HANBELL

AE3 Series
Operation Manual

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1. Notices and Safety Instruction

Please read this manual carefully before installing the air compressor to avoid accident and damage to the machine.

1.1 Safety Notices for Electric Appliance

(1) Once the air compressor is switched on, it will get dangerous voltage. Thus, only qualified technician who obtains certificate of national examination or electric engineer is allowed to install the machine. Operators must safely operate by following the operational instruction in this manual and national regulations and safety criteria.

(2) User and installer shall provide earth and protection circuit for the machine sets according to national electric standard.

(3) It is necessary to arrange an exclusive moulded circuit breaker (MCCB) or HRC switch for any individual equipment.

(4) When choosing suitable moulded circuit breaker (MCCB) or HRC switch, the buffer should be taken into account. Refer to figure 3.7 for more information.

(5) Before carrying out any maintenance work, please confirm power has been switched off to avoid accident. Please hang a signal "Under maintenance, switch on is forbidden" on the switch.

1.2 Notices for Transmission Elements

(1) Please do not open the soundproof enclosure before the air compressor is totally stopped, to avoid any risk.

(2) Before conducting any dismantling and installing work, please do wait until motor and fan are completely stopped, and confirm the power is switched off.

(3) It is advised not to wear too loose clothing to avoid accident during maintenance.

1.3 Notices for High Temperature and Pressure

(1) For part of pipe lines or elements that may produce high temperature (obvious marks have been stuck on such places), it is forbidden to touch it in case of a scald accident before cooling down completely.

(2) Any element of the machine may hold high pressure air flow, it is necessary to confirm complete discharge before dismantling and installing. Avoid pointing high pressure air flow to any person. It can cause serious injury.

(3) Compressed air provided by this machine is for industrial use only. It can not be used for respiration.

1.4 Safety Notices for Drainage of Machine Sets

(1) To avoid oil emulsification in the compressor and consequent seizing of rotars, please

do open the drain valve to drain out condensation water in the air oil tank of the system before running the machine.

(2) To ensure proper functioning of the system, remember to check drainage function of the air processing equipment and the drain equipment.

2. Inspection and Handling

In order to ensure customer's right, please read content of this chapter carefully. Please stick to methods stated in 2.4 when handling the machine in case of accident and damage to the machine set.

2.1 Warranty of Compressor

Hanbell screw air compressors are manufactured under strict quality control system. Unless there are special articles, warranty period of the air compressor starts uniformly from the day it leaves the factory until 18 months or from the day of formal test running until 12 months (whichever comes first). During the warranty period, any resultant inferior quality, malfunction due to manufacturing reasons will get free product service once it is confirmed by the company. However, uncontrollable factors such as damage during delivery, collision, force majeure, failure to operate and maintain according to user's guidance, or malfunctions resultant by service engineer that is not from Hanbell or authorised dealer of Hanbell, are excluded from the warranty scope.

It is recommended that all users of Hanbell product to inform Hanbell or authorised dealer to clarify the root cause of malfunctions and do the trouble shooting when abnormal phenomenon found. It is not allowed to modify the system or bypass original setting and force the machine to run continuously to avoid any serious damage on air compressor.

2.2 Check of Specification and Model

Please check if specification on the nameplate of the air compressor is consistent with your purchase order.

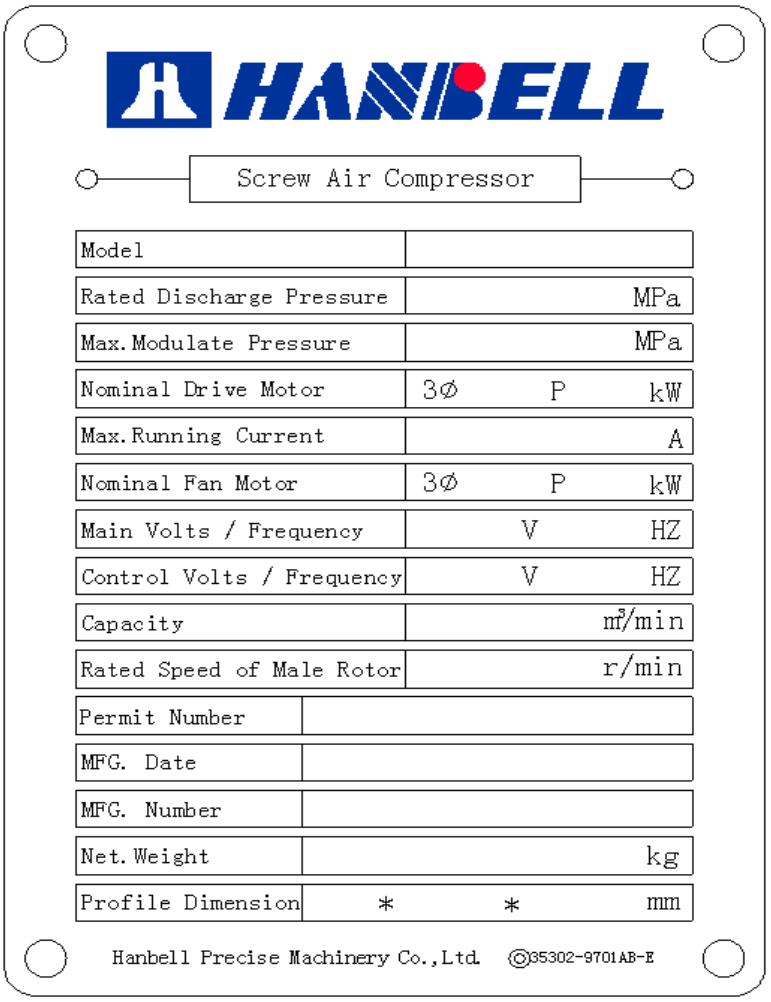


Figure 2.1

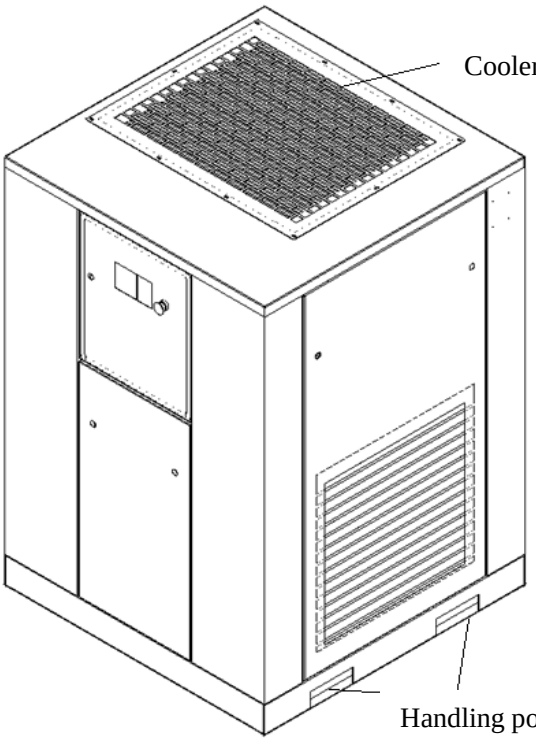
2.3 Check of Accessories

After receiving the air compressor, please firstly check if the accesories are complete. All Hanbell air compressors are equipped with the following elements:

(1) One operation manual;
(2) One Warranty letter;
(3) Two door keys

2.4 Notices for Handling

Please handle with suitable forklift or crane according to weight of the air compressor. Do not stand under the air compressor during hoisting, and stay at a place which is as safe as possible. The machine sets can be moved by hydraulic pressure truck and it can also be moved with forklift according to the direction listed below. Furthermore, it can be hoisted with walking crane.



Notice: It is not allow to pile up any stuff on the cooler in case of high temperature trip

2.4.1 Fastening Bolt

Motor pedestal of the air compressor is fixed with fastening bolt before delivery to avoid damages during transportation and handling which may cause pipe line leakage and damage to parts, and so on.

(1) Please check if fastening bolt on the interior pedestal of the air compressor has been dismantled before commissioning it. There is a paper sticker on the fastening bolt (Fig. 2.3).

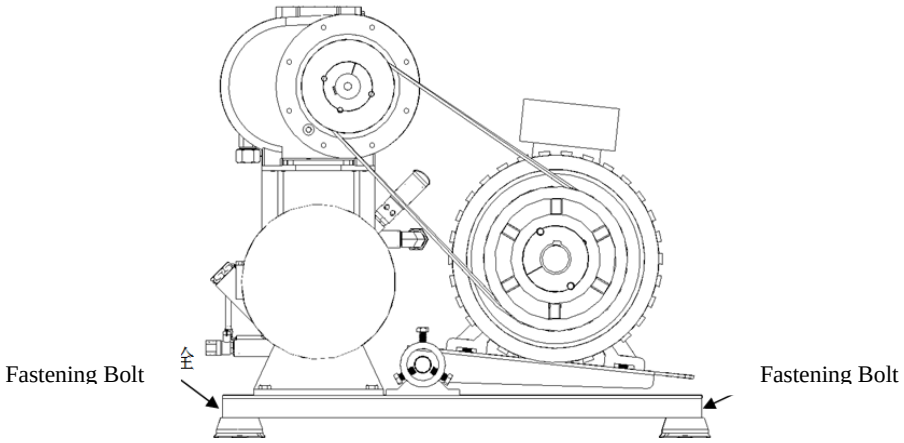


Figure 2.3

(2) Then please check if all the fastening bolts and adjuster bolts on the pedestal have been dismantled. The air compressor can be run only if all fastening bolts have been removed (Fig. 2.4)

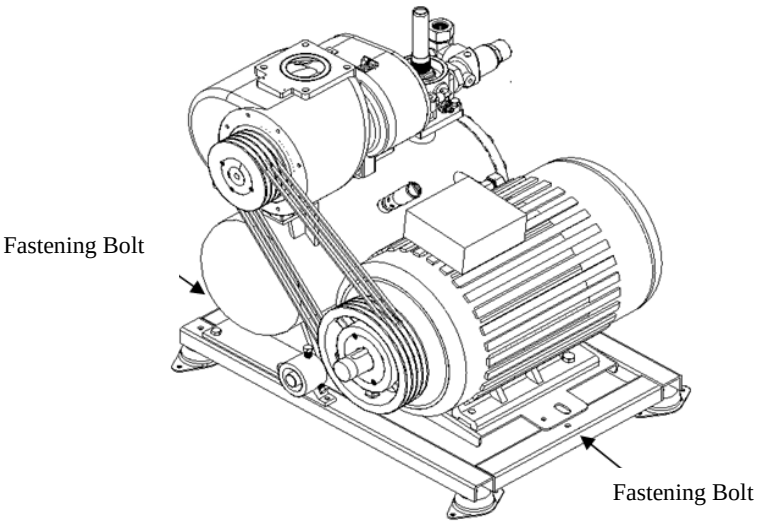


Figure 2.4

3. Installation

Please do read this chapter before installation in order to guarantee air ompressor's correct installation and reliable running.

