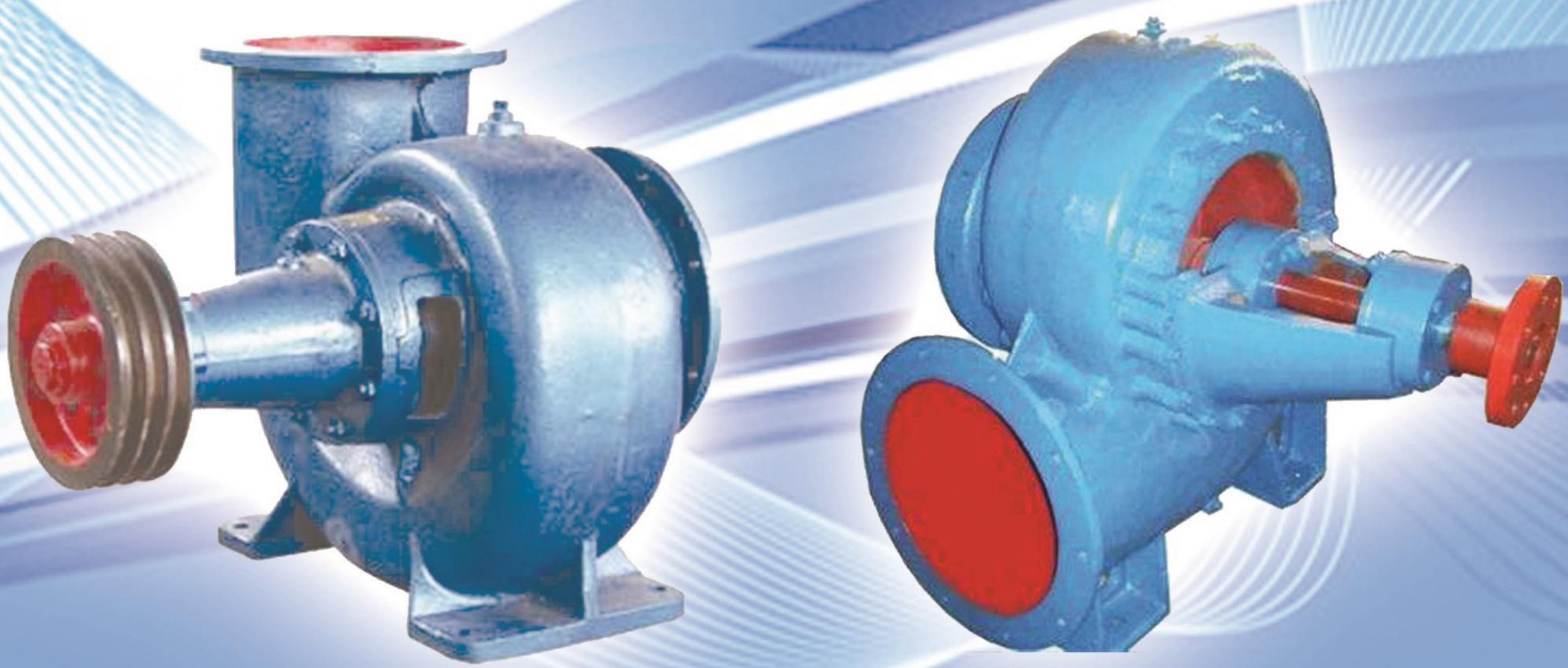
HW Series Mixed-Flow Pumps

User Manual



IVY-PUMP

Hebei Ivy Pump Industry Co., Ltd.

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I. Overview

1. Application:

The HW-type pump is a horizontal, single-stage, single-suction, volute-type mixed-flow pump. It is suitable for pumping clean water or other liquids with physical and chemical properties similar to water. The temperature of the pumped liquid should not exceed 50°C. It is widely used in various applications, including agricultural irrigation, industrial processes, and municipal water supply and drainage.

Performance range of the HW-type pump: flow rate 90–9,000 m^3/h, head 3.5–22 m.

2. Features:

Simple structure, reliable operation, easy installation, high efficiency, compact size, and light weight.

3. Drive Methods:

Available in direct-drive and variable-speed drive configurations. Common power sources include electric motors and diesel engines. When placing an order, specify the power source model (power rating, rotational speed) to determine the appropriate coupling or pulley specifications.

4. Pump Rotation Direction:

Viewed from the pump inlet, the impeller generally rotates counterclockwise (except for 650HW-5, -7, and -10 pumps, which rotate clockwise).

5. Model Description: Taking the 100HW-8S as an example

100——Pump inlet and outlet diameter (mm)

HW — Horizontal volute mixed-flow pump

8 — Design head, m.

S — Variant code

II. Structure and Function

1. The HW-type pump consists primarily of the pump cover, impeller, pump casing, pump shaft, shaft sleeve, and bearing housing (for diameters ≤ 350 mm) or bearing bracket (for diameters ≥ 400 mm) (Figs. 1 and 2).

2. The pump cover connects to both the pump casing and the suction pipe. There should be an appropriate clearance between the plane of the pump cover and the plane of the impeller. If the clearance is too small, friction will occur; if it is too large, a significant amount of pressurized water will flow back into the pump casing, reducing the pump's efficiency. The recommended clearance for actual use is 0.3–0.7 mm (when the pump shaft is pushed toward the suction end of the pump); this clearance can be adjusted by adding or removing paper shims.

3. The shaft seal assembly consists of packing, a packing gland, a packing ring, and the packing chamber on the pump body (Models 100HW, 150HW, and 200HW do not have a packing ring). Its function is to prevent air from being drawn into the pump and to prevent excessive water leakage along the shaft from the pump.

4. The shaft sleeve protects the pump shaft. It should be replaced promptly when worn.

5. The pump shaft is supported by single-row radial ball bearings. The bearings can be lubricated with oil—the oil level should be maintained between the marks on the oil dipstick—or with grease, which can be applied during pump assembly. During operation, lubricant can be replenished by removing and reinstalling the front and rear covers.

6. The threaded hole at the top of the pump body is used for filling with priming water or forconnecting a vacuum pump to evacuate air and prime the pump.

