

空压机的常识.操作.故障说明

Common sense, operation, and fault description of air compressors

警告!

WARNING!

1、切勿在雨中、潮湿区域或靠近爆炸环境下使用压缩机。压缩机应在通风良好的区域内使用。
Never use the compressor in rainy, wet areas and environment near explosion . The compressor should be used in a well-ventilated area.

2、切勿直接吸入由此压缩机产生的压缩空气或气体。

Do not breathe compressed air or gas generated by the compressor directly .

3、检查电动机铭牌，确定电动机是否适合当地的供电条件（电压、相位、频率）。在进行任何维护或修理工作之前，一定要断开电源线。

Check the nameplate of the motor to know whether the motor is suitable for the local power supply conditions (voltage, phase and frequency). Be sure to disconnect the power cord before beginning any maintenance or repair work.

4、切勿使压缩机在可能有爆炸或易燃气体的任何区域内运行，在压缩机或储气罐的附近，严禁烟火，不得使用明火。

Do not operate the compressor in any areas may be explosive or include flammable gas.

Smoking and open flames are prohibited and not allowed near the compressor or gas storage tank.

5、切勿擅自改变储气罐的结构，这样会导致其强度减弱，从而造成其破裂或爆炸，并造成严重的人员伤亡。压力超过设计极限使用，会导致储气罐破裂或爆炸，造成严重的人员伤亡。不正确使用气体工具和附件，会导致爆炸，并造成严重的人员伤亡。

储气罐必须安装安全阀，以防止过压工作。切勿对安全阀进行拆卸、调节。定期拉动安全阀的拉环，以确保其自由动作，如果阀门卡涩或不能自由动作，则必须予以更换。

Do not change the structure of the air tank without authorization, which will weaken its strength, causing the tank rupture or explode and leading severe casualties . When the pressure exceeds the designed limit, the air tank will rupture or explode possibly , causing possible serious casualties. Incorrect use of gas tools and accessories maybe will lead to explosion and serious casualties .

Safety valve must be assembled onto the air tank to prevent it over-pressure operation and use .

Do not disassemble or adjust the safety valve easily . Pull the pull ring of the safety valve regularly to ensure it Free operation. If the valve is jammed or cannot operate freely, it must be replaced immediately .

6、切勿试图对压力开关进行调节、拆卸或加装旁路；或者对任何压力开关控制的有关装置进

行改变。每天或每次使用前应排放掉储气罐内的冷凝水。

Do not try to adjust, disassemble or add bypass to the pressure switch; or change to related device of any pressure switch control . Drain the condensed water from the air tank every day or before operation.

7、切勿将空气喷嘴或空气喷射器指向身体的任何部分或指向其他人员。旋转的压缩机会带动污物、砂子、金属屑等，并造成严重的人身伤害。

Do not point the air nozzle or air ejector at any part of the body or at other people. The rotary compressor maybe involves dirt, sand, metal scrap, etc., and cause serious personal injury possibly .

8、在进行任何维护或修理工作之前，一定要确保压缩机、储气罐和空气附件内的压力均已释放掉。当风扇防护罩已拆下、已受损或破裂时，切勿操作压缩机。

Before carrying out any maintenance or repair work, please make sure that the pressure in the compressor, air storage tank and air accessories has been released. Do not operate the compressor when the wind fan protection guard is removed, damaged or cracked.

9、压缩机运转时会发烫。如果触及，会造成严重烫伤。当压缩机运转或压缩机停机不久时，切勿触及压缩机、电机或其管道。

The compressor will become hot when it is running. If touched, it will scald somebody . When the compressor is running or the compressor is shut down soon, do not touch the compressor, motor or its pipes.

操作 OPERATION

操作检查

OPERATING CHECKS

任何机械设备要进行正常操作很大程度上取决于是否遵守预防性维护计划。

Satisfactory operation of any piece of mechanical equipment depends, to a large degree, upon adherence to a preventive maintenance schedule.

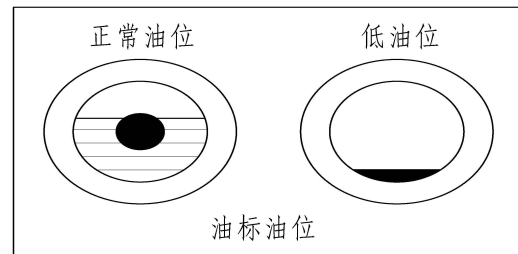
要以最低的成本获得最佳设备性能，则应遵守本说明书上的“维护保养”指南。

To obtain the best equipment performance at the lowest cost, follow the "Maintenance" guidelines in this manual.

压缩机润滑

COMPRESSOR LUBRICATION

在每次使用设备前，拧下加油塞并检查压缩机的油位情况，直到接触到螺纹为止（只要螺纹搭牙），如图不要加得太满。拧好油塞。仅用手拧紧。



Before each use of the equipment, unscrew the filler plug and check the compressor. The oil level of the oil tank should not be too full as shown in the figure until it comes into contact with the thread (as long as the thread is overlapped). Screw on the oil plug. Tighten by hand only.

润滑油更换

Lubricating oil change

切断电源，打开储气罐排污阀释放罐内压力，旋下放油塞，排放曲轴箱内的润滑油。经过操作人员观察若干次换油情况，如果得到了保证，则换油的时间间隔可以延长。曲轴箱油容量如下：1230—2.4-2.8kg; 1530—4.0-4.4kg。

Cut off the power supply, open the drain valve of the air storage tank to release the pressure in the tank, unscrew the oil plug and drain the lubricating oil in the crankcase. After the operator observes the oil change several times, if the guarantee is obtained, the oil change interval can be prolonged. The crankcase oil capacity is as follows: 1230-2.4-2.8kg; 1530—4.0-4.4kg。

润滑油使用建议

LUBRICATING OIL RECOMMENDATIONS

用户使用中高压空压机专用润滑油，具体情况及要求请您与最近的公司经销商联系。

Requires users to use the special lubricating oil for medium and high pressure air compressors provided by LONES company. Please contact the nearest distributor for details and requirements.

