CORROSION RESISTANT

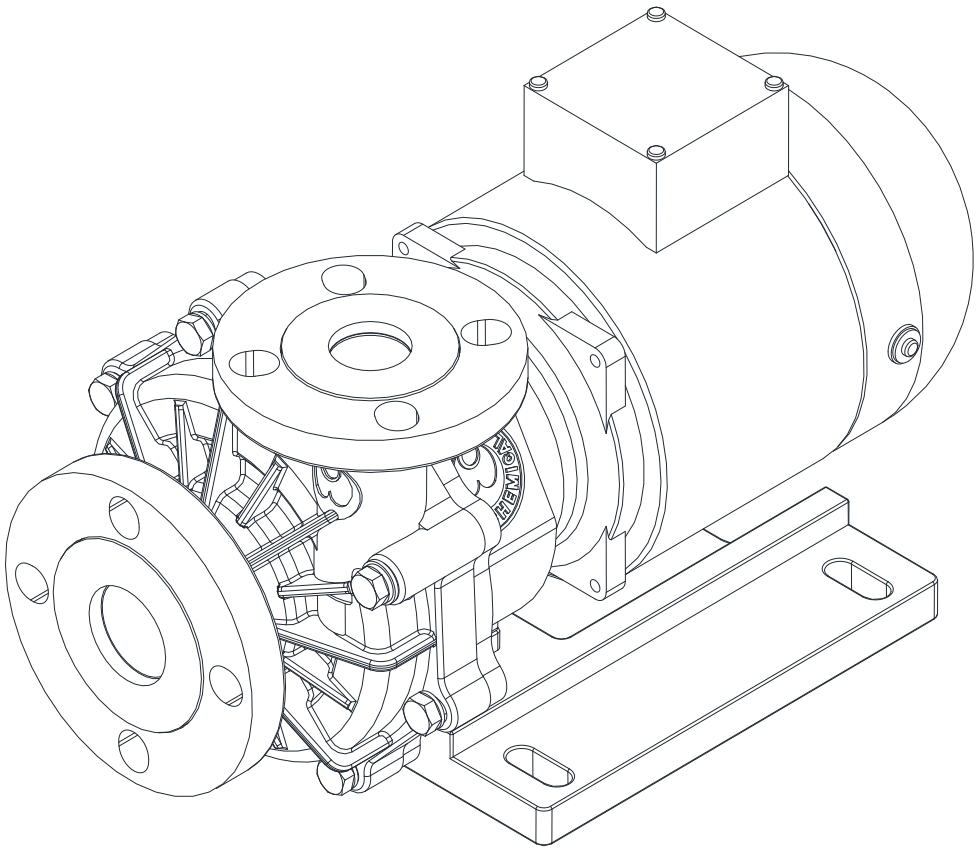
MAGNET DRIVE PUMP

Chemi-Free

YD-GS (F) series

INSTRUCTION MANUAL

Version: 180620



World Chemical Co.,Ltd.

Preface

Thank you very much for purchasing World Chemical's magnet drive pump "CHEMIFREE".
To effectively use CHEMIFREE for an extended period of time, it is necessary to operate correctly and maintain as described in the instruction manual.
Before using, read and understand the safety precautions outlined in this manual.
It is recommended to keep the instruction manual where it can easily be accessed.

Table of contents

Safety precaution (Observe at all times)

The following procedures are intended to protect you from personal injury and/or property damage.

- The following symbols classify the degree of danger and explain the damages that could occur when its contents are ignored, or the pump is used incorrectly.

Warning	Indicates that there is a possibility of "death or a serious injury"
Caution	Indicates that there is a possibility of "an injury or property damage"

- The following symbols classify and explain the rules to be observed.

	Indicates "Caution"
	Indicates "Prohibited"
	Indicates "A mandatory action"

⚠ WARNING

(1) **Using with dangerous liquids or atmosphere**

When transferring dangerous liquid using this pump, or using in potentially explosive atmospheres (only explosion-proof type), observe the equipment standards set forth by law and make sure to perform daily inspection to prevent liquid leakage. If the pump is operated under the abnormal conditions such as liquid leakage, it may cause a severe accident, such as a physical injury, an explosion, or fire. Always comply with instructions of the supplier or manufacturer of liquids.

(2) **Prohibited use of a damaged or modified pump**

Using a damaged or modified pump may cause a physical injury, electric shock, or product failure. Such usage will not be covered by our warranty.

