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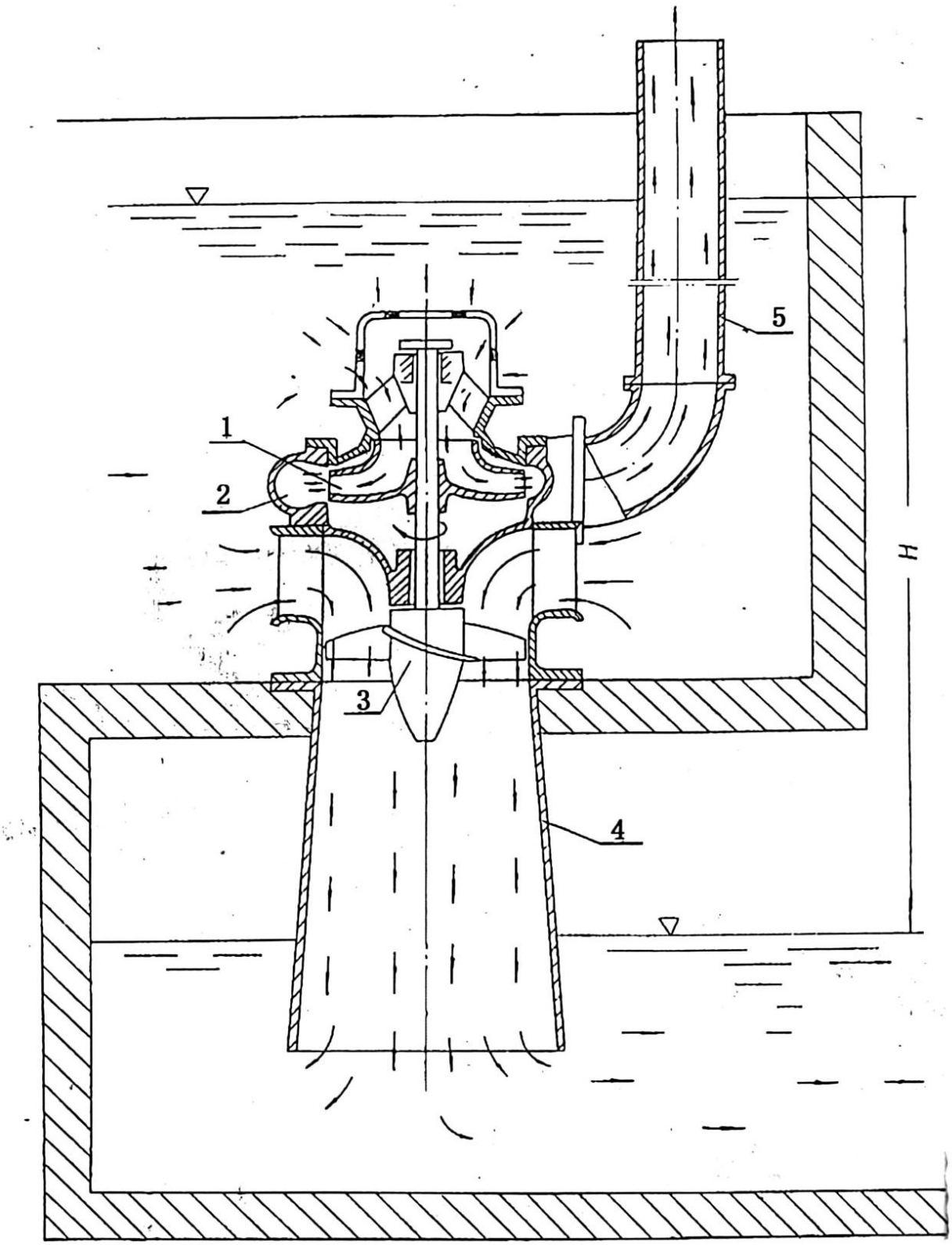
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水轮泵工作原理图

1. Impeller　2. Pump shell　3. Runner　4. Draft pipe　5 Outlet pipe

Working principle diagram of hydraulic pump

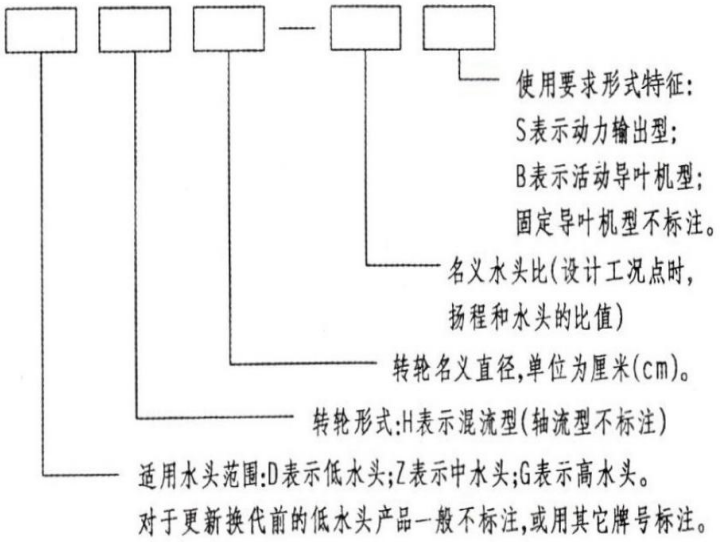
一、 概　述

水轮泵是由水轮机和水泵按一定方式组成的提水机器。具有一定能量的水流驱动水轮机转轮旋转，从而带动水泵叶轮转动，在叶轮的作用下，水被扬至高处。凡具有一定流量和落差的地方均能建站安装使用水轮泵。

First, overview

Hydraulic pump is a water lifting machine composed of hydraulic turbine and pump in a certain way. The water with a certain energy drives the turbine runner to rotate, thus driving the pump impeller to rotate, under the action of the impeller, the water is lifted to a high place. Where there is a certain flow and drop can be built station installation and use of hydraulic pump.

水轮泵型号表示法（Hydraulic pump type representation）



Use requirements Formal characteristics:
S stands for power output type;
B represents the type of movable guide vane; Fixed guide vane type is not marked.
Nominal head ratio (the ratio of head and head at the design working point) nominal diameter of the runner in centimeters (cm).
Runner form :H indicates mixed flow type (axial flow type is not marked) Applicable head range :D indicates low head; Z stands for middle head; G stands for high head. For low-head products before upgrading, they are generally not marked, or marked with other brands.

二、 结　构

本类产品的结构如图 1 所示。其主要特点：水泵部分为单级泵或多级泵；水轮机部分的导水座为固定导叶式或活动导叶式； 顶部轴承为金属滚动轴承或塑料轴承； 机泵同轴串联还有非同轴水轮泵：机泵分离，中间设有齿轮传动增速或皮带传动增速，可实现发电、抽水两种用途。

Second, structure

The structure of this product is shown in Figure 1. Its main features: the pump part is single-stage pump or multistage pump; The water guide seat of the turbine part is fixed guide vane type or movable guide vane type. The top bearing is metal rolling bearing or plastic bearing; Machine and pump coaxial series and non-coaxial hydraulic pump: machine and pump separation, the middle is equipped with gear drive growth rate or belt drive growth rate, can achieve power generation, pumping two uses.

三、性　能

水轮泵的性能参数包括：水头 H、过流量 Q、扬程 h、出水流量 q、效率 η 、水轮机功率 Pt 和转速 n t（见图 2 所示）。

Third, sexual ability

The performance parameters of the hydraulic pump include: head H, overflow Q, head h, discharge flow q, efficiency η, turbine power Pt and speed nt (see Figure 2).

四、安装方法

水轮泵与一般小型轴流式水轮机类似，需要根据建站的地形条件，建造与机组相适应的引水渠道、拦污栅、闸门、机坑、尾水管及尾水渠道等水工设施。但是水轮泵的安装方式又有别于一般小型轴流式水轮机。本说明书介绍水轮泵不仅可以立装或卧装，还可以采取多台水轮泵串联或并联的安装方式以提高泵站的提水高度或增加其出水流量。

图 3、 4、 5、及表二、三分别表明了立式和卧式安装的机坑布置形式以及有关的安装方式。图中 Hs 为水轮泵安装吸出高度，计算公式如下：

Fourth, installation method

The hydraulic pump is similar to the general small axial flow turbine. According to the topographical conditions of the station, the hydraulic facilities such as the diversion channel, sewage barrier, gate, pit, draft pipe and tail canal which are suitable for the unit should be constructed. However, the installation method of the hydraulic pump is different from the general small axial flow turbine. This manual describes that the hydraulic pump can not only be installed vertically or horizontally, but also can take a series or parallel installation of multiple hydraulic pumps to increase the lifting height of the pump station or increase its water flow.

Figure 3, 4, 5, and Table 2 and 3 respectively show the vertical and horizontal installation of the pit layout and the related installation mode. Hs in the figure is the suction height of the hydraulic pump installation, the calculation formula is as follows:

$$H_s \leqslant 10 - (\sigma + \triangle\sigma) \cdot H - \frac{\nabla}{900} (m)$$

式中：H——工作水头(m)

∇——安装地点海拔高程(m)

σ——汽蚀系数(760 转轮角度＋5°汽蚀系数取 1.05)

△σ——汽蚀修正系数(根据水头变化汽蚀修正系数不同，最大取 0.13)

Hs——对于立装是指转轮叶片中心至尾水面的垂直高度

对于卧装是指转轮叶片最高点至尾水面的垂直高度。

$$H_s \leqslant 10 - (\sigma + \triangle\sigma) \cdot H - \frac{\nabla}{900}(m)$$

式中：H— Installation site elevation (m)

∇— Cavitation coefficient (760 runner Angle +5 cavitation coefficient of 1.05)

σ— Corrosion correction coefficient (according to the change of water head, the maximum is 013)

△σ— For vertical installation refers to the vertical height of the runner blade center to the tail water surface

Hs— For horizontal installation, it refers to the vertical height of the runner blade from the highest point to the tail water surface

FIG. 6 and FIG. 7 are the schematic diagram of series and parallel installation of the same type of hydraulic pump respectively, and their installation dimensions refer to the above

图 6、图 7 分别为同型号水轮泵串、并联安装的示意图，其安装尺寸参照上面立式安装的有关尺寸。串联机组的提水扬程为各台扬程的总和，机组出水量和单台一样。并联机组出水量为各台出水量的总和，机组提水扬程仍和单台一样。同样，无论串联或并联，机组的总过流量为各台过流量的总和。

供客户选用或自制的各种尾水管：(见图 8、 9、 1 0、11、及表 4)。

FIG. 6 and FIG. 7 are the schematic diagram of series and parallel installation of the same type of hydraulic pump respectively, and their installation dimensions refer to the above vertical installation dimensions. The water lift of the tandem unit is the sum of the lift of each unit, and the water output of the unit is the same as that of a single unit. The water output of the parallel unit is the sum of the water output of each unit, and the lifting head of the unit is still the same as that of a single unit. Similarly, whether in series or parallel, the total overflow of the unit is the sum of the overflow of each station.

