HEHAi 河海动力
HEHAi POWER

沼气压缩机组使用维护说明书

(BIO)GAS COMPRESSOR SET OPERATION MANUAL

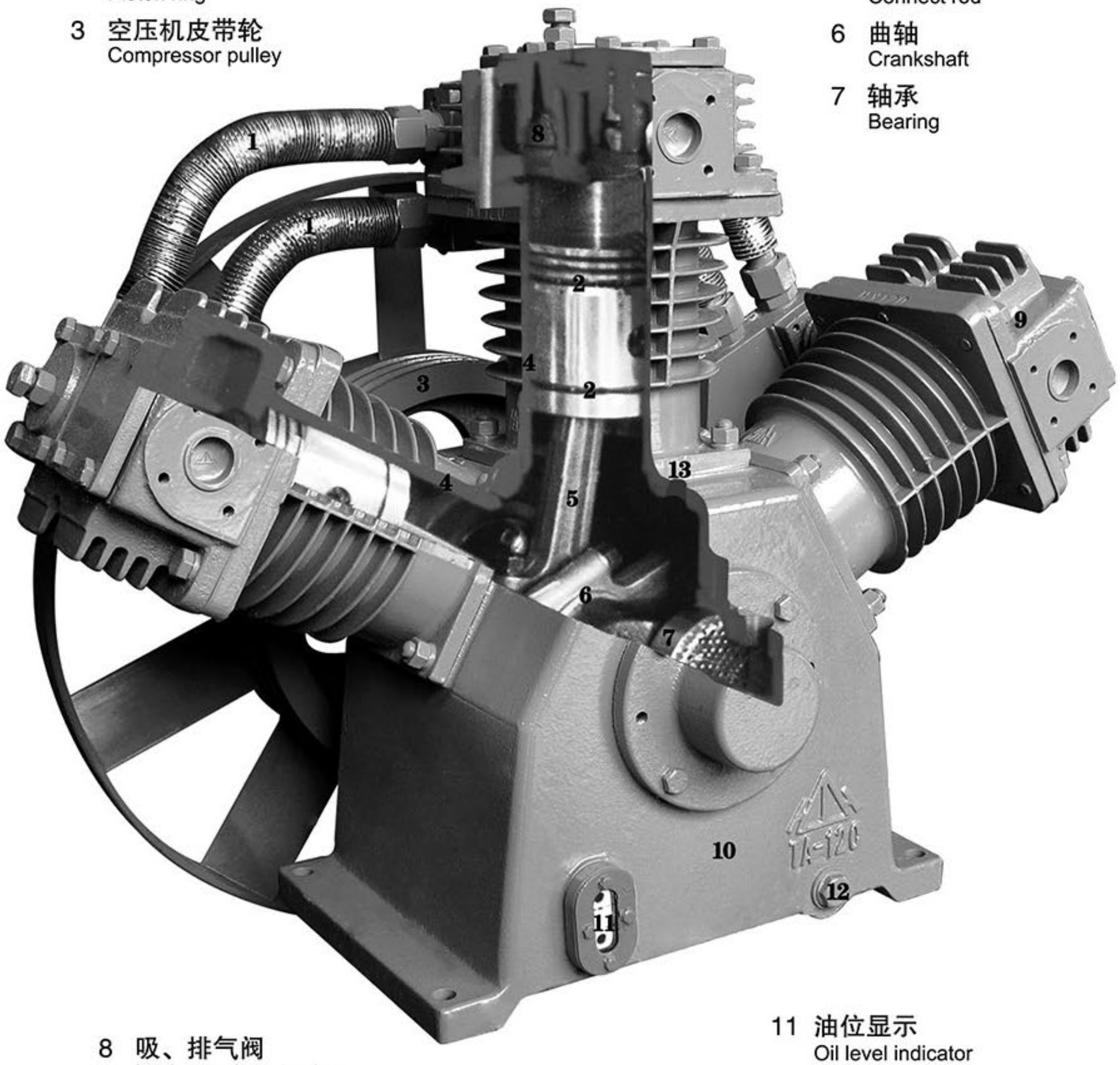
南通河海动力设备有限公司
NANTONG HEHAI POWER EQUIPMENT CO., LTD.

沼气压缩机零部件说明
Biogas Compressor Parts List

1 冷却铝管
Aluminum cooling tube

2 活塞环
Piston ring

3 空压机皮带轮
Compressor pulley



4 气缸
Cylinder

5 连杆
Connect rod

6 曲轴
Crankshaft

7 轴承
Bearing

8 吸、排气阀
Intake、exhaust valve

9 气缸盖
Cylinder head

10 曲轴箱
Crankcase

11 油位显示
Oil level indicator

12 放油孔
Oil drain hole

13 加油孔
Oil fill hole

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沼气压缩机组零部件说明
Biogas Compressor Parts List

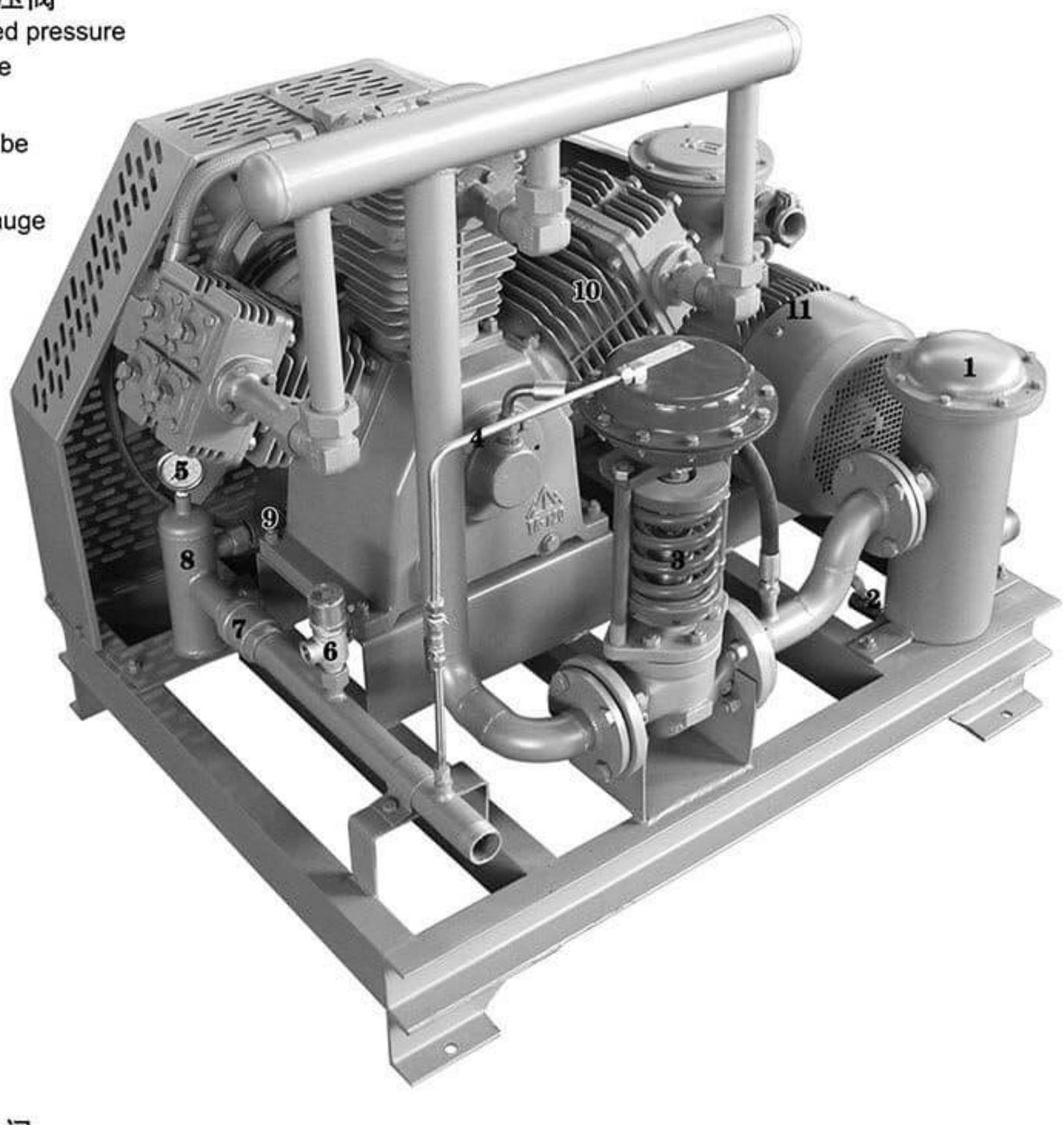
1 蓝式过滤器
Water gas Filter

2 排水阀
Drain valve

3 自力式调压阀
Self-operated pressure regular valve

4 取样管
Sampling tube

5 压力表
Pressure gauge



6 防爆阀
Explosion-proof valve

7 单向阀
Check valve

8 缓冲罐
Buffer tank

9 铝散热片压力管
Aluminum heat sink pressure tube

10 压缩机
Compressor

11 防爆电机
Explosion-proof motor

致客户书

尊敬的客户：

首先感谢您选用“河海牌”沼气压缩机组，相信它能够帮您财源滚滚而来，像海浪一样永无止境，动力源畅！

本机虽然在出厂前均经过严密的检验与测试，但为了确保沼气压缩机组能安全、可靠地运转，所以在使用之前务必详细阅读本使用说明书，虽然有未尽之处，可阅读之后，它还是能给您很多帮助，当您充分了解机组各部分结构功用、使用保养方法之后，方可对机组进行正确使用和保养，这对延长沼气压缩机组使用寿命及使用期处于良好的工作状态是极为重要的。

声　明

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安全操作注意事项

1. 维护和安装后请勿删除警示标志；

2. 手动运行引擎至少一圈，以确保没有机械故障；

3. 请先释放掉燃(沼)气储气罐的高压气体后再移动压缩机组，压缩机组固定点一定要安装减震垫以避免机器因震动而产生位移。

目　录

第一章 概 述

一、沼气压缩机组用途

沼气压缩机组适用于燃气管道的气体输送，供发电，民用燃气等部门，亦适用于酒精厂、垃圾填埋场等其他需要气源加压的行业。

二、压缩机组型号与参数

型 号 / 规 格	电动机 KW	缸径 X 缸数 mm	排气量 m^3/min	排气压力 MPa
HHYV100	2.2	Φ100X2	0.45	0.3
HHYV100	3.0	Φ100X2	0.45	0.3
HHYW120	4.0	Φ120X3	1.0	0.3
HHYW120-2	5.5	Φ120X3	1.5	0.3
HHYW130	7.5	Φ130X3	1.7	0.3
HHYW130-2	11	Φ130X3	2.4	0.3
HHYW80	4	Φ80X3	0.51	0.8(空气)
HHYW80G65	4	Φ80X2	0.45	12.5(空气)
HHYW100G80	7.5	Φ100X2	0.84	12.5(空气)
HHYW120G100	11	Φ120X2	1.2	12.5(空气)

注：HH代表河海，Y代表压缩机组，Z代表单缸，V代表二缸，W代表三缸，G代表二级压缩10KG以上

三、沼气压缩机组的工作原理

沼气压缩机组是把沼气池经过发酵产生的沼气，经过管道输送到压缩机的进气管，将低压沼气压缩成高压沼气。压缩过程由沼气压缩机组的防爆电机经三角皮带带动压缩机曲轴旋转，由曲轴带动连杆活塞做上下往复运动，当活塞向下运动时气体通过进气管道进入吸气阀到气缸内，由活塞向上运动时进行压缩，经排气阀排入到储气罐内，再由储气罐排出供设备使用。压缩机连杆大头采用的是含合金瓦，小头为铜套，它们的润滑方式为飞溅润滑，即曲轴箱内是要加注一定数量的润滑油，通过连杆旋转运动，不断搅动机油，达到飞溅而润滑所有的运动部件。

第二章 沼气压缩机组的安装与调试

一、沼气压缩机组安装前的检查

1、 检查沼气压缩机与您订购的型式、规格是否一致。

2、 是否在运输过程中受到污损。

如有上述情形，请于一星期内，与本公司接洽，将会给您圆满的解决。

二、沼气压缩机组安装与调整

A、放置沼气压缩机场所的选择：

1、空气清洁，通风良好的地方可延长机器的使用寿命，降低能耗。

2、光线充足，预留保养的空间，定期检查机器的油位，并保持沼气滤芯的清洁。

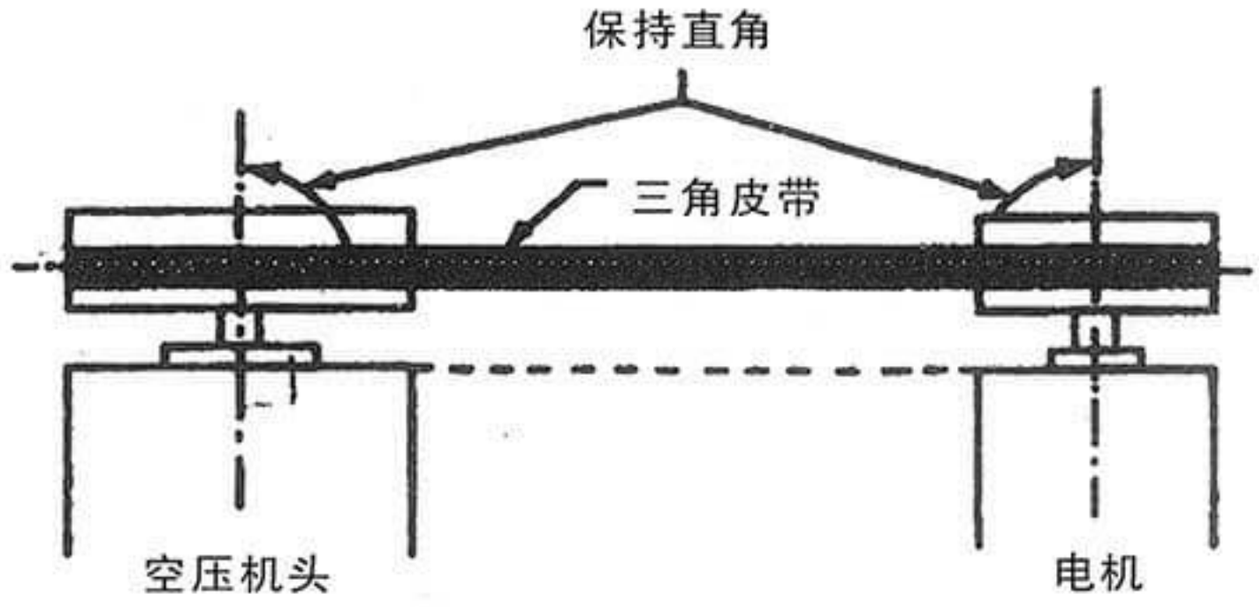
3、尽可能将机器放置水平，皮带侧应向墙壁，但不可过于靠近，以免影响风扇的冷却结果。(0.55kw-4kw应留有20公分以上，5.5kw以上应留有30公分以上)。