3.1 Requirement for Environmental Condition

(1) It is better to install the air compressor in a room with good ventilation and lighting, and avoid installing it in places with much dust, high humidity, erosive gas, metallic dust, direct sunlight or direct rain shower.

(2) Environmental temperature: 0^0~45^0.

(3) When installing the air compressor outdoors, keep it away from boilers and any equipment that may produce huge amount of heat. Flashing shed should be arranged, and attention should also be paided to the effect of environment ventilation.

(4) At least 900 mm maintenance room must be set aside in the surrounding air compressor and the upper ventilating fans (Fig. 3.1).

(5) Altitude shall not be higher than 1000 meters.

(6) Relative humidity shall be below 95%.

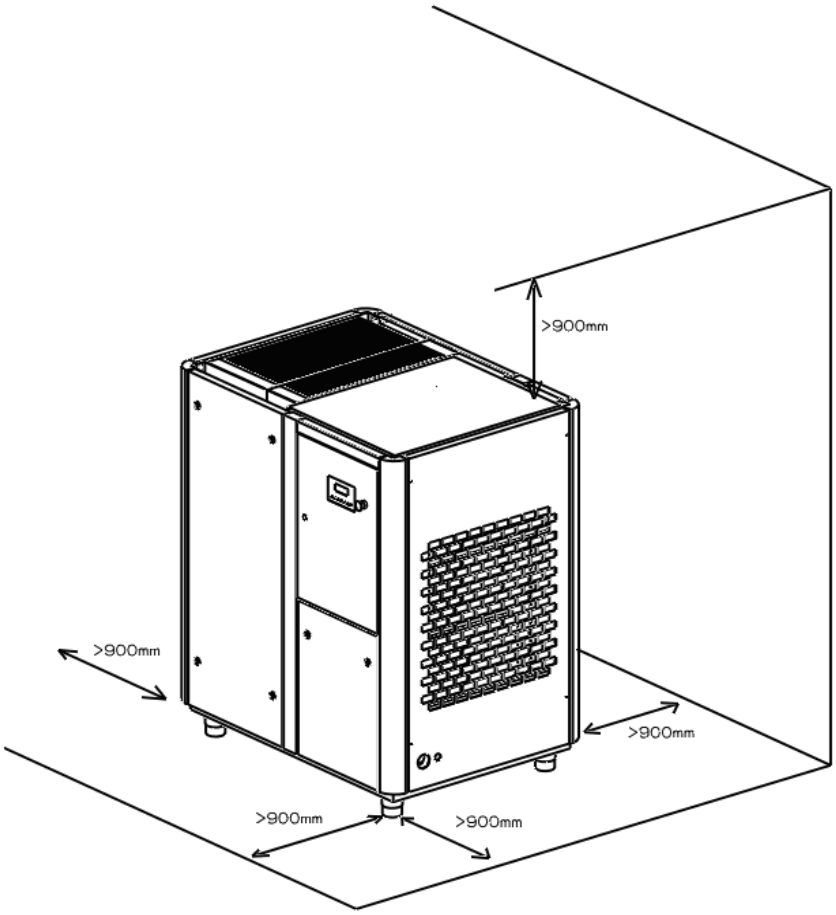


Figure 3.1

3.2 Requirement for Installation Site

The screw air compressor can be positioned into any floor slab that can bear weight of the compressor without special base only if the ground is even and horizontal. But when installed on steel frame, moving to ships or vehicles, the air compressor must be fixed with anchor screws, and at the same time, using rubber cushion to buffer vibration of the machine sets.

3.3 Requirement for Ventilation and Cooling

Ventilating condition should be kept well when installing indoors or outdoors for least short cycle of hot gas or interactions of thermal exhaust of machine. Thus the location of ventilation pipe, ventilator and air compressor should be taken into consideration carefully (in general there are three arrangement methods, see Fig. 3.2).

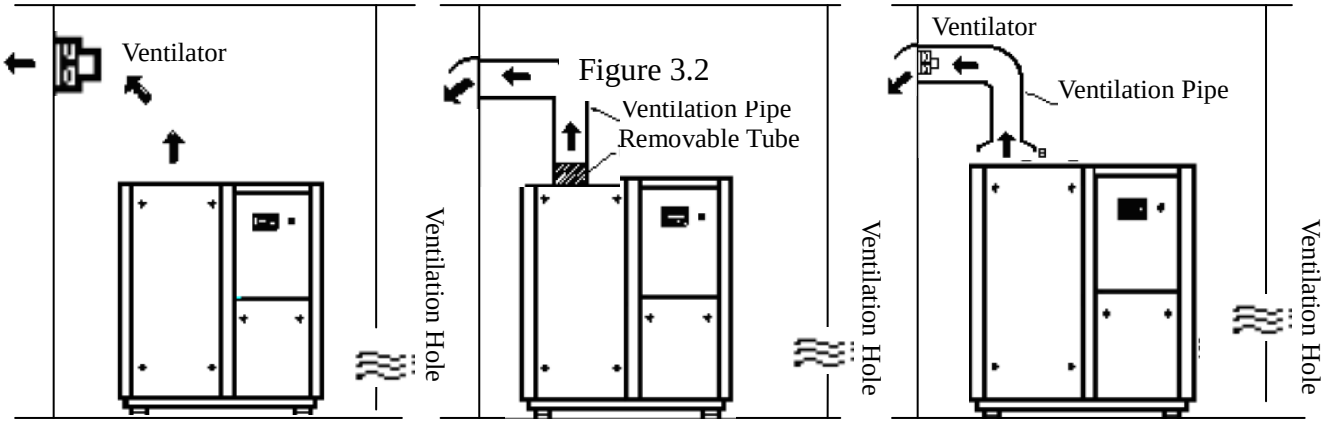


Figure A Figure B Figure C

Notes:

(1) Figure A: When ventilation pipe is not used for ventilation, please refer to ventilation amount (1) stated in table 3.1 for recommended external ventilation amount by ventilator, and please install ventilator as high as possible.

(2) Figure B: When ventilation pipe is used but ventilator is not installed, pressure loss of the ventilation amount of air compressor in the ventilation pipe must be calculated. When pressure loss is less than 20Pa, the ventilator doesn't need to be installed. Please install removable ventilation tube directly at the ventilation hole of the air compressor (Ventilation designs indicated in Fig. A and C are recommended).

(1) Figure C: When pressure loss inside the ventilation pipe is more than 20 Pa, ventilator needs to be installed, and the distance between ventilation pipe and ventilation hole of the air compressor ranges between 200~300mm. The ventilation amount (2) stated in table 3.1 is recommended. Selection of ventilator must consider the ventilation amount. Also pressure loss as well as temperature increase of the discharge air shall be taken into account.

3.4 Requirement for Amount of Ventilating and fanning

Table 3.1

Air Compressor Cooling Method	Air Cooling							
Main Motor KW	7.5	11	15	18	22	30	37	45
Ventilation Amount (1) m3 /min	95	140	180	225	270	360	450	540
Ventilation Amount (2) m3 /min	50	50	90	90	170	170	170	240

3.5 Warning

The compressed air and electricity are dangerous. Please obey the following steps before operating the air compressor.

1. Be sure that power has been switched off. The switch is locked and warning signal is hung.
2. Pressure of the air compressor system has been released.

(1) It is not allowed to remove all kinds of caps, nut and install or remove any joint or equipment, because high temperature liquid and compressed air in the machine will cause serious personal injury and even mortality.

(2) Control box for starting the motor of the air compressor is dangerous because of high voltage, thus all installation work must be done according to admitted code. Before working with electric system, be sure that manual switch can cut off voltage of the system, and moulded circuit breaker (MCCB) or HRC switch must be equipped on the circuit that supplies power for the air compressor. Person in charge of the equipment installation must provide all electric elements with proper earthing, maintenance space and lightning conductor.

(3) It is not allowed to run the air compressor with discharge pressure higher than that stated on the nameplate. Otherwise the motor will be overloaded and trip.

(4) The air compressor and assistant equipments can only be cleaned with safe solvent.

(5) Install manual stop valve (block-taped type) in discharge piping. If there is a relief valve between stop valve and air compressor, the relief valve must have enough capability to release the maximum continuous air flow in the air compressor.

(6) Pressure releasing via relief valve indicates extremely high pressure in the system. Root cause of high pressure must be found out at once.

(7) Lubricant for the air compressor has side effect to the air system of the factory. Any liquid carried along with air can be reduced to the least amount if proper fine separator and dryer are chosen and installed. Plastic shell without metalline hood used for filtration devices may be dangerous. For safety concern, metalline shell shall be used in any pressure system. Thus, we suggest to check the air piping system of the factory again.

(8) If air storage tank is installed, its installation and maintenance shall be executed according to regulations regarding pressure vessel

(9) Please read carefully and understand completely the maintenance and repair guidance before

starting the air compressor.

(10) After repair and maintenance, all cover plate and hood shell must be refitted.

Notice：It is forbidden to run the compressor when cover plate is open.

Warning 

Fail to adopt these safety instructions may cause mechanical malfunction, loss in property, serious personal injury and even mortality. Vibration, pulse, temperature, maximal pressure, corrosion and chemical resistance shall all be considered for piping and joints. In addition, there is oil containing in the compressed air system, so the compatibility of air exhaust pipe, necessary equipment for post processing should be taken into consideration.

