钻井泵系列产品
Drilling pump series product

W-440三缸单作用泵
W-440 Triple Cylinder Single Action Pump
使用维护说明书&零件目录
Operation and Maintenance Manual & Parts Catalog
（第二版）
(Version II)

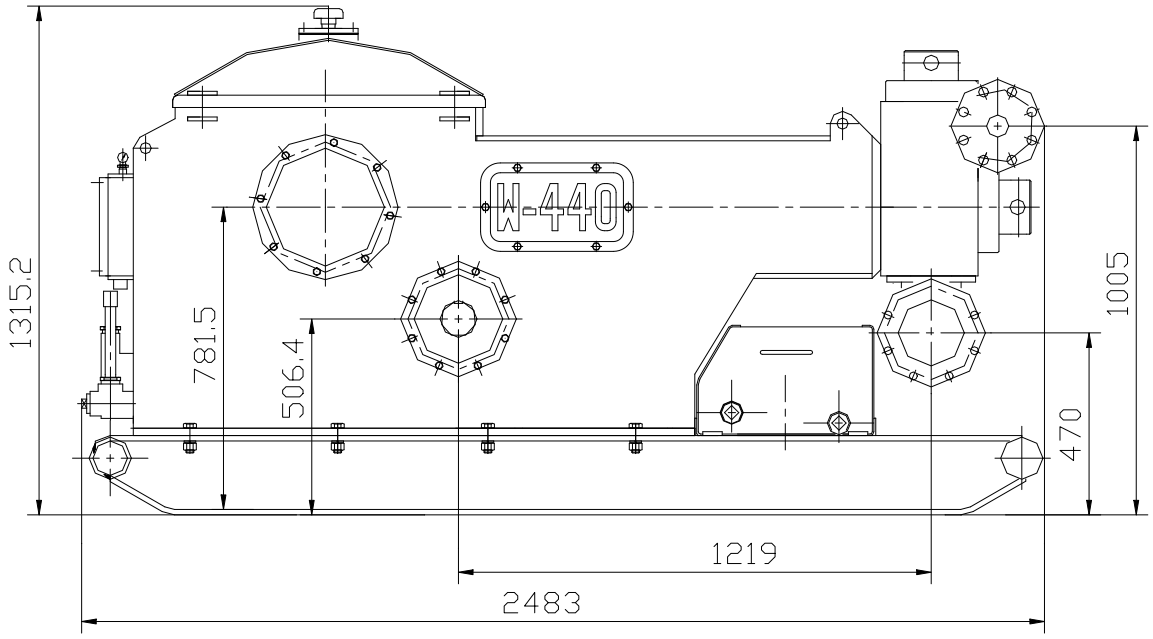
在您准备安装和使用钻井泵以前，请您务必阅读这份使用说明书，它将告诉您正确的安装方法与使用规则，这对钻井泵的使用和维护将是十分有益的。
Please make sure to read this user manual, before you prepare to install and use this drilling pump, and it will tell you the correct installation methods and operation rules, which will be very helpful to use and maintenance of this pair of drilling pumps.

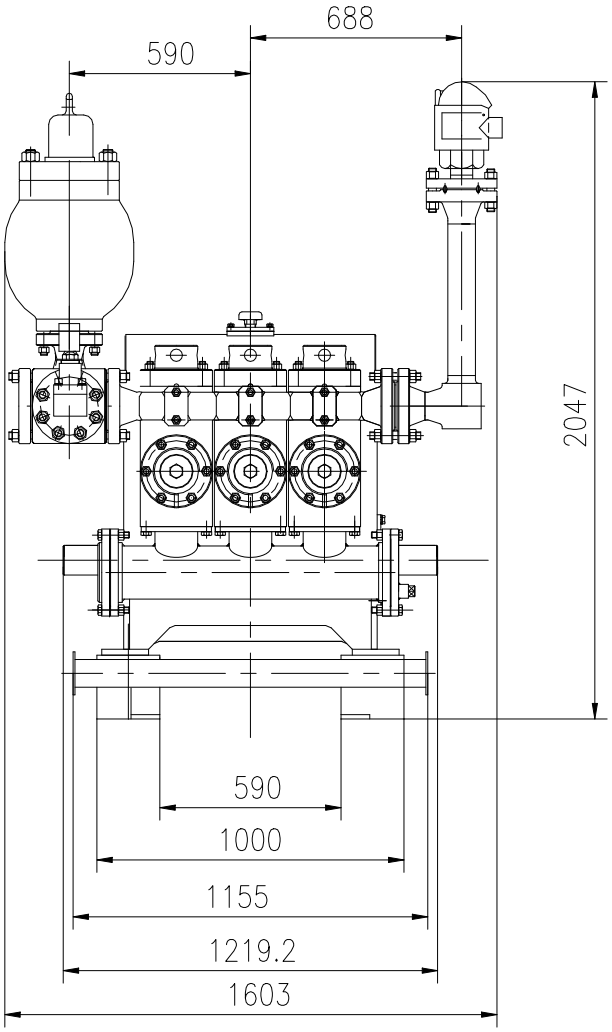
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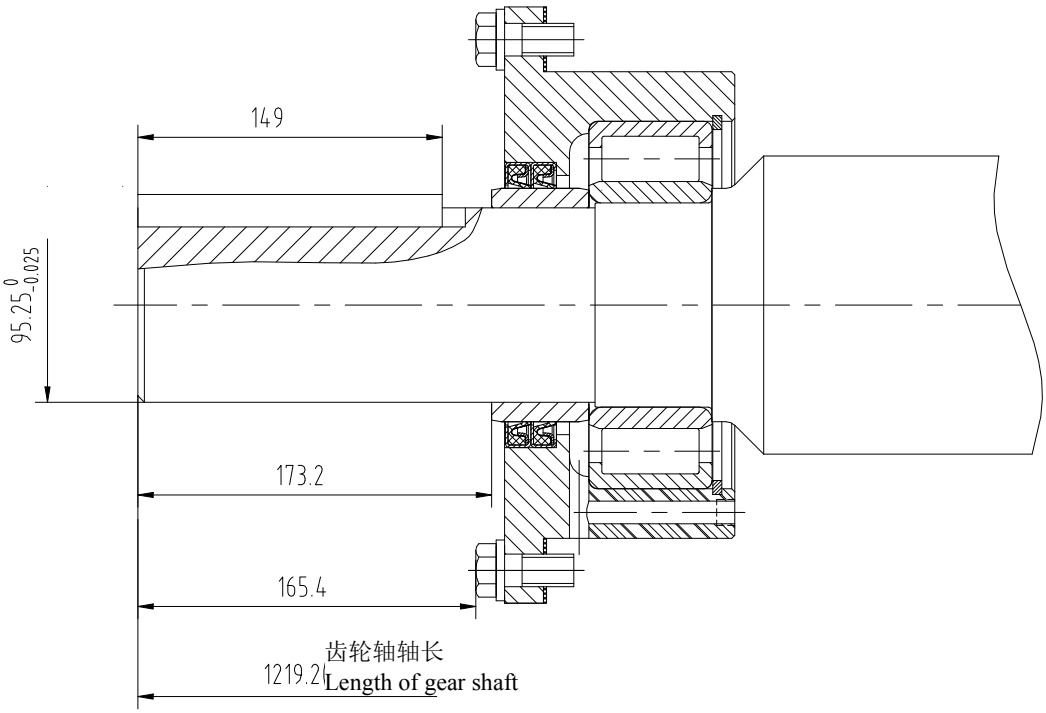
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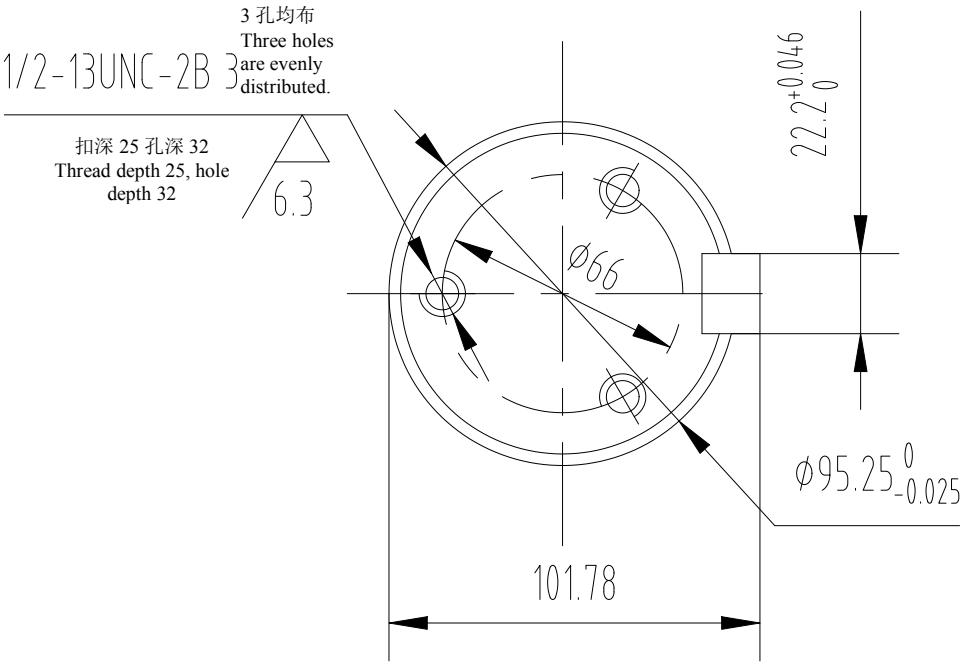
外型尺寸图
Overall Dimension Diagram





W-440 轴头尺寸
W-440 Shaft Head Dimension





一、W-440 三缸单作用泵技术规范
Technical specification of W-440 triple cylinder single action pump

额定输入功率 Rated output power	324kw (440HP) 324 kw (440 HP)
最高冲次 Maximum strokes per minute	320 冲/分 (320SPM) 320 strokes per minute (320 SPM)
连续运转冲次 Strokes per minute for continuous runs	220 冲/分 (220SPM) 220 strokes per minute (220 SPM)
冲程 Stroke	152.4mm (6″) 152.4 mm (6″)
齿轮传动比 Gear ratio	4.578：1 4.578:1
最高工作压力 Maximum working pressure	35 Mpa 35 MPa
阀腔 Cavity	API #4 API #4
最大缸套直径 Maximum liner diameter	4 1/2″ 4 1/2″
吸入管口, Suction pipe orifice	6″ (150#)法兰 6″ (150#) flange
排出管口 Discharge pipe orifice	2 9/16-5000Psi 法兰 2 9/16-5000Psi flange
小齿轮轴直径 Diameter of pinion shaft	95.25 mm(3.75″) 95.25 mm (3.75″)
键 Key	22.174x15.9mm 22.174x15.9mm
泵外形尺寸（主机）： Overall dimension (main frame):	2483X1219X1315 mm 2483X1219X1315 mm
重量（主机） Weight (main frame)	3950 kg 3950 kg

二、结构特点
Structural characteristics

整机结构设计紧凑、体积小、重量轻、齿轮副为整体人字齿轮传动，传动扭矩大、工作平稳。曲轴为锻件焊接结构的平衡曲轴，重量轻、无振动、运转平稳。

The whole machine has compact structure, small volume, light weight and the gear pair is driven the whole herringbone gear. It has large driving torque and stable operation. The crankshaft is the balanced shaft with forging welded construction, with light weight, stable running and without vibration.

W-440 三缸单作用泵可广泛用于油田的各种作业、缸套规格 3 1/2"---4 1/2"宜采用活塞结构，适宜修井作业、以及浅井钻井等，缸套规格 3 1/4"---2 适宜采用柱塞，可适用于高压作业。

W-440 triple cylinder single action pump is widely used for different operations. The liners with specification of 31/2"-41/2" should be of piston structure, suitable for well workover and shallow-water well drilling; and the liners with specification of 31/4"-2 should be of plunger piston structure, suitable for high pressure operation.

动力端
Power end

机架 为钢板焊接结构，焊后经退火处理，以消除内应力，钢性好、强度高在曲轴轴承座和主轴承座处采用加强板结构，刚性好强度高。
Frame. It is of steel welding structure. After welding, it is subject to the annealing treatment to relieve the stress, thus having good rigidity and high strength. The stiffening plate structure is used at the bearing housing of crankshaft and main bearing housing, thus having good rigidity and high strength.

曲轴 曲轴上分别装有大齿圈、连杆、轴承等。大齿圈的齿形为（整体）人字齿，大齿圈内孔与曲轴为过盈配合，并用螺栓和防松螺母紧固。连杆大端通过单列短圆柱滚子轴承分别安装在曲轴的三个偏心拐上，小端通过双列长圆柱滚子轴承安装在十字头销上。曲轴两端为锥面双列向心球面滚子轴承。
Crankshaft. The crankshaft has large gear rim, connecting rod and bearing. Among them, the large gear rim (integral) is herringbone and the inner hole of large gear rim and crank are interference fit and tightened with bolts and lock nut. The connecting rod big-end are installed on three eccentric cranks of the crank respectively by passing through the single row cylindrical roller bearing while the small end is installed on the crosshead pin through dual row cylindrical roller bearing. Both ends of the crank are double-row self-aligning spherical roller bearings.