电机润滑和维护

MOTOR LUBRICATION & CARE

应每月用压缩空气吹电机的绕组，以防止聚积灰尘。

The windings of the motor shall be blown with compressed air monthly to prevent dust accumulation.

如果电动机的安装位置暴露在大量水、油、灰尘或者烟雾的场合，则电动机必须采取特殊的结构措施。

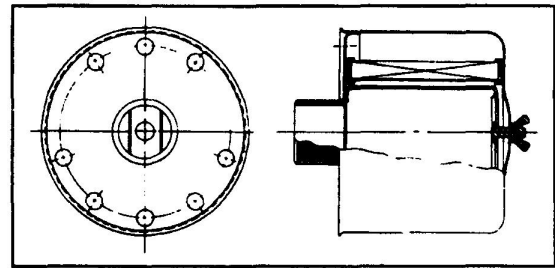
If the installation position of the motor is exposed to a large amount of water, oil, dust or smoke, the motor must take special structural measures.

空气进气滤清器 / 消音器

AIR INLET FILTER/SILENCER

空气进气滤清器 / 消音器应始终保持干净状态。

一个不干净的进气滤清器会降低压缩机的性能。滤芯应选用提供的专用滤芯，压缩机每工作 300 小时，滤芯应取出一次，用压缩空气吹理一下，保持干净状态。



The air intake filter/silencer should always be kept clean. An unclean air inlet filter will reduce the performance of the compressor. Filter element The special filter element shall be selected, and the compressor shall work at 300 per hour. Hours, filter should be taken out once, with compressed air blowing, keep Clean state

标准的空气进气滤清器适合通常的工业用场合。如果压缩机所用场合空气中含有大量灰尘，则必须使用专门设计的空气滤清器。

Standard air intake filters are suitable for common industrial applications. If there is a large amount of dust in the air when the compressor is used, a specially designed air filter must be used.

中间冷却器

AIRCOOLED INTERCOOLER

压缩机空气流入中间冷却器后进行散热冷却，被冷却过的空气进入下一级压缩。管道不可形成堵塞，如发现灰尘或者油脂存在于这些管道内外表面时应使用阻燃安全溶剂进行清洗。在正常的修理过程中，应把管子外表面的灰尘、油脂用清洗剂清洗。如果管道内部需要清洗，则应把管子从其接头上拆下，一头盖住，加阻燃安全溶剂帮助清除内部积存的油、污垢和结碳，然后用温水冲洗管道，彻底烘干后重新安装。

Compressor air flows into the intercooler for heat dissipation and cooling, and the cooled air enters the next stage of compression. Pipes shall not be blocked. If dust or grease is found on the inner and outer surfaces of these pipes, flame retardant and safe solvent shall be used for cleaning. In the normal repair process, the dust and grease on the outer surface of the pipe should be cleaned with cleaning agent. If the inside of the pipe needs cleaning, the pipe should be removed from its joint, covered at one end, and added with flame retardant safety solvent to help remove oil, dirt and carbon accumulated inside, then the pipe should be washed with warm water, dried thoroughly and reinstalled.

后冷却器

AIR-COOLED AFTERCOOLERS

1230、1530 和 1040、2030 压缩机都配备有一个带有翅片管的后冷却器。后冷却器的功能是冷却压缩空气，并将冷却后的压缩空气存储在储气罐内。

The 1230, FH1530 and 1040, 2030 compressors are all equipped with an after cooler with finned tubes. The function of the after cooler is to cool the compressed air and store the cooled compressed air in the air storage tank.

要保持后冷却器管道和翅片无灰尘和污垢。后冷却器冷凝水排放管应根据需要经常进行排放，以防止冷凝水进入压缩机。

Keep the after cooler pipes and fins free of dust and dirt. The condensate drain pipe of the aftercooler shall be drained as often as necessary to prevent condensate from entering the compressor.

安全阀

SAFETY VALVE

每个冷却器中都装有安全阀。如果冷却器安全阀发生喷气，并且连续喷气一分钟以上，则压缩机应立即停止工作。这说明下一级压缩过程气阀出现故障或密封垫损坏。

A safety valve is provided in each inter cooler. If an inter cooler safety valve blows, and continues to blow for more than a minute, the compressor should be stopped at once. It indicates a leaky, broken or carbonized discharge valve in the next higher pressure cylinder.

排气安全阀在所有型号上均作为标准件进行配置。安全阀参见下表：

A discharge safety valve is furnished as standard equipment on all models. See safety valve chart below:

型 号 Model	排气压力 Discharge Pressure	一级中间冷却器 (Mpa) 1st Stage Intercooler
1230	3. 0MPa	0. 8MPa
1530	3. 0MPa	0. 8MPa
1040	4. 0MPa	0. 8MPa
2030	3. 0MPa	0. 8MPa

启动卸载系统

STARTING UNLOADING SYSTEM

启动卸载系统:此系统的目的是在压缩机停止工作时释放机器级间压力，然后在轻载情况下进行启动，增强了驱动装置和延长了皮带的使用寿命，降低过载继电器跳闸的可能性。系统按以下方法进行的操作：

OPERATION OF STARTING

UNLOADING SYSTEM – The purpose of

the system is to relieve cylinder pressure when the compressor stops permitting it to start against a light load, increasing the life of the driver and belts and also reducing the possibility of tripping the overload relay.

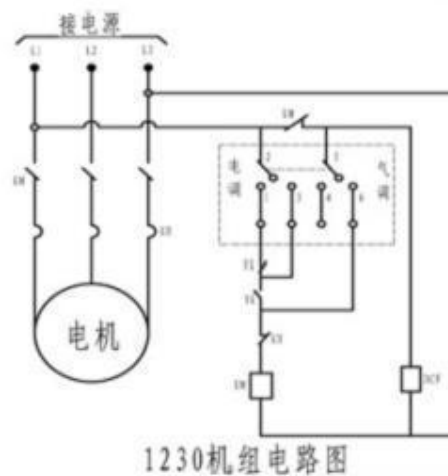
The system operates in the following manner:

一. 压缩机正常运行时, 电磁阀处于常闭状态, 当压缩机工作至设定压力停机时, 压控自动控制电磁阀打开, 释放机器管路压力, 便于压缩机在轻载情况下启动运行。

When the compressor is in normal operation, the solenoid valve is in a normally closed state. when the compressor is stopped at the set pressure, the pressure-controlled automatic control solenoid valve is opened to release the pressure of the machine pipeline so as to facilitate the compressor to start operation under light load.

