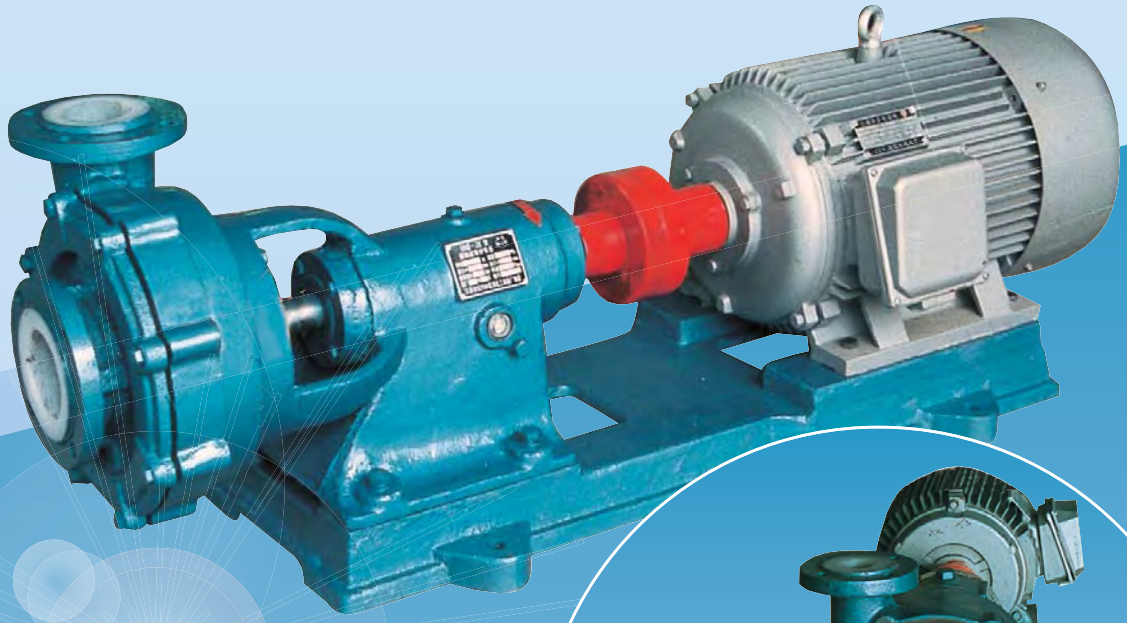
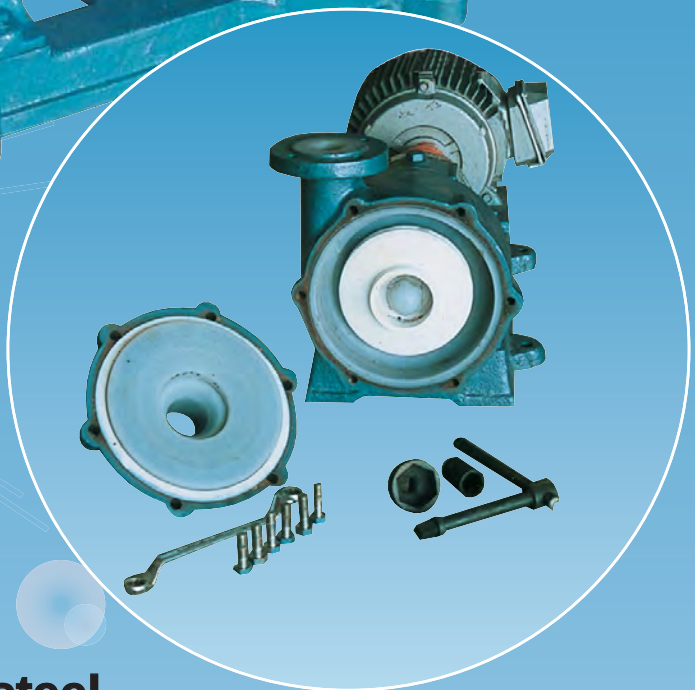
Prior to use, read this manual thoroughly

FS Series
Acid type, Alkali type
Corrosion resistant pumps





- **Structure: Plastic lined steel**
- **Feature: Corrosion resistant**

Z-S® 宙斯 Yixing Zeus Pump Co., Ltd.