齿轮轴 为合金钢锻件，在轴上加工有人字齿轮（整体），采用中硬齿面。为了便于维修，选用了内圈无挡边的单列向心长圆柱滚子轴承。齿轮轴的两端轴伸出部分，任一端均可安装皮带轮。
Gear shaft is the alloy steel forged part, processed with angular gear (as a whole) on the shaft, with moderately hard gear surface adopted. In order to facilitate maintenance, the single row radial long cylindrical roller bearing free from lip with inner ring is selected and used. Belt pulley may be mounted on either end of the extensions of the shaft.

十字头 采用球墨铸铁整体铸造，具有良好的耐磨性能，导板采用上下导板结构，可以通过在下导板处加垫片来调整同心度。十字头与中间拉杆之间为销孔配合的法兰螺栓连接。这种刚性连接方法，保证了中间拉杆与十字头的同心度。中间拉杆与活塞杆间采用卡箍连接，重量轻的卡箍使中间拉杆与活塞杆间的连接方便可靠。
he crosshead is wholly cast using spheroidal graphite cast iron, characterized by good wear performance and long service life, while the structure of upper and lower guide plates is applied to drilling pump, able to adjust the concentricity by filling shim in the area of the lower guide plate. Flange bolt connection matched with pin hole is employed between the crosshead and the intermediate draw bar. The concentricity of the intermediate draw bar and the crosshead is ensured through such connecting method typical of rigidity. Clamp connection is used between the intermediate draw bar and the piston rod, and the clamp light in weight has allowed the connection between the intermediate draw bar and the piston ring to be easy and reliable

液力端
Hydraulic end

液缸 材料为合金钢锻件，直通式液缸，体积小，容积效率高。对液缸表面做化学镀处理，以增强抗腐蚀性能。
Hydraulic cylinder It is made of alloy steel forging. As straight-through hydraulic cylinder it has small volume and high volume efficiency. The surface of hydraulic cylinder is nickel plated to improve the corrosion performance.

阀总成 均使用 API 4#阀。吸入阀和排出阀及阀弹簧相同。
Valve assembly. API #4 valve is used for all valve assemblies. Suction valve, discharge valve and valve spring are the same.

缸套、活塞 用作活塞泵缸套、活塞的规格范围是 31/2"、4"、41/2" 活塞杆尺寸规格符合 API 7K 标准代号为 SA-2。
Cylinder liner and piston The specifications of the cylinder liner and piston for piston pump are 31/2", 4" and 41/2" and the specification of the piston rod meet API 7K, Standard code is SA-2.

吸入口 在泵的吸入管两侧均有吸入口，可与吸入管线相接，吸入法兰均采用 6″ASME 150 磅级法兰。此处的密封圈是 O 形圈 185X7（GB/T3452。1）
Inlet. There are inlets on both sides of the pump intake pipe which can be connected to the suction pipeline, the suction flange is 6" ASME 150 pound flange. Sealing ring here is an O-ring 185X7(GB/T3452.1)

排出口 液力端排出管法兰均采用 2 9/16-5000psi 法兰，，此处的密封槽及环尺寸是 R27 （API）。
Outlet. Outlet of the hydraulic end is 29/16-5000psi flange, the size of the seal groove and sealing ring here is R27 (API).

润滑系统 采用强制润滑，在油箱中设置有齿轮油泵，通过润滑管线，将压力油分别输送到十字头、中间拉杆、十字头导板以及各部轴承中去，从而达到强制润滑、冷却的目的，齿轮油泵的工作情况，可以通过机架后部的压力表进行观察。
Lubricating system. With forced lubrication, there is gear oil pump in the oil tank, and it conveys the pressure oil to crosshead, intermediate draw bar, crosshead guide plate and different bearings through lubrication pipeline, so as to realize the forced lubrication and cooling. The working conditions of the gear oil pump can be observed by the pressure gauge behind the frame.

三、性能参数表
Performance parameters table

W-440 泵参数（间歇运转）Parameters of Pump W-440 (intermittent operation)		冲次/分 Strokes/minute	320	270	220	170	120	70
		额定输入功率（马力）Rated input power (HP)	440	380	320	260	200	200
缸径（in）Cylinder diameter (in)	压力（psi）Pressure (psi)	加仑/转 Gallon/revolution	加仑/分（GPM）Gallon/minute (GPM)					
4-1/2	1710	1.239	397	335	273	211	149	87
4	2169	0.979	313	264	215	167	118	69
3-1/2	2816	0.750	240	202	165	127	90	52
取机械效率η=90%，充满系数α=100%，容积效率 100% Mechanical efficiency η=90%, coefficient of admission α=100% and volume efficiency 100%								

W-440 泵参数（间歇运转）Parameters of Pump W-440 (intermittent operation)		冲次/分 Stroke/minute	320	270	220	170	120	70
		额定输入功率（马力）Rated input power (HP)	440	380	320	260	200	200
缸径（in）Cylinder diameter (in)	压力（MPa）Pressure (Mpa)	升/转 Liter/revolution	升/秒（L/S）Liter/Second (L/S)					
4-1/2	11.79	4.69	25.01	21.11	17.19	13.29	9.38	5.47
4	14.95	3.71	19.79	16.69	13.6	10.51	7.42	4.32
3-1/2	19.4	2.84	15.14	12.78	10.41	8.04	5.68	3.31
取机械效率η=90%，充满系数α=100%，容积效率 100% Mechanical efficiency η=90%, coefficient of admission α=100% and volume efficiency 100%								

为使泵排出压力达到 35MPa，需要降低泵冲使用，此时泵冲为 175 冲/分，缸径、排量与压力关系表如下：
To make the outlet pressure of the pump reach 35 MPa, the pump stroke must be reduced. At this moment, pump strokes are 175 strokes /minute. The relation table of cylinder diameter, displacement and pressure is as below:

缸径（in）Cylinder diameter (in)		3 1/2	4	41/2
排量 Displacement	Gal/Rev	0.75	0.979	1.239
	L/S	8.28	10.82	13.68
压力 Pressure	Psi	5000	3892	3080
	MPa	35	26.86	21.25

四、安装与使用
Installation and use

拆卸缸套程序
Procedures to dismantle the cylinder liner

1. 拆下缸盖（1），取出缸盖堵头（15）、阀侧盖密封圈（16）、吸入阀导向架（17）、阀弹簧、阀体总成。
   Dismantle cylinder head (1), pull out the large plug of the cylinder head plug (15), sealing ring of the valve side cover (16), suction valve guide frame (17), valve spring and valve assembly.
2. 拆除冷却缸套喷淋管总成。
   Dismantle the spray pipe assembly of the cylinder liner.
3. 拆卸卡箍螺栓（30）及卡箍（29）。
   Dismantle the collar clamp bolt (30) and collar clamp (29).
4. 盘泥浆泵传动轴，使活塞杆（26）运行到前死点位置，继续盘车到后死点位置，使活塞杆与介杆之间脱开并有足够的空间，以便拆卸缸套（21）。
   Jigger the transmission shaft of the mud pump to move the piston rod (26) to the front dead point, continue to jigger until to the back dead point, so as to disconnect the piston rod and immediate rod and leave enough space between them, for convenience of dismantling the cylinder liner (21).
5. 拆除 4 个缸套压盖螺母（31）。
   Dismantle the 4 nuts (31) of the cylinder liner gland.

6. 用长铜棒从液力端液缸内撞击缸套右端面，使缸套从液缸（9）内脱开，然后取下缸套压盖，将缸套、活塞及活塞杆一起取出。
   Strike the right end surface of the cylinder liner with a long copper rod in the hydraulic cylinder from the hydraulic end to disconnect the cylinder liner from the hydraulic cylinder (9), then remove the cylinder liner gland, and take out the cylinder liner, piston and piston rod all together.

7. 更换活塞及缸套，更换损坏的密封圈。
   Change the piston and cylinder liner, and change the broken sealing ring.

安装缸套程序
Procedures to install the cylinder liner

1. 将所需的活塞安装到活塞杆之前，应检查活塞杆与活塞根部 O 型密封圈（25），并涂黄油。卡住活塞杆扁方，上紧活塞锁紧螺母（23）。
   Before install the required piston to piston rod, the piston rod and the O-ring (25) on piston bottom shall be checked, and shall be coated with butter. Stick the flat end of the piston rod, and tighten the piston locking nut (23).

2. 将组装好的活塞杆及活塞总成预先装入缸套中（注意：由于活塞唇口尺寸比缸套内径大，因此，装活塞时要顺着从活塞底部方向安装，避免倒着安装）。
   Pre-install the assembled piston rod and piston assembly into cylinder liner (Note: Because the piston lip is larger than the inner diameter of the cylinder liner, the piston shall be installed from the bottom to avoid inverse installation).

3. 将缸套压盖连同缸套、活塞杆、活塞总成等从机架中腔将缸套装入液缸内，同时检查缸套密封圈（20）是否完好并涂黄油。
   Install the cylinder liner into the hydraulic cylinder from the frame central chamber by the cylinder liner gland together with cylinder, piston rod, piston assembly, etc. Meanwhile check whether the cylinder liner sealing ring (20) is complete and coated with butter.

4. 盘动传动轴，用介杆将缸套顶近液缸并安装到位（为保证缸套对正液缸孔，可同时用铜棒从液缸前面伸进撬缸套），锁紧 4 个缸套压盖螺母（31）。
   Jigger the transmission shaft, push the cylinder liner into the hydraulic cylinder and install in place with immediate rod (to ensure that the cylinder liner is align with the hydraulic cylinder hole, may as well remove the cylinder liner from the front of the hydraulic cylinder with a copper rod at the same time), lock the 4 nuts of the cylinder liner gland (31).

5. 也可以先装好缸套，然后再将装好活塞的活塞杆从液缸前面装入（可用铜棒敲击活塞杆头部使活塞进入缸套，单独更换活塞时也是如此）。
   You can install the cylinder liner first and then install the piston rod of the assembled piston from the front of hydraulic cylinder (you can knock the head of piston rod with a copper rod to make the piston into the cylinder liner, and it is the same method when you change the piston separately).

6. 盘泵，连接卡箍（29），上紧卡箍螺栓（30）。
   Run the pump, connect the collar clamp (29), and tighten the collar clamp bolt (30).

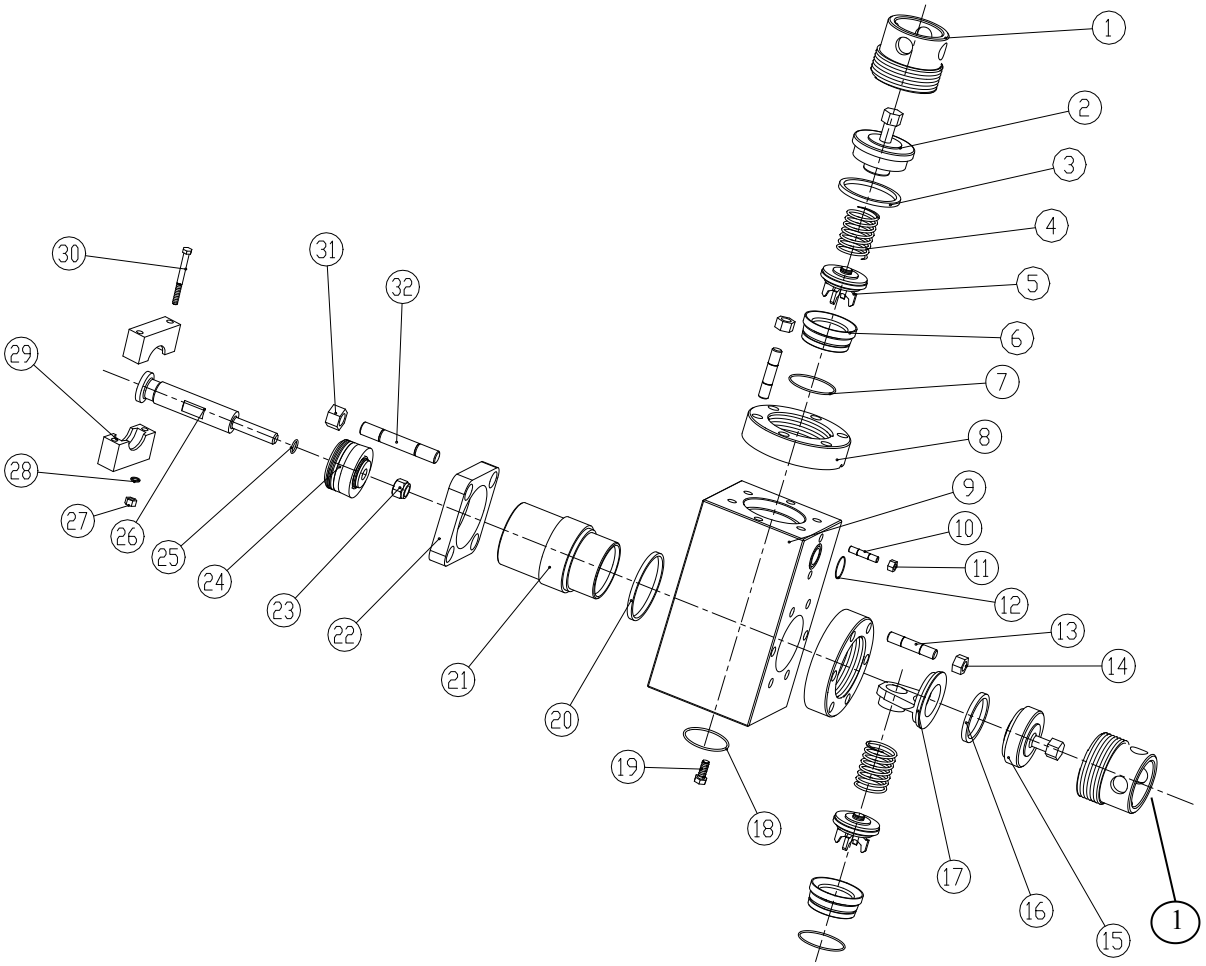
7. 依次装入阀体总成、阀弹簧、吸入阀导向架（17）、阀侧盖密封圈（16）、缸盖堵头（15）并拧紧缸盖（1）。
   Install the valve assembly, valve spring, suction valve guide frame (17), valve side cover sealing ring (16), cylinder head plug (15) successively, and tighten the cylinder head (1).