Various draft pipes for customers to choose or make: (see Figure 8, 9, 10, 11, and Table 4).

五、使用注意事项

水轮泵必须使用得当，才能充分发挥效益，达到它应有的使用年限。因此必须注意如下事项：

1. 水轮泵水工工程竣工验收后，才能进行机组、管道、闸门、拦污栅等设备安装，并经正式验收运转，待工程质量达到要求时，方能交付使用。

2. 每次运转前，需严格检查联接部位和转动部分是否正常，各通流部件、拦污栅有无乱杂草杂物堵塞。

3 . 在水轮泵运转过程中应经常观察其运行情况，如发现异常声响或机组、管道有振动及不转、不出水等现象时，应查明原因处理后，方可开机使用。

4. 应检查尾水管和泵部滤网的淹没深度是否达到要求，以防止空气进入泵部和尾水管影响机组性能。

5. 采用塑料轴承结构的水轮泵，开机前和停机时应预先注入足够流量的清水润滑，防止机组在脱水状态下运转，而导致塑料轴承烧毁。

6. 多台并联机组开机时，应注意并联总管先后，防止机组倒转影响出水流量。

7. 多台串联机组开机时，应注意开机先后，防止最后上水一台机组不转，影响提水扬程和出水流量。

8. 对于采用直锥形尾水管的泵站，具水轮泵安装吸出高度除了应符合计算公式要求外，Hs 应小于或等于使用水头的 25%，尽量加大机坑水深尺寸，增大正压力。

9.对于 80 型以上水轮泵尽量采用 4H 弯肘形尾水管或 7 号尾水管,对于 1.5M 水头的泵站应采用卧装形式。

10. 水轮泵出水管道中应安装止回阀或闸阀，停机时防止管道内水倒流入泵体，使机组反转，圆螺母松动，水轮泵承受水垂压力作用产生强烈震动。

Five. Use precautions

The hydraulic pump must be used properly in order to give full play to its benefits and achieve its due service life. Therefore, we must pay attention to the following matters:

1. After the completion and acceptance of the hydraulic engineering of the hydraulic pump, the installation of the unit, pipeline, gate, sewage barrier and other equipment can be carried out, and the formal acceptance operation can be delivered until the quality of the project meets the requirements.

2. Before each operation, it is necessary to strictly check whether the connection part and the rotating part are normal, and whether the flow parts and the sewage grid are blocked by random weeds and debris.

3. During the operation of the hydraulic pump, it is necessary to observe its operation frequently. If abnormal sound or vibration of the unit or pipeline is found, and no rotation or water is produced, the cause should be identified before it can be turned on.

4. Check whether the submerged depth of the draft pipe and the pump filter meets the requirements to prevent air from entering the pump and the draft pipe from affecting the unit performance.

5. The hydraulic pump with plastic bearing structure should be lubricated with sufficient flow of water before starting and stopping to prevent the unit from operating in a dehydrated state, resulting in the burning of plastic bearings.

6. When multiple parallel units are started, attention should be paid to the parallel main pipes successively to prevent the unit from reversing to affect the water flow.

7. When multiple series units are started, attention should be paid to the starting sequence to prevent the final water unit from not turning, affecting the water lift and water flow.

8. For the pump station using the straight conical draft pipe, the suction height of the hydraulic pump installation should meet the requirements of the calculation formula, Hs should be less than or equal to 25% of the water head, and the depth of the pit should be increased as far as possible to increase the positive pressure.

9. For more than 80 type hydraulic pump, 4H elbow draft pipe or No. 7 draft pipe should be used as far as possible, and the pump station with 1.5M head should be installed horizontally.

10. Check valve or gate valve should be installed in the water outlet pipe of the hydraulic pump to prevent the water in the pipe from pouring into the pump body when the machine is shut down, so that the unit is reversed, the round nut is loose, and the hydraulic pump is subjected to hydraulic vertical pressure to produce strong vibration.

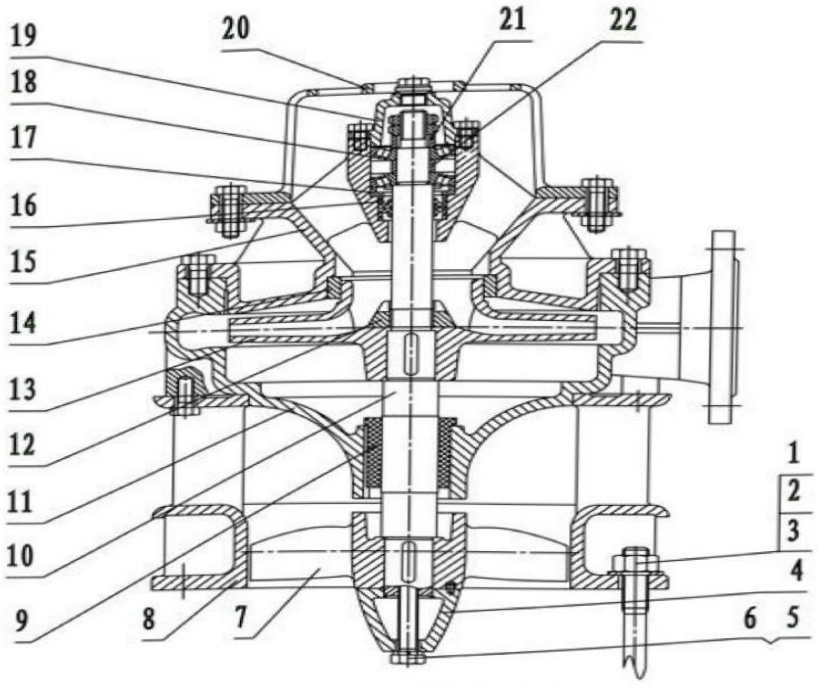


图1A AT系列水轮泵结构图

Figure 1A Structure diagram of AT series hydraulic pump

1、地脚螺栓　2、六角螺母　3、平垫圈　4、泄水锥
5、泄水锥螺栓　6、弹簧垫圈　7、转轮　8、导水座
9、橡胶导轴承　10、主轴　11、泵体　12、叶轮螺母
13、叶轮　14、密封环　15、泵盖　16、油封
17、压圈　18、单列圆锥滚子轴承　19、轴承盖
20、过滤栅　21、小压环
22、小压环(20 型水轮泵无此套)

1, anchor bolt　2, hexagon nut　3, flat washer　4, drain cone
5, drain cone bolt　6, spring washer　7, runner　8, water guide seat
9, rubber guide bearing　10, spindle　11, pump body　12, impeller nut
13, impeller　14, sealing ring　15, pump cover　16, oil seal
17, pressure ring　18, single row tapered roller bearing　19, bearing cover
20, filter gate　21, small pressure ring
22, small pressure ring (type 20 hydraulic pump without this set)

说明

H8—安装吸出高度；

H8<10-(q+△Q）•△（m）

Q—转轮气蚀系数；

△Q—气蚀修正系数

H—使用水头；

△—泵站海报高度（m）

Instructions

H8-mounting suction height

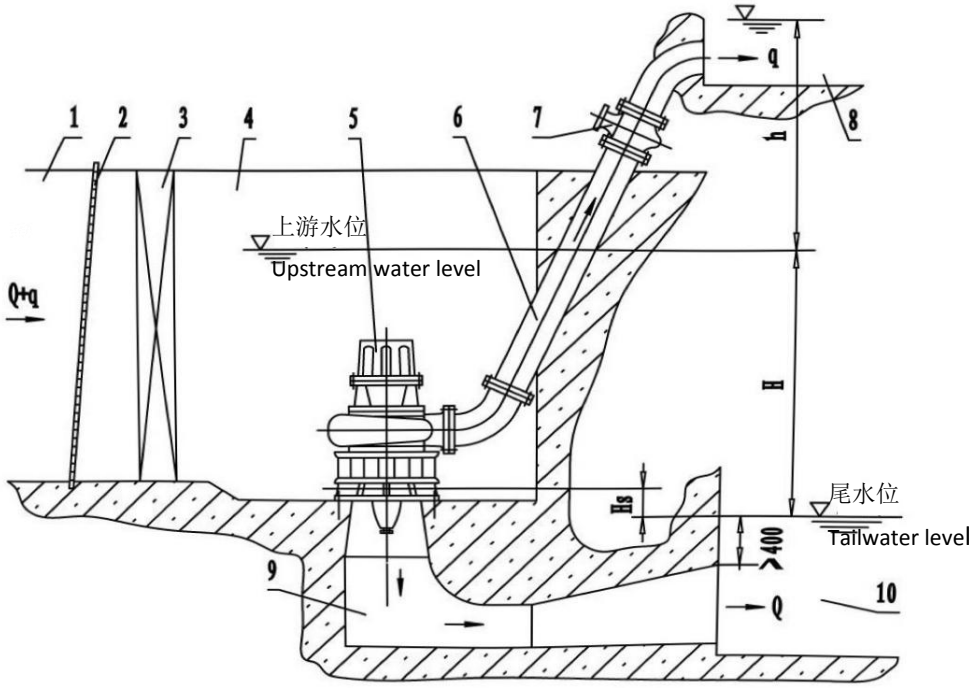
H8<10-(q+△Q) •△ (m)

Q-runner cavitation coeffici

△Q- cavitation correction f

H - use water head;