2011.11

I. Main Properties and Uses

The series of pumps are single-stage single-suction cantilever centrifugal pumps, and its flow passage components are made from fluorinated ethylene-propylene (F46, commonly known as the “King of Plastics”) which features extraordinary corrosion resistance and thus applies to various highly corrosive mediums like sulfuric acid, hydrochloric acid, nitric acid and hydrofluoric acid of various concentrations, various mixed acids and aqua regia as well as various alkalies or organic solvents. Mechanical seals WB2, 152 and 169 are employed, and the service temperature of the pump is between -20 and 110℃.

II. Selection tips

When selecting the pump the user should describe the detailed intended service conditions like chemical properties, solid content, viscosity, temperature and explosion-proof demand of the mediums to be delivered, so as to select one of the specific models from:

1. Acid-resistant model: Applicable for the delivery of various strong acids or solutions of acids and solvents;

2. Alkali-resistant model: Applicable for the delivery of alkaline clear liquids or solutions of alkaline liquids and solvents;

3. Impurity-resistant model: Applicable for the delivery of mediums like acid or alkaline liquids containing solid materials in small volume. In case of high solid content, UHB-ZK series of corrosion-resistant slurry pumps could be used, or an appropriate model could be selected through consultation with us;

4. Explosion-proof model: Equipped with an explosion-proof motor, this model is applicable for the delivery of inflammable and explosive liquids.

In case this series of pumps are intended to be used under special service conditions, other lining materials could be used, taking into consideration the appropriateness and economy of such materials. The lining materials available include UHMWPE, PVDF and ceramics. The price of the product varies depending on the material used.

For this series of pumps with an inlet diameter of over 125mm, there is no model with F46 lining, and only PE and PVDF models are available.

III. Model Meaning Description

The nameplates of this series of products shall be consistent with the following specification:
1. FS high corrosion-resistant pump refers to acid-resistant pump that could also be used to deliver acid solvents;
2. FS alkali-resistant pump refers to the pump that could resist alkalies or alkaline solvents induced corrosion;
3. Explosion-proof model could be identified by the explosion-proof motor equipped;
4. Particle-resistant pump refers to the pump which could be used to deliver liquids containing solid materials, and its nameplate indicates no information about such material; the user will be informed of such information by the manufacturer orally or in written form.

IV. Performance Parameters

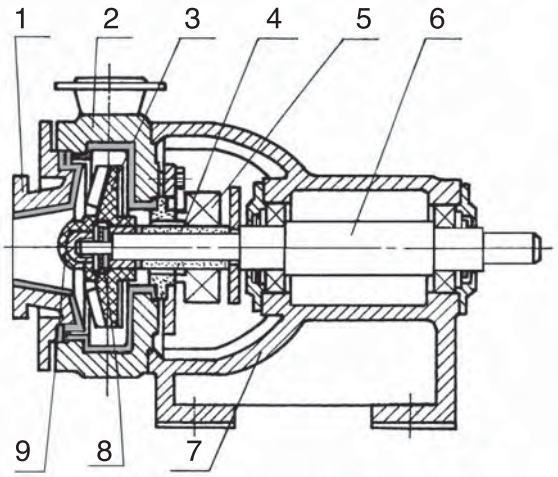
No.	Model	Flow (m^3/h)	Lift (m)	Speed (r/min)	Power (kw)		Inlet and outlet diameter (mm × mm)	Weight (kg)
					Shaft power	Motor		
1	32FS-3-13	3	13	2900	0.3	0.75	32×25	75
2	32FS-5-12	5	12	2900	0.42	0.75		
3	32FS-7-10	7	10	2900	0.5	0.75		
4	32FS-3-18	3	18	2900	0.4	1.1		
5	32FS-5-15	5	15	2900	0.55	1.1		
6	32FS-8-12	8	12	2900	0.7	1.1		