7. To expand the pump's range of applications and meet different user requirements, the outer diameter of the impeller can be cut down or replaced with an impeller of different performance characteristics (indicated by the letter "A").

8. Accessories for the 150-300HW series pumps include inlet and outlet straight elbows, flexible elbows, foot valves, and pulleys or couplings; accessories for the 400-650HW series pumps include inlet and outlet straight elbows, check valves, and pulleys or couplings. Users may select the appropriate options.

9. Refer to Tables 1 and 2 for the bearing models and packing specifications of HW-type pumps.

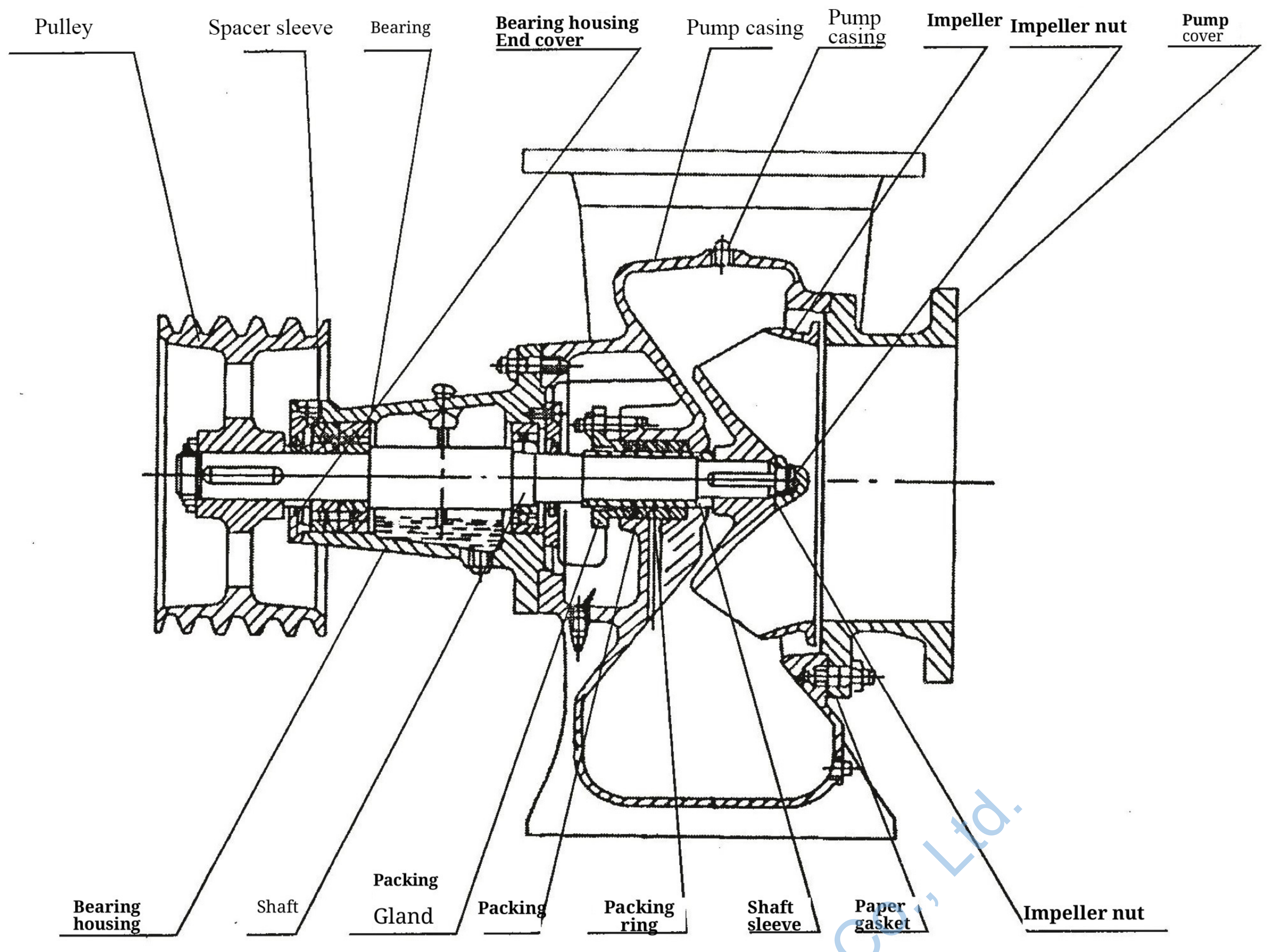

Figure 1: Structural Diagram of 100–350HW Pumps (The 350HW-8 pump is available in both upward and horizontal discharge configurations)

Table 1 Bearings and Packing for 100–350WH Pumps

Pump Model	Bearing Model	Packing Specification
		Oil-impregnated asbestos packing
100HW-8S	306	8 × 8 × 141
150HW-5, -8, -12	306	8 × 8 × 135
150HW-6	307	10 × 10 × 157
200HW-5, -8, -10, -12	308	10 × 10 × 188
250HW-5, -8, -7, -11, 12 300HW-5, -7, -8, -12 350HW-8	311	13 × 13 × 228