3.6 Recommended piping

3.6.1 Piping

Air cooler in the machine sets will drop temperature of the Discharge Air to a point that is far below dewpoint (it is so in most environmental condition), and a great amount of water will be condensed. As a result, drain valve for condensation water is recommanded at the air outlet of the air compressor (drainage device), and a piece of discharge pipe shall be connected to the drainage on the bottom frame.

Important: the drainage device must be leaning downward to function.

Notes: For check the functioning status of the automatic drain valve easily, a piece of transparent drainage pipe shall be installed in the pipe system. If rear pipe system cools down the air again, condensation water will be produced. Therefore in lower part of the pipe system, another drain valve shall be installed.

Important: Diameter of the air delivery pipes shall be at least the same size as air compressor discharge piping. All pipes and joints must be compatible with the maximum working temperature of the machine sets, and its rating pressure shall be at least the same as that in the Air-Oil Tank of the air compressor.

It is necessary to check joint size of the air compressor. Proper length and dimension of pipes, numbers and types of joints as well as valves should all be taken into account to maximize the efficiency of the air compressor. To ensure safety of the whole system, it is important to review air delivery system of the factory when install the air compressor.

Condesation water will be produced in the air delivery pipes definitely. Almost all occasions in the compressed air pipings need the equipments for draining the water.

Some prevailing problems caused by moisture:

(1) Water in air compressors that will emulsify lubricant and then the air end blocked

(2) Piping rusts and dirt is accumulated;

(2) Meters blocking;

(3) Control valve getting stuck;

(4) Frost of the outdoor air pipes under the low temperature environment

Any problem mentioned above may cause the factory to stop production partly or completely. Dryer of the compressed air can reduce density of the steam, and prevents forming water in the air pipings. Combination of dryer, filter, rear cooler and automatic drain valve can improve efficiency of the air system. To solve water-containing problem of the system, two dryers can be used, i.e. refrigeration type and regenerating type. When dew point requirement of the compressed air system is 1-4℃, the refrigeration dryer is generally used, while dew point requirement is below 1℃, the regenerating dryer shall be used.

Notes: if there is no pulse isolation device (e.g. shared air storage tank), the screw air compressor can not be connected with a reciprocating compression system. We recommend you to connect two types of air compressors to a shared air storage tank by using individual piping. When several air compressors are installed in parallel, it is necessary to install a stop valve and a drain valve for each air compressor before shared air storage tank.

Notice:

(1) **When several air compressors are installed in parallel, a drainage device must be installed in each discharge piping.**

(2) **Before starting up the machine, please open drain valves of the air-oil tank and the system gas storage tank to completely drain the condensation water. This prevents emulsifying of the lubricant of the machine sets so that the air compressor won't be stuck due to oil deterioration.**

(3) **To ensure the system function properly, drainage function of the post processing devices and drainage equipments need to be checked periodically.**

3.6.2 Suggestion for piping of the air pipes

（1）Depending on the diameter of air compressor outlet piping, same or larger diameter can be used for latter piping connected to the air tank to avoid pressure drop.

（2）For convenience of maintenance and repair in the future, compressor air outlet pipe shall be connect to air tank via flange. A stop valve (which is close to the air tank) helps to isolate the air system without releasing pressurized air which is precious.

（3）When arrange piping, requirement for flexibility shall be considered and resonance of the pipe lines shall be avoided. 1/100 gradient shall be kept in the air pipe line, so that water in the pipe line can be smoothly drained.

（4）To avoid too much water condensed in the piping and affect the function of the equipment, generally dryer with suitable air processing amount for removing moisture is installed after the air tank.

Please refer to framework below for standard arrangement of air system.

Please contact with Hanbell for special arrangement of air with different quality requirement or application.

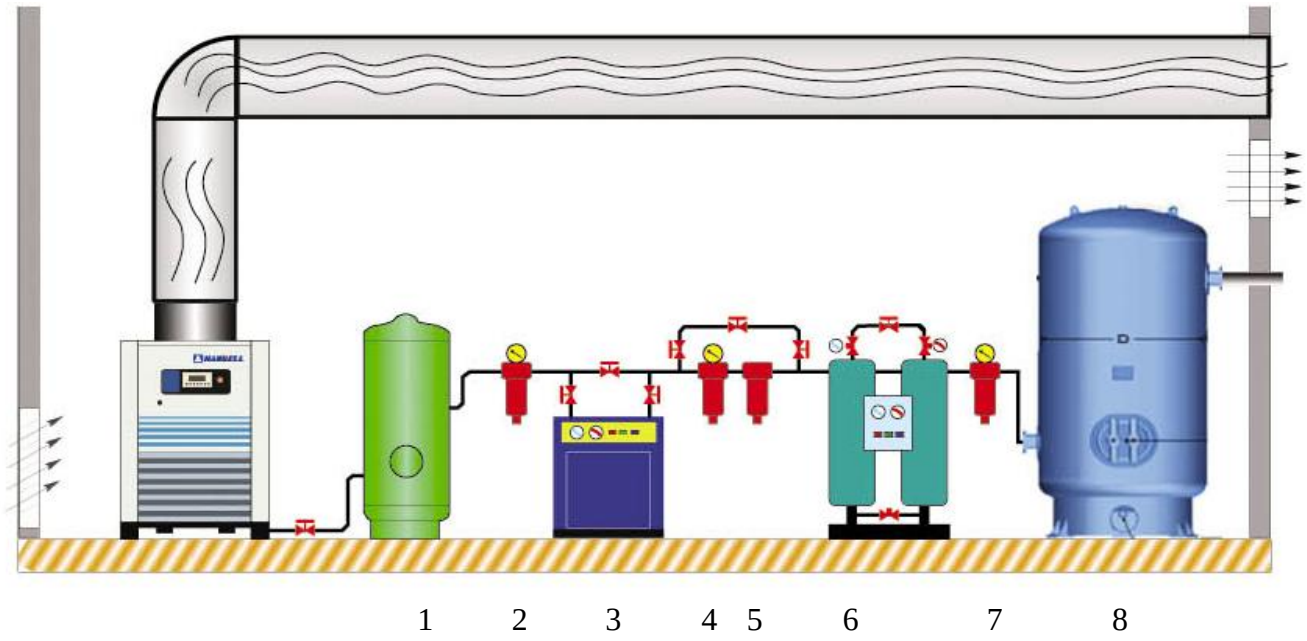


Figure 3.7

Codes in the figure represent the following articles respectively:

1. Air storage tank
2. Pre-positioned filter
3. Refrigerant dryer
4. Fine filter
5. Oil filter
6. Absorption dryer
7. Fine filter
8. Air storage tank

3.7 Safety Notices for Electric Installation and Control System

3.7.1 Precautions for electric installation

Before installing electric appliance, we suggest to review the safety instruction stated in this manual. Please check nameplate of the air compressor or the motor on the hood. It shows the working pressure, maximum discharge pressure as well as characteristics and capacity of the motor. Please confirm voltage in the circuit is consistent with that described on the nameplate of the air compressor. Open the door of the control box and confirm all the devices and wires are connected properly. Confirm correctness of power supply of the control transformer. Check if connection of motor and the control circuit is firm or not and close the door of the control box.

Select suitable main power supply wires, earthing line and moulded circuit breaker (MCCB) to guarantee safe operation. Safe current of the power line is defined based on 600V PVC wire which length is less than 20 meters, and the ambient temperature is 35℃, working temperature is lower than 55℃. If power supply wires can not satisfy the specification mentioned above, its specification shall be enlarged. Otherwise the air compressor can not be started up due to voltage drop.

Other notices:

(1) It is better to use a separated electrical system only for air compressor. In particular, parallel use of the air compressor with other system with different electricity consumption shall be avoided. If parallel use is adopted, the protector will trip easily due to overload resulted from too much voltage drop or imbalance of the three-phase current. Therefore, special attention shall be paid to higher capacity air compressor.

(2) Correct power distribution of the air compressor must be confirmed. The earthing line must be arranged, and it can not be directly positioned on the air delivery piping or on cooling water piping.

(3) The air compressor should be earthed to prevent electricity leakage and consequent danger.

(4) Due to the limitation in dimension of the control box, individual wire can not be too thick. If section area of the power supply wire is too large, it can be replaced by two or more pieces of wires. When several wires are used, individual power supply line must be three-phase balanced, otherwise the cable will be overheated and the combined voltage will be imbalanced. The input power voltage shall be within ±10％ of the rating voltage, and difference among three phases shall be within 3%. The air compressor must be provided with correct earthing line, ortherwise noise will be delivered to control system and results in signal disturbance. If earthing problem can not be improved, reading of temperature, current and pressure in the controller may probably fluctuate.

Motor KW			7.5	11	15	18.5	22	30	37	45	55	75
380V	Rated current(A)		15	22	30	35	44	57	72	85	115	157
	Power cable (mm2)		2.5	4	8	10	10	16	25	35	50	70
	Grounding cable (mm2)		2.5	4	8	10	10	16	25	25	25	35
	Switch NFB	AT	50	70	70	100	125	125	125	175	225	300

Notes: (1) Specs of the voltage is: 380V, 50/60HZ

(2) Diameter of earthing wire of the movable electric appliance should be as same size as the power supply line when it is arranged inside the tube or the cable.

3.7.2 Main Motor

Seeing from the drive end, correct rotational direction of the drive motor shall be anticlockwise. When checking rotational direction of the motor, the time of contact snap shall be as short as possible. After pressing the start up button, press the emergency stop button immediately. If rotational direction of the motor is incorrect, the main power switch must be switched off and locked. A signal "under maintenance, switch on is forbidden"shall be hung. Open the door of the control box and interchang any two terminals (R, S, T) on the starter. Then close the door of control box, and again check rotational direction of the motor.

3.7.3 Fan Motor

Check if the fan exhausts outward from the machine sets. If the rotational direction is incorrect, the main power switch must be switched off and locked. A signal "under maintenance, switch on is forbidden"shall be hung. Please interchange any two terminals of the contactor. Then close the door of control box, and again check rotational direction of the motor.