No.	Model	Flow (m^3/h)	Lift (m)	Speed (r/min)	Power (kw)		Inlet and outlet diameter (mm × mm)	Weight (kg)
					Shaft power	Motor		
7	32FS-5-20	5	20	2900	0.72	1.1	32×25	80
8	32FS-8-18	8	18	2900	1.2	1.5		
9	32FS-12-15	12	15	2900	1.3	2.2		
10	32FS-5-25	5	25	2900	1.1	2.2		
11	32FS-10-20	10	20	2900	1.6	2.2		
12	32FS-5-5	5	5	1450	0.25	0.75		
13	32FS-15-15	15	15	2900	1.7	2.2		
14	40FS-10-30	10	30	2900	2.2	3	40×32	130
15	40FS-15-25	15	25	2900	2.7	3		
16	40FS-7.5-6	7.5	6	1450	0.4	0.75		
17	40FS-18-20	18	20	2900	2.6	3		
18	40FS-10-18	10	18	2900	1.3	2.2		
19	40FS-15-15	15	15	2900	1.7	2.2		
20	50FS-15-32	15	32	2900	3.5	5.5	50×40	170
21	50FS-20-30	20	30	2900	4.3	5.5		
22	50FS-10-7.5	10	7.5	1450	0.6	1.1		
23	50FS-25-28	25	28	2900	5.0	5.5		
24	50FS-10-35	10	35	2900	3.2	4		
25	50FS-12-40	12	40	2900	3.8	5.5		
26	50FS-15-43	15	43	2900	5.6	7.5		
27	50FS-20-20	20	20	2900	3.0	4		
28	50FS-25-18	25	18	2900	3.2	4		
29	50FS-30-15	30	15	2900	3.1	4		
30	65FS-30-25	30	25	2900	5.3	5.5	65×50	220
31	65FS-35-20	35	20	2900	5.1	5.5		
32	65FS-40-15	40	15	2900	4.5	5.5		
33	65FS-30-32	30	32	2900	6.5	7.5		
34	65FS-15-8	15	8	1450	0.9	1.1		
35	65FS-35-25	35	25	2900	6.2	7.5		
36	65FS-40-20	40	20	2900	5.9	7.5		
37	65FS-10-45	10	45	2900	4.8	7.5		
38	65FS-5-11	5	11	1450	0.6	1.1		
39	65FS-10-40	10	40	2900	4.2	5.5		
40	65FS-20-50	20	50	2900	8.7	11		
41	65FS-10-12.5	10	12.5	1450	1.2	2.2		
42	65FS-30-50	30	50	2900	12	15		
43	65FS-15-12.5	15	12.5	1450	1.6	2.2		
44	65FS-30-40	30	40	2900	9.6	11		
45	80FS-40-20	40	20	2900	5.8	7.5	80×65	270
46	80FS-45-18	45	18	2900	6.1	7.5		
47	80FS-50-15	50	15	2900	5.6	7.5		
48	80FS-35-45	35	45	2900	10.8	11		
49	80FS-17.5-11	17.5	11	1450	1.5	2.2		
50	80FS-40-35	40	35	2900	10.2	11		
51	80FS-45-32	45	32	2900	10.1	11		
52	80FS-50-30	50	30	2900	10.2	11		
53	80FS-60-30	60	30	2900	12.6	15		
54	80FS-45-50	45	50	2900	14.8	15		
55	80FS-22.5-12.5	22.5	12.5	1450	2.3	3		
56	80FS-55-40	55	40	2900	15	15		
57	100FS-50-58	50	58	2900	21	22	100×80	370
58	100FS-50-50	50	50	2900	17.5	18.5		
59	100FS-60-50	60	50	2900	21.5	22		
60	100FS-60-40	60	40	2900	16.8	18.5		
61	100FS-60-30	60	30	2900	13.8	15		
62	100FS-70-45	70	45	2900	22.1	22		
63	100FS-80-35	80	35	2900	17.8	18.5		
64	100FS-100-27	100	27	2900	18.4	18.5		
65	100FS-80-15	80	15	2900	10.2	11		

