BESCUTTER

AIR COMPRESSOR MANUAL

Contents

1.ADVANCE DOUBLE SCREW COMPRESSOR

Screw compressor is a biaxial volumetric type of compressor and double screw compressor. This Empty compressor has uparalleled technical advantage:

a)High reliablity.Double screw compressor has fewer parts.Most of them are not easy to damage.This makes it a longer life.

b)Easy to operate and maintence.The high-automatic control technology of compressor ensure the user can operate with a short time study only.It can run unmanned even.

c)Excellent power balance Double screw compressor have this structural principles,The compressor by itself has no imbalanced inertia.The compressor doesn't have imbalance for its mechanism theory.It can run steadly in hish RPM.That is why it can be put to work without special basement.It is convient to use for it is small and light-weight,very convenient to use.

d)High efficiency. Because the screw compressor has the characteristics of forced gas transmission, the air volume flow is almost not affected by the exhaust pressure, so the working efficiency of the air compressor is very high, long-term use will not affect the efficiency of the air compressor

e)Little noise and vibration.The adoptation of noise,vibration insulation and absorption achieves this advantage.

Our screw compressor is a biaxial volumetric type of compressor.The air intake is located at the upper end of the fuselage,and the exhaust outlet is open at the lower part.Two hi-gh-precision main and secondary rotors mounted parallel in the housing.The main and secondary rotor teeth are spiral and the two engage each other.Both ends of the main and secondary rotor are supported by bearings.

Compressor drive is belt.The belt drive is according air end pulley and motor pulley.Belt driven to increase the speed of the main rotor.

Transportation and storage: the equipment is randomly equipped with a fixed base bracket, which should be firmly fixed during transportation; The equipment is designed with forklift loading and unloading holes, loading and unloading according to the requirements during transportation. No illegal operation!

Storage condition: the equipment should be moisture-proof and rainproof. Equipment storage temperature is recommended to be less than 45. Humidity < 70%.

The operating noise of air compressor is 70-85dB

2.Screw compressor operational principle (*refer to figure 1*)

The whole working cycle of screw compressor is divided into 3steps:inspiration,compressing,exhaust.With the rotor rotating,each pair of joggled teeth is finish the same cycle one by one.To simplize the word,let us study one pair teeth only.

a) Inhalation process As showed below,when the rotors begin to rotate.tooth space positive-displacement is forming as well one side of tooth disengages joggling.The explanding of displacement generates vacum inside.Then the air will go inside through air-intake as the difference of pressure.The positive rotor's teeth are leaving from the negative one's alveoluses during the following rotating.The displacement connects with air-intake keeps expanding and it breaks away with air-intake when it reaches maximum.The air is keeping between the teeth.Now this is the end of inspiration.

b) Compressing process. The displacement is getting smaller while the rotor rotates.The air inside it is compressed.

c) Exhausing process.The compressed air is moved to the exhaust and pushed out while the displacement is getting smaller.This process continues until the teeth joggle again.Now the air inside is ejected completely.The displacement becomes minimum.Exhausting finishes.

Media（air）	Inlet	Intermediate	Discharge
Temperature（℃）	Ambient temperature（≤38℃）	95℃	45-60℃
Pressure（MPa）	0.1	1.6	1.6

1.INSTALLATION PLAN
CHOOSE THE RIGHT INSTALL PLACE:

Please plan to choose the right install place that help air compressor easier to use and maintains and keep away the trouble for incorrect installation.It is importation when choosing the right install place.Please do as follows:

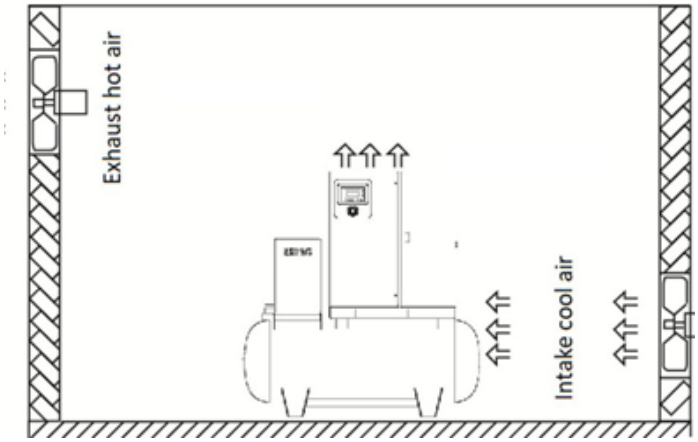
a) Please find the place that the ventilation condition is absolutely good, the fresh air can flow freely.
b) Clean air with little dust, no acid, alkaline and amyctic material.
c) With low temperature and humidity,the enviroment temperatur shoud be between+5°C and +40°C, the relative humidity should be <80%,Below 1000 meters above sea level.
d) Engough space for maintenace and light.The space surrounding the compressor should be at least 500mm for maintenace and air cooling. 1500mm above(exclude hot air channel)to eject hot air and avoid to form a wind bridge with cool air.
e) The ground for screw compressor need the level ground.
f) The compressor should be installed close to where to be used if it is installed in a compressor station.About the relative equitments installing,please refer to the detail guide of ear other.