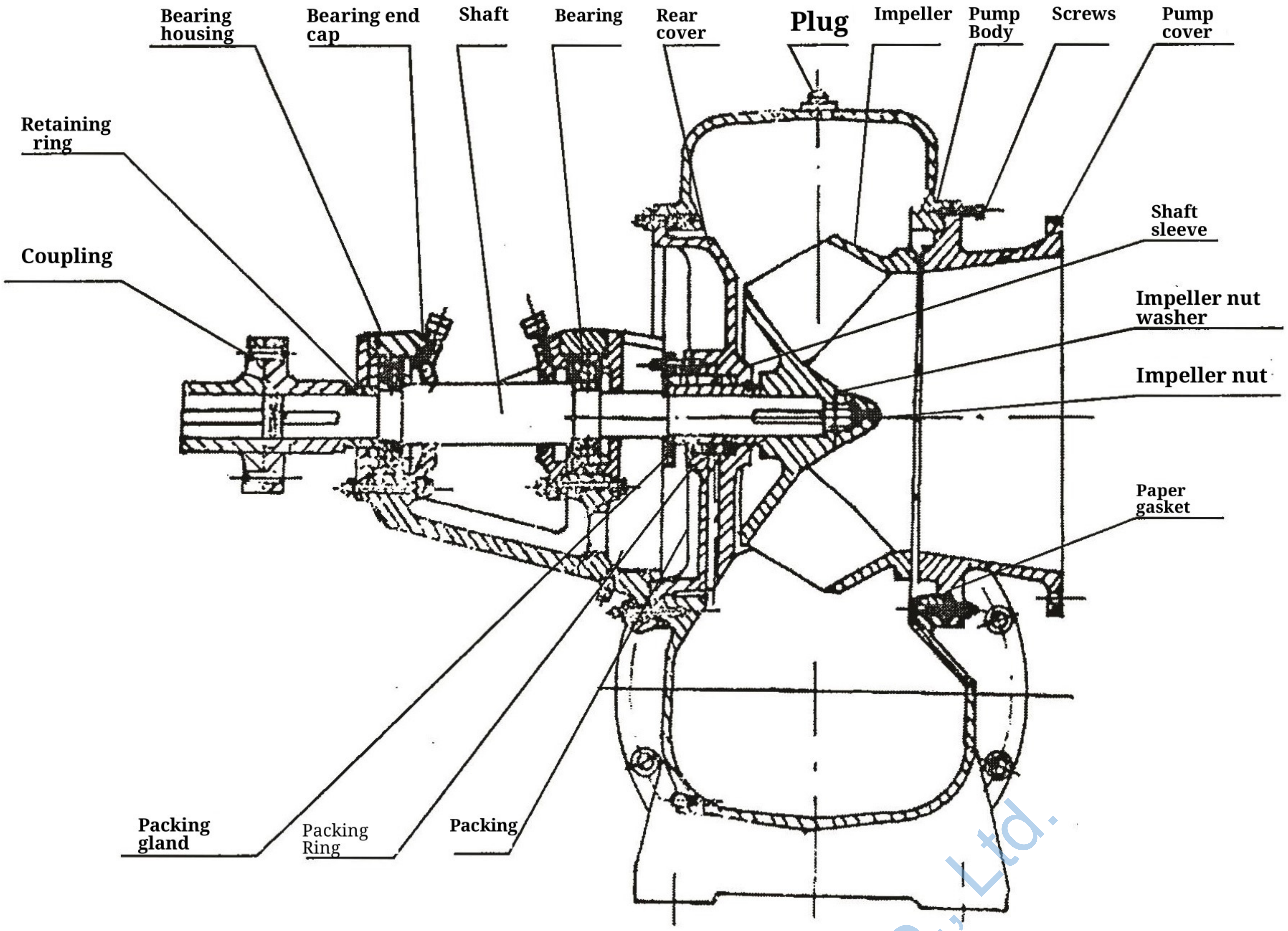

Figure 2: Structural Diagram of the 400-800HW Pump (For the 650HW-5, -7, and -10 models, the discharge direction is opposite to that shown in the figure —when viewed from the pump inlet, the impeller rotates clockwise)

Table 2 Bearings and Packing for 400-800HW Pumps

Pump Model	Bearing Model	Packing Specification Oil-impregnated asbestos packing
400HW-7, -8, -10	312 (or 46312 and 446312);	13 × 13 × 261
500HW-6	314	13 × 13 × 261
650HW-5, -7, -10	46322 (or 46322 and 446322)*	19 × 19 × 437
800HW-10, -16	27324 and 324	19 × 19 × 437

*See page 9 and Note 2, Item (8)

III. Main Technical Specifications

1. Pump Performance: See the HW Series Pump Flow-Head Curves (Fig. 3) and Performance Tables (Tables 3 and 4)

2. Pump Performance Adjustment:

(1) Changing the pump's rotational speed can alter its performance and expand its range of application;

(2) Methods for changing the rotational speed: Change the outer diameter of the pulley or the gear ratio of the gear reducer, or select a prime mover with a different rotational speed.

(3) After changing the pump's rotational speed, the relationship between flow rate (Q), head (H), and power (N) is shown by the following equations:

$$Q_1=Q\frac{n}{n_1} \qquad H_1=H\left(\frac{n_1}{n}\right)^2 \qquad N_1=N\left(\frac{n_1}{n}\right)^3$$

Where: Q_1, H_1, and N_1 represent the flow rate, head, and power, respectively, after the speed change.

Q, H, and N represent the flow rate, head, and power at the rated speed, respectively.

(4) When the pump speed is increased, power consumption rises, the suction vacuum decreases, and servicelife is shortened. Excessively increasing the speed may lead to other accidents; therefore, this practice should be

(5) When the pump speed is excessively reduced, the pump's operational efficiency decreases; therefore, operating the pump at excessively low speeds should be avoided as much as possible.

To maximize the pump's range of applications and meet the diverse needs of ourcustomers, our factory has designed and manufactured a wide variety of configurationswith different speeds, power ratings, and other specifications. Moving forward, whilevigorously developing new products, we will also further refine and expand our range ofsuitable configurations to better serve our customers. We welcome feedback, suggestions,and inquiries from our customers regarding product selection.

3. The allowable suction vacuum (Hs), the required net positive suction head (NPSH)r, and the critical net positive suction head (NPSH)c can generally be approximated using the following two equations:

$$(Hs) \approx 10-(NPSH)c$$

$$(NPSH)r \approx (NPSH)c + 0.3$$

Where: (Hs) — Allowable suction vacuum, m.

(NPSH)c — Critical net positive suction head, m.

(NPSH)r — Required net positive suction head, m.

