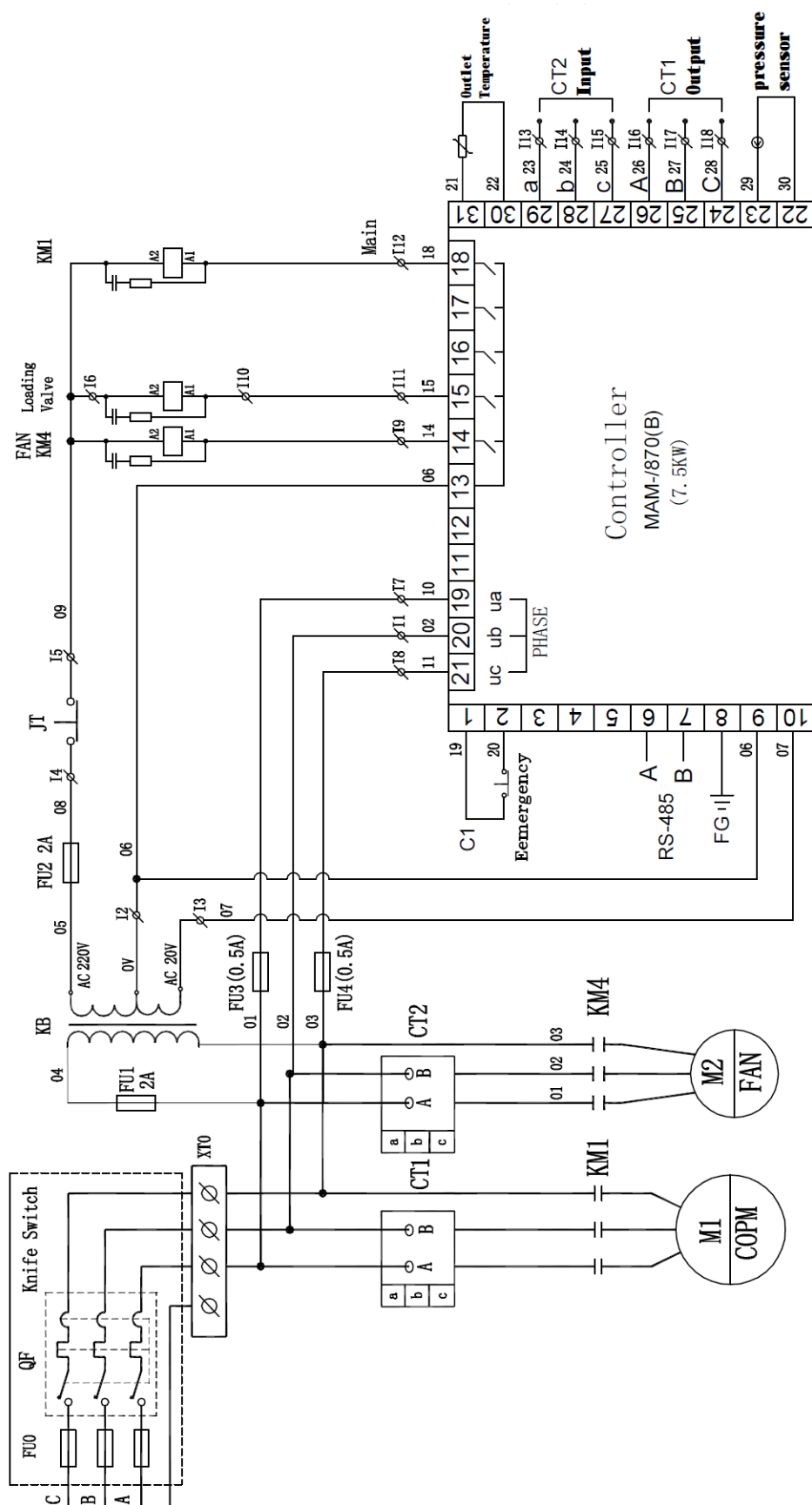


Fig. 1-5 Electrical Schematic Diagram of ZS100T Series II

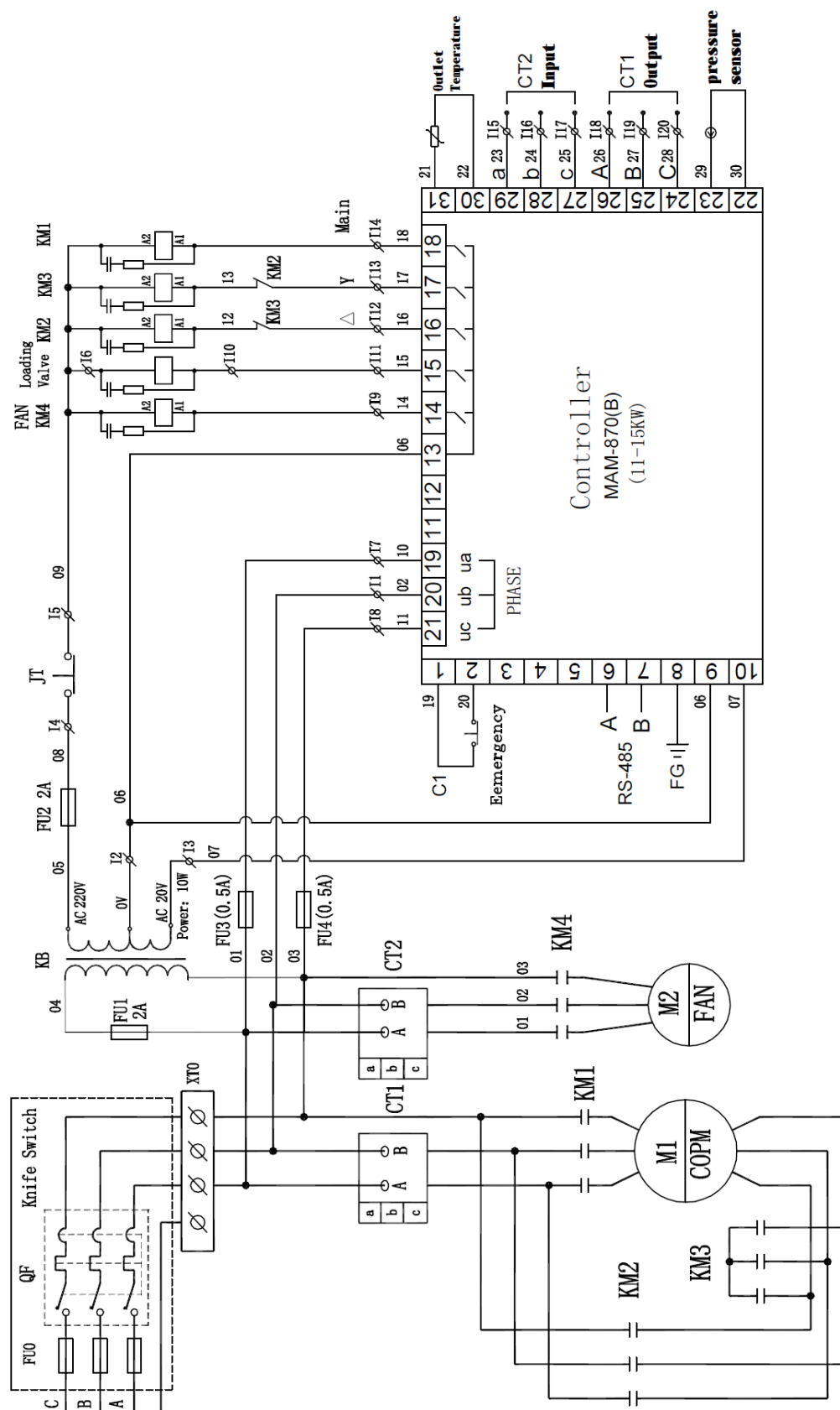
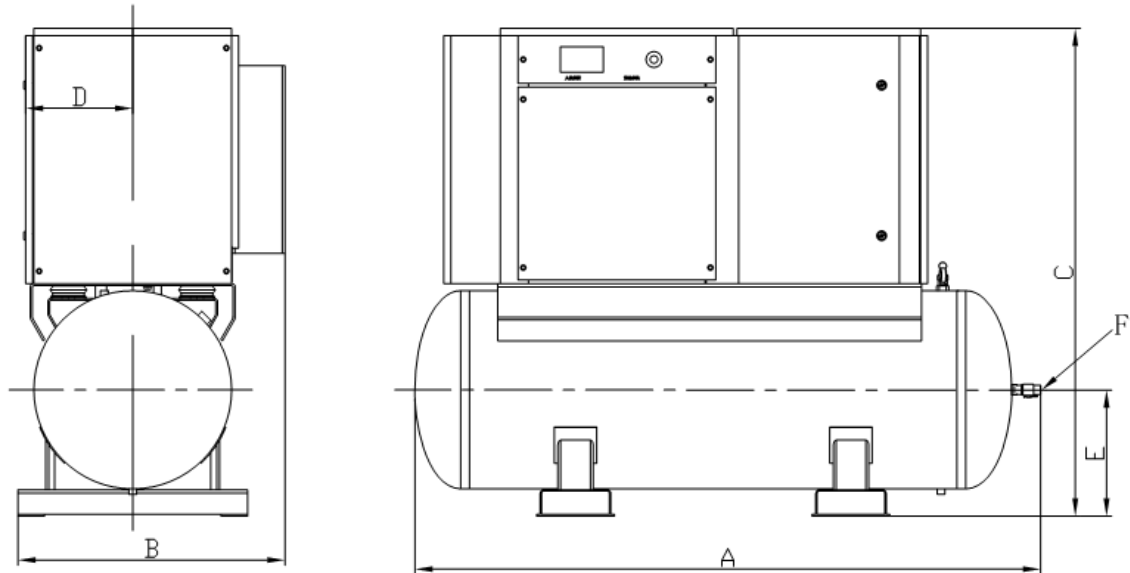