4、压缩机组摆放平稳，用工厂提供的减震垫，垫平底座以防振动引起机器位移。

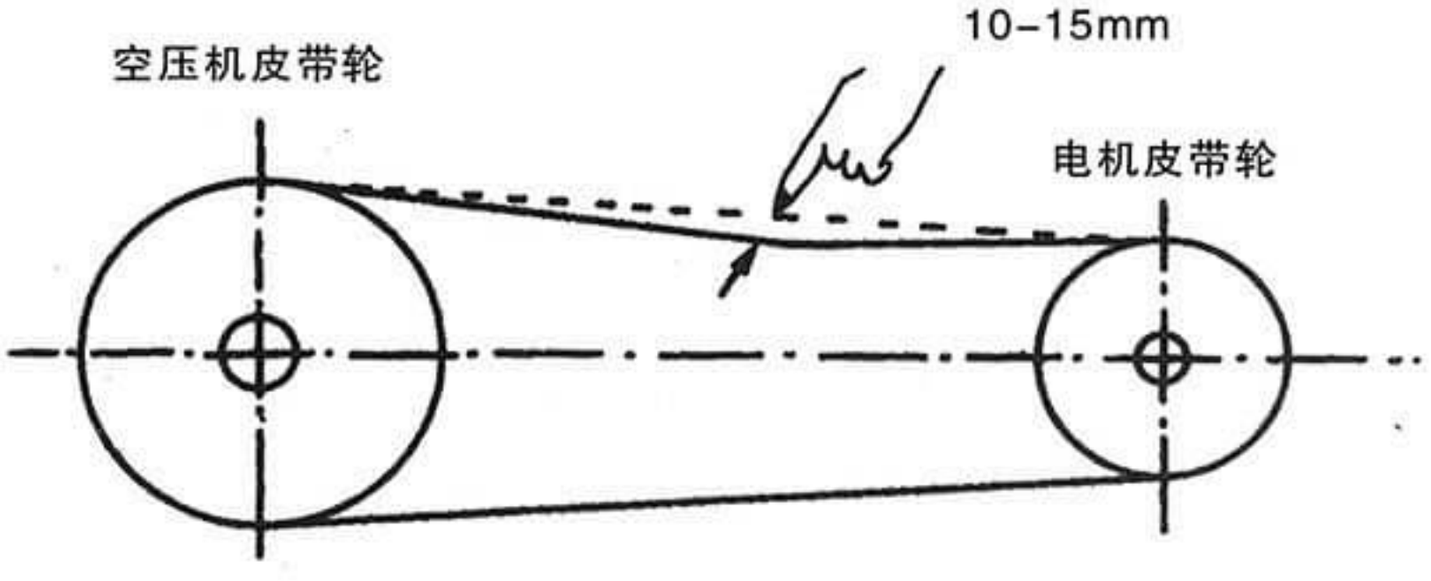
B、电机安装：

1、当您自购电机装配时，请购买和沼气压缩机组相同功率(KW)的电机。

2、装入三角皮带时，请注意下图所示之要点。



3、请适当调整皮带之松紧度。其方法如图所示，在两皮带之中点施力（3-4.5kg）时，三角皮带比原来高度低10～15mm为宜。



若①三角皮带过紧，会增加电机负荷，电机容易发热，耗电，皮带张力过大容易断裂。

②三角皮带过松，则容易造成皮带打滑而产生高热，损毁皮带，且使沼气压缩机组转速不能稳定。

注意：调整时，请务必保证电机皮带轮和压缩机皮带轮在同一平面内。

三、沼气压缩机组接线与原理图

一、沼气压缩机组接线

1、电源线请采用橡胶电缆线，电缆线须可靠接地。

2、检视电缆线电源的电流和电压需与电动机的要求是否一致。

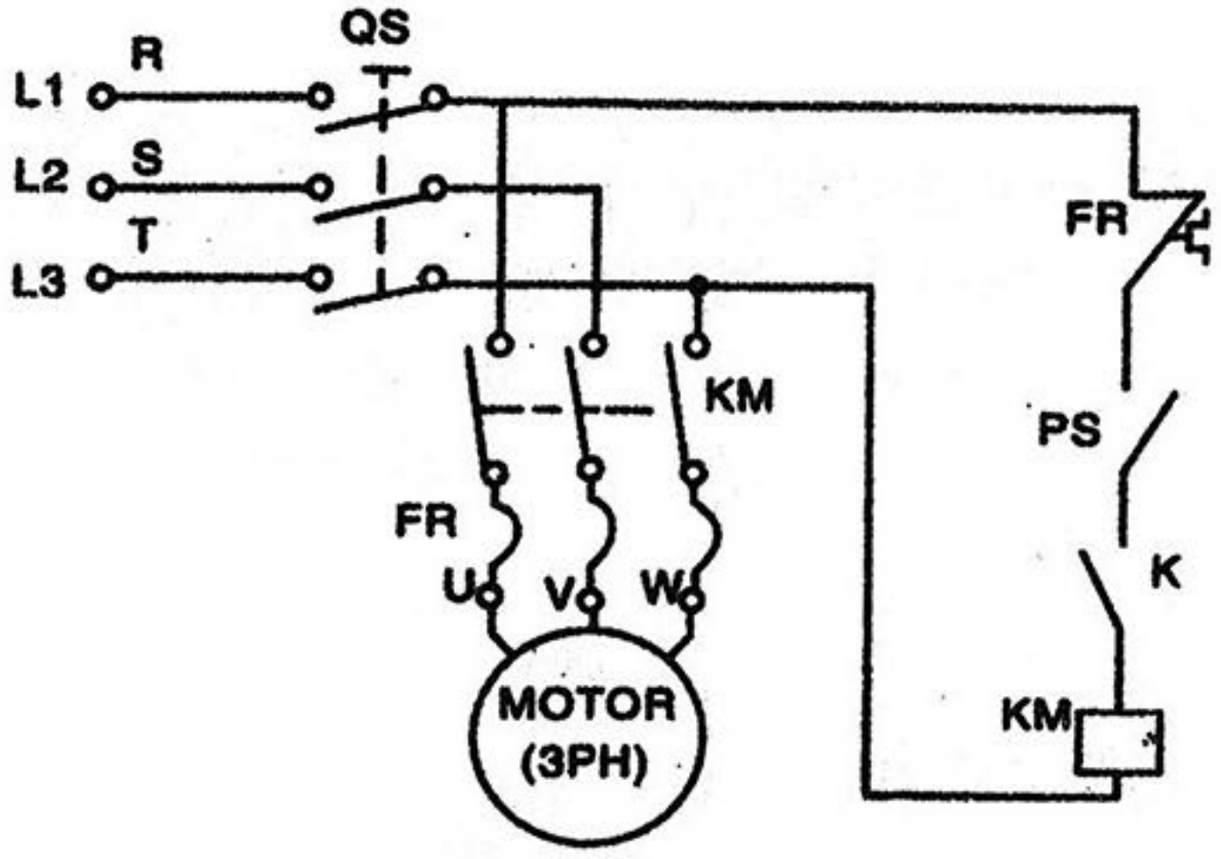
3、单相接线法适用于0.55-0.75kw的压缩机。在(含)1.5kw以上若使用220V单相或三相电源必须采用电磁开关来保护电机。