△- Pump station poster hei



1、进水渠 2、拦污栅 3、

6、出水管 7、单向止回阀

10、尾水渠 H—水头 h—杨程 Q—过滤量 q—出水浏览量

1, inlet canal 2, sewage barrier 3, gate 4, pit 5, hydraulic pump

6, outlet pipe 7, one-way check valve 8, irrigation channel 9, 7 draft pipe

10. Tail canal H - head h - Yang Cheng Q - filter quantity q - effluent page views

图 2 水轮泵单机安装布置图

FIG. 2 Installation layout of a single hydraulic pump

14、

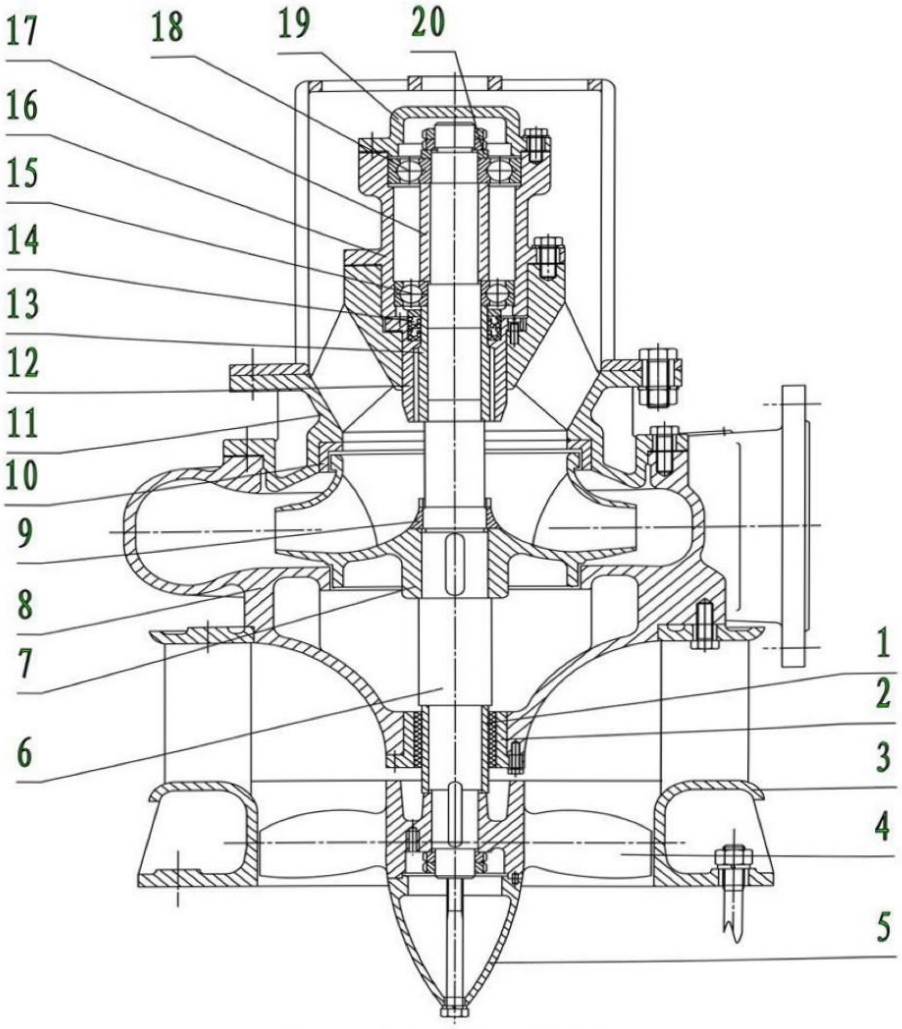


图1B D系列水轮泵结构图

FIG. 1B Structure diagram of D series water wheel

1、轴套　2、导轴承　3、导水座　4、转轮　5、泄水锥
6、主轴　7、叶轮　8、泵体　9、叶轮螺母　10、密封环
11、泵盖　12、螺旋密封体　13、螺旋密封套　14、油封　15、深沟球轴承
16、轴承体　17、轴套　18、深沟球轴承　19、轴承盖　20、压环

1, shaft sleeve　2, guide bearing　3, water guide seat　4, runner
5, water drain cone　6, main shaft　7, impeller　8, pump body
9, impeller nut　10, sealing ring　11, pump cover　12, spiral sealing body
13, spiral sealing sleeve　14, oil seal　15, deep groove ball bearing
16, bearing body　17, shaft sleeve　18, deep groove ball bearing
19, bearing cover　20, pressure ring

表一　水轮泵工作性能 Table 1 Working performance of hydraulic pump

D 系列水轮泵性能参数表 D series hydraulic pump performance parameter table

号 No.	工作性能 Work ability							净重 kg Net weight kg
	适用水头 H (m) Applicable head H (m)	扬程 h(m) Head h(m)	过流量 Q(L/S) Overflow Q(L/S)	出水流量 q(L/S) Discharge flow q (L/S)	效率 n(%) Efficiency n(%)	水轮机 Water turbine		
						转速 nt(r/min) Speed nt(r/min)	功率 Pt(KW) Power Pt(KW)	
20-4	1~6	4~24	84~206	11~26.9	52.4	950~2327	0.57~8.38	64
20-6		6~36		6~14.7	42.8			59
20-10		10~60		4.3710.73	52.1	950~1550		
20-16		16~96		2.656.5	50.5			
30-4		4~24	189~463	25.7~62.9	54.4	633~1550	1.32~19.4	160
30-6		6~36		16~39.2	50.6			155
40-2.5		2.5-15	348~852	81.2-223.39	66.7	480~1175	2.73~40.12	295
40-4		4-24		45-110.2	60.1			600
40-4B		6~36		35.09~85.91	60.5			290
40-6								600
40-6B								
40-10		10~60		19.7~48.2	56.5			445
40-16		16~96		11~26.9	50.5		2.73-40.12	650
40-20		20~120	333~815	7.8~19.15	47	535~1310	2.93~43.8	570
60-4		4~24	760~1862	117.8~288.5	62	350~857	5.96~87.59	1000
60-4B								1360
60-6		6~36		77~188.6	60.8			985
60-6B								1350
60-16		16~96	727~1781	23.4~57.3	51.5	350~857	5.57~81.77	1374
D30-4		4~24	193~472	32.5~79.6	66	633~1550	1.54~22.70	190
D30-6		6~36		21.2~51.9	64.5			180
D30-12		12~72		8.35~20.45	52			320
D30-18		18~108		5.36~13.13	50			380
D40-4		4~24	342~839	59.5~146	68	475~1160	2.79~41.0	380
D40-6		6~36		38.8~95.1	66.5			370
D60-2.5		2.5~15	770~1890	212~520	69	317~776	6.40-94.10	1315
D60-4		4~24		138~337	70.0			1150
D60-6		6~36		90~220	68.5			1100
D60-10		10~60		44.6~109.4	58			970
D60-10B								1340
D60-12		12~72		35.29~86.14	55			1552
D80-2.5	2~6	5~15	1860~3220	520~902	70	336~582	31.7~165	2900
D80-2.5B								3850
D80-4				316.2~547.6	68			2680

D80-4B		8~24						3630
D80-6				207~360	67			2630
D80-6B		12~36						3580

D80-8		16~48		141.8~245.6	61			
D80-8B								
D80-10		20~60		113~195				2610
D80-10B								4500
D80-12B	2~6	24~72	2263~3919	116~200	62	318~551	36~187	
D100-4		8~24	3030~5248	515~892	68	260~465	51~266	4710
D100-4B								5660
D100-6		12~36		338~585	67			4650
D100-6B								5600
D100-8		16~48		238~412	63			4500
D100-8B								5450
D100-10B		20~60	3750~6490	269~465	64.5	226~392	58.0~301.74	6800
D100-20B		40~120		97~168	52		58.07~301.14	
D100-25B		50~150		82~142	55			
D120-3	2.6~5.0	7.8~15.0	4179~5796	994~1380	71.41	242~335	86.4~268.9	7000
D120-12B	2~6	24~72	4360~7550	240~416	66	200~347	73.9~384	
D120-16		32~96	4378~7584	170~294	62	245~346	134~379	
D120-16B								
D120-20B	3~6	60~120	5361~7584	163~231	61	245~346	134~379	
D120-25B		75~150		128~182	60			
D140-4B		8~24	5940~10288	1010~1749	68	182~316	98~509	
D140-6B		12~36		663~1148	67	182~316	98~509	
D140-8B		16~48		468~810	63.1	182~316	98~509	
D160-4B		8~24	8508~14736	1446~2505	68	150~260	140~728	
D160-6B		12~36		936~1621	66			
D160-8B		16~48		675~1170	63.5			
D160-10B		20~60		477~826	60			
号 No.	适用水头 H (m) Applicable head H (m)	扬程 h(m) Head h(m)	过流量 Q(L/S) Overflow Q(L/S))	出水流量 q(L/S) Discharge flow q (L/S)	效率 n(%)Efficiency n(%)	转速 nt (r/min) Speed nt (r/min)	功率 Pt(KW) Power Pt(KW)	净重 kg Net weight kg
80 至 160 型水轮泵功率输出型机组， 根据具体泵站设计水头装机容量， 选配转轮角度和发电机型号，发电性能指标另行计算 80-160 type turbine pump power output units, according to the specific pump station design head installed capacity, optional runner Angle and generator model, power generation performance indicators are calculated separately								

Z 系列水轮泵性能参数表

Z series hydraulic pump performance parameter table

号 No.	工 作 性 能 Work ability							净重 kg Net weight kg
	适用水头 H (m) Applicable head H (m)	扬程 h(m) Head h(m)	过流量 Q(L/S) Overflow Q(L/S)	出水流量 q(L/S) Discharge flow q (L/S)	效率 n(%) Efficiency n(%)	水轮机 Water turbine		
						转速 nt(r/min) Speed nt(r/min)	功率 Pt(KW) Power Pt(KW)	
Z30-16	5-20	80-320	352-704	10-20	46	1229-2459	14-113	
Z30-18	5-20	90-360	352-704	9-18	46	1229-2459	14-113	
Z40-12	5-20	60-240	750-1500	30-60	50	922-1845	31-249	
Z60-16	5-20	80-320	1408-2816	45-90	51.5	615-1230	56-448	
Z80-3.3	5-20	16.5-66	2573-5146	514-1028	66	447-894	107-856	
Z80-8	5-20	40-160	2361-4722	177-354	60	461-922	98-784	