2.SOLUTION OF HEAT DISSIPATION AND VENTILATION
If the cooling when the place compressor installing is not good or eren it is a close place to evacuate the hot air so that you can keep compressor cool.The general idia is below:
(1):Intall a aerofoil fan(picture2.Choose at least2 aerofoil fans according to the size of working place.The cool air volume can be calculated by the equation.

$$Q=3100XP/t$$

(Q:air volume m3/hP:heat generated in the space KW t:safe temperature 5-10°C)
One of them should be used to inspire the cool air.This one should be installed in the lower postion.Anoth should be used to exhaust the hot and installed in the upper position. The more fans will help better with cooking.

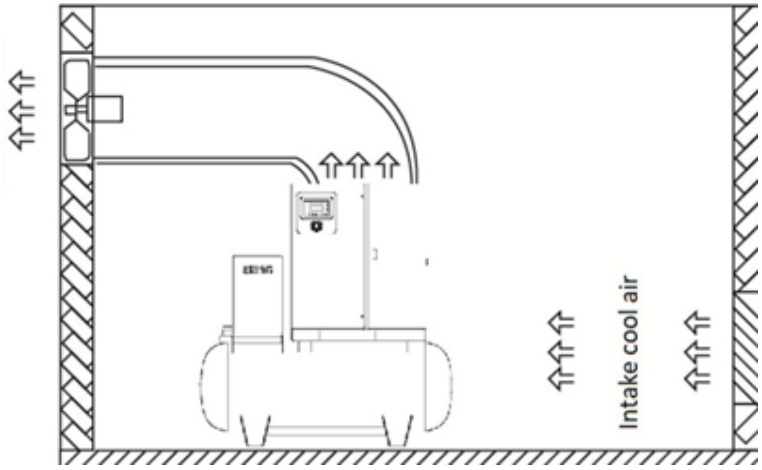
PICTURE2



(2):(Recommended to use)

Install exhaust duct. (PICTURE3)Make an exhast duct with galvanized iron sheet(not too thin,better strength with some bracing to avoid transforming and noise). Install a fan at the exhaust.the exhaust ability should be more than the hot air exhaust. The area of pipe section must be bigger than the area of ust pipe.This will help a lot in cooling.

PICTURE3



3.Deployment of compressor air pipeline

a) The main pipe must be gradient at 1-2°C the lowest part must be equipped with auto-drain valve to transpire clotted water.
b) The pipe pressure drop is not over than 5% of the compressor specified pressure.if the distance is long,it is better to choose the bigger diameter pipe to reduce the pressure drop.
c) The main pipe should keep the same size,otherwise,it will cause the bigger pressure damage,meanwhile easy to cause the pipe damage.
d) It should reduce to use pipe-tap injunction especially for 90degree and the valve be-cause too many use of junctions will be easy to lead to the leakage of the compressing air.

4.Deploy electricity to the air compressor

This series of screw compressor is kind of high automatic machine electric incorporation product.So it is very important to the deplayment of electric power and electric,please complied the followings when you deplay.

a) Confirm the air compressor power supply the voltage,frequency and so on.Choose the suited power supply.
b) According to power specification sdifference,delay power line which suited string line,if it is possible,it should deploy large electric current in order to defend aging capability and anti-high temperature capability quality cable line.If so,it can avoid instance caused by power supply.
c) It is better for air compressor to use a set of power supply unit independently,especially don't use together with other different electric consuming system,because when parallel connection used,there will be a possibility to cause the instability of three phase volage or electric current.And then cause to damage the protection of air compressor,it will effect the use of air compressor.
d) According to the power of the air compressor, the appropriate NFB(no fusible wire switch) is provided for the protection of the power system and the safety of electrical maintenance
e) The air compressor must be equipped with a grounding line to prevent the danger caused by electricity leakage

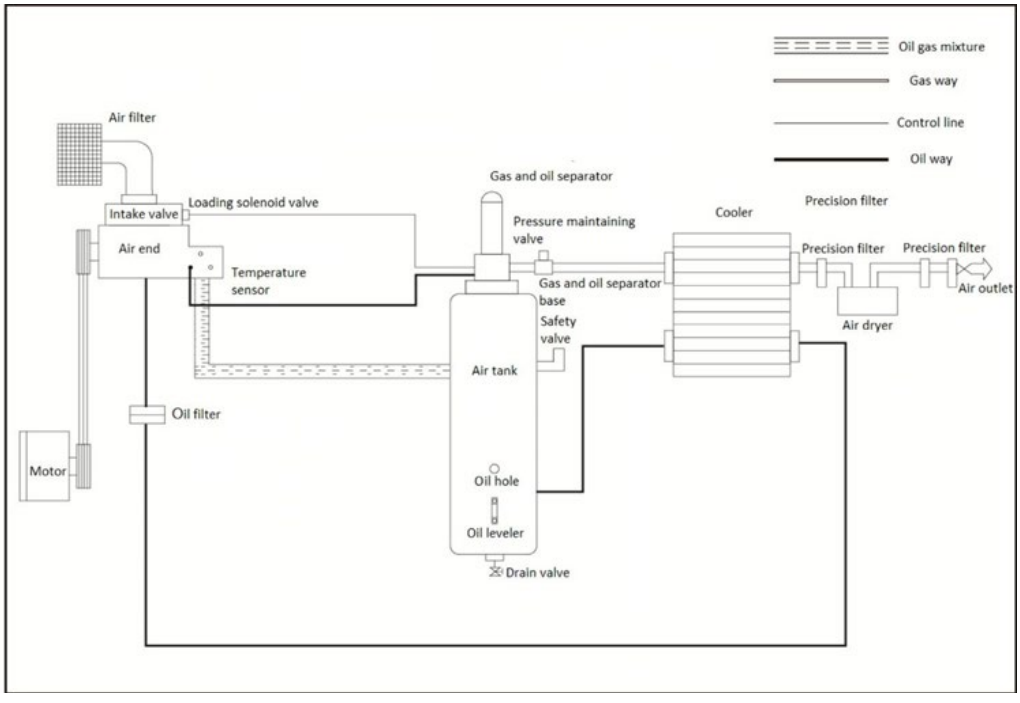
This series of screw compressor system process and function