(3) **Cautions on transporting and lifting the pump**

Use the hoist bolts when lifting a pump. If a hoist bolt is not available, use a belt sling to lift the pump with careful attention to the weight balance. Only a qualified person should perform this with a strong enough sling. The lightest pump weighs a minimum of 35lbs (16kg). Do not hand carry the pump as much as possible, as it may cause an accident.

(4) **Prohibited work with the power ON**

Do not perform inspection or disassembly of the pump or motor while the power is ON. Rotating parts can cause physical injury. You can also be subject to electric shock. In addition to confirming the main power is OFF, check the hand switch of the pump as an additional safety measure before performing any work.

(5) **Connection of a ground wire**

Using the motor without a ground wire connected may cause an electric shock. A qualified person must ground it according to the electric equipment technical standards and wiring regulations.

(6) **Protection of a power cord**

Pulling, tucking, or damaging a power cord or motor lead wire may damage cabling, causing fire or an electric shock. Install the terminal box cover in the designated position after wiring.

(7) **Installation of Ground Fault Interrupter**

If a ground-fault interrupter is not installed when using the pump, an electric shock can occur. Install a ground-fault interrupter or overcurrent protective device to prevent electric accidents or motor damage.

(8) **Cautions on removing the pump**

When removing the pump from pipes, close the suction and discharge pipe valves to ensure no spillage occurs. Directly touching chemical liquid may be hazardous, and may cause severe injuries. Wear protective equipment before starting work.

⚠ CAUTION

(1) **Prohibited use**

Do not use the pump other than as listed on the pump specifications or nameplate. Especially, check the motor's power supply specifications (phase, voltage, and frequency) before connecting. Incorrect usage may cause a physical injury or damage of the filter pump or peripheral devices.

(2) **Restriction on users**

Only knowledgeable experts of the pumps should handle and perform installation, wiring, operation, or maintenance.

(3) **Cautions on unpacking**

Check and confirm the proper side up when unpacking. When unpacking the crate, be careful with nails or wood chips to avoid any injury.

(4) **Ventilation**

If any object is placed around the pump, it can block ventilation, causing the motor to overheat. When handling poisonous or odorous liquid, install the pump where sufficient ventilation is available, due to risk of inhalation.

(5) **Repair and return**

To request repair of a damaged pump, contact our sales representatives or your distributor. When returning the pump using a carrier service or parcel delivery service, wash both inside and outside of the pump with clean water, make sure no liquid residue is left, and wrap it with a plastic bag.

(6) **Resin parts**

The pump consists of resin parts, so a strong impact may damage parts or lead to physical injury. Do not strike the pump with any objects or climb on it. Additionally, install a pipe support to prevent a load being directly applied to the pump.

(7) **Starting of the pump**

Make sure to check the rotational direction when starting the pump for the first time. Open the suction and discharge valves and ensure no liquid leakage near the pipe connection area. After air is released from the pipes and liquid is filled within the pump, briefly start to check the rotational direction. If the direction is reversed, in the three-phase power supply, switch two of the three cables. As a precaution, ensure the power supply is disconnected before performing any work.

(8) **Disposal of the pump**

When discarding used pumps, dispose of them as industrial waste following the applicable laws and regulations after removing accumulated chemicals.

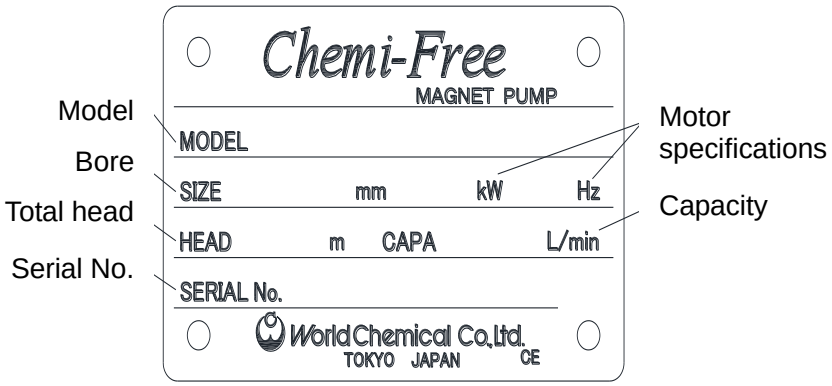
(9) **Protection measures for leakage**

In case of liquid leakage from the damaged pump or pipe, take appropriate safety and protection measures.

