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LW446 泥浆泵用户手册

LW446 Mud Pump Service Manual

德州利安石油机械有限公司
DE ZHOU L&A PETROLEUM MACHINERY CO.,LTD

在您准备安装和使用泥浆泵以前，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 mud 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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一、技术规范

Technical Specification

额定输入功率 Rated input power	328KW (440HP)
额定冲次 Rated Stroke	320 冲 / 分 (320SPM) (LW440) 300 冲 / 分 (300SPM) (LW446)
冲程 Stroke	152.4mm (6")
齿轮传动比 Gear Ratio	4.578 : 1
最高工作压力 Max. operation pressure	35 Mpa
阀腔 Valve chamber Valve-Over	API 4#
最大缸套直径 Max. liner dia.	4-1/2" (LW440) 6" (LW446)
最大缸套泵压 Max. liner mud pressure	(160 冲 / 分) 16.9 Mpa
吸入法口 6" Dia. of suction manifold 6"	(150 #) 法兰 Flange
排出管口 3" Dia. of discharge manifold 3"	(900 #) 法兰 Flange
小齿轮轴直径 Dia. pinion Shaft	95.25mm (3.75")
小齿轮轴键 Dia. pinion Key	22.174×15.9 mm
泵外形尺寸 (不包括底座) Dimension: (No included base)	2479×1219×1103 mm
重量 Weight	4463 Kg

二、结构特点

Structure Character

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 pump is compact structure, small volume, lightweight, integrated herringbone gear pair, large transmit torque and smooth run. Crankshaft is welding forged and light weight without libration.

LW-446 三缸单作用泵可广泛用于油田的各种作业、缸套规格 3_1/4" ----- 6" 宜采用活塞结构；适宜修井作业、以及浅井钻井等，2" -----3_1/4" 宜采用柱塞，可适用于高压作业。

LW-446 Single-acting Triplex Pump can be used widely in oilfield operation. Liner size from 3_1/4"-----6" is better-adopted piston structure for work over operation and low well drilling operation while plunger structure for liner size from 2----3_1/4" for high- pressure operation.

1. 动力端

POWER END

机架：为钢板焊接结构，焊接经退火处理，以消除内应力，刚性好，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: Frame is weld structure and anneal treatment is adopted to release weld stress to improve rigidity and strength. Bearings of crankshaft and main bearings are strengthened with ribs.

曲轴：曲轴上分别装有大齿圈、连杆、轴承等，大齿圈的齿形为人字形（整体），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一个偏心拐上，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: Bull gear, connecting rod and bearings are installed on the crankshaft, Bull Gear type is integrated herringbone. Inner hole of bull gear and crankshaft are interference match, and are fastened with bolts and lock nuts. Large ends of connecting rod are installed on the three eccentric axils of crankshaft through single-row short cylindrical roller bearings. While small ends are installed on the crosshead pins through double-row long cylindrical roller bearings. Crankshaft is supported by two double row annular ball bearings.

齿轮轴：为合金锻件，在轴上加工有人字齿轮（整体），采用中硬齿面，为了便于维修，采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。

Pinion shaft: Pinion shaft is forged alloy steel. There is a herringbone gear, which is middle hardness. In order to easy to repair, single row long cylindrical roller bearing is adopted, which is no baffle. The two ends of pinion shaft extend to outside of the shell and pulley can be installed on each end of it.

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，可以通过在上下导板处添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联结。这种刚性联结方法，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联结，重量轻的卡箍使中间拉杆与活塞杆的联结方便可靠。

Crosshead: Crosshead is ductile iron and has good wear resistance performance. Upper and lower guide plate are adopted, and concentricity can be adjusted through precision shim. Connection between crosshead and extension rod is flanged connection, which is pin-matched hole. This rigid connection can ensure concentricity between extension rod and crosshead. The extension rod is connected with piston rod through clamp and this light clamp can ensure reliable connection between them.

2. 液力端

Fluid End

液缸：材料为合金钢锻件，直通式液缸，体积小容积效率高。

Cylinder is alloy steel forged. Through structure design, which is valve on valve, can reduce cylinder volume and improve volumetric efficiency.

阀总成：均使用 API4# 阀。吸入阀和排出阀及阀弹簧相同。

Valve Assembly: API 4# full open valve is used. Using the same suction valve, discharge valve and valve spring.

缸套、活塞：用作活塞泵缸套、活塞的规格是 3_{1/4}"、3_{1/2}"、3_{3/4}"、4"、4_{1/4}"、4_{1/2}"、4_{3/4}"、5"、5_{1/4}"、5_{1/2}"、5_{3/4}"、6"，活塞杆尺寸规格符合 API 7K，用作柱塞泵缸套、柱塞的规格范围是 2"、2_{1/4}"、2_{1/2}"、2_{3/4}"、3"。缸套的外径尺寸均相同，紧固是通过弓形缸套压盖、螺栓压紧在液缸端面上，缸套与液缸之间的密封是矩形密封垫。

Liner and Piston: For mud pump with piston structure, liner & piston size from 3_{1/4}"、3_{1/2}"、3_{3/4}"、4"、4_{1/4}"、4_{1/2}"、4_{3/4}"、5"、5_{1/4}"、5_{1/2}"、5_{3/4}"、6" and piston rod is conform to API 7K. For mud pump with plunger structure, liner & plunger size from 2"、2_{1/4}"、2_{1/2}"、2_{3/4}"、3". Outer diameter of liner for all sizes is same and liner is fixed with cylinder through square liner cover and bolts. Seal between liner and cylinder is rectangular rubber washer.

吸入口：在泵的吸入管两侧均有吸入口，可与吸入管线连接，吸入法兰均采用 6" ASME 150 磅级法兰。此处的密封圈是 "O" 型圈 185×7（GB/T3452.1）

Suction outlet: There are suction outlets on both end of suction manifold and to be connected with 6" ASME 150# flange with O-ring 185×7. (GB/T3452.1)

排出口：液力端排出管法兰均采用 3" ASME 900 磅级法兰。此处的密封槽及环尺寸是 R31（API）

Discharge outlet: 3" ASME 900 flange is adopted on discharge manifold and gasket is R31.(API)

润滑系统：采用强制润滑，在油箱中设置有齿轮油泵，通过油箱管线，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。

Lubrication System: Pressure lubrication combining splash lubrication is adopted for power end. Pressure oil pumped by gear oil pump in the oil tank is transmitted to crosshead, extension rod, crosshead guide plate and bearings through lubrication pipe line. Working condition of gear oil pump can be watched from pressure gauge in the back of the frame.

三、性能参数表

Performance Parameter Table

LW-440 泵参数 LW-440Parameter			冲次 / 分 (stroke/Min.)		320		270		220		170		120		70	
			额定输入 (马力) Rated Input (HP)		440 (328)		380 (283)		320 (238)		260 (194)		200 (149)		200 (149)	
缸径 Liner Dia. (in)	压力 Pressure		加仑 / 转 Gallon/ Turn	升 / 转 Liter/ Turn	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min.	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min
	psi	Mpa														
4-1/2	1710	11.793	1.239	4.690	397	1503	335	1268	273	1033	211	799	149	564	87	329
4	2169	14.959	0.979	3.706	313	1185	264	999	215	814	167	633	118	447	69	261
3-1/2	2816	19.421	0.750	2.839	240	908	202	764	165	625	127	481	90	341	52	197

LW-446 泵参数 LW-446Parameter			冲次 / 分 (Stroke/Min.)		300		250		200		150		100		50	
			额定输入 (马力) Rated Input (HP)		440 (328)		367 (273)		293 (219)		220 (164)		147 (109)		73 (55)	
缸径 Liner Dia. (in)	压力 Pressure		加仑 / 转 Gallon/ Turn	升 / 转 Liter/ Turn	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min	加仑 / 分 Gallon/ min	升 / 分 Liter/min
	PSI	Kg/cm2														
6"	1027	72.2	2.203	8.339	661	2502	551	2085	441	1668	330	1251	220	834	110	417
5-1/2"	1222	85.9	1.851	7.007	555	2102	463	1752	370	1402	278	1051	185	701	93	350
5"	1479	104.0	1.53	5.791	459	1737	382	1448	306	1158	229	869	153	579	76	290
4-1/2"	1826	128.4	1.239	4.691	372	1407	310	1173	248	938	186	704	124	469	62	235
4"	2311	162.4	0.979	3.706	294	1112	245	927	196	741	147	556	98	371	49	185
3-1/2"	3000	210.9	0.750	2.838	225	851	187	709	150	568	112	426	75	284	37	142

四、安装与使用

Installation And Operation

1. 喷淋泵系统:

Spray System

LW-446 泵在工作时需配备喷淋系统以冷却润滑缸套和活塞，LW-446 泵已经随机配置了水箱和喷淋管，水箱的联结口螺纹为 NPT 1_1/2"，喷淋管的接口螺纹为 NPT 3/4"。

LW-446 Pump is necessary to equip the working pump with spray pump for cooling and lubricating liner and piston, and with the pump are equipped the water box and spray pipe, the connection thread of water box is NPT 1_1/2, and that of spray pipe 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和缸套的损坏。冷却液采用水或以水为基本介质添加防锈剂的冷却液。

When working should pay attention to the cooling fluid enough in the liner and piston. And the interrupt of cooling fluid will damage the piston rubbers and the liners. Cool fluid is on the base of water adding antirust.