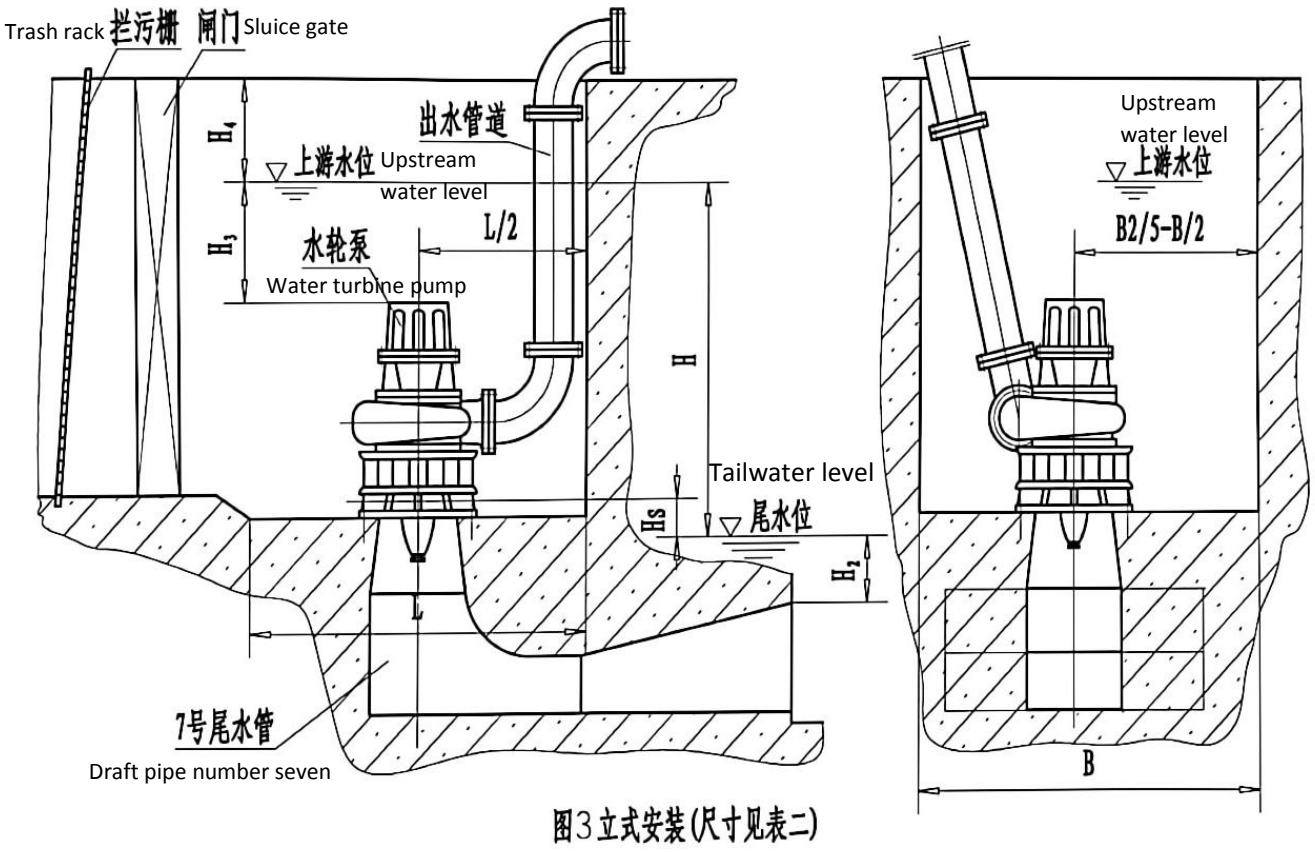


Figure 3 Vertical installation (see Table 2 for dimensions)

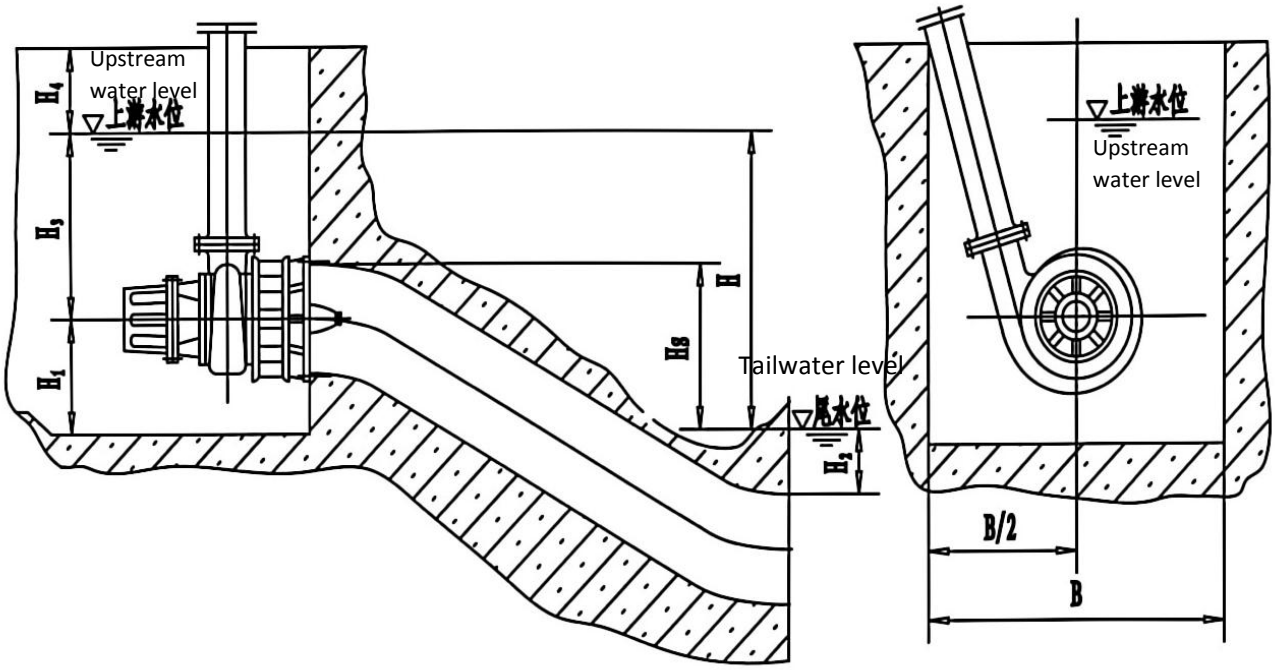
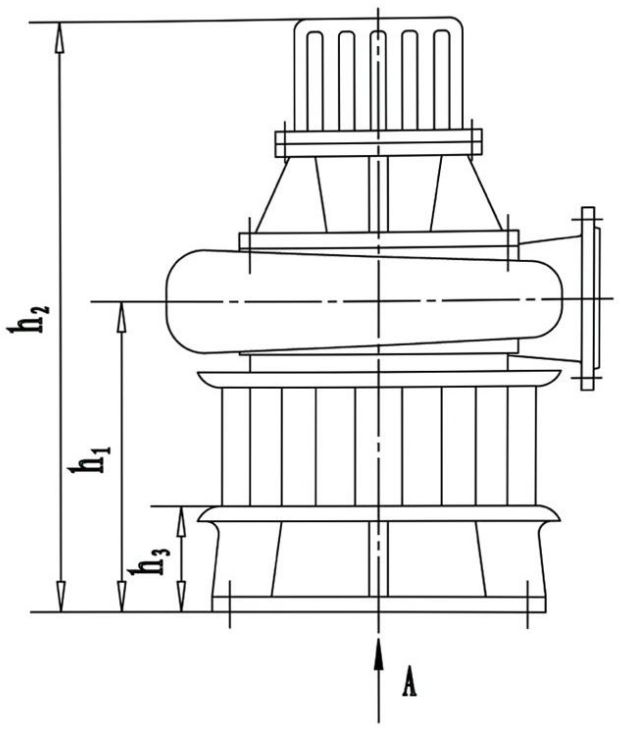


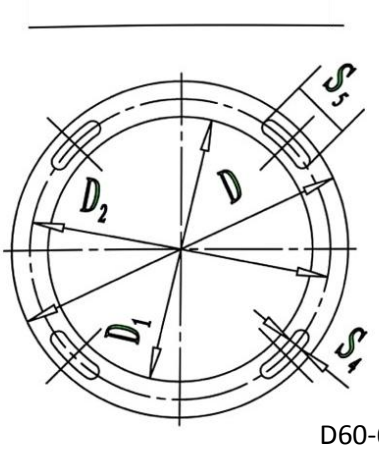
图4 卧式安装(尺寸见表二)

表二　立式与卧式安装尺寸（米）

Table 2　Figure 4 Horizontal installation (dimensions are shown in Table 2)
Vertical and horizontal mounting dimensions (m)

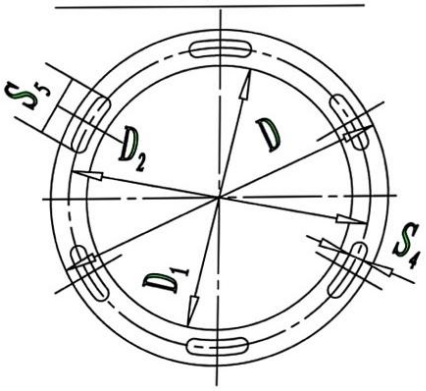
型号 Model number	B	H1	H2	H3	H4	L
20-4 20-6 20-10	0.8	0.30	≥0.30	≥0.46	0.30	0.8
30-4 30-6 D30-4 D30-6 30-12 30-18	1.0	0.45	≥0.40	≥0.64	0.30	1.0
40-2.5 40-4 40-6 D40-4 D40-6 40-10 40-20	1.2	0.55	≥0.40	≥0.70	0.30	1.2
60-4 60-6 D60-4 D60-6 60-10 60-16	1.8	0.75	≥0.50	≥0.95	0.40	1.8
D80-2.5 D80-4 D80-6 D80-10	2.4	1.10	≥0.70	≥1.20	0.50	2.4
D100-4 D100-6 D100-10	3.0	1.40	≥0.80	≥1.30	0.50	3.0





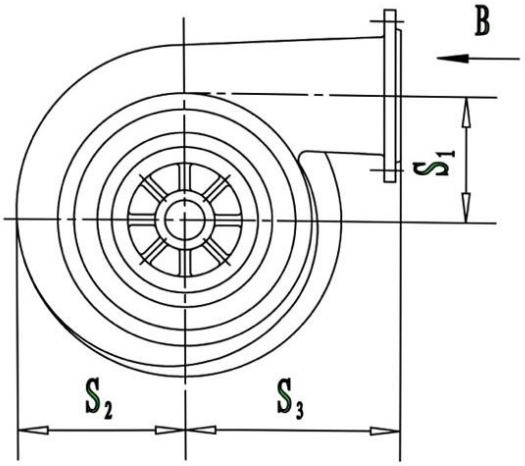
D60-6
water wheel
A direction

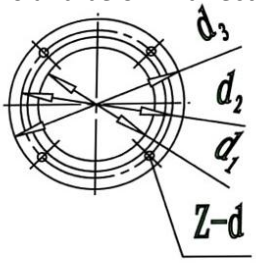
D60-6型水轮泵 A 向



40型及以下型号 B 向

Type 40 and below B direction





D60-6
Water wheel
B direction

D60-6型水轮泵 B 向

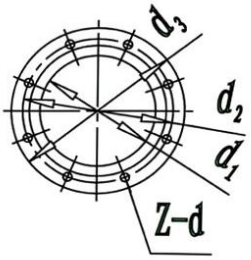


图5 水轮泵外形尺寸示意图(尺寸见表三)

Figure 5 Water shape inch intention (see 3)

表三 水泵主要外形尺寸(毫米)Table 3 Main dimensions of the pump (mm)