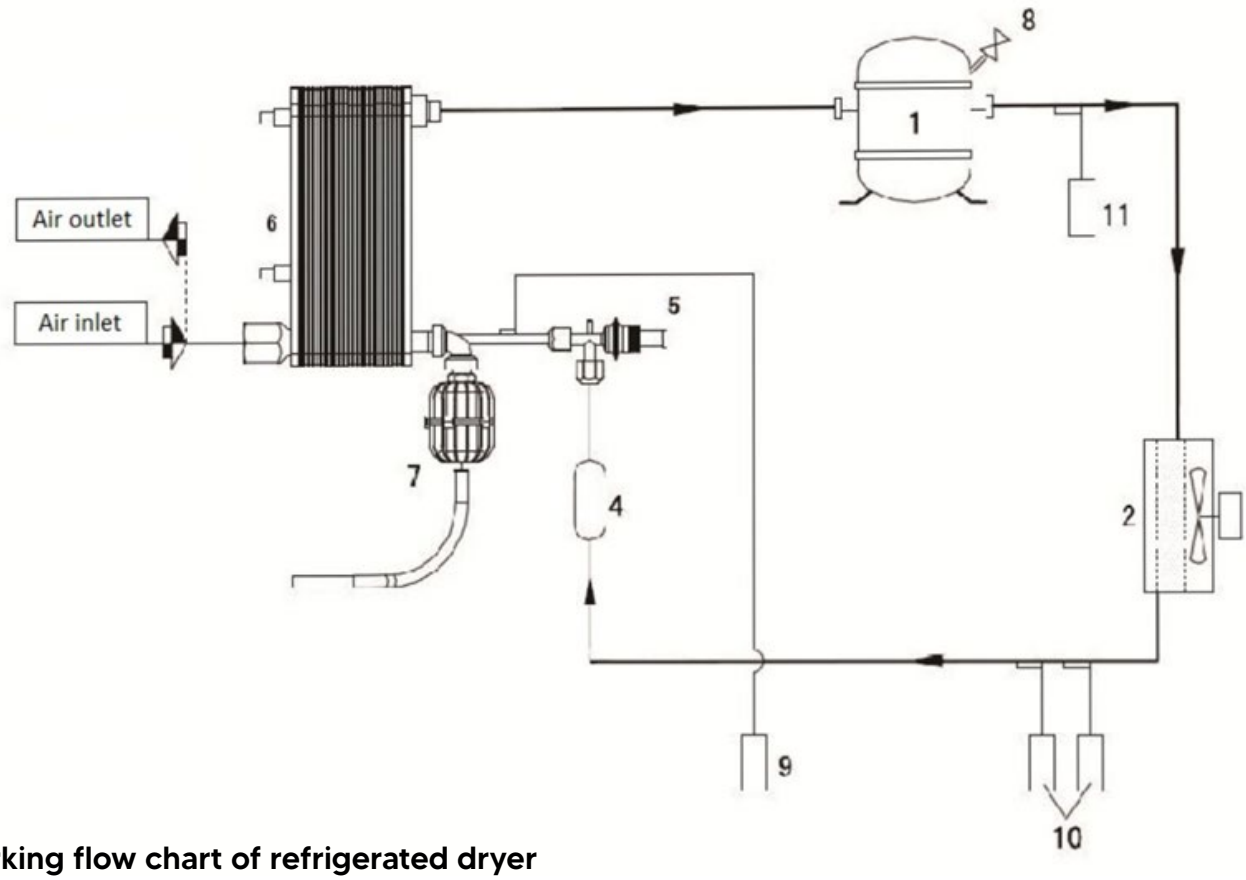
1.This series of screw compressor system process

This series of compressor has a high quality intergration characteristic.The system has a characteristics such as less connecting tache of outside pipeline,modulariztion design and so on.Such design and system intergration have reduced leakage and aging pipeline greatly.All kind of module cooperation will be more reliable,and makes the whole system's framework more complact,reduce the easy-broken greatly.play down the trouble rate to a lowest degree.make the operation of this series of screw compressor have a high stability. it is very easy to maintain.

As is shown in,Firthly Air passes through an efficient intake filter and passes through the intake controller to the air end.At the same time,The oil in the oil pipeline is firstly controlled by a thermostatic valve under the effect of pressure difference within the system, and the oil with higher temperature is mixed with the oil with lower temperature after cooling,finally form the lube that temperature comparatively stable and come into the oil filter.The oil through the oil filter filter enter the air end ,and then ejected into one -off separating tin after be compressed with clean inhalational air by double screw rotor.Inside the one-off separating tin,the compressed admaxture of oil and air leave most of the oil in the oil slot by bumping separating,and some compressed air with few gaseous oil fog will enter the oil fine separator.After be separated by the oil fine separator's intergrating,the compressed air without oil mostly enter the control of least pressure valve through the exhaust check valve.When the pressure of compressed air is higher than the interface valve of least pressure valve,the least pressure valve will open.The compressed air will enter the retral cooler and then be ejected to the working system,but the oil which is be separeated in the oil fine separator will enter the main framer back bearing end directly through oil returning pipeline and oil returning check valve,and enter the system.Thereout the circle is screw compressor ejects compressed air constantly.