Fig. 1-6 Electrical Schematic Diagram of ZS150T and ZS200T Series II

Chapter 2 Installation

2.1 Outline Dimensions



Model	A	B	C	D	E	F
ZS100T	1,730	700	1,220	280	305	1" BSP
ZS150T	1,800	760	1,400	310	357	1" BSP
ZS200T	1,800	760	1,400	310	357	1" BSP

Fig. 2.1 Outline Dimensions of ZS100T/ZS150T/ZS200T Series II

2.2 Installation Site of Compressor

A proper installation site should be selected for the compressor. It is recommended to use a dedicated compressor room. The installation site should meet the following requirements:

- It is essential to install the compressor in an area with good lighting and sufficient free space for unhindered operation and maintenance. The compressor should have a distance no less than 1 m away from its surrounding walls and ceiling.
- Good ventilation should be provided and proper heat radiation facility should be set to ensure that the indoor ambient temperature is not above 40°C. It is recommended to fit the hot air duct for heat radiation. The air draft volume of fan should be higher than the air discharge flow of the cooling fan of the compressor.
- The ambient air should have low relative humidity, low dust content and no acid or alkali corrosive gas content. If the air quality fails to reach the requirement, then it

will be necessary to guide the air entry of compressor to a place with clean air or to install pre-filtration equipment.

- d. The compressor should be placed in a horizontal position on solid and flat ground to avoid vibration occurring to the compressor due to poor ground condition. The use of flexible vibration isolators underneath the mounting feet is highly recommended and will reduce noise emissions.

2.3 Electrical Safety Requirements

- a. The 3-phase mains power supply voltage should be stabilized to 415 V. A separate supply circuit is recommended for the compressor to avoid motor current overload due to excessive voltage drop or unbalanced 3-phase caused by other electrical equipment operating in parallel.
- b. The power supply cable diameter should be properly selected in accordance with local regulations. Do not use an undersized cable.
- c. Make sure that the connected power supply is consistent with the rated voltage of the motor of compressor.
- d. According to the power of the compressor, the necessary short circuit protection and other safety devices such as breaker switch, etc. should be installed in front of the lead-in power supply cable of the compressor.
- e. It is essential to connect the compressor to a secure grounding (earthing) line, preventing the hazards due to electricity leakage. Do not connect the compressor's earth wire to the compressed air pipeline.

Chapter 3 Operation

Before compressor start-up, the operator should thoroughly read this manual. They should strictly follow all related safety regulations including the related contents specified in the manual and expertly master the related characteristics of the unit and its operation methods.

3.1 Initial Start-Up

- a. Loosen the transport supports or bolts connected to air tank on the mounting plate of the unit.
- b. Connect the power supply cord and the grounding line. Check whether the voltage is correct and the 3-phase voltage is balanced.
- c. Check whether the electrical wiring is safe, secure and reliable.
- d. Check whether the oil level in the oil-air tank is in a proper position.
- e. Check whether the V-belt tension is correct.
- f. Before initial start-up or restarting after 3-6 months long-term shutdown, add 0.5-1.5 L of compressor lubricating oil into the compressor through the air inlet valve and rotate the screw air end for several turns by hand. This is to prevent friction/heat damage to the screw air end due to insufficient lubrication upon start-up.
- g. At the first power-on, the power supply light will be lit and the current temperature will be shown on the panel. **Caution:** If the phase of power supply is inconsistent, the LCD window will indicate 'wrong phase sequence'. At this point, any two phases of power supply cable should be interchanged to correct the phase sequence.
- h. Open the air tank discharge valve.
- i. **Rotation direction test:** Although the unit has reverse phase protection measure, the rotation direction test is still an important step in the initial start-up. It should be repeated additionally after the motor is repaired or replaced.
- j. Press 'ON' to start the compressor to rotate, and immediately press the 'Emergency Stop' button. Make sure that the rotation direction of the compressor is consistent with the arrow direction on the air end. If it is incorrect, just interchange any two phases of power supply cables. The rotation direction of fan motor should be checked as well; the cooling air should discharge upwards from the exhaust duct at the rear of the unit.
- k. Restart the compressor. The unit will automatically turn to the star-delta starting process. Close the valve at the air tank discharge to allow the discharge pressure to rise, until the unit starts unloading. Check whether the unloading pressure is consistent with the setting, and observe whether the indicating meters and lights are normal at the same time. If any abnormal sound, vibration or leakage occurs, immediately press the 'Emergency Stop' button to shut down the machine for maintenance.

1. Shutdown: Press 'OFF' shutdown key, and the unit will turn to the shutdown procedure. At first, the light/heavy-load solenoid valve will reduce the power, the compressor vent valve will discharge the air, and the inlet valve will be shut off for unloading. After several seconds, the motor will stop.

Caution: During normal operation, do not use the 'Emergency Stop' button for shutdown.

3.2 Daily Operation

3.2.1 Start-Up

- a. Open the screw-plug and ball valve at the oil discharge outlet of oil separation tank to drain out the condensate settling down on the lowest part of oil-air tank after shutdown. Immediately close them when the lubricating oil flows out.

Caution: Before opening the water drainage and oil discharge outlet in the oil separation tank, always check that there is no air pressure inside it.

- b. Open the ball valve underneath the air receiver tank to drain out all water condensate and then close the valve afterwards.
- c. Open the discharge valve on the air tank.
- d. Turn on the power supply and operate the compressor's peripheral equipment such as a compressed air dryer.
- e. Press the 'ON' button to start the compressor. Please note whether the compressor operates normally with the direct on line or Y-Δ switching time, operating noise, etc. Check the discharge pressure, lubricating oil pressure, air discharge temperature, and complete the related records.

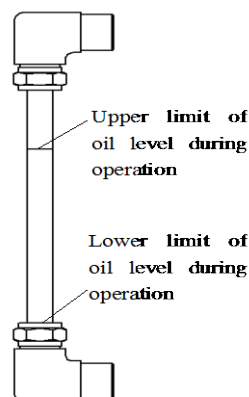


Fig. 3-1 Oil Level Indications

- f. After the operation becomes stable, check the oil level. If the oil level is lower than or close to the 'lower limit of oil level during operation' in Fig. 3-1, then shutdown the

unit, drain the compressed air, and top up with additional oil as required.

- g. If any abnormal condition is found, the 'OFF' button or 'Emergency Stop' button should be pressed immediately. Only restart the unit after rectifying the problem.

3.2.2 Operation Status of Compressor

Start

After all preparations are completed, press the starting button. The contactor in the electrical cabinet will be closed to start the motor. At this point, the throttle in the inlet valve will be closed, and only a low volume of air enters into the compressor through the check valve in the inlet valve. The compressor will be started at light load and the preliminary system pressure will be established gradually in the oil-air tank.