8. 安装喷淋管总成。
   Install the spray pipe assembly.

9. 盘泵检查各部是否有卡阻现场。
Run the pump and check if there is any jam spot in different parts.

正常情况下，更换泥浆泵三只缸套需 3-4 小时。
Normally, it takes 3 to 4 hours to change the three cylinder liners of the mud pump.

附图：W440 液缸总成
Figure: W440 Hydraulic Cylinder Assembly



喷淋系统 W-440 泵工作时需配置喷淋系统以冷却、润滑缸套和活塞，W-440 泵已随机配置了水箱和喷淋管，水箱的连接口螺纹为 NPT 11/2，喷淋管的接口螺纹为 NPT 3/4。
Spray system. W-440 pump must be configured with spray system to cool down and lubricate the cylinder liner and piston while working. W-440 pump has already been equipped with water tank and spray pipe, screw thread of water tank connector is NPT 11/2, and screw thread of spray pipe connector is NPT 3/4.

在所有使用时间内都必须注意，冷却液要充分供应到缸套及活塞上，冷却液的中断会立即导致活塞橡胶件及缸套损坏。缸套的冷却液采用水或用水为基本介质，加入防锈剂的冷却液。
See to it that the cooling fluid shall be supplied to cylinder liner and piston fully within the operation duration, as the interruption of it will result in the damage to the piston rubber parts and piston. The cooling fluid of cylinder liner is water or the fluid that takes water as the basic media and is added with anti-rusting agent.

喷淋泵系统必须比钻井泵先启动或同时启动，以免烧坏活塞或缸套，经常检查喷管，确使喷出的液流要直接射到活塞上。
The spray pump system must be started together with or before the drilling pump so as to avoid burnout of piston or cylinder liner, check the spray pipe regularly so as to ensure that the fluid sprayed is directly shot to the piston.

排出空气包 W-440 泵工作时需合理配置排出空气包，空气包是非常有效的辅助装置，使泵动力端受力平稳，液力端排出液流脉动减少、从而使管路液流均匀，惯性力减少，降低压力波动。
Discharge pulsation dampener W-440 pump shall be configured with discharge pulsation dampener while working which is a very effective auxiliary device to make the stress on the power end stable and reduce the pulsation of the discharge fluid from the hydraulic end thus make the fluid in the pipeline even, and the inertia force falls down and the pressure fluctuation reduces.

安全阀 排出管路应配置安全阀、以避免系统内压力突然升高，使泵及系统管路过载损坏。
Safety valve Outlet pipeline shall be configured with safety valve to avoid the pressure surge within the system which may damage the system because of overload of system pipeline.

泵的基础 泵的安装基础必须是水平的，并有足够的强度，以便能够支持泵的自重和运转时产生的力。应尽量将泵放在水平的基础上，防止动力端机架可能的扭曲或歪斜。
Pump base Installation base of the pump must be level and of enough strength so as to support the self weight of the pump and the stress produced during the operation. Please try to put the pump on level base so as to avoid the possible twist or skew of the power end frame.

传动装置 泵和动力源之间的传动元件不论采用三角皮带或多排链条传动，均应在安装时十分小心，以保证传动的可靠性并可避免由于传动故障造成的停机。
Transmission device The drive element between pump and power source, whatever V-belt or multi-strand chains, shall be installed carefully to ensure the reliability of driving and avoid shutdown due to the gear fault.

五、泵的起动及操作
Starting and operation of the pump

1. 动力端的准备工作
Preparation for the power end

钻井泵在出厂前已完全组装好，并经过负荷运转试验，润滑油已从动力端放出。在泵运转前要进行下述的操作和检查。
The drilling pump has already been completely well assembled before delivery from the factory, and has been subjected to the load running test, while lubricating oil has been discharged out from the power end. It is required to make undermentioned operations and inspections before operation of the pump.

开动一台新泵或重新开动一台久停不用的泵时，在加入润滑油以前，先打开泵上的上罩，检查动力端内腔里是否可能有凝集润滑油，打开泵两侧的管堵，放出集存的油，并冲洗动力端内腔。然后按下述要求将一定牌号和数量的润滑油注入动力端油池内，同时打开十字头孔盖，用机油枪将润滑油喷到导板上并盘车数圈，以保证启动泵时立即得到润滑：
When a new pump is started or a pump that has not been used for a long time, firstly open the inspection cover on the pump, before lubricating oil is filled, to examine whether or not lubricating oil has possibly been agglutinated in the inner chamber of the power end, and open the pipe plugs on the two sides of the pump, discharge out the accumulated oil, and flush the inner chamber of the power end. Then fill certain brand and amount of lubricating oil into the oil sump of the power end according to the undermentioned requirements, and at the same time open the crosshead hole cover, use oil gun to spray the lubricating oil onto the guide plate and turn the engine for a number of circles, to ensure that lubrication is available immediately when pump is started.

使用极压（EP），无腐蚀，防泡沫的齿轮润滑油，规定如下：
Use extreme pressure (EP), non-corrosive, and anti-foam gear lubricating oil, and the specifications are given as follows:

环境温度 +10℃~+68℃ L-CKD460 或 AGMA MILD EP #7。
Ambient Temperature +10℃~+68℃ L-CKD460 or AGMA MILD EP #7

环境温度-7℃~+38℃ L-CKD320 或 AGMA MILD EP #6。
Ambient Temperature +7℃~+38℃ L-CKD320 or AGMA MILD EP #6

环境温度-29℃~+16℃ L-CKD68 或 AGMA MILD EP #2。
Ambient Temperature -29℃~+16℃ L-CKD68 or AGMA MILD EP #2

加油量：至油标尺高油位，约 146 升。
Filling Amount: to the high oil level of the oil pointer, about 146L

在泵运转 15 分钟以后，再次检查油面，停泵大约 5 分钟使油平稳后，检查油标尺，由于有一定量的润滑油停滞在十字头以及机壳空腔，可能使油位下降视需要补充一定量的润滑油。
After the pump has run for 15min, examine the oil level again, and examine the oil leveler, after the pump has been stopped for about 5min to stabilize the oil. As certain amount of lubricating oil stays behind in the crosshead and the empty chamber of the case, the oil level may likely drop, to be supplemented with certain about of lubricating oil as required.

2. 液力端的准备工作
Preparation for hydraulic end

检查液力端的缸套，活塞和阀是否装配正常，泵排出管线阀门是否打开。
Examine whether or not cylinder liner, piston, and valve of the hydraulic end are normally assembled, and whether or not the valve of the discharge line for the drilling pump is opened.

起动前，必须在液缸里灌满泥浆或水，以免发生气穴现象，已经发生气穴现象的泵，不能在有压力的情况下解除气穴，所以要打开通向泵的阀门，作“小循动”运转，让泵运转到所有空气都被排除为止，这样可以保证钻井泵运行平稳，并延长易损件的寿命。
Prior to start, it is required to fill up mud slurry or water in the hydraulic cylinder, to avoid cavitation. As to the pump that has encountered cavitation, the effect shall not be removed under the situation when there is pressure. Therefore, the valve leading to the drilling pump shall be opened, to make “minor-circulation” operation, and allow the pump to run until all the air is removed, thus to be able to ensure a steady operation of the drilling pump, and extend the service life of the wearing parts.

检查安全阀安全设定压力是否与缸套相应压力匹配。详见安全阀使用说明书
Examine whether or not the safety pin of the safety valve has been inserted on the pin hole of corresponding pressure of the cylinder liner. Refer to the Safety Vale Operating Manual for details.

喷淋泵系统必须比钻井泵先启动或同时启动，以免烧坏活塞或缸套。在离心式喷淋泵启动之前，必须向泵体内灌满液体，使之不产生气穴现象。
The spray pump system must be started earlier or at the same time compared with the drilling pump, to avoid burnout of piston or cylinder liner. Before the centrifugal spray pump is started, it is required to fill up fluid into the pump body, for it to be free from generation of cavitation.

3. 起动后的工作
Work after Start

泵的转数最好慢慢提高，这样做可使吸入管线内液体流速的增加跟上活塞的速度，不致发生气穴现象。
It is advisable for the number of pump revolutions to be slowly increased, which may enable the increase in the flow speed of the fluid sucked into the pipeline to keep up with the speed of piston, not giving rise to cavitation.

在自然吸入情况下，泵的最高转数决定于泵在吸入行程中是否吸足液体，这个极限转数在不同的情况下是不一样的，根据吸入管线的设计和有效压头而异，也根据液体情况而异（如泥浆比重、粘度和所含的气体量），操作人员根据泵的声音来判断是否出现气穴或吸入不良，以便及时采取措施。
Under the circumstance of natural suction, the maximum number of pump revolution depends on whether or not fluid has been sufficiently sucked during the suction stroke, and this limiting number of revolutions is different under different situations, varying according to the design of the suction line and the effective pressure head, or according to the situation of mud as well (such as the specific weight, viscosity, and the contained gas amount of the mud). Operator judges whether or not cavitation has occurred or the suction is poor according to the sound of the pump, so that the measures can be timely taken.

检查动力端各个轴承部位，十字头导板等位置的温度是否过高和有异常响声、异常现象等，一般油温升不超过 45℃。
Examine whether or not temperature in the positions of respective places of bearing on the power end, and the crosshead guide plate, etc is too high or anomalous sound, and anomalous effect exists there, and generally the oil temperature shall not exceed 50℃.

4. 润滑
Lubrication

对运动的机械零件进行充分的润滑是很重要的，它直接影响机械零件的极限寿命，要使泵动力端获得最长的无故障寿命，就必须进行常规的保养和检查，以保证适量的清洁的润滑油流到各运动零件上。
It is very important to make full lubrication to the moving mechanical parts, and it directly affects the limit service life of the mechanical parts. Routine maintenance and inspection must be performed, if it is intended for the power end to get the longest fault-free service life, to ensure that proper amount of clean lubricating oil can flow onto respective moving parts.

钻井泵的动力端润滑系统采用强制润滑方式，设置在油箱中的齿轮油泵，通过润滑管线，将压力油分别输送到十字头、中间拉杆、十字头导板以及各部轴承中去，从而达到强制润滑的目的，齿轮油泵的工作情况，可以通过机架后部的压力表进行观察。
For the lubricating system of the power end of the drilling pump, the method of forced lubricating is adopted, and the oil gear pump in oil tank is to convey the pressure oil to crosshead, intermediate draw bar, crosshead guide plate and different bearings through lubricating pipeline, so as to realize forced lubricating. The working condition of the oil gear pump can be observed by the pressure gauge behind the frame.

泵工作时，每班巡回检查一次机架内的油位，使之保持在油标尺的满位标记上。
When pump is under operation, each working shift takes one patrol inspection for the oil level of the mainstock, for it to be kept on the full-level mark of the oil pointer.

在动力端的十字头部位两侧有沉淀池，溅入池内的油污应进行沉淀，沉淀池排油盖位于十字头检查门下方的机架两侧，每月检查一次，打开两侧的排污盖，从沉淀池排出沉渣的油污，这样要损失约一定数量油，因此要补充一定数量的润滑油。
The settling tanks are available on the two sides of the crosshead part on the power end, and the oil stain splashed into the tank shall be settled. The oil discharge covers of the settling tank are located on the both sides of the frame under the access door of the crosshead, to be examined once a month, by opening the blow-down covers on

the two sides, to discharge out the sedimentary oil stain from the settling tank, to lose some oil this way, for this reason it is required to make up certain amount of lubricating oil.

新泵累积运转 300 小时后应更换全部动力端润滑油，然后每六个月时间检查一次，如油里有磨粒或腐蚀性化合物，应一次把油排出，并对油池进行冲洗，然后加入新油。排油口在泵的机架后端。在冲洗时，要彻底清洗各油槽和十字头导板上面的油腔。定期检查润滑油的状况。由于空气的潮气、水分、灰尘、及泥浆的侵入，更需要经常的换油。

All the lubricating oil for the power end shall be replaced after the new pump has cumulatively operated for 300h, to be examined once for every 6 months afterwards. If abrasive particles or corrosive chemicals exist in the oil, the oil shall be discharged out for a single time, and the oil tank shall be flushed, for new oil to be filled then. The oil discharge outlets are located on the two sides and back end of the pump. The oil chambers on respective oil grooves and crosshead guide plate shall be thoroughly cleaned, at flushing. The condition of the lubricating oil shall be periodically inspected. It is moreover required to replace the oil frequently, due to the intrusion of the humidity, moisture, and dust in the air, as well as the mud.