• **Work flow chart of air compressor**



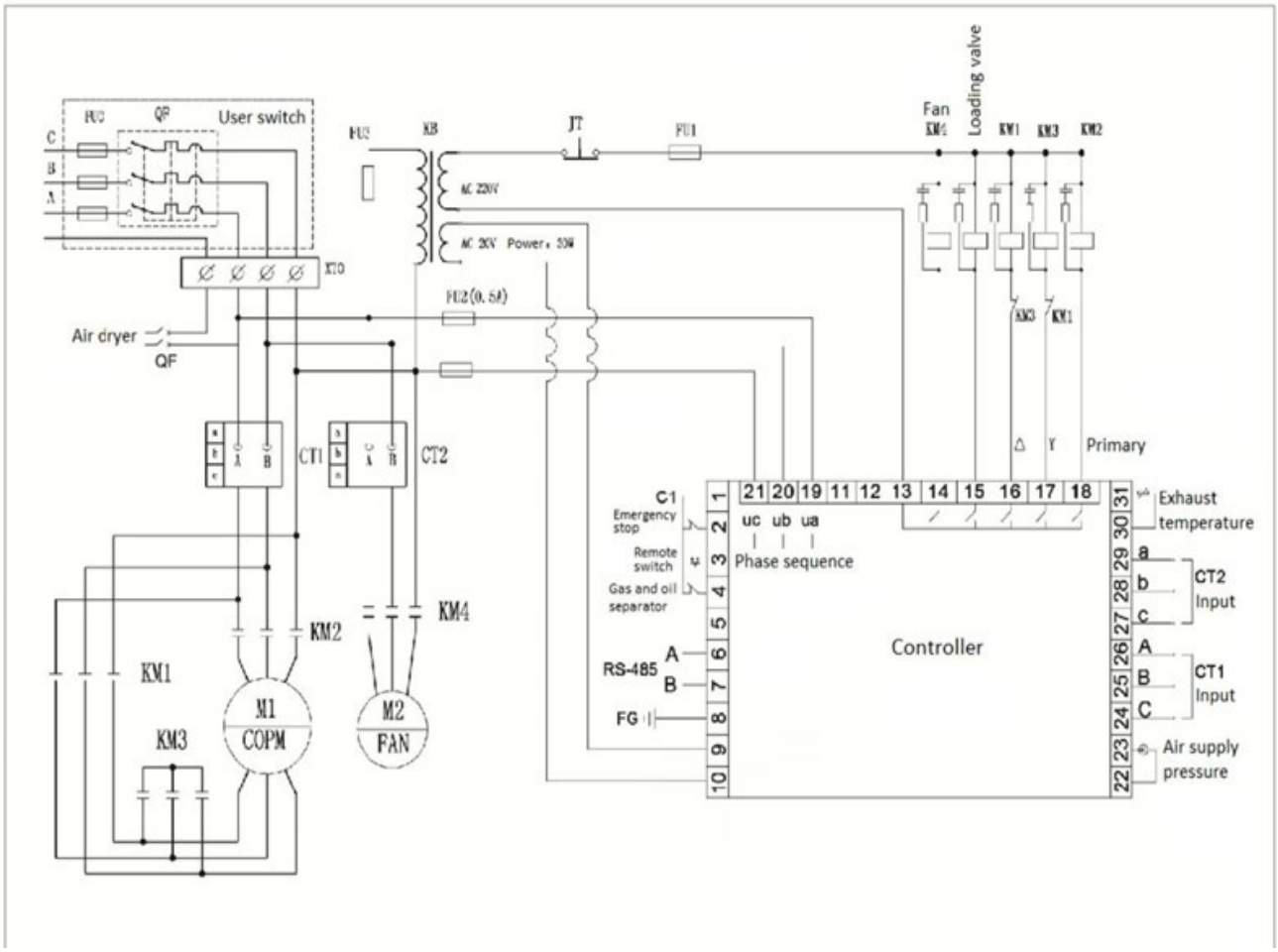


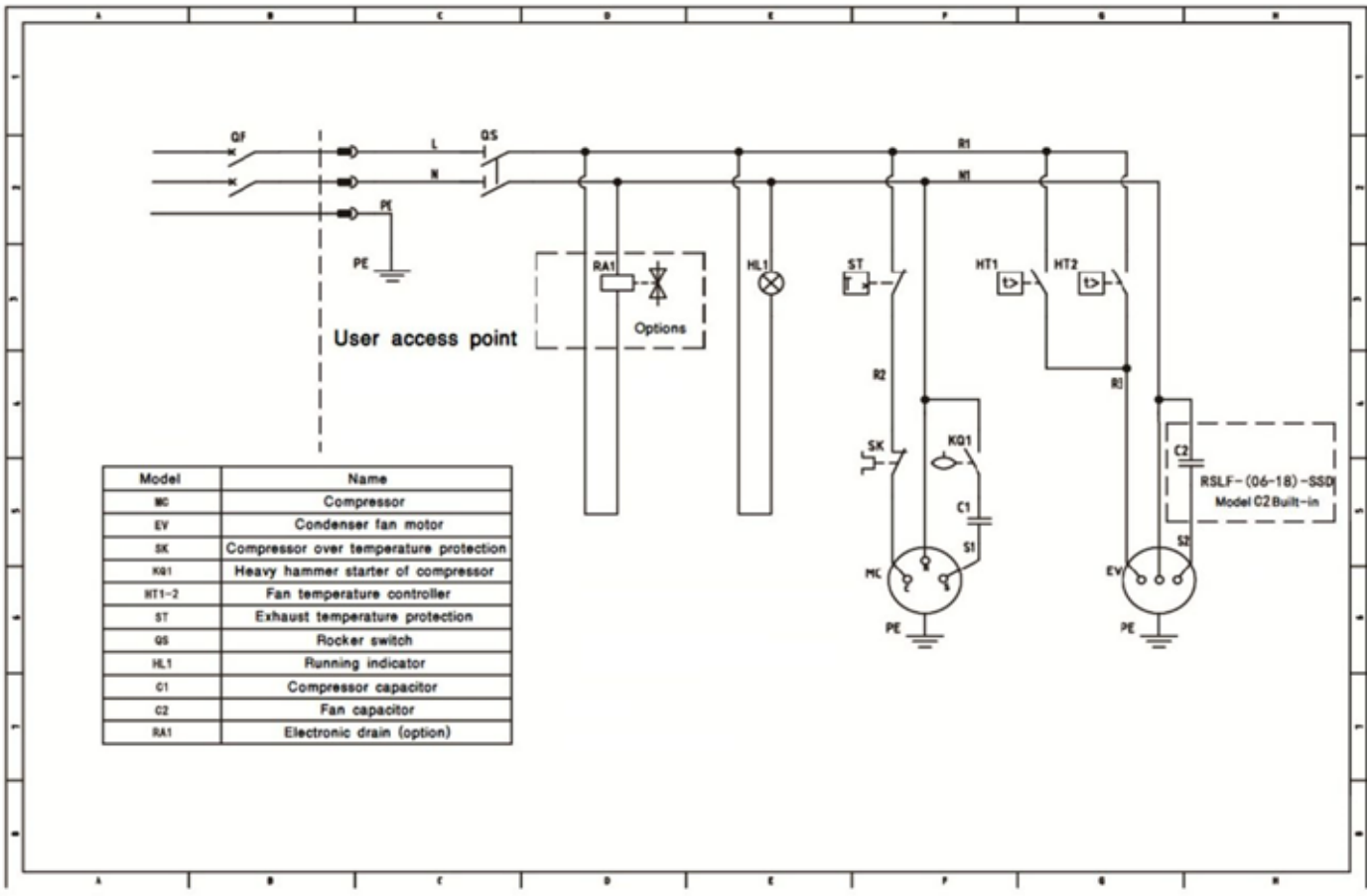
- **Working flow chart of refrigerated dryer**

The “disconnecting switch” in the circuit diagram is provided by the user; The recommended selection of each power isolating switch is as follows:

Selection of recommended isolating switch for each power segment (A):

Motor power (KW)	Rated current (A)	Overflow value (A)	Disconnecting switch selection (A)
11	21.01	28.5	65
15	28.36	35.5	65
18.5	36.32	44	150
22	41.14	49.5	150
37	68.5	75	180



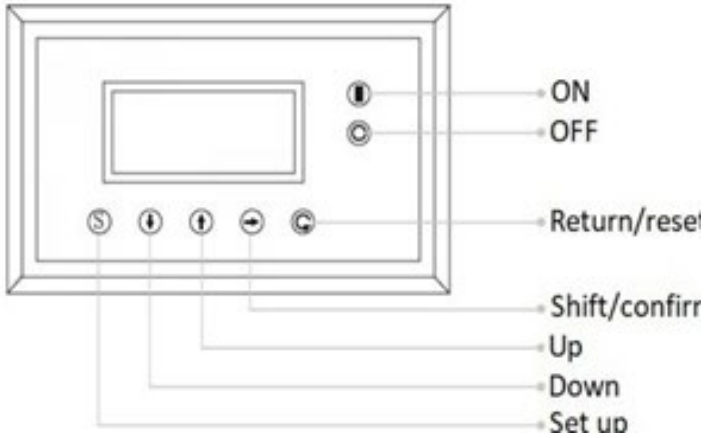


Model	Name
MC	Compressor
EV	Condenser fan motor
SK	Compressor over temperature protection
KQ1	Heavy hammer starter of compressor
HT1-2	Fan temperature controller
ST	Exhaust temperature protection
QS	Rocker switch
HL1	Running indicator
C1	Compressor capacitor
C2	Fan capacitor
RA1	Electronic drain (option)

Before starting up

1.Control panel and operation instruction
ON-start key: when the emergency shut-down is on the ON position,start the electric motor by pressing this key.

OFF-stop key: the electric motor will stop a few seconds after pressing this key.



Set up key: after revising data,press this key to confirm the data store input.
Up key: when revising data,pressure this key upward to revise the digit,in the menu it is used as selecting key.
Down key:when revising data,pressure this key downward to revise the digit,in the menu it is used as selecting key. Shift/confirm key:when revising data,it is a shift key,in the menu it is a confirm key.
Return/reset key:in operating menu it is used as return key returning to the last item of the menu,during the fault and shut-down pressure this key for reset.