No.	Model	Flow (m^3/h)	Lift (m)	Speed (r/min)	Power (kw)		Inlet and outlet diameter (mm × mm)	Weight (kg)
					Shaft power	Motor		
66	100FS-100-20	100	20	2900	15	15	100 × 80	370
67	100FS-80-50	80	50	2900	27	30		
68	100FS-100-45	100	45	2900	28	30		
69	100FS-50-11	50	11	1450	4.2	5.5		
70	100FS-120-40	120	40	2900	28.5	30		
71	100FS-145-28	145	28	2900	29.5	30		
72	100FS-80-30	80	30	2900	17.5	18.5		
73	100FS-100-25	100	25	2900	17.9	18.5		
74	100FS-120-20	120	20	2900	17.2	18.5		
75	100FS-140-15	140	15	2900	16.8	18.5		
76	100FS-100-20	100	20	2900	14.9	15		
77	100FS-120-15	120	15	2900	14.2	15		
78	100FS-140-10	140	10	2900	14.5	15		
79	125FS-100-40	100	40	2900	28.8	30	125 × 100	480
80	125FS-120-35	120	35	2900	29.4	30		
81	125FS-140-25	140	25	2900	25	30		
82	125FS-120-32	120	32	2900	26.8	30		
83	125FS-140-28	140	28	2900	27.6	30		
84	125FS-160-24	160	24	2900	28.1	30		
85	125FS-120-20	120	20	2900	17.2	18.5		
86	125FS-140-18	140	18	2900	21	22		
87	125FS-150-15	150	15	2900	21.5	22		
88	125FS-80-15	80	15	1450	10.2	11		
89	150FS-120-25	120	25	1450	22	30	150 × 125	950
90	150FS-80-11	80	11	980	8.9	11		
91	150FS-150-20	150	20	1450	24.5	30		
92	150FS-180-30	180	30	1450	35.5	37		
93	150FS-210-26	210	26	1450	36.4	37		
94	150FS-148-11	148	11	980	15	15		
95	150 FS-240-24	240	24	1450	37	37		
96	150FS-270-20	270	20	1450	36	37		
97	150FS-190-18	190	18	1450	22	22		
98	150FS-135-8	135	8	980	10.5	11		
99	150FS-260-16	260	16	1450	28	30		
100	150FS-280-14	280	14	1450	28.2	30		
101	150FS-120-40	120	40	1450	33.6	37		
102	150FS-150-40	150	40	1450	42	45		
103	150FS-101-18	101	18	980	12.8	15		
104	150FS-200-32	200	32	1450	44	45		
105	150FS-250-30	250	30	1450	44.5	45		
106	150FS-300-25	300	25	1450	45	45		
107	200FS-320-32	320	32	1450	55	55	200 × 150	1200
108	200FS-210-14	210	14	980	18.4	18.5		
109	200FS-350-28	350	28	1450	55	55		
110	200FS-400-25	400	25	1450	70	75		
111	200FS-250-45	250	45	1450	74	75		
112	200FS-168-20	168	20	980	27	30		
113	200FS-300-38	300	38	1450	72	75		
114	200FS-350-34	350	34	1450	73.8	75		
115	200FS-320-24	320	24	1450	42	45		
116	200FS-215-10	215	10	980	15.6	18.5		
117	200FS-350-20	350	20	1450	43	45		
118	200FS-400-18	400	18	1450	44	45		
119	200FS-500-12	500	12	1450	45	45		