Unpacking checklist

Check for the following while unpacking and contact your supplier if you have any questions.

1. The model, total head, capacity, motor specifications, voltage specifications, etc., are the same as ordered.
2. Relevant accessories are included.
3. Bolts or screws have not loosened and no damage has occurred during transportation.



Model description

YD – 2502 GS 3 – GP – C D 6 0

(1) (2) (3) (4) (5) (6) (7) (8)

(1) Bore / Motor Output

Model	Suction Bore	Discharge Bore	Motor Output
2500GS (F)1	25A	25A	0.4Kw, 3/4HP
2501GS (F)1(3)	25A	25A	0.75kW, 1HP
2502GS (F)1(3)	25A	25A	1.5kW, 2HP
2503GS (F)1(3)	25A	25A	2.2kW, 3HP
4000GS (F)1	40A	40A	0.4kW, 3/4HP
4001GS (F)1(3)	40A	40A	0.75kW, 1HP
4002GS (F)1(3)	50A	40A	1.5kW, 2HP
4003GS (F)1(3)	50A	40A	2.2kW, 3HP
4005GS (F)1(3)	50A	40A	3.7kW, 5HP
5005GS1(3)	65A	50A	3.7kW, 5HP

(2) Model

GS / GSF

(3) Motor type

1: IE1 (Without Motor, With non-standard Motor) 3:IE3 (With IE3 Motor “High efficiency Motor”)

(4) Main material

GP: GFR PP CF: CFR ETFE

(5) Bearing material

C: High density carbon A: Alumina ceramics

R: CFR PTFE K: SiC (Only SiC bearing is available for YD-5005GS1(3).)

(6) O-ring material

E: EPDM D: FPM (Dai-el) T: Special material

(7) Frequency

5: 50Hz 6: 60Hz

(8) Limit of specific gravity

Model	250*GS series	250*GSF series	400*GS series	400*GSF series	5005GS series
Specific Gravity	0: 1.0	2: 1.2	1: 1.05/1.1	2: 1.2	1: 1.1
	3: 1.3	5: 1.5/1.6	3: 1.3	5: 1.5	3: 1.3
	5: 1.5	9: 1.9	5: 1.5	9: 1.9	5: 1.5

YD-250*GS

Specifications

Model			2500GS1	2501GS3	2502GS3	2503GS3
Bore (Suction x Discharge)			25A (G1) x 25A(G1)			
Motor output			0.4kW	0.75kW	1.5kW	2.2kW
Standard specifications (mL/min)	50Hz	S.G.1.0	14 – 50	21 - 50	-	-
		S.G.1.3	10 – 50	17 - 50	25.5 - 50	-
		S.G.1.5	9 – 50	15 - 50	24 - 50	-
	60Hz	S.G.1.0	14 – 50	21.5 - 50	34 - 50	-
		S.G.1.1	-	-	-	37 – 50
		S.G.1.3	10.5 – 50	17 - 50	27 - 50	34 – 50
		S.G.1.5	9 – 50	15 - 50	25 - 50	31 – 50
Weight (kg/lbs.)			**19.5/ 43**	**21.5/ 47**	**26.5/ 58**	**28.5/ 62**
Max. TDH & Capacity (ft./gpm)	**60Hz**	**S.G.1.0**	**53.5 / 45**	**76.8 / 26.4**	**118 / 39.6**	**-**
		S.G.1.1	**-**	**-**	**-**	**126.0 / 42.3**
		S.G.1.3	**39.7 / 39.6**	**63.00 / 26.4**	**95.1 / 39.6**	**116.8 / 42.3**
		S.G.1.5	**35.8 / 39.6**	**56.1 / 26.4**	**89.2 / 39.6**	**107.3 / 42.3**

- The nameplate is labeled Max TDH and capacity for U.S.A.
- The weight is based on the pump with a Japan standard motor.

