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Model GAHW Vortex casing Flow-mixing Pump

Operation Instruction

Please carefully read the operation instructions before use of the product

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MODEL
GAHW VORTEX-CASING FLOW-MIXING PUMP

OUTLINE

1. Purpose:
Model AHW pump is a horizontal single stage single suction volute mixed flow pump and suitable for transporting pure water or the other liquid with both physical and chemical natures similar to those of water, with the temperature of the liquid to be transported not over 50 , for the farm land irrigation, industrial and city water supply and drainage etc.
multiple places.
The pump's performance range: flow 130~9000m3/h, head 3.5~22m.
2. Features:
Simple structure, reliable use, easy installation, high efficiency, small body, light weight.
3. Mode of actuation:
Direct and variable actuations. The common movers are motor and diesel engine. Please note the model (power, rotating speed) of the mover so as to make sure of the norms of the clutch or the belt pulley.
4. Water pump direction:
Viewing from the pump inlet, the impeller rotates counterclockwise generally (clockwise with 650AHW -5, -7, -10 pump).
5. Model meaning:
Take 300AHW~8A as the example.
300----pump's inlet and outlet diameters.
AHW----horizontal volute mixed flow pump.
8----designed head m.
A----cut the impeller's outer diameter or replace it with an impeller of different performance.

STRUCTURE AND

1. Model AHW pump mainly consists of pump cover, impeller,pump casing, shaft, muff and bearing body (aperture≤350mm) or bearing stand (aperture 400mm) etc. parts (Fig.1and 2).
2. The pump cover is connected to the pump casing and the water-in pipe separately. There should a proper interval between the planes of both pump cover and impeller, too small interval will produce friction; while too big will cause the pressured water inside of the pump to flow back greatly to have the pump efficiency lowered.
The practically used proper interval is 0.3~0.7mm (push the pump shaft to the pump inlet)
and the interval can be adjusted through increasing or decreasing the paper pad thickness.

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3. The shaft seal is formed with packing, packing gland,packing ring and the packing box on the pump casing (no packing ring with 150AHW and 200AHW pumps)an d function s to prevent air from being sucked into the pump and too muchwater from flowing out axially.
4. The muff is used to protect the pump shaft and can be replaced after getting worn out.
5. The pump shaft is supported with a single-line centripetal ball bearing. The bearing can be lubricated with lubricating oil-w ith he oil amount controlled in between the marking lines of the oil leveler rod; also with lubricating grease-filled during pump assembly or during use by means of removing both front and rear covers.
6. The screw hole on the top of the pump casing is used to prime leading water or link a vacuum pu mp for exhaust leading water.
7. To widen the pump's range of use and meet with the users' different requirements, cut the ou ter dia meter of the impeller or use an impeller of different performance (expressed with letter A etc. Added).
8. The accessories of 150~350AHW pump include inlet and outlet dead and flexible elbows, foot valve, belt pulley or clutch; and of 400~650AHW pump include inlet and outlet dea d an d flexible elbows, check valve, belt pulley or clutch. Selectable by users.
9. See Table 1 and 2 for the bearing model and packing norm of model AHW pump.

Table 1 Bearing and packing of model 150~350AHW pump

Pump model	Bearing model	Packing norm
		Oil soaked asbestos packing
150AHW-5 -8、-12	6306	8×8×135
150AHW-6	6307	10×10×157
200AHW-5 -8、-10、-12	6308	10×10×188
250AHW-5 -8、-7、-11、-12 300AHW-5 -8、-7、-12 350AHW-8	6311	13×13×228

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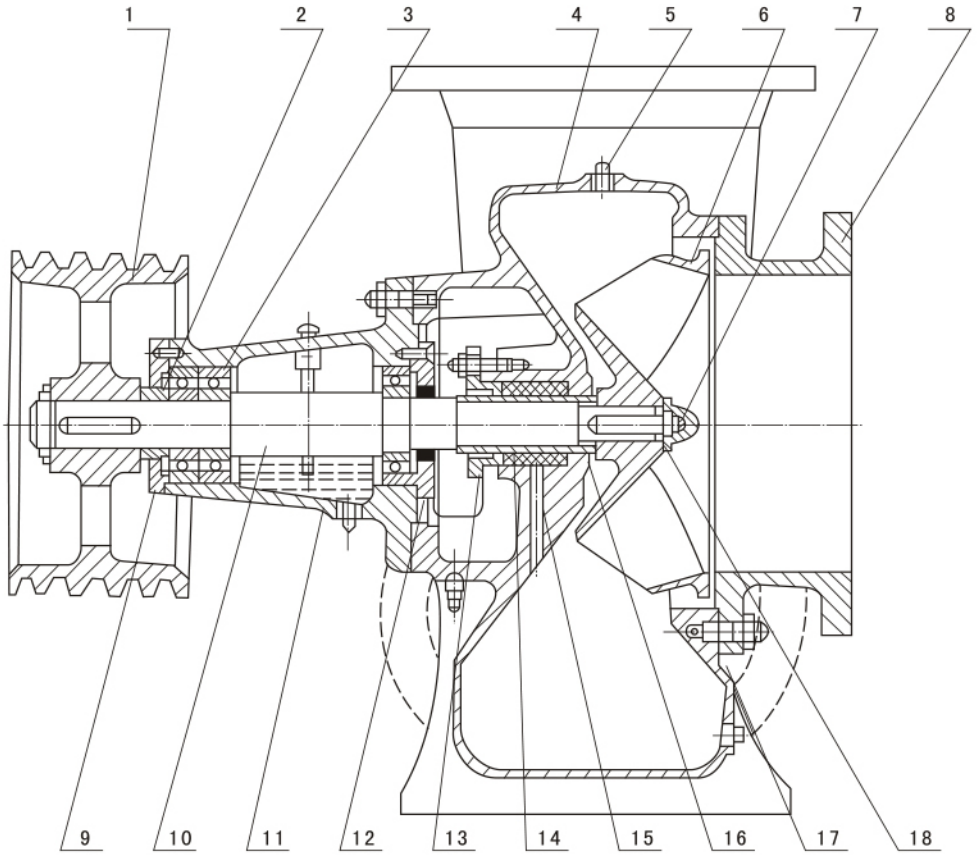