二. 如线路电压偏低, 启动困难, 用气大启动过 (每小时启动 6 次以上) 可选用气调方式。使压缩机连续空载, 电磁阀运行自动排空管路压力。(如图所示)

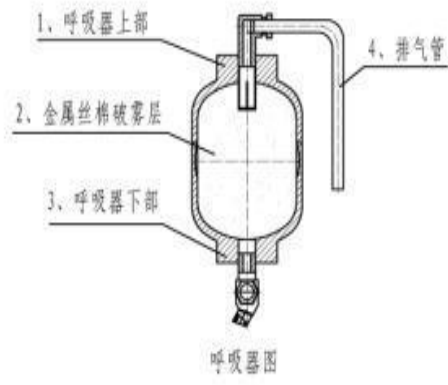
If the line voltage is low and it is difficult to start, the modified atmosphere method can be used if the gas is used for large start-up (starting more than 6 times per hour). The compressor is continuously unloaded, and the solenoid valve automatically empties the pipeline pressure. (as shown)



呼吸器管 BREATHER TUBE

呼吸器是把压缩机在工作时把曲轴箱内、活塞往复运动, 压缩过程中泄漏所产生的内压, 释放到大气中。为保证呼吸器正常工作, 应定期将呼吸器中的的金属滤网取出, 用温性洗涤剂清洗。去除油污, 必要时更换新的滤网。

The breather tube connects the interior of the frame to the inboard side of the inlet filter/silencer. This connection permits pulsations, created by the reciprocating action of the pistons, to be vented to atmosphere, thus preventing any pressure build up within the frame.



故障检查说明
TROUBLE GUIDE

故障现象 TROUBLE	检查说明对照表 CHECK POINT NUMBERS
泵油 Oil Pumping	1-6-8-10-17-21-22
敲缸，发出卡嗒声 Knocks or rattles	4-18-20-22-23-24
排气量减少 Air delivery has dropped off	1-5-17-18-19-21-22-32-16
安全阀突然爆开 Safety valve pops	18-19-20-29
电机过载跳闸，或者电流过大 Trips motor overload or draws excessive current	7-13-14-15-18-22-23-25-26
曲轴箱中有水或气缸生锈 Water in frame or rusting in cylinders	2-10-11-16-19
频繁启动和停止 Excessive starting and stopping (Auto Start and Stop Models)	2-5-12
压缩机停止时无法卸载 Compressor doesn't unload when stopped	18-19-31-30
冷凝水不会自动排放 Condensate drain trap will not drain automatically	18-19-31-32-30-19-16
压缩机运行过热 Compressor overheating	3-9-18-27
压缩机未达到额定转速 Compressor won't come up to speed	13-15-26
压缩机运行时有轻微颤动 There is slight vibration when the compressor is running.	13-14-26-33
活塞、环或者气缸磨损 Abnormal piston, ring of cylinder wear	6-7-9-10-28
排水阀失灵或泄漏 Air and/or condensate leaking from automatic drain valve	30-31-19-16
运行时噪声很大 Unit very noisy when operated	4-18-19

故障原因对照表

CHECK POINT NUMBERS/TROUBLE CAUSE

1. 进气滤清器堵塞。
Clogged Intake Filter.
2. 单向阀泄漏。
Leaking Check Valve.
3. 通风条件是否良好。
Air to fan blocked off fan shroud not in place.
4. 风扇轮、皮带轮松动，或者电机轴向间隙过大。
Loose beltwheel, motor pulley, or motor with excessive end play in shaft.
5. 机器或者机外系统管路泄漏。
Air leak in piping on machine or in outside system.
6. 油粘度太低。
Oil viscosity too low.
7. 油粘度太高。
Oil viscosity too high.
8. 油位太高。
Oil level too high.
9. 油位太低。
Oil level too low.
10. 油牌号不对。
The oil grade is wrong.
11. 位于潮湿位置。
Extremely light duty of located in a damp humid spot.
12. 重新调整压力开关设定值（增加差值）。
Readjust pressure switch setting. (Increase differential)
13. 检查线路电压，电动机端子接触是否良好，起动机连接是否拧紧，起动机加热器是否正确。
Check line voltage, motor terminals for good contact, tight starter connections, proper starter heaters.
14. 线路不平衡并咨询电力公司。
Poor power regulation (unbalanced line).Consult power company.
15. 皮带过紧或过松。
V-Belt pulled excessively tight.
16. 冷凝水电磁阀定时器故障。
Condensate solenoid valve timer failure.
17. 进气电磁阀故障。
Defective inlet solenoid valve.
18. 阀门泄漏、断裂、碳化或者松动，空气通道受到限制。
Leaking, broken, carbonized or loose valves, or restricted air passages.
19. 冷凝水排放阀故障。
Automatic condensate drain valve defective.
20. 活塞顶端积碳。
Carbon on top of piston.
21. 活塞环断裂、卡在槽中，粗糙、擦伤，或者间隙过大（0.55mm 环搭扣处）或者侧向偏差 0.16mm。
Piston rings broken or not sealed in, end gaps not staggered, stuck in grooves, rough, scratched, of excessive end gap (over.020" worn)(.508 mm) or side clearance (over .006%)(.152mm).