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。

Spray pump must be started earlier than mud pump or at same time, otherwise piston or liner will be damaged. And check the spray pipe often to ensure that fluid spurt out on the piston directly.

2. 排出空气包:

Pulsation Dampener

LW-446 泵在工作时要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，惯性力减小，降低压力波动。

Chose suitable pulsation dampener for LW-446 Pump. Pulsation dampener is effective assistant equipment to make pressure on power end smoothly and reduce pulsation on the discharge manifold. Thereby will have equal flow, reduce inertial force and pressure fluctuation.

3. 安全阀:

Security Valve

排出管路要配置安全阀，以避免系统内压力突然升高，使泵及系统管路过载损坏。

Security valve should be equipped on discharge manifold to avoid system pressure raising sharply to damage mud pump and manifold due to over load.

4. 泵的基础:

Mud Pump Base:

泵的安装基础必须是水平的，并有足够的强度，防止机架可能的扭曲和歪斜，以便能够支持泵的自重和运转时产生的力。

The installment of the pump must be done aclinally and the strength must be enough so that it can bare the weight of the pump itself and weight the pump produce when it works. The pump must be put horizontally prevent frame being distorted or declined.

5. 传动装置:

Transmit

泵与动力源之间的传动必须保证传动的可靠性，避免造成突然停机。

Must assure the safety transmission between pump and power fountain to avoid shut down suddenly due to transmission accident.

五、泵的启动及操作

Start And Operation Of The Pump

1. 动力端的准备工作

Preparation of Power End

钻井泵在出厂前已经经过负荷运转试验，润滑油已从动力端放出，因此在运转前要进行以下的检查和操作。

The pump has been completely assembled and tested by loading before being shipped to the field. The lubrication is drained from the power end. Before operating the pump, the following must be performed or checked.

开动 一台新泵或开动一台久停不用的泵时，在加入润滑油以前，先打开泵机架的上罩，检查动力端内腔

内是否可能有凝集润滑油，打开泵两侧的管堵，排出积存的油，并冲洗动力端内腔。然后按下述要求加入一定牌号和数量的润滑油，并盘车数圈，使各部位均充满润滑油。

When starting a new pump or restart a pump which has not been used for a long time, before adding lubrication into the power end, you must open the upper cover of the pump frame to inspect the inner of the power end to see whether agglutinated lubrication. Open the pipe plugs in each side of pump to discharge the oil and flush the inner of the power end. Add the proper type and quantity of lubrication into the power end, then drive the pump for several round by hands, ensure the pump get a good lubricating in time after starting the pump.

冬季使用 N150 中级压齿轮油（硫磷型），加入 10% 的 4# 复方防锈剂（或 AGMA 中推荐的 MildEp 2#）；

In winter: Please use N150 sulfur-phosphorous type medium EP gear oil and add 10% of 4# compounding antirust additive (Or MildEp 2# recommended by AGMA).

夏季使用 N320 中级压齿轮油（硫磷型），加入 10% 的 4# 复方防锈剂（或 AGMA 中推荐的 MildEp 6#）；

In summer: Please use N320# sulfur-phosphorous type medium EP gear oil and add 10% of 4# compounding antirust additive (Or MildEp 6# recommended by AGMA).

加油量至游标尺的高油位，约 146 升。

Oil volume for adding: up to the high oil level of vernier, about 146 liter.

在泵运转 15 分钟以后，再次检查油面，停泵 5 分钟使油面平稳后检查游标尺，因有部分油存贮于十字头以及机壳空腔，故油位下降，此时宜再加入适量润滑油。

After operating about 15 minutes, check the oil level again. Check the vernier after 5 minutes shut down the pump. There may be some oil stopped on the crosshead and cavum of frame, caused the oil level drop. So add more lubrication oil when needed.

2. 液力端的准备工作

Preparation for Fluid End

检查液力端的缸套，活塞和阀是否装配正常，泵排出管线是否打开。启动前，必须在液缸内灌满泥浆或水，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“小循环”运转，让泵运转到所有空气都被排出为止，这样可以保证钻井泵运转平稳，并延长易损件使用寿命。

Check the liner, piston and valve of fluid end, ensure they have been installed correctly. Check the discharge manifold whether opened. Before starting the pump, must fill the cylinder with mud or water, in case of the air cavity being taken place. For the pump with air cavity, you can not eliminate the air cavity under pressure, you must open the valve to pump and run the pump in “small circulating” until all the air have been eliminated, in this case, we can make the pump running smoothly and the life of the pump will be longer.

3. 启动后的工作

Operation After Start-Up

泵的运转最好慢慢提高，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。

In order to avoid air cavity happen, better to speed up the pump slowly to assure the liquid in suction pipe can catch up with the speed of the piston.

在自然吸入情况下，泵的最高转数决定于吸入行程中是否吸足液体，这个极限转数在不同情况下是不一样的，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（如泥浆粘度、比重和所含的气体量），操作人员要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 natural suction, the highest round of the pump is determined by the fill factor in the suction stroke, this limited round is different in different cases, it is changed according to the design of the suction pipe and the efficient pressure head, it still determined by the liquid (such as gravity, viscosity of mud and the air quantity in the mud), operator can judge the running condition of the pump through sounds whether have air cavity or suction condition not good so as to take measures in time.

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及是否有异常响动。一般油温不超过 45°C。

Check the temperature of all the bearings of power end and crosshead guide plate should less than 45°C. Check whether have abnormal sound.

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，保证润滑的效果。

Proper lubrication of the moving parts in any piece of machinery is the most important Single factor will affect its ultimate life. To obtain maximum trouble-free service life from the power end of the pump, it is necessary to perform routine maintenance and inspection to insure the efficient lubrication.

动力端采用强制润滑方式，设置在油箱中的齿轮油泵，通过润滑管线，将油输送到十字头、中间拉杆、十字头导板及各部轴承中去，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。

Adopt compulsory lubrication for power end. The gear pump placed in the oil bank provide the pressure oil to crosshead, extension rod, guide plate of crosshead and all the bearings of the pump through oil line individually, so as to obtain the compulsory lubrication for the pump. The working condition of the gear pump can be observed from the pressure gauge at the back of the pump frame.

泵工作时，每班巡回检查一次机架内的油位，使之保持在游标尺的满位标识上。

Each shift check the oil level in frame when pumps operation. Keep the vernier at the full position.

在动力端的十字头部位两侧有沉淀池，每月打开两侧的排污盖进行清理，然后在补充适量的润滑油。

There are desilters at two sides of the crosshead of power end. Each month open the oil discharge cover on the two sides cleaning. Then add certain quantity of lubricant.

每六个月检查一次，如润滑油含有磨粒或腐蚀性化合物，应将润滑油彻底更换，并对油池进行清洗，然后加入新油。排油口在机架后端。清洗时，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。由于潮气、水分、灰尘、泥浆的侵入，更需要经常的换油。

Check every 6 months. If there is any grind chip or corrosive compound in the oil, discharge it completely, wash the oil pool and add new oil. The discharge spout is just in the behind of the frame. When washing, pay more attention to the oil grooves and oil chambers on cross head guide plate. Check the lubrication condition within a certain time. There are humidity, water, dust and mud, which will affect the oil.