A

Fig. 1 Structural diagram of model 150~350 AHW pump
(there are upward and horizontal two water-out types with 350AHW ~8 pump)

No	Name	No	Name	No	Name	No	Name	No	Name
1	Belt pulley (or pump's clutch)	5	Thread cork	9	Rear cover	13	Packing gland	17	Paper pad
2	Retaining sleeve	6	Impeller	10	Pump shaft	14	Packing	18	Impeller nut gasket
3	Bearing	7	Impeller nut	11	Bearing body	15	Packing ring		
4	Pump casing	8	Pump cover	12	Front cover	16	Muff		

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Pump model	Bearing model	Packing norm
		Oil soaked asbestos packing
400AHW-7、-8、-10	6312(或7312AC和7312AC/DT)★	13×13×261
500AHW-11	6314	15×15×299
650AHW-5、-7、-10	6322(或7322AC和7322AC/DT)★	19×19×437
800AHW-10、-16	27324和6324	19×19×437

★ Please refer to (8) of the precautions, clause 2 on page 9.

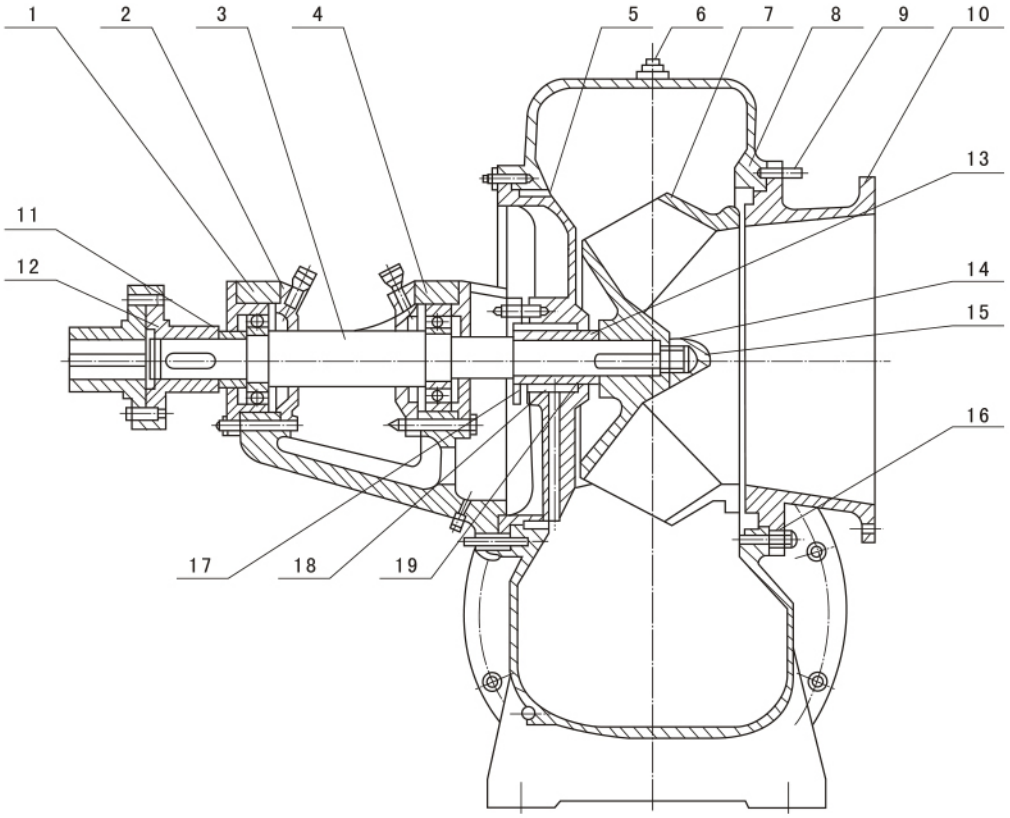

Fig. 2 Structural diagram of model 400~800 AHW pump
(the water-out direction of model 650 AHW -5, -7, -10 is reversed to that shown in the figure-viewing from the pump's inlet, the impeller moves clockwise)