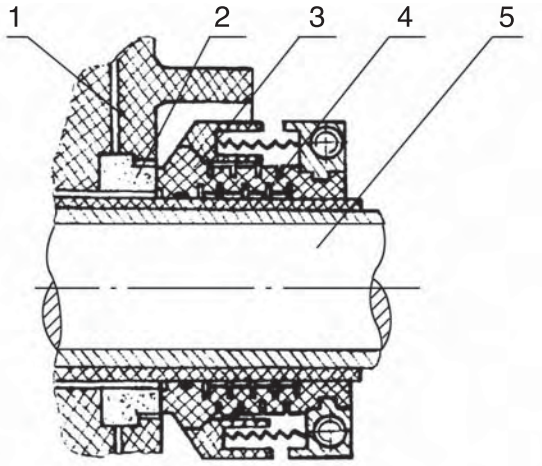
V. Structure of the Pump

Structure of the Pump



1. Pump Cover 2. Pump Casing 3. Impeller
4. Sleeve 5. Seal 6. Shaft 7. Bearing
8. Rotating-resistant Nut 9. Cap

Structure of the Sealing



1. Static ring gland 2. Stationary ring
3. Dynamic ring 4. Sleeve 5. Shaft

VI. Instructions for Starting, Running, Maintenance & Disassembling

Starting, Running & Maintenance

1. Check before start

Manually turn the shaft coupling or shaft before commissioning to see if its direction is correct and turning smoothly, if it is stuck or with abnormal noise, check to see if the coupling shaft to be horizontal, and inspect from the oil mirror hole on the bearing support to see if the position of lubrication oil is nearby the central line of the oil mirror (release some if it is too much, and add if too low), turning the shaft while checking, if the problem persists then it is required to open the case to check and clear foreign substances, and contact us for resolving the issue. (Please refer to diagram of structure and procedures found on this manual when disassembling.)

2. Start steps
a. Fill the pump with liquid;
b. Open the inlet valve timely (manual operation not needed for single check valve);
c. Turn-on power;
d. Open the outlet valve.

3. Running
When abnormality such as strange noise or heat motor occurs during running, stop to check the same way as 1.

4. Stop Pump
a. Close the outlet valve first.
b. Cut off power and close the inlet valve timely.
(manual operation not needed for single check valve).

5. Maintenance

a. Replace the lubricating oil in the bearing support periodically, every six months under normal conditions.
b. The pump should be protected against idle running, otherwise the seal might be damaged; after long-term service, the end faces of the rotating ring and stationary ring of the seal might be worn out with enlarged clearances, so they should be correspondingly adjusted in a timely manner by first loosing the hold thread of the rotating ring, adjusting the rotating ring assembly forward and then fastening the thread (generally a forward adjustment of 0.5mm each time);
c. In case of freezing, crystallization of liquid or jamming of seal, after shutdown of the pump, never fail to remove the crystal substance around rotating ring and stationary ring of the seal and turn the coupling until it flexibly rotates before restarting the pump;
d. The service of the pump after closing the outlet valve is called “closed pressure service”. The closed pressure service period of plastic pump or lining plastic pump should be minimized, and shall not exceed 5min for mediums at normal temperature, and 2min for high-temperature mediums;
e. For pump of which the case is composed of two halves for example, whose inlet diameter of over 150mm, the

sealing plastic at the split might change in size due to expansion caused by heat and contraction caused by cold, so in installation process the connecting bolts at the split should be fastened before connecting inlet pipes in order to prevent split leakage. This is a matter needing special attention of the users in Northern China;
f. The pump is not designed to bear the weight of inlet and outlet pipes, so the inlet pipes should be as short as possible, and the vertical height from the pump outlet to the valve be minimized;
g. Keep the motor free of water so as to prevent damping.

Disassembling

Disassembling sequence (referring to the structure diagram specified in the manual):
1. Loosen the connecting bolt between pump body 2 and pump cover 1 and remove the pump cover;
2. Loosen the impeller nut 9 (left-hand thread) and locking nut (left-hand thread) and dismantle the impeller 3;
3. Loosen the connecting bolt between pump body 2 and bearing pedestal 7 and remove the pump body 2;
4. Loosen the connecting bolt between the stationary ring gland of the seal and pump body 2 and dismantle the stationary ring gland as well as the stationery ring;
5. Unscrew the fastening screw of the seal and dismantle the rotating ring from the shaft sleeve.

The installation sequence is opposite to the dismantling sequence, notice:

1. After the impeller cap is assembled tightly, inspect the gap between impeller and pump shell, this gap is required to be around 2mm.
2. After the pump cover is installed properly, inspect the gap between the pump cover and impeller (inspect it from the exit to inner), this gap should be ensured to be around 2mm. When the pump is used for high-temperature medium, this gap is required to be around 2mm.
3. When the gap between the impeller and pump shell doesn't reach the requirement, adjust it by adding and reducing the gasket between impeller and shaft sleeve.
4. When the gap between the impeller and pump shell doesn't reach the requirement, adjust it by adding and reducing the gasket between the pump shell and pump cover.