六、保养

Maintenance

1. 每天的保养工作

Daily Maintenance

停泵每班检查一次动力端的油位。

Check the oil level of the power end each shift when shut down the pump.

观察缸套与活塞的工作情况，不应有明显的偏磨和液体泄漏。

Check the liners and pistons when they are working to see if there is any obviously wear and tear and leakage.

检查缸套和活塞的冷却液，不足时加以补充，脏了把其更换。

Check the cooling fluid of the cylinder liner and piston often, add it if need, change it if dirty .

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。

Check the liners' nozzle everyday to avoid jam and make sure the liners and pistons are sufficiently cooling and lubricating.

钻并泵安装完毕以后，第一次运转几小时以后，应当重新检查一下活塞卡箍的上紧力矩。

Several hours after first start the pump you should re-check the tighten torque of piston clamp.

每天将活塞杆的卡箍松开，将活塞转动 1/4 周左右，然后上紧卡箍，这样做使活塞磨损均匀，延长活塞和缸套的使用寿命。

Loosen the piston rod clamp daily, and turn the piston quarter round then tighten the clamp in order to make piston wear equally and prolong the life of liners and pistons.

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 pulsation dampener everyday to make sure it meet the demand of the standard.

2. 每周的保养工作

Weekly Maintenance

每周将液缸上的阀盖卸开，把阀盖丝扣和阀盖法兰丝扣上的淤泥与其它脏物冲洗干净，然后在清理干净的丝扣上涂抹丝扣油，以防扣磨蚀，擦伤和咬死（建议采用铅基丝扣油）。

Open the valve cap of cylinder and clean the sundries on cap threads and flange threads, and then put thread oil on cleaned screw avoiding abrasion, scrape and bad mesh (lead base thread is advised).

检查阀和阀座的磨耗情况，把磨损或刺坏了的阀座换掉。

Check valve and seat abrasion condition and change them if they worn out or damaged.

检查缸套和活塞，如磨损大或刺坏了的阀座必须换掉。

Check the liners and pistons if they are worn out or damage, must change valves.

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 pistons' locking nut if they are damaged, rusted or unable to lock.

3. 每月的保养工作

Monthly Maintenance

每 6 个月把动力端油槽的沉淀池（十字头下面），中的脏油放掉加以清洗，并加入新油。

Let out the dirty oil in the deposit pool of power end (under the cross head) per six months and clean it, then re-fill it with new oil.

每 6 个月检查十字头与导板之间的间隙，间隙太大应与调整。

Check the clearance between crosshead and guide plate every six month. Adjust it if too large.

液力端的所有双头螺栓与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。

Check the tightness condition of all the double studs and nuts including the nuts between thread ring and cylinder, between cylinders and pump shell, between liner bushing and cylinder

4. 每年的保养工作

Yearly Maintenance

每隔一年或两年，检查曲轴轴承、连杆轴承、传动轴承、十字头轴承、十字头导板是否松动，如果发现松动地方应当对泵进行一次更加彻底的检查并采取纠正措施。

About one or two years, check the tightness of crankshaft bearing, connecting rod bearing, transmit shaft bearing, cross head bearing, crosshead guide plate. Should have a throughout check if find any problem.

七、贮藏

Storage

动力端：如果泵的停车时间超过 3 个月，应当把液力端垫高使泵向动力端倾斜，然后，将油槽和沉淀池内的油放空，洗干净做长期贮备。

Power end: If the pump shut down over three month, you should make the pump lean to power end, then empty the oil grooves and deposit pool and clean them.

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涂抹防锈油，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。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。

Fluid end: After disassembling valves, pistons, piston rod and liners, thoroughly clean all inner parts of cylinders and parts. Coat the cylinder valve and parts with anti-rust grease. Clean up the liner spray system and liner chamber and inject some lubricant into liner spray system avoiding rust. Check pump each month and turn he gear when checking. Coat anti-rust if needed.

贮藏后重新启动：贮藏一段时间后重新开启泵时，不管是现场用的泵还是刚从工厂送来的新泵，都必须彻底检查，确定没有零件损坏，以及所有零件装配良好。如果不注意以下事项，将会引起严重的破坏事故。

Restart after storage You must have a thorough check to make sure the parts are good assembly and installed rightly before you restart the pump. (No matter the pump is new or used one). Please pay attention to the following items in order to prevent some serious problems.

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，保证他们都清洁并且情况良好，在动力端加润滑油至规定油位，在轴承处加油，并使它流到轴承里面去。

Open the covers of power end and fluid end and check the pump thoroughly, clean all parts, machining surface and bearings insuring that all the parts are clean and good. Add lubricant oil into power end to specified oil level. Add the oil on bearings and make the oil flow into bearings.

阀、活塞、缸套和液力端的所有零件都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。

Valves, pistons, liners and all parts of fluid end must be installed properly and have a good condition. Tighten the bolts, nuts, double studs, valve cover and cylinder head.

八、LW-446 泵轴承型号对照表 Pump Suitable Bearings List

序号 Item	名称 Description	部位 Position	型号 (国外) Type (International)	型号 (国内) Type (national)
1	圆柱滚子轴承 Cylindrical roller bearing	齿轮轴总成 Gear Shaft Assy.	NU5250MC3	NU3220 M/P63
2	圆柱滚子轴承	曲轴总成及偏心轮 Crank shaft and eccentric wheel	ADD41105GE	NFP6/292.1 M/ P69W33
3	调心滚子轴承 Self Aligning Ball Bearing	曲轴总成曲轴轴头 crank shaft and shaft stub	23224MBK/ W33C3	23224 CAK/ C3W33
4	双列长圆柱滚子轴承 Double-row Long Cylindrical Roller Bearing	十字头总成 Crosshead Assy.	TRCIR75168 or W-3361-C	NNAL6/69.85 M/ C4W33XYA

零部件手册

Parts Manual

1. LW446 总图零件

LW446 Pump Parts List

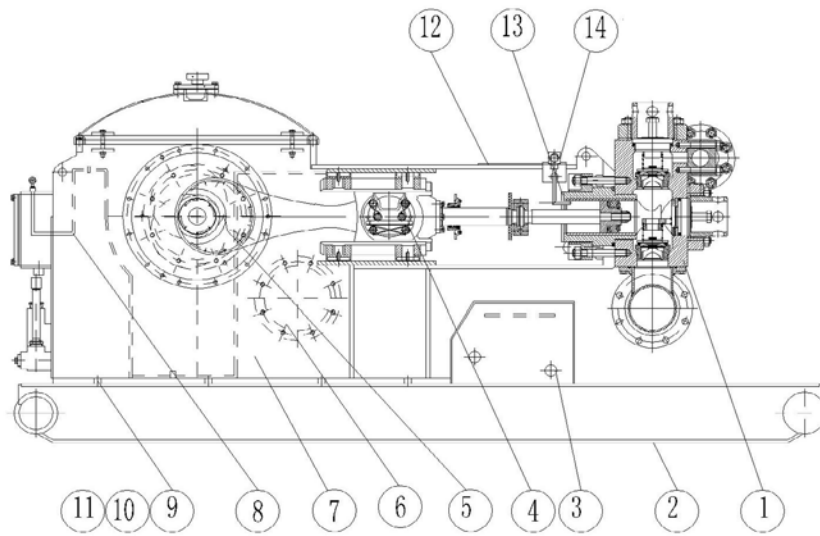


图1: LW-446泵总成零件(Pump parts list)

序号 Item	代号 Part number	名称 Description	数量 Qty
1	LW-446.01.00	液力端总成 Fluid End Assy.	1
2	LW-446.02.00	底座 Base plate	1
3	LW-446.03.00	水箱 Water Tank	1
4	LW-446.04.00	十字头总成 Crosshead Assy.	3
5	LW-446.05.00	曲轴总成 Crank Shaft Assy.	1
6	LW-446.06.00	齿轮轴总成 Gear Shaft Assy.	1
7	LW-446.07.00	机架总成 Frame Assy.	1
8	LW-446.08.00	润滑系统总成 Lubricate System Assy.	1
9	LW -0001	螺栓 7/8-9UNCX21/2 Stud	8
10	LW-446.01.12	螺母 7/8-9UNC-2B Nut	8
11	LW-446.09.00	垫片组 Washer	As needed
12	LW-446.10.00	盖板总成 Cover Plate Assy.	1
13	LW-446.11.00	挡水板 Deflector	1
14	LW-446.12.00	喷淋管总成 Spray Pipe Assy.	1