No	Name	No	Name	No	Name	No	Name	No	Name
1	Bearing stand	5	End cover	9	Screw	13	Muff	17	Packing gland
2	Bearing end cover	6	Thread cork	10	Pump cover	14	Impeller nut gasket	18	Packing ring
3	Shaft	7	Impeller	11	Retaining sleeve	15	Impeller nut	19	Packing
4	Muff	8	Pump casing	12	Clutch	16	Paper pad		

MAIN TECHNICAL SPECIFICATIONS

1. Pump performance: see the flow-head curve chart (Fig.3) and the performance table (Table 3 and 4) of model GAHW pump.
2. Pump performance variation:
(1)Change of the pump speed can vary the pump performance and widen the pump's range of use.
(2)Way to change the pump speed: change the outer diameter of the belt pulley or the drive ratio of the gear decelerator,also use the mover of different speed.
(3)After the speed change, the variable relationship between the flow(Q), head(H) and power(N) of the pump comes
as below:
$Q_1 = Q(n/n_1)$ $H_1 = H(n/n)^2$ $N_1 = N(n_1/n)^3$
In which: Q_1 , H_1 , N_1 separately mean the flow, head and power after the speed change.
Q, H, N separately mean the flow, head and power under the set speed
(4) When the pump speed is enhanced, the consuming
power is increased, the upward suction vacuum lowers and the duration is shortened. Excessive enhancement of speed may cause other accidents to occur, so do it carefully.
(5) When the pump speed is lowered excessively, the pump's efficacy of use may becomes low, so avoid the pump from working in an excessive low speed a can as possible.
To widen the range of use and meet with the users' different requirements, this Co. has designed and made multiple different speed and power completions and, at the same time greatly developing new products in the future, will further perfect and develop various proper completions so as to provide the users with a better service. Please supply informati on and suggestions and select the product.
3. In general, the allowed upward-suction vacuum [Hs], (NPSH)r and (NPSH)c can be approximately expressed with the two formulas below:
$[Hs] \approx 10-(NPSH)c$ $(NPSH)r \approx (NPSH)c+0.3$
In which: [Hs]allowed upward suction vacuum, m.
(NPSH)ccritical NPSH, m.
(NPSH)rrequired NPSH, m.

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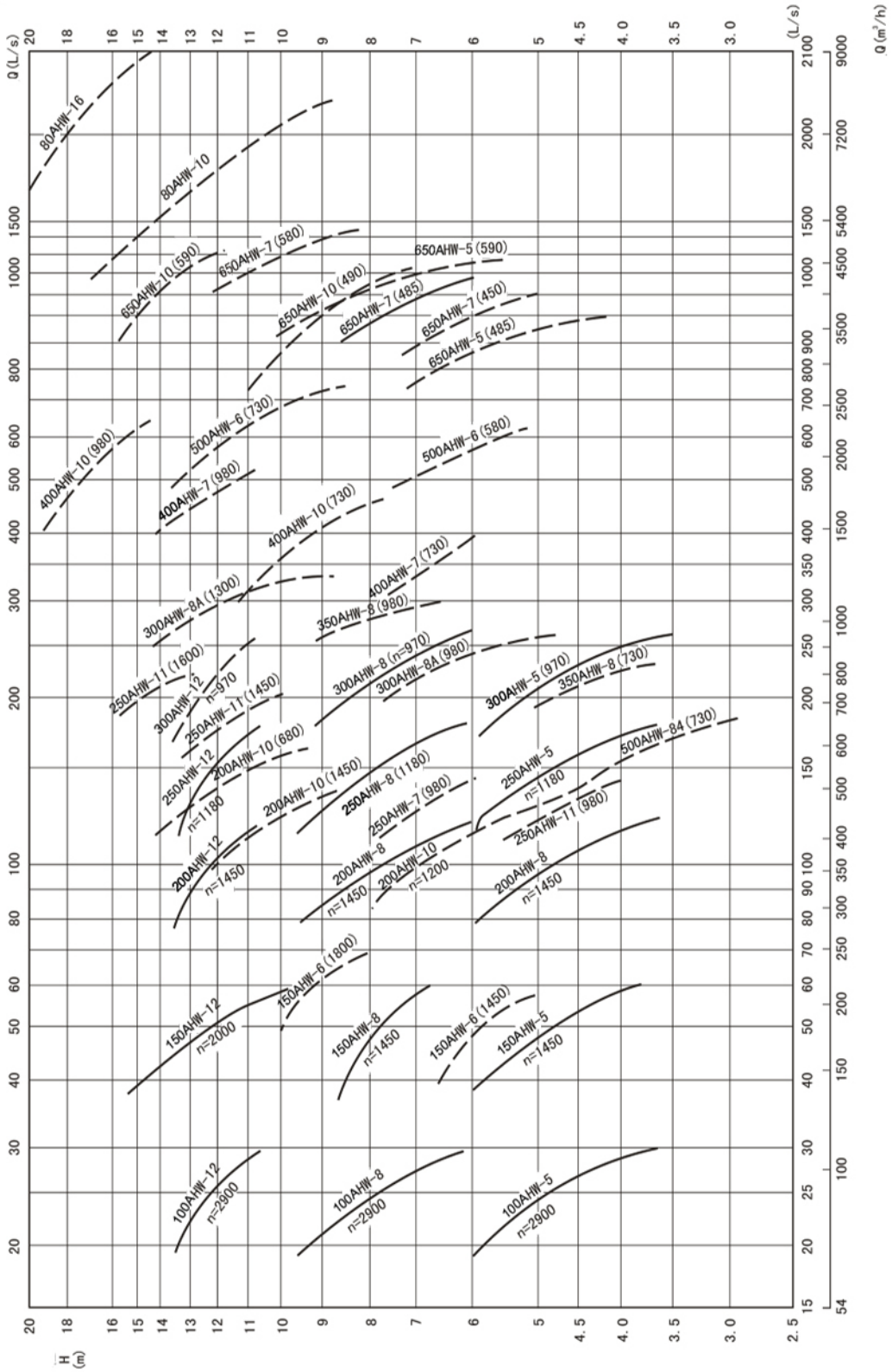