Key points for usage of mechanical seal

1. Mechanical seals 152 and WB2 are required to adopt alumina ceramics stationery rings and filled PTFE rotating rings; the seals are only applicable to mediums without suspended hard particles. The newly-installed pipelines and fluid reservoirs should be carefully washed to prevent particle impurities entering the seal and invalidating the seal. Seal 169 is suitable for alkaline mediums, and WB2's silicon carbide rotating and stationery rings are applicable to mediums containing acid particles. Seals shall be selected according to the specific properties of medium.
2. The integrity of components and parts shall be ensured before installation and the damaged parts (if any) shall be replaced before installation.
3. It is important to mount the stationery rings on pump case and compress them tightly with the gland firstly; it should be particularly noted that the compressing force shall be applied uniformly so as to maintain the balance.
4. The rotating rings shall be nested in shaft sleeves and be installed together with the shaft sleeves on the main shaft; the compressing force of spring shall be suitably adjusted after the connection between pump case and bearing pedestal is fixed firmly. Manually rotate during the installation till the seal is felt with both a certain compressing force and a certain flexibility in rotation; if this proves not to be the case, the spring shall be adjusted continuously to realize such a compression degree, thus to guarantee the sealing effect.
5. Be careful when dismantling mechanical seals; it is not allowed to use a hammer or ironware to strike the seals since this may cause damage to stationery rings.

VII. Overall and installation dimensions

Equipment Foundation Drawing

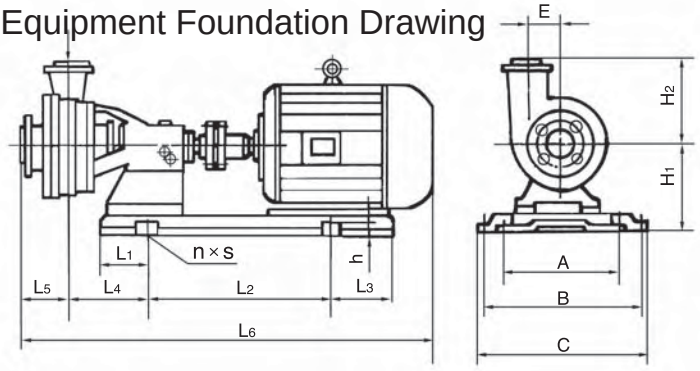
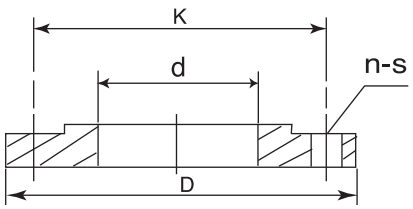


Diagram of Inlet and Outlet Flanges



Installation dimensions table

No.	Model	A	B	C	E	H_1	H_2	L_1	L_2	L_3	L_4	L_5	L_6	h	S × n
1-6	32FS	260	260	310	62	170	125	100	335	100	210	85	815	25	18 × 4
7-13	32FS	260	260	310	78	170	150	100	335	100	210	105	815	25	18 × 4
14-19	40FS	320	260	310	86	180	170	130	335	130	250	120	900	25	18 × 4
20-29	50FS	320	320	380	95	215	180	160	400	160	270	130	1070	25	20 × 4
30-36	65FS	320	320	380	105	212	195	160	400	160	270	127	1070	25	20 × 4
37-39	65FS	320	320	380	126	212	205	160	400	160	265	135	1070	25	20 × 4
40-44	65FS	320	370	430	126	212	205	160	520	160	265	135	1290	25	25 × 4
45-56	80FS	320	370	430	125	212	220	160	525	160	265	135	1290	35	25 × 4
57-78	100FS	415	460	540	183	285	225	188	705	190	320	145	1510	40	25 × 4
79-88	125FS	415	460	540	130	285	235	188	705	190	320	195	1610	45	30 × 4
89-91	150FS	420	586	650	-190	350	435	250	700	300	430	350	1868	45	30 × 4
97-100	150FS	420	586	650	-190	350	435	250	700	300	430	350	1868	50	25 × 4
92-96	150FS	420	586	-190	-190	350	435	250	840	188	430	350	1926	50	25 × 4
101-106	150FS	510	610	680	-225	370	450	250	935	250	468	365	1998	50	25 × 4
107-119	200FS	525	675	780	-235	405	475	250	1010	250	468	230	1980	60	25 × 4