Load

About 6-7 seconds after starting, the solenoid valve in the inlet valve will act to fully open the inlet valve, so that a high volume of air will enter into the compressor which will turn to the full load operation. If the pressure (system pressure) inside the oil separation tank reaches or exceeds 0.35 MPa, the minimum pressure valve will open and the unit will start to supply the air to the exterior. As long as the system pressure is below the setting of unloading pressure, such a state will be kept.

Unload

If the air consumption is continuously below the air discharge, the discharge pressure of the unit will reach or exceed the setting of unloading pressure. At this point, the micro-computer controller will control the solenoid valve. Then the throttle of inlet valve is closed to stop the air input in a high volume. Only a low volume of air can enter into the compressor through the check valve. The check valve spool of minimum pressure valve will be closed to isolate the compressor system from the pipeline of the user. At the same time, the vent valve will open to release the compressed air in the oil separation tank to 0.2-0.3 MPa. It will reduce the operating back pressure of the compressor and maintain the circulation of lubricating oil in the oil circuit system.

In the unloading operation state, if the discharge pressure reduces to the setting of loading pressure, the micro-computer controller will control the solenoid valve. Then the throttle of inlet valve will open again and the vent valve will be closed. The unit will return to the loading operation state.

If the unit fails to unload at the correct system pressure as a part of unloading control is faulty or the setting is improper, it may cause the safety valve installed in the oil separation tank to trip for the system pressure relief, avoiding any hazards due to excessively high system pressure. If this occurs, immediately shut down the unit and check the inlet valve and controller for their correct setting.

Stand-By

If the unloading operation lasts for a relatively long time (10 minutes set as default for the machine), the micro-computer controller will assume that the user has stopped air consumption and will switch the compressor to its stand-by state. The main motor and fan motor will stop their operation to further save energy.

In the stand-by state, if air consumption is resumed and pressure in the air discharge pipeline decreases to the loading setting, the micro-computer controller will restart the unit automatically.

Caution: In the stand-by state, the LCD window will provide this indication. In such a state, individual cabinet doors in the unit should not be opened and no maintenance works are allowed in order to prevent injury.

3.2.3 Shutdown

Normal Shutdown

If the air application is not required for a long term, then the shutdown button should be pressed and the compressor will go into the shutdown state. For shutdown, the throttle of inlet valve should be closed at first. The vent valve should be opened to release the pressure in the oil separation tank. After 30-50 seconds, the unit will be shut down at a lower system pressure.

After shutdown, the power supply of electrical system should be switched off and then the valve at the air discharge should be closed to protect the unit against the influence of compressed air in the external pipeline network. Finally, the external power supply of the unit should be switched off to prevent accidents.

Failure Shutdown

If any electrical or over-temperature failure occurs in the compressor, the micro-computer controller will immediately shut down the machine. If this happens, the failure should be eliminated according to the indication and then the resetting key can be pressed for restarting.

Emergency Shutdown

If any abnormal condition occurs to the compressor, press the 'Emergency Stop' button immediately for direct shutdown of the compressor to avoid any damage. After shutdown, the failure should be eliminated in time and then the resetting key can be pressed for restarting.

3.2.4 Monitoring During Operation

- a. Observe whether any abnormal noise or vibration appears. If it is present, an immediate shutdown should be performed.

- b. During operation, it is prohibited to loosen any pipes, bolts and screw-plugs in the unit. And individual valves in the unit shouldn't be opened or closed at random.
- c. Observe the oil level. If the oil level is too low or not visible, the compressor should be shut down for oil refilling.
- d. The operators in each shift should complete the operation record including the discharge pressure, system pressure, air discharge temperature, oil level, operation time, etc. If possible, the infrared temperature detector can be applied to inspect the temperature at individual points and the power supply voltage and current may also be recorded.

3.3 Long-Term Shutdown

3.3.1 Preparation

If long-term shutdown is required for the compressor, the following steps should be performed:

- a. Any faults should be rectified in preparation for the unit's future use.
- b. The water in the oil cooler should be completely drained out to prevent internal corrosion.
- c. All openings should be enclosed with plastic cloth or oiled paper to prevent the ingress of moisture and dust.
- d. If the unit is out of service for more than two months, it will be necessary to replace the lubricating oil before that and to operate it for 30 minutes. After three days, the condensate in the oil separation tank should be completely drained out.

3.3.2 Restarting

- a. Remove the protective plastic cloth or oiled paper.
- b. Measure the insulation resistance of motors to ground, which should be more than 1 MΩ.
- c. Follow the initial start-up procedure in Section 3.1 to restart the unit.

Chapter 4 Maintenance

4.1 Lubricating Oil

The lubricating oil has a critical effect on the performance and service life of a screw air compressor. If incorrect lubricating oil is used, it will cause severe damage to the compressor. Either of the following compressor lubricating oils is recommended:

Option 1: Compressor Oil – Mineral Based

Brand: Castrol
Product: AIRCOL PD46
Service Life: Up to 2,000 Hours

Option 2: Synthetic Compressor Oil - Polyalphaolefin Based

Brand: Castrol
Product: AIRCOL SR46
Service Life: Up to 8,000 Hours

Equivalent premium grade compressor oils from other suppliers may be substituted.

Caution: Only use one or the other of the above recommended oil types. Do not use a mixture of mineral and synthetic oils.

4.1.1 Oil Change Interval

- The initial oil change should be performed after the compressor operates for about 500 running hours or 3 months, whichever occurs first.
- If mineral lubricating oil is used, it should be replaced every 1,000 - 2,000 hours. If synthetic oil is used, it should be replaced every 4,000 - 8,000 hours. In either case, the lubricating oil should be replaced at least every 12 months if not sooner according to the running hours limit.
- If an oil sample analysis indicates that a lubricating oil change is required, it should be replaced.
- If the operating conditions are poor and the discharge temperature is high, the oil change period should be shortened.

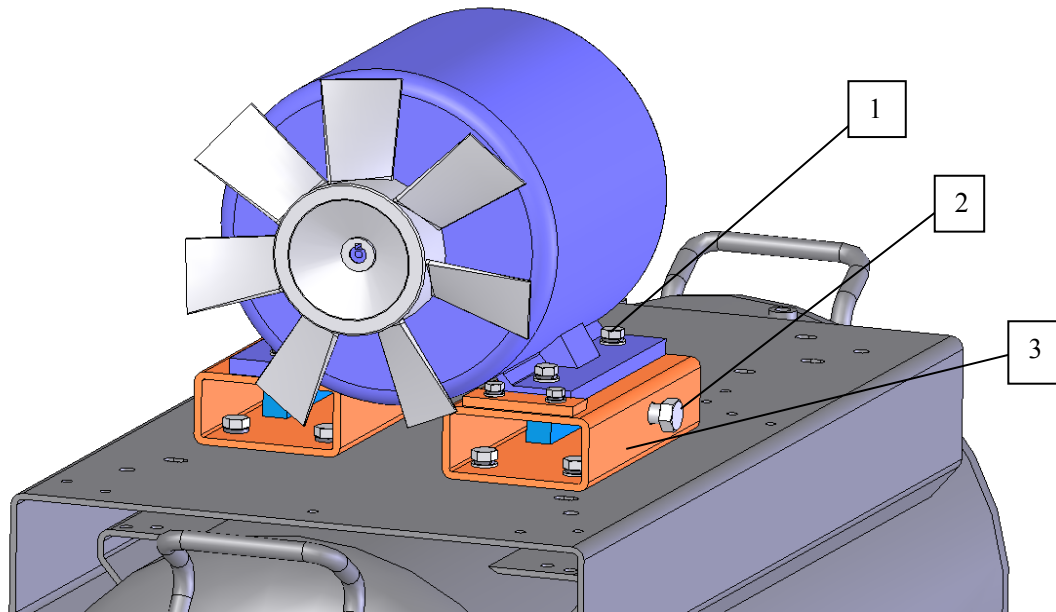
4.1.2 Replacing Oil and Oil Filter

- Slowly close the air tank discharge valve to allow the compressor to operate in unloading state for 3 minutes.
- Shut down the compressor and switch off the power supply.