Fig.3 Flow-head curve chart of model AHWpump (for users to select the model)

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Pump model	Flow		Head (m)	Speed (r/min)	Efficiency (%)	Power(KW)		(NPSH) c(m)	Pump mass (kg)	Model of directly completed mover
	(L/s)	(m^3/h)				Shaft	Complementary			
150GAHW-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
150GAHW-8	38 50 60	137 180 216	8.7 8.0 6.8	1450	82.0 82.0 82.0	4.78 4.78 4.78	5.5	2.7	60	Y132S-4
150GAHW-12	38 50 60	137 180 216	15.3 12.5 9.7	2900	75.0 82.0 74.0	7.60 7.47 7.71	11	6.0	55	△160M-2
200GAHW-5	100 100 100	360 360 360	5.0 5.0 5.0	1450	81.5 81.5 81.5	6.01 6.01 6.01	7.5	4.0	105	△Y132M-4
200GAHW-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
200GAHW-12	75 100 120	270 360 430	13.5 12.5 10.8	1450	83.5 83.5 83.5	14.68 14.68 14.68	18.5	4.0	105	△Y180M-4
250GAHW-5	150 150 150	540 540 540	5.0 5.0 5.0	1180	82.0 82.0 82.0	8.97 8.97 8.97	11	4.0	190	
250GAHW-8	93 123 148	335 444 553	6.5 5.4 4.1	970	77.0 84.0 76.0	7.67 7.78 7.74	11	2.7	190	△Y160L-6
250GAHW-8	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	190	
250GAHW-8	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	190	Y200L-4
250GAHW-12	113 150 180	407 540 648	13.5 12.5 10.8	1180	84.0 84.0 84.0	21.8 21.8 21.8	30	4.0	190	
300GAHW-5	220 220 220	792 792 792	5.0 5.0 5.0	970	83.0 83.0 83.0	12.99 12.99 12.99	15	4.0	230	Y180L-6
300GAHW-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	Y220L2-6
300GAHW-8A	141 161 188	507 581 678	4.4 3.9 2.8	730	82.0 84.0 78.0	7.56 7.48 6.75	11	3.0	230	Y180L-8
300GAHW-8A	189 217 253	680 780 910	8.0 7.0 5.0	980	82.0 84.0 78.0	18.44 18.08 16.22	22	4.0	230	Y200L2-8
300GAHW-8A	251 288 335	902 1035 1207	14.1 12.3 8.8	1300	82.0 84.0 78.0	43.16 42.17 37.79	55	5.0	230	
300GAHW-12	165 220 264	594 792 950	13.5 12..5 10.8	970	85.0 85.0 85.0	31.72 31.72 31.72	37	4.0	230	△Y250M-6

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Performance table of model GAHW pump (varied type)

Pump model	Flow		Head (m)	Speed (r/min)	Efficiency (%)	Power(KW)		(NPSH) c(m)	Pump mass (kg)	Model of directly completed mover
	(L/s)	(m^3/h)				Shaft	Complementary			
150GAHW-6	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	5.5	3.0	68	Y132S-4
150GAHW-6	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	11	4.0	68	
200GAHW-10	83 100 125	300 360 450	8.0 7.0 5.1	1200	77.0 83.5 70.0	8.45 8.22 8.12	11	4.0	130	
200GAHW-10	100 125 150	360 450 540	12.0 10.0 7.0	1450	77.0 83.5 77.0	15.27 14.68 14.32	18.5	5.0	130	Y180M-4
200GAHW-10	111 139 167	400 500 600	14.5 12.5 9.5	1600	77.0 83.5 77.0	20.49 19.91 20.20	30	5.5	130	
250GAHW-7	111 125 139	400 450 500	8.0 7.0 6.3	980	81.0 84.0 79.0	10.75 10.22 11.87	15	4.0	168	Y180L-6
250GAHW-11	111 125 139	400 450 500	5.5 4.8 4.0	980	83.0 78.4 73.6	7.22 7.5 7.4	11	4.0	169	160L-6
250GAHW-11	153 180 200	550 650 720	13.2 11.6 9.8	1450	83.0 84.0 80.0	23.85 24.37 24.02	30	6.0	169	Y200L-4
250GAHW-11	178 200 222	640 720 800	15.5 14.3 11.8	1600	83.0 84.0 80.0	32.59 33.38 32.11	37	6.5	169	
350GAHW-8	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	15	4.5	330	Y200L-8
350GAHW-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	30	5.0	330	Y225M-6
400GAHW-7	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	30	4.0	486	Y250M-8
400GAHW-7	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	75	5.5	486	Y315S-6
400GAHW-8	310 310 310	1116 1116 1116	8.4 8.4 8.4	730	86.0 86.0 86.0	29.67 29.67 29.67	45	4.0	492	Y280M-8