2. 齿轮轴总成零件
Gear Shaft Assy. Parts List

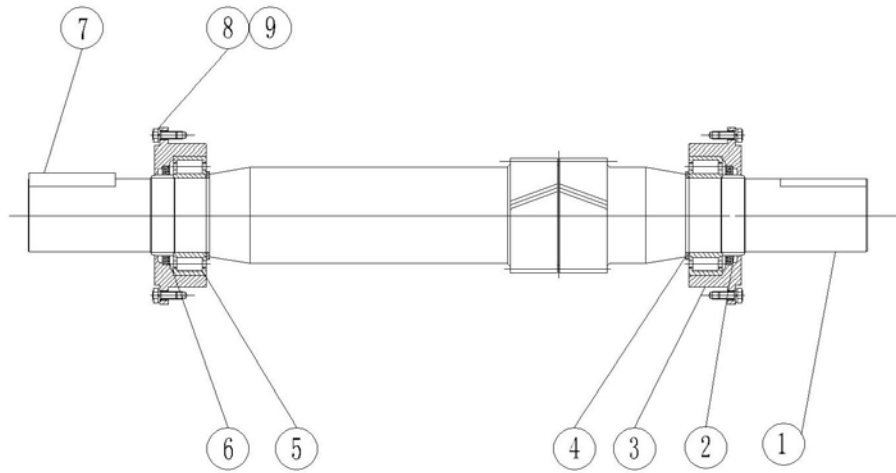
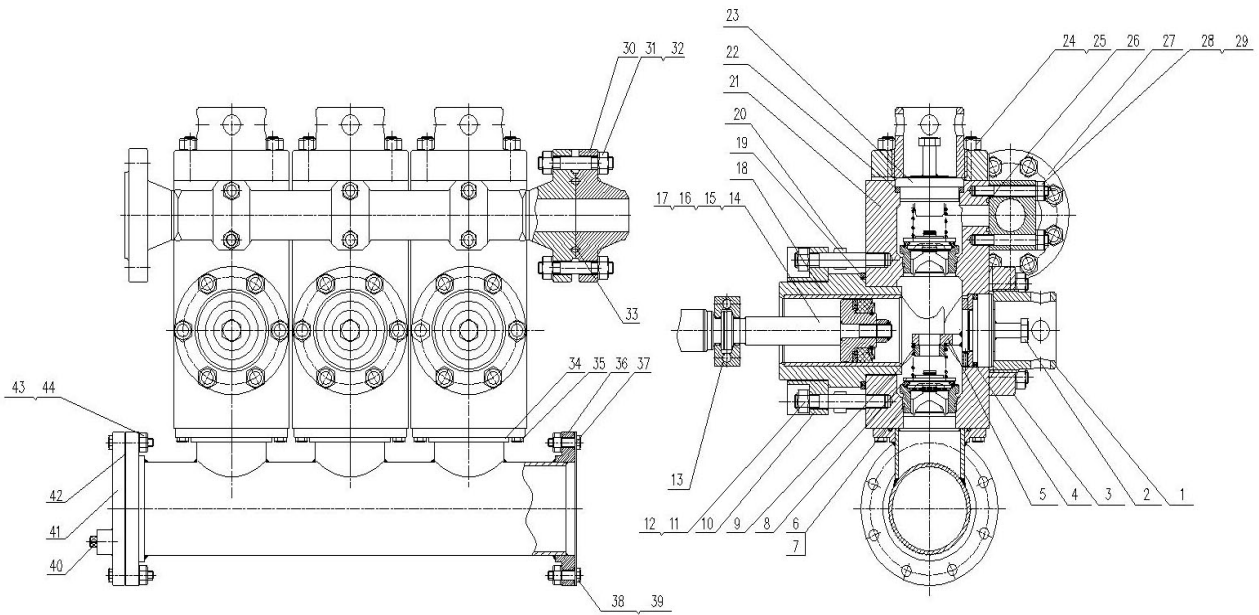


图2：齿轮轴总成零件(Gear Shaft Assy. Parts List)

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW-446.06.221	齿轮轴 Gear Shaft	1
2	LW-446.232	隔套 Bush(Distance Sleeve)	2
3	LW-446.229	轴承座 Bearing Housing	2
4	GB/T893.1	卡簧 180 Spring	2
5	NU5220MC3	轴承 Bearing	2
6	LW-446.06.03	骨架密封 5.5"×4.5"×0.5"Reinforced Seal	4
7	LW-446.06.001	平键 Flat Key	1
8	LW-0502	螺栓 5/8"-11UNCX2-1/2" Stud	16
9	LW-446.05.001	铜垫 Copper Washer	16

3. 液力端总成零件 Fluid End Assy. Parts list

附图3: 液力端总成零件 (Fluid End Parts List)

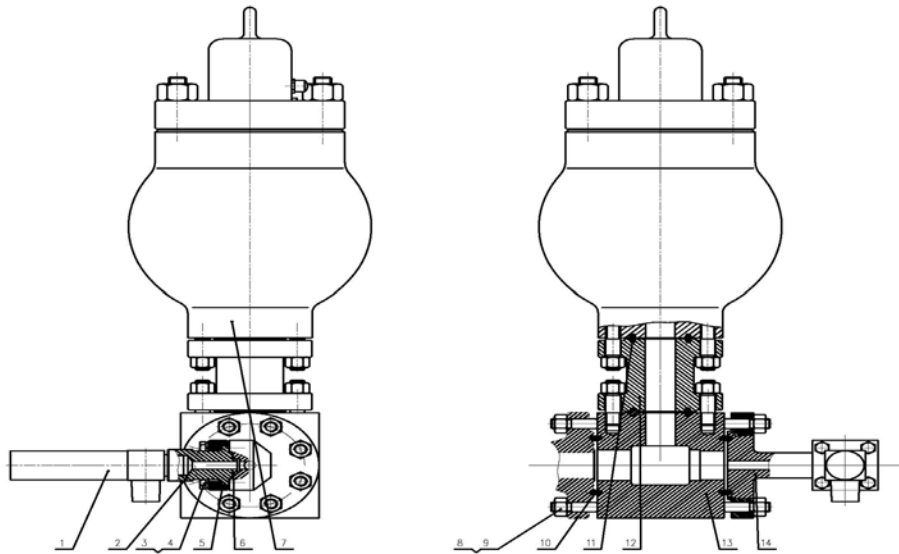


序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW-446.343	阀盖压筒 Valve cover	6
2	LW-446.309	缸盖堵头 Cylinder Head Plug	3
3	LW-446.342	阀盖法兰 Thread Ring	6
4	LW-446.01.001	阀侧盖密封圈 Valve Pot Cover Seal	3
5	LW-446.321	上水阀导向架 Lower Valve Guide	3
6	LW-446.01.002	阀座 Valve Seat	6
7	GB/T3452.1	“O”形密封圈 $\phi 100 \times 3.55$ O Ring	6
8	LW-446.01.03.00	整体硫化阀体总成 Bonded Valve Assy	6
9	LW-446.01.004	阀弹簧 Valve Spring	6
10	LW-446.322	缸套压盖 Thread Liner Retainer	3
11	LW-446.01.005	双头螺栓 1"-8UNC \times 7-1/4" Stud	18
12	LW-446.01.006	螺母 1"-8UNC-2B Nut	18
13	LW-446.227	活塞杆卡箍 Clamp	3
14	LW-446.308	活塞杆 Piston Rod	3
15	LW-446.01.007	锁紧螺母 Lock Nut	3