2.Please read all instructions before starting the air compressor

3.New air compressor test
3-1 Get through power and grounding wire to test that the voltage is correct and the three phase voltage is balance or not.
3-2 Loose the fixed transmission bolts on the quakeproof support in the pedestal,otherwise it can not tighten the belt,will cause the machine damaged badly.
Attention:When the machine is being moved, it is necessary to tighten the transport fixed nuts again in order to prevent the belt from shaking and breaking during transportation.
3-3 Check the oil level is between the two red lines of oil inspection mirror or not
3-4 If you test the machine after long delivery, you have to add 0.5liter lube and rotate the air compressor many times bu hands to avoid burning in the air compressor because of less of tube. Please special attention to avoid foreign objects have fallen into the air compressor.
Attention: don't get through power at this moment
3-5 Make the air compressor control panel with power Attention:if the power supply phase sequence doesn't match,indicator alarm signal will occur,while not stare up.

Before starting up

3-6 Turning test:press "ON"button,compress turns,then check the turning direction.Please reference to the arrowhead on the compressor for correct turning direction.If the turning direction is fault,please "urgent stop" button immediately,and exchange any two of electricity wire R,S,T.

Cooling fan also should be turned.

Attention: *don't get through power when handling electrical.Live operation is strictly prohibited. Although compressor has been tested in the production process, steering test is still an important step in the test run of new engine.*

Attention: *Inverse phase protection is to detect the phase of the power supply. The steering test must be repeated after the motor is repaired.*

3-7 Start up: Firstly, press the start up key on the dryer, the light of the dryer is on, the dryer is running, then press the start up key of the air compressor, and the air compressor is running.

Attention: *the machine is full automatism,near 5 seconds later normal start,intake valve starts to operate.*

3-8 observe the LCD screen and failure of audible alarm are normal or not,it there is any unusual around,shake,leakage,press "URGENT STOP" button for inspection.

3-9 Stop: Press the "OFF" button, the air compressor will stop after 60 seconds of delay, and then turn off the dryer switch. At this time, the man-machine interface shows the stop countdown.

Attention: *When the "stop" button is pressed, the discharge valve of the air compressor is unloaded, and the timing relay starts to time. After about 60 seconds, the motor stops and the start-up delay is 30 seconds.*
Attention: *Don't use "emergency stop"button to shut down normally*

4.Daily check before start-up

Daily check before start-up is the necessary work of compressor normal operation to ensure the service life of compressor, please be careful to implement.
4-1 Open the surrounding doors when the power is off, check whether there is dust in the machine, whether there is much dust in the dust-proof net, blow out the dust in the machine with an air gun, and then close the door.
4-2 Check whether the power supply and the power supply wires have fallen off or the skin has been damaged, and then send the electricity after confirming that there is no mistake.
4-3 Check whether all doors are closed and peripheral connection equipment is ready before starting.
4-4 Check whether there is alarm information on the LCD screen. If so , it should be processed according to the information feedback before starting.
4-5 Regular cleaning and replacement of filters according to the working environment.
Warnings: high oil viscosity during cold start up, clogged oil filters or valve malfunction can result in oil starvation.

5.Running

5-1 When there is abnormal sound and vibration in operation, stop immediately.

5-2 There is pressure in the pipeline and container during operation. Do not loosen the pipeline or embolism, and open unnecessary valves.

5-3 The oil level should be observed carefully in operation. The oil level should be between the upper and lower red lines of the oil viewing mirror. If the oil level is lower than the lower red line, should be stop the machine than add special lubricant.

5-4 There will be condensate water in the rear cooler and gas storage tank. It should be discharged regularly or installed with automatic drain valve every day, otherwise water will be brought into the system.

5-5 Record voltage,current and pressure, temperature and other parameters of LCD screen with instrument every 8 hours under conditions of users in operation for future maintenance and repair.

6.Long term shutdown solution

In case of long-term shutdown, the following measures shall be taken carefully, especially in high humidity seasons or regions

6-1 Over 1 month of shutdown:

- A control panel and other electrical equipment, wrapped in plastic cloth or oiled paper, to prevent moisture intrusion.
- The water in the rear cooler and air tank is completely discharged.
- If there is any malfunction, It should be excluded in order to facilitate future use.

6-2 shutdown for more than 2 months:

- In addition to the above procedures, the following procedures are required:

- Close all openings to prevent moisture and dust from entering.
- replace lubricating before shutdown, and run for about 30 minutes.

6-3 restart the program:

- Remove protective plastic cloth or oiled paper.
- Measuring the insulation of the motor to the ground should be above 1M Ω
- Restart the engine according to the test run step.

Inspection and maintenance

Please carry out correct operation and maintenance according to the instructions, and confirm the use of positive parts during maintenance. If mechanical damage is caused by not using positive parts or special oil designated by the company, the company is not liable for warranty. If in doubt,please contact the supplier or the company hotline.

1. Rules and Maintenance of Lubricating Oil

1) rules for Lubricating Oil

Lubricating oil has a decisive influence on the performance of screw air compressor. If improper use or wrong choice of oil, it will cause serious damage to compressor. Must use: anti aging, not easily mixed with water, not easy to foam, corrosion resistant oil.