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Pump model	Flow		Head (m)	Speed (r/min)	Efficiency (%)	Power(KW)		(NPSH) c(m)	Pump mass (kg)	Model of directly completed mover
	(L/s)	(m^3/h)				Shaft	Complementary			
400GAHW-10	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	55	4.0	496	Y315S-8
400GAHW-10	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	110	5.0	496	Y315L2-6
500GAHW-6	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	55	5.5	770	Y315M-10
500GAHW-6	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	90	6.0	770	Y315L1-8
650GAHW-5	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	75	5.5	1940	
650GAHW-5	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	110	6.0	1940	Y355M-10
650GAHW-7	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	90	5.3	1940	
650GAHW-7	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	110	5.5	1940	Y355L-12
650GAHW-7	1115 1238 1442	4014 4457 5193	62.7 11.18 8.59	590	85.0 88.0 85.0	163.3 154.2 142.9	200	6.0	1940	Y450-10
650GAHW-10	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	200	6.0	1940	Y450-10
650GAHW-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	110	5.5	1940	
800GAHW-10	1329 1661 1993	4784 5980 7176	14.8 12.2 8.6	490	85 88 80	227 225 210	250	5.5	3433	Y450-64-12
800GAHW-16	1600 2000 2400	5760 7200 8640	21.5 17.7 12.5	590	85 88 80	397.0 394.6 367.0	450	6.5	3433	Y500-50-10

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PUMP INSTALLAITION

M odel GAHW pump is usually ground installed and also half-way installed in a well, the latter can reduce the additional loss with the former due to a high suction range and a longer water-in pipe.

1. Installation principle:

(1)Installation height: the maximum upper water surface should not be higher than the lower end of the bearing and lowest upper water surface is depended upon the pump's allowed upward-suc tion vacuum[Hs] (should reduce the branch pipeline's loss).

(2)Get the pump close to the water source as can as possible so as to shorten the water-in pipeline and reduce the pipeline loss.

(3)Have the pipeline straight and short. Use one bent pipe in the inlet gen erally. Use a slanting pour of the foot basis of the pump can save the water-out bent pipe.

2. Precautions:

(1)In case of belt drive, the belt pulleys of both pump and mover should be aligned. Set a safety cover on the belt pulley and the outside of the belt.

(2)Do not have the pump cover directly connected to an elbow till a straight pipe connected first so as to make sure of a uniformly distributed flowrate at the inlet.

(3)Fill rubber pad or asbestos threads in between the connecting flanges of the pump so as to prevent air or water leak.

(4)The position for the water-in pipe to stretch into the water pool should be so proper as the distance to the pool wall from it is generally (1~1.5)D (D as the water-in pipe aperture),
use the big value for a small pump and a small value for a big pump.

(5)The water outlet should be submerged in the water of the water-out pool and close to the water surface as can as possible so as to reduce the head loss.

(6)Set a screen cover before the water inlet to prevent waterweeds etc. impurities from going into the pump to breakor block up the geat.

(7)When the pump is placed on a ship for use and lubricated with lubricating oil (thin oil), the pump shaft should be ensured to be kept at the horizontal place so as to prevent the bearing from injury due to lack of oil, as the pump's priming will cause the ship head pressed low or the side of the ship body inclined.

(8)In general, model 650AHW pump uses two sets of single-line centripetal thrust ball bearing 7322AC, of which, model 650AHW-7and -10 pumps use each set of 7322AC/DT and 7322AC with the speed at 590r/min. During assembly and use, a suitable axial walking interval should be made sure (adjust the paper pad thickness) to have the bearing a good loading capacity and duration. (The same requirements are also applicable for 400AHW-10 pump when it uses each set of 7312 AC/DT and 7312AC with the speed at 590r/min).