序号 Item	代号 Part Number	名称 Description	数量 Qty
16	LW-446.01.022	活塞总成 Piston Assembly	3
17	GB/T3452.1	“O”形密封圈 O Ring $\phi 47.5 \times 3.55$	3
18	LW-446.307	缸套 Liner	3
19	LW-446.01.008	缸套密封圈 Liner Seal	3
20	LW-446.01.009	内六角螺钉 1"-8UNC \times 3-3/8" Inner Hex Screws	12
21	LW-446.003	液缸 Cylinder	3
22	LW-446.01.010	阀顶盖密封圈 Upper valve cover seal	3
23	LW-446.323	阀盖堵头 Thread plug retainer	3
24	LW-446.01.011	双头螺栓 7/8"-9UNC \times 4-1/2" Stud	36
25	LW-446.01.012	螺母 7/8"-9UNC -2B Nut	36
26	GB/T3452.1	“O”形密封圈 $\phi 47.5 \times 5.3$ Seal	3
27	LW-446.325	排出管汇 Discharge Pipe	1
28	LW-446.01.013	双头螺栓 3/4"-10UNC \times 6" Stud	6
29	LW-446.01.014	螺母 3/4"-10UNC -2B Nut	6
30	LW-446.01.018	3" 焊颈法兰 Welded Flange	1
31	LW-446.01.019	双头螺栓 7/8"-9UNC \times 6" Stud	8
32	LW-446.01.020	螺母 7/8"-9UNC -2B Nut	8
33	SY5279.3	垫环 R31 Washer Ring	1
34	GB/T3452.1	“O”形密封圈 $\phi 150 \times 5.3$ O RING	3
35	LW-0101	螺栓 3/4"-10UNC \times 1-11/16" Stud	12
36	LW-446.326	吸入管汇 Suction Pipe	1
37	LW-446.01.017	挡板 Deflector	1
38	LW-0102	螺栓 3/4"-10UNC \times 2-1/16" Stud	4
39	LW-0103	螺母 3/4"-10UNC -2B Nut	4
40	LW-446.01.015	丝堵 NPT 1" Thread Plug	1
41	LW-446.01.21.00	吸入盲板法兰 Flange	1
42	GB/T3452.1	“O”形密封圈 $\phi 180 \times 7$ O Ring	1
43	LW-446.01.015	螺栓 3/4"-10UNC \times 2-1/16" STUD	8
44	LW-0104	螺母 3/4"-10UNC -2B Nut	8

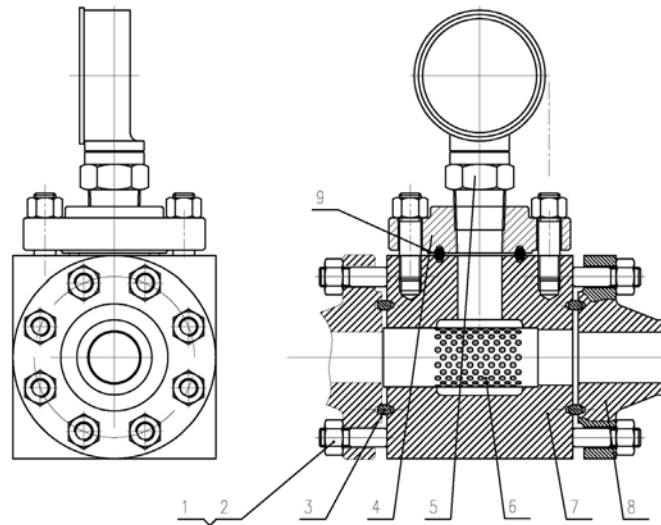
4. 排出四通总成零件

Discharge Block Assy. Parts list



空气包 PULSATION DAMPENER

序号 Item	代号 Part Number	名称 Description	数量 Qty
1		安全阀组合件 Safety Valve Assembly	1
2	LW-446.01.018.04	安全阀接管 Safety Valve Connector	1
3	LW-446.01.018.09	螺栓 5/8"-11UNC×2-1/2" Stud	4
4	GB93-1987	标准型弹簧垫圈 16 Spring Washer	4
5	LW-446.01.018.05	方法兰 Squre Flange	1
6	LW-446.01.018.03	橡胶垫 Rubber Gasket	1
7		蓄能器 Accumulator KB25	1
8	LW-446.01.018.07	双头螺栓 7/8"-9UNC-4-1/2" Stud	24
9	LW-446.01.018.08	螺母 7/8"-9UNC-2B Nut	24
10	SY5279.3	垫环 r31 Washer Ring	
11	SY5279.3	垫环 r24 Washer Ring	
12	LW-446.01.018.11	转换法兰 Conversion Flange	2
13	LW-446.01.018.01	排出四通 Discharge Four-Way	1
14	LW-446.01.018.02.00	排出法兰 Discharge Flange	1



压力表 PRESSURE GAGE

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW-446.01.018.07	双头螺栓 7/8"-9UNC-4-1/2" Stud	4
2	LW-446.01.018.08	螺母 7/8"-9UNC-2B Nut	4
3	SY5279.3	垫环 R31 Washer Ring	2
4	LW-446.01.018.10	压力表座 Pressure Gage Seat	1
5		0-60MPA 抗震压力表 Pressure Gage	1
6	LW-446.01.018.06	排出滤网 Strainer	1
7	LW-446.01.018.01	排出四通 Discharge Four-Way	1
8	LW-446.01.018	焊颈法兰 Welded Flange	1
9	SY5279.3	垫环 R24 Washer Ring	1

5. 十字头总成零件

Crosshead Assy. Parts List

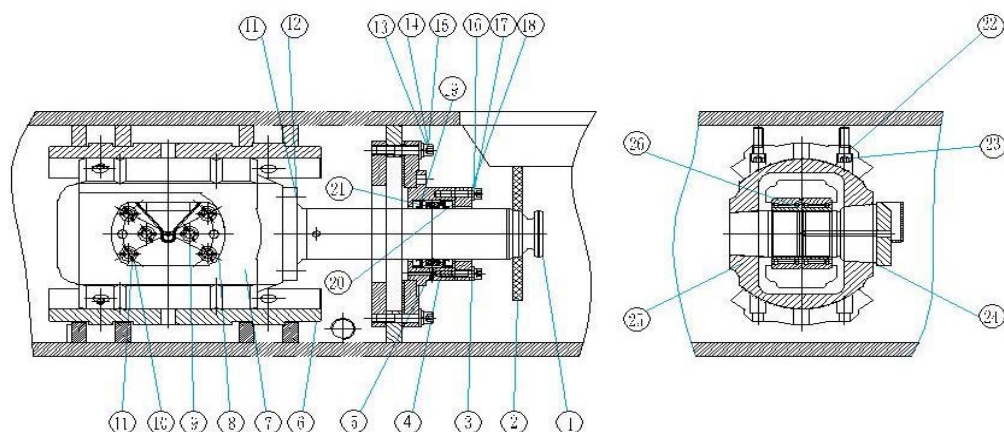
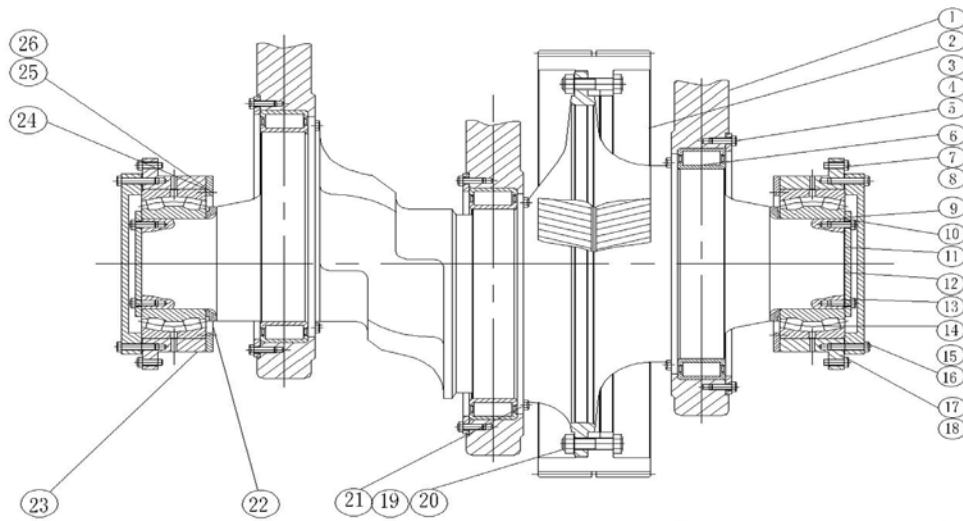