六、保养
Maintenance

1. 每天的保养工作
Daily maintenance

1)、停泵每班检查一次动力端的油位。
Stop the pump every shift and check the oil level of the power end.

2)、观察缸套与活塞的工作情况,不应有明显的偏磨和液体漏失。
Observe the working condition of cylinder liner and piston, there shall be no obvious eccentric wear and fluid leakage or loss.

3)、检查缸套和活塞的冷却液,不足时加以补充,脏了把它换掉,脏的冷却液会增加冷却泵的磨损,缩短使用寿命。
Check the cooling fluid for the cylinder liner and piston, replenish when it is not enough, and change when it is dirty because dirty cooling fluid may exacerbate wear of the cooling pump and shorten its service time.

4)、每天检查一下缸套喷管,以免喷管堵塞,保证缸套与活塞都得到充分的冷却与润滑液的供应。
Check the cylinder liner nozzle every day to avoid the block of the nozzle, and ensure the enough cooling for cylinder liner and piston and the supply of lubrication liquid.

5)、钻井泵安装完毕之后,第一次运转几小时后,应当重新检查一下活塞卡箍的上紧力矩。
After the drilling pump is installed and few hours of the first running, recheck the tightening torque of the piston collar clamp.

6)、每天把活塞杆的卡箍松开,将活塞转动四分之一圆左右,然后上紧卡箍,这样做的目的是使活塞的磨耗面均匀分布,延长活塞与缸套的使用寿命。
Everyday loosen the collar clamp of the piston rod and turn the piston 1/4 circle, then tighten the collar clamp again, in this way the wear surface evenly distributes on the piston thus prolong the service life of piston and cylinder liner.

7)、每天检查一次排出空气包的压力,保证它的充气程度符合规定要求。
Check the pressure of the discharge pulsation dampener once a day, to ensure that the gas charging level meet specified requirements.

2. 每周的保养工作
Weekly maintenance

1)、每周把液缸上的阀盖卸开,把阀盖丝扣和阀盖法兰丝扣上的淤泥与其它脏物清除干净,然后在清理干净的丝扣上涂一层丝扣油,以防扣磨蚀,擦伤和咬死(建议采用铅基丝扣油)。
Remove the valve cover in the hydraulic cylinder every week, clean off the mud and other dirt on the screw thread of valve cover and valve lip flange, then coat the screw thread with a layer of screw thread oil to avoid thread wear, scratch and dead locking (It is suggested to use lead-base screw thread oil).

2)、检查阀和阀座的磨耗情况,把磨损或刺坏了的阀座换掉。
Check the wear condition of the valve and valve seat, and change the broken or pricked valve seat, if necessary.

3)、检查缸套和活塞,如磨耗大或刺坏必须更换。
Check the cylinder liner and piston. It must be changed if the wear is serious or it is pricked.

4)、如果活塞锁紧螺母已经损坏,磨蚀或者锁紧螺母尼龙已经丧失锁紧能力需把它换掉。
Change the locking nut of the piston in case that it has broken or worn or the locking nut nylon has lost the locking ability.

3. 月的保养工作
Monthly maintenance

1)、每六个月把动力端内油槽的沉淀池(十字头下面),中的脏油放掉加以清洗，并加入新油。
Discharge the dirty oil in the precipitating tank (below the crosshead) of the oil tank in the power end, clean it and inject new oil every six months.

2)、每六个月检查导板与十字头之间的间隙，间隙太大应调整。
Check the clearance between the guide place and crosshead every six months. If the clearance is too large, it shall be adjusted.

3)、液力端的所有双头螺柱和螺母包括压盖法兰与液缸,液缸与机壳，缸套座与液缸之间的螺柱螺母,都要检查一次上紧程度。
Tightening of all stud bolts and nuts of the lucid end including the bolts and nuts connecting gland flange and hydraulic cylinder, hydraulic cylinder and the frame, cylinder liner seat and hydraulic cylinder shall be checked once.

4. 年度保养工作
Annual maintenance

每隔一年或两年,检查曲轴轴承,连杆轴承,传动轴轴承,十字头轴承,十字头导板是否松动,如果发现有松动的地方应当对泵进行一次更加彻底的检查并采取纠正措施。
Check the crank bearing, connecting rod bearing, transmission bearing, crosshead bearing, and crosshead guide plate for looseness every one or two years. If any, a more thorough check and corrective action must be taken.

七、贮藏
Storage

动力端:如果泵的停车时间超过三个月,应当把液力端提起垫高使泵向动力端倾斜,然后,将油槽和沉淀池内的油放空,洗干净作长期贮备。
Power End: if the time for the pump to be stopped for operation for more than 3 months, the hydraulic end shall be lifted and filled up, for the power end of the pump to be inclined. Then the oil grooves and settling tanks shall be emptied, and cleaned up, for long-term preservation.

液力端：卸下液缸的阀、活塞、活塞杆缸套，彻底清理液缸内部和所有的零件，在整个液缸阀和零件上都要涂防锈油，清洗缸套喷淋系统和缸套室，在缸套喷淋系统内注入一些润滑油，防止生锈。
Hydraulic End Remove the valve, piston, piston rod, and cylinder liner on the hydraulic cylinder, thoroughly clean the inside of the hydraulic cylinder and all the parts. It is required to coat antirust oil on the entire hydraulic cylinder valve and the parts, to clean the cylinder liner spraying system and the cylinder liner chamber, and to fill some lubricating oil into the cylinder liner spraying system, to prevent rust.

每月把泵检查一次,并转动齿轮一次,如有必要重新涂防锈油。
Examine the pump once a month, and turn the gear once, for antirust oil to be re-coated if necessary.

贮藏后重新开动
Restart of storage

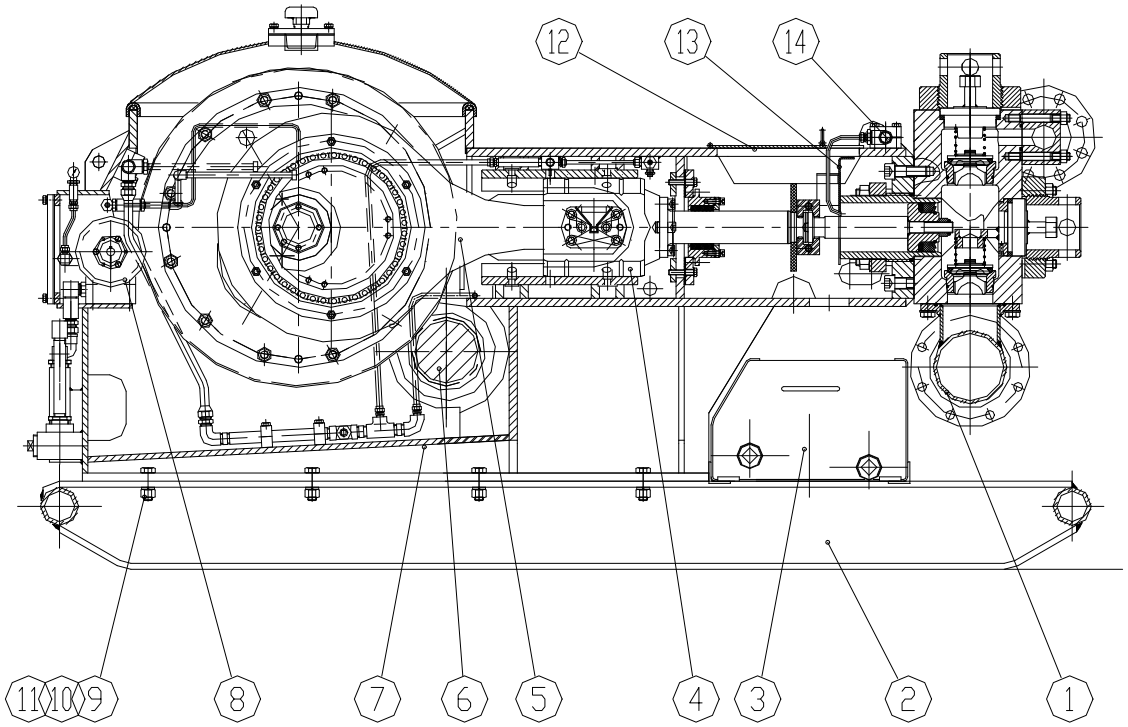
贮藏一段时间后重新开动泵时，不管是现场用的泵，还是刚从工厂送来的新泵，都必彻底检查，确定它有没有损坏零件，以及所有零件是否都装配良好，如果不注意下列各点，可能会引起严重破坏事故。
When the pump is restarted after storage for a period of time, no matter it is the pump used on site or the new pump just delivered from factory, it shall be thoroughly inspected without exception, to make sure as to whether or not it has the damaged parts, and whether or not all the parts are well assembled. It may likely give rise to severe destructive accident, if attention is not paid to the following points.

1. 把动力端和液力端的盖子都打开,彻底检查,清理所有零件和加工面,检查所有轴承,保证它们都是清洁而且情况良好,在动力端加润滑油,加至规定油位。在轴承处加油，并使它流到轴承里面去。
   Open all the covers of the power end and the hydraulic end, to thorough examine and clean up all the parts and the processing surfaces, and examine all the bearings, to ensure that they are all clean and under good conditions. Fill lubricating oil at the power end, to be filled to the specified oil level. Fill oil into the lubricating oil distribution grooves, and have it flow into the bearings.
2. 阀、活塞、缸套和液力端的所有零件必须正确安装并处于良好状态，上紧螺栓、双头螺栓、压紧阀盖、缸盖等。
   All the parts for the valve, the piston, the cylinder liner, and the hydraulic end must be correctly installed and under good conditions. The tighten bolts, the double-ended bots and tighten valve cover and cylinder head shall be tightened.

八、W-440 泵轴承型号对照表
Comparison table of W-440 pump bearing model

序号 No.	名称 Name	部位 Position	型号（国外） Model (Foreign)	型号（国内） Model (Domestic)
1	圆柱滚子轴承 Cylindrical roller bearing	齿轮轴总成 Gear shaft assembly	NU5250MC3	NU 3220 M/P63
2	圆柱滚子轴承 Cylindrical roller bearing	曲轴总成偏心轮 Eccentric wheel of crankshaft assembly	ADD41105GE	NFP 6/292.1 M/P69W33
3	调心滚子轴承 Self-aligning roller bearings	曲轴总成曲轴轴头 Crankshaft head of crankshaft assembly	23224MBKW33C3	23224 CAK/C3W33
4	双列长圆柱滚子轴承 Double row cylindrical roller bearing	十字头总成 Crosshead assembly	TRCIR75168 或 W-3361-C TRCIR75168 or W-3361-C	NNAL 6/69.85 M/C4W33XYA

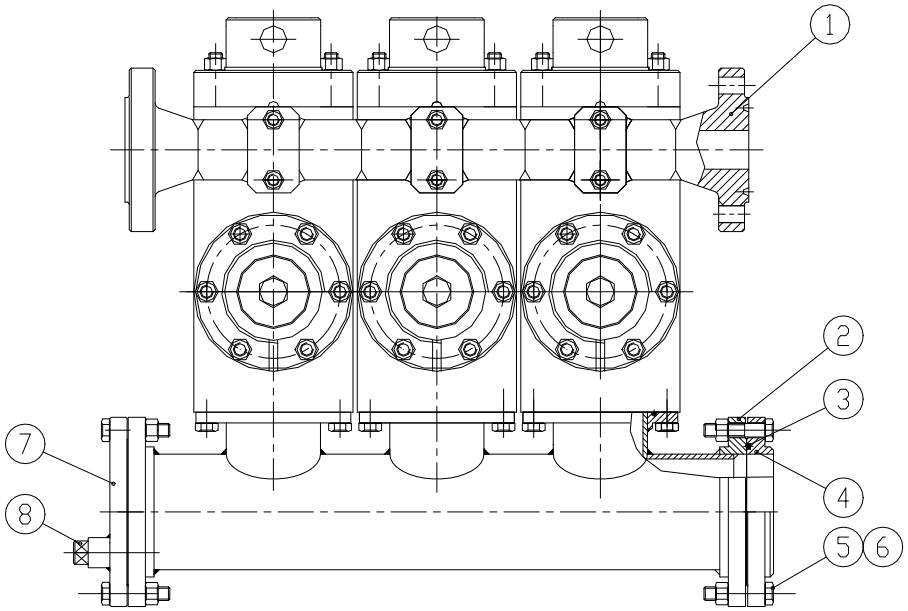
W-440 三缸单作用泵
W-440 triple cylinder single action pump