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OUT-FORM INSTALLATION DRAWING AND DIMENSION TABLE

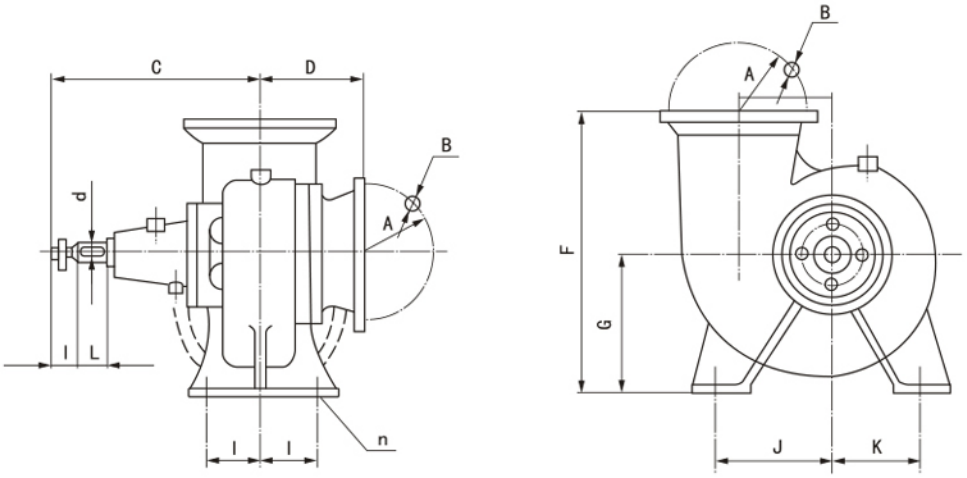

Fig. 4 Out-form and installation diagram of model 150~300AHW and350AHW-8 pump with the water out upward

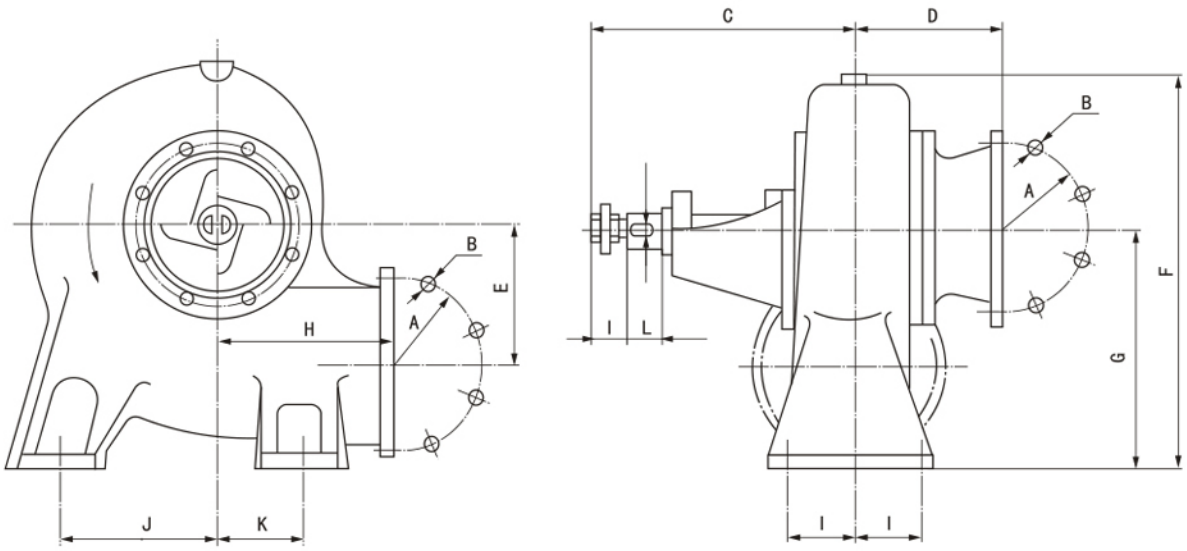

Fig. 5 Out-form and installation diagram of model 150-300AHW and 350AHW-8 pump with the water out horizontally (both water out direction and impeller moving direction of model 650 AHW pump are reversed to that shown in the figure)

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Table 5 Out-form and installation dimensions of model GAHW pump