4、建议在电源线上使用与电机规格匹配的空气开关或熔丝，进一步保护电机。

5、电源线不要太长，防止电压下降过多使电机电流增大，造成电磁开关保护停机或烧毁电机。

二、电气原理图及接线图

A、 电气原理图

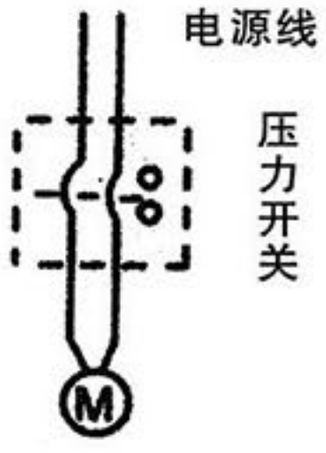


FR-热继电器在热元件　　PS-压力开关　　K-停止开关

QS-空气开关　　KM-接触器

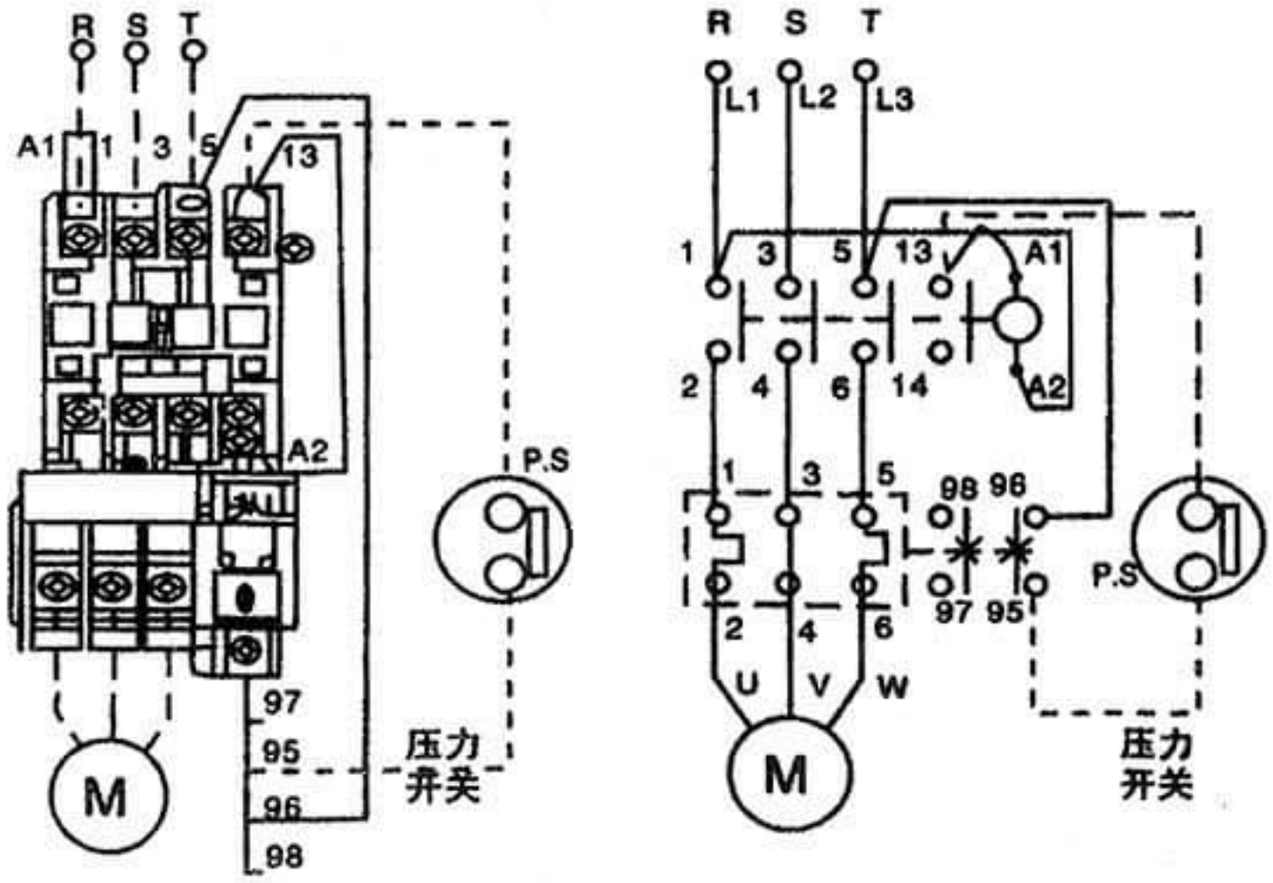
B、接线图

①单相电机接线图



单相电机接线图

② 三相电源接线图



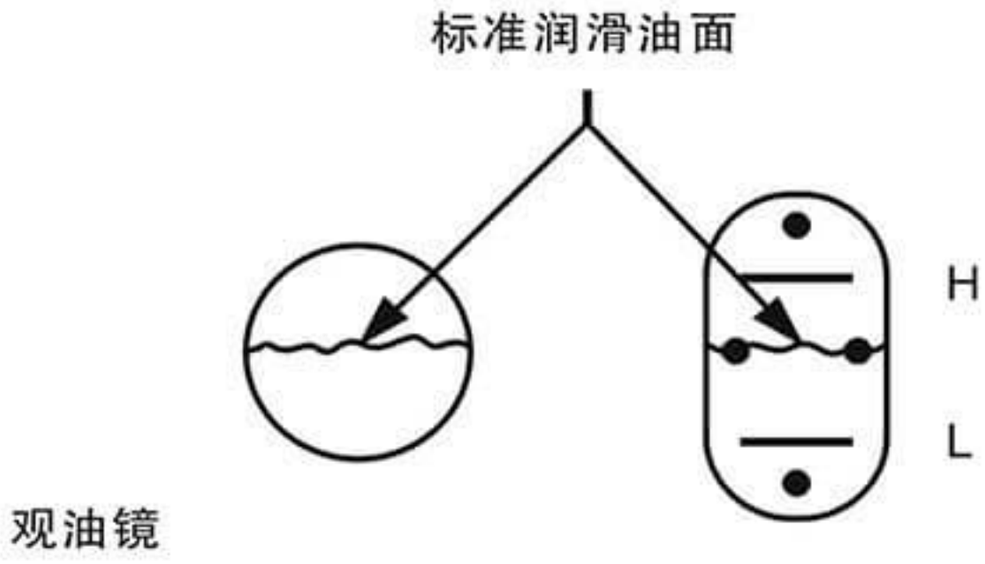
配压力开关，磁力开关，磁力起动器接线图

四、沼气压缩机组调试

一、运转前的检查事项

1、加注压缩机润滑油（L-DAB100或GB12691专用机油）。

2、油面请保护在观油镜两红标线之间或红圈之上、下缘间。



①油量太少将妨碍机器的正常运转，甚至于造成烧毁曲轴、连杆等。

②若油量过多则造成无谓的浪费，且使排气阀积碳而影响整机的效率和寿命。

③请注意在压缩机组断电停机状态下更换或添加润滑油

④请注意机油之品质。（如机油之清洁度及粘度）

3、检查各部分螺丝或螺母有无松动现象。

4、皮带之松紧是否适度。

5、管路是否正常无泄漏现象。

6、电线及电器开关是否合乎规定，接线是否正确，牢靠。

7、电源之电压是否正确。

8、压缩机皮带轮是否可轻易用手转动。盘车至少一圈以确保无机械干涉；
（检查时须切断电源，停机。注意安全）

9、打开并再次关闭排污阀。

10、检查并确定所有安全保护装置均处于合适的操作状态。

二、沼气压缩机组的调试

1、 以上各点检查完毕后，将进气球阀关闭，然后打开压缩机组电源开关，使压缩机组在无负荷状态下运转，这样可以增加压缩机及电机的寿命。

2、 检查运转方向是否和皮带防护罩上箭头指示相同。三相电机可通过更换三条电源线中的任意两条来变更转向。

3、 起动后约三分钟左右若没有异音，则将沼气进气球阀打开，调整自力式调压阀弹簧，使储气罐中之压力渐次升高，到达额定的压力，正常压力0.2～0.3Mpa之间。再进行保护功能测试。

4、 保护功能测试：

压力达到设定点后，自力式调压阀处在关闭状态，使压缩机组成无负荷的状态下运转。压力始终保持设定值不变。

5、 压缩机组的最高允许使用环境温度为40℃。

6、 电机不宜频繁启动，每小时不应超过10次，以免引起电器故障。

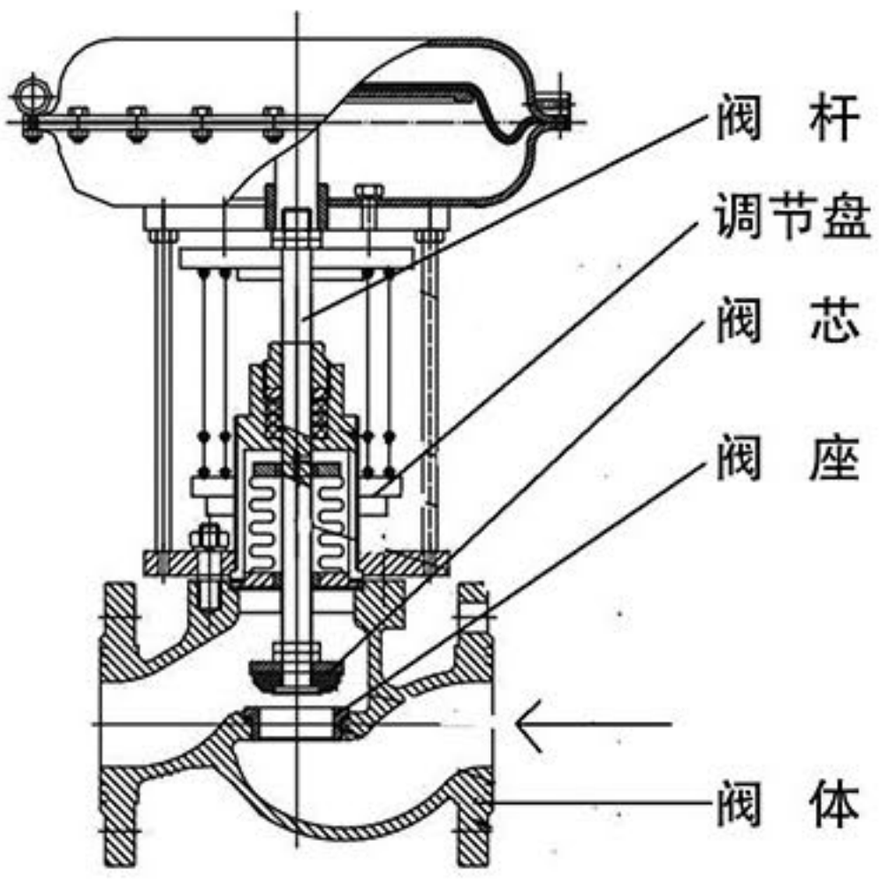
五、自力式调压阀控制与调整

1、 用途与特点

调节阀压力设定值在运行中可以随意调整，采用快开流量特性，动作灵敏、密封性能好。

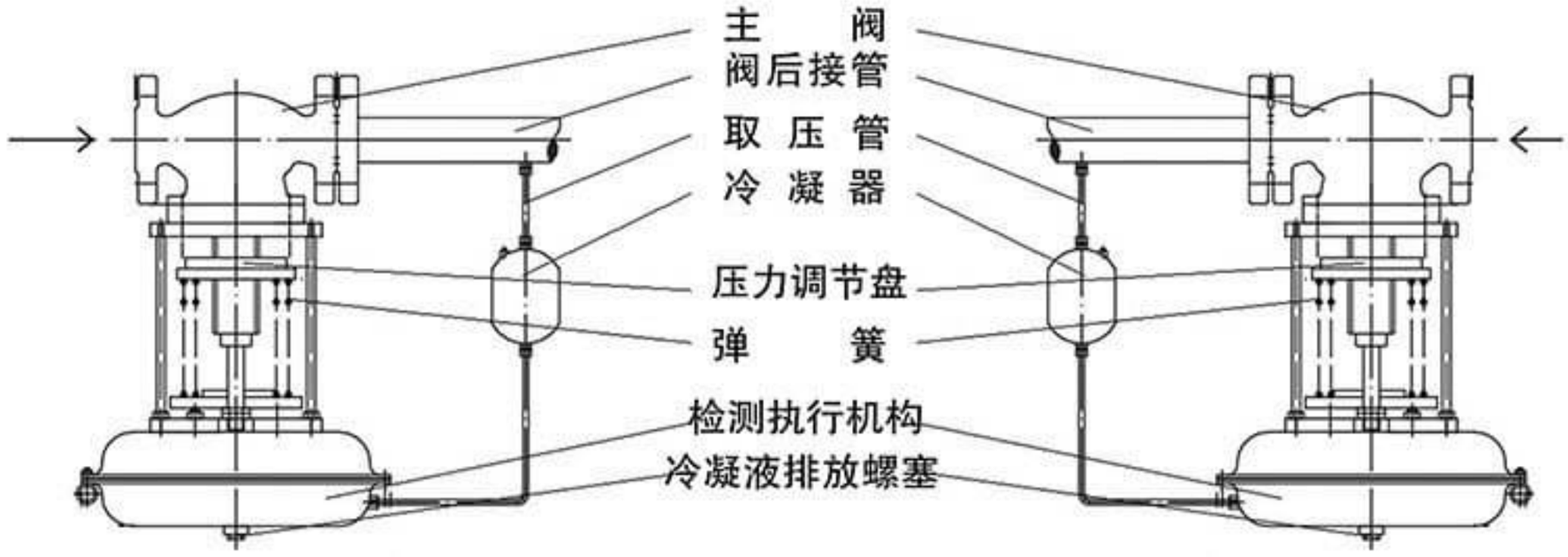
2、 结构与作用原理

调节阀主要有检测机构、调节阀、冷凝器与阀后接管等四部分组成。检测执行器机构为膜片式，见图一，膜片式调节灵敏度好，压力变化反应快。



图一 膜片式

工作原理见图三，介质由箭头方向流入阀体，经阀芯、阀座节流后输出。另一路经冷凝器（介质为蒸汽时使用）冷却后，被引入执行机构作用膜片上，使阀芯随之发生相应的位移，达到减压、稳压之目的。如阀后压力增加，作用于膜片上的力增加，压缩弹簧，带动阀芯，使阀门开启度减小，直至阀后压力下降到设定值为止。同理，如阀后压力降低，作用于膜片上的力减小，在弹簧的弹力作用下，带动阀芯，使阀门开启度增大，直到阀后压力上升到设定值为止。

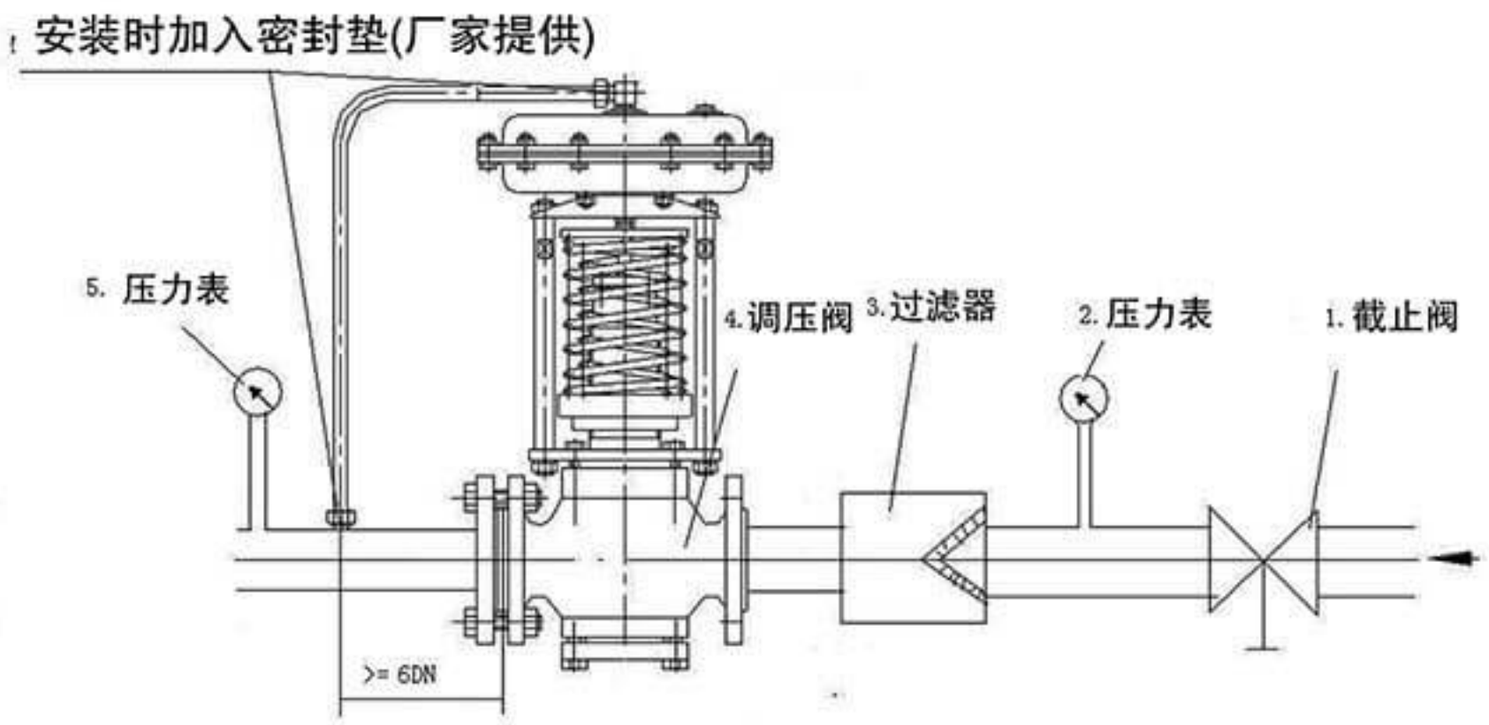


图三、ZZYP-16B型调节阀

3、安装使用与维护

（1）、安装

阀在常温下（≤70℃）气体或低粘度液体介质中使用时，此时与通常的气动薄膜调节阀相同为直立安装在水平管道上，如图四所示



图四、ZZYP-16B型调节阀流程

安装时，注意以下几点：

a、冷凝器必须高于调压阀的执行机构、低于阀后接管，以保证冷凝器内充满冷凝液。

b、取压点应取在离调压阀适当的位置，阀前调压阀应大于2倍管道直径，阀后调压阀应大于6倍管道直径。

c、为便于调压阀现场维修及操作，调压阀四周应留有适当空间。调压阀前后应设

置截止阀，并设置旁路手动阀。

d、介质流动方向与阀体上箭头指向一致，调压阀前后管道中心应对准调压阀两法兰中心，避免阀体受过大的应力。

e、调压阀应设置过滤器以防止介质中杂质堵塞。

f、调压阀应安装在环境温度不超过-25℃～+55℃的场合。

（2）、使用

a、使用在常温下的气体和低粘度液体场合的操作。

b、缓慢开启调压阀前后截止阀，开始进行调压阀的操作，拧松排气塞8(参见图三)直至气体或液体从执行机构溢出为止，然后重新拧紧排气塞，调压阀即可工作。所需的压力值是通过压力调节盘5的操作而得到调整，调整时，注意观察压力表示值，动作应缓慢，且注意不得使阀杆跟着转动，若要使压力升高则应右旋方向转调节盘，否则应左旋方向转调节盘。