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	W-440.01.00	液力端总成 Hydraulic end assembly	1
2	W-440.02.00	底座 Base	1
3	W-440.03.00	水箱 Water tank	1
4	W-440.04.00	十字头总成 Crosshead assembly	3
5	W-440.05.00	曲轴总成 Crankshaft assembly	1
6	W-440.06.00	齿轮轴总成 Gear shaft assembly	1
7	W-440.07.00	机架总成 Frame assembly	1
8	W-440.08.00	润滑系统总成 Lubricating system assembly	1
9	BF1-7/8	螺栓 7/8-9UNCX2 1/2 Bolt 7/8-9UNCX2 1/2	8
10	W-440.01.012	螺母 7/8-9UNC-2B Nut 7/8-9UNC-2B	8
11	W-440.09.00	垫片 Washer	按需 As required

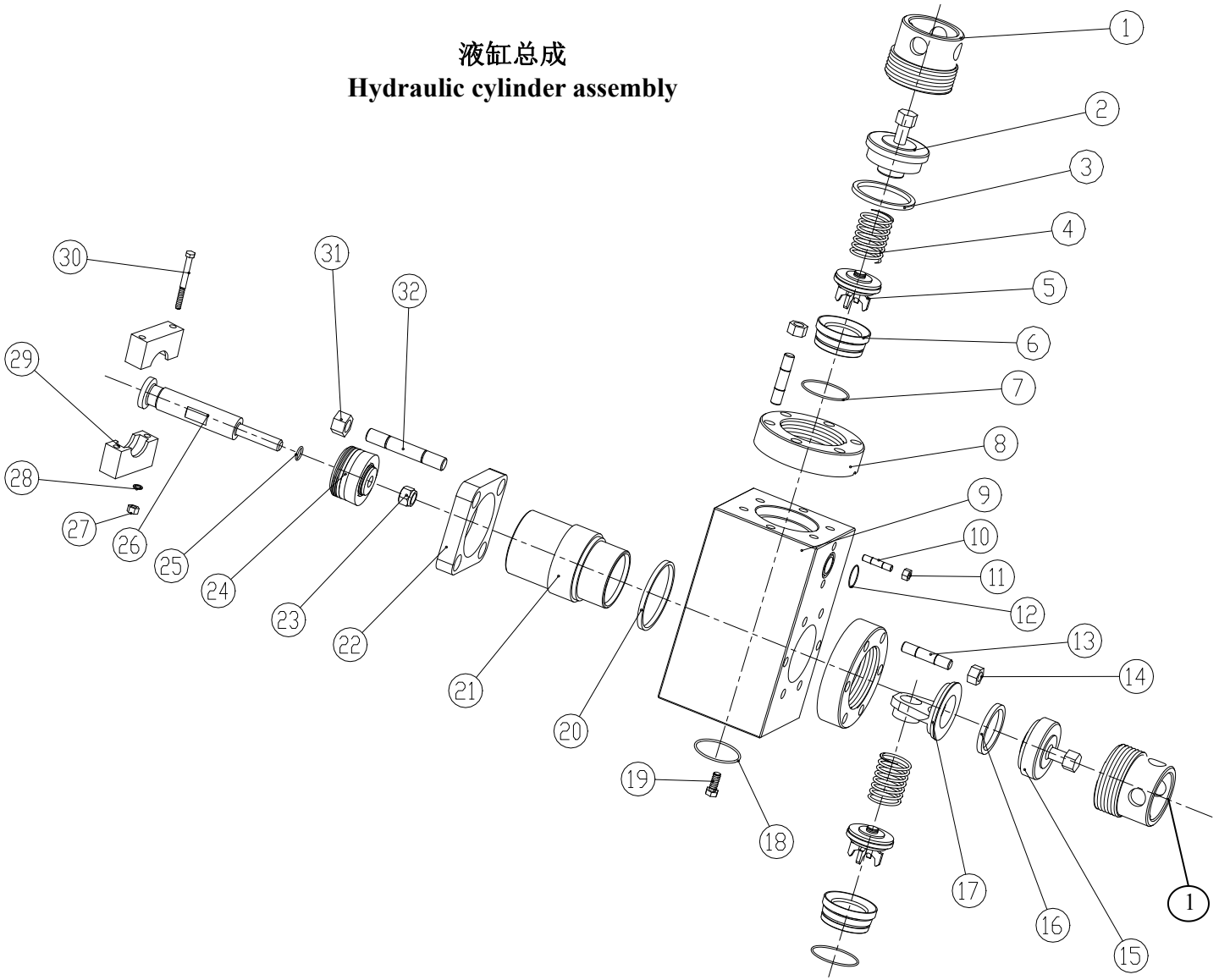
序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
12	W-440.10.00	盖板总成 Cover plate assembly	1
13	W-440.11.00	挡水板 Dash plate	1
14	W-440.12.00	喷淋管总成 Spray pipe assembly	1

液力端总成
Hydraulic end assembly



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	D-440325	排出管 Discharge pipe	1
2	D-440326	吸入管 Suction pipe	1
3	GB/T 3452.1	O 型密封圈φ185x7 O-ring φ185x7	2
4	W-440.01.020	150#6"法兰 150#6" flange	1
5	BH1-3/4	螺栓 3/4-10UNCX3 Bolt 3/4-10UNCX3	20
6	NF1-3/4	螺母 3/4-10UNC Nut 3/4-10UNC	20
7	W-440.01.21.00	吸入盲板 Suction blind plate	1
8	W-440.01.015	丝堵 NPT1 Screw plug NPT1	1

液缸总成
Hydraulic cylinder assembly



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.	序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	B-440343	阀盖（缸盖） Valve cover (cylinder head)	2	17	B-440321	吸入阀导向架 Suction valve guide frame	1
2	B-440323	阀盖堵头 Valve cover plug	1	18	GB/T 3452.1	O 型密封圈φ150x5.3 O-ring φ150x5.3	1
3	W-440.01.010	阀盖密封圈 Valve cover seal ring	1	19	W0101	螺栓 3/4-10UNCX1 11/16 Bolt 3/4-10UNCX1 11/16	4
4	W-440.01.004	阀弹簧 Valve spring	2	20	W-440.01.008	缸套密封圈 Liner seal ring	1
5	W-440.01.03.00	阀体总成（API #4） Valve body assembly (API #4)	2	21	W-440307	缸套 Liner	1
6	W-440.01.002	阀座 Valve seat	2	22	B-440322	缸套压盖 Liner gland	1
7	GB/T 3452.1	O 型密封圈φ100x3.55 O-ring φ100x3.55	2	23	W-440.01.007	锁紧螺母 Locking nut	1
8	D-440342	阀盖法兰 Valve cover flange	2	24		活　塞 Piston	1
9	D-440003	液缸 Hydraulic cylinder	1	25	GB/T 3452.1	O 型密封圈φ25x3.55 O-ring φ25x3.55	1
10	W-440.01.013	双头螺柱 3/4-10UNCX6 Stud bolt 3/4-10UNCX6	2	26	B-440308	活塞杆 Piston rod	1
11	NF2-3/4	螺母 3/4-10UNC-2B Nut 3/4-10UNC-2B	2	27	W0105	螺母 9/16-12UNC Nut 9/16-12UNC	2
12	GB/T 3452.1	O 型密封圈φ47.5x5.3 O-ring φ47.5x5.3	1	28	GB/T93	弹簧垫圈 14 Spring washer 14	2
13	W-440.01.011	双头螺柱 7/8-9UNCX4 1/2 Stud bolt 7/8-9UNCX4 1/2	12	29	B-440227.01	卡环 Retaining ring	1
14	NF2-7/8	螺母 7/8-9UNC Nut 7/8-9UNC	12	30	W0104	螺栓 9/16-12UNCX4 Bolt 9/16-12UNCX4	2

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.	序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
15	B-440309	缸盖堵头 Cylinder head plug	1	31	W-440.01.006	螺母 1 1/8-8UN Nut 1 1/8-8UN	4
16	W-440.01.001	阀侧盖密封圈 Seal ring of side cover of valve	1	32	W-440.01.005	双头螺柱 1 1/8-8UNX7 1/4 Stud bolt 1 1/8-8UNX7 1/4	4

注：本表中第 21 项和第 24 项中缸套和活塞的规格为：3 1/2”、4”、4 1/2”

Note: The specification of liner and piston at item 21and 24 in this table: 3 1/2”, 4”, 4 1/2”

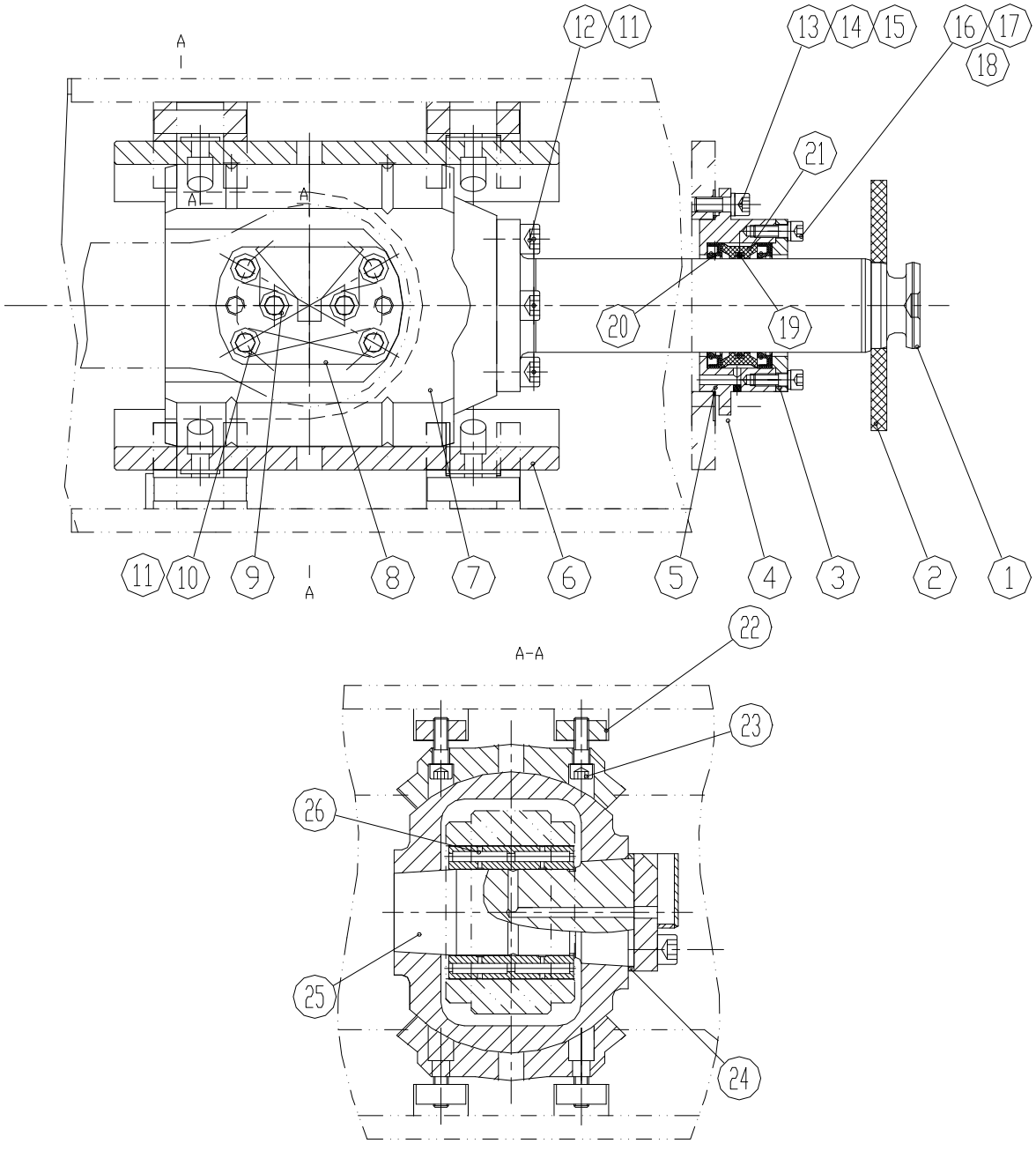
本表中所列数量均为一套液缸总成所需数量，整台泵需将表中数量 X3。

The quantity listed in this table is for one hydraulic cylinder assembly and for the whole pump, the quantity is X3.