- c. After the system pressure in the oil separation tank is completely released, slowly open the screw-plug at the oil filling port, and then rotate the compressor for about 10 turns in the rotation direction of compressor by hand.
- d. Utilize a specialized belt-type wrench to remove the lubricating oil filter. Please note to catch the lubricating oil flowing out into a container. After no more lubricating oil flows out, clean the lubricating oil filter base.
- e. Replace the lubricating oil filter.
- f. Remove the oil drain plug and open the ball valve in the oil drain pipe to drain out the lubricating oil from the oil separation tank. Catch the discharged lubricating oil with a container and properly dispose of it to prevent any environmental pollution.
- g. Close the oil drain ball valve and install the oil drain plug. Fill the oil separation tank with lubricating oil until the oil level reaches the upper limit. Tighten the screw-plug at oil filling port.
- h. Restart the compressor and allow it to operate in loading state for 5 minutes, and then check the oil level. If the oil level is low, then the unit should be shut down. After the system pressure in the oil separation tank is released thoroughly and the oil level is stabilized, slowly open the screw-plug at the oil filling port and continue to fill the oil separation tank with sufficient lubricating oil.

4.2 V-Belts

- a. After the new V-belts operate for 100 hours, it is necessary to check the tightness or tension of the belts. If the V-belts are too loose, then adjustment will be required. Adjustment will be required later every time it operates another 500 - 1,000 hours.
- b. It is essential to use replacement V-belts with the correct specifications. V-belts with the same lot number should be used to ensure consistent tension in each belt. In addition, it is essential to replace all V-belts simultaneously. Do not use a mixture of new and used V-belts.
- c. To adjust the V-belt tension, the four fixing bolts under the main motor should be slightly loosened at first, and the adjustment screw can be turned to drive the main motor to tension the belt until the tension meets the requirement. Then the fixing bolts of motor should be tightened. Refer to Fig. 4-1.



1: Fixing bolt of the main motor. 2: Adjustment screw. 3: Motor Bracket.

Fig. 4-1 V-Belt Adjustment Device

When carrying out any maintenance, do not allow any oil to splash onto the V-belts or pulleys in order to avoid belt slippage.

4.3 Air Filter

- a. The dust removal method for the air filter element is to blow clean compressed air at a pressure no higher than 5 bar through it from inside to outside. Keep the air blowing outlet more than 20 mm away from the inner surface of the filter element. After the air filter element is cleaned 3-4 times, it should be replaced.
- b. It is not permitted to hit the air filter element or to clean it with water. If the filter element is damaged, it should be replaced. If the filter element is oily or contaminated severely, no cleaning is practicable and element should be replaced.
- c. After the air filter element is cleaned or replaced, it is necessary to hold down the resetting button in the upper of indicator until the contamination indication is completely reset.
- d. The service life of air filter element is about 2,000 hours. If the operating conditions of compressor are adverse, then the replacement period should be shortened.



Fig. 4.2 Air Filter Element Cleaning

4.4 Oil Filter

The initial replacement of lubricating oil filter element should be performed after the compressor operates for 500 hours (or after 3 months, whichever occurs first). Subsequently, replacement will be required every 1,000 hours or 12 months. If the lubricating oil needs to be replaced, the lubricating oil filter should be replaced at the same time. If the operating condition is poor, then the replacement period should be shortened.

The replacement steps are as follows:

- a. Shut down the unit and release the air pressure. After the unit cools down, utilize a belt wrench to remove the lubricating oil filter.
- b. Clean the sealing washer of new lubricating oil filter, and apply a layer of clean lubricating oil on the sealing washer.
- c. Install the new filter onto the lubricating oil filter base until the sealing washer contacts the lubricating oil filter base, and then tighten it by hand about half a turn.

4.5 Oil-Air Separator

Generally, after the compressor operates for 2,000 hours with mineral lubricating oil, it is essential to replace the fine oil separator. When the operation time of fine oil separator exceeds the setting of its maximum operation time, the indication will be shown on the controller LCD window and the fine oil separator should be checked or replaced. In a dusty environment, the replacement period should be shortened. It is not possible to clean the fine oil separator element; only replacement is allowed. The fine oil separator should be replaced at least every 12 months if not sooner according to the running hours limit.

Replacement of the fine oil separator should be performed as per the following steps:

- a. The replacement steps of the external fine oil separator are the same as the ones of lubricating oil filter.

Caution: When removing the fine oil separator, the separator connector may become loose. Use a spanner to tighten the separator connector if necessary and take care not to damage the sealing O-ring.

Caution: After the oil separator is replaced, the controller record should be reset to zero.

Caution: When replacing the fine oil separator, it is essential to prevent ingress of foreign matter into the oil-air tank.

4.6 Oil Cooler

If the air discharge temperature in the compressor is excessively high, the dust on the oil cooler's fins should be blown off with clean compressed air. If it can't be cleaned in this manner, then wash it with a proper cleaning agent. Never use a metal wire brush or metal scraper to remove the dust. The finned oil cooler should be kept clean at all times.

4.7 Safety Valves

Regularly check the safety valves on the oil-air receiver and air receiver tanks to verify that they're operating freely. While the receiver tank is pressurized to at least 650 kPa (94 psi), pull the ring on the safety valve and allow it to snap back to its normal position. If air leaks out after the ring has been released, or the valve is stuck and cannot be actuated by pulling the ring, the safety valve is faulty and must be replaced before operating the compressor.

Caution: Take care when testing the safety valve as compressed air will discharge from the valve with high velocity.

Caution: Do not tamper with the safety valve. It is designed to automatically release air if the tank pressure exceeds a preset maximum.

4.8 Preventative Maintenance Program

Maintenance items	Maintenance interval (based on operating hours)**							
	Daily	Weekly	Quarterly	1,000	2,000	4,000	6,000	8,000
				1 Year			2 Years	
Daily maintenance works								
Check oil level	√							
Check tightness of components	√							
Check correct indication of meters	√							
Check maintenance indicator of air filter	√ *							
Drain out condensate after shutdown	√							
Air system								
Clean or replace air inlet screen, if fitted		√						
Clean air filter element			√					
Replace air filter element					√			
Clean fittings of inlet valve						√		
Replace maintenance kit of inlet valve							√	
Replace maintenance kit of minimum pressure valve								√
Clean oil cooler		√						
Check pressure transducer				√		√		
Check safety valves				√				
Oil circuit system								
Replace oil for new machine			√ Initial					
Add lubricating oil (if necessary)				√				
Check cleanliness in oil return pipe					√			
Replace oil filter			√ Initial	√				
Replace oil-air separator element					√			
Replace maintenance kit of thermostatic valve								√
Replace oil					√ ^①			√ ^②
Drive system								
Check or adjust V-belt tension		√ Initial		√				
Check or replace V-belts						√		
Add lubricating grease for motor bearings					√			
Electrical system								
Check emergency stop button			√					
Check reliability of electrical connection			√					
Check controller for its normal functions						√		

¹ Using mineral based compressor lubricating oil; 2,000 hours maximum or 1 year.

² Using synthetic based compressor lubricating oil; 8,000 hours maximum or 1 year.

* Applicable to the model equipped with air filter condition indicator.

** In adverse working conditions such as dusty environment and high temperature, the maintenance or replacement interval should be reduced.

Chapter 5 Fault Diagnosis and Repair

5.1 Compressor Fault Analysis

Please refer to this section for assistance with fault diagnosis and repair in the unlikely event that any problem might occur with your air compressor.

It is important to collect the operating data of the unit routinely and systematically. Based on this data, the operator can find any changes in the unit's performance and detect the potential failure.

Before repairing or replacing any components, various factors causing failures should be analyzed in detail to find the exact reason. Don't disassemble or move the compressor unit in a disorderly way, otherwise unnecessary damage may be caused.

Routine inspection should be made on the following items:

- a. Whether any wiring connections/terminals are loose or disconnected.
- b. Whether any piping is damaged.
- c. Whether any components are damaged due to over-heating or short circuiting. An obvious telltale sign is discoloration or a burning odor.
- d. Whether any air or oil leakage is evident.
- e. Whether any abnormal noise is audible.
- f. Whether any abnormal vibration is detectable.
- g. Whether any parameters shown on the LCD display and meters deviate from their regular values.