3.7.4 Control System

(1) Start up of the motor (voltage decrease or Y running)

During this period the suction control valve is completely closed, and the unloading solenoid valve (N.O.) shall be deenergized and completely open. Air inlet side is in high vacuum status. Lubricant required in compression chamber and bearings are ensured by the pressure difference between compression chamber and air-oil tank.

(2) Full-voltage running of the motor (full voltage or △ running)

When it switches to the status of full voltage running, the unloading solenoid valve (N.O) is energized and closed. The pressure in the air-oil tank increases gradually at this time. The suction control valve opens gradually, and pressure in the air-oil tank increases rapidly so that the suction control valve is completely open, and the air compressor runs at a full load. When pressure increases to a certain level, the minimum pressure valve completely opens and air is discharged.

(3) Load/Unload

When pressure increases continuously to a prescribed value of the unload pressure, the unloading solenoid valve (N.O) is actuated and starts to release air. The suction control valve closes, and air releases via a bypass pipe. Pressure in the air-oil tank starts to release, and instantly the minimum pressure valve closes rapidly to isolate the system pressure. When system pressure drops to the load pressure, the unloading solenoid valve (N.O) is energized and the suction control valve is completely opened. The air compressor loads again.

(4) Machine stop

After pressing the “STOP” button, the unloading solenoid valve (N.O) actuates and starts to release air. Air inlet is shut off and minimum pressure valve closed. Pressure in the air-oil tank starts to be released and be isolated from the system pressure. When pressure in the tank is released and reaches part load pressure, the motor stop running at once. 20 seconds later, the motor totally stops. Pressure in the air-oil tank releases continuously to zero.

(5) High temperature trip or motor overload

When discharge temperature is higher than 105° C or current overload, protector of the motor will actuate. Power will be cut out and the motor will stop running at once. Simultaneously the suction control valve will be closed, and the unloading solenoid valve (N.O) is completely opened. The minimum pressure valve closes and pressure in the air-oil tank goes down to zero. The emergency stop is only for abnormity condition. Frenquent use will cause system malfunction.

(6) Auto-stop system for long term unload

Once air consumption of the system decreases, the air compressor will keep running without loading. When the time of unload running is longer than the prescribed time, the air compressor will stop automatically. When air consumption of the system increases, pressure of the system will decrease, and the air compressor will start automatically to complement amount of air. Compressor will stop for 20 minutes after long term unload auto-stop. After the motor stopped, it can be started up again 5 minutes later as a protection.

3.7.5 Circuit of the electric appliance

Electric control of the air compressor can be divided into two systems. One is the internal control system, the other is the part of start up panel. The start up panel is a general Y-△ startup control used by ordinary machine, while the internal control part is an electric one. Internal circuit of the electric control part is more complex, thus it is not further described in the chapter. Please contact with customer service center of Hanbell directly for more information.

4. Introduction to the System（see figure 4.5.1: systemic flow chart）

4.1 Whole system

The air compressor is electric driven, single-stage screw air compressor set. In addition to air processing devices (freezing dryer, filter), it will be a complete system. This is a completely matched air compressor set.

4.2 Air compressor set (refer to figure 4.5.1 of Flow Chart of the Air System)

The air compressor consists of the following main components:

(1) Air Fillter
(2) Compressor
(3) Fine separator
(4) Minimum pressure valve
(5) Air cooler
(6) Air-oil tank

Air enters the air compressor, and then passes through air filter as well as suction control valve. Compression of the screw air compressor is done by a pair of rotor (a male and a female). Two rotors are installed on two parallel axes respectively in high intensity cast iron chamber. Air inlet and outlet are positioned at either side of the chamber respectively. Groove of the female rotor is joggled with and driven by the male rotator. Bearings are used at the discharge side to resist axial force. Oil-air mixture is discharged and enters the oil separating system. This system separates most of the lubricant. The lubricant will be returned to the system after cooling, and only several PPM of lubricant is carried to the air cooling system with the compressed air. The after cooling system includes heat exchanger and drainage device. After cooling, most of moisture in the discharged air will be condensed and drained via rear piping of the machine sets. When unloading, unloading solenoid valve opens, and suction control valve closes. Compressed air returns to the suction control valve via bypass pipe.

4.3 Lubricant System

Driven by pressure difference, lubricant will flow from air-oil tank, fine separator to cooler. Thermal control valve controls discharge temperature to be higher than the dew point. When the air compressor is cold started up, some of the lubricant bypasses the cooler. When temperature of the system increases to a level that is higher than the prescribed value of the thermal control valve, lubricant will flow through the cooler. When machine runs at high environment temperature, all the lubricant will flow through the cooler. Outlet temperature of the air compressor oil cooler is controlled so that possibility of moisture condensed in the oil separator can be reduced. Through maintaining high lubricant temperature, the temperature of discharged oil-air mixture can be kept above dew point. The lubricant will return to the air end via oil filter.

4.4 Oil Separating System

The air-oil tank adopts a method of mechanical impact. Oil-air mixture enters the entrance and bumps against the edge of the air-oil tank which makes the velocity drop and oil droplet to be separated from the oil-air mixture. In the shell of air-oil tank the centrifugal force let the oil drolet separated. Droplet diameter larger can 1 um can be separated by centrifugal force effectively.

Notice:

Please install a Y shape water filter before cooling water inlet in water cooled models to ensure the proper operation of the cooler.

4.5 System Flow Chart

Figure 4.5.1 Name of the Elements of the System

NO.	Name	NO.	Name
1	Air Filter	14	Water Drain Valve (Optional)
2	Suction Control valve	15	Taper Bush Pulley(for model below 45KW)
3	Air End	16	Belt(For model below 45KW)
4	Air-oil Tank	17	Taper Bush Pulley(For model below 45KW)
5	Fine Separator	18	Check Valve
6	Minimum Pressure Valve	19	Throttle Valve
7	After Cooler(Air or Water Cooled)	20	Unloading Solenoid Valve (N.O.)
8	Shuttle Valve(optional)	21	Proportion Valve(optional)
9	Oil Cooler(Air or Water Cooled)	22	Check Valve for Oil Return
10	Oil filter	23	Motor
11	Thermal Control Valve	T1	Discharge Temperature Sensor
12	Oil Drain Valve	P2	System Pressure Sensor
13	Relief Valve		