22. 气缸或者活塞擦伤、磨损或者刮伤。
Cylinder of pistons scratched, worn or scored.
23. 连杆、活塞、活塞销、或者连杆轴承磨损或者刮伤。
Worn or scored connecting rod, piston, piston pin of crankpin bearings.
24. 曲轴或者电机轴上的球轴承故障。
Defective ball bearing on crankshaft or on motor shaft.
25. 转速太高。用转速计进行检查，正确的转速参见电机铭牌。
R.P.M. too high. Check with tachometer and refer to motor nameplate for correct r.p.m.
26. 电压太低。有电压表进行检查，正确的电压参见电机铭牌。
Voltage too low. Check with voltmeter and refer to motor nameplate for correct voltage.
27. 旋转方向不正确。
Wrong direction of rotation.
28. 使用环境太脏。需更换滤芯。
Extremely dusty atmosphere. Need more effective air inlet muffler and cleaner.
29. 安全阀故障。
Defective safety valve.
30. 排水阀中活塞卡住。
Actuating piston in automatic drain valve sticking.
31. 排水阀活塞“O”型圈进行润滑。
Lubricate automatic drain valve piston o-ring.
32. 起动放空电磁阀故障。
Start the vent solenoid valve failure.
33. 基础是否坚固，底脚要求水平。
Whether the foundation is firm or not, the footing should be level.

维修保养

MAINTENANCE

维修保养 MAINTENANCE OPERATION		保养间隔 SERVICE INTERVAL				
		操作小时/月（二者取其先） Operating Hours/Months - Whichever comes first				
		500/3	1000/8	1500/9	2000/12	2500/15
COMPRESSOR						
压缩机	曲轴箱油位-检查 Frame Oil Level – Check	每天 Daily				
	空气进气滤清器-检查和清洗 Air inlet Filter – inspect and Clean	每月(灰尘多的环境每周) Monthly (weekly in Dusty Locations)				
	检查油是否变质-如果需要更换 Inspect Oil for Contamination – Change if necessary	每月 Monthly				
	曲轴箱油-更换 Frame Oil – Change Petroleum Lube	√		√		√

	自动排水阀活塞“O”型圈-润滑 Automatic Drain Valve Piston	√	√	√	√	√
	压缩机气阀-检查, 清洗或者更换 Compressor Valves – inspect , Clean or Replace				√	
	中间冷却器清洁外部 Intercooler clean Exterior	每月 Monthly				
	低油位开关-检查操作情况 Low Oil Level Switch – Check Operation	√	√	√	√	√
	操作安全阀-手动 Operate Safety Valves – Manually	每月 Monthly				
	清洗气缸冷却翅片 Clean Cylinder Cooling Fins	每月 Monthly				
RESPIRATOR						
呼吸器	清洗滤网 Cleaning filter screen	每月 Monthly				
V – BELT DRIVE						
皮带	皮带张紧情况-检查 Belt Tension - Check	每月 Monthly				
MOTOR						
电动机	电机轴承-检查和润滑 Motor Bearings – Check and Lubricate				√	
	清洁 Clean	每月- (灰尘多的环境每周) Monthly – (Weekly in Dusty locations)				
AFTERCOOLER						
后冷却器	空气冷却: 外部清洁 Aircooled :Clean externally	每月- (灰尘多的环境每周) Monthly – (Weekly in Dusty locations)				
	内部清洁 Clean air flow internally				√	
RECEIVER						
储气罐	排放冷凝水-手动 Drain Condensate – Manual	每天 Daily				
	操作安全阀 Operate safety Valves	每月 Monthly				
GENERAL						
其它	拧紧或者检查所有的螺栓(重新拧紧) Tighten or check all bolts (retorque)	每月 Monthly				
	检查异常噪声和震动 Check for Unusual Noise and Vibration	每天 Daily				
	检查空气泄漏情况 Inspect for Air Leaks	每月 Monthly				

概述

SUMMARIZE

我们认为具有一般的机械操作经验的人员在不需要详细指导的情况下则可以进行较为普通的维修保养。

We believe that personnel with general mechanical operation experience can carry out more general maintenance without detailed guidance.

气阀清洗

Air VALVE CLEANING

要拆卸和清洁环状阀（如图所示），应按照以下步骤进行：

To remove and clean the ring valve (as shown in the figure), follow the following steps:

1. 如果气缸盖带卸载装置，则要拆下卸载装置的管道，拆下卸载装置的螺栓，从气缸盖上拆下卸载装置。（新机型选用更先进的电气卸载系统）

If the air heads are equipped with unloaders, disconnect the tubing to the unloaders, remove the unloader cap screws and lift the unloaders off the air head.

2. 松开气阀螺母，然后，拆下气缸盖螺栓，并从气缸上拆下气缸盖。

Loosen the valve acorn nuts, then take out the air head cap screws and remove the air head from the cylinder.

3. 为了方便阀拆卸，在阀座两个带螺纹口中旋入两个螺栓。在台钳上夹紧螺栓，拆下锁紧螺母和六角螺母。注意气阀部件安装和更换方法顺序和位置与拆卸相同。

The valve itself may now be disassembled. To facilitate the valve disassembly, screw two bolts part way into the tow threaded ports located in the valve seat. Clamp these bolts firmly in a vise and

4. 阀件要轻轻刮或者用鬃刷（不要用钢丝刷）清洁阀片。如果需要，使用阻燃安全溶剂来清除污垢、油污或者积碳。

The valve parts may be cleaned by light scraping or stiff bushing (do not use a wire brush.) If necessary, use a non-flammable safety solvent to loosen dirt, oil or carbon deposits.

5. 以正确的顺序和位置重新安装阀件。应确保阀片、弹簧片正确位于阀座的中心位置；否则，阀在气缸盖中拉紧时会损坏。重新放好阀螺栓上的螺母和垫圈。按照以下力矩拧紧气阀螺母：

remove the locknut and hex nut .Note the manner in which the valve parts are assembled and replace them in the same order and position.

- 拆装阀部件时要小心。不要产生刻痕、划伤或者弯曲阀部件的现象。

NOTE: Handle the valve parts with care. Do not nick, scratch or bend them.



高压阀件 — (88Nm) 低压阀件 — (149Nm)

Reassemble the valve parts in their proper sequence and position. Make absolutely certain that the stop-plate is centered properly on its guide; otherwise, the valve will be damaged when it is pulled up tight in the air head. Replace the valve hex nut and washer on the valve bolt. Tighten the valve hex nuts to the following torque:

High pressure valve assembly – 65 ft.lbs.

(88 Nm.) dry torque

Low pressure valve assembly – 110 ft.lbs.