（3）、维修

调压阀投入运行后，一般维护工作量很小，平时仅需时常观察阀前、阀后压力表即可。另外，观察填料函与执行机构处是否渗漏，若渗漏应拧紧或更换填料及膜片。调压阀常见故障排除方法见下表。

故障现象	产生原因	排除方法
阀后压力不稳定随着阀前压力变动而变动	1、阀芯被异物卡住 2、阀杆、推杆卡住 3、进液管道堵塞	1、重新拆装排除异物 2、重新调整 3、疏通
阀后压力降不下来，始终在需求值上方变动	1、设定弹簧刚度太大 2、阀口径过大 3、阀前压力过高，减压比过大	1、更换弹簧 2、更换较小口径 3、阀前压：阀后压超过 10:1，应二级降压
阀后压力升不上去，始终在需求值下方变动	1、设定弹簧刚度太小 2、阀口径过小 3、减压比过小	1、更换弹簧 2、更换较大口径 3、阀前压：阀后压低于 1:25，应提高阀前压
阀前压力升不上去，始终在需求值下方动作	1、设定弹簧刚度太小 2、阀芯被异物卡住 3、阀杆、推杆卡住 4、阀芯、阀座损坏，泄漏量过大 5、阀口径太大	1、更换弹簧 2、重新拆装 3、重新调整 4、重新研磨，或更换 5、更换较小口径
阀前压力降不下去，始终在需求值上方动作	1、设定弹簧刚度太大 2、阀口径太小 3、阀芯、阀杆、推杆等卡死	1、更换弹簧 2、更换较大口径 3、排除卡死原因，重新调整
阀后压或阀前压波动过于频繁	1、阀口径过大 2、执行机构膜室容量过小	1、选择恰当的阀口径 2、在进液管道内增设阻尼器

第三章　沼气压缩机组定期检查、保养及维护

一、定期检查与保养

1、 请保持压缩机组清洁。

2、 储气罐之泄水阀，每日打开一次排除油水。沼气含水分较重的地方，请每四小时打开一次。

3、 润滑油面请每天上班前检查一次，确保压缩机之润滑作用。

4、 沼气过滤器约30天左右清洁。亦视使用环境之不同而酌予增减清洗。

5、 每月检查一次皮带及各部位螺丝的松紧。

6、 润滑油最初运转100小时后请换新油，以后每500小时换新油一次（使用环境较差者应300小时换一次油）。

注意！更换新油时，必须清洗曲轴箱，清洗干净后方可注入新油。

7、 使用1000小时（或半年）请将气阀拆出清洗。

8、 每年请将机器各部位清洗一次。

二、维护

① 所有的维修工作均应停车释放压力后进行，关闭压缩机组进出口阀门，压缩机曲轴箱至少应在停车15分钟后才能打开。

② 维修压缩机时应在起动装置上设一标示牌，其上注明：“警告：正在检修，严禁开车”。同时还应采取措施将压缩机进、排气管路阀门关闭及断开电动机电源，以避免疏忽意外而起动压缩机。

a、 拉掉机组控制柜里面电源开关；

b、 断开电动机电源线；

c、 关闭沼气总管阀门；

③ 压缩机组的安全阀每年至少校验一次，压力表应按计量部门规定的期限校验，调压阀、单向阀也应定期进行检查，以确保他们处于正常工作状态。

④ 所有防护罩、警告标志等安全防护装置应定期检查。

⑤ 压缩机组储气罐检验周期应严格遵照“压力容器安全技术监察规程”进行检验。

⑥ 定期清洗压缩机组各部件时，任何情况下均不应用易挥发性易燃清洗剂或对人体有害的清洗剂来清洗。清洗完成后，所有部件应漂洗吹干。

三、安全阀

安全阀在出厂之前泄放压力就已设定了，请勿任意调动。您需更改安全阀总成设定压力时，请联络本公司之维护单位，来为您服务。

四、电机维修及制造编号

1、 应检查电机铭牌和压缩机上的铭牌功率是否一致，一致为正确。

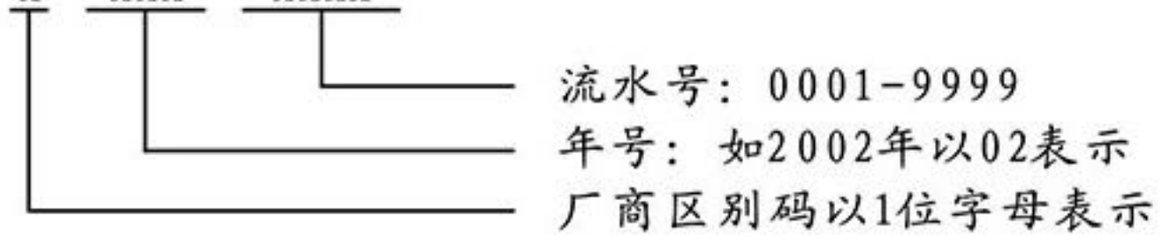
2、 电机表面应保持清洁，进风口不应受尘土纤维的阻碍。

3、 保证电机在运行过程中的润滑，一般运行5000小时左右应补充或更换润滑脂。

4、 运行中发现轴承过热或润滑脂变质时，应及时更换润滑脂。

5、 当轴承寿命终了时，电机运行时的振动及噪声将明显增大，即应更换轴承。

6、 电机制造编号如下要求：



第四章　沼气压缩机组故障和排除方法

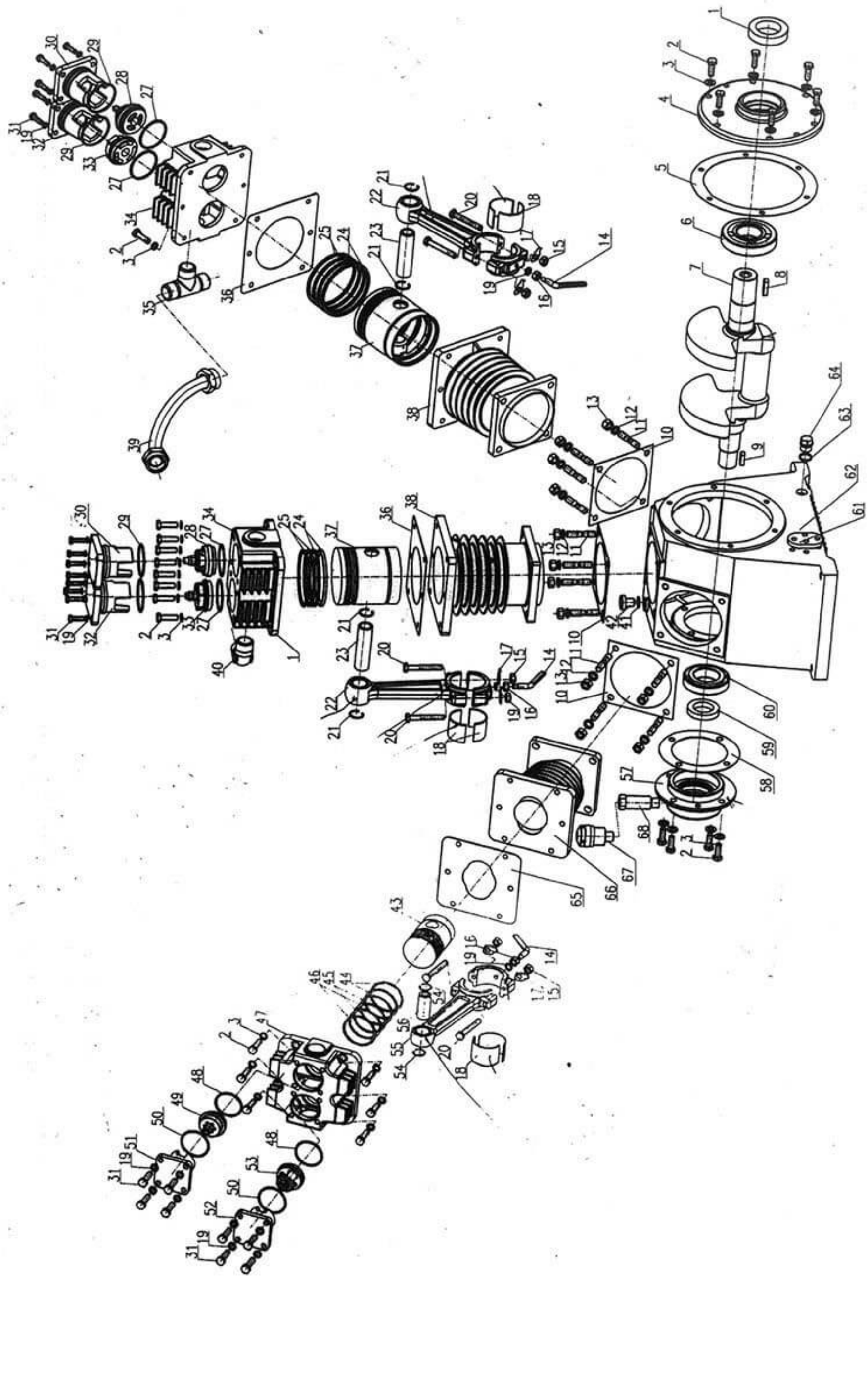
一、压缩机组日常较易发生故障现象、原因及排除对策表

	故障现象	故障原因	排除故障方法
沼气压缩机组可转动时	旋转方向不对	电机接线错误	更改接线
	转动很慢	1、 皮带太松、打滑 2、 电压不对	调紧皮带 检查
	压缩机振动激烈	1、 曲轴弯曲 2、 压缩机底座摆放不平整	送专门工厂修理 垫平底座
	气压不能升高到某种程度即不能上高	1、 阀片破损或动作不良 2、 阀片阀座不平漏气 3、 阀体弹簧不良 4、 阀片附有灰尘或积碳 5、 安全阀漏气 6、 由螺丝孔漏气 7、 活塞环漏气 8、 石棉板垫片不良（过厚） 9、 排气排水开关漏气 10、铝管漏气 11、单向阀漏气 12、用气量太大 13、进气过滤器滤芯堵塞 14、进气管路堵塞 15、自力式调压阀阀芯卡住或阀体内腔有污物 16、压力表指示不准	修磨或更换阀片 修磨或更改 更换新品 拆开阀体清理扫之 拆除或更换安全阀 锁紧螺丝或在螺丝上加垫片后锁紧之 更换活塞环 更换石棉板垫片 更换排气排水开关 修复更换 更换 更换 清理 清理 检修清理污物 更换新品
	输出气量少	1、 进排管路系统堵塞 2、 过滤器堵塞 3、 脱硫剂受潮 4、 阀组松动 5、 阀片破损 6、 转速过低 7、 活塞环过渡磨损 8、 各连接处泄漏 9、 阻火器堵塞 10、单向阀卡住 11、自力式调压阀阀芯卡住或阀体内腔有污物 12、压力表指示不准	清除管路 清洗或更换 更换脱硫剂 锁紧阀组 更换阀组或阀片 检查皮带松紧 更换 检修 清洗或更换 检修或更换 检修清理污物 更换新品
	润滑油消耗过多	1、 活塞环磨损 2、 活塞磨损 3、 汽缸磨损 4、 压缩机旋转方向不对	更换新品 更换新品 更换新品 调整
	皮带打滑	1、 使用压力过高 2、 皮带过松 3、 皮带逾龄不堪使用 4、 皮带轮槽磨损	减低使用压力 拉紧皮带 更换新皮带 更换皮带轮
	电机过热	1、 使用压力超过规定最高压力，致电机负载过高 2、 活塞烧毁，气缸拉毛 3、 轴承合金烧毁 4、 电压降低 5、 电缆线不匹配	降低使用压力 送专门工厂修理 送专门工厂修理 装稳压器 调整
	压缩机转动时噪音突然升高	1、 排气管路漏气 2、 因机油液位低而引起主轴与主轴瓦造成拉瓦现象	检查修复 修复更换
沼气压缩机组不能运转	没有声音	1、 停电 2、 配线断掉 3、 电机故障 4、 开关未打开	 更换配线 送专门工厂修理 合上开关
	保险丝易断	1、 保险丝过细 2、 接线错误 3、 电机超载 4、 排气阀漏气致使电机负载过重 5、 沼气压缩机之曲轴过紧 6、 单向阀阀芯磨损	更换较大保险丝 更改配线 减轻负载 拆修排气阀 拆开检修 更换阀芯