图4：十字头总成零件 (Crosshead Assy. Parts List)

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW -446.226	介杆 Extension Rod	1
2	LW -446.244	挡泥板 Deflector	1
3	LW -446.235	填料盒端盖 Stuffing box cover	1
4	LW -446.233	填料盒 Stuffing Box	1
5	LW -446.243	填料盒密封圈 Stuffing Box Seal Ring	1
6	LW -446.228	十字头导板 Crosshead Guide Plate	2
7	LW -446.213	十字头 Crosshead	1
8	LW -446.222	十字头销挡板 Crosshead Pin Deflector	1
9	LW -0401	内六角螺钉 5/8"-11UNCX1.575 Inner Hex. Stud	2
10	LW -0402	内六角螺钉 5/8"-11UNCX2, Inner Hex Stud	4
11		Φ 1.5 不锈钢丝 Stainless Wire	按需
12	LW -0403	内六角螺钉 5/8"-11UNCX1 11/16" Inner Hex. Stud	4
13	LW -0404	内六角螺钉 1/2"-13UNCX1-1/4" Inner Hex. Stud	4
14	LW -446.04.002	胶圈 Φ 13 Rubber Ring	4
15	GB/T97.1	垫圈 Φ 12 Washer	4
16	LW -0405	内六角螺钉 3/8"-16UNCX1-1/8" Inner Hex Stud	6
17	GB/T97.1	胶圈 Φ 10 Rubber Ring	6
18	LW -446.04.003	胶圈 Φ 10 Rubber Ring	6
19	LW -446.04.005	骨架双唇密封 3"×4"×0.5" Reinforced Double Lip Seal	2
20	LW -446.04.006	油封环 Seal Ring	1
21	GB3452.1	"O" 型圈 75×5.3 "O" Ring	1
22	LW -446.04.001	固定块 Alignment Block	8
23	LW -0406	内六角螺钉 1/2"-13UNCX1-1/2" Inner Hex Stud	8
24	LW -446.04.002	调节垫片 Adjusting Washer	1
25	LW -446.219	十字头销 Crosshead Pin	1
26	W-3361-C	滚针轴承 Needle Roller Bearing	1

6. 曲轴总成零件

Crank Shaft Assy. Parts List

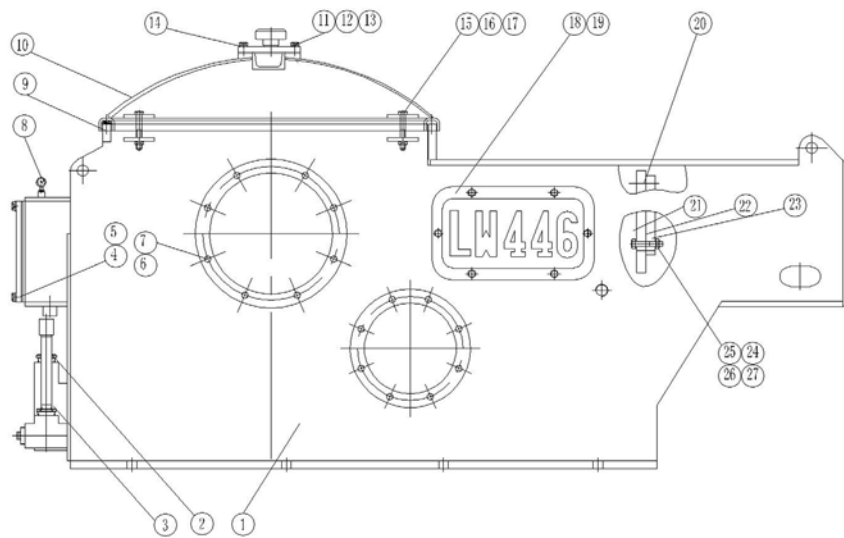


曲轴总成零件 (Crank Shaft Assy. Parts List)

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW -446.208	连杆 Connection Rod	1
2	LW -446.221.00	大齿轮 bull gear	1
3	LW -446.223	偏心轮外挡圈 Eccentric Wheel Outer Deflector	3
4	LW -0501	螺栓 1/2"-13UNCX13/16" Stud	36
5	GB/T862.2	外锯齿锁紧垫圈 14 Outer Serrated lock washers	36
6	ADD41105GE	偏心轮轴承 Eccentric Wheel Bearing	3
7	LW -0502	螺栓 5/8"-11UNCX2-1/2" Stud	16
8	LW -446.05.001	铜垫 ϕ 17/ ϕ 45 \times 2 Copper Washer	16
9	LW -446.144	主轴承端盖盖垫 Main Bearing Cap Gasket	2
10	LW -446.141	主轴承盖座 Main Bearing Housing	2
11	LW -446.05.002	曲轴头盖 Crank Shaft Head Cover	2
12	LW -446.05.003	曲轴头盖垫 Crank Shaft Head Cover Washer	2
13	LW -446.0503	头孔螺栓 1/2"-13UNCX2	8
14	W33C3	曲轴主轴承 Crank Shaft Main Bearing	2
15	LW -0504	螺栓 1/2"-13UNCX1-1/2" Stud	12
16	LW -446.05.004	铜垫 ϕ 14/ ϕ 35 \times 2 Copper Washer	12
17	LW -446.216	右轴承座 Right Bearing Housing	1
18	LW -446.252	轴承座垫 Bearing Housing Washer	2
19	LW -0505-1	螺栓 3/4"-10UNCX3 Stud	12
20	LW -446.05.005	锁紧螺母 3/4"-10UNC Lock Nut	12
21	LW -446.05.006	连杆大头轴承压块 Connection Rod Big End Bearing Lock Block	12
22		锁紧铁丝 Lock Iron Wire	按需
23	LW -446.215	主轴承座左 Left Main Bearing Housing	1
24	LW -446.217	主轴承座外挡圈 Outer Deflector of Main Bearing Housing	1
25		乐泰胶	按需
26	LW -0506	头孔螺栓 1/2"-13UNCX13/16"	30

7. 机架总成零件

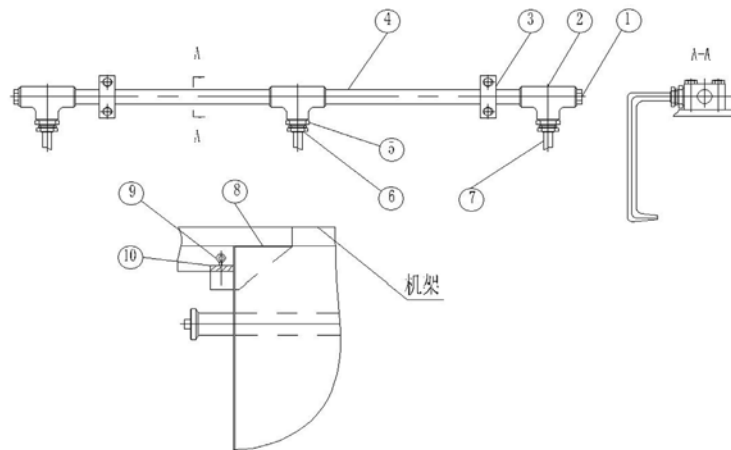
Pump Frame Assy. List



机架总成零件 (Pump Frame Assy. List)