部位 position	外　形 Outer form						导水座安装法兰 Mounting flange for water guide seat							泵体出口法兰 Pump body outlet flange					
型号尺寸 Model size	h_1	h2	h_3	S1	S2	S3	D	D_1	D_2	S4	S_5	地脚螺栓孔数 Number of anchor bolt holes	地脚螺栓直径 Anchor bolt diameter	d_1	d_2	d_3	Z	d	螺栓直径 Bolt diameter
20-4	231	442	72	129	178	185	320	200	280	19	30	4	M16	100	170	205	4	18	M16
20-6	221	428	72	137	153	200	320	200	280	19	30	4	M16	65	130	160	4	14	M12
30-4	324	630	107	191	240	265	480	300	420	20	50	4	M16	125	200	235	8	18	M16
30-6	324	630	107	192	240	265	480	300	420	20	50	4	M16	100	170	205	4	18	M16
40-4	431	794	148	258	307	300	610	400	560	24	54	4	M20	150	225	260	8	18	M16
40-6	411	774	148	260	298	300	610	400	560	24	54	4	M20	125	200	235	8	18	M16
40-10	656	984	330	280	325	360	650	436	590	24	54	4	M20	125	210	250	8	18	M16
60-4	680	1220	214	391	459	450	920	600	840	28	78	6	M24	250	335	370	12	18	M16
60-6	670	1179	214	390	447	500	920	600	840	28	78	6	M24	200	280	315	8	18	M16
D80-2.5	1115	1910	310	565	709	760	1240	800	1170	28	28	8	M24	550	650	700	20	23	M20
D80-4	1023	1930	310	521	620	730	1240	800	1170	30	70	8	M24	400	495	535	16	23	M20
D80-6	990	1877	310	530	620	750	1240	800	1170	28	28	8	M24	300	395	435	12	23	M20
D80-10	975	1847	310	560	623	750	1240	800	1170	28	28	8	M24	250	350	390	12	23	M20
D100-8	1110	1942	415	768	870	800	1440	1000	1360	30	70	8	M24	350	460	500	16	23	M20

续表三 水泵主要外形尺寸(毫米)Table 3 Main dimensions of water pump (mm)

部位 position	外　形 Outer form						导水座安装法兰 Mounting flange for water guide seat							泵体出口法兰 Pump body outlet flange					
型号尺寸 Model size	h_1	h2	h_3	S1	S2	S3	D	D_1	D_2	S4	S_5	地脚螺栓孔数 Number of anchor bolt holes	地脚螺栓直径 Anchor bolt diameter	d_1	d_2	d_3	Z	d	螺栓直径 Bolt diameter
D30-4	334	755	99	191	253	265	480	300	420	20	50	4	M16	150	225	260	8	18	M16
D30-6	324	732	99	192	241	265	480	300	420	20	50	4	M16	100	170	205	4	18	M16
30-12	325	918	99	165	205	240	480	300	420	20	50	4	M16	80	160	195	8	18	M16
30-18	325	1070	99	165	205	240	480	300	420	20	50	4	M16	80	160	195	8	18	M16
D40-4	435	920	135	258	339	300	610	400	560	24	54	4	M20	200	280	315	8	18	M16
D40-6	411	902	135	260	350	300	610	400	560	24	54	4	M20	125	200	235	8	18	M16
40-20	623	1052	130	217	288	288	640	400	560	24	54	4	M20	100	180	215	4	18	M16
D60-4	718	1356	227	391	505	550	920	600	840	28	78	6	M24	300	400	440	12	23	M20
D60-6	670	1259	227	390	475	500	920	600	840	28	78	6	M24	200	280	315	8	18	M16
D60-10	670	1259	227	420	465	600	920	600	840	28	78	6	M24	200	280	315	8	18	M16
60-16	937	1374	220	364	567.5	715	920	600	840	28	78	4	M24	150	240	280	8	23	M20
40-16	480	1120	135	242	274	295	620	400	560	24	54	4	M20	100	180	215	8	18	M16
60-2.5	955	1555	227	425	532	570	920	600	840	28	78	6	M24	400	495	535	16	23	M20
60-12	688	1443	227	370	410	480	920	600	840	28	78	6	M24	200	295	335	8	23	M20
D100-9B	1180	2380	350	680	774	800	1440	1000	1360	28	60	8	M24	350	460	500	16	23	M20

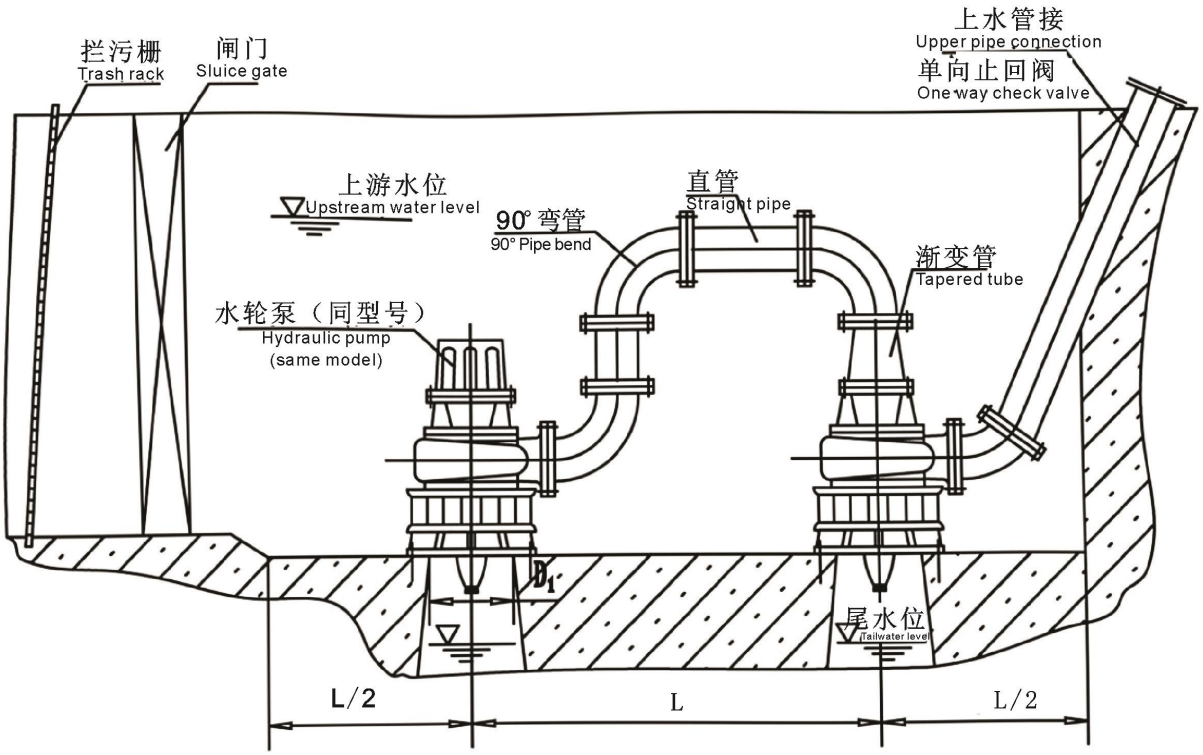


图6 串联安装（尺寸见表二）

Figure 6 Series installation (dimensions are shown in Table 2)

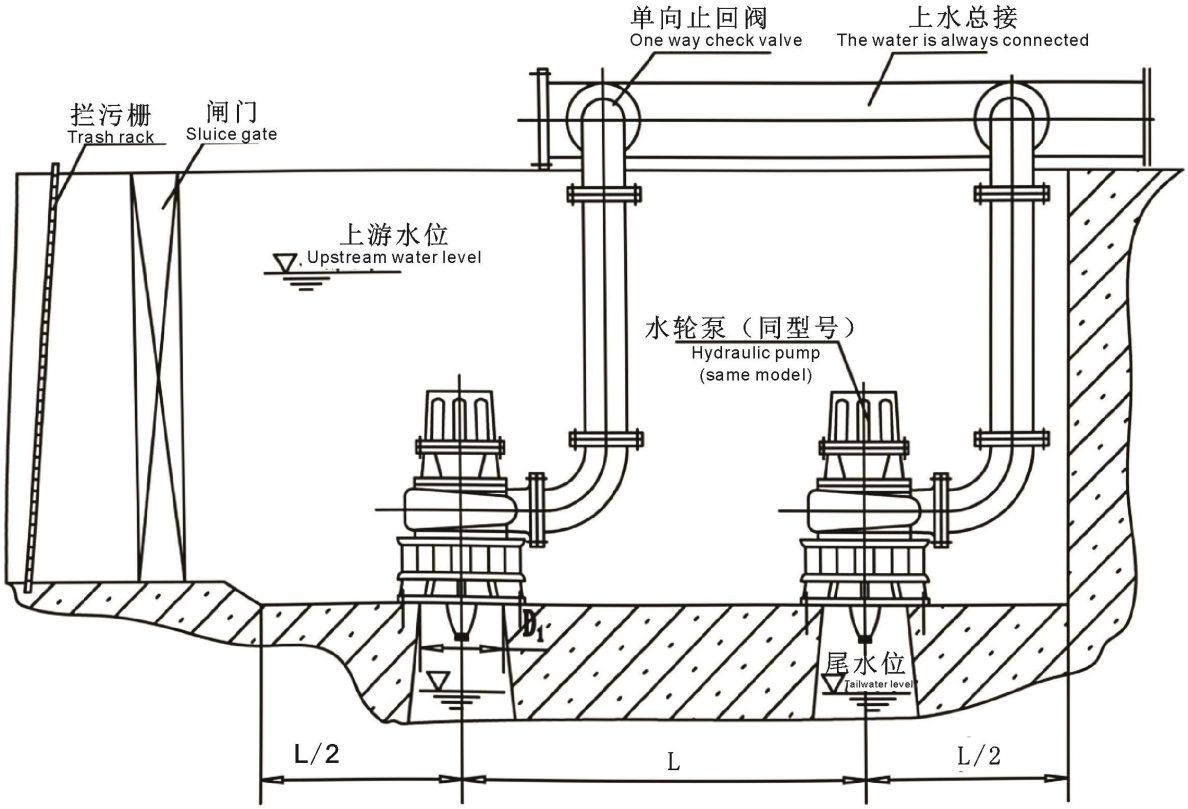


图7 并联安装（尺寸见表二）

Figure 7 Parallel installation (dimensions are shown in Table 2)

表四直锥形尾水管尺寸(毫米)

Table 4 Dimensions of conical draft pipe (mm)

型号尺寸 Model number dimension	D_1	D_3	L	B_1	C	h_4	h_5
20-4 20-6	200	361	800	200	200	≥300	300
30-4 30-6 D30-4 D30-6 D30-12 D30-18	300	542	1200	300	300	≥400	450
40-4 40-6 D40-4 D40-6 40-20	400	722	1600	400	400	≥400	550
40-10	436	722	1420	400	400	≥400	550
60-4 60-6 D60-4 D60-6 D60-10 D60-16	600	1083	2400	600	600	500	750