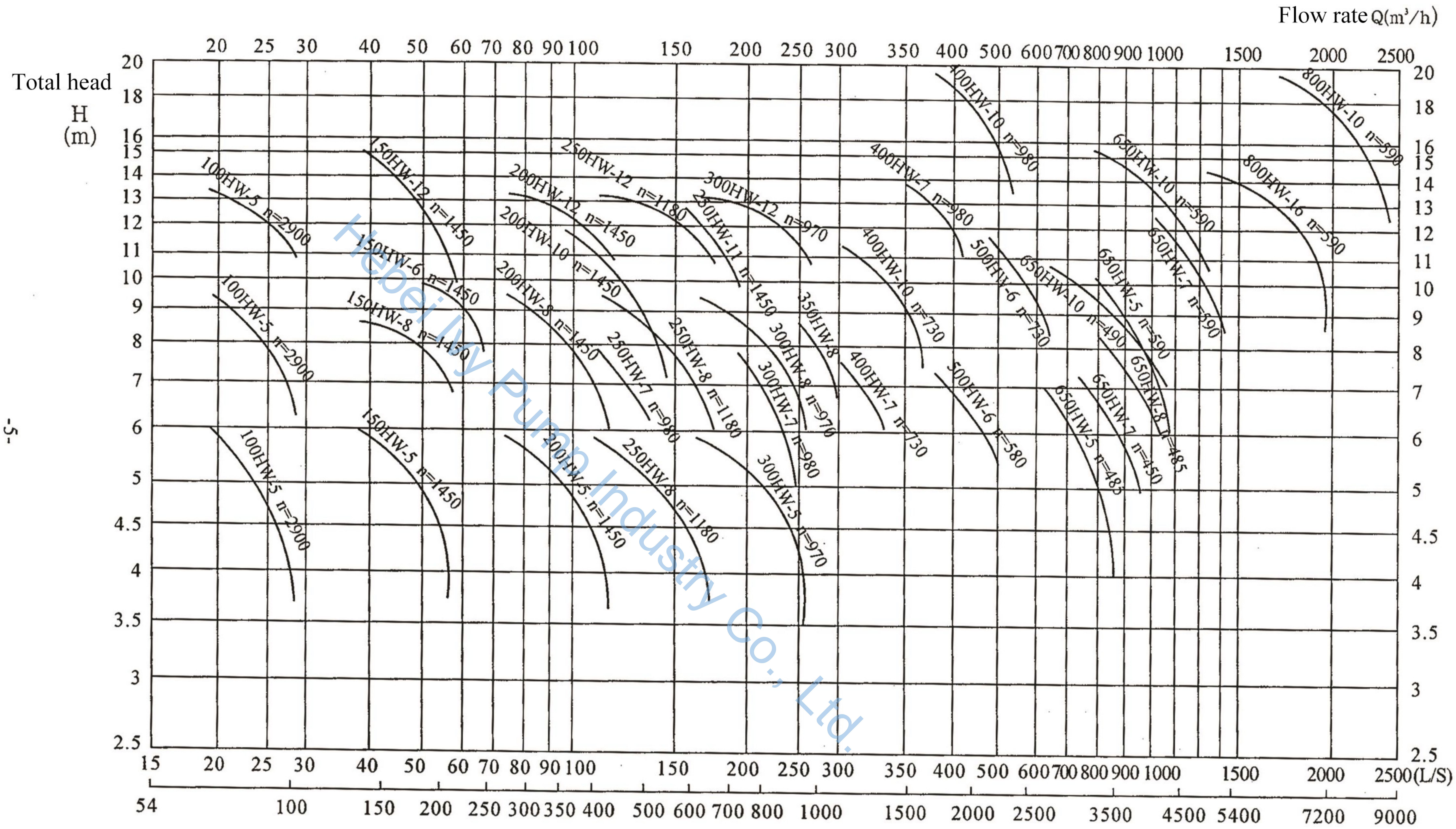

Figure 3: Flow-Head Curves for HW-Type Pumps (for User Selection)

Table 3 HW Series Pump Performance Table (Basic Model)

Pump Model	Flow Rate Q L/S	Flow Rate Q m^3/h	Head H m	Speed N r/min	Efficiency η %	Power: Shaft Power kW	Power: Matched Power hp/kW	Critical Net Positive Suction Head (NPSH)c m	Pump Mass kg	Direct-coupled Driving Motor Model
150HW-5	38 50 60	137 180 216	6.1 5.0 3.7	1450	75.0 82.0 74.0	3.30 2.99 2.94	4	2.7	60	Y112M-4
150HW-8	38 50 60	137 180 216	8.7 8.0 6.8	1450	82.0	4.78	5.5	2.7	60	Y132S-4
150HW-12	38 50 60	137 180 216	15.3 12.5 9.7	2900	75.0 82.0 78.0	7.60 7.47 7.71	11	6.0	55	ΔY160M-2
200HW-5	100	360	5.0	1450	81.5	6.01	7.5	4.0	105	ΔY132M-4
200HW-8	75 100 120	270 360 432	9.6 8.0 6.0	1450	76.0 83.5 75.0	9.29 9.39 9.41	11	4.0	105	Y160M-4
200HW-12	75 100 120	270 360 430	13.5 12.5 10.8	1450	83.5	14.68	18.5	4.0	105	ΔY180M-4
250HW-5	150	540	5.0	1180	82.0	8.97	11	4.0	190	
250HW-8	93 123 148	335 444 533	6.5 5.4 4.1	970	77.0 84.7 76.0	7.67 7.78 7.74	11	2.7	190	ΔY160L-6
	113 150 180	407 540 648	9.6 8.0 6.0	1180	77.0 84.0 76.0	13.81 14.01 13.93	18.5	4.0		
	139 184 221	500 664 796	14.5 12.1 9.1	1450	77.0 84.0 76.0	25.6 26.0 25.9	30	6.4		Y200L-4
250HW-12	113 150 180	407 540 648	13.5 12.5 10.8	1180	84.0	21.8	30	4.0	190	
300HW-5	220	792	5.0	970	83.0	12.99	15	4.0	230	Y180L-6
300HW-8	165 220 264	594 792 950	9.6 8.0 6.0	970	78.0 85.0 77.0	19.90 20.30 20.10	22	4.0	230	Y200L2-6
300HW-12	165 220 264	594 792 950	13.5 12.5 10.8	970	85.0	31.72	37	4.0	230	ΔY250M-6

Table 4: HW Series Pump Performance Table (Variant)