5.2 Troubleshooting Chart

Symptom	Possible Cause	Corrective Action
Compressor fails to start up.	<ol style="list-style-type: none"> 1. Fuse is ruptured. 2. Power supply voltage is too low. 3. Phase-loss or error-phase. 4. Loose wiring or poor contact. 5. Motor failure. 6. Air end failure. 	<ol style="list-style-type: none"> 1. Investigate cause and replace fuse. 2. Investigate and rectify electricity supply. 3. Restore phase loss or re-connect the wire. 4. Check and tighten all connections. 5. Repair or replace motor. 6. Repair or replace air end.
Too high air discharge temperature ($\geq 105^{\circ}\text{C}$).	<ol style="list-style-type: none"> 1. Insufficient lubricating oil. 2. Too high ambient temperature. 3. Oil cooler fins are blocked. 4. Oil filter is blocked. 5. Thermostatic valve is faulty. 6. Incorrect grade of lubricating oil. 7. Cooling fan is faulty. 8. Temperature sensing element is damaged. 	<ol style="list-style-type: none"> 1. Check oil level in oil-air tank. 2. Improve ventilation conditions and reduce room temperature. 3. Clean oil cooler fins. 4. Replace oil filter. 5. Check whether oil is cooled down via oil cooler. If not, repair or replace thermostatic valve. 6. Change to correct grade of lubricating oil. 7. Repair or replace cooling fan and fan motor. 8. Check or replace temperature sensing element.
Too low air discharge temperature ($\leq 75^{\circ}\text{C}$).	<ol style="list-style-type: none"> 1. Very low ambient temperature. 2. Thermostatic valve is faulty. 3. Temperature sensor is incorrect. 	<ol style="list-style-type: none"> 1. Reduce radiating area of cooler. 2. Repair or replace thermostatic valve. 3. Check and replace temperature sensing element.
Air supply pressure is below rated discharge pressure.	<ol style="list-style-type: none"> 1. Pressure settings are too low. 2. Air consumption of the user is higher than air supply amount. 3. Air filter is blocked. 4. Inlet valve isn't opening fully. 5. Pressure sensor is faulty. 6. Minimum pressure valve is faulty. 7. Oil-air separator is blocked. 	<ol style="list-style-type: none"> 1. Check the controller's pressure settings. 2. Reduce air consumption and/or check air piping system for leakage. 3. Clean or replace air filter element. 4. Check the action of inlet valve. 5. Check or replace pressure sensor. 6. Check and repair minimum pressure valve. 7. Check and replace oil-air separator.
Air supply pressure is above the setting of unloading pressure.	<ol style="list-style-type: none"> 1. Pressure settings are too high. 2. Unloading parts (such as solenoid valve 'C' in air inlet control valve, vent valve, etc.) are faulty. 3. Leakage in control air piping. 4. The filter in control air piping is blocked. 5. Pressure sensor is faulty. 	<ol style="list-style-type: none"> 1. Check the controller's pressure settings. 2. Check unloading parts for normal operation. 3. Check and rectify leakage. 4. Clean or replace the filter assembly. 5. Check or replace pressure sensor.

Symptom	Possible Cause	Corrective Action
System pressure (tank pressure) is too high.	<ol style="list-style-type: none"> 1. Unloading parts (such as solenoid valve 'C' in air inlet control valve, vent valve, etc.) are faulty. 2. Pressure settings are too high. 3. Leakage in control air piping. 4. The filter in control air piping is blocked. 5. Oil-air separator is blocked. 6. Minimum pressure valve is faulty. 7. Pressure sensor is faulty. 	<ol style="list-style-type: none"> 1. Check unloading parts for normal operation. 2. Check the controller's pressure settings. 3. Check and rectify leakage. 4. Clean or replace filter assembly. 5. Replace oil-air separator. 6. Check and repair minimum pressure valve. 7. Check or replace pressure sensor.
Compressed air has relatively high oil content and oil refilling period is shortened.	<ol style="list-style-type: none"> 1. Oil addition is excessive and oil level in oil-air tank is too high. 2. Filter or orifice in oil return pipe is blocked. 3. Filter element or packing washer in oil-air separator is damaged. 4. Oil return pipe in oil separator element is damaged. 5. Leakage in oil piping system. 6. Oil grade is poor causing excessive foaming. 	<ol style="list-style-type: none"> 1. Check oil level and drain out any excess. 2. Clean filter element and orifice. And if necessary, replace them. 3. Check oil-air separator. If it is damaged, replace it. 4. Replace oil return pipe. 5. Check oil piping system and eliminate leakage. 6. Replace oil with correct grade.
Oil mist leaks out of air filter during shutdown.	<ol style="list-style-type: none"> 1. Before shutdown, no unloading is performed or unloading period is too short. 2. Minimum pressure valve is faulty. 3. Venting of oil-air tank is incomplete. 	<ol style="list-style-type: none"> 1. Check air inlet control valve. Check electrical circuits such as shutdown time delay, etc. 2. Check and repair minimum pressure valve. 3. Check vent valve.
The switching between unloading and loading is too frequent.	<ol style="list-style-type: none"> 1. Air piping leakage. 2. The difference between the unload and load pressure settings is too small. 3. Air consumption is unstable. 	<ol style="list-style-type: none"> 1. Check and rectify air leakage. 2. Check the controller's pressure settings. 3. Increase the air storage capacity. If necessary, install pressure regulating valve downstream from the air tank.

Chapter 6 Warranty

6.1 Proof of Purchase

Please complete the following details about your air compressor for future reference regarding warranty, spare parts and service.

Date and Place of Purchase:

Air Compressor Model Number:

Air Receiver Tank Serial Number:

It is recommended that you keep a copy of the tax invoice with this manual.

6.2 Warranty Conditions

The manufacturer (hereinafter the “Company”) warrants that the Goods manufactured by it shall be free from defects in material and workmanship for a period of twelve (12) months from the date of original sale (the “Warranty Period”).

Upon return – transportation charges prepaid by the Purchaser – to the Company’s or its nominated agent’s premises within the Warranty Period, the Company shall repair or replace, at its option, any Goods which it determines to contain defective material or workmanship, and shall return said Goods to the Purchaser free-on-board (FOB) at the Company’s or agent’s premises. The repair or replacement work will be scheduled and performed according to the Company’s normal work flow and availability of replacement parts.

The Company shall not be obligated, however, to repair or replace Goods which have been: repaired by others; abused; improperly installed, operated or maintained; fitted with non-genuine spare parts or accessories; altered or otherwise misused or damaged in any way. The Company shall not be responsible for any diagnosis, communication, dismantling, packing, handling, freight, and reassembly or reinstallation charges. Freight damage, pre-delivery service, normal operating adjustments, preventative maintenance service, consumable items, cosmetic damage, corrosion, erosion, normal wear and tear, performance, merchantability, and fitness for a particular purpose are not covered under this Warranty. The Company shall not be liable for any repairs, replacements, or adjustments to the Goods or any costs of labour performed by the Purchaser without the Company’s prior written approval.

Accessories or components furnished by the Company, but manufactured by others – including, but not limited to electric motors, petrol engines and diesel engines – shall carry whatever warranty the manufacturer conveyed to the Company and which can be passed on to the Purchaser.

This Warranty is in lieu of all other warranties, expressed or implied.

To the extent permissible by law and notwithstanding any other clause in these Warranty Conditions, the Company excludes all liability whatsoever to the Purchaser arising out of or in any way connected with a contract for any consequential or indirect losses of any kind howsoever arising and whether caused by breach of statute, breach of contract, negligence or other tort.

The Company's liability will be limited to, in the case of products, the replacement of the products, the supply of equivalent products or the payment of the cost of replacing the products or of acquiring equivalent products or, in the case of services, the supply of the services again or the payment of the cost of having the services supplied again. The choice of remedy will be at the discretion of the Company and the Purchaser acknowledges that this limitation of liability is fair and reasonable.