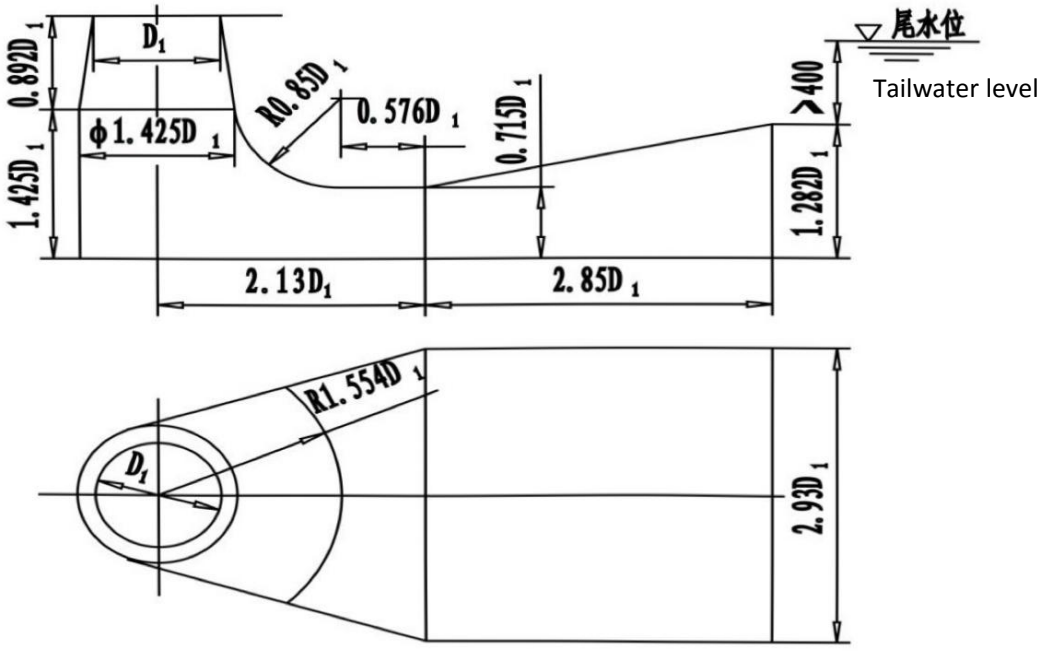


图8 7号弯肘形尾水管尺寸(立式安装)

Figure 8 Dimensions of No. 7 elbow draft pipe (vertical installation)

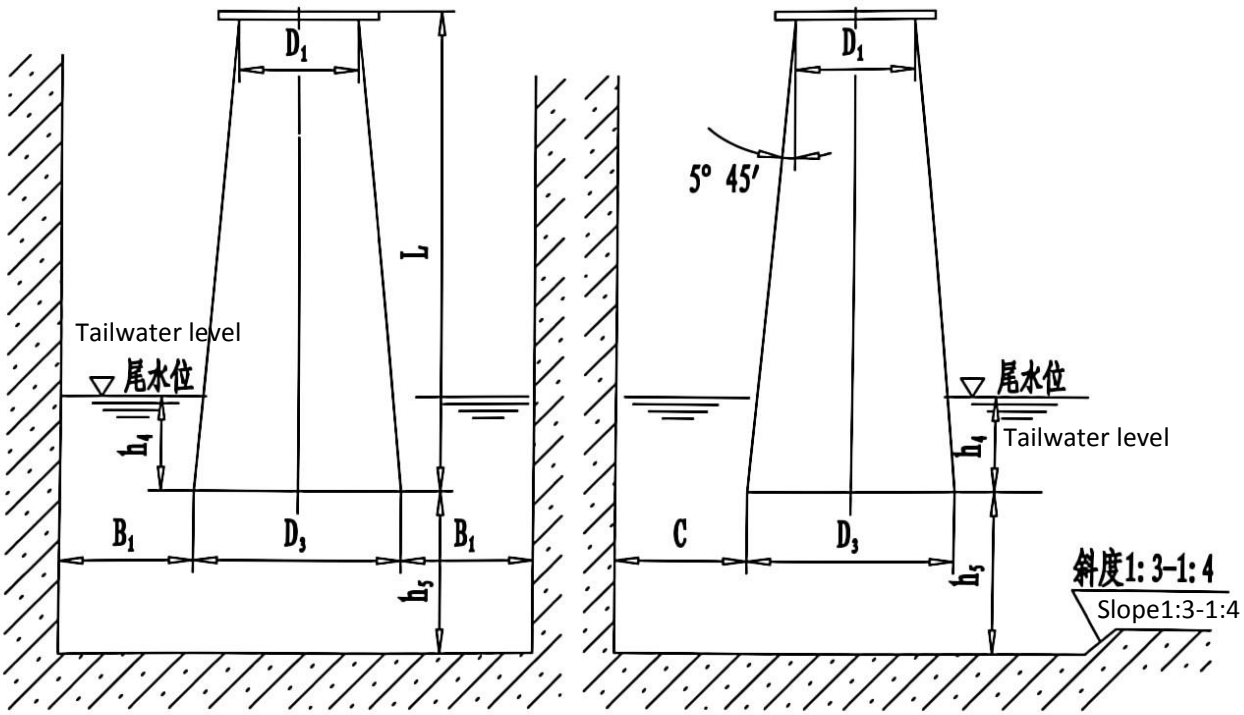


图9 直锥形尾水管及尾水渠(立式安装,尺寸见表四)

Figure 9 Straight conical draft pipe and tail canal (vertical installation, dimensions are shown in Table 4)

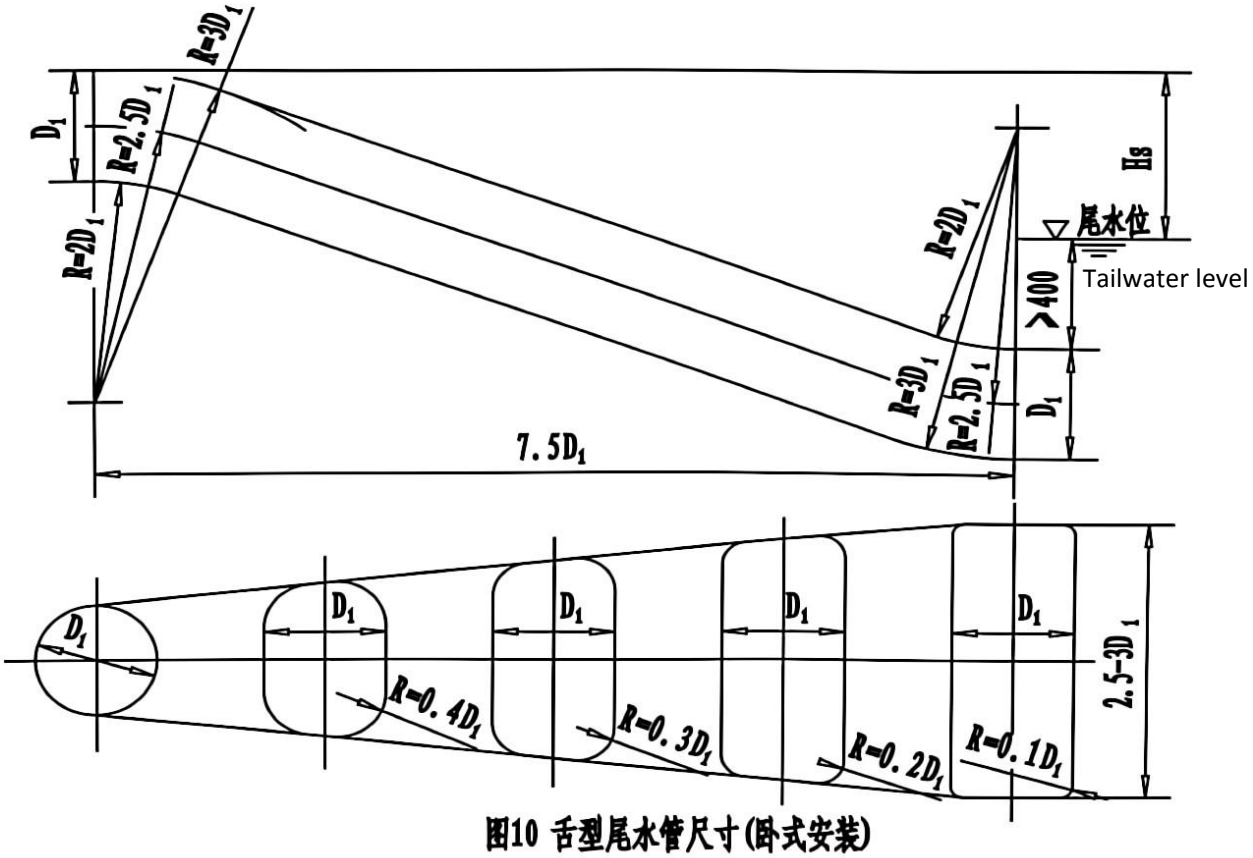


图10 舌型尾水管尺寸(卧式安装)

Figure 10 Dimensions of nozzle draft pipe (horizontal installation)