W-440 泵活塞总成
W-440 pump piston assembly

序号 No.	图号 Drawing No.	名称 Name	备注 Remarks
1	RS-HS.3 1/2K-1	活塞总成 3 1/2 K-1 Piston assembly 3 1/2 K-1	
2	RS-HS.4K-1	活塞总成 4 K-1 Piston assembly 4 K-1	
3	RS-HS.4 1/2K-1	活塞总成 4 1/2K-1 Piston assembly 4 1/2K-1	

十字头总成
Crosshead assembly

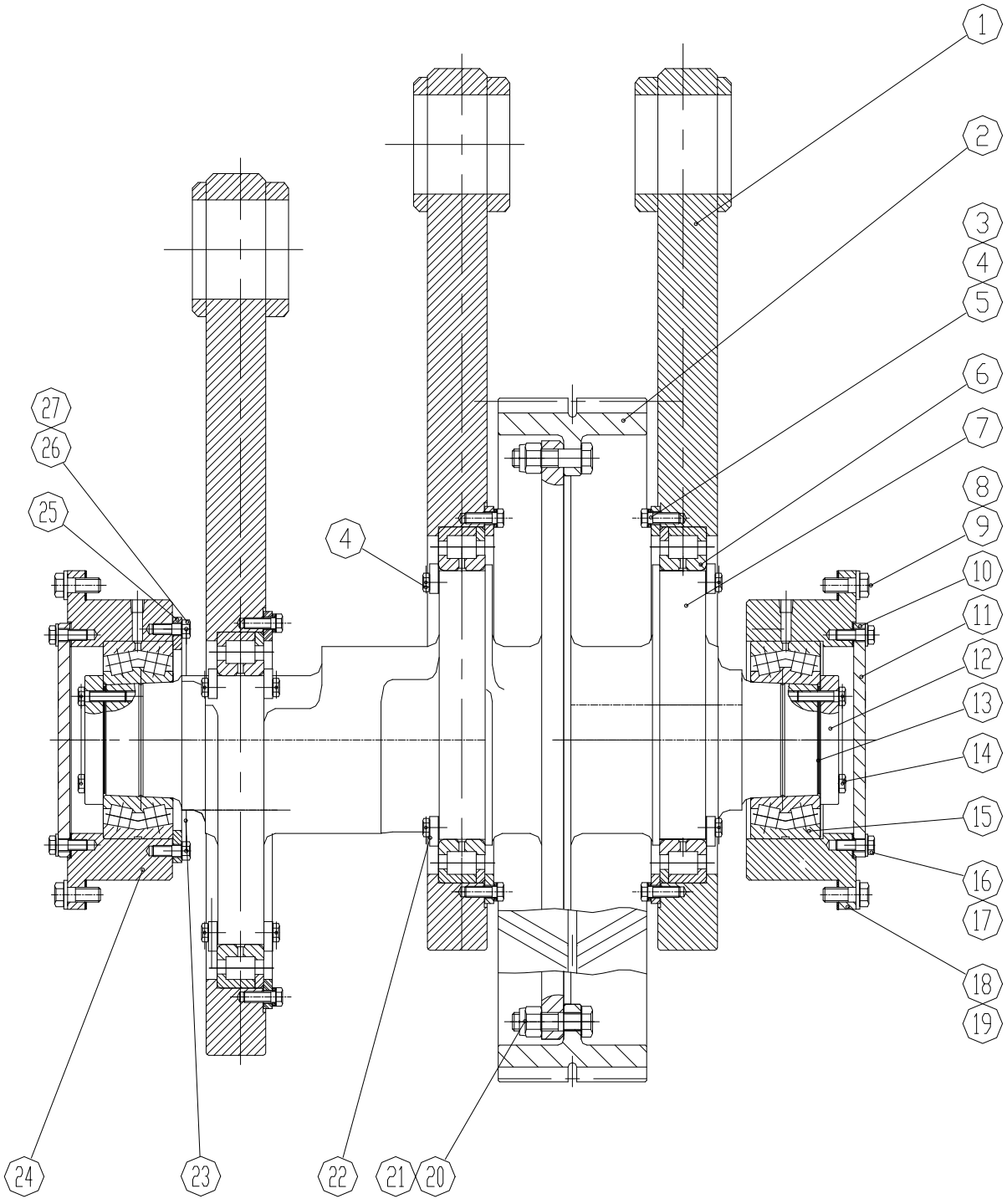


序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	B-440226	介杆 Intermediate rod	1
2	B-440244	挡泥板 Mud guard	1
3	B-440235	填料盒端盖 Stuffing box end cover	1
4	B-440233	填料盒 Stuffing box	1
5	B-440243	填料盒密封圈 Stuffing box seal ring	1
6	D-440228	十字头导板 Crosshead guide plate	2
7	D-440213	十字头 Crosshead	1
8	B-440222	十字头销挡板 Crosshead pin baffle	1
9	BF20-5/8	内六角头孔螺栓 5/8-11UNCX1.575 Hexagon socket-head cap bolt 5/8-11UNCX1.575	2
10	BF20-5/8	内六角头孔螺栓 5/8-11UNCX2 Hexagon socket-head cap bolt 5/8-11UNCX2	4
11		φ1.5/不锈钢铁丝 φ1.5/ stainless steel wire	按需 As required
12	BF20-5/8	内六角头孔螺栓 5/8-11UNCX1 11/16 Hexagon socket-head cap bolt 5/8-11UNCX1 11/16	4
13	BF2-1/2	内六角螺栓 1/2-13UNCX1 1/4 Hexagon socket-head cap bolt 1/2-13UNCX1 1/4	4
14	W-440.04.004	胶圈 φ13 Rubber ring φ13	4
15	GB/T97.1	垫圈 12 Washer 12	4
16	BF2-3/8	内六角螺栓 3/8-16UNCX1.125 Hexagon head bolt 3/8-16UNCX1.125	6
17	GB/T97.1	垫圈 10 Washer 10	6
18	W-440.04.003	胶圈 φ10 Rubber ring φ10	6
19	W-440.04.005	骨架双唇油封 3X4X0.5" Framework double-lip oil seal 3X4X0.5"	2
20	W-440.04.006	油封环 Oil seal ring	1
21	GB3452.1	O 型圈 75.X5.3 O ring 75.X5.3	1
22	W-440.04.001	固定块 Fixed block	8

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
23	BF2-1/2	内六角螺栓 1/2-13UNCX1 1/2 Hexagon head bolt 1/2-13UNCX1 1/2	8
24	W-440.04.002	调节垫片 Adjusting shim	1
25	B-440219	十字头销 Crosshead pin	1
26	W-3361-C	滚针轴承 Needle bearing	1

注：本表中所列数量均为一套十字头总成所需数量，整台泵需将表中数量 X3。
Note: The quantity listed in this table is for one hydraulic cylinder assembly and for the whole pump, the quantity is X3.

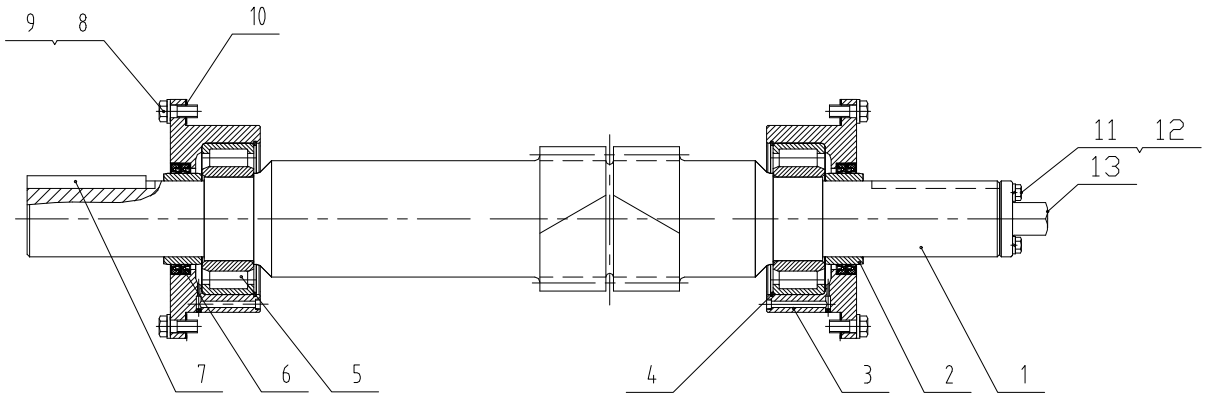
曲轴总成
Crankshaft assembly



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	D-440208	连杆 Connecting rod	3
2	D-440211	大齿轮 Large gear	1
3	B-440223	偏心轮外挡圈 Outer retaining wall of eccentric wheel	3
4	BF1- 1/2	螺栓 1/2-13UNCx1 3/16 Bolt 1/2-13UNCx1 3/16	36
5	GB/T862.2	外锯齿锁紧垫圈 14 External teeth serrated lock washer 14	36
6		偏心轮轴承 Eccentric shaft bearing	3
7	D-440202	曲轴 Crankshaft	1
8	BF1-5/8	螺栓 5/8-11UNCx2.5 Bolt 5/8-11UNCx2.5	16
9	W-440.05.001	铜垫 φ17/φ45x2 Copper packing φ17/φ45x2	16
10	D-440144	主轴承端座盖垫 End support cover gasket of main bearing	2
11	D-440141	主轴承端座 End support of main bearing	2
12	W-440.05.002	曲轴头盖 Crankshaft head cover	2
13	W-440.05.003	曲轴头盖垫 Cover gasket of crankshaft cover	按需 As required
14	BF10- 1/2	头孔螺栓 1/2-13UNCx2 Countersunk head bolt 1/2-13UNCx2	8
15		曲轴主轴承 Main bearing of crankshaft	2
16	BF1- 1/2	螺栓 1/2-13UNCx1.5 Bolt 1/2-13UNCx1.5	12
17	W-440.05.004	铜垫 φ14/φ35x2 Copper packing φ14/φ35x2	12
18	D-440216	右轴承座 Right bearing housing	1
19	B-440252	轴承座垫 Bearing washer	2
20	BH1-3/4	螺栓 3/4-10UNCx3 Bolt 3/4-10UNCx3	12
21	W-440.05.005	锁紧螺母 3/4-10UNC Lock nut 3/4-10UNC	12
22	W-440.05.006	连杆大头轴承压块 Big end bearing block	12

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
23		锁紧铁丝 Lock wire	按需 As required
24	D-440215	主轴承座左 Main baring housing	1
25	B-440217	主轴承座外挡圈 Outer retaining ring of main bearing	1
26		乐泰胶 Loctite adhesive	按需 As required
27	BF10-1/2	头孔螺栓 1/2-13UNCx1 3/16 Countersunk bolt 1/2-13UNCx1 3/16	30

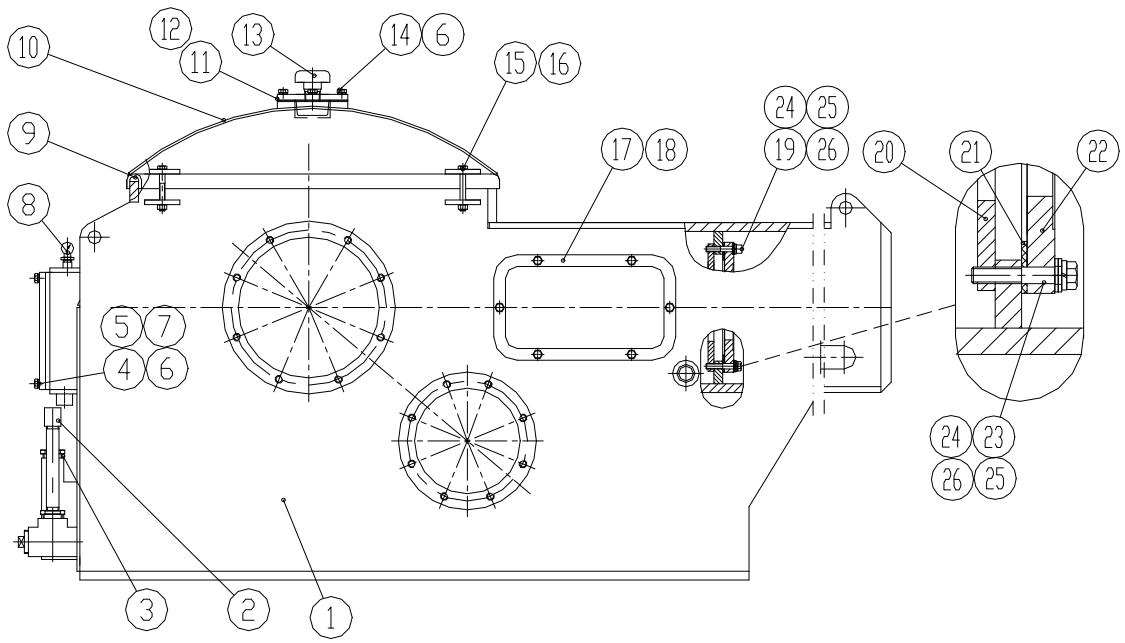
小齿轮轴总成
Pinion shaft assembly



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	D-440221	齿轮轴 Gear shaft	1
2	B-440232	隔套 Spacer	2
3	B-440229	轴承座 Bearing house	2
4	GB/T893.2	卡簧 180 Circlip 180	2
5		传动轴轴承 Drive shaft bearing	2
6	W-440.06.003	骨架油封 Framework oil seal	4
7	W-440.06.001	平键 Flat key	1
8	BF1-5/8	螺栓 5/8-11UNCX2 1/2 Bolt 5/8-11UNCX2 1/2	16

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
9	W-440.05.001	铜垫 φ17/φ45X2 Copper packing φ17/φ45X2	16
10	B-440242	轴承座垫 Bearing housing cushion	2
11	BF1-1/2	螺栓 1/2-13UNCX1 1/2 Bolt 1/2-13UNCX1 1/2	3
12	GB/T93	弹垫 14 Spring washer 14	3
13	W-440.06.002	盘泵法兰 Plate pump flange	1