二、电动机常见故障分析与排除办法表

问题名称	现　象	产生主要原因	排除办法和处理意见
过载烧包	整个线包颜色变黑、包绑带裂、严重时槽楔发黑、绝缘纸冒泡、线包烧坏崩裂	1、负载电流超出铭牌标定技术数据要求。 2、电压过低	用户使用不当，不负责三包。
缺相烧包	线包中一相或两相变黑，烧坏（通常情况下的接电机缺相时一相变黑；星接电机缺相对两相变黑）	电源问题，如：熔断器、继电器坏等用户其他设备故障或接线不正确造成。	用户电源、接线问题引起故障、不负责三包。
对地	电机内部受潮、进水或自行拆装造成严重磕碰、导致绝缘电阻为零兆欧。	用户使用过程中,存放、保管不善，或使用环境不合理造成。	用户使用不当，不负责三包。
	线包无颜色变化绝缘电阻为零兆欧。产生部位：槽内和槽口，镗内有异物，大盖挤破引线等	线包绝缘质量不好或漆包线质量不好引起 V 波圈坏，螺栓掉进电机内部，引线排列不好。	质量问题，负责三包。
匝间、相间	线包颜色无明显变化，匝与匝或相与相之间，有两匝或多匝线绝缘受损造成短路。	线包匝、相间处绝缘较差，漆包线质量不好引起。	质量问题，负责三包。
扫镗	定、转子磨擦扫镗烧包	断轴、轴承坏、轴承档细、轴承室大、大盖止口小、壳止口大或椭圆	质量问题，负责三包。
轴承问题	轴承杂音	皮带过紧、不同心或不平衡。油脂不清洁、粉尘污染造成	要求用户及时调整
		轴承进水	用户负责
	轴承坏	轴承质量问题	质量问题，负责三包。
	轴承过热	轴承损坏	更换轴承
		皮带过紧、不同心或不平衡	要求用户及时调整
		电机两侧端盖或轴承盖未上紧	将端盖轴承盖按止口装进、装正拧紧螺栓或螺钉。
		轴承室或轴磨损严重	更换端盖或转子。
		润滑脂质量不好或填充量不当	更换润滑脂、填充量不超过轴承容积的70%

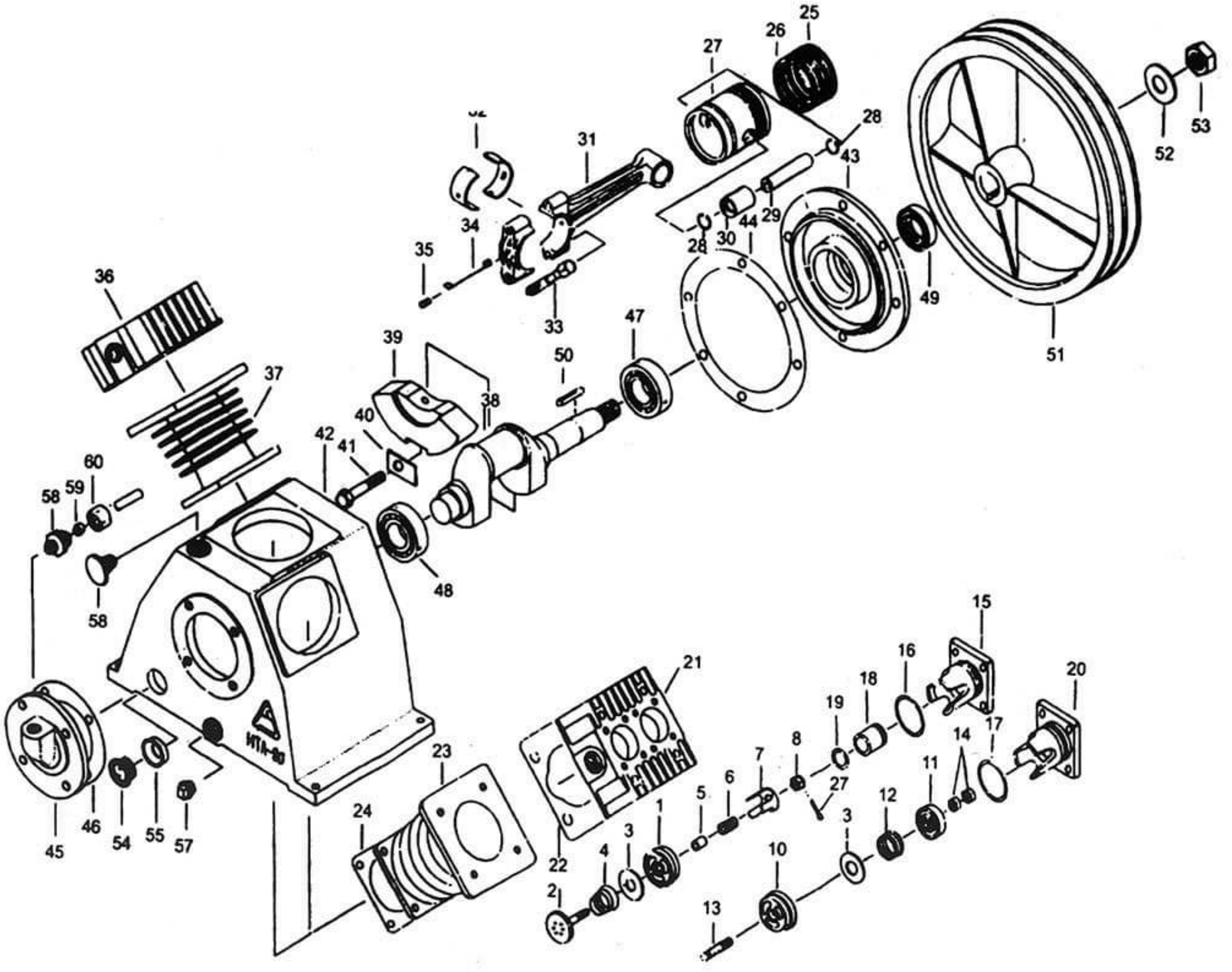
第五章、沼气压缩机组零部件图



适用机型HYW100 HYW130 HYW120

1、 油封
2、 螺栓M10X35
3、 垫圈10
4、 轴承盖
5、 垫片
6、 圆锥滚动轴承
7、 曲轴
8、 键14X50
9、 键6X25
10、 垫圈
11、 双头螺栓M12X32
12、 垫圈12
13、 螺母M12
14、 打油杆
15、 螺母M10X1
16、 螺母M8
17、 单耳止动垫圈10
18、 薄壳轴瓦
19、 垫圈
20、 连杆螺栓M10X70
21、 档圈
22、 连杆
23、 活塞销
24、 刮油环
25、 扭曲环
27、 垫圈
28、 吸气阀
29、 O型密封圈 ¢ 70X3
30、 吸气阀压盖
31、 螺栓M8X25
32、 排气阀压盖
33、 排气阀
34、 气缸
35、 接头
36、 气缸上垫
37、 活塞
38、 气缸
39、 连通管部件
40、 接头
41、 O型密封圈 ¢ 23X3
42、 滚花平头螺钉M20X20
43、 活塞
44、 刮油环
45、 活塞环
46、 扭曲环
47、 缸盖
48、 垫圈
49、 排气阀
50、 O形圈 ¢ 60X3
51、 排气阀压盖
52、 吸气阀压盖
53、 吸气阀
54、 档圈
55、 连杆
56、 活塞销
57、 端盖
58、 垫片
59、 油封
60、 圆锥滚动轴承7510
61、 油标
62、 曲轴箱
63、 复合垫
64、 放油塞
65、 汽缸上垫
66、 气缸
67、 呼吸器
68、 呼吸器接头

适用机型HYW80 HYW100 HYW120 HYW120G100 HYW100G80



吸、排气阀和卸荷装置部分

1、 吸气阀座
2、 吸气阀受座
3、 吸排气阀片
4、 吸气阀弹簧
5、 吸气阀卸荷叉导套
6、 卸荷弹簧
7、 吸气阀卸荷叉
8、 自锁螺帽
10、 排气阀座
11、 排气阀座
12、 排气阀弹簧
13、 排气阀螺栓
14、 螺帽
15、 吸气阀压盖
16、 O型环
17、 O型环
18、 卸荷活塞
19、 O型环
20、 排气阀压盖

气缸部分

21、 一级气缸盖
22、 气缸盖衬垫
23、 一级气缸
24、 气缸和曲轴箱衬垫
25、 一级压缩环
26、 一级刮油环
27、 一级活塞
28、 活塞销扣环
29、 一级活塞销
30、 活塞销轴承
31、 连杆组立
32、 曲轴销轴承
33、 连杆螺丝
34、 拨油杆
35、 拨油杆螺丝
36、 二级气缸盖
37、 二级气缸

曲轴箱和曲轴组立部分

38、 曲轴
39、 曲轴平衡重
40、 平衡重固定垫圈
41、 平衡重固定螺丝
42、 曲轴箱
43、 前轴承盖
44、 前轴承盖衬垫
45、 后轴承盖
46、 后轴承盖衬垫
47、 前轴承
48、 后轴承
49、 前油封
50、 三角皮带轮销
51、 压缩机皮带轮
52、 压缩机皮带轮垫圈
53、 压缩机皮带轮固定螺丝
54、 油量计盖
55、 油量计盖油封
56、 曲轴箱通气帽
57、 曲轴箱油塞头
58、 通气器主体
59、 玻璃珠
60、 通气器帽

To User

Dear Customers:

Thank you for your choosing of our biogas compressor, We believe it can help you to make money with its endless power supply!

The machine was strictly tested and inspected in the workshop, and it is very import to read and refer the manual before operation to make sure its safety and reliability.

The manual could help you fully understand the structure of the machine, the function of each component and the maintenance schedule. It is very important to prolong the life of biogas compressor and good working condition

Statement

We have the right to change the design of our product!

Due to continuous research and development, the manual content could be different with the actual product; we are not responsible for the modification and improvement of the sold products.

We may change the specification of some parts of the machine without prior notice.

Safety -- Very important

Operation

1. Remove all the warning signs and safety cards after maintenance and installation;
2. Manual run the engine at least one circle to make sure no mechanical interference.
3. Please release the pressure of the biogas storage tank before you move the biogas compressor.

Please put the biogas compressor stable and install the anti-vibration rubber to avoid the displacement of the machine caused by the vibration.

Contents

I General

1/ Application of biogas compressor set

Biogas compressor set is widely adapted for gas pressure increasing of gas pipeline for gas power station and civil gas transportation, and also used for the industry such as landfill, alcohol plant.

2/ Model and specs of biogas compressor set

Model / spec	Motor KW	Bore X cylinder No. mm	Displacement m^3/min	Exhaust pressure MPa
HHYV100	2.2	ϕ100X2	0.45	3
HHYV100	3.0	ϕ100X2	0.45	3
HHYW120	4.0	ϕ120X3	1.0	3
HHYW120-2	5.5	ϕ120X3	1.5	3
HHYW130	7.5	ϕ130X3	1.7	3
HHYW130-2	11	ϕ130X3	2.4	3
HHYW80	4	ϕ80X3	0.51	0.8(air)
HHYW80G65	4	ϕ80X2	0.45	12.5(air)
HHYW100G80	7.5	ϕ100X2	0.84	12.5(air)
HHYW120G100	11	ϕ120X2	1.2	12.5(air)

Note: HH means Hehai, ,Y means compressor set, Z means single cylinder , V means two cylinder, W means three cylinder, G means two steps compression (10KG and above).

3/ Principle of biogas compressor set

The biogas compressor set is used to increase the gas from low pressure to high pressure.

II Installation and debug of biogas compressor set

1/ Checking before installation of biogas compressor set

a. Please confirm the biogas compressor model and spec same as your order.

b. Please check if any damage after delivery.

Please contact your supplier in one week if any case happened.

2/ Installation and adjustment of biogas compressor set

A. The place chosen for the biogas compressor:

(1) It could prolong the life of the machine, reduce energy consumption which place with clean air and well ventilated.

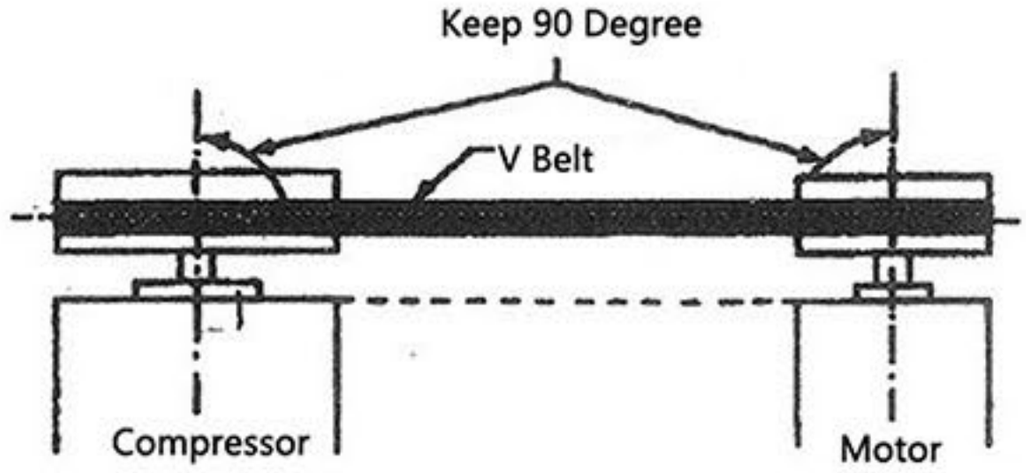
(2) It needs good light and enough space for maintenance purpose, and please check the oil level of the machine regularly, keep the clearance of the biogas filter element.

(3) The biogas compressor should be installed level as far as possible, and the pulley side should be against the wall, but not too near to affect the results of fan cooling (it should be more than 20cm for the models 0.55kw - 4kw, more than 30cm for the models 5.5 kw and above).