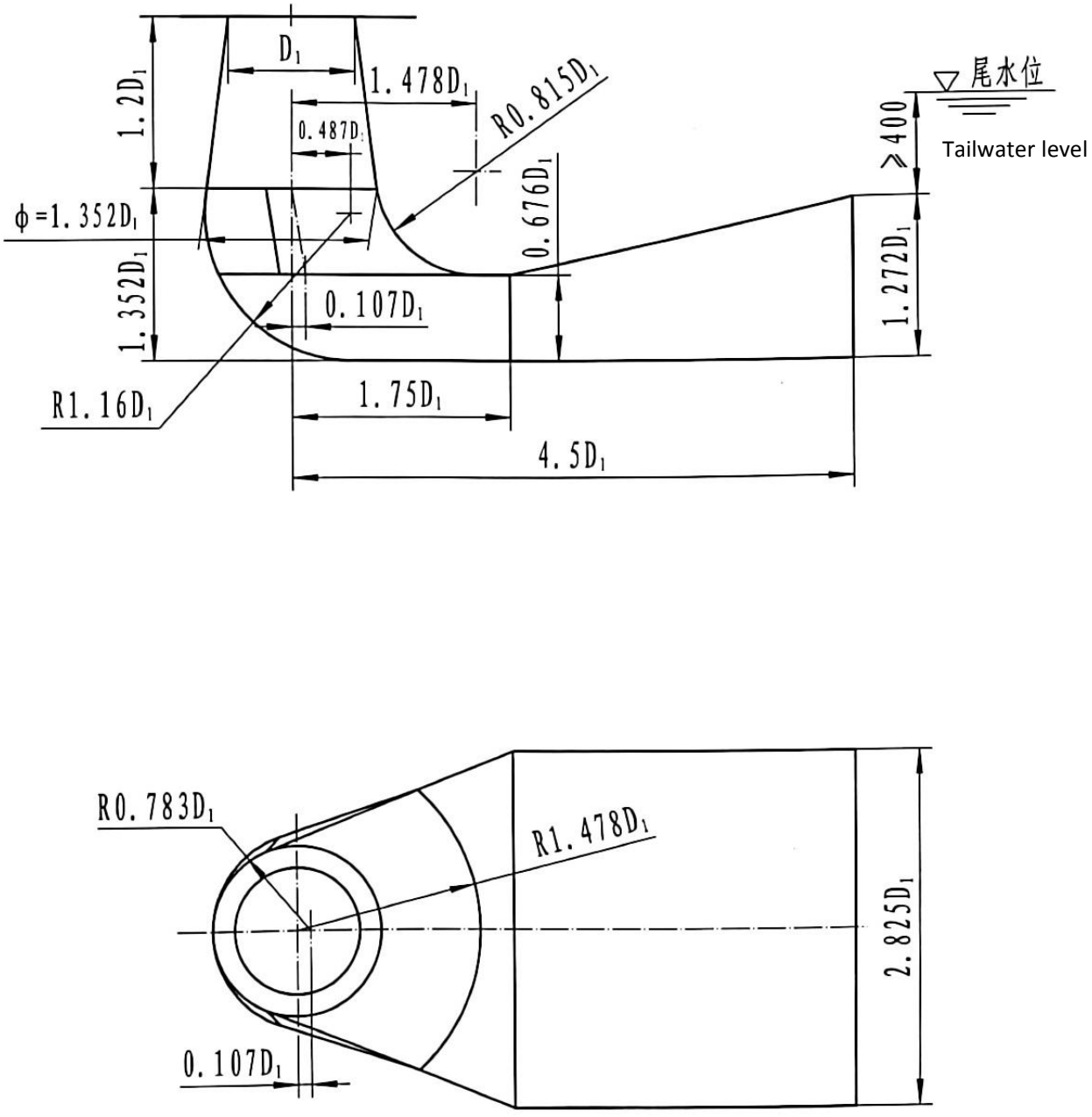


图11　4H弯肘形尾水管尺寸(立式安装)

Figure 11 Dimensions of 4H elbow draft pipe (vertical installation)

六、故障及处理 Failure and treatment

故障现象及原因 Fault symptoms and causes	处理办法 Treatment method
1.不转原因 ①杂草污物卡住转轮；②泥砂堵死水泵； ③转轮和座环相碰或叶轮与泵体相碰； ④工程塑料轴承烧掉；⑤工程塑料轴承磨损、主轴下降；⑥并联机组单机上水管无安装单向止回阀，开机顺序有问题,后开水轮泵受反向水压力。 1. Reasons for not changing ① Weeds and dirt stuck the runner; ② Mud and sand blocking pump; ③ The runner and the seat ring collide or the impeller and the pump body collide; ④ engineering plastic bearing burned; ⑤ Engineering plastic bearing wear, spindle decline;No one-way check valve is installed on the water pipe of the single parallel unit, the startup sequence is wrong, and the rear opening water wheel pump is subject to reverse water pressure.	①除去杂草污物；②清洗泥砂； ③检查圆螺母有无松动， 造成推力头移动及轴承磨损情况；④更换新轴承， 检查润滑水质及供应水量； ⑤加垫片、抬高主轴位置以保机组轴向尺寸二相对位置， 保证叶轮对准泵体流道中心位置不碰在泵体上；⑥按技术要求配套单向止回阀， 按顺序先后开机关联总管。 ① Remove weeds and dirt;② Clean mud and sand;③ Check whether the round nut is loose, resulting in thrust head movement and bearing wear;Replace the new bearing, check the lubrication water quality and water supply; ⑤ Add gaskets and raise the position of the main shaft to ensure the relative position of the axial size of the unit, and ensure that the impeller is aligned with the center of the flow channel of the pump body without touching the pump body;⑥ According to the technical requirements, the one-way check valve is started successively and associated with the main pipe.
2.不出水或出水量小原因 ①水头不足；②栏污、过滤网被杂草污物堵塞，或活动导叶被杂草污物堵塞， 进水量不够； ③转轮被杂草污物堵塞， 转速不够；④叶轮或出水管污物堵塞；⑤尾水管漏水转速降低；⑥水泵进水室水位淹没不足，造成空气进入叶轮⑦出水管太长， 管路损失过大；⑧轴承损坏⑨上水管道泄漏，水压力下降。 2. No water or small water yield ① insufficient water head;(2) The fence pollution, filter is blocked by weed dirt, or the active guide blade is blocked by weed dirt, and the water intake is not enough;③ The runner is blocked by weeds and dirt, and the speed is not enough;④ The impeller or the outlet pipe is clogged with dirt;⑤ the draft pipe leakage speed is reduced;The water level of the water inlet chamber of the pump is insufficient, causing air to enter the impeller⑦ The outlet pipe is too long, the pipeline loss is too large; ⑧ Bearing damage⑨ Water pipe leakage, water pressure drop.	①增大水头；②停机， 清除杂草污物； ③停机， 清除杂草污物；④停机， 清除杂草污物；⑤停机， 修补尾水管；⑥提高上游水位或在上水位浮盖板以削除漩涡现象；⑦核算出水扬程， 更换管径较大的出水量；⑧停机，更换轴承；⑨停机，排除上水管道泄漏问题。 ① Increase the water head;② Stop the machine and remove weeds and dirt; ③ Stop the machine and remove weeds and dirt;④ Shut down and remove weeds and dirt; ⑤ Stop the machine and repair the draft pipe;⑥ Raise the upstream water level or float the cover plate on the upper water level to cut the vortex phenomenon;⑦ Calculate the discharge head and replace the water output of the larger pipe diameter;⑧ Stop and replace bearings;⑨ Shut down and eliminate the leakage problem of the water supply pipeline.

3.有异常声响原因 ①轴承损坏；②转轮与座环或叶轮与泵体相碰；③尾水管漏气；④有异物落入泵内； 3. There are abnormal sound reasons ① bearing damage;② The runner collides with the seat ring or the impeller with the pump body;③ draft pipe leakage; ④ Foreign matter falls into the pump;	①停机，更换橡胶轴承或塑料轴承；②停机， 检查上下导轴承；（即橡胶轴承， 塑料轴承）观看推力瓦， 推力头部位磨损情况，进行调节或更换；③停机， 修补尾水管；④清除石块等异物。 ① Stop, replace rubber bearings or plastic bearings; ② Stop the machine and check the upper and lower guide bearings; (i.e. rubber bearings, plastic bearings) watch the thrust tile, thrust head wear, adjust or replace;③ Stop and repair the draft pipe;④ Remove foreign objects such as stones.
4.振动问题原因 ①地脚螺栓松动；②产生气蚀现象；③转动部件不平衡；④倒转现象；⑤轴承已损坏或导轴承与轴套间的间隙太大；⑥上水管无支承座、固定台，各种压力在泵体上。 4. Cause of vibration problem ① The anchor bolt is loose;② Cavitation occurs;③ unbalance of rotating parts; ④ inversion phenomenon;⑤ The bearing has been damaged or the clearance between the guide bearing and the bushing is too large; The upper water pipe has no support seat, fixed platform, and various pressures are on the pump body.	①停机， 拧紧地脚螺栓； ②校核吸出高程， 至在允许的范围之内； ③纠正转动部件的不平衡量； ④防止水轮泵倒转现象发生； ⑤更换新轴承； ⑥按技术要求上水管由支承座、固定台承受水压力、重力和振动力。 ① Stop the machine and tighten the anchor bolts;② Check the suction elevation to within the allowable range;③ Correct the unbalance of the rotating parts;④ Prevent the phenomenon of water wheel pump reversal; ⑤ Replace new bearings;⑥ According to the technical requirements of the water pipe by the support seat, fixed table to withstand water pressure, gravity and vibration force.
5.活动导叶关不紧原因 ①水轮泵出口处与水管相连处松动； ②座环上的地脚螺栓松动或水泥地基下沉，把活动导叶卡死；③杂物堵塞在活动导叶上； ④调速器活动部分卡死， 无法调节活动导叶。 5. The movable guide vane is not tightly closed ① The outlet of the hydraulic pump is loose at the connection of the water pipe; ② The anchor bolt on the seat ring is loose or the cement foundation sinks, and the movable guide vane is stuck; ③ Debris is blocked on the movable guide vane; ④ The moving part of the governor is stuck and the movable guide vane cannot be adjusted.	①停机检查紧固， 该处螺栓。使水轮泵安装位置正立水平，活动导叶灵活；②停机， 紧固地脚螺栓， 或修补水泥地基， 使活动导叶转动灵活；③停机， 消除杂物活动导叶转动灵活；④停机，检查修理调速器活动轴套部分， 使调速器操作正常。 ① Stop the machine to check the fastening, where the bolt. The installation position of the hydraulic pump is upright and horizontal, and the movable guide vane is flexible; Stop the machine, tighten the anchor bolt, or repair the cement foundation, so that the movable guide vane rotates flexibly; ③ Stop, eliminate debris activities guide vane rotation flexible; ④ Stop the machine, check and repair the movable shaft sleeve part of the governor, so that the governor can operate normally.

七、易损件一 7. Wearing parts 1

型 号 Type number	代 号 Code number	名 称 Name	材料 Materials	数 量 Count
20-4 20-6	AT20-4 (6) -04	导轴承 Guide bearing	橡胶 Rubbe	1
	AT20-4 (6) -12	压圈 Pressing ring	HT200	1
	AT20-4 (6) -13	垫圈 Gasket	A3	1
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubbe	2
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		2
20-4	AT20-4-09	密封环 Sealing ring	HT200	1
20-6	AT20-6-09	密封环 Sealing ring	HT200	1
30-4 30-6	AT30-4 (6) -04	导轴承 Guide bearing	橡胶 Rubbe	1
	AT30-4 (6) -12	压圈 Pressing ring	HT200	1
	AT30-4 (6) -13	垫圈 Gasket	A3	2
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubbe	2
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		2
30-4	AT30-4-09	密封环 Sealing ring	HT200	1
30-6	AT30-6-09	密封环 Sealing ring	HT200	1
40-4 40-6	AT40-4 (6) -04	导轴承 Guide bearing	橡胶 Rubbe	1
	AT40-4 (6) -12	压圈 Pressing ring	HT200	1
	AT40-4 (6) -13	垫圈 Gasket	HT200	2
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubbe	2
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		2
40-4	AT40-4-08	密封环 Sealing ring	HT200	1
40-6	AT40-6-09	密封环 Sealing ring	HT200	1
60-4 60-6	AT60-4 (6) -05	导轴承 Guide bearing	橡胶 Rubbe	1
	AT60-4 (6) -12	压圈 Pressing ring	HT200	1
	AT60-4 (6) -13	垫圈 Gasket	HT200	2
	AT60-4(6) -19	轴套 Shaft sleeve	HT200	1
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		2
60-4	AT60-4-09	密封环 Sealing ring	HT200	1
60-6	AT60-6-09	密封环 Sealing ring	HT200	1