Maintenance and Repair Log

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[illegible]

[illegible]

[illegible]

[illegible]

[illegible]



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INSTRUCTION MANUAL

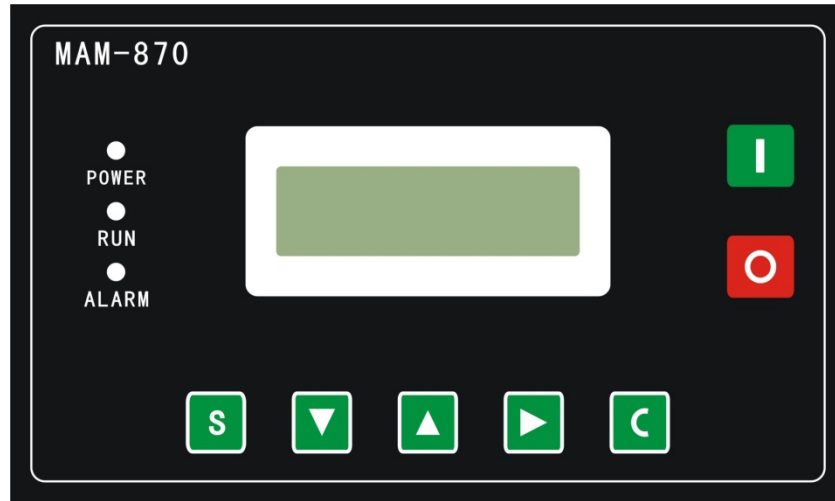
MAM-870 COMPRESSOR CONTROLLER



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1.0 BASIC OPERATION

1.1 Description of Keypad



- Start Button. Press this button to start the compressor.



- Stop Button. Press this button to stop the compressor.

S - Set Button. Press this button to confirm the data input and save it after modification. When the compressor is running in normal automatic mode, press this button to switch to manual load / unload operation.

▲ - Up Button. Press this button to move upward during data modification. Press this button to select menu during the menu selection.

▼ - Down Button. Press this button to move downward during data modification. Press this button to select menu during the menu selection.

► - Cursor/Confirm Button. This button can be used as a cursor during the data modification and as confirm button during the menu selection.

C - Return/Reset Button. Press this button to return to upper menu during the menu operation. Press this button for 5 seconds to reset the machine when the unit is stopped after fault shutdown.

1.2 Status Display and Operation

The display interface appears as follows when the unit is switched on:

SCREW
COMPRESSOR

The main display will change after 5 seconds to the following:

PRES: 0.00MPa
SYS STOP

Press ► to display the following:

TEMP: 20°C
SYS STOP

Press ▼ to display the Menu Selection Interface:

RUN PARAMETER

USE PARAMETER

Press ▼ again twice to display:

FAC PARAMETER

MOD PARAMETER

1.3 Parameter Review

Pressing ► in the RUN PARAMETER menu will display the following parameters and status:

- MAIN MOTOR CURRENT PER PHASE
- FAN MOTOR CURRENT PER PHASE
- TOTAL RUN TIME
- TOTAL LOAD TIME
- THIS RUN TIME
- THIS LOAD TIME
- OIL FILTER TIME
- O-A SEPARATOR TIME
- AIR FILTER TIME
- LUBE TIME
- GREASE TIME

- BELT TIME
- ALARM 1 TIME AND TYPE
- ALARM 2 TIME AND TYPE
- ALARM 3 TIME AND TYPE
- ALARM 4 TIME AND TYPE
- ALARM 5 TIME AND TYPE
- PRODUCTION DATE
- SERIAL NUMBER
- C-STATE

2.0 USER AND FACTORY SET PARAMETERS

2.1 Parameter View and Modification

Note: The user set parameters and factory set parameters cannot be modified during compressor operation.

Press ▼ button once in the Menu Selection Interface to select "USE PARAMETER" for access to the user set parameters.



RUN PARAMETER
USE PARAMETER

Press ▼ button once more to select "FAC PARAMETER" for access to the factory set parameters.



FAC PARAMETER
MOD PARAMETER

When the black cursor is on "USE PARAMETER", press ► button and the following interface will appear:



LOAD PRES:
00.70MPa

Now press ► button to bring up the following interface where the USER PASSWORD is required:



USER PASSWORD:

The USER PASSWORD is 9999. Enter it using ► button to move the blinking cursor from left to right, and use ▼ or ▲ buttons to change the numerical value. Then press S button and the previous screen will now reappear with the additional symbol "*" indicating that the password has been entered and the parameters can now be modified, for example:



LOAD PRES: *
00.70MPa

Use ▼ or ▲ buttons to scroll through the entire list of user set parameters. To modify any value, press ► button and the blinking cursor will appear. Press ► button again to move the blinking cursor from left to right, and use ▼ or ▲ buttons to change the numerical value. Press S button to confirm the change and the blinking cursor will disappear, or press C button to cancel the change.

Upon completion of review and/or changes to the user set parameters, press **C** button to return to the previous menu.

2.2 User Set Parameters

The user set parameters have been pre-programmed in accordance with the following table and should not be changed without reference to the manufacturer.

PARAMETER	SET VALUE	FUNCTION
LOAD PRES	00.70 MPa	The compressor will commence loading operation at or below this pressure.
UNLOAD PRES	00.80 MPa	The compressor will commence unloading operation at or above this pressure.
FAN START TEMP	0085 °C	The cooling fan will start at or above this air end discharge temperature.
FAN STOP TEMP	0070 °C	The cooling fan will stop at or below this air end discharge temperature.
MOTOR DELAY T	0010 S	When using the controller to protect the motor, it is required that the time here defined will not meet the impulse starting current of the motor. The value here must be longer than the STAR-DELTA TIME plus LOAD DELAY TIME.
FAN DELAY TIME	0006 S	When using the controller to protect the fan motor, it is required that the time here defined will not meet the impulse starting current of the motor.
STAR DELAY TIME	0007 S	Star pressure release starting delay time.
LOAD DELAY TIME	0002 S	The loading delay time after star contactor releasing.
EMPTY DELAY T	0300 S	Load free continuous running time. The machine will automatically stop after this time.
STOP DELAY TIME	0030 S	The machine will not stop until this time has passed in the unloading state.
START DELAY T	0060 S	Machine cannot be restarted before this set time after being manually or automatically stopped.

PARAMETER	SET VALUE	FUNCTION
START MODE	LOCAL	When the remote mode is set, both the buttons at machine side and the remote control side can turn on and off the machines.
LOAD MODE	AUTO	When the manual mode is set, the Load/Unload function can only be executed by pressing buttons.
COM MODE	PROHIBIT	When this is set as "PROHIBIT" the communication function is not available. When this is set as "COMPUTER" the Controller is a slave in accordance with MODBUS protocol communications with external devices. Do not set as "SEQUENCE", because sequencing function is not available on this model.
COM ADDRESS	0001	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
SEQ STATE	MASTER	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
TOGGLES TIME	0000 H	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
SEQ NUMBER	0000	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
SEQ LOAD PRES	00.72MPa	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
SEQ U.L. PRES	00.78MPa	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
SEQ DELAY TIME	0030S	Enter only the selection or value shown in the SET VALUE column. Sequencing function is not available on this model.
OIL FILTER RST	0000 H	Reset time for the duration of oil filter changing. Do not reset unless the filter is replaced.
O-A FILTER RST	0000 H	Reset time for oil-air separator changing. Do not reset unless the filter is replaced.

PARAMETER	SET VALUE	FUNCTION
AIR FILTER RST	0000 H	Reset time for air filter changing. Do not reset unless the filter is replaced.
LUBE RESET	0000 H	Reset time for lubricating oil changing. Do not reset unless the oil is replaced.
GREASE RESET	0000 H	Reset time for lubricating grease changing. Do not reset unless the grease is replaced.
BELT RESET	0000 H	Reset time for belt changing. Do not reset unless the belt is replaced.
OIL FILTER SET	1000 H	Set this value to "0" to disable the oil filter alarm function.
O-A FILTER SET	2000 H	Set this value to "0" to disable the O-A separator alarm function.
AIR FILTER SET	2000 H	Set this value to "0" to disable the air filter alarm function.
LUBE SET	2000 H	Set this value to "0" to disable the lubricating oil alarm function.
GREASE SET	0000 H	Set this value to "0" to disable the lubricating grease alarm function.
BELT SET	0000 H	Set this value to "0" to disable the belt alarm function.
LANGUAGE SEL.	ENGLISH	Set this value to the required display language.
USER PASSWORD	9999	For access to the User Set Parameters.

2.3 Factory Set Parameters

The factory set parameters can be reviewed in a similar manner to that described above for the user set parameters. However, they cannot be changed without the FACTORY SET PASSWORD, which is only made available upon request. It is unlikely that any of the factory set parameters would need to be changed during the life of the air compressor set.

The factory set parameters have been pre-programmed in accordance with the following table.

Note that any parameter marked “#” can only be accessed with the FACTORY SET PASSWORD and the SUPER PASSWORD.