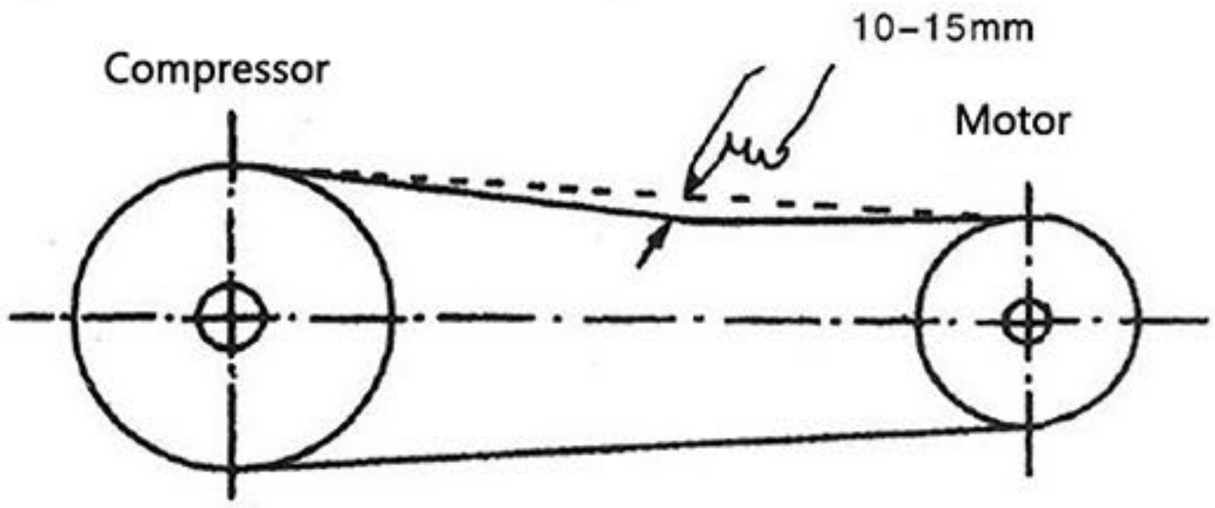
B. Motor Installation:

(1) Please choose the same power (Kw)and spec when you purchase or change the motor by yourself.

(2) Please refer points of the graph below when you install the V belt



(3) Please adjust the tension of the belt as below graph, when force be added(3-4.5kg) at the middle of the belt, it will be lower 10～15mm。



(a) If v belt too tight, it will increase the motor load, and the motor is easy to overheat, waste electricity, the belt is easy to fracture due to the high tension.

(b) If v belt too loose, it is easy to skid and overheat even damage, it cannot keep the biogas compressor rotation speed stable.

Note: please make sure the motor pulley and compressor pulley in the same level lines when adjustment.

3/ Wiring and diagram of biogas compressor set

A. Power cable：

(1) Please use rubber cable for the power supply and must be reliable grounding。

(2) Please check the power Hz and Voltage, it should be same as the motor required.

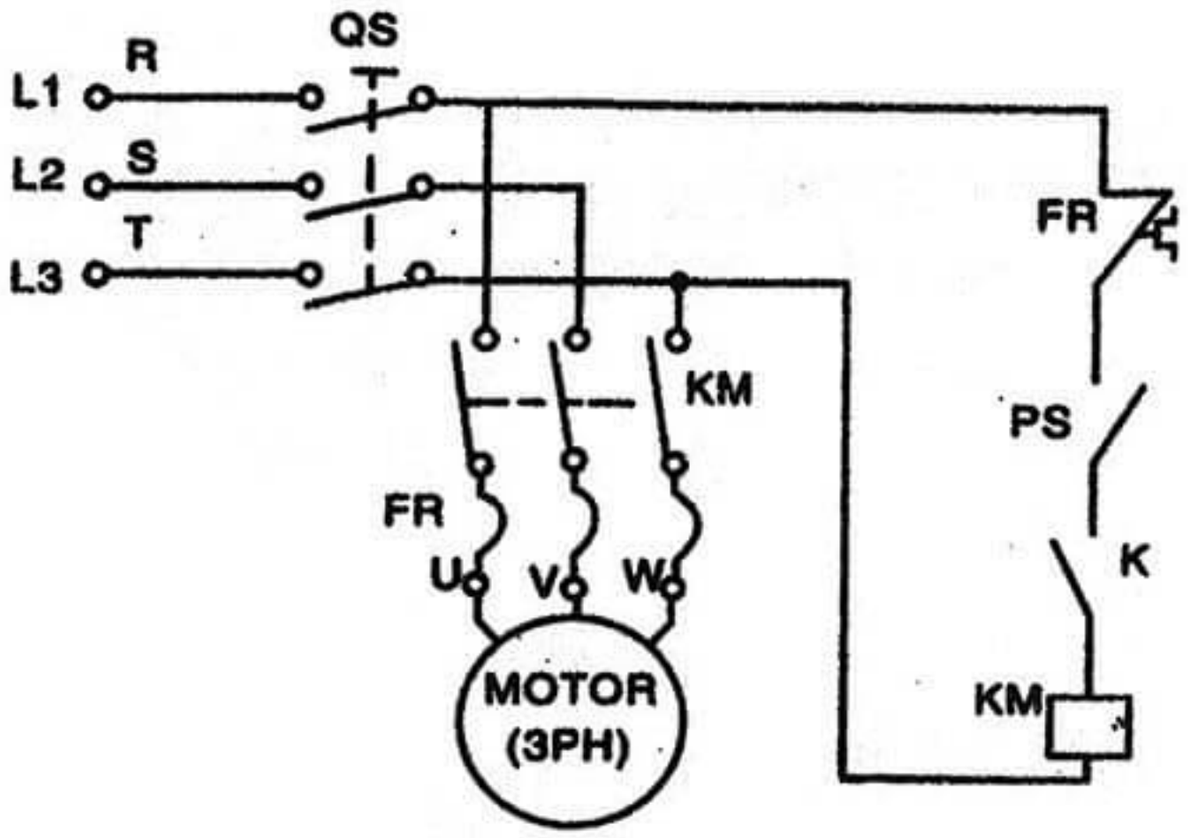
(3) Single phase diagram is for biogas compressor with motor power 0.55-0.75kw. It should have solenoid switch to protect the motor if 220V single phase or three phase power supply is connected for the motor power above1.5kw.

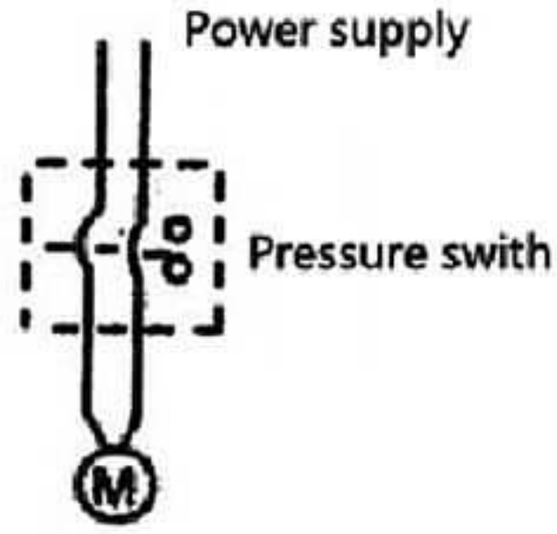
(4) Strongly suggest using the equal breaker or fuse to protect the motor.

(5) The power supply cable cannot be too long to avoid the voltage drop and current increase to damage the motor.

B. Diagram

(1) Diagram for single phase motor

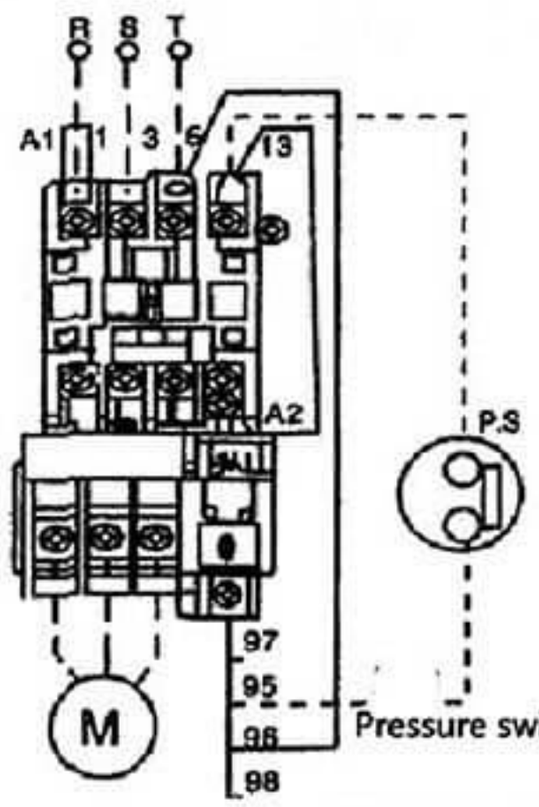


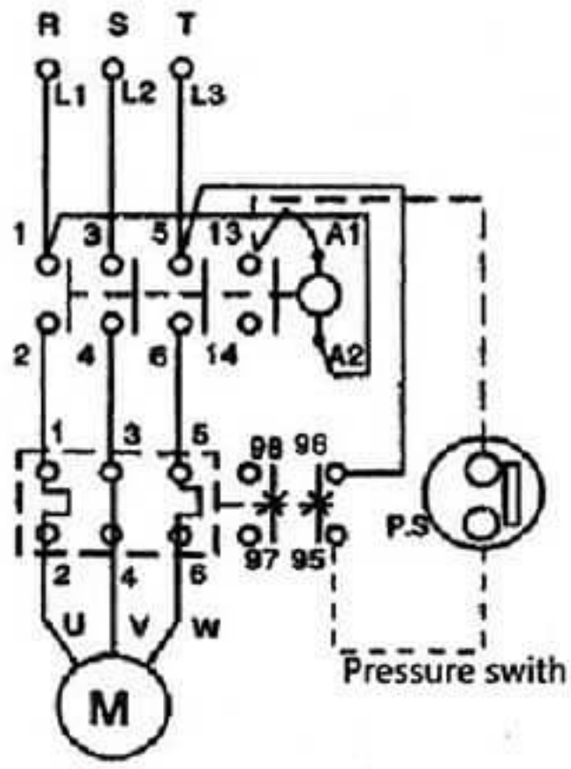


Single Phase Motor Diagram

FR– Relay
QS– Breaker
PS– Pressure swith
KM– Contactor
K– Stop swith

(2) Diagram for three phase motor





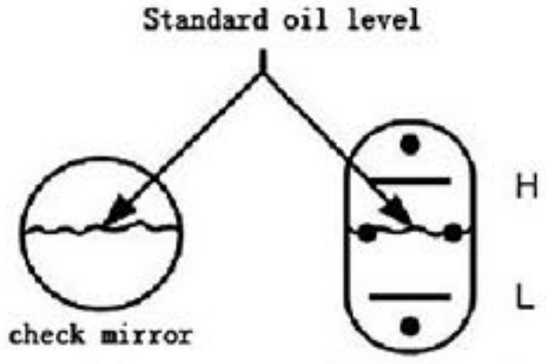
Three Phase Motor Diagram

4/ Debug of biogas compressor set

A. Check below items before running:

(1) Please choose the standard oil L-DAB100 or special oil GB12691.

(2) The oil level should be between the redlines of check window.



① It will affect the operation of the machine even damage the crankshaft, connect rod etc if less oil.

② It will be waste even make the exhaust valve carbon deposition , affect the efficiency and life if too much oil.

③ please make sure to change or fill the oil under the power off situation.

④ please use the qualified oil (clean and viscosity)

(3) Check if any bolt or nut loose.

(4) Check the tension of V belt.

(5) Check the correct connection of tubes and pipes.

(6) Check if the cables and switches connected and reliable.

(7) Check the voltage of the power.

(8) Check if the compressor pulley could be rotated manually (pay attention safety, power off).

(9) Open the drain valve , then close it;

(10) Check and make sure all safety protection devices are in proper operating condition.

B. Debug of biogas compressor

(1) After checking the items above, please shut off the inlet ball valve, then press the start button, run the machine under no load condition, it can prolong the life of the compressor and motor.

(2) Check if the motor rotation is the same direction as the arrow on the belt cover. The rotation of three-phase motors can be changed by changing each two wires of three power wires.

(3) If there is no abnormal sound 3 minutes after starting , then open the biogas inlet ball valve, adjust the spring of self-operation pressure regular valve, let the pressure of the storage tank increases gradually and reach the rated pressure the normal pressure is between 0.2 - 0.3 Mpa. Then test the protect function.

(4) Protection function test: when the biogas pressure reaches the set-point, run the biogas compressor under the no-load situation while the self-operation pressure regular valve closed.

(5) The highest environmental temperature is + 40 ℃ for the biogas compressor;

(6) The motor should not be frequent start-up, and it should not be more than 10 times per hour to avoid the electrical failure.