Pump model	A	B	C	D	E	F	G	I	J	K	n	轴伸 Shaft extension L×d	螺纹长l Thread length l	H
150GAHW-5	Φ225	8-Φ17.5	360	160	158	400	212	80	170	120	4-Φ18.5	42×28	14	-
150GAHW-6	Φ210	6-Φ14	384	163	155	390	205	78	154	110	4-Φ18	49×30	14	-
150GAHW-8	Φ225	8-Φ17.5	344	178	145	400	212	80	170	120	4-Φ18.5	42×28	14	-
150GAHW-12	Φ225	8-Φ17.5	340	170	128	350	170	80	170	120	4-Φ18.5	42×28	14	-
200GAHW-5	Φ280	8-Φ17.5	430	188	200	500	265	100	220	150	4-Φ18.5	58×35	16	-
200GAHW-8	Φ280	8-Φ17.5	430	188	194	500	265	100	220	150	4-Φ18.5	58×35	16	-
200GAHW-12	Φ280	8-Φ17.5	406	210	180	500	265	100	220	150	4-Φ18.5	58×35	16	-
200GAHW-10	Φ270	6-Φ18	449	192	200	520	270	110	240	150	4-Φ18	56×35	16	-
250GAHW-5	Φ335	6-Φ17.5	546	249	220	590	315	120	270	190	4-Φ24	82×50	18	-
250GAHW-8	Φ335	6-Φ17.5	570	225	237	590	315	120	270	190	4-Φ24	82×50	18	-
250GAHW-7	Φ320	8-Φ17.5	596	251	232	585	297	123	262	164	4-Φ24	107×54	18	-
250GAHW-11	Φ320	8-Φ17.5	596	251	232	585	297	123	262	164	4-Φ24	107×54	18	-
250GAHW-12	Φ335	6-Φ17.5	546	249	221	590	315	120	270	190	4-Φ24	82×50	18	-
300GAHW-5	Φ395	6-Φ22	572	260	290	725	375	150	330	230	4-Φ24	82×50	18	-
300GAHW-7-8	Φ395	6-Φ22	572	260	282	725	375	150	330	230	4-Φ24	82×50	18	-
300GAHW 12	Φ395	6-Φ22	540	300	265	725	375	150	330	230	4-Φ24	82×50	18	-
350GAHW 8	Φ445	8-Φ22	608	290	290	780	400	150	320	200	4-Φ24	107×54	18	-
350GAHW-8	Φ445	8-Φ22	608	290	255	903	545	150	300	200	4-Φ24	107×54	18	380
400GAHW-7	Φ495	8-Φ22	718	306	300	1082	670	190	320	230	4-Φ30	82×55	18	450
400GAHW-8	Φ495	8-Φ22	718	306	300	1082	670	190	320	230	4-Φ30	82×55	18	450
400GAHW-10	Φ495	8-Φ22	718	306	300	1082	670	190	320	230	4-Φ30	82×55	18	450
500GAHW-11	Φ600	10-Φ22	849	331	400	1246	750	195	425	335	4-Φ30	105×65	20	565
650GAHW-5	Φ770	10-Φ27	1132	480	570	1670	1000	290	550	430	4-Φ34	130×95	35	735
650GAHW-7	Φ770	10-Φ27	1132	480	570	1670	1000	290	550	430	4-Φ34	130×95	35	735
650GAHW-10	Φ770	10-Φ27	1132	480	570	1670	1000	290	550	430	4-Φ34	130×95	35	735
800GAHW-10	Φ920	12-Φ33	1368	640	705	2050	1250	400	700	600	4-Φ34	165×110	37	1059
800GAHW-16	Φ1015	12-Φ33	1368	640	705	2050	1250	400	700	600	4-Φ34	165×110	37	1059

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MODEL GAHW VORTEX-CASING FLOW-MIXING PUMP

USE AND MAINTENANCE

1. Trial:

Take a trial movement after the pump is installed to check the moving direction of it and remove the defect in the installation.

2. Sequence of trial:

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

(2)Fill leading water: first start the pump and fill water into it through the screw hole on the top of it or open the check valve to let the water in the water-out pool back primed in; or directly use a vacuum pump to lead water by means of exhausting (when the vacuum pump exhausts the air inside of the pump completely and gets water out, start the pump and stopthe vacuum pump).

(3)When the mover reaches the normal speed, open the gate valve fully and adjust the packing tightness . Have the pump go on moving in case of a normal movement and bearing temperature and a slight vibration (when the check valve is used, lift the bonnet when water goes out so as to reduceresistance).

3. Use and maintenance

(1)When the bearing uses thin oil for lubricating, often check and control the oil level with the bearing body in between two marking lines on the oil leveler rod; and when it uses dry oil (lubricating grease), supplement a proper amount of oil in a period ic time by means of removing both front and rear covers for model 150~350AHW pump and the oil cu p fo r model 400~800AHW pump.

(2)Often check the bearing's temperature rise, which should not be over the ambient one by 35 generally and by 75 to the utmost extent.

(3)Pay attention to both frictional and collided sounds which may occur during the pump movement. In case of friction between both pump cover and impeller, add paper pad in between both pump cover and casing. The applicable intervalin the actual use is 0.3~0.7mm.

(4)Adjust the packing properly to have the liquid intermittently leak in drops from the packing gland. Too tight packing will cause the shaft heated and the power increased while tooloose will cause excessive liquid leak and a lowered efficiency.

(5)In case of direct link between both pump and motor ,have the axial lines of both on a same straight line.

(6)Check if there is air which leaks from the water-in pipeline.

(7)Pay attention to the power to see if it is suddenly enlarged or lowered and if the flow is suddenly reduced, stopthe pump to troubleshoot if it is.

(8)Often check if the bolts get loose due to vibration.

(9)Drain out the water remained in both pump and pipeline after stop in case of winter.
(10)Replace the lubricating oil or grease after 3000h work of the pump or in half a year and then once every 1000h or every year. Disassemble the pump for check and maintenance after 20000h work or in three years.
For the pump to be stopped for a long time, remove the moving part and take rustproof treatment, then keep it well.