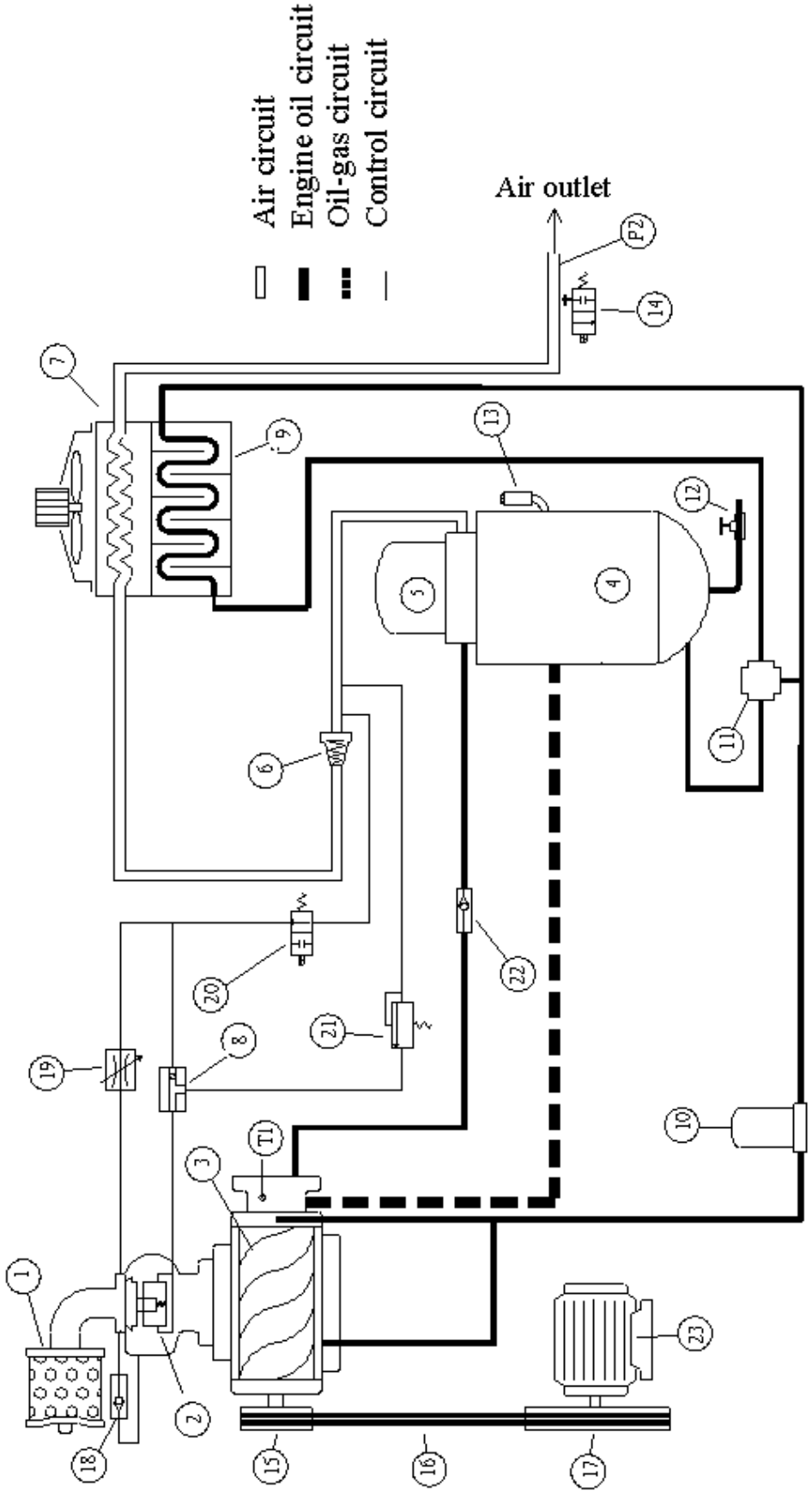


Figure 4.5.1 Flow Chart of the Air Cooling System

5. Introduction of micro-controller

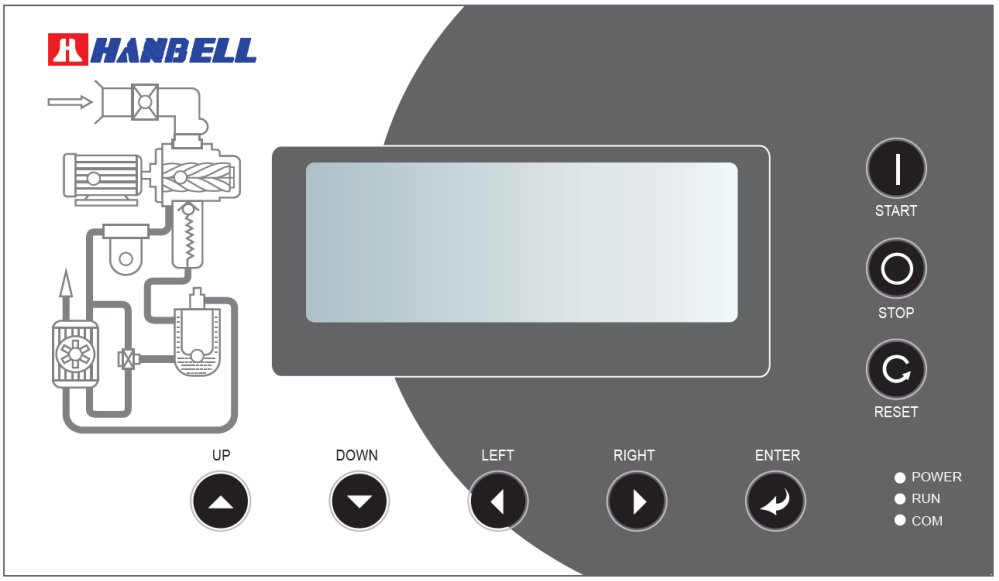


Figure 5.1

5.1 Description of Buttons

START: for starting up the compressor
STOP: for stopping the compressor
RESET: for reset
UP: for scroll up the menu
DOWN: for scroll down the menu
LEFT: for scroll left the menu
RIGHT: for scroll right the menu
ENTER: confirmation on the setting
POWER: showing the power is on
RUN: showing the compressor is run
COM: common point

5.2 Status display

T	000℃	Single 1-1
P	0.01Mpa	Air Adjustment
State		Stop
Phase Sequence Error		

When power is delivered to the controller, this page is displayed. If “Phase Sequence Error” is shown, check the connection of the wire.

Current	Main	Fan
A phase	000.0A	000.0A
B phase	000.0A	000.0A
C phase	000.0A	000.0A

Press UP/DOWN to check the current of main motor and fan motor

Unload pressure	0.80MPa
Load pressure	0.70MPa
Total run time	000000h 00m
Load run time	000000 h 00m

Function select	
Maintenance	Fault record
User set	Factory set

Select “User ser”

Passwords：****

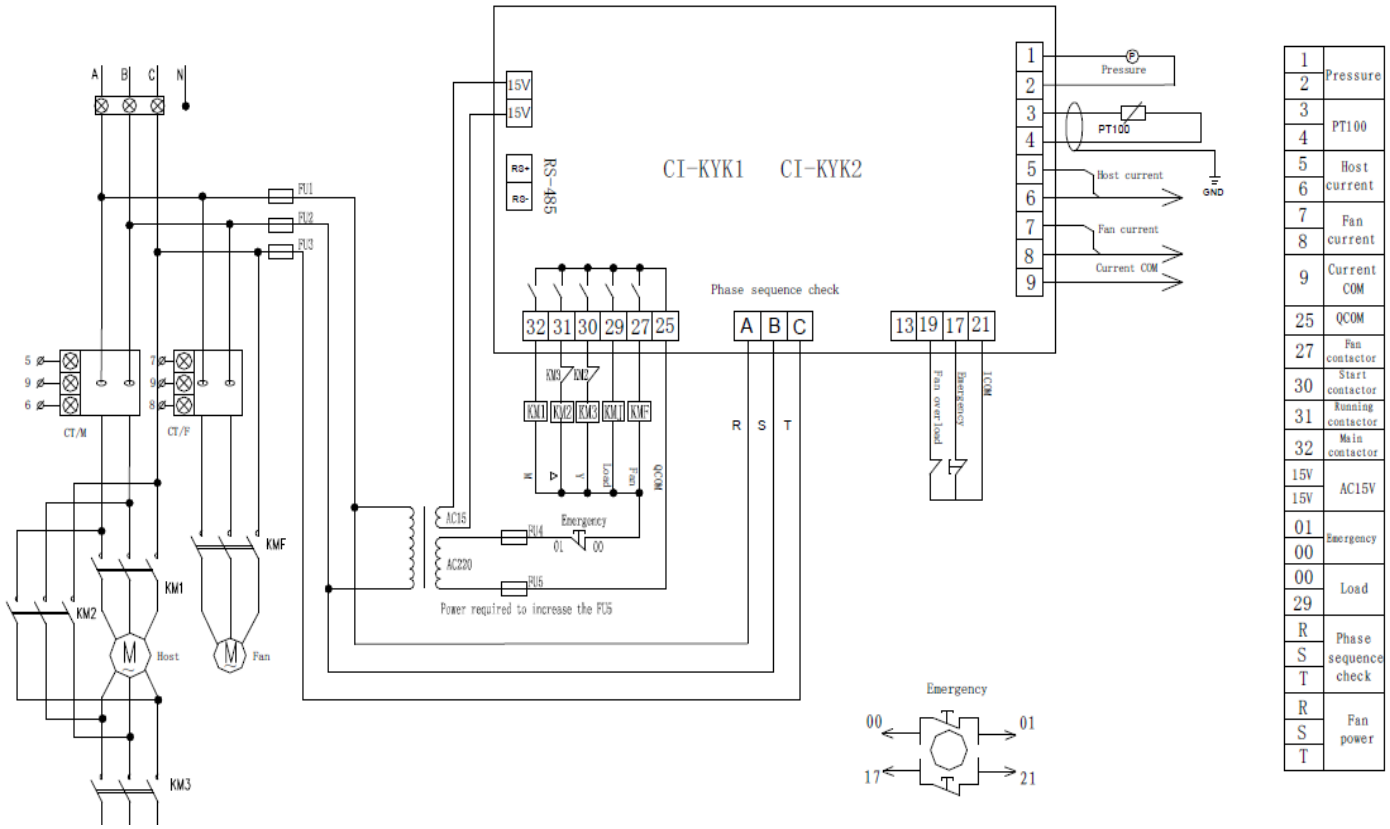
Enter paswords

Maximum 10 error displays. If it is more than 10, the pervious one will be deleted

5.3 User's parameter and Function

1st Level Menu	2nd Level Menu	Range	Function
Control	Unload pressure	0.3-1.7MPa	Pressure value for unloading
	Load pressure	0.1 -1.6MPa	Pressure value for loading
	Fan start temperature	60-100℃	Control the fan to start up.
	Fan stop temperature	50-100℃	Control the fan to stop
	Communication mode	follow/boradcast	Two communication mode
	Machine number	1-32	Machine number for multi machines
	User passwords	0-9999	User can can the passwords.
Sequence/Time	Y-Δ time	5-40 seconds	Y-Δ time
	Loading delay time	5-30 seconds	After starting up, delay time for running and measure the current.
	Long term unload stop	4-60 mins	Long term non load stop
	Unload delay time before stop	10-60 seconds	Delay time before stop
	Serial starting up time	5-90 seconds	Starting time without multi ccontrol
	Serial unloading time	5-90 seconds	Unloading time without multi control
	Serial interchange time	50-5000 hrs	Running interchange between severail unit without multi control
	Drain ON time	0-30 seconds	Drainage time
	Drain OFF time	1-10 mins	Drainage interval time
	Date		Current date
	Time		Current time
Maintenance	Air filter replacement	500-5000 hrs	Estimated service life of air filter
	Fine separator replacement	500-8000 hrs	Estimated service life of fine separator
	Oil replacement	500-8000 hrs	Estimated service life of the oil
	Grease recharge	500-6000 hrs	Estimated grease recharge time
	Oil filter replacement	500-5000 hrs	Estimated service life of oil filter
	Belt replacement	500-8000 hrs	Estimated service life the belt
	Air filter use time	0-9999 hrs	
	Fine separator use time	0-9999 hrs	
	Oil use time	0-9999 hrs	
	Grease use time	0-9999 hrs	
	Oil filter use time	0-9999 hrs	
	Belt use time	0-9999 hrs	

5.4 Connection diagram



5.5 Operation

5.5.1 Press “START” button：（Y—△ Start up）

After power is delivered to controller, the controller will do the self examination for 3 seconds. During these 3 seconds, the “START” button is not working. After self examination is done, press the”START, then the compressor starts up.：KM3 and KM1 is powered in Y starting period. After switching from Y to delta, KM3 disconnects（KM2、KM3 interlocked），KM2 is powered.

5.5.2 Automatic running：

After switching to delta status for a period of delay time，the unloading solenoid valve (N.O) is energized. The compressor starts to load, and the pressure in the air-oil tank increases. When the pressure reaches the upper limit(unload pressure)，unloading solenoid valve (N.O) is deenergized. The compressor starts to unload; when the pressure reaches the lower limit (load pressure), unloading solenoid valve (N.O) is energized. The compressor starts to load and the pressure increases. If the system pressure does not reach lower limit during unloding for a period of time, the controller will function “long term unload stop” to stop the motor.

5.5.3 Normal stop：

Press “STOP” button, and the unloading solenoid valve (N.O) is deenergized. After a period of delay time, the magnetic contactor is disconnected. Main motor and fan motor will stop. The compressor can be start up again by pressing”START.”

5.5.4 Avoid frequent start up

In normal stop, long term unload stop, or malfunction stop, the motor can not be started up right away. Delay time is set to avoid frequent start up. In the controller display, the delay time (for example 199 seconds) is shown. Only after the delay time can the motor be started up again.