Item	Parameter
40°C Viscosity (mm²/Sec)	28.8-39
100°C Viscosity (mm²/Sec)	5.0-6.0
Viscosity ratio	⩾95
Flash degree	⩾210℃
Pour Point	⩽-0.9℃
Acid value mgkH/g	⩽0.1-0.5

2) Influencing factors of oil change time

(1) Poor ventilation and excessive ambient temperature.
(2) High humidity environment or rainy season.
(3) Dusty environment.

Do not let the lubricating oil exceed the service life of oil products, oil products should be replaced on time, otherwise the quality of oil products will decline, lubricity is not good, easy to cause high temperature tripping phenomenon, at the same time, because of the decline in the ignition point of oil products, it is also easy to form spontaneous combustion of oil products and burning of air compressor.

After two years of using air compressor, it is better to use lubricating oil to do a "system cleaning" job. That is, after replacing the new lubricating oil, let the air compressor run for 6-8 hours, immediately replace the lubricating oil, so that the remaining organic components in the original system can be cleaned, and the replaced lubricating oil can have a better service life.

Do not mix with other brands of lubricants. It is easy to cause serious damage to the air compressor.

3).Pressure adjustment
Enter the modification settings parameter modification, generally the factory has set up, if you need to adjust, please contact our company.

4). Safety valve adjustment:
The discharge pressure of the relief valve is generally set at 0.1MPa higher than the exhaust pressure. When the upper fastening screw is loosened, the set pressure will be reduced counterclockwise.

Warning: *Safety valve has been set before leaving factory. Non-professional personnel can not adjust it arbitrarily*

The first replacement is after the compressor runs for 500 hours, and then it is usually replaced every 2000 hours.

3) Oil separator(16kg special oil separator,Replacement of two oil separator together)
oil separator differential pressure fault alarm, or oil pressure ratio of air pressure must be checked, oil separator must be replaced, the general replacement time is 2500-3000 hours, if the environment is poor, its time will be shortened.

The replacement steps of the oil separator are as follows:
A. After the air compressor shuts down, the air outlet is closed to confirm that there is no pressure in the system.
B. Take off the oil separator and replace it with the new oil separator.

Attention: *When replacing the oil separator, it is necessary to prevent dirty items from falling into the oil drum, so as not to affect the operation of the air compressor.*

4). Lubricants
The first oil change is in the compressor running 500 hours, and then generally every 2000 hours to replace (exhaust temperature at 70-90°C). The replace time is shortened when the environment is poor.

5).Precision filter element
Precision filter cartridges are usually replaced every 3000 hours (three cartridges are replaced at the same time).

3. Maintenance and Troubleshooting

1). Daily Maintenance

1-1.Daily or before operation: check before start-up (see previous section 1-2). running 500 hours: First time change oil filter after new machine is used.
The air filter element and the pre-filter net are removed and cleaned, and the low pressure compressed air is blown out and inside.

1-2. Operation for 500 hours:

Check the action of intake valve, pull rod and movable part, and add grease. Clean air filter element. Check the oil filter or replace it. The new machine changes oil for the first time in 500 hours. Clean the radiator. Mobil XHP222 oil is added from the filling port of the front and rear cover bearing of the motor.

1-3.Running for 2000 hours or 6 months: Check the pipelines of each department. Inspect the oil mirror and remove and clean it if necessary. Replace lubricants and remove grease stains.

1-4. Running 3000 hours or a year:

Clean intake valve, replace O-ring, add lubricating grease. Check the three-way solenoid valve. Check the relief valve. Check whether the oil separator is blocked. Check the pressure maintenance valve. Replace air filter and oil filter. Check the action of the starter. Check whether the protective differential switches are working properly. Check the operation of the safety valve. Mobil XHP222 oil is added from the filling port of the front and rear cover bearing of the motor.

1-5. Every 20,000 hours or 4 years: Check or replace the body bearing and oil seal, adjust the clearance. Measuring motor insulation should be above 1 MΩ. Replace motor bearings.

1-6.Frequency Converter Maintenance For maintenance, please refer to "Maintenance and Maintenance" in the manual.

Item		work	Per day	Per week	500	3000	6000	24000
Name		content			hours	hours	hours	hours
Control system	All system	Check						
	Intake valve	Function check						
	Pressure retaining valve	Function check						
Air End	Bearing	Replace						
	Seal assembly	Check/ replace						
Motor	Bearing grease	Supplementary replacement						
	Insulation test	Check						
	Bearing	Replace						
Oil Separator	Oil separator	Replace						
	Oil lever	supplementCheck and						
	Air tank	Drain water						
	Oil returning pipe	Clean						
Inverter	Air duct, Heat sink	Clean						
	Cooling fan	Replace						
Other	Safety valve	Functioncheck						
	Lubricating oil	Replace						
	Cooler	Clean						
	Belt	Tension check						
	Cooling motor	Insulationtest						
	Cooling blade	Clean						
	Coupling rubber pad	Check						
	Oil filter	Replace						