FAILURES CAUSES AND TROUBLESHOOTING

Failure	Possible causes	Troubleshooting
1、No water out of the pump	a. Insufficient led water or insufficiently air exhausted from inside of the pump b. Air leaks from water-in pipeline c. Too high suction stroke d. Wrong rotating direction of pump e. Total water transporting height is over the set one	a. Go on priming or exhausting b. Check and remove c. Lower the pump position d. Change it e. Reduce it
2、Water cut off just out of the pump	a. Too much bubble inside of water b. Air exists in the water-in pipeline c. Air leaks from water-in pipeline d. Water-in pipeline or impeller blocked up by waterweeds impurities	a. Make the water-in pipe deeper in water b. Exhaust it c. Tighten bolts, adjust the pad, block up the space d. Remove it
3、Insufficient out water	a. Waterweeds impurities exist in water-in pipeline or impeller b. Insufficient speed or power c. Excessive water transportation height d. Seal rings on both pump cover and impeller are worn out, too big sealing interval e. Gate valve is not enough opened or check valve blocked up by obstructs f. Insufficiently submerged depth of water-in pipe	a. Remove it b. Adjust it c. Lower it d. Repair or adjust paper pad e. Open gate valve properly, remove the obstructs f. Make it submerged deeper

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FAILURES CAUSES AND TROUBLESHOOTING

Failure	Possible causes	Troubleshooting
4、Too heavy consumed power	a. Too high speed b. Drive shaft bent c. Too tightly pressed packing d. Bearing worn out or injured e. Too tight belt	a. Lower it b. Make it straight c. Loosen the gland nut or take packing out to make it flatter d. Replace it e. Loosen it properly
5、Noise and vibration	a. Shaft centers not aligned b. Shaft bent, bearing too much worn out c. Foot bolt loose d. Partially blocked up impeller e. Too high suction stroke, steam erosion happened f. Pump sucks impurities in	a. Make tem aligned b. Make it straight or replace it c. Tighten it d. Settle it e. Lower the pump position f. Remove it
6、Bearing heated	a. Insufficient lubricating oil b. Bad quality or unclean lubricating oil c. Shaft centers not aligned d. Bearing worn out e. Too tight belt	a. Fill oil b. Clean bearing and replace lubricating oil with proper one c. Make them aligned d. Replace it e. Loosen it properly
7、Packing heated	a. Packing is pressed too tightly and uneven tightness around it b. Packing is pressed slantingly, making the muff an uneven friction	a. Loosen gland nut, adjust packing tightness b. Loosen gland, retighten it evenly
8、Too much water leaks from the packing	a. Packing not pressed tightly b. Improper packing device c. Improper packing norm or packing worn out d. Muff worn out	a. Screw in the gland nut properly b. Adjust packing hasps to have them spaced in a certain angle c. Replace it d. Replace it

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REFERENCE TABLE FOR PIPELINE LOSS

Brief table for the frictional loss of a straight pipe(for evaluation), the lost meters of a 100m straight pipe takes the newly cast iron pipe as the standard and multiple for the old one.

Pipe diameter (mm)	Capacity (L/s)																							
	1	2	4	6	8	10																		
25	32.7	13.0																						
38	3.5	14	55				15	20																
50	0.8	3.1	13	29					25	30														
65		1.6	3.2	7.1	13	20					40	50												
75		0.4	0.8	3.3	5.9	9.6	21.6						60	70										
100			0.23	0.8	1.3	2.1	6.8	8.6	13	19.4					80	90								
125				0.23	0.4	0.63	1.3	2.7	4.1	5.9	10.7						100	110						
150					0.16	0.26	0.58	1.1	1.6	2.3	4.2	6.4	9.4						120	130				
175						0.11	0.27	0.5	0.74	1.05	1.9	2.9	4.3	5.8	7.7	9.6					140	160		
200							0.13	0.26	0.37	0.53	0.93	1.5	2.1	2.9	3.7	4.7	6.1	7.2	8.5				180	200
250								0.07	0.12	0.18	0.30	0.48	0.68	0.93	1.2	1.5	1.9	2.3	2.8	3.3	3.7	4.9	5.2	
300										0.07	0.12	0.19	0.27	0.37	0.49	0.61	0.76	0.9	1.1	1.3	1.5	2.0	2.4	3.0

The length of a straight pipe converted into from both valve and elbow(each)

Variety	Convert into the times of the diameter of a straight pipe	Remark
Fully opened gate valve	13	Multiple in case of unopen
Standard elbow	25	
Back valve	100	
Foot valve	100	Partial block-up multipled

Note:For instance, a 100mmdiameter pipe, the foot valve has a 100×100=10000mm=10m diameter when which is converted into 100 times that of the pipe's diameter. Suppose the flow is 8L/s, looked into the above table, the loss of the straight pipe is 1.3m each 100m, then the one for 100mm is 0.13m, that is, for a 100mm foot valve with a flow 8L/s, its head low is 0.13m.

LIMIT OF THE MAXIMUN FLOW FOR A PIPE WITH A CERTAIN DIAMETER

Pipeline diameter (mm)	Maximum flow (L/s)	Maximum flow rate (m/s)	Pipeline diameter (mm)	Maximum flow (L/s)	Maximum flow rate (m/s)
25	1	2.04	125	30.0	2.44
38	2.5	1.69	150	43.0	2.45
50	4.17	2.12	175	60.0	2.49
65	6.67	2.01	200	83.3	2.69
75	10.0	2.26	250	133.0	2.72
100	18.4	2.33	300	192.0	2.71

Note: The pipeline loss would be made greatly increased once the limit is over.