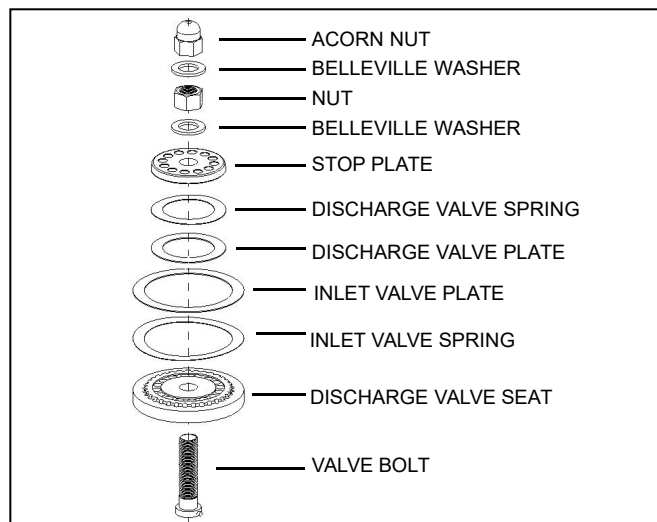
(149 Nm.) dry torque

6. 在重新安装气阀前，刮去气阀螺栓垫圈上旧的密封胶并上新密封胶，以防止空气泄漏，并按照推荐的气阀拧紧力矩拧紧。螺母不要拧的太紧，因为这会使得弹簧和阀板变形，引起气阀泄漏。气阀在气缸盖中重新安装后，应检查阀片能否上下运动，确保气阀能正常工作。

Before replacing the valve in the air head, scrape the old shellac off the valve bolt steel washer and coat it with new shellac to prevent air from leaking under the washer. Replace the acorn nut and tighten it to the lower limit of the torque valve, recommended below. Do not over tighten this nut, since this will distort the springs and plates, causing the valve to leak. After the valve has been replaced in the air head, make certain that the valve operates freely by lifting at its edges with a knife blade.

7. 重新安装气缸盖垫片，气缸盖。根据推荐的拧紧力矩来拧紧气缸盖螺栓，如果带卸载装置则重新安装此装置。

Replace the air head gasket on the cylinder; Then replace the air head. Tighten the airhead cap screws to the torque recommended below and replace the unloader if the unit is so equipped.



Concentric Ring-Type Valve

皮带安装和调整

BELT INSTALLATION AND ADJUSTMENT

当安装新皮带时，不要把皮带撬到皮带轮槽上。拆下安装新皮带的正确方法是松开固定螺栓和皮带拉紧螺钉。（见图 A），将电动机向压缩机方向移动。使用皮带拉紧螺钉来调整新皮带的张紧度。

When installing new belts, do not pry the belts over the pulley grooves. The proper method of removing an installing new belts is to loosen the anchor screws and the belt tightener screw, Figure A, and push the motor toward the compressor. Use the tightener screw to adjust belt tension on new belts.

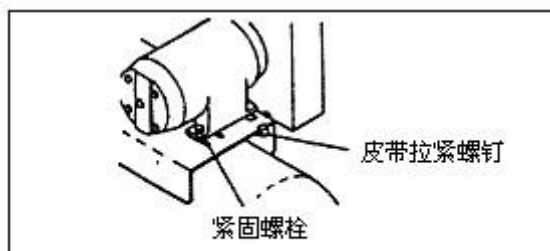


图 A

皮带调整 Belt Adjustments.

皮带应正确进行调整。皮带如果太松，则皮带会脱落，造成发热和磨损；如果皮带太紧，可能会造成轴承受到过大负载力。一种快速检查以确定皮带调整是否正确的方法，就是观察皮带的松弛情况，皮带应成轻微弓形。（见图 B）。如果有轻微弓形，则说明皮带调整符合要求。It is important that the belts be property adjusted. A belt that is too loose will slip and cause heating and wear, and a belt that is too tight may overload the bearings. A quick check to determine if belt adjustment is proper may be made by observing the slack side of the belt for a slight bow when the unit is in operation. See Figure B. If a slight bow is evident, belts are usually adjusted satisfactorily. However, the recommended method of checking belt tension is by the more accurate spring scale measurement method that follows:

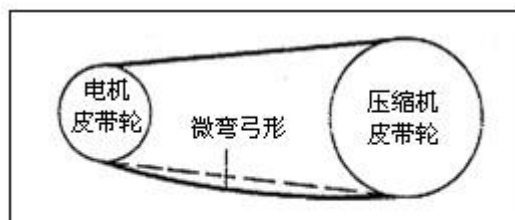


图 B 目测法

Visual Method.

但是，检查皮带张紧度，我们建议使用精度较高的弹簧尺测量，方法如下：

However, in order to check the belt tension, we suggest to use a spring ruler with higher accuracy to measure it.

The method is as follows:

A. 如图 C 所示，测量皮带跨距（t）。

Measure the belt span (t) ad shown in Figure C.

B. 在跨距（t）中心，施加一个力。此施加到弹簧尺上的力应足以使皮带每 25.4mm 跨距长度（t）

下垂 0.4mm。 例如： 2540mm 跨距其下垂度为 40mm。

At the center of span (t), apply a force (perpendicular to the span ,by attaching a spring scale to the two

outside belts. The force applied to the spring scale should be sufficient to deflect the belts 1/64" (.396mm) for every inch of span length (t). For example: The deflection of 100" (2540mm) span would be 100/64" or 1 9/16"(39.6mm), thus, the force applied to the spring scale should deflect the belts to 1 9/16"(39.6mm).

C. 当皮带下垂相应距离，将弹簧尺读数（以 kg）

为单位的力与下表中的数值比较。

When the belts are deflected the necessary distance, compare the spring scale reading (in lbs. force) with the value given in the following table.