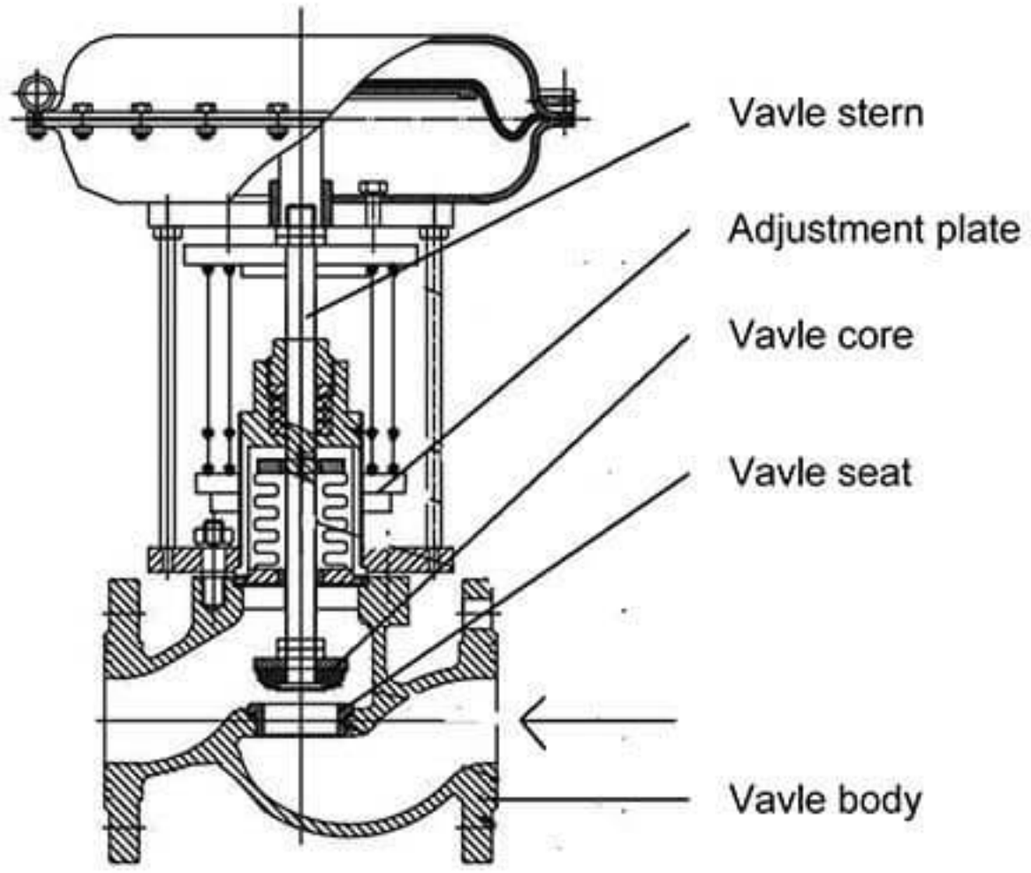
5/ Control and adjustment of self-operated pressure regular valve

1. The application and characteristics:

Regular valve pressure setting point could be adjusted freely when running, It adopts the open flow characteristic with quick action and good seal performance.

2. Structure and function principle:

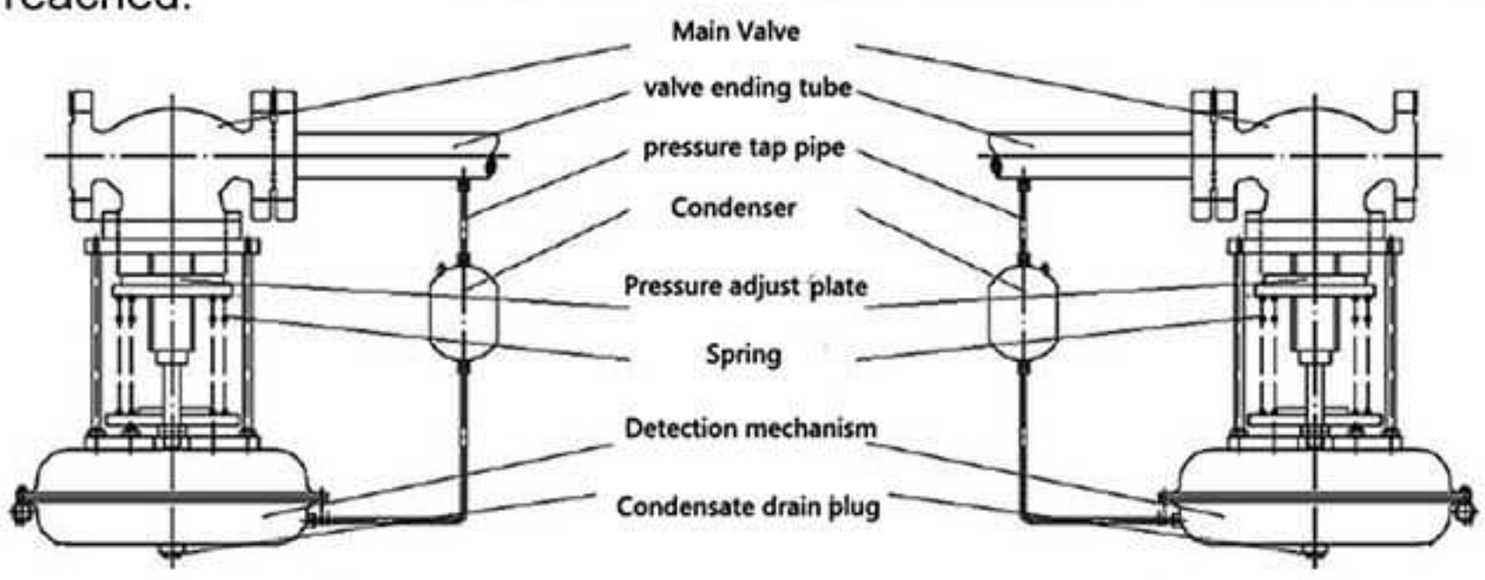
Regular valve mainly includes detection mechanism, regulating valve, condenser, valve ending connecting pipe. The detection actuator is diaphragm type (see below graph), diaphragm type is good for regulating sensitivity and quick pressure change.



Diaphragm Type

Working principle (see graph below):

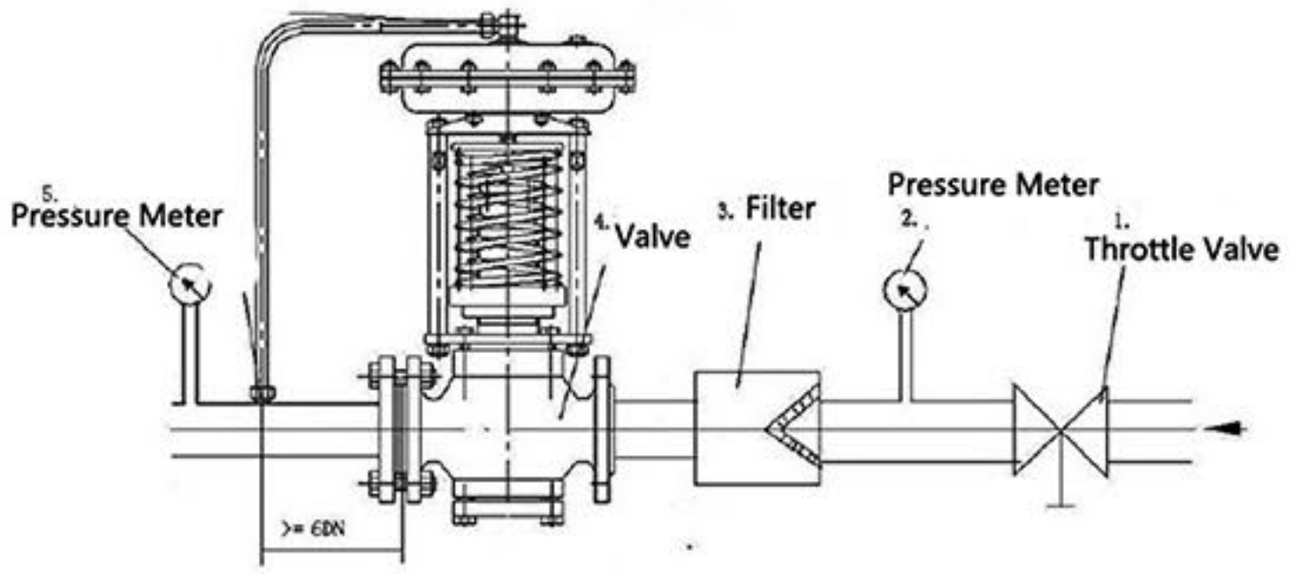
Medium flowen by the direction of the arrow into the valve body, then goes into valve core and valve seat;at same time another medium passes the condenser (it works when the medium is hot steam) and cooled,flows into diaphragm of the actuator mechanism, the valve core will displace accordingly to maintain the medium pressure. When valve ending pressure increases, then the pressure forced on the diaphragm will increase and press the spring to drive the valve core to close the valve until the setting point is reached.In the same way, when the valve ending pressure reduces, then the pressure forced on the diaphragm will reduce and release the spring to drive the valve core to open the valve until the setting point is reached.



3. Installation and maintenance of the self-operated pressure regular valve：

(1). Installation

When valve be used for gas or low viscosity liquid medium at normal temperature (≤70 ℃) , it could be installed in horizontal pipe, (see the graph below)



Pay attention to below items when installation:

a. Condenser must be higher than that of pressure regulating valve actuators, lower than the connecting pipe valve, to ensure that full of condensate in the condenser.

b. Pressure tap points should be the proper position, Pressure regulating valve should be bigger than 2 times diameters before and after the valve regulating valve should be bigger than 6 times of the pipe diameter.

c. For convenience of pressure regulating valve on-site maintenance and operation, the pressure regulating valve should have proper space all around. Pressure regulating valve should have throttle valve inlet and outlet, also should have manual bypass valve.

d. The medium flow direction is same with arrow on valve body, inlet and outlet pipe center of pressure regulating valve should be aimed at regulating valve flange center to avoid the valve body high stress.

e. Filter should have installed to prevent the medium impurities clogging.

f. Pressure regulating valve should be installed in the environment temperature from - 25 ℃ to + 55 ℃.

(2). Operation

a. Operate it under the normal environment temperature and use for gas and low viscosity liquid.

b. Open the inlet and outlet throttle valves of the pressure regulating valve to start the operation, unscrew the drain plug (see graph below) until gas or liquid overflows from the actuator, and then tighten drain plug.

(3). Maintenance

It is easy to maintain the pressure regulating valve when normal operation only checking the pressure meter of the inlet and outlet of valve. In addition, observe the leakage of the actuator mechanism. Please change the diaphragm if any leaking.

Self-operated Pressure Regular Valve Trouble shooting

Symptoms	causes	Remedies
Outlet pressure not stable and changes along with inlet pressure	1、valve core jammed 2、Valve stern, push rod jammed 3、liquid inlet pipe jammed	1、clean 2、adjustment 3、unplugging
Outlet pressure always higher than the setting point	1、spring rigidity is too high 2, the valve diameter is too big 3, inlet pressure is too high, and the ratio is too big	1、change the spring 2、change the valve with smaller diameter 3、if the pressure ratio between inlet and out valve more than10:1, should reduce the valve pressure with 2 level
Outlet pressure always lower than the setting point	1、spring rigidity is too low 2、the valve diameter is too small 3、pressure ratio is too small	1、change the spring 2、change the valve with bigger diameter 3、increase the inlet pressure if ratio less than 1:25

Symptoms	causes	Remedies
Inlet pressure always lower than the setting point	1、spring rigidity is too low 2、valve core jammed 3、valve stern, push rod jammed 4、vale core or valve seat damage and leakage 5、valve diameter too big	1、change the spring 2、clean 3、adjust 4、repair or change 5、change valve with smaller diameter
Inlet pressure always higher than the setting point	1、spring rigidity is too high 2、valve diameter is too small 3、valve core, stern, or pushrod jammed	1、change the spring 2、change valve with bigger diameter 3、clean and adjust
Outlet or inlet pressure changes frequently	1、valve diameter is too big 2、the diaphragm capacity is too small	1、choose correct valve diameter 2、add a damper in the liquid inlet pipe

III Regular checking and maintenance of biogas compressor set

1/ Regular maintenance schedule

(1) Keep the clearance of biogas compressor set.
(2) Discharge the water and oil from the drain plug of the gas storage per day. Do it per 4 hours when heavy moisture.
(3) Check the oil lever per day.
(4) Clean the biogas filter per 30 days normally, less or more according the actual situation.
(5) Check the tension of belt and blot per month.
(6) Change oil in the first 100 hours from start running, and per 500 hours after that.
notice： Must clean the crankcase when the oil is changed.
(7) Clean the biogas valve per 1000 hours (or half year).
(8) Clean each parts of the machine once per year.

2/ Maintenance

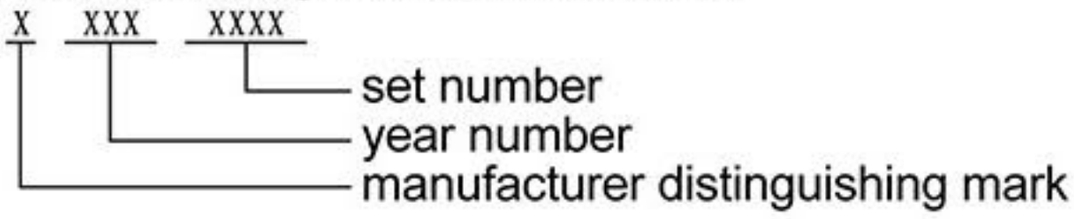
(1) All the maintenance work should be performed after the machine shut off and pressure release, it should be at least 15 minutes later to open the crankcase after the biogas compressor set shut off.
(2) When the biogas compressor set maintaining, the warning sign should be put on site which writing " WARNING: UNDER MAINTENANCE, RUNNING STRICTLY PROHIBITED". The inlet and outlet biogas pipe , motor power should be cut off to avoid the wrong starting of the biogas compressor set negligently,
a. cut off the control cabinet power supply
b. cut off the motor power supply
c. close off main pipe value of biogas
(3) The safety valve of the biogas compressor set should be calibrated at least once per year; the pressure gauge should be corrected according the government requirement regularly. The pressure regulating valve, one way valve also should be checked regularly to make sure the normal working condition.
(4) All the protection device such as safety cover, warning sign should be checked regularly.
(5) The storage tank should be inspected strictly and regularly comply with "pressure vessel safety technology and supervision rules".
(6) When regularly cleaning the compressor parts, it cannot be used easy volatile, inflammable cleaning agents or harmful detergent to clean in any case. All parts should be rinsed and blown dry after cleaning finished.

3/ Safety Valve

Do not adjust the safety valve arbitrarily since the release pressure already setting. Please contact us or professional person if you need change setting.