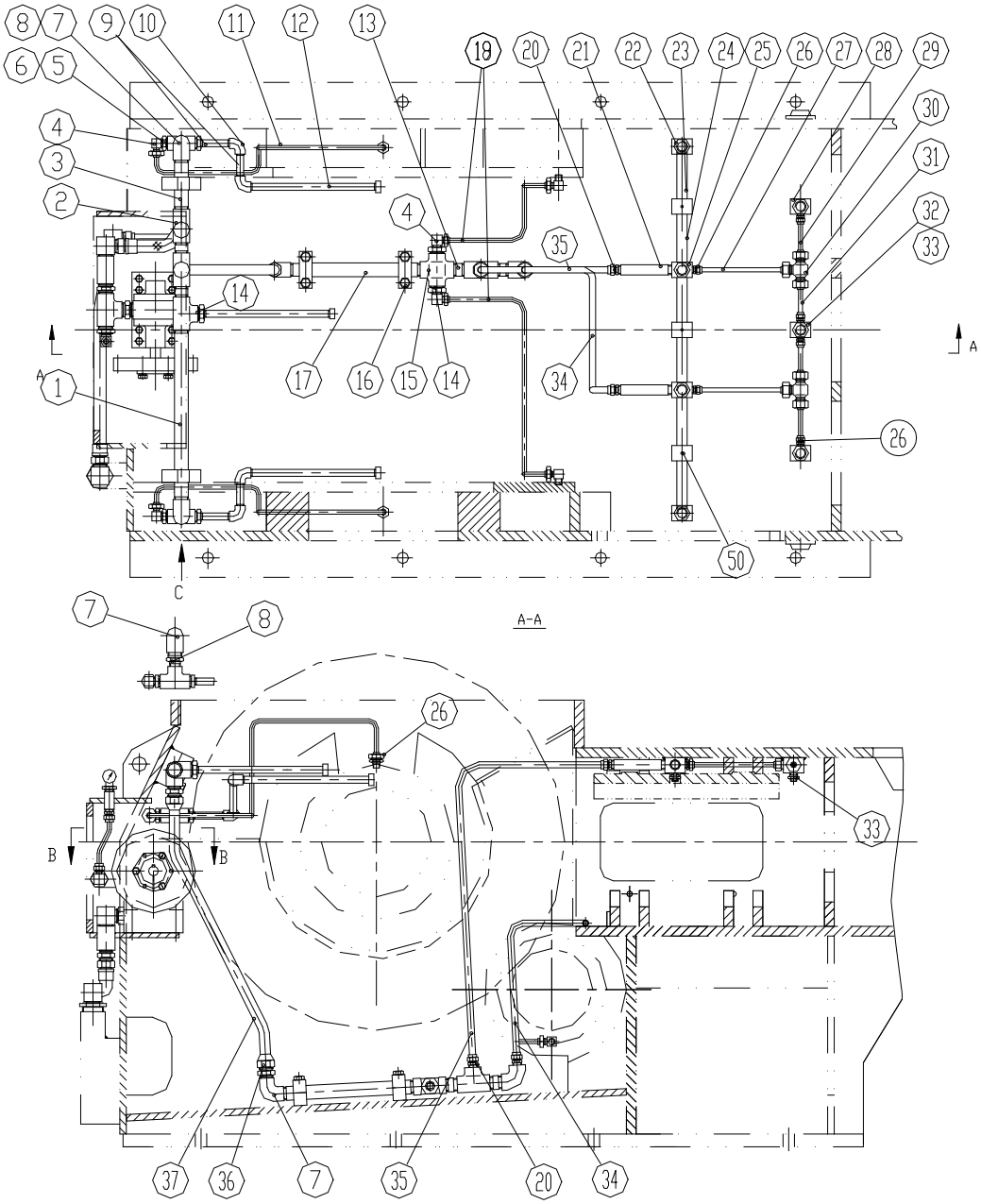
机架总成
Frame assembly

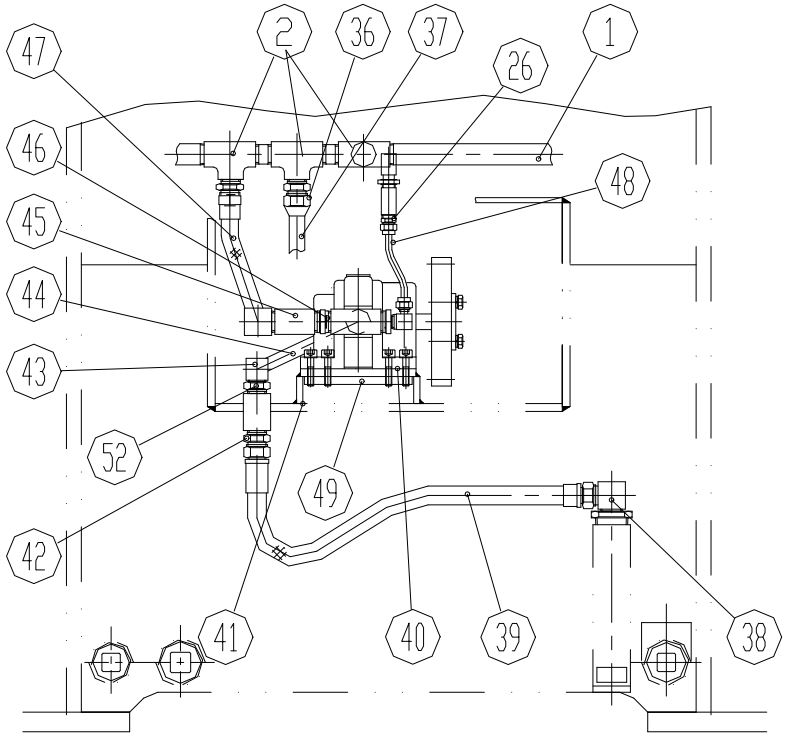


序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	W-446.007	机架 Frame	1
2	W-440.07.01.00	油位计总成 Oil level indicator assembly	1
3	W-440.07.03.00	滤油器 Oil filter	1
4	D-440119	油泵腔后盖 End cover of oil pump chamber	1
5	B-440167	油泵腔后盖垫 Back cover gasket of oil pump chamber	1

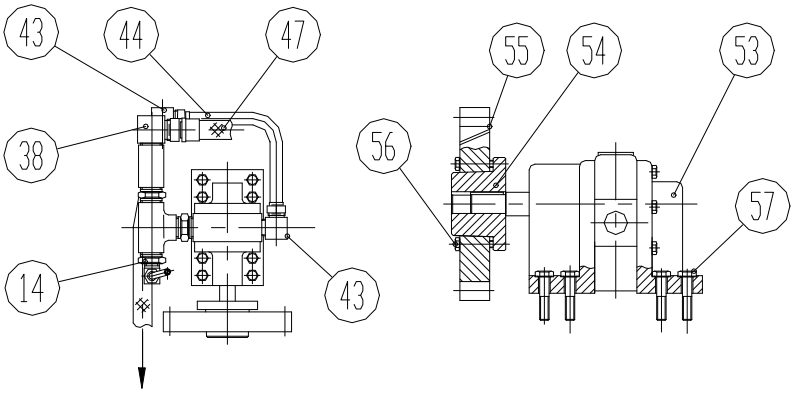
序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
6	BF1-1/2	螺栓 1/2-13UNCX1 1/2 Bolt 1/2-13UNCX1 1/2	24
7	GB/T97.1	平垫 12 Flat washer 12	18
8	Y60-Z	双刻度压力表 0.6Mpa Double-scale pressure gauge 0.6MPa	1
9		橡胶条 Rubber strip	1
10	B-440136	上罩 Top cover	1
11	B-440166	观察孔盖垫片 Cover washer of observation hole	1
12	B-440165	观察孔盖 Observation hole cover	1
13	W-440.07.02.00	通风罩 Ventilation cover	1
14	GB/T 93	弹簧垫圈 12 Spring washer 12	4
15	BH1-1/2	螺栓 1/2-13UNCX3.5 Bolt 1/2-13UNCX3.5	4
16	NF1-1/2	螺母 1/2-13UNC Nut 1/2-13UNC	4
17	B-440129	十字头孔盖 Crosshead hole cover	2
18	B-440142	十字头孔盖垫 Cover gasket of crosshead hole	2
19	BH2-1/2	内六角螺钉 1/2-13UNCX2.5 Socket cap screw 1/2-13UNCX2.5	12
20	D-440134-2	连接板 B Cross piece B	3
21	B-440253	填料盒密封板 Seal pad of stuffing box	3
22	D-440134-1	连接板 A Cross piece A	3
23	BH1-1/2	螺栓 1/2-13UNCX2.5 Bolt 1/2-13UNCX2.5	12
24	GB/T93	弹性垫圈 14 Elastic washer 14	24
25	GB/T97.1	平垫 14 Flat washer 14	24
26	W-440.04.002	胶圈 13 Rubber ring 13	24

润滑系统总成
Lubricating system assembly





B-B



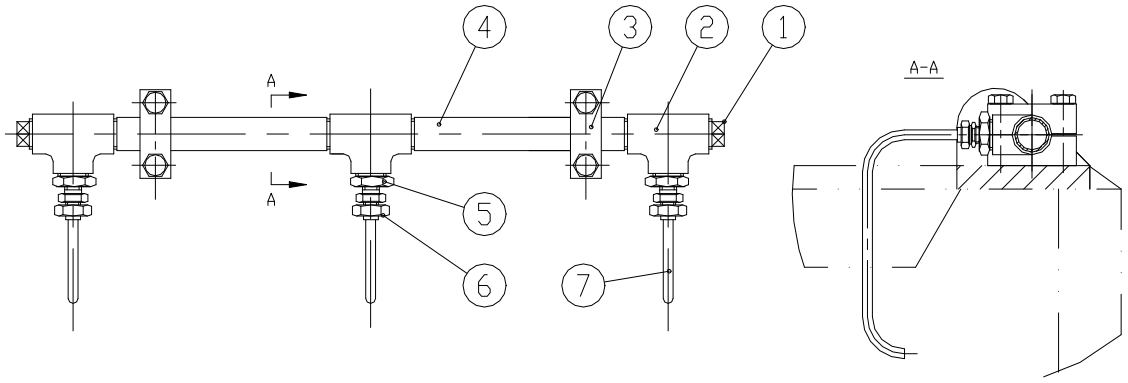
序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	W-440.08.001	接管 NPT 3/4 Adaptor NPT 3/4	1
2	GB/T14626	三通 DN20-Sch80NPT3/4 Tee pipe DN20-Sch80NPT3/4	5
3	W-440.08.002	短接 NPT 3/4 Nipple NPT 3/4	1
4	JB/ZQ4410	直角管接头 A8 Right angle pipe joint A8	7
5	GB/T14626	内外接头 NPT1/4-NPT1/2 Internal and external joints NPT1/4-NPT1/2	4
6	GB/T14626	三通 DN15-Sch80NPT1/2 Tee pipe DN15-Sch80NPT1/2	2

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
7	GB/T14626	90°弯头 DN20-Sch80NPT3/4 90° elbow DN20-Sch80NPT3/4	4
8	W-440.08.003	接头 NPT3/4-NPT1/2 Joint NPT3/4-NPT1/2	3
9	W-440.08.004	短接 NPT 1/4 Nipple NPT 1/4	4
10	GB/T14626	90°弯头 DN8-Sch80NPT 1/4 90° elbow DN8-Sch80NPT 1/4	4
11		紫铜管 φ8X1 L=780 Red copper pipe φ8X1 L=780	2
12	W-440.08.05.00	喷油管 Injection pipe	3
13	W-440.08.006	接头 NPT 3/4 Adapter NPT 3/4	4
14	GB/T14626	内外接头 NPT1/4-NPT3/4 Internal and external joints NPT1/4-NPT3/4	3
15	GB/T14626	四通 DN20-Sch80NPT3/4 Cross joint DN20-Sch80NPT3/4	1
16	W-440.08.07.00	管座 Pipe holder	4
17	W-440.08.008a	接管 NPT 3/4 Adapter NPT 3/4	1
18		紫铜管 φ8X1 L=400 Red copper pipe φ8X1 L=400	1
19		紫铜管 φ8X1 L=650 Red copper pipe φ8X1 L=650	1
20	JB/ZQ4408	直通管接头 A12 Through pipe joint A12	4
21	W-440.08.009	接头 NPT3/8 Adapter NPT3/8	2
22	W-440.08.010	接头座 Ⅰ Joint seat I	2
23		紫铜管φ20X1.5 L=95.5 Red copper pipe φ20X1.5 L=95.5	4
24		紫铜管φ20X1.5 L=101 Red copper pipe φ20X1.5 L=101	2
25	W-440.08.011	接头座 Ⅱ Joint seat II	2
26	JB/ZQ4408	直通管接头 A8 Through pipe joint A8	9
27		紫铜管 φ8X1 L=162 Red copper pipe φ8X1 L=162	2
28	W-440.08.012	接头座 Ⅲ Joint seat III	2