Pump Model	Flow Rate Q L/S	Flow Rate Q m^3/h	Head H m	Speed N r/min	Efficiency η %	Power: Shaft Power kW	Power: Matched Power hp/kW	Critical Net Positive Suction Head (NPSH)c m	Pump Mass kg	Direct-coupled Driving Motor Model
100HW-8S (4HBC-35)	27 25 19	98 90 70	7 8 10	2900	78 81 80	2.42 2.42 2.38	4/3	4.0	29	Y100L2-2
150HW-6 (6HBC-35)	39 50 56	140 180 200	6.6 6.0 5.0	1450	75.0 82.0 78.0	3.36 3.59 3.52	7/5.5	3.0	68	Y132S-4
	49 62 69	174 223 248	10.1 9.2 7.7	1800	75.0 82.0 78.0	6.46 7.07 6.72	12/7.5	4.0		S195
200HW-10 (8HBC-35)	83 100 125	300 360 450	8.0 7.0 5.1	1200	77.0 82.0 70.0	8.46 8.39 8.10	15/11	4.0	130	
	100 125 150	360 450 540	12.0 10.0 7.0	1450	77.0 82.0 77.0	15.3 14.9 14.4	30/18.5	5.0		Y180M-4
	111 139 167	400 500 600	14.5 12.5 9.5	1600	77.0 82.0 77.0	20.5 20.2 20.2	40/30	5.5		
250HW-7 (10HBC-30)	111 125 139	400 450 500	8.0 7.0 6.3	980	81.0 84.0 79.0	10.74 10.29 10.88	20/15	4.0	168	Y180L-6
250HW-11 (10HBC-40)	111 125 139	400 450 500	5.5 4.8 4.0	980	83.0 78.4 73.6	7.2 7.5 7.4	15/11	4.0	169	Y160L-6
	153 180 200	550 650 720	13.2 11.6 9.8	1450	82.3 83.4 80.0	24.0 24.6 24.0	40/30	6.0		Y200L-4
	178 200 222	640 720 800	15.5 14.3 11.8	1600	82.3 83.4 79.3	32.8 32.8 32.4	60/37	6.5		
300HW-7 (12HBC2-40)	141 161 188	507 581 678	4.4 3.9 2.8	730	82.0 84.0 78.0	7.4 7.3 6.6	11	3.0	230	Y180L-8
	189 217 253	680 780 910	8.0 7.0 5.0	980	82.0 84.0 78.0	18.1 17.1 15.9	22	4.0		Y200L2-6
	251 288 335	902 1035 1207	14.1 12.3 8.8	1300	82.0 84.0 78.0	42.3 41.4 37.1	55	5.0		
350HW-8 (14HBC-40)	186 207 228	670 745 819	5.2 4.4 3.7	730	85.0 85.5 81.5	11.16 10.44 10.15	20/15	4.5	330	Y200L-8
	250 278 306	900 1000 1100	9.4 8.0 6.7	980	85.0 85.5 81.5	27.10 25.50 24.66	40/30	5.0		Y225M-6
400HW-7 (16HBC-40)	300 350 380	1080 1260 1368	7.8 6.8 6.2	730	84.0 86.0 84.0	27.31 27.13 27.50	40/30	4.0	486	Y250M-8
	403 470 510	1450 1692 1836	14.1 13.3 11.2	980	84.0 86.0 84.0	66.32 65.90 66.67	100/75	5.5		JS115-6 Y315S-6

Continued from Table 4: HW Series Pump Performance Table (Variant)

Pump Model	Flow Rate Q		Head H m	Speed N r/min	Efficiency η %	Power		Critical Net Positive Suction Head (NPSH)c m	Pump Mass kg	Direct-coupled Driving Motor Model
	L/S	m^3/h				Shaft Power kW	Matched Power hp/kW			
400HW-8	310	1116	8.4	730	86.0	29.67	45	4.0	492	Y280M-8
400HW-10 (16HBC-30)	305 389 478	1098 1400 1720	11.5 9.94 7.55	730	83.0 86.0 83.5	41.5 44.3 42.4	66/55	4.0	496	Y315S-8 JS115-8
	409 522 641	1474 1880 2309	20.7 18.0 13.6	980	83.0 86.0 83.5	100.1 107.1 102.4	165/110	5.0		
500HW-6 (20HBC-40)	469 550 606	1690 1980 2180	7.6 6.2 5.3	580	83.4 87.0 80.4	41.9 38.4 39.1	60/55	5.5	770	JS116-10
	591 692 762	2127 2492 2744	12.0 9.8 8.4	730	83.4 87.0 80.4	83.4 76.4 78.1	120/95	6.0		JS125-8
650HW-5 (26HBC-50)	736 920 1000	2650 3312 3600	7.15 5.1 4.0	485	86.0 85.0 79.0	60.0 54.1 49.6	90/75	5.5	1940	
	896 1120 1216	3224 4032 4379	10.58 7.55 5.92	590	86.0 85.0 79.0	108.1 97.5 89.3	150/115	6.0		JS127-10
650HW-7 (26HBC-40)	850 944 1100	3060 3400 3960	7.4 6.5 5.0	450	85.0 88.0 85.0	72.5 68.4 63.4	120/90	5.3	1940	
	915 1017 1185	3295 3663 4244	8.6 7.6 5.9	485	85.0 88.0 85.0	90.8 86.1 80.6	135/100	5.5		JS137-12 JS13-12
	1115 1238 1442	4014 4457 5193	12.7 11.18 8.59	590	85.0 88.0 85.0	163.6 154.2 142.9	221/180	6.0		JS138-10
650HW-10 (26HBC-30)	889 1111 1389	3200 4000 5000	15.8 14.0 10.4	590	81.0 88.0 85.0	170.0 173.3 166.6	250/180	6.0	1940	JS138-10
	738 923 1154	2658 3322 4153	10.9 9.7 7.2	490	81.0 88.0 85.0	97.4 99.7 95.8	150/115	5.5		
800HW-10	1329 1661 1993	4784 5980 7176	14.8 12.2 8.6	490	85 88 80	227 225 210	310/250	5.5	3433	Y450-64-12
800HW-16	1600 2000 2400	5760 7200 8640	21.5 17.7 12.5	590	85 88 80	397.0 394.6 367.0	550/450	6.5	3433	Y500-50-10

IV. Pump Installation

HW type pumps are typically installed on the ground, but semi-submerged installation is also possible. Semi-submerged installation reduces the suction lift required for ground installation and minimizes losses caused by long suction pipes.