4/ Motor repairing and manufacturing number

(1) Please check the motor power if same as the required kW for the biogas compressor set.
(2) Keep the motor surface clean and good ventilation of the air inlet.
(3) Make sure the lubrication of the motor and change or fill the grease per 5000 running hours.
(4) Please change the grease in time when bearing overheat or grease deterioration is found.
(5) Please change the bearing when motor vibration and noise increases visible.
(6) Manufacturing number as follows:

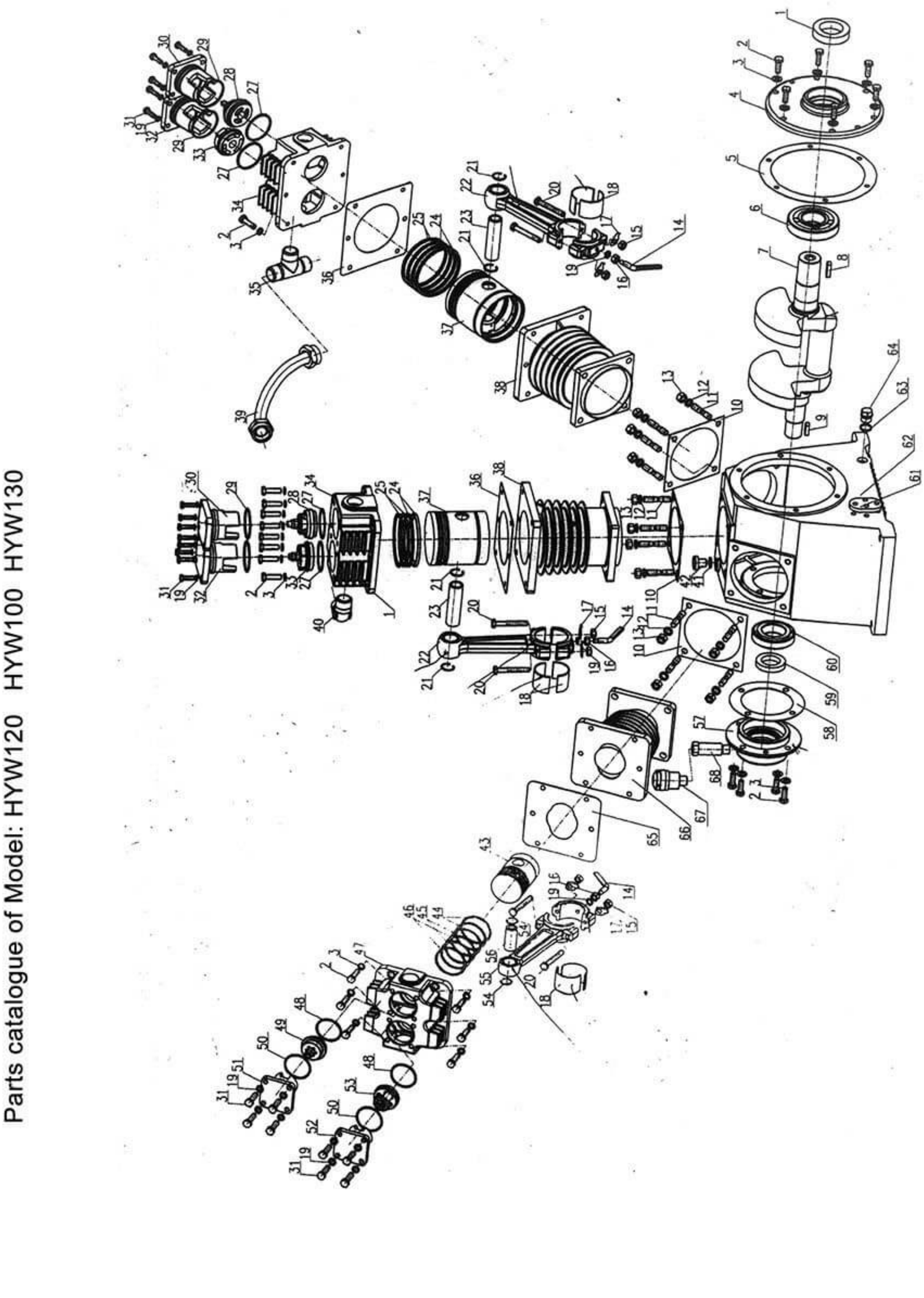


IV Trouble shooting of biogas compressor set

Case	Symptoms	causes	Remedies
Operation	Wrong rotation direction	Wrong motor wiring	Correct motor the wiring
	Rotate slowly	Belt loose and skid	Tense the belt
	Strongly vibration	Crankshaft problem	Change crankshaft or repair
	Pressure cannot increase to the setting point	01.Valve damage	Repair or change valve
		02.Valve seat gas leakage	Repair of change
		03.Spring problem	Change new one
		04.Dirt or carbon	Clean the valve body
		05.Safety valve leakage	Dismantle or change the safety valve
		06.Bolt hole leakage	Lock bolt with gasket
		07.Piston ring leakage	Change piston ring
		08.Asbestos too thick	Change the asbestos
		09.Outlet switch leakage	change
		10.Aluminium tube leakage	repair or change
		11.Throttle valve leakage	change
		12.High air consumption	change
		13.Inlet filter element jammed	change or clean
		14.Inlet pipe jammed	clean
		15.Regular valve core jammed or dirt	clean
	Less gas outlet	01.Pipelines jammed	Clean pipelines
		02.Inlet filter dirty	Clean or change
		03.Valve sets loose	Lock valves
		04.Valve damage	Change
		05.Low rpm	Check the belt tension
		06.Piston ring worn away	change
		07.Connect points leakage	check
		08.Main shaft bearing score due to low oil	repair and change
		09.Inlet pipe jammed	change or repair
		10.Inlet filter elements jammed	change or clean
		11.Regular valve core or valve body dirty	clean or change
	High oil consumption	01.Piston ring worn	Change
		02.Piston worn	Change
		03.Cylinder worn	Change
		04.Compressor wrong rotation direction	adjust
	Belt skid	01.Too high pressure	Lower the pressure
		02.Belt loose	Tense belt
		03.Belt aged	Change new belt
	Motor overheat	01.High pressure cause the motor overload	Lower the pressure
		02.Piston damage	repair
		03.Bearing damage	repair
		04.Loss of Voltage	install voltage regulator
		05.Cable not proper	change cable
	Noise increase suddenly	01.Outlet pipes leakage	Check and repair
		02.Main shaft bearing score due to low oil	Repair and change

Case	Symptoms	causes	Remedies
Non operation	No sound	01.Power off 02.Cable broken 03.Motor breakdown 04.Switch off	 Change the cable Repair motor Switch on
	Fuse broken easily	01.Too small fuse 02.Wrong wiring 03.Motor overload 04.Outlet valve leakage caused motor overload 05.Crankshaft tightly assembled 06.Throttle valve elements worn	Change a bigger fuse Change the wiring Reduce the load Repair Repair Check and change the elements

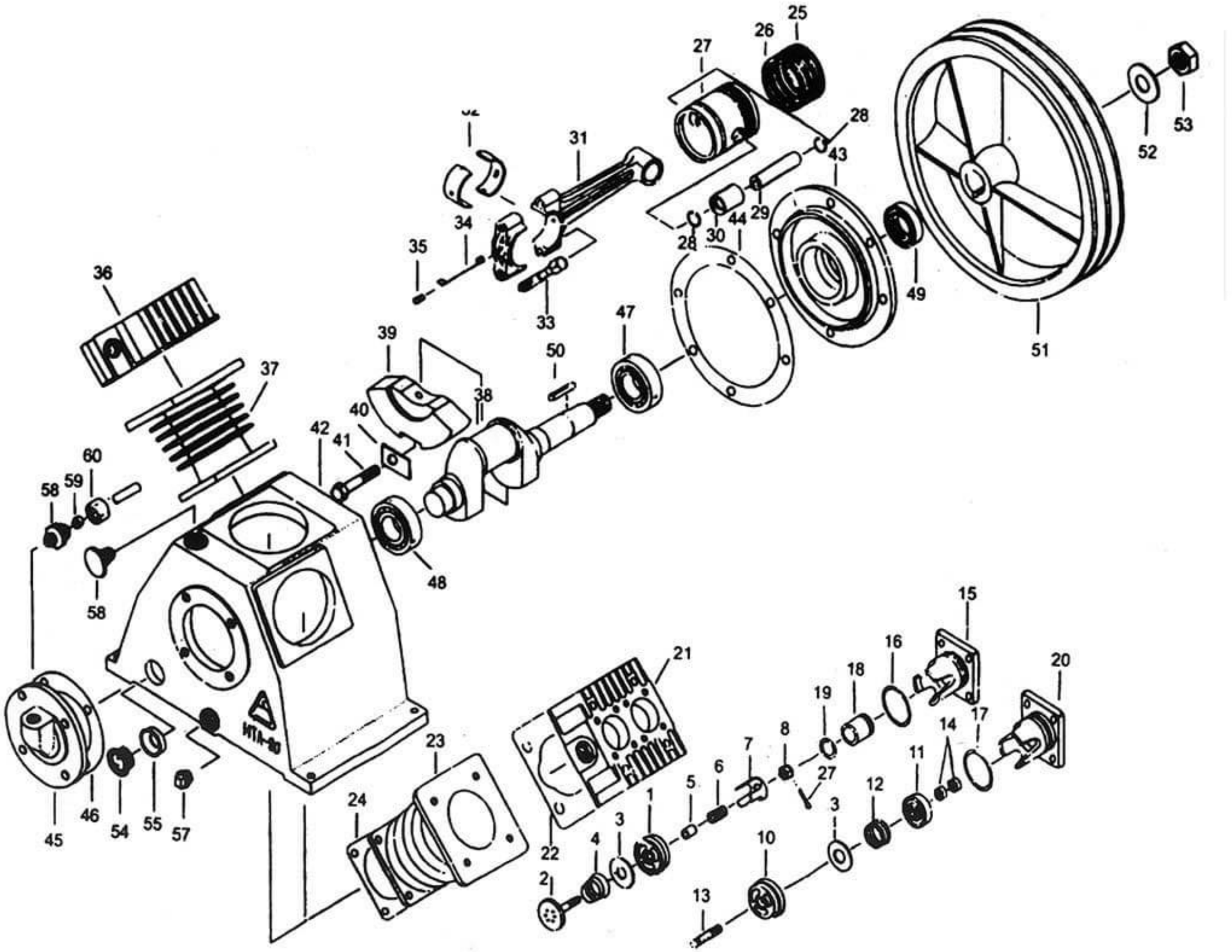
V Parts catalogue of biogas compressor set



Parts catalogue of Model: HYW120 HYW100 HYW130

1、 oil seal
2、 bolt M10X35
3、 gasket 10
4、 bearing seat
5、 gasket
6、 needle bearing
7、 crankshaft
8、 key 14X50
9、 key 6X25
10、 gasket
11、 stud M12X32
12、 gasket 12
13、 nut M12
14、 oil supply stern
15、 nut M10X1
16、 nut M8
17、 lock washer 10
18、 slim cover bush
19、 gasket
20、 connect rod bolt M10X70
21、 retaining ring
22、 connect rod
23、 piston pin
24、 oil scrape ring
25、 twist ring
26、 muffler
27、 washer
28、 intake valve
29、 O type sealing ring ϕ 70X3
30、 intake valve cover
31、 bolt M8X25
32、 exhaust valve cover
33、 exhaust valve
34、 cylinder head
35、 connector
36、 cylinder head gasket
37、 piston
38、 cylinder
39、 pipe
40、 connector
41、 O type seal ring ϕ 23X3
42、 screw M20X20
43、 piston
44、 oil scrape ring
45、 piston ring
46、 twist ring
47、 cylinder head
48、 gasket
49、 exhaust valve
50、 O type ring ϕ 60X3
51、 exhaust valve cover
52、 intake valve cover
53、 intake valve
54、 retaining washer
55、 connect rod
56、 piston pin
57、 end cover
58、 gasket
59、 oil seal
60、 bearing 7510
61、 oil lever
62、 crankcase
63、 gasket
64、 drain plug
65、 cylinder gasket
66、 cylinder
67、 breather
68、 breather connector

Parts catalogue of Mdoel: HYW80 HYW100 HYW120 HYW120G100 HYW100G80



Intake, exhaust valve and unloading device

1、 intake valve upper seat
2、 intake valve lower seat
3、 intake and exhaust valve
4、 intake valve spring
5、 intake valve unloader guider
6、 unload spring
7、 intake valve unloader
8、 self-lock nut
10、 exhaust valve upper seat
11、 exhaust valve lower seat
12、 exhaust valve spring
13、 exhaust valve bolt
14、 nut
15、 intake valve cover
16、 o ring
17、 o ring
18、 unload piston
19、 o ring
20、 exhaust valve cover

Cylinder

21、 level 1 cylinder head
22、 cylinder head gasket
23、 level 1 cylinder
24、 gasket (cylinder to crankcase)
25、 level 1 compression ring
26、 level 1 oil scrape ring
27、 level 1 piston
28、 lock ring , piston pin
29、 level 1 piston pin
30、 bearing, piston pin
31、 connect rod
52、 bearing, crankshaft pin
53、 bolt, connect rod
34、 oil supply stern
35、 bolt, oil supply stern
36、 level 2 cylinder head
37、 level 2 cylinder

Crankcase and crankshaft

38、 crankshaft
39、 crankshaft balance weight
40、 washer, balance weight
41、 bolt, balance weight
42、 crankcase
43、 front bearing cover
44、 gasket, front bearing cover
45、 rear bearing cover
46、 gasket, rear bearing cover
47、 front bearing
48、 rear bearing
49、 front oil seal
50、 pin, V belt pulley
51、 compressor belt pulley
52、 gasket, compressor belt pulley
53、 bolt, compressor belt pulley
54、 oil flow meter cover
55、 oil seal, oil flow meter
56、 breather cover, crankcase
57、 oil plug, crankcase
58、 breather
59、 glass beads
60、 breather cover

HEHAi 河海动力
HEHAi POWER

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