1.Troubleshooting table

Item	Fault situation	Possible causes	Ways of exclusion
1	Unable to start No display	A.Is the power supply normal Display but cannot start B.Is the phase sequence normal C.Is the emergency stop button released D.What is the prompt of PLC E.CT1, T2 disconnect F.Pressure sensor, temperature sensor broken	According to the prompts, remove the fault step by step.If you can't judge, please contact our company or the local dealer
2	High voltage during operation, motor overload	A.The voltage is too low,the circuit is small, and the wire diameter is small B.The exhaust pressure exceeds the factory setting too much C.Poor circuit contact D.CT1, CT2 broken E.Three Filters clogged (causing internal pressure higher than exhaust pressure) F.Low current and voltage, three-phase serious imbalance G.Incorrect specification of lubricating oil	A.Increase the wire diameter and shorten the distance between the compressor and the power supply B.Check whether the pressure gauge and pressure switch exceed C.Maintenance circuit D.liaison hengde company E.Replace the three filters according to the three filter display F.Check the causes of low power supply voltage and three-phase imbalance G.Use the lubricating oil designated by Hengde company
3	The running current is lower than the normal value, and the exhaust volume is obviously insufficient	A.The air consumption is too large,(the user's gas consumption is large and the peak power is always below the set value) B.Three filter plugging C.Poor operation of air inlet valve D.Improper adjustment of volume control valve E.Power supply voltage too high,too low F.belt loose	A.The user shall consider whether the air consumption increases far more than the exhaust volume of the machine. If possible, he can onsider purchasing another machine for rallel use B.clean or replace C.Remove and clean the internal oil stain or inhaled fine particles D.please contact the service unit of Hengde company E.Please contact with the power supply station for adjustment to reduce and increase the power supply voltageF.Adjust the belt

Item	Fault situation	Possible causes	Ways of exclusion
4	Exhaust temperature abnormal	A.Thermal control valve failure B.Insufficient lubricating oil C.The oil cooler is blocked D.Incorrect specification of lubricating oil E.The plate fin heat exchanger is not clean F.Oil filter blocked G.Cooling fan failure H.PLC failure	1. Replace the thermal control valve 2.Check the oil level.If the oil level is insufficient,please stop the machine and add oil 3.Remove and clean with potions 4. please use our company special engine oil 5. Clean with low pressure dry air 6.Please use our company's special products 7.Ask electrical personnel for maintenance 8. Please contact with our company
5	Large consumption of lubricating oil	A.The oil level is too high B.Oil return pipeline is blocked C.The o-ring of oil return core tube is damaged D.The oil separator is damaged and invalid E.Pressure maintenance valve spring damaged F.Use incorrect oil	A.Check the oil level and discharge it properly B.Please contact with our company C.Replace our company's special products D.please use our company's special products E.Replace our company's special products F.please use our company special engine oil
6	Unable to empty or load normally	A.The pressure sensor is broken B.PLC broken C.Poor operation of pressure maintenance valve D.Control pipeline leakage E.The relief solenoid valve is broken or there is no power supply for the solenoid valve F.PLC internal setting error	A. Please contact with our service unit B.Replace the company's special productsC.Repair and replace the company's special products D.check the leakage position and lock it E.Repair and replace the solenoid valve or contact with the service unit ofHengde company
7	Insufficient discharge of compressor	A.Air filter element is blocked B.Poor operation of intake valve c.The oil separator is blocked D.Drain solenoid valve failure E. The regulating valve is not adjusted properly	A. Clean or replace our company's special products C. Replace our company's specialB. Disassemble, clean and addlubricating oil or replace D.maintenance and replacement if products necessary E. Readjust
8	Frequent empty or load	A.Pipeline leakage B.The pressure difference of pressure switch is too small C.Unstable air consumption	A. Check the leakage position and lock it B.Reset C. Increase the capacity of air tank
9	When the machine is stopped, the air filter emits oil	A. The intake valve is not closed tightly or stuck B.Leakage of pressure maintenance valve C. The relief valve is not released	A.Maintenance, contact with our company if necessary B.Maintenance,contact with our company if necessary C.Maintenance, contact with our company if necessary

10	Abnormal sound produced by compressor air end	A.Foreign matters enter the compressor B.Bearing wear C.The belt is loose,producing"squeak" sound	A.Repair and elimination B.replace C.adjust the belt
11	Other noises and V-belt noises	A. Improper installation of air compressor B.The bolt or nut is loose C.V belt is loose	A.Cement joint filling, installation and horizontal fixation B.locking really C.Adjustment and Implementation
12	Excessive vibration	A.Poor installation B.Loose bolts or nuts	A.Cement joint filling, installation and horizontal fixation B.locking really
13	Inverter fault		Please refer to the operation manual of inverter "trouble shooting" for troubleshooting or contact the local dealer
14	High dew point	Compressed air pressure too low	Increase air pressure
15	Air outlet temperature too high	Condenser fouling	Clean condenser
16	High temperat ure protection or overload pr otection	Refrigerant exhaust pressure too high	Repair the fan or reduce the temperature
17	Compressor noise	Compressor parts damaged	Repair or replace the compressor
18	Excessive current consumption	Condenser fouling or fan inoperative	Clean condenser or service fan

19	Freeze	Evaporation pressure too low	Check whether the pressure constant valve is set properly
20	Refrigerant exhaust pressure too high	Fan temperature controller damaged	Check or replace the fan pressure controller

Date	operating hours	outlet pressure	outlet temperature	lo level	oil filter element display	air filter element display	Motor display	Exahaust high temperature display	safety valve	Current	Oil leakage,air leakage	Abnormal sound	Automatic unloading	Maintenance or exception handling record	Maintenance person
Remark			Normal below 90°C	Calibration	Normal extinction	Normal extinction	Normal extinction	Normal extinction	PUI ring test				Stop for check	Record abnormal conditions replace parts	