1. Installation Principles

(1) Pump Installation Height: The highest water surface should not be higher than the lower end of the bearing; the lowest water surface depends on the pump's allowable suction vacuum head (Hs) (to minimize branch line losses).

(2) The pump should be installed as close to the water source as possible to shorten the suction piping and reduce piping losses.

(3) Piping should be as straight and short as possible; generally, a single elbow is used at the inlet. By pouring the pump base foundation at an angle, the discharge elbow can be eliminated.

2. Precautions:

(1) When using belt drive, the pulleys of the pump and the power source must be aligned. Safety guards should be installed around the pulleys and belts.

(2) The pump cover should not be connected directly to an elbow. A straight pipe section should be installed first, followed by the elbow, to ensure uniform flow velocity distribution at the inlet.

(3) Rubber gaskets or asbestos cord should be installed between all flange connections in the piping system to prevent water and air leaks.

(4) The inlet pipe should extend into the intake basin to an appropriate depth. The distance between the inlet pipe and the basin wall is generally (1-1.5)D (where D is the diameter of the inlet pipe); use the larger value for smaller pumps and the smaller value for larger pumps.

(5) The discharge outlet should be submerged in the water of the discharge basin and positioned as close to the water surface as possible to minimize head loss.

(6) A screen should be installed upstream of the suction inlet to prevent aquatic plants and debris from entering the pump and being crushed or causing blockages in the flow path.

(7) When the pump is installed on a vessel and lubricated with lubricating oil (thin oil), consideration must be given to the fact that the pump may cause the bow to dip or the hull to list when drawing water. It is essential to ensure that the pump shaft remains horizontal during operation to prevent bearing damage due to oil starvation.

(8) The 650HW type pump generally uses two sets of single-row radial-thrust ball bearings (46322). For the 650HW-7 and 10 models, when the rotational speed is 590 r/min, one set each of 446322 and 46322 bearings is used.During assembly and operation, ensure an appropriate axial clearance (by adjusting the thickness of the shims) to ensure the bearings have good load-bearing capacity and a long service life (the same requirement applies to the 400HW-10 pump when operating at 980 r/min, which uses one set each of 446312 and 46312 bearings).

3. Outline and Installation Drawings and Dimension Tables

(1) See Figures 4 and 5 for the HW type pump and its outline and installation drawings

(2) See Table 5 for the external installation dimensions of the HW type pump.

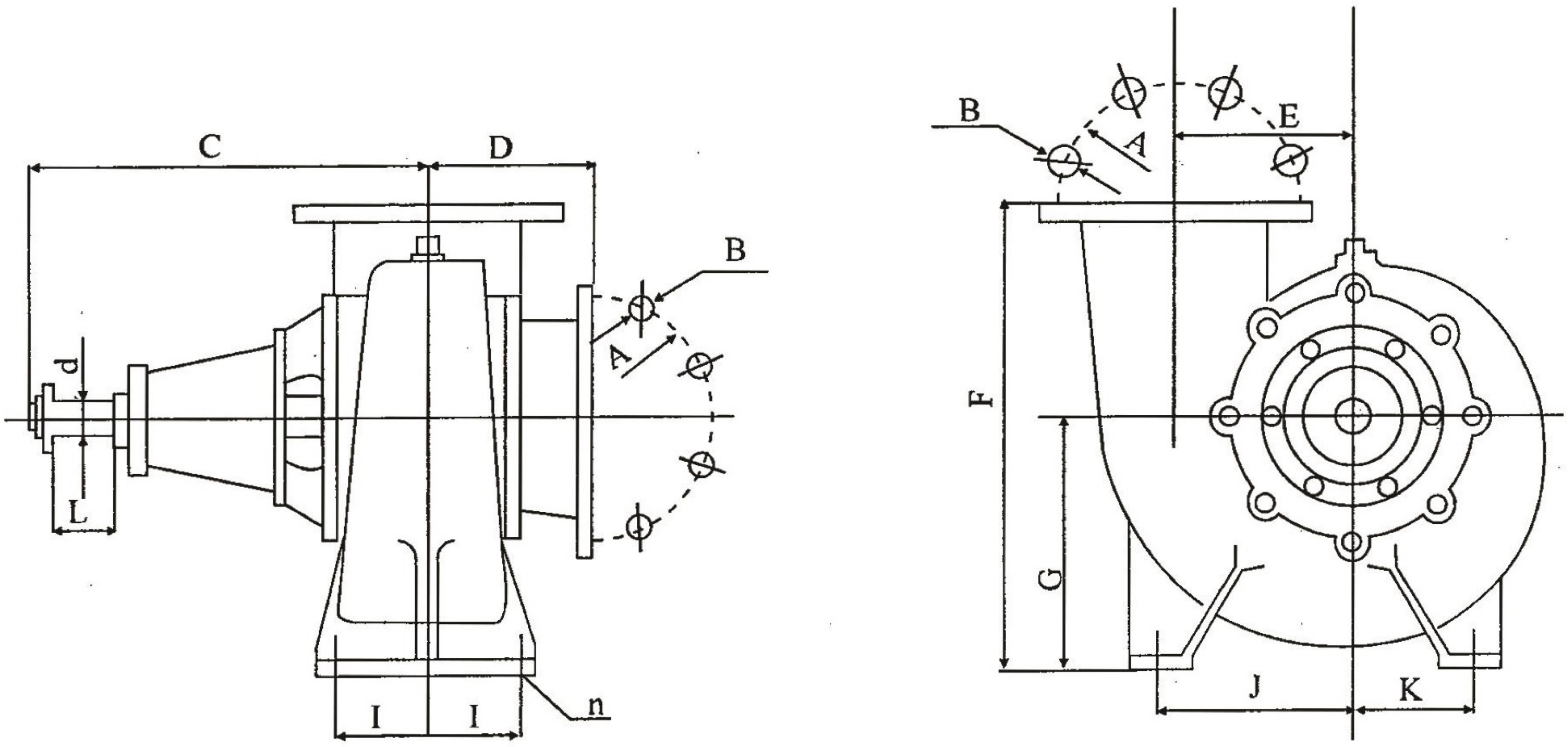

Figure 4: Installation Diagram of the 100HW-300HW and 350HW-8 Pumps with Upward Discharge