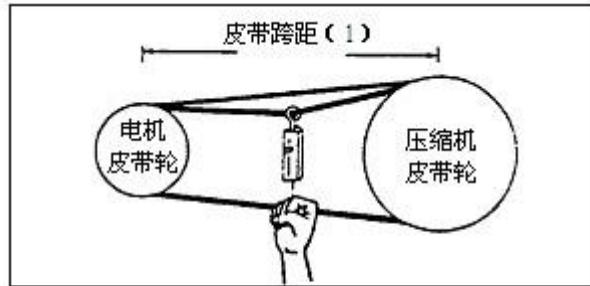


图 C 弹簧称测量法

Spring Scale Method.

标准皮带张紧度

STANDARD BELT TENSION

皮带类型 Belt Type	正常张紧度 Normal Tension	105%张紧度 105%Normal Tension
A	0.57kg 1 1/4 lbs.(.565 kg)	0.85kg 1 1/8 lbs.(.85 kg)
B	1.25kg 2 3/4 lbs.(1.25 kg)	1.8kg 4 lbs.(1.81 kg)
C	2.5kg 5 1/2 lbs.(2.5 kg)	3.74kg 8 1/4 lbs.(3.74 kg)

如果读数在正常数值和 105%数值之间，则说明皮带张紧度为符合要求。如读数低于正常张紧度数值，则皮带的松弛，相反，如果读数超过正常张紧度 105%，则皮带过紧。经验显示新的三角皮带其初次张紧度可以为正常张紧度的两倍，这样使得在运行中皮带张紧度有所下垂以得到补偿。

If the reading is between the value for normal tension and 150% normal tension, the belt tension should be satisfactory. A reading below the value for normal tension indicated the belt slack should be reduced, and conversely, a reading exceeding the value for 150% normal tension indicated the belt slack should be increased. Experienced has shown that a new drive can be tightened initially to two times normal tension to allow for any

drop in tension during run in.

力矩数值表

TORQUE VALUE TABLE

国家标准 直径距离	等级 2	等级 5	等级 8
M6	5 Nm.	8 Nm.	12 Nm.
M8	11 Nm.	16 Nm.	24 Nm.
M10	20 Nm.	31 Nm.	42 Nm.
M12	50 Nm.	76 Nm.	108 Nm.
M14	72 Nm.	110 Nm.	157 Nm.
M16	92 Nm.	153 Nm.	217 Nm.
M18	177 Nm.	275 Nm.	388 Nm.

NATIONAL COARSE	GRADE 2		GRADE 5		GRADE 6	
Dia. Pitch						
1/4"---20	48In. Lb.	5Nm.	72In. Lb.	8Nm.	108In. Lb.	12Nm.
5/16"—18	96In. Lb.	11Nm.	144In. Lb.	16Nm.	18In. Lb.	24Nm.
3/8"---16	15Ft. Lb.	20Nm.	23Ft. Lb.	31Nm.	31Ft. Lb.	42Nm.
7/16"---14	24Ft. Lb.	33Nm.	36Ft. Lb.	49Nm.	51Ft. Lb.	69Nm.
1.2"---13	37Ft. Lb.	50Nm.	56Ft. Lb.	76Nm.	80Ft. Lb.	108Nm.
9/16"---12	53Ft. Lb.	72Nm.	81Ft. Lb.	110Nm.	116Ft. Lb.	157Nm.
5/8"---11	69Ft. Lb.	92Nm.	113Ft. Lb.	153Nm.	160Ft. Lb.	217Nm.
3/4"---10	131Ft. Lb.	177Nm.	203Ft. Lb.	275Nm.	286Ft. Lb.	388Nm.

我们建议拧紧所有的螺栓和平头螺丝使用扭力扳手，螺母使用上表中的数值。给出的数值适用于油脂润滑的螺纹。

We recommend to tighten all bolts and flat head screws with torque wrench and nuts with the values in the above table. The values given are applicable to grease lubricated threads.

长期停机的保护措施

Protection Measures for Long-term Shutdown

每当机组长期不工作时，必须采取某些保护措施来防止机组锈蚀。

Whenever the unit does not work for a long time, some protective measures must be taken to prevent the unit from rusting.

A 将曲轴箱内润滑油放掉，并重新注入防锈油，防止机组的所有内表面生锈。此时机组应运行 10 分钟，使油雾化，从而复盖所有的内表面。让防锈油留在曲轴箱中。

- Drain the lubricating oil from the crankcase and inject antirust oil again to prevent all inner surfaces of the unit from rusting. At this time, the unit should run for 10 minutes to atomize the oil, thus covering all inner surfaces. Leave the antirust oil in the crankcase.
- 将机组重新投入使用时，应用常规的润滑油代替防锈油。
- When the unit is put into use again, conventional lubricating oil shall be used instead of antirust oil.
- B 在上述操作后，将所有与大气相通的孔用胶带封闭，以防潮气进入机组。
- After the above operation, seal all the holes communicating with the atmosphere with adhesive tape to prevent moisture from entering the unit.
- C 将储气罐中冷凝水放出，并将机组存放在干燥避风雨的地方。
- Drain the condensed water from the air tank and store the unit in a dry and weatherproof place.
- D 遵守电机制造商有关电动机存放的说明。
- Observe the instructions of the motor manufacturer regarding the storage of the motor.

选配设备和附件

OPTIONAL EQUIPMENT AND ACCESSORIES

单向阀

CHECK VALVE

单向阀由于结构的特点故不可进行调整。有泄漏故障的阀有时可以通过拆开，清洁其阀座表面来消除故障。如果清洁无法消除泄漏或无法拆开单向阀，则应更换。

The check valve is not adjustable. Leak valves can sometimes be corrected by disassembling the valve and cleaning the seating surface. If cleaning does not stop the leaking, the valve should be replaced.

自动冷凝水排放阀

AUTOMATIC CONDENSATE DRAIN VALVE

一般讲，此阀不需要维修。但是，如果发现阀存在空气或冷凝水泄漏（通过压缩机加载运行时排放管路流量来确定），则说明阀活塞“O”型圈（参见图 7-1）可能有故障，或者排放阀体上的活塞密封表面可能划伤或者拉伤。

- Normally, this valve should require no maintenance. However, if there is evidence of air or condensate leakage through the valve (determined by flow from the drain lines while the compressor is operating loaded), the valve piston ,O-rings (See Figure 7-1) may be defective, or the piston sealing surfaces on the drain valve body may be scratched or wire drawn.