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
29		紫铜管 φ8X1 L=60 Red copper pipe φ8X1 L=60	2
30	GB5639.1	三通管接头 A8 Tee pipe joint A8	2
31		紫铜管 φ8X1 L=54 Red copper pipe φ8X1 L=54	2
32	W-440.08.013	接头座 Ⅳ Joint seat IV	1
33	W-440.08.014	接头 NPT1/4-M12X1.5 Adapter NPT1/4-M12X1.5	7
34		紫铜管 φ12X1 L=650 Red copper pipe φ12X1 L=650	1
35		紫铜管 φ12X1 L=840 Red copper pipe φ12X1 L=840	1
36	JB/ZQ4408	直通管接头 B20 Through pipe joint B20	2
37		紫铜管 φ20X1.5 L=540 Red copper pipe φ20X1.5 L=540	1
38	W-440.08.015	直角接头 NPT3/4-M27X1.5 Right angle joint NPT3/4-M27X1.5	2
39	W-440.08.016	吸入软管 Suction hose	1
40	W-440.08.17.00	齿轮油泵总成 Gear oil pump assembly	1
41	W-440.08.018	油泵底座 Oil pump base	1
42	W-440.08.019	接头 NPT3/4-M27X1.5 Adapter NPT3/4-M27X1.5	1
43	JB/ZQ4410	直角管接头 A16 Through pipe joint A16	2
44		紫铜管 φ16X1.5 L=240 Red copper pipe φ16X1.5 L=240	1
45	GB/T14626	双接口管箍 DN20-Sch160NPT Double connector pipe clamp DN20-Sch160NPT	1
46	W-440.08.020	接头 NPT3/4 Adapter NPT3/4	1
47	W-440.08.021	排出软管 Discharge hose	1
48		紫铜管 φ8X1 L=75 Red copper pipe φ8X1 L=75	1
49	W-440.08.022	连接板 Cross piece	1
50	W-440.08.023	接头座 Ⅴ Joint seat V	3

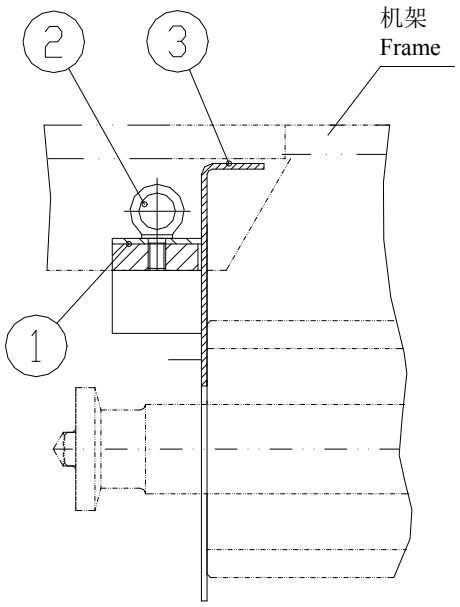
序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
51	GB/T14626	内外接头 NPT3/8-NPT3/4 Internal and external joints NPT3/8-NPT3/4	2
52	GB/T14626	内外接头 NPT1/2-NPT3/4 Internal and external joints NPT1/2-NPT3/4	1
53	W-440.08.023	齿轮油泵 Gear oil pump	1
54	RS11306.06.08.002	轴套 Shaft sleeve	1
55	B-440212	油泵齿轮 Gear of oil pump	1
56	BF1-1/4	螺栓 1/4-20UNCX1 1/2 Bolt 1/4-20UNCX1 1/2	3
57	BF1-3/8	螺栓 3/8-16UNCX1 1/2 Bolt 3/8-16UNCX1 1/2	8

喷淋管总成
Spray pipe assembly



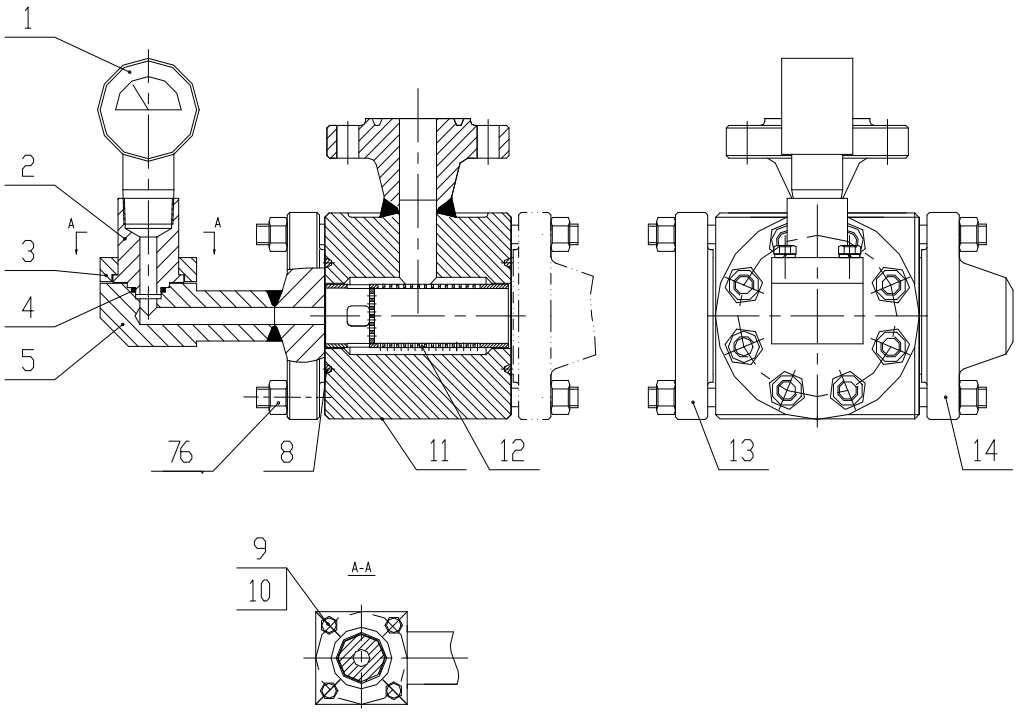
序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	GB/T14626	丝堵 NPT 3/4 Screw plug NPT 3/4	2
2	GB/T14626	三通 DN20 NPT3/4 Tee pipe DN20 NPT3/4	3
3	W-440.08.07.00	管座 Pipe seat	2
4	W-440.12.001	接管 NPT3/4 Joint NPT3/4	2
5	GB/T14626	内外接头 NPT1/4-3/4 Internal and external joints NPT1/4-3/4	3
6	JB/ZQ4408	直通管接头 A8 Through pipe joint	3
7		喷淋管 (紫铜管 φ8X1) Spray pipe (red copper pipe φ8X1)	3

挡水板
Dash plate



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	W-440.11.001	连接块 Connection block	2
2	W-440.11.002	蝶形螺栓 Wing bolt	2
3	W-440.11.003	挡水板 Dash plate	1

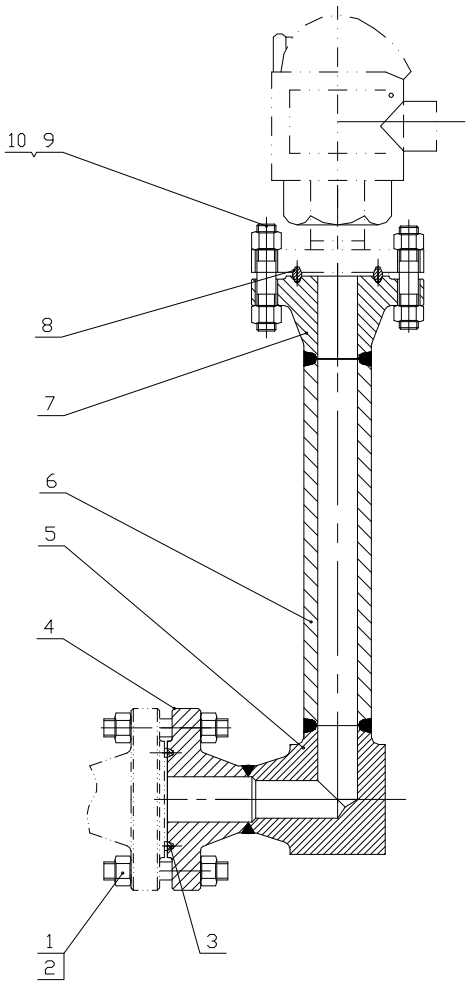
排出五通总成
Discharge five-way joint assembly



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	YK-150	双刻度抗震压力表 NPT 1 1/2 Double-scale shock-resistant pressure gauge NPT 1 1/2	1
2	RS11309.16.006	表接头 Gauge connector	1
3	RS11309.16.007	方法兰 Square flange	1
4	RS11309.16.008	密封垫 Sealing gasket	1
5	W-440.16.01.00	弯接头 Bent sub	1
6	W-440.16.003	双头螺柱 1-UNC Stud bolt 1-UNC	32
7	NF2-1	螺母 1-8UNC Nut 1-8UNC	48
8	GB/T 22513	密封垫环 R27 Seal backing ring R27	4
9	BF1-5/8	螺栓 5/8-11UNCX2 1/2 Bolt 5/8-11UNCX2 1/2	4
10	GB/T 93	弹簧垫圈 16 Spring washer 16	4
11	W-440.16.04.00	排出五通 Discharge five-way joint	1

12	W-440.16.05.00	滤网 Filter screen	1
13	W-440.16.006	盲法兰 Blind flange	1
14	W-440.16.001	排出法兰 Discharge flange	1

安全阀接管
Safety valve adaptor



序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
1	W-440.17.004	双头螺栓 1-8UNCX170 Stud bolt 1-8UNCX170	8
2	NF2-1	螺母 1-8UNC Nut 1-8UNC	16
3	GB/T 22513	密封垫环 R27 Seal backing ring R27	1
4	W-440.17.003	焊径法兰 Welding neck flange	1

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.
5	W-440.17.001	90°弯接头 90°Bent sub	1
6	W-440.17.002	接管 Adapter	1
7	RS11309.17.004	安全阀法兰 Safety valve flange	1
8	GB/T 22513	密封垫环 R27 Seal backing ring R27	1
9	B.17.001	螺柱 1-8UNCX5 3/5 Bolt 1-8UNCX5 3/5	8
10	NF2-1	螺母 1-8UNC Nut 1-8UNC	16

随机工具
Attached tools

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.	备注 Remarks
1	GB/T3390.1	套筒 12.5 系列 28X38X36X48 Sleeve 12.5 series 28X38X36X48	1	排出管与液缸螺母 3/4"（S28X32） Discharge pipe and hydraulic cylinder nut 3/4" (S28X32)
2	W-440.18.001	内六方扳子头 Hexagon socket spanner head	1	液缸与机架内六角螺栓 1" Hydraulic cylinder and frame hexagon socket head bolt 1"
3	GB/T 5356	内六角扳手 S19 Hexagon socket spanner S19	1	液缸与机架内六角螺栓 1" Hydraulic cylinder and frame hexagon socket head bolt 1"
4	GB/T3390.1	套筒 25 系列 34X51.9X52X70 Sleeve 25 series 34X51.9X52X70	1	缸盖螺母 7/8"（S33X38） Cylinder head nut 7/8" (S33X38)
5	GB/T3390.1	套筒 25 系列 38X56.7X52X70 Sleeve 25 series 38X56.7X52X70	1	排出管两端螺母 1"（S37.5X43） Nut at both end of discharge pipe 1" (S37.5X43)
6	W-440.18.002	力矩扳子头 Torque spanner head	1	缸套压盖螺母 1 1/8"（S44.7X51.2） Cylinder head gland nut 1 1/8" (S44.7X51.2)
7	GB/T3390.1	套筒 12.5 系列 27X36.7X34X48 Sleeve 12.5 series 27X36.7X34X48	1	大齿圈锁紧螺母 3/4"（S26.9X31） Lock nut of large gear ring 3/4"（S26.9X31）
8		API 4#阀液压拔阀器 API 4# Hydraulic valve lifter	1	选用 Optional
9	PSH-Ⅱ	手摇液压泵 70Mpa Hydraulic hand pump 70MPa	1	选用 Optional

随机备件
Attached spare parts

序号 No.	图号 Drawing No.	名称 Name	数量 Qty.	备注 Remarks
1	W-440.04.005	骨架油封 4X3X0.5" Framework oil seal 4X3X0.5"	6	十字头总成 Crosshead assembly
2	GB/T3452.1	O 形圈 75X5.3 O-ring 75X5.3	3	十字头总成 Crosshead assembly
3	W-440.06.003	骨架油封 5.5X4.5X0.5" Framework oil seal 5.5X4.5X0.5"	4	传动轴总成 Driver shaft assembly
4	GB/T3452.1	O 形圈 100X3.55 O-ring 100X3.55	6	液力端总成 Hydraulic end assembly
5	GB/T3452.1	O 形圈 25X3.55 O-ring 25X3.55	3	
6	GB/T3452.1	O 形圈 47.5X5.3 O-ring 47.5X5.3	3	
7	GB/T3452.1	O 形圈 150X5.3 O-ring 150X5.3	3	
8	GB/T3452.1	O 形圈 185X7 O-ring 185X7	2	
9	W-440.01.001	阀侧盖密封圈 Seal ring of valve side cover	3	
10	W-440.01.008	缸套密封圈 Liner seal ring	3	
11	W-440.01.010	阀顶盖密封圈 Seal ring of valve top cover	3	
12	GB/T22513	密封垫环 R27 Seal backing ring R27	4	如配备五通、安全阀 If five-way joints and safety valve are provided