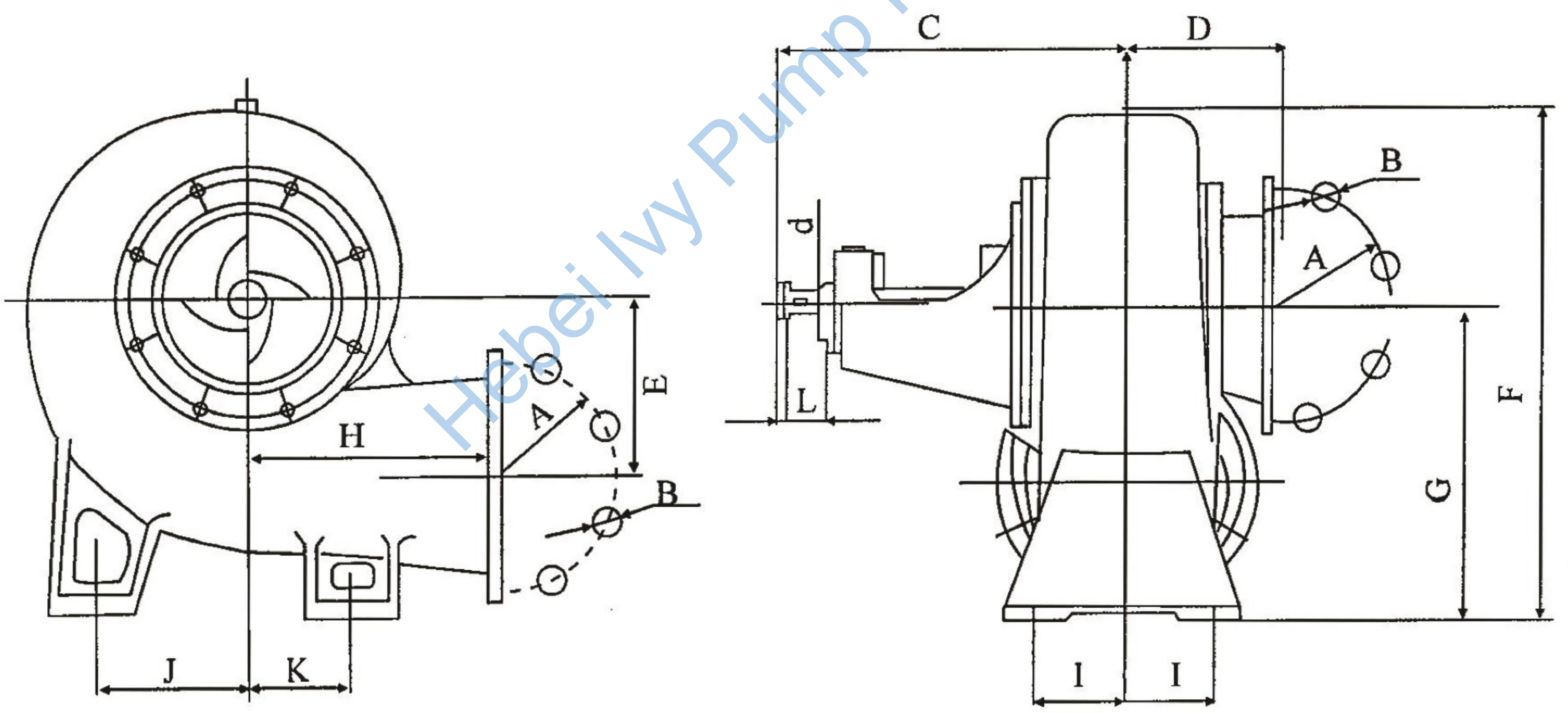

Figure 5: Installation Diagram Showing the External Dimensions of the 400HW-800HW and 350HW-8 Pumps with Horizontal Discharge
(The discharge direction and impeller rotation of the 650HW pump are opposite to those shown in the figure)

Table 5: HW Series Pump Dimensions and Installation Diagrams

Pump Model	A	B	C	D	E	F	G	I	J	K	n	L×d	l	H
100HW-8S	Φ142	6−Φ9	314	124	97	278	135	47	100	78	4−Φ12	53×28	12	−
150HW-5	Φ225	8−Φ17.5	360	160	158	400	212	80	170	120	4−Φ18.5	42×28	14	−
150HW-8			344	178	145									
150HW-12			340	170	128	350	170							
150HW-6	Φ210	6−Φ14	384	163	155	390	205	78	154	110	4−Φ18	49×30	14	−
200HW-5	Φ280	8−Φ17.5	430	188	200	500	265	100	220	150	4−Φ18.5	58×35	16	−
200HW-8			430	188	194									
200HW-12			406	210	180									
200HW-10	Φ270	6−Φ18	449	192	200	520	270	110	240	150	4−Φ18	56×35	16	−
250HW-5	Φ335	6−Φ17.5	546	249	220	590	315	120	270	190	4−Φ24	82×50	18	−
250HW-8			570	225	237									
250HW-12			546	249	221									
250HW-7 250HW-11	Φ320	8−Φ17.5	596	251	232	585	297	123	262	164	4−Φ24	107×54	18	−
300HW-5	Φ395	6−Φ22	572	260	290	725	375	150	330	230	4−Φ24	82×50	18	−
300HW-8			572	260	282									
300HW-12			540	300	265									
300HW-7 300HW-10	Φ380	8−Φ18	596	245	282	710	360	150	320	200	4−Φ22	107×54	18	−
350HW-8(向上)	Φ445	8−Φ22	608	290	290	780	400	150	320	200	4−Φ22	107×54	18	−
350HW-8(水平)	Φ445	8−Φ22	608	290	255	903	545	150	300	200	4−Φ22			380
400HW-7 400HW-10	Φ495	8−Φ22	717	305	300	1082	670	190	320	230	4−Φ30	82×55	18	450
500HW-6	Φ600	10−Φ22	851	332	370	1226	755	190	430	330	4−Φ35	106×65	20	565
650HW-5	Φ770	12−Φ27	1132	480	570	1670	1000	290	550	430	4−Φ34	130×95	35	735
650HW-7														
650HW-10														
800HW-10	Φ920	12−Φ33	1368	640	705	2050	1250	400	700	600	4−Φ34	165×110	37	1059
800HW-16	Φ1015													

V. Operation and Maintenance

1. Test Run:

After installation is complete, the pump must undergo a test run to verify the rotation direction and identify and correct any installation issues.