要拆卸阀，请参见 7-1，具体步骤如下：

- To disassemble the valve, refer to Figure 7-1 and proceed as follows:
1. 断开自动排水阀的电气接线和管路。
- Disconnect the electrical wiring and tubing to the automatic condensate drain valve.

2. 从压缩机排放支管拆下自动凝水排放阀。注意： 为了使得重新安装阀门方便，应对阀按拆卸的顺序进行编号。

- Remove the automatic condensate drain valve from the compressor drain leg, and take to a suitable work area.

NOTE: TO MAKE RE-ASSEMBLY OF THE VALVE EASIER CAREFULLY MARK THE DIRECTION OF DISSEMBLY.

3. 拆下把排放阀阀体和活塞气缸连接在一起的螺栓。小心地把它们分开，推出操纵活塞。

- Remove the cap screws holding the drain valve body and piston cylinder together. Carefully separate the pieces, and push out the actuating piston.

4. 小心检查活塞和活塞缸密封表面。如果密封表面存在划伤或者轻度划痕，抛光表面可能解决此问题。如果划伤或者划痕较严重，则凝水排放阀必须更换。

- Carefully inspect the sealing surfaces of the piston and piston cylinder. If scratches or slight scoring of the sealing surfaces are present, hand lapping of these surfaces may correct the situation. If the scratches or scoring are excessive, the condensate drain valve must be replaced. NOTE: IF THE CONDENSATE DRAIN VALVE LEAKS CONTINUOUSLY, THIS MAY BE REMEDIED BY MERELY INVERTING THE VALVE SEAT. IF THE VALVE SEAT HAS BEEN INVERTED DURING A PREVIOUS OVERHAUL, THE SEAT MUST BE REPLACED.

5. 阀安装步骤与拆卸正好相反。注意：活塞外圈处涂润滑脂。

- Re-assemble the valve by reversing the Dis-assembly procedures.

6. 重新把排放阀安装到压缩机的排放支管上，重新连接所有管路和电气接线。

- Reinstall the condensate drain valve to the compressor drain leg, and reconnect all tubing and electrical wiring.

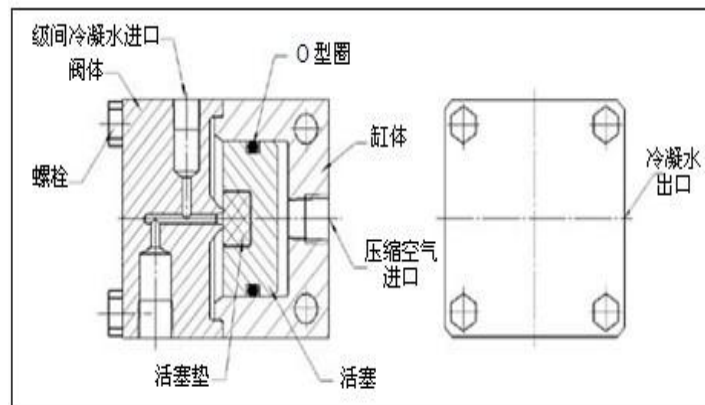


图 7-1 自动排水阀

定时自动冷凝水排放系统

TIMED AUTOMATIC CONDENSATE DRAIN SYSTEM

中高压空气压缩机配有一个定时自动冷凝水排放系统。此系统由一个双设定定时器定时发出电信号来控制电磁阀，此电磁阀通过打开和关闭排水阀压力源，从而实现排水阀定时自动排放冷凝水。

- Medium and high pressure air compressor is equipped with a timing automatic condensate discharge system. In this system, a double-set timer sends out electric signals regularly to control the electromagnetic valve, which opens and closes the pressure source of the drain valve, thus realizing the drain valve to automatically drain condensed water regularly.

压缩机装有起动、卸载和冷凝水排放系统。这一系统的用途是每当压缩机起动停机时，释放中间冷却器、后冷却器的压力并将冷凝水从凝水管中排出。

- The compressor is equipped with starting, unloading and condensate drain systems. The purpose of this system is to release the pressure of the intercooler and aftercooler and drain the condensed water from the condensate pipe whenever the compressor starts and stops.

释放中间冷却器、后冷却器的压力，可以在轻载的情况下起动，这样就可提高压缩机、电动机、皮带的使用寿命，还能减少过载继电器跳闸的可能性。

- Releasing the pressure of the intercooler and the aftercooler can start under light load, thus prolonging the service life of the compressor, the motor and the belt and reducing the possibility of tripping the overload relay.

储气罐（选配件）

HIGH PRESSURE Air RECEIVER

如果压缩机排气的空气系统没有足够的容积，则压缩机会过于频繁起停。这样会对压缩机、电动机及电器设备造成损坏，在这种情况下，则必须使用储气罐来提供足够量的空气来运行压缩机调节装置。如需订购储气罐，请和公司当地经销商联系。

- If the air system exhausted by the compressor does not have sufficient volume, the compressor will start and stop too frequently. This will cause damage to the compressor, motor and electrical equipment. In this case, the air storage tank must be used to provide enough air to operate the compressor regulator. If you need to order a gas tank, please contact your local distributor.

控制箱操作说明

SECTION VIII OPERATING INSTRUCTIONS FOR CONTROL BOXES

电源 Power supply: AC 380-415V 3PH 50-60HZ

控制电压 Control voltage: AC 220-230V

压力信号 Pressure signal: PS 压力开关。

功率 Power: 7.5KW(10HP)-22KW(30HP)

一. 特点 Characteristics

1. 星三角启动 (11KW 以下含 11KW 为直接启动器, 15KW 有两种启动方式供选)。
 - Star triangle startup (below 11KW, 11KW is the direct starter, and 15KW has two startup modes to choose from).
2. 当电机启动时电磁阀排空管道内压缩空气, 达到卸载启动的功能。
 - When the motor is started, the electromagnetic valve empties compressed air in the pipeline to achieve the function of unloading and starting.
3. 具有电机过载热继电器保护停机功能。
 - With motor overload thermal relay protection shutdown function.
4. 具有低油位保护功能。当油位过低时停机保护。(选项)
 - It has low oil level protection function. Stop protection when oil level is too low. (Options)
5. 具有定时排空管道内冷凝水的功能。由双设定时间继电器设定排空时间及间隔时间。(选项)
 - It has the function of regularly emptying condensed water in the pipeline. The emptying time and interval time are set by the double set time relay. (Options)