PARAMETER	SET VALUE	FUNCTION
MOTOR CURR	014.3 A [ZS100T] 021.1 A [ZS150T] 028.8 A [ZS200T]	After the starting delay time, when the main motor current is greater than 1.2 times the set value and less than 4 times the set value, the unit will shutdown per overload feature.
FAN CURR	000.5 A [ZS100T] 001.2 A [ZS150T] 001.2 A [ZS200T]	After the starting delay time, when the fan motor current is greater than 1.2 times the set value and less than 4 times the set value, the unit will shutdown per overload feature.

PARAMETER	SET VALUE	FUNCTION
PRE-ALARM TEMP	0105 °C	Alarm when the discharge air temperature at the air end reaches this set value.
STOP TEMP	110 °C	Shutdown when the discharge air temperature at the air end reaches this set value.
STOP PRESS	00.85 MPa	Shutdown when the discharge air pressure reaches this set value.
MAX U.L. PRESS	00.80 MPa	The UNLOAD PRES set by the user cannot exceed this value.
#TOTAL RUN TIME	***** H	The factory can modify the total running time. Do not change it.
TOTAL LOAD TIME	***** H	The factory can modify the total load time. Do not change it.
RESET FAULT	8888	Set the password that is used to clear all of the fault history.
CURR UNBALANCE	0010	When the Maximum Phase Current ÷ Minimum Phase Current is greater than 1 + (Set Value ÷ 100), the unbalance protection will stop the machine. Set this value greater than 15 to disable the current unbalance function.
LACK PHASE TIME	005.0 S	Set this value ≥ 20 S to disable the lack-of-phase shutdown protection function.
PRODUCT DATE	****Y**M**D	The factory inputs the production date of the unit. Do not change it.
SERIAL NUMBER	*****	The factory inputs the serial number of the unit. Do not change it.
#PHASE PROTECT	ENABLE	Enable phase protection.
#SELECT FREQ	50Hz	Set the power frequency.
SEQ MODE	COMPATIBLE	Set the sequencing function compatibility.
HIGH VOLTAGE	436V	If the voltage is higher than the set value, it will shutdown the compressor and report voltage too high. Set this value to 0000 to disable this function.
LOWER VOLTAGE	394V	If the voltage is lower than the set value, it will shutdown the compressor and report voltage too low. Set this value to 0000 to disable this function.
LOW T PROTECT	-5°C	If the temperature is lower than the set value, the compressor cannot be started and reports temperature too low.
#MAX RUN TIME	0000 H	Set this value to “0000” to disable the maximum run time shutdown function.
ALARM LONG STOP	0000 H	Set this value to “0000” to disable the overdue maintenance shutdown function.
COM SET PAR.	ENABLE	Spare parameter setting channel.
PARAMETER 1	****	Set the FACTORY SET PASSWORD.

2.4 Calibration Set Parameters

The calibration set parameters can be reviewed in a similar manner to that described above for the user set parameters. However, they cannot be changed without the CALIBRATION SET PASSWORD, which is only made available upon request. It is unlikely that any of the calibration set parameters would need to be changed during the life of the air compressor set.

The calibration set parameters have been pre-programmed in accordance with the following table.

PARAMETER		SET VALUE	FUNCTION
MOTOR A	TARGET CUR	000.0A	Enter the target current value when the compressor is running; the controller will divide the target current value by the sample input current value to work out the coefficient. The target value is for calculation only; will not be saved.
	COEF.	1.000	Controller displays the current value = sample value \times COEF.
MOTOR B	TARGET CUR	000.0A	Enter the target current value when the compressor is running; the controller will divide the target current value by the sample input current value to work out the coefficient. The target value is for calculation only; will not be saved.
	COEF.	1.000	Controller displays the current value = sample value \times COEF.
MOTOR C	TARGET CUR	000.0A	Enter the target current value when the compressor is running; the controller will divide the target current value by the sample input current value to work out the coefficient. The target value is for calculation only; will not be saved.
	COEF.	1.000	Controller displays the current value = sample value \times COEF.

PARAMETER		SET VALUE	FUNCTION
FAN A	TARGET CUR	000.0A	Enter the target current value when the compressor is running; the controller will divide the target current value by the sample input current value to work out the coefficient. The target value is for calculation only; will not be saved.
	COEF.	1.000	Controller displays the current value = sample value \times COEF.
FAN B	TARGET CUR	000.0A	Enter the target current value when the compressor is running; the controller will divide the target current value by the sample input current value to work out the coefficient. The target value is for calculation only; will not be saved.
	COEF.	1.000	Controller displays the current value = sample value \times COEF.
FAN C	TARGET CUR	000.0A	Enter the target current value when the compressor is running; the controller will divide the target current value by the sample input current value to work out the coefficient. The target value is for calculation only; will not be saved.
	COEF.	1.000	Controller displays the current value = sample value \times COEF.

3.0 FUNCTIONS AND TECHNICAL PARAMETERS

Switching value: 5 ways of switching value input; 5 ways of relay switching value input.

Analog quantity: 1 x PT100 temperature input; 1 x 4~20 mA transferred input; 2 groups of 3-phase current input (match with current transformers).

Input voltage of phase sequence: 3 phase 415V.

Working power consumption of the controller: 220 V, 50 Hz, 20 VA.

Display measuring range:

- Oil Temperature: -50~150°C with accuracy of ± 1 °C.
- Discharge Air Temperature: -50~150°C with accuracy of ± 1 °C.
- Running Time: 0~999999 Hours.
- Current Display Measuring Range: 0~999.9 A with accuracy of $\pm 1\%$.
- Pressure: 0~1.60 MPa with accuracy of ± 0.01 MPa.

Phase sequence protection: When the wrong phase sequence is detected by the protector, it activates within a time of ≤ 2 S.

Motor protection: This control unit has the following 6 basic protection functions for the motor.

1. Locked rotor: After the starting of the motor, if the working current reaches between 4 to 8 times of the set value, the protection activates in less than 0.2 S.
2. Short circuit: If the detected current reaches 8 times or more of the set value, the protection activates in less than 0.2 S.
3. Lack of phase: If any lack of phase is detected, the protection activates at the pre-programmed time set value.
4. Unbalance: If the current difference between any of the two phases reaches the pre-programmed percentage set value, the protection activates in less than 5 S.
5. Overload: Refer to the following table.

When the running current of the motor is between 1.2 to 3.0 times of the set value, the overload multiple and protection activation time will be in accordance with the following table.