易损件二 Wearing parts 2

型 号 Type number	代 号 Code number	名 称 Name	材料 Materials	数 量 Count
30-12	D30-6-04	轴套 Shaft sleeve	45	1
	D30-6-05	导轴承 Guide bearing	HT150+橡胶 HT150+Rubber	1
	D30-6-13	螺旋密封体 Spiral seal	HT200	1
	D30-6-14	螺旋密封套 Spiral seal sleeve	HT200	1
	30-18-15	密封环 Sealing ring	HT200	2
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		各 1 Each 1
	D30-6-18	轴套 Shaft sleeve	HT150	1
	D30-6-19	压环 Compression ring	HT150	1
30-18	D30-6-04	轴套 Shaft sleeve	45	1
	D30-6-05	导轴承 Guide bearing	HT150+橡胶 HT150+Rubber	1
	D30-6-13	螺旋密封体 Spiral seal	HT200	1
	D30-6-14	螺旋密封套 Spiral seal sleeve	HT200	1
	30-18-15	密封环 Sealing ring	HT200	3
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		各 1 Each 1
	D30-6-18	轴套 Shaft sleeve	HT150	1
	D30-6-19	压环 Compression ring	HT150	1
40-10	MS40-10-08	导轴承 Guide bearing	橡胶 Rubber	1
	MS40-10-07	轴套 Shaft sleeve	HT200	1
	MS40-10-07	泵口环 Pump ring	HT200	1
	HG40-10-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	MS40-10-27	压圈 Pressing ring	HT200	1
	GB886-76	挡圈 Retainer	35	1
	MS40-10-28	垫圈 Gasket	HT200	1
	GB/T292-1994	单列角接触球轴承 Single row angular contact ball bearing		2
40-20	40-20-07	下导轴承 Lower guide bearing	MC 尼龙 nylon	1
	40-20-10	密封套 Seal sleeve	HT200	1
	40-20-12	密封环 Sealing ring	HT200	3
	40-20-17	上轴套 Upper shaft sleeve	45	1
	40-20-18	上导轴承 Upper guide bearing	MC 尼龙 nylon	1
	40-20-21	下推力轴承 Lower thrust bearing	P23-1	1
	40-20-22	推力头 Thrust head	45	1
	40-20-23	上推力轴承 Upper thrust bearing	P23-1	1
	40-20-35	轴承 bearing	45	1

易损件三 Wearing parts 3

型 号 Type number	代 号 Code number	名 称 Name	材料 Materials	数 量 Count
60-10	D60-6-04	轴套 Shaft sleeve	45 镀铬 45 Chrome plating	1
	D60-6-05	导轴承 Guide bearing	HT200-橡胶 HT200-Rubber	1
	60-10-13	叶轮密封环 Impeller seal ring	HT200	1
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	1
	D60-6-14	螺旋密封套 Spiral seal sleeve	HT200	1
	D60-6-15	螺旋密封体 Spiral seal	HT200	1
	D60-6-20	轴承 bearing	HT200	2
	D60-6-23	压环 Compression ring	HT200	1
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		1
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		1
60-16	60-16-05	推力瓦 Thrust shoe	P23-1	2
	60-16-09	推力头 Thrust head	45	1
	60-16-10	上轴套 Upper shaft sleeve	45	1
	60-16-12	上导轴承 Upper guide bearing	P23-1	1
	60-16-15	密封环 Sealing ring	HT200	2
	60-16-19	导叶轴套 Guide vane shaft sleeve	ZQSn6-6-3	24
	60-16-20	导叶轴 Guide vane shaft	45	12
	60-16-23	调速环衬套 Governor ring bushing	ZQSn6-6-3	1
	60-16-27	下轴承 Lower bearing	HT200	1
	60-16-28	导轴承(下)Guide bearing (bottom)	橡胶 Rubber	1
40-4B 40-6B	60-16-28	导轴承 Guide bearing	橡胶 Rubber	1
	AT40-4 (6) -12	压圈 Pressing ring	HT200	1
	AT40-4(6) -13	垫圈 gasket	HT200	1
	HC4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		2
	40-6B-17	导叶轴套 Guide vane shaft sleeve	ZQSn6-6-3	24
	40-6B-15	导叶轴 Guide vane shaft	45	12
	40-6B-13	调速环衬套 Governor ring bushing	ZQSn6-6-3	4

易损件四 Wearing parts 4

型 号 Type number	代 号 Code number	名 称 Name	材料 Materials	数 量 Count
40-4B	AT40-4-08	密封环 Sealing ring	HT200	1
40-6B	AT40-6-09	密封环 Sealing ring	HT200	1
60-4B 60-6B	60-16-05	推力瓦 Thrust shoe	P23-1	2
	60-16-09	推力头 Thrust head	45	1
	60-16-10	上轴套 Upper shaft sleeve	45	1
	60-16-12	上导轴承 Upper guide bearing	P23-1	1
	60-16-28	导轴承(下)Guide bearing (bottom)	橡胶 Rubber	1
	60-16-27	下轴套 Lower shaft sleeve	HT200	1
	60-16-19	导叶轴承 Guide vane bearing	ZQSn6-6-3	24
	60-16-20	导叶轴 Guide vane shaft	45	12
	60-16-23	调速环衬套 Governor ring bushing	ZQSn6-6-3	1
60-4B	AT60-4-09	密封环 Sealing ring	HT200	1
60-6B	AT60-6-09	密封环 Sealing ring	HT200	1
D30-4 D30-6	D30-4(6)-04	轴套 Shaft sleeve	45 镀铬 45 Chrome plating	1
	D30-4(6)-05	导轴承 Guide bearing	HT150+橡胶 Rubber	1
	D30-4(6)-13	螺旋密封体 Spiral seal	HT200	1
	D30-4(6)-14	螺旋密封套 Spiral seal sleeve	HT200	1
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		各 1 Each 1
	D30-4(6)-18	轴承 bearing	HT150	1
	D30-4(6)-19	压圈 Pressing ring	HT150	1
D30-4	D30-4-11	叶轮密封环 Impeller seal ring	HT200	1
D30-6	D30-4-11	叶轮密封环 Impeller seal ring	HT200	1
D40-4 D40-6	D40-4(6)-04	轴套 Shaft sleeve	45 镀铬 45 Chrome plating	1
	D40-4(6)-05	导轴承 Guide bearing	HT150+橡胶 Rubber	1
	D40-4(6)-13	螺旋密封体 Spiral seal	HT200	1
	D40-4(6)-14	螺旋密封套 Spiral seal sleeve	HT200	1
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		各 1 Each 1

易损件五 Wearing parts 5

型 号 Type number	代号 Code number	名称 Name	材料 Materials	数 量 Count
D40-4D40-6	D40-4(6)-18	轴套 Shaft sleeve	HT200	1
	D40-4(6)-19	压环 Compression ring	HT150	1
D40-4	D40-4-11	叶轮密封环 Impeller seal ring	HT200	1
D40-6	D40-6-11	叶轮密封环 Impeller seal ring	HT200	1
D60-4 D60-6	D60-4(6)-1	轴套 Shaft sleeve	45 镀铬	1
	D60-4(6)-05	导轴承 Guide bearing	HT150+橡胶 HT150+Rubber	1
	D60-4(6)-15	螺旋密封体 Spiral seal	HT200	1
	D60-4(6)-14	螺旋密封套 Spiral seal sleeve	HT200	1
	HG4-692-67	油封(J 型)Oil seal (J type)	橡胶 Rubber	2
	GB/T276-1994	深沟球轴承 Deep groove ball bearing		各 1 Each 1
	D60-4(6)-20	轴套 Shaft sleeve	HT200	1
	D60-4(6)-23	压圈 Pressing ring	HT150	1
D60-4	D60-4-13	叶轮密封环 Impeller seal ring	HT200	1
D60-6	D60-6-13	叶轮密封环 Impeller seal ring	HT200	1
D80-2.5 D80-4 D80-6 D80-10	80-6-05	导轴承 Guide bearing	HT150+橡胶 HT150+Rubber	1
	80-6-06	护轴套 Shaft guard sleeve	HT200	1
	80-6-15	螺旋密封套 Spiral seal sleeve	HT150	1
	HG4-338-66	J 型油封 J-type oil seal	橡胶 Rubber	3
	80-6-17	轴套 Shaft sleeve	HT150	1
	80-6-21	垫圈 Gasket	HT150	1
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		2
D80-2.5	D80-2.5-06	密封环(叶轮)Seal ring	HT200	1
D80-4	D80-4-14	叶轮密封环 Impeller seal ring	HT200	1
	D80-4-9	密封环 (下)Seal ring (bottom)	HT200	1
D80-6	D80-6-14	叶轮密封环 Impeller seal ring	HT200	1
	D80-6-09A	密封环 Sealing ring	HT200	1
D80-10	D80-10-14	叶轮密封环 Impeller seal ring	HT200	1
	D80-6-09	密封环 Sealing ring	HT200	1

易损件六 Wearing parts 5

型 号 Type number	代 号 Code number	名 称 Name	材料 Materials	数 量 Count
D100-8 D100-10	100-I-5	橡胶轴瓦 Rubber bearing bush	HT200+橡胶 HT200+Rubber	1
	100-I-10	护轴套 Shaft guard sleeve	HT200	1
	D100-8-04	叶轮密封环 Impeller seal ring	HT200	1
	D100-8-09	螺旋密封套 Spiral seal sleeve	HT200	1
	HG4-692-67	油封(J 型) Oil seal (J type)	橡胶 Rubber	3
	D100-8-12	轴套 Shaft sleeve	HT150	1
	D100-8-14	挡圈 retainer	HT150	1
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		1
	GB/T297-1994	单列圆锥滚子轴承 Single row tapered roller bearing		1

说明：
30-12, 30-18, 40-20, 60-16 等多级泵以及 B 型活动导叶结构, S 型综合利用机型图与固定导叶单级泵结构图不一样，比较复杂， 由蓝图提供， 本说明书不绘制。
Instructions:
30-12, 30-18, 40-20, 60-16 and other multistage pumps and B-type movable guide vane structure, S-type comprehensive utilization model diagram and fixed guide vane single-stage pump structure diagram is different, more complex, provided by the blueprint, this manual does not draw.

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地址： Address：		联系人： Contact person：		电话： Phone：
水头： 米 Water head: meters	流量： 米3/秒 Flow rate: m 3/ s	机型： Model:	台数： No. of sets:	灌溉面积： 亩 Irrigated area: mu
使用情况及对产品有何新的要求 Usage and any new requirements for the product:				