2. Startup Sequence:

(1) Close the discharge gate valve or check valve.

(2) Prime the pump: First, start the motor and add water through the threaded hole at the top of the pump casing; or open the check valve to allow water from the discharge tank to flow back into the pump; or use a vacuum pump to evacuate air and prime the pump (once the vacuum pump has removed the air from the pump and begins drawing water, start the pump and stop the vacuum pump).

(3) Once the prime mover reaches normal speed, fully open the gate valve, then adjust the packing tightness. If the pump operates normally, bearing temperatures are within normal range, and vibration is minimal, continue operation (when using a check valve, lift the valve cover after water begins to discharge to reduce resistance).

3. Operation and Maintenance:

(1) When bearings are lubricated with thin oil, frequently check and maintain the oil level in the bearing housing between the two marks on the oil dipstick; when bearings are lubricated with grease, replenish an appropriate amount of grease at regular intervals. For 150-300HW pumps (the front and rear covers can be removed for replenishment), and for 400-500HW pumps, replenishment can be done via the grease nipple.

(2) Regularly check the temperature rise of the bearings. Generally, it should not exceed 35℃ above ambient temperature, but must not exceed 75℃ under any circumstances.

(3) Listen for any friction or impact noises while the pump is running. If the pump cover is rubbing against the impeller, insert a paper shim between the pump cover and the pump body. The recommended clearance during operation is 0.3-0.7 mm.

(4) The packing must be adjusted properly; liquid should leak intermittently in droplets from the packing gland. If the packing is too tight, the shaft will overheat and power consumption will increase; if it is too loose, excessive liquid leakage will occur, reducing efficiency.

(5) If the motor is directly connected to the pump, the centerlines of the two shafts must be aligned.

(6) Check the suction piping for air leaks.

(7) Monitor for any sudden increases or decreases in power consumption, or sudden drops in flow rate. If any of these occur, shut down the pump to troubleshoot the issue.

(8) Check frequently to ensure that all bolts have not loosened due to vibration.

(9) In winter, drain any water remaining in the pump and piping after shutdown.

(10) Replace the lubricating oil or grease after the pump has operated for 1,000 hours or six months. Thereafter, change the oil every 1,000 hours or once a year.

VI. Troubleshooting

Fault	Cause	Solution
Pump Fails to Deliver Water	**1**. Insufficient priming or the vacuum pump is not evacuating enough air from the pump **2**. Air leak in the suction line **3**. Suction lift is too high **4**. Pump is rotating in the wrong direction **5**. Total head exceeds specifications	**1**. Continue priming or venting **2**. Inspect and troubleshoot **3**. Lower the pump's installation position **4**. Adjust **5**. Reduce
Pump stops immediately after water begins to flow	**1**. Air bubbles in the water **2**. Air trapped in the suction pipe **3**. Air leak in the suction line **4**. Suction line or impeller clogged with aquatic plants or debris	**1**. Increase the depth to which the inlet pipe is submerged in the water **2**. Remove the air **3**. Tighten the screws, adjust the gasket, and seal any gaps **4**. Eliminate
Insufficient Water Flow	**1**. Aquatic plants or debris in the inlet pipe or impeller **2**. Insufficient rotational speed or power **3**. Water delivery height is too high **4**. Wear on the pump cover and impeller seal rings, resulting in excessive sealing clearance **5**. Gate valve is opened too little or check valve is blocked by debris **6**. Inlet pipe is not submerged deep enough in the water	**1**. Eliminate **2**. Adjust **3**. Reduce **4**. Repair or adjust the paper gasket **5**. Open the gate valve appropriately and remove the obstruction **6**. Increase the immersion depth
Excessive Power Consumption	**1**. Rotational speed is too high **2**. Drive shaft is bent **3**. Packing is compressed too tightly **4**. Bearings are worn or damaged **5**. Belt is too tight	**1**. Reduce **speed** **2**. Straighten **3**. Loosen the gland nut or remove the packing and flatten it slightly **4**. Replace **5**. Loosen appropriately
Noise and Vibration	**1**. Misaligned shaft center **2**. Bent shaft, excessive bearing wear **3**. Loose foot bolts **4**. Partial blockage of the impeller **5**. Suction head too high, causing cavitation **6**. Foreign objects in the pump suction	**1**. Align **2**. Straighten or replace **3**. Tighten **4**. Eliminate **5**. Lower the pump's installation position **6**. Eliminate
Bearing Overheating	**1**. Insufficient lubricant **2**. Poor-quality or contaminated lubricant **3**. Misaligned shaft center **4**. Bearing wear **5**. Belt too tight	**1**. Add lubricant **2**. Clean the bearings and replace with appropriate lubricant **3**. Align the shafts **4**. Replace the bearings **5**. Loosen the belt appropriately
Packing Overheating	**1**. Packing is compressed too tightly or the tightness is uneven around the perimeter **2**. Packing is compressed unevenly, causing uneven friction against the shaft sleeve	**1**. Loosen the gland nut to adjust the packing tightness **2**. Loosen the gland, then retighten it evenly
Excessive water leakage at the packing area	**1**. Packing is not sufficiently compressed **2**. Packing is installed incorrectly **3**. Packing specifications are incorrect or the packing is worn **4**. The shaft sleeve is worn	**1**. Tighten the gland nut appropriately **2**. Adjust the packing joints so they are offset by a certain angle **3**. Replace **4**. Replace