5.5.5 Malfunction stop and emergency stop

When motor malfunction or high discharge temperature occurs, the controller will stop the compressor. The compressor can be started up again only after the root cause is found and problems are solved. Emergency stop buttom is used for emergent case.

5.6 Alarm

Alarm	Status display	Signal	Compressor status
Time to change air filter	Air filter replacement	Air filter alarm signal	Alarm, not stop
Time to change oil filter	Oil filter replacement	Oil filter alarm signal	Alarm, not stop
Time to change fine separator	Fine separator replacement	Fine separator alarm signal	Alarm, not stop
Time to recharge grease	Grease recharge		Alarm, not stop
Time to change oil	Oil replacement		Alarm, not stop
Time to change belt	Belt replacement		Alarm, not stop
Low environment temperature	Low environment temperature		Alarm, not stop
High environment temperature	High environment temperature		Alarm, not stop
High discharge temperature	High discharge temperature	High discharge temperature alarm signal	Alarm and stop
Temperature sensor disconnect	Temperature sensor fault	Temperature sensor alarm signal	Alarm and stop
Pressure sensor disconnect	Pressure sensor fault	Pressure sensor alarm signal	Alarm and stop
Main Motor overload	Main motor overload	Main motor overload alarm signal	Alarm and stop, delay time for restart
Fan motor overload	Fan motor overload	Fan motor overload alarm signal	Alarm and stop
Discharge pressure higher than the limit	High discharge pressure		Alarm and stop
Phase reverse, loss	Phase sequence error	Phase sequence error	Alarm and stop

		alarm signal	

5.7 Protection

5.7.1 Electric protection

Protection for short circuit, locked, overload, phase loss and imbalance.

Malfunction	Display	Root cause
Short circuit	Main motor or fan motor short circuit	Short circuit or rated current setting is wrong
Locked	Main or fan motor locked	Mechanical loading is too high, bearing deterioration, and other mechnical malfunction
Overlaod	Main or fan motor current overload	Mechanical loading is too high, bearing deterioration, and other mechnical malfunction
Phase loss	Main of fan motor phase loss	Power, magnetic contactor, or motor phase loss
Unbalance	Main or fan motor phase unbalance	Magnetic contactor is not good or damage in motor

5.7.2 Temperature protection

Discharge temperature protection：When discharge temperature reaches upper limit, controller will alarm and stop the compressor. “High discharge temperature” will be shown on the display.

5.7.3 Phase sequence protection

When the three phases power connected to the compressor are not consistent with those in the controller setting, “phase sequence error” will be shown. Controller will not start up the motor. Interchange any two phases to check the rotation again.

5.7.4 High discharge pressure

When discharge pressure reaches the upper limit and controller will alarm and stop the compressor. Display shows “High discharge pressure”

5.7.5 Sensor malfunction

When pressure or temperature disconnect, controller will alarm and stop the compressor. Display shows “Temperature sensor fault” or” Pressure sensor fault”

6. Function of Main Components

6.1 Air Filter

It is a dry paper filter and functions to filter the air entering the air end. Quality of the filter affects directly service life of lubricant, oil filter, fine separator and bearings. If air filter is blocked, air inlet amount will decrease, which will affect the amount of air supply. Hanbell service engineer will suggest to change it or not according to environment condition and service time from controller display.Micro-controller will remind to replace a new filter based on setting time. When warning message appears, old filter must be replaced.

6.2 Suction Control valve

It is a piston type valve. By using of air flow which enters piston via its bottom, amount of inlet air can be controlled by movement of piston. The more amout of air enters the bottom of piston, the more the piston moves. The amount of air inlet will decrease because the opening of the sunction control valve decreases. In adverse condition, the amount of air inlet increases.

6.3 Air-oil Tank

In addition to function as lubricant receiver, most of the lubricant can be separated by mechanical impact and centrifugal force. Efficiency of separation has influence on the working of oil fine separator, and oil content in the compressed air. An oil level indicator is at the side of air-oil tank for ease of oil level observation. A drain valve is at the bottom of the air-oil tank. It is used for oil change in periodical maintenance and drainage of condensation water in the oil before starting up.

6.4 Fine Separator

It is made of dual-layered glass fiber, and can catch oil molecule in compressed air. The filtered oil is kept in the central groove, and flows back to the air compressor via an oil return pipe. Oil content in air can be controlled under 3PPM when it works at rating pressure. Efficiency and service life of oil fine separator are greatly affected by environment pollution, quality of lubricant, effect of oil filter and condensation water in air-oil tank. When it is blocked or the separation efficiency is not good, oil content in the air increases. This causes oil carry over. Hanbell service engineer will suggest to change it or not according to environment condition, dust in air filter, lubricant quality, and service time from controller display. Micro-controller will remind to replace a new fine separator based on setting time. When warning message appears, old fine separator must be replaced.

6.5 Relief Valve

When it runs abnormally or the pressure sensor is malfunction, the pressure in the oil separator may increase continuously. When the pressure increases to the setting value of the relief valve, the relief valve will actuate to release pressure and to avoid accident. Actuated pressure of relief valve has been calibrated before product delivered from the factory, please do not modify it.

6.6 Minimum Pressure Valve

Functions of this element are as below:

A. When starting up, the valve makes it easier to establish pressure required for oil supply.

B. Maintains pressure inside the air-oil tank at minimal value to prevents oil fine separator from damage by huge pressure difference.

C. At part load or after stopping, it isolates the air-oil tank from system as non return valve.

6.7 After Cooler (Water or Air Cooled)

It is used to cool the compressed air. High outlet temperature will damage the dryer in the system or affect its efficiency. If the cooler is blocked by dust, the heat exchange efficiency will decrease. The cleanliness of the cooler should be taken care of in periodical maintance.

6.8 Thermal Control Valve

It keeps discharge temperature above dew point to avoid moisture being condensed in oil separator which may cause deterioration and emulsification of lubricant. It also protects the compressor from extremely high discharge temperature(cut out at 105 ℃), which may cause damage on mechanical elements and deterioration of lubricant. The mechanism of thermal control valve is as follows: when discharge temperature is too high, amount of oil that flows to cooler increases, while the amount of bypass decreases.Therefore, the temperature of oil flowing to compression chamer is lower and the discharge temperature is also lower. If discharge temperature is too low, amount of oil that flows to cooler decreases, whereas the amount of bypass increases. As a result, oil flowing to compression chamber will be of high temperature, so does the discharge temperature. Based on this mechanism, discharge temperature will be kept at a stable value.

6.9 Oil Cooler

It is used to cool the lubricant. If the cooler is blocked, the discharge temperature will increase. The cleanliness of the cooler should be taken care of in periodical maintance.

6.10 Oil Filter

It is a paper filter that can capture the debris which will damage the bearings and other moving parts in the oil. Hanbell Engineer will suggest to change the oil filter or not by measuring the pressure difference before and after oil filter or by checking the lubricant quality during maintenance. New oil filter must be installed based on the maintenance schedule which can be set in the controller. If the filter is blocked, the lubricant supply will be insufficient and discharge temperature will increase. This will cause damage in moving parts or in worst case the screw rotor will lock.

6.11 Discharge Temperature Sensor

It detects the discharge temperature and forward signal to micro-controller which helps to maintain normal running of the compressor. When discharge temperature is too high, micro-controller will

make air compressor stop running to avoid any damage or accident.

6.12 Pressure Sensor

The pressure sensor forwards signal to micro-controller for protecting the whole unit.

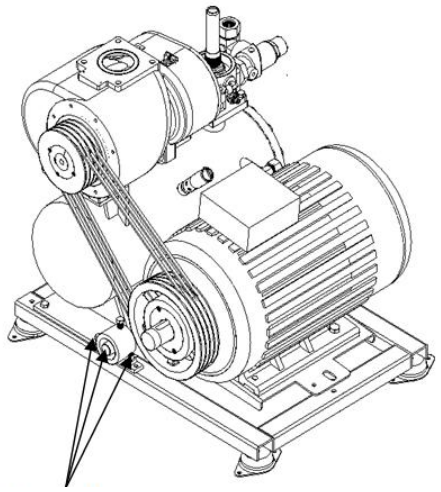
7. Maintenance and Repair

Before maintenance or repiar, please confirm the motor and fan have already been stopped completely and the power has been switched off. During maintenance or repair, a signal"under maintenance, switch on is forbidden" must be put at the startup button. The pressure in the unit must be released before inspecting any pressure vessel or elements.

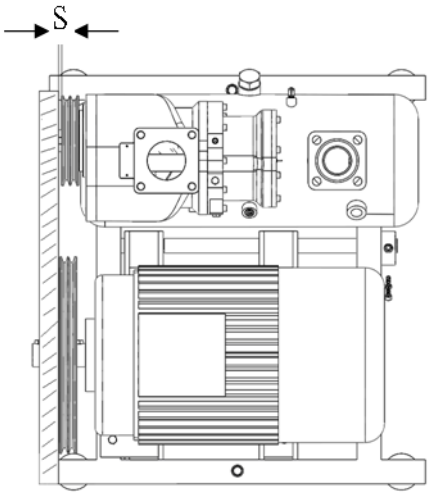
7.1 Inspection and Change of Belt and Pulley

（1）Adjustment of belt and pulley:

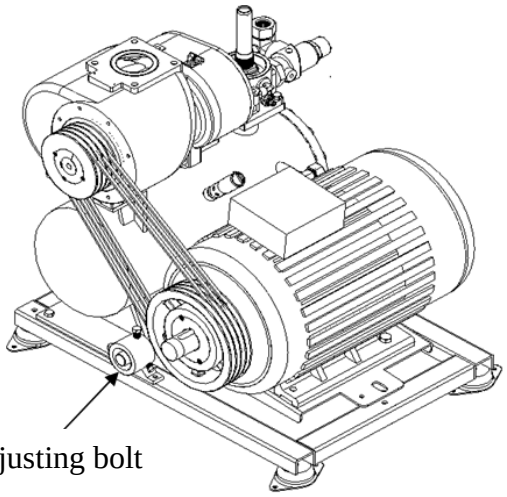
By using the principle that the deadweight of motor is balanced by its resultant moment, intensity of belt is automatically modified, which can free intensity modification of belt and calibrating work for belt changing, and can prolong the service life of belt. If working pressure or amount of air flow needs to be changed, its change will be more convenient. Calibration of pulley can be done by clinging a ruler or slat with straight edge to end surface of the pulley, and deviation ("S") between ruler and another pulley can be measured in this way. Value of "S" shall be within 1 mm. If horizontal surface of pulleys of motor and machine framework can not match required standard, it can be adjusted by modifying position (height, left or right) of adjusting bolt. The adjusting bolts must be fastened after adjustment is completed.