出厂状态:

Factory condition

压力开关 PS (按订单要求) Pressure switch PS (as per order)	停机压力值/压差值出厂已设定好。 The shutdown pressure value/pressure difference has been set at the factory.	
双设定时间继电器 (选项) Double Set Time Relay (Option) FH1230、FH1530、FH1040	ON 5-7 S	OFF 15 M
星三角转换延时时间 Star triangle conversion delay time	5-7 S	
热继电器整定值 (直接启动) Setting Value of Thermal Relay	7.5KW (10HP)	15.5A
	11KW (15HP)	22A

(Direct Start)		
热继电器整定值（星三角）	15KW (20HP)	17.5A
Setting value of thermal relay (star	18.5KW(25HP)	21A
triangle)	22KW(30HP)	25.5A

请不要随便更改设定参数

Please do not change the setting parameters casually.

二、 注意事项

Matters attention

- 进线安装合适的断路器，线径符合有关规定。起动机到电机的6根线（U1，V1，W1；W2，U2，V2）严格按图示标识位置与电机的6根接线标识位置一一对应连接，不得错接。
- Suitable circuit breakers shall be installed in the incoming line, and the line diameter shall conform to relevant regulations. 6 wires from starter to motor (U1, V1, W1; W2, U2, V2) are connected to the 6 wiring identification positions of the motor one by one in strict accordance with the identification positions shown in the figure, and no wrong connection is allowed.
- 起动机故障停机（热继电器动作保护）。要仔细检查确认故障原因后方可打开机箱对热继电器手动复位。
- Starter failure shutdown (thermal relay protection). Only after carefully checking and confirming the cause of the failure can the chassis be opened to manually reset the thermal relay.
- 维修时必须切断电源。
- The power must be cut off during maintenance period.
- 起动机、电动机必须可靠接地并符合有关法规。
- Starter and motor must be grounded reliably and comply with relevant regulations.
- 机器不使用时必须将电源切断，否则压缩机随时可能启动，因为当压缩机处于自动停机状态时，一旦压力下降到设定值会立即启动。请务必注意安全。机器未正确安装、操作、保养，会造成严重或致命的伤害。
- When the machine is not in use, the power supply must be cut off, otherwise the compressor may start at any time, because when the compressor is in an automatic shutdown state, it will start immediately once the pressure drops to the set value. Please pay attention to safety. If the machine is not properly installed, operated and maintained, serious or fatal injuries will be caused.
- 起动机必须垂直安装，安装时注意不要有异物进入电器内。
- The starter must be installed vertically, and care should be taken not to allow foreign matters to enter the electrical appliance during installation.
- 停机压力不要随便修改，调整后的压力不能高于压缩机额定压力。
- Do not modify the shutdown pressure casually. The adjusted pressure cannot be higher than the rated pressure of the compressor.
- 严禁带载启动。

- It is forbidden to start with load.

三、 一般故障处理

General fault handling

1. 起动器在正常开机工作中发生断路器跳闸或热继在运行中保护，电动机停止运转。要仔细检查电动机是否断相或过载，确认故障原因后，方可打开机箱对热继电器手动复位。 确认故障原因并排除后按热继电器手动复位按钮，重新启动。

When the starter trips during normal starting operation or the heat relay is protected during operation, the motor stops running. Check the motor carefully. Whether there is phase failure or overload, and after confirming the cause of the fault, the chassis can be opened to manually reset the thermal relay. After confirming the cause of the fault and troubleshooting, press Manual reset button of thermal relay to restart.

2. 开机发生断路器跳闸或热继保护停机，检查起动器到电机的6根线（U1，V1，W1；W2，U2，V2）是否正确连接。检查断路器是否有故障。检查整定电流是否正确。

In case of circuit breaker tripping or thermal relay protection shutdown during startup, check the 6 wires (U1, V1, W1; W2, U2, V2) is connected correctly. Check the circuit breaker for faults. Check whether the setting current is correct.

四、报警停机排除方法

Elimination method for alarm shutdown

- 1.将机器加油到规定位置。

Fill the machine to the specified position.

2. 将热保护器复位。

Reset the heater thermal protector.

- 3.重新启动该机器。若油位，热保护是正常的，机器开一会儿又停机报警，请检查并调整油位开关位置及油位开关是否有效工作。

Restart the machine. If the oil level and thermal protection are good, and the machine will stop to give an alarm after a small while, please check and adjust the position of the oil level switch and Whether the oil level switch works effectively.

控制箱双控方式说明 The double-control formula of the control box statement	
开关位置 Switch Position	压缩机运行状态 Compressor operating state
电调 ASSC	<p>压力上升到压力开关设定值的上限值时，压缩机停机，压力下降到压力开关设定值的下限值时，压缩机开机。适用于用气量较小的场合，在冷态下其压缩机每次启动间隔时间不得少于 5 分钟，可节省电能。</p> <p>When the pressure rises to the upper limit of the set value of the pressure switch, the compressor will stop and when the pressure falls to the lower limit of the set value of the pressure switch, the compressor will start. It is suitable for occasions with small gas consumption. In cold state, the starting interval of the compressor shall not be less than 5 minutes, which can save electric energy.</p>
气调 CSC	<p>压力上升到压力开关设定值的上限值时，压缩机不停机，也不再加压，卸荷运行。当压力下降到压力开关设定值的下限值时，压缩机开始加压运行，适用于用气量较大，压缩机连续运行，不能停机的场合。</p> <p>When the pressure rises to the upper limit of the set value of the pressure switch, the compressor will not stop, nor will it pressurize or unload. When the pressure drops to the lower limit of the set value of the pressure switch, the compressor starts pressurization operation, which is suitable for occasions with large gas consumption, continuous operation of the compressor and no shutdown.</p>