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW -446.134	机架 Frame	1
2	LW -446.07.01.00	油位计总成 Oil Level Gauge Assy.	1
3	LW -446.07.03.00	滤油器 Oil Filter	1
4	LW -446.119	油泵腔后盖 Oil Pump Chamber Rear Cover	1
5	LW -446.167	油泵腔后盖垫 Oil Pump Chamber Rear Cover Washer	1
6	LW -0504	六角螺栓 Hex Stud	24
7	GB/T96	平垫 12 Flat Washer	6
8	Y60-Z	压力表 1.6Mpa (NPT1/4") Pressure Gauge	1
9		橡胶条 Rubber Strip	1
10	LW -446.136	上罩 Upper Cover	1
11	LW -446.166	观察盖垫片 Observe cover Washer	1
12	LW -446.165	观察盖孔 Observe Cover Hole	1
13	LW -446.07.02.00	通风罩 ventilation door	1
14	GB/T93	弹簧垫片 12 Spring Washer	6
15	LW -0701	螺栓 Stud	4
16	LW -0702	六角螺母 Hex Nut	4
17	LW -446.164	压紧块 Lock Block	8
18	LW -446.129	十字头孔盖 Crosshead Hole Cover	2
19	LW -446.04.142	头孔盖垫 Crosshead Hole Cover Washer	2
20	LW -0704	螺钉 Screw	12
21	LW -446.134-2	连接板 B Connection Board	3
22	LW -446.253	填料盒密封板 Stuffing Box Seal Board	3
23	LW -446.134-1	连接板 A Connection Board	3
24	LW -0703	六角螺栓 Hex Stud	12
25	GB/T93	弹簧垫圈 14 Spring Washer	24
26	GB/T96	平垫 14 Flat Washer	24
27	LW -446.04.002	胶圈 13 Rubber Seal	24

8. 喷淋泵、挡水板零件 Spray Pump and Deflector Parts List

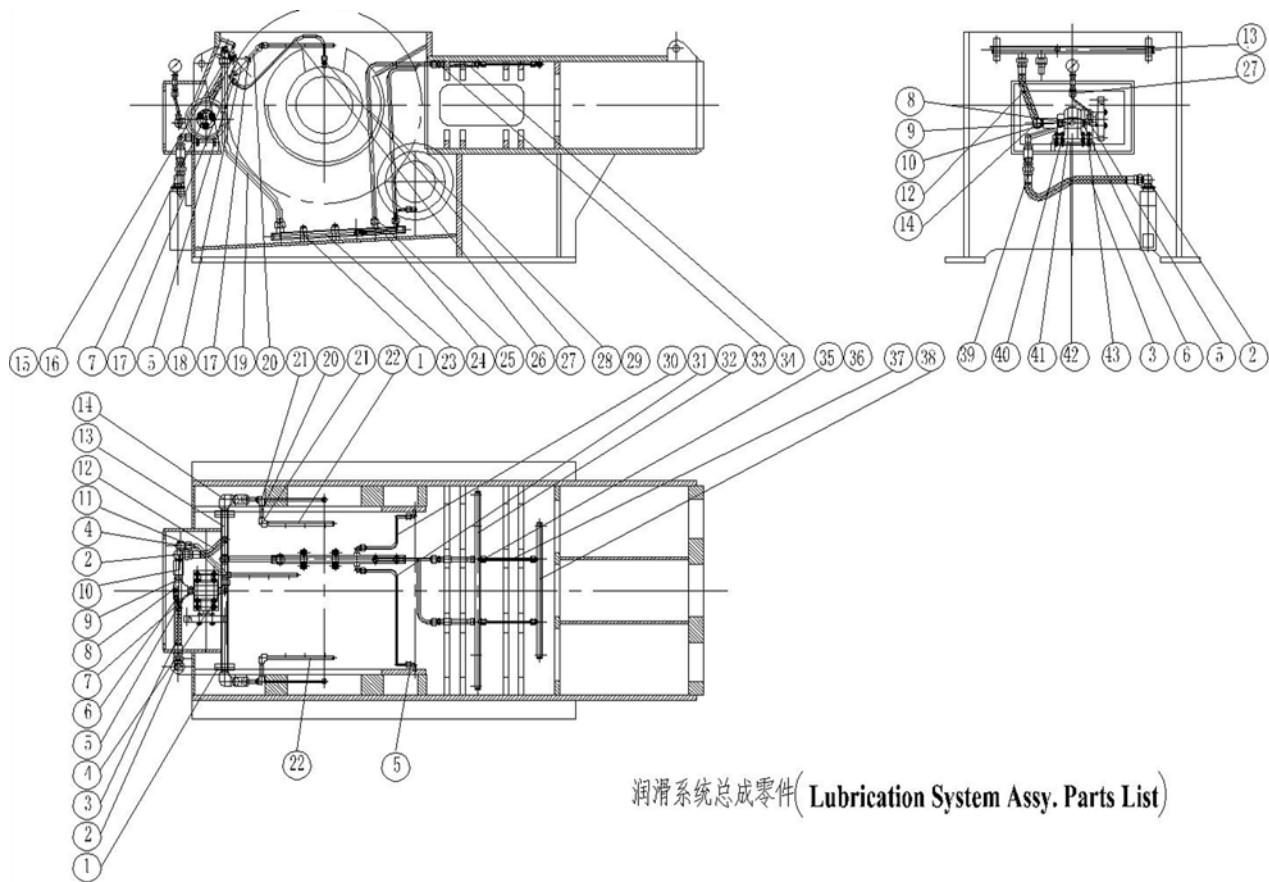


喷淋泵、挡水板零件(Spray Pump and Deflector Parts List)

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	GB/T14626	丝堵 NPT3/4" Thread Plug	2
2	GB/T14626	三通 DN20 NPT3/4" Tee	3
3	LW -446.08.07.00	管座 Tube Fixing Seat	2
4	LW -446.12.001	街头 NPT3/4"	2
5	GB/T14626	内外街头 NPT1/4"-3/4"	3
6	JB/ZQ4408	直通接头 A8 Straight Joint A8	3
7		喷淋管 (紫铜管 \varnothing 8X1) Spray Pipe(Copper Pipe)	3
8	LW -446.11.003	挡水板 Deflector	2
9	LW -446.11.002	碟形螺栓 Butterfly Stud	2
10	LW -446.11.001	连接块 Connection Block	1

9. 润滑系统总成零件

Lubrication System Assy. Parts List



润滑系统总成零件 (Lubrication System Assy. Parts List)

序号 Item	代号 Part Number	名称 Description	数量 Qty
1	LW -446.08.07.00	管座 Tube Fixing Seat	5
2	LW -446.08.015	直角街头 NPT3/4"-M27×1.5	2
3	LW -446.08.016	吸入软管 Suction Hose	1
4	JB/ZQ4410	直角管接头 A16 90°Pipe Joint	2
5	JB/ZQ4410	直角管接头 A8,90°Pipe Joint	7
6	JB/T14626	内外街头 NPT3/4"-NPT1/4"	1
7	LW -446.08.003	街头 NPT3/4" -NPT1/2"	3
8	JB/T14626	三通 DN20 (NPT3/4") Tee	1
9	LW -446.08.020	街头 NPT3/4"	1
10	JB/T14626	双接口管箍 DN20 (NPT3/4") Double Connector pipe clamp	1
11		铜管 Copper Pipe	1
12	LW -446.08.021	排出软管 Discharge Hose	1
13	LW -446.08.27.00	顶部油管焊合 Upper Tubing solder	1

序号 Item	代号 Part Number	名称 Description	数量 Qty
14	JB/T14626	直角弯头 DN20 (NPT3/4") 90°Elbow	2
15	JB1918-77	M30×2 扩口式管接螺母 Flared type tube connection nuts	2
16	JB/T5646-1988	∅ 20 扩口式管套 Flared type tube Sleeve	2
17	JB/T14626	内外街头 NPT1/2"-NPT1/4"	4
18	JB/T14626	三通 DN15 (NPT1/2") Tee	2
19		铜管 Copper Pipe	1
20	LW -446.08.004	短接 NPT1/4" Nipple(Sub)	4
21	JB/T14626	直角弯头 DN8 (NPT1/4") 90°Elbow	4
22	LW -446.08.05.00	喷油嘴焊合 Spray Nozzle solder	3
23	LW -446.08.26.00	底部主油管焊合 Bottom Main Oil Pipe Solder	1
24	JB1918-77	M18×1.5 扩口式管接螺母 Flared type tube connection nuts	2
25	JB/T5646-1988	∅ 12 扩口式管套 Flared type tube Sleeve	2
26		铜管 Copper Pipe	2
27	JB/ZQ4408	直角管接头 A8,90°Pipe Joint	3
28		铜管 Copper Pipe	1
29		铜管 Copper Pipe	1
30		铜管 Copper Pipe	1
31		铜管 Copper Pipe	1
32	JB/ZQ4408	直角管接头 A12, 90°Pipe Joint	2
33	LW -446.08.009	街头 NPT3/8"	2
34	LW -446.08.24.00	喷淋管 I 焊合 Spray Pipe I Solder	1
35	JB1918-77	M14×1.5 扩口式管接螺母 Flared type tube connection nuts	4
36	JB/T5646-1988	∅ 8 扩口式管套 Flared type tube Sleeve	4
37		铜管 Copper Pipe	2
38	LW -446.08.25.00	喷淋管 II 焊合 Spray Pipe II Solder	1
39	LW -446.08.019	直角街头 NPT3/4"-M27×1.5	1
40	LW -446.08.17.00	齿轮油泵总成 Gear Oil Pump Assy	1
41	LW -446.08.018	油泵底座 Oil Pump Base Plate	1
42	LW -446.08.022	连接板 Connection Board	1
43		铜管 Copper Pipe	1