Adjusting bolt



(2) Change of belt



When service life of belt expires or there is crack in belt or the belt is seriously damaged, the belt must be changed. Firstly, height of motor can be increased by modifying the adjusting bolt until the belt can be easily dismantled (height of motor is supported by bolt). When the belt is assembled properly, the adjusting bolt can be dismantled. Readjustment of the horizontal surface of pulley is not necessary.

7.2 Air Fillter

When indicator light of maintenance flashes, it must be changed. The service life of air filter is about 3000 hrs more or less, depending on the air quality of the environment. The air filer can be replaced by removing the fixing bolt. Please note that the gasket must be stuck on the fixing base.

7.3 Lubrication of Motor Bearing

The grease must be recharged to the motor for maintaining the lubrication effect.

(a) Table 7.2: Time and supply amount of lubrication grease

kW	Initial charge(g)	Recharge(g)	Recharge interval(hr)
	Notice(1)	Notice(2)	
22	100	30	1500
11	50	30	1500
15	50	30	1500
18.5	50	30	1500
22	100	30	1500
30	100	30	1500
37	100	30	1500
45	200	30	1500

Table 7. 2

Notice:

(1) Initial charge amount is that to be filled after bearing is disassembled. 1/3 of the amount will be filled in the bearing, and the rest will be filled in the cover of it. (The initial charge is done by motor manufacture before delivery)

(2) Grease must be recharged by the interval shown in the table.

(3) Recharging more grease does not guarantee longer recharge interval. Please follow the recharge amount in the table above.

(4) If the grease is accumulated and the storage space is completely occupied, there will be an extra loading one the bearing due to the resistance. This will result in higher temperature or grease leakage. Please remove cover of drain port (once in 2~3 times of oil recharge) to drain the grease.

(5) Too much grease will cause damage to the bearing.

(6) The frequency of grease change depends on the environment and working condition. Please follow the instruction sticker on the motor for interval and amount of grease changing.

(b) The characterics tic of the grease is shown in the table below. Please use qualified grease to ensure the service life of the bearing.

Temperature range	The application range of the grease is -20°C-120°C.
For high-speed, large-diameter bearing	The hard grease has better performance in pressure resistance (strength of of oil film). The soft grease has better performance in noise and vibration (silicon grease should be avoided).
Load resistance	Heavy load such as belt, gear, etc. shall choose pressure resistant grease (silicon grease should be avoided).
Water resistance	Na, Ca grease shall be avoided in high humidity location.
Viscocity	Due to similar hardness, seen from temperature increase during addition, rolling noise, abnormal vibration and lubrication when cold, soft grease is good.
Lubricative capacity	Please use only qualified grease.

7.4 Bearing of Compressor

Bearings of the compressor are a consumption materials (suggest to change them for every 30,000 hrs), and their service life will be influenced by normal or abnormal friction, inlet air quality, lubricant quality and efficiency of oil fiter. Deteriorated bearings will generate higher level of noise and vibration.

7.5 Lubricant of Air Compressor

Lubricant for screw air compressor is with special formula. Only Hanbell original lubricant can be used. Otherwise, it will cause serious damage to air compressor. Old lubricant must be completely drained from the system before charging new lubricant; otherwise service life of the new lubricant will be shortened. In general, oil filter and oil fine separator must be changed when changing the lubricant. Lubricant chainging instruction is as follows: (1) Confirm that power of the air compressor has been switched off. (2)Releases pressure in the air-oil tank. (3)After pressure is released, open drain valves of air-oil tank and cooler and hold the oil with tray. (4)After old lubricant in the air-oil tank and cooler has been drained completely, close drain valves. (5)Switch on power to restart the air compressor for only 3 seconds, then switch off power. (6) Release the pressure in the air-oil tank, and open drain valves again to drain the rest lubricant. (7)The drain valves of air-oil tank and cooler must be closed tightly before adding lubricant. (8)The air-oil tank should be fully charged at the first time, which can be observed from the oil level indicator. (9)Restart the air compressor to check if oil level is at half position. If oil level is lower than half, switch off the power, release the pressure and add more bubricant. (10)Oil level can be neither lower than half, nor too full.

7.6 Fine Separator

After using for a period of time, the filter will be blocked gradually, which causes some pressure drop. Cleanliness oil fine separator will affect its efficiency. Too much blockage will result in higher oil content in outlet air and higher power consumption. Depending on environment air quality, cleanliness of air filter, oil filter, quality of lubricant, the service life of the fine separator ranges 3000～6000 hours.

Fine separator can be changed as follows: The fine separation is a screw in type. It can be dismantled by special tools. Please check that the O- ring and gasket are normal or not. Apply lubricant on the surface of gasket before install it.

7.7 Oil Return Pipe

Check the oil return pipe is smooth or not periodically. High temperature of oil return pipe during operation is normal. If it is blocked, heat of pipe surface can not be felt or there is more oil content in the condensation water. Pipe must be cleaned in these kinds of situations.

Method for checking the oil return is as follows: Check fine separator, oil pipe, joint, check valve and orifice are blocked or not.

7.8 Oil Filter

For new compressor, oil filter shall be changed after running 500 hrs. After that, it can be changed according to maintenance schedule. Service life of oil filter is about 3000 hrs more or less depending on environment condition. When the efficiency of the oil filter started to deteriorate, it should be replaced to avoid any damage on compressor. The oil filter should be dismantled with special tools to avoid the shell from deforming. A tray should be placed under the filter to hold the spilled oil. It would be better to clean the piping before installing new one. Apply lubricant on the surface of

gasket before install it.

7.9 Thermal Control Valve

Under normal condition, bypass of the thermal control valve will be shut off at high temperature, and open at low temperature. We can check the function of thermal control valve by this method.

7.10 Joint of Pipe

All joints of pipes in air compressor must be checked periodically for leakage, and soft pipes must be checked for aging and crack. Gasket, O-ring, and soft pipes may need to be changed or thread sealant must be applied again according the problem found.

7.11 Suction Control valve

Piston of the suction control valve must be periodically dismantled to remove deposited dirt. To add grease or change the piston ring ensures the sensitivity of piston to control air inlet volume.

7.12 Minimum Pressure Valve

Minimum pressure valve must be periodically dismantled to remove deposited dirt and add new grease. O-ring or seal ring of valve disc must be changed if they are damaged.
Periodical check on the sealing effect of the valve disc can reduce loss due to leakage.

7.13 Relief Valve

(1) The relief valve has been calibrated before delivery. Please do not adjust it again.
(2) Function of the relief valve must be checked periodically.

7.14 Unloading solenoid valve (N.O)

(1) If the compressor switches between load and unload too frequently, the load and unload pressure must be reset according to the actual air consumption. Otherwies, the service life of unloading solenoid valve (N.O) will be shortened.
(2) Check the unloading solenoid valve (N.O) function properly or not periodically.
(3) Check point of unloading solenoid valve (N.O)
   a. Dismantle the unloading solenoid valve (N.O) to check if there is particle inside.
   b. To check the valve body and coil operates properly or not by using the electric tool to measure the coil.
   c. Check the switch between load and unload is normal(there is some noise when changing)

7.15 Cooler (Air cooled cooler)

After operation for a period of time, the heat exchange efficiency of the cooler will be lower due

to dirt and dust stuck on the surface. The discharge temperature will increase. It is necessary to clean the surface by pressurized air periodically to recover its efficiency. The maintenance schedule depends on the environment air quality.

7.16 Electric Insulation

Periodically check the insulation value of the motors of compressor and fan. Testing by 500VDC, the insulation value should be above 5MΩ. The root cause of inferior insulation must be found out and treated.

7.17 Periodical Inspection and Clean

After the air compressor has been working for a period of time, maintenance must be done by following the maintenance table. The maintenance can only be done by Hanbell or Hanbell authorized dealer.

8. Safety Protection and Warning Device

8.1 Overload Protection of Motor

There are two motors in the air compressor set. One is the main motor of the air end, the other is the motor of cooling fan. Under normal condition, current of the main motor will not be higher than trip value in the micro-controller. When current of the motor is higher than the upper limit of the electric protection device, the micro-controller will automatically cut off the main power supply and the air compressor stops. The air compressor can not be started unless power is supplied again.

Attention: Fluctuation of voltage should range between ≤-10%～ +10%. Voltage Imbalance between phases can not exceed 3%, or else, temperature of motor will increase rapidly. When voltage imbalance reaches 3.5%, temperature of motor will increase by 25%.

Reasons for motor overload are:

(1) Manual error: Modify pressure of discharge, or improper adjustment on system.

(2) Mechnical malfunction: Deterioration in motor, phase loss, relief valve does not actuate, system setting malfunction, and blockage in oil fine separator.

If overload of motor is observed, contact with manufacturer immediately for inspection.The root cause must be found out and solved. The motor burnt out case will cause higher service cost and compressed air supply problem.

8.2 High Discharge Temperature

The setting value of high discharge temperature is 105℃. If discharge temperature reached 105℃, the compressor will be cut out automatically. Malfunction of oil cooler is one of the most common reasons for high discharge temperature. For air cooled oil cooler, if the heat exchanger is blocked by dust, cooling air is not able to pass freely. The oil temperature and discharge temperature will increase. After running for a period of time, dust on the fin of heat exchanger must be cleared with low pressurized air. If blocking stuff on the fin can not be removed completely, it is better to clean it with detergent or solvent. The maximum environment temperature of the air compressor is 45℃. The higher the environment temperature is, the higher the discharge temperature. Therefore, it is necessary to select a place with lower environment temperature and good ventilation for air compressor.