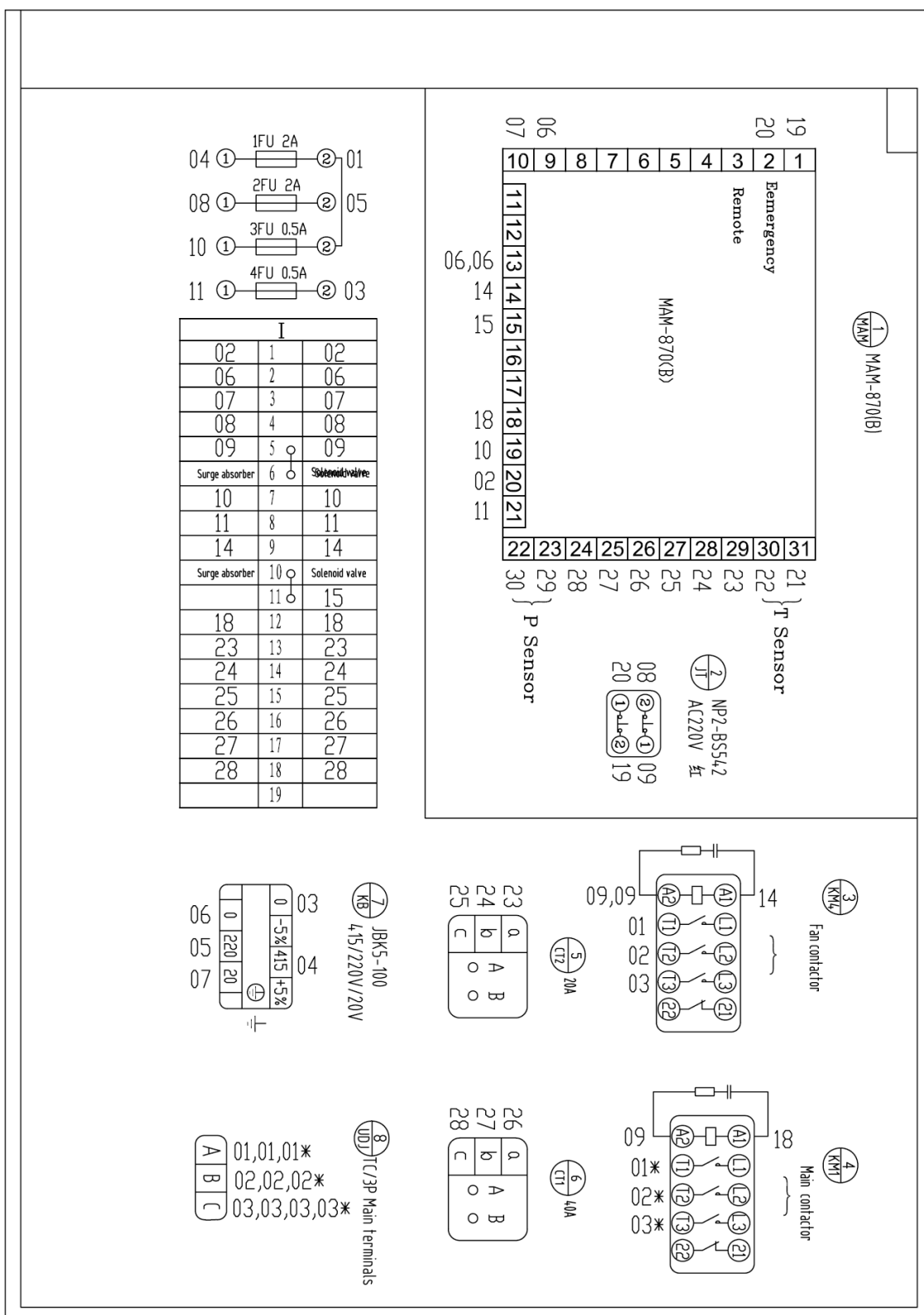
I_{Act}/I_{Set}	≥ 1.2	≥ 1.3	≥ 1.5	≥ 1.6	≥ 2.0	≥ 3.0
Activation Time	60 S	48 S	24 S	8 S	5 S	1 S

6. Temperature: When the actual detected temperature is higher than the set temperature, the protection activates in less than 2 S.

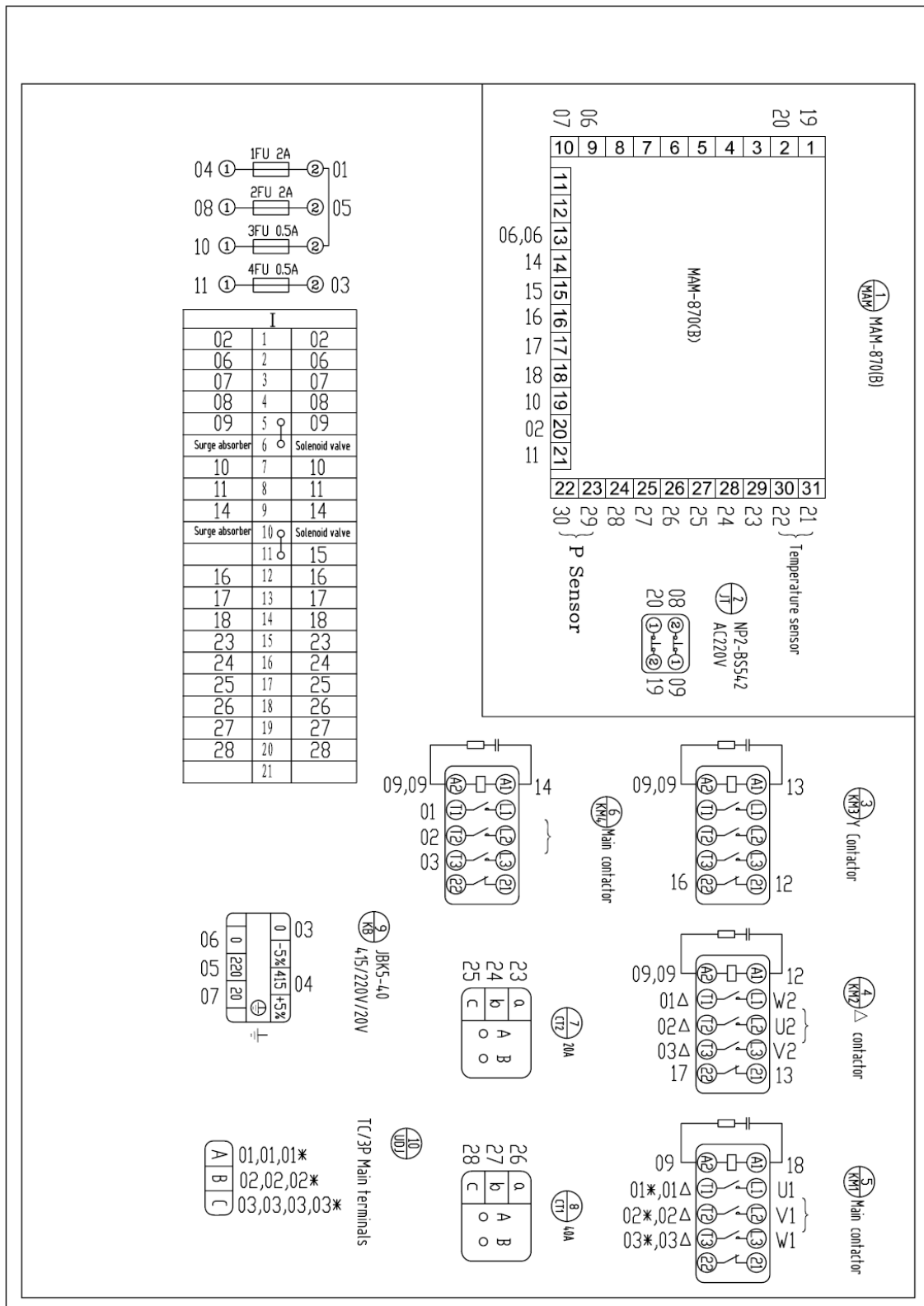
The output relay contactor capacity is 250V, 5A. The service life of the contactors is 500,000 cycles.

4.0 SPECIFICATIONS

4.1 Connections



Terminal Arrangement Diagram of ZS100T



Terminal Arrangement Diagram of ZS150T and ZS200T

4.2 Alarms and Messages

The controller will display self-explanatory messages such as “Air Filter Life Terminated”, “Oil Filter Life Terminated”, etc. when the pre-programmed running hour limits are reached.

Faults caused by other components may also be displayed on the control screen, for example:

STOP:
P SENSOR FAULT

In this case, the necessary remedial action would be to check the pressure sensor wiring and also the sensor itself to find the fault.

The following table provides a guide to some other common fault messages and recommended actions.

FAULT	LIKELY CAUSE	REMEDIAL ACTION
Air Exhaust Temperature Too High	Poor ventilation or low oil level.	Check ventilation conditions and oil level.
Temperature Sensor Failure	Cable disconnected or PT100 sensor faulty.	Check wiring and PT100 condition.
Over Pressure	The pressure setting is too high or the pressure sensor is faulty.	Check pressure and pressure sensor.
Pressure Sensor Failure	Wire disconnected or reversed, or the pressure sensor is faulty.	Check wiring and pressure sensor.
Phase Lacking	Power supply phase lacking or the motor contactor is faulty.	Check the power supply and contactors.
Overloaded	Voltage too low, piping blocked, bearing or other mechanical failure or wrong parameter setting.	Check the set parameters data, power supply voltage, bearings, piping and other mechanical components.
Unbalance	Power supply unbalance, motor contactor fault, or main motor fault.	Check the power supply, contactors and the main motor.
Wrong Phase Sequence	Reversed phase sequence or phase off.	Check the wiring
Overload or Rotor locking during starting	MOTOR DELAY TIME is shorter than STAR-DELTA TIME plus LOAD DELAY TIME.	Reset the MOTOR DELAY TIME or STAR-DELTA TIME / LOAD DELAY TIME.
Main Contactor activated intermittently	The emergency button wire loose.	Check the wiring

This image shows a full page of blank, lined paper. It features approximately 28 horizontal blue or grey lines spaced evenly apart, typical of notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings on the page.



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