10. 橡胶件明细表
Rubber Parts List

序号 Item	图号 Drawing No.	名称 Description	材料 Materials	数量 Qty	备注 Note
1	LW -446.06.03	骨架密封 5.5"×4.5"×0.5" Reinforced Seal	组件 Assembly	4	传动轴总成 Transmission Shaft Assy.
2	LW -446.167	油泵腔后盖垫 Oil Pump Chamber Rear Cover Washer	耐油橡胶 I-3 oil resistant rubber	1	机架总成 Frame Assy.
3		橡胶条 Rubber Strip	泡沫橡胶板 expanded rubber plate	1	机架总成 Frame Assy.
4	LW -446.04.142	头孔盖垫	耐油橡胶 I-3 oil resistant rubber	2	机架总成 Frame Assy.
5	LW -446.253	填料盒密封板 Stuffing Box Seal Board	耐油橡胶 I-3 oil resistant rubber	3	机架总成 Frame Assy.
6	LW -446.244	挡泥板 Deflector	耐油橡胶 I-4 oil resistant rubber	3	十字头总成 Crosshead Assy.
7	LW -446.243	填料盒密封圈 Stuffing Box Seal Ring	耐油橡胶 I-3 oil resistant rubber	3	十字头总成 Crosshead Assy.
8	LW -446.04.002	胶圈 \varnothing 13 Rubber Seal	耐油橡胶 oil resistant rubber	12	十字头总成 Crosshead Assy.
9	LW -446.04.003	胶圈 \varnothing 10 Rubber Seal	耐油橡胶 oil resistant rubber	18	十字头总成 Crosshead Assy.
10	LW -446.04.005	骨架双唇密封 3"×4"×0.5" Reinforced Double Lip Seal	组件 Assembly	6	十字头总成 Crosshead Assy.
11	GB3452.1	“O”型圈 75×5.3 O Ring	耐油橡胶 oil resistant rubber	3	十字头总成 Crosshead Assy.
12	GB3452.1	“O”型圈 100×3.5 O Ring	耐油橡胶 I-3 oil resistant rubber	6	液力端总成 Fluid End Assy.
13	GB3452.1	“O”型圈 25×3.55 O Ring	耐油橡胶 oil resistant rubber	3	液力端总成 Fluid End Assy.

序号 Item	图号 Drawing No.	名称 Description	材料 Materials	数量 Qty	备注 Note
14	GB3452.1	“O”型圈 47.5×5.3 O Ring	耐油橡胶 oil resistant rubber	3	液力端总成 Fluid End Assy.
15	GB/T3452.1	“O”型圈 150×5.3 O Ring	耐油橡胶 oil resistant rubber	3	液力端总成 Fluid End Assy.
16	GB/T3452.1	“O”型圈 185×7 O Ring	耐油橡胶 oil resistant rubber	2	液力端总成 Fluid End Assy.
17	LW -446.01.001	侧盖密封圈 Valve cover Seal	丁晴加布橡胶 Butadiene- acrylonitrile rubber with Fabric	3	液力端总成 Fluid End Assy.
18	LW -446.01.008	缸套密封圈 Liner Seal	丁晴加布橡胶 Butadiene- acrylonitrile rubber with Fabric	3	液力端总成 Fluid End Assy.
19	LW -446.01.010	阀顶盖密封圈 Upper Valve Cover Seal	丁晴加布橡胶 Butadiene- acrylonitrile rubber with Fabric	3	液力端总成 Fluid End Assy.
20	LW-446.01.022.04/5	胶皮 3-1/2"K Rubber	组件 Assembly	3	与活塞一起选用 Together with Piston
21	LW-446.01.022.04/2	胶皮 4"K Rubber	组件 Assembly	3	与活塞一起选用 Together with Piston
22	LW -446.01.022.04/1	胶皮 4_1/2"K Rubber	组件 Assembly	3	与活塞一起选用 Together with Piston
23	LW -446.01.010	胶皮 5"K Rubber	组件 Assembly	3	与活塞一起选用 Together with Piston
24	LW -446.01.010	胶皮 5-1/2"K Rubber	组件 Assembly	3	与活塞一起选用 Together with Piston
25	LW -446.01.022.04/6	胶皮 6"K Rubber	组件 Assembly	3	与活塞一起选用 Together with Piston

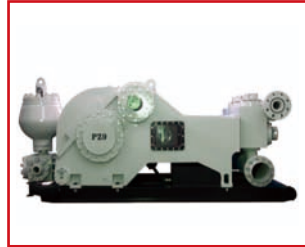
11. 随机备件（易损件）明细表
Expendable Parts List

序号 Item	图号 Drawing No.	名称 Description	材料 Materials	数量 Qty	备注 Note
1	GB3452.1	“O”型圈 75×5.3 O Ring	耐油橡胶 oil resistant rubber	4	十字头总成 Crosshead Assy.
2	GB3452.1	“O”型圈 100×3.5 O Ring	耐油橡胶 I-3 oil resistant rubber	6	液力端总成 Fluid End Assy.
3	GB3452.1	“O”型圈 47.5×3.55 O Ring	耐油橡胶 oil resistant rubber	3	液力端总成 Fluid End Assy.
4	GB3452.1	“O”型圈 47.5×5.3 O Ring	耐油橡胶 oil resistant rubber	3	液力端总成 Fluid End Assy.
5	GB/T3452.1	“O”型圈 150×5.3 O Ring	耐油橡胶 oil resistant rubber	3	液力端总成 Fluid End Assy.
6	GB/T3452.1	“O”型圈 185×7 O Ring	耐油橡胶 oil resistant rubber	2	液力端总成 Fluid End Assy.
7	LW -446.01.001	阀盖密封圈 Valve Cover Gasket	丁晴加布橡胶 Butadiene-acrylonitrile rubber with Fabric	3	液力端总成 Fluid End Assy.
8	LW -446.01.008	缸套密封圈 Liner Gasket	丁晴加布橡胶 Butadiene-acrylonitrile rubber with Fabric	3	液力端总成 Fluid End Assy.
9	LW -446.01.010	阀顶盖密封圈 Upper Valve Cover Gasket	丁晴加布橡胶 Butadiene-acrylonitrile rubber with Fabric	3	液力端总成 Fluid End Assy.
10		喷淋泵 Spray Pump	组建 Assembly	1	与泵一起选用 Together with pump
11		随机工具 Tools	组建 Assembly	1	与泵一起选用 Together with pump

泥浆泵系列 MUD PUMP



LW440/LW446

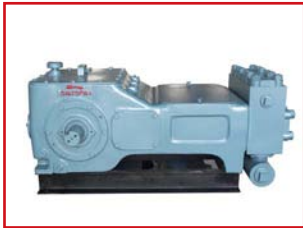


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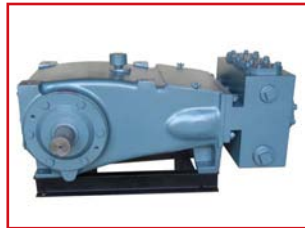


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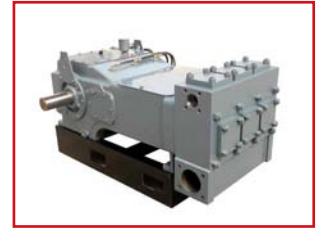
柱塞泵系列 PLUNGER PUMP



LG3



L59T



LHE215



LEE165



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