8.3 Filter Maintenance

Maintenance schedule of air filter, oil fiter, and fine separator is set in the micro-controller .The warning light reminds the time for replacement.

8.4 Other Protection and Warning

Please refer to this operation manual or catalogue.

8.5 Trouble Shooting

Problem	Probability causes	Corrective Action
Start-up failure	Malfunction of control circuit	Check control voltage, fuse and connection of the control circuit
	Emergency switch actuates	Check if the emergency switch actuated or contact is loosed
	Power is not switched on	Check if power switch has been switched on Check power supply of motor and controller
	Voltage is too low	Wire diameter is too small-> Modify the wire. Voltage of power is too low-> Adjust to correct voltage.
System pressure is too low	Air consumption is much higher than the capacity of compressor	More air compressors are required
	Suction control valve malfunctions	Check and repair.
	Leakage in the system	Check the pipe and repair it.
	Air filter is too dirty	Change the air filter.
	Pressure setting value in the controller is too low	Check the setting value and pressure sensor.
	Unloading solenoid valve (N.O) is unable to close	Check if the solenoid valve has been energized,or the valve is stuck. Signal output from the controller also needs to be checked.
	Pipe is blocked or valve is not opened completely	Check pressure of each part of the air compressor.
Too much moisture in the system	Installation of drain pipe in the system is incorrect	Modify the incorrect arrangement of drain pipe
	Heat exchange efficiency of cooler is not good	Cooler is too dirty. Clean the cooler.
	No dryer installed or dryer is not working properly.	Install dryer or check the dryer.
Fluctuation of pressure is too large	Air consumption changes too much in a short time	Increase volume of the gas storage tank
	The pressure range between load and unload is too large	Revise setting value of the pressure.
Oil content in the air is too high.Oil	Leakage in lubricant system	Check if oil pipe and sealing part is leaking and fix them.

consumption is too much	Fine separator is blocked	Change fine separator.
	Fine separator is leaking	Check the fine separator.
	Oil return pipe is blocked	Check all elements in oil return pipe.
	Air compressor works under rated pressure	Decrease air consumption, or let the compressor operate at rated pressure.
Vibration and noise Level are too high	Abnormal transmission	Alignment between motor and air end is not good. Coupling is loose. Change new rubber ring.
	Bearings in air end are deteriorated	Change the bearing and find out the root cause of bearing deterioration.
	Bearings in the motor are deteriorated	Change the bearing and find out the root cause of bearing deterioration.
	Connection of certain parts are loose	Tighten the parts.
	Installation of compressor or piping is not good.	Strengthen the installation base or supporter. Check the connection of the piping.
	Compressor runs abnormall and shaft seal is damaged	Eliminate the factors casues loss of oil or high temperature running.
Relief valve actuated	Pressure setting in controller is not correct.	Reset the pressure value.
	Pressure sensor malfunctions	The real pressure is higher than the pressure detected by the sensor. Check or clean the pressure sensor.
	Controller malfunctions	Correct the I/O signal in controller.
	Relief valve malfunctions	Change a new relief valve.
Short service life of lubricant	Mix with other brand of lubricant	Remove the oil in the system completely and charge new oil.
	Old oil in the system is not removed completely in maintenance.	Remove the oil in the system completely and charge new oil.
	Compressor runs at high temperature	Find out the root cause of high temperature and adjust it too reasonable value.
	Compressor runs at low temperature	When runs below dew point, condensation water which deteriorates the oil will be generated.
	Class of oil is different	Use suitable oil.

9. Specification of Screw Air Compressor

Hanbell Precise Machinery Co., Ltd Air Compressor Technical Parameters						
Model			AE3-08A	AE3-11A	AE3-15A	AE3-18A
Compressor	Air Flow (m^3/min)	7kgf/cm^2	1.2	1.7	2.4	3.2
		8kgf/cm^2	1.1	1.6	2.2	3.0
		10kgf/cm^2	1.0	1.4	1.9	2.7
	Discharge Air Temp ℃		Ambient Temperature+15℃			
	Air Outlet Size (inch)		1”	1”	1 1/4"	1 1/4"
	Transmission Type		V-belt Drive			
	Lubrication volume (L)		9		14.5	
	Capacity Control		STEPLESS CAPACITY CONTROL			
	Highest Ambient Temp ℃		45℃			
Motor	Rated Output (kW)		7.5	11	15	18.5
	Terminal box		on the Top			
	Voltage (V)/Frequency(Hz)		220V/380V/440V/50Hz/60Hz			
	Type		TEFC			
	Starting		Y-Δ			
Cooler	Cooling Mode		Air Cooled			
	Fan Power (kW)		0.25	0.25	0.37	0.37
	Air Flow (m^3/min)		33	33	75	75
Safety Protection			Safety Valve, High Discharge Temperature and Pressure,Current Overload, Phrase Loss, Phase Reversal			
Maintenance Indication			Air filter, Oil filter, Fine Separator, Oil Change, V-belt Change			
Micro Controller			Digital Temperature/Pressure Indication Control, Auto Running/Stop Control, Timer Running/Stop Control, Master/Slave Interlock Control(Optional), Scalable Central Monitor(Optional)			
Compressor Net Weight (kg)			380	400	450	480
Outline Dimension	Length (mm)		800	800	895	895
	Width (mm)		950	950	1045	1045
	Height (mm)		1170	1170	1270	1270

Hanbell Precise Machinery Co., Ltd Air Compressor Technical Parameters						
Machine Model			AE3-22A	AE3-30A	AE3-37A	AE3-45A
Compressor	Air Flow (m^3/min)	7kgf/cm^2	3.8	5.0	6.4	7.5
		8kgf/cm^2	3.6	4.7	6.1	7.1
		10kgf/cm^2	3.2	4.3	5.4	6.4
	Discharge Air Temp ℃		environment degree +15℃(while ambient temp. lower than 30℃)			
	Air Outlet Size (inch)		1 1/4"	1 1/2"	1 1/2"	1 1/2"
	Transmission Type		V-belt Drive			
	Lubrication volume (L)		16	18		25
	Capacity Control		STEPLESS CAPACITY CONTROL			
	Highest Ambient Temp ℃		45℃			
Motor	Rated Output (KW)		22	30	37	45
	Terminal box		on the Top			
	Voltage (V)/Frequency(Hz)		220V/380V/440V/50Hz/60Hz			
	Type		TEFC			
	Starting		Y-Δ			
Cooler	Cooling Mode		Air Cooled			
	Fan Power (kW)		0.37	0.75	0.75	1.5
	Air Flow (m^3/min)		75	125	125	183
Safety Protection			Safety Valve, High Discharge Temperature and Pressure,Current Overload, Phrase Loss, Phase Reversal			
Maintenance Indication			Air filter, Oil filter, Fine Separator, Oil Change, V-belt Change			
Micro Controller			Digital Temperature/Pressure Indication Control, Auto Running/Stop Control, Timer Running/Stop Control, Master/Slave Interlock Control(Optional), Scalable Central Monitor(Optional)			
Compressor Net Weight (kg)			700	750	780	900
Dimensions	Length (mm)		1100	1100	1100	1200
	Width (mm)		1100	1100	1100	1150
	Height (mm)		1565	1565	1565	1565

Appendix 1: Maintenance Schedule

○Clean ◎Adjust、Check ●Replace

Item	Description	Day	Week	500 hours	1500 hours	3000 hours	6000 hours	12000 hours	18000 hours	30000 hours	Remark
				Month	Quarter	Half Year	Year	Every Two Years	Every Three Years	Every Five Years	
Light & signal on panel	Check if there is abnormal light or signal	◎									
Discharge temperature	Check (70~95℃)	◎									
Condensing water in air-oil tank	Drain	◎									
Oil level	Check	◎									
Transparent tube and core set	Check / Replace	◎					●				
Piping (Rubber / Metal)	Check / Replace	◎						●			
Air inlet tube	Check / Replace					◎		●			
Cooler	Clean		○						◎		
Cooling fan	Clean		○								
Air filter	Clean / Replace		○			◎	●				
Pre filter	Check / Clean		○								
Magnetic contactor	Check / Clean		○				◎		●		
Belt/pulley	Adjust / Replace						●				
Oil filter	Replace			New ●		●					
Motor	Add grease				◎						
Compressor Shaft Seal	Check / Replace					◎				●	
Lubrication 5201-AB01F	Add/ Replace oil						●				
Lubrication 5201-AC01F	Add/ Replace oil					●					
Fine separator	Replace					●					
Electric Insulation	Check all the phases and grounding						◎				
Pipeline Connector	Leakage test						◎				
Thermal control valve	Check / Replace						◎	●			
Suction control valve	Check / Clean / Replace						◎	●			
Minimum pressure valve	Check / Clean / Replace						◎	●			
Proportion valve	Check / Clean / Replace						◎	●			
Relief valve	Check / Clean / Replace						◎				
Unloading Solenoid valve	Check / Clean / Replace					◎		●			
Pressure sensor	Check / Replace						◎		●		
Temperature sensor	Check / Replace						◎		●		

Compressor bearing	Check / Replace							◎		●	

Remark: The suggested maintenance schedule should be modified according to environment and working conditions.

Attention!

(1) Service life of semi synthetic oil is 3000 hours or half and year (whichever comes first). Service life of synthetic oil is 6000 hours or a year (whichever comes first). The lubricant change schedule mentioned above is for normal running. If the compressor runs at high temperature, the service life of lubricant is half.

(2) When discharge pressure is above 10 bar, synthetic oil (5201-AB01F) is recommended. The lubricant service hour is 4000 hours.

(3) Under normal working condition(no dust, using Hanbell lubricant, environment temperature＜45℃), the oil filter, air filter could be used for 3000 hours. Fine separator could be used for 3000～6000 hours..

(4) Serivce life of oil filter, air filter, and fine separator would be only 60% of original schedule when compressor runs at harsh working environment without using Hnabell original lubricant.

(5) Hanbell is not responsible for the after service or maintenance and exempt from warranty if the compressor is used in harsh working condition without using original Hanbell lubricant