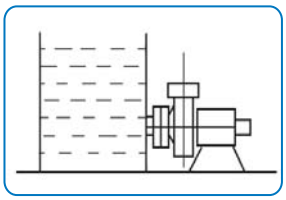
Flange Size Chart

d	25	32	40	50	65	80	100	125	150	200	250
D	115	140	150	165	185	200	220	250	285	340	395
K	85	100	110	125	145	160	180	210	240	295	350
n-s	4-Ø14	4-Ø18				8-Ø18			8-Ø22		12-Ø22

Standard: GB9116-88 PN 1.0MPa

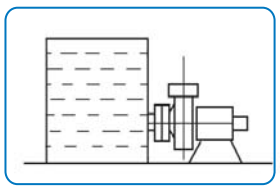
1. For pumps with inlet ≥150mm, the outlet position is the opposite of what is illustrated in the diagram.
2. Data on the L6 column is the total length of the pumps equipped with grade two motor, if grade four motor is equipped then the length should be reduced accordingly.

IX. Instruction for Typical Tank Conditions



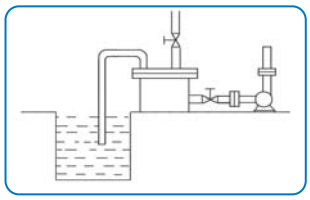
A. Head Tank Positive Pressure

Characteristics: the pump is positioned on the bottom of the tank and the medium is in positive pressure status, upon opening the inlet valve the liquid is flowed by itself into the pump. This is the most ideal installation type for the FS series pumps.



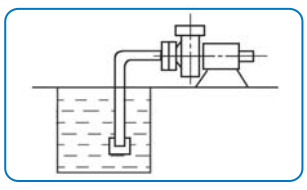
B. Head Tank Negative Pressure

Characteristics: the pump is positioned on the bottom of the tank and the medium is in negative pressure status in the closed tank. For the selection of pumps for this application, obtain precise data of the negative pressure in the tank and then contact us for deciding.



C. Lower Tank w/o Bottom Valve but with Siphon-Tank

Characteristics: the pump is positioned above the tank and a siphon-tank is installed nearing the inlet of the pump to help start it. Fill liquid fully in the siphon-tank before first use, and no need to do it later. Produce the siphon-tank with proper material and process according to the properties of the medium, the most important requirement of the siphon-tank is its tightness, no leakage allowed. Use the following formula to calculate the size required of the siphon-tank: $V=(3\sim5)\times\frac{\pi d^2}{4}\times L$ d: inlet diameter; L: total length of the inlet pipe; V: volume of the siphon-tank. The decide the diameter and height of the siphon-tank according to the volume and materials available.



D. Lower Tank with Bottom Valve

Characteristics: the pump is positioned above the tank and a bottom valve is installed on the bottom end of the inlet pipe. For every start, fill liquid fully into the pump, no empty running allowed.

Main Components

No.	Name	Material	No.	Name	Material
1	Cover	HT200/F46	2	Cap	A3/F46
3	Impeller	F46	4	Pump casing	HT200/F46
5	Stationary ring	Al_2O_3	6	Dynamic ring	PTFE
7	PTFE bellows	F4	8	Half clamping ring	1Cr18Ni9Ti
9	Sleeve	F46/A3			

Other Major Products


UHB-UF Series


UHB-ZK Series


UHB-UM Series


HFM Series


FSZ Series


UT Series


FZB Series


FS Series


FP Series


RGB Series


UHB-Z Series


IHF Series


UHB-ZK-III Series


FSB Series


YU/YUF/YU-J/YUF-J Series

A50 new type of anticorrosive and abrasion resistant pipeline)

Temperature resistance ≤120℃, abrasion resistance; applicable for conveying various corrosive slurry and clear liquid;

Production license
XK06-003-00176

Z-S® 宙斯

Yixing Zeus Pump Co., Ltd.

Add: Dapu Industry Concentration Zone, Dingshu Town, Yixing City, Jiangsu Province

Code: 214225