YD-250*GSF series

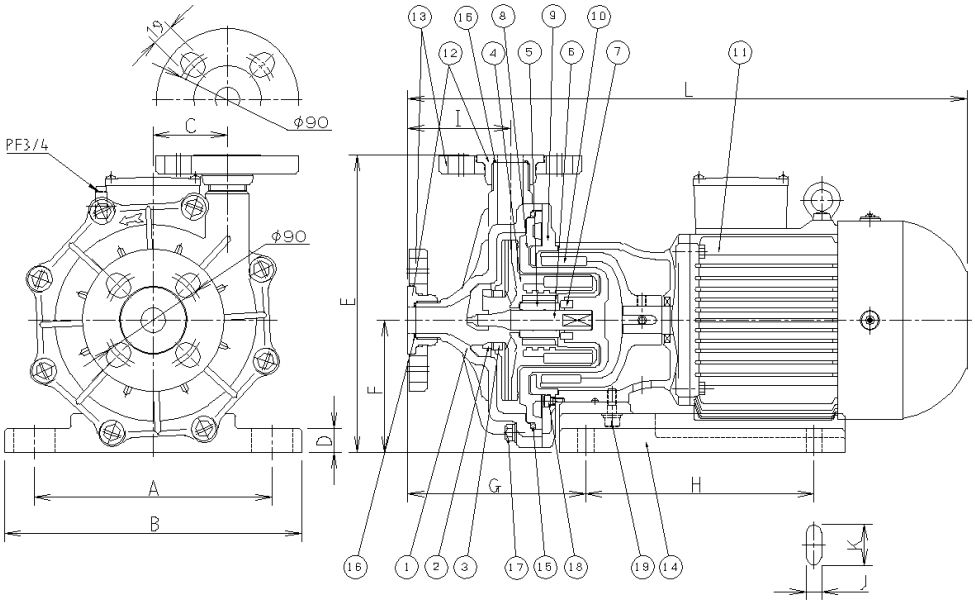
Specifications

Model			2500GSF1	2501GSF3	2502GSF3	2503GSF3
Bore (Suction x Discharge)			25A (G1) x 25A(G1)			
Motor output			0.4kW=3/4HP	0.75kW=1HP	1.5kW=2HP	2.2kW=3HP
Standard specifications (mL/min)	50Hz	S.G.1.2	9 – 50	16.5 - 50	24 – 50	-
		S.G.1.5	7 – 50	14 - 50	22 - 50	-
		S.G.1.9	5.5 – 50	11.5 - 50	18 - 50	23.5 – 50
	60Hz	S.G.1.2	9 – 50	15 - 50	26 - 50	33 – 50
		S.G.1.5	6.5 – 50	-	22 - 50	28 – 50
		S.G.1.6	-	11 - 50	-	-
		S.G.1.9	-	-	18 - 50	25.5 - 50
Weight (kg/lbs.)			20.5/45	22.5/ 49	28/ 61	30/ 66
Max. TDH & Capacity	60Hz	S.G.1.2	37.7 / 37	58.7 / 43.6	96 / 59.4	119.4 / 60.8
		S.G.1.5	30 / 33	-	83.3 / 54. 2	103.4 / 60.8

(ft./gpm)		S.G.1.6	-	45 / 41	-	-
		S.G.1.9	-	-	70 / 49	91.5 / 56.8

- The nameplate is labeled Max TDH and capacity for U.S.A.
- The weight is based on the pump with a Japan standard motor.

Outline dimension / structure



Dimension of YD-250*GS (F) series

	A	B	C	D	E	F	G	H	I	J	K	L
2500GS(F)1	130	160	65	18	260	115	173	130	90	Φ12		431
2501GS(F)3	130	160	65	18	260	115	173	130	90	Φ12		457
2502/2503GS(F)3	208	260	65	21	261	116	156	200	90	14	36	490

Parts name & material

No.	Parts name	Qty	Material		Remark
			YD-GS	YD-GSF	
1	Front casing	1	GFR PP	CFR ETFE	
2	Liner ring	1	Alumina Ceramics + GFR PPS	Alumina Ceramics + CFR ETFE	Integrated molding
3	Mouth ring	1	CFR PTFE		
4	Impeller	1	GFR PP + PP + Magnet	CFR ETFE + Magnet	Integrated molding
5	Bearing	1	CFR PTFE/Carbon/Alumina Ceramics/SiC *1		+GFRPPS/+ CFRETFE
6	Shaft	1	Alumina Ceramics		
7	Rear thrust ring	1	Alumina Ceramics		
8	Rear casing	1	GFR PP	CFR ETFE	
9	Rear casing support	1	FC200		
10	Outer magnet	1	FCD450– 10 + Magnet		
11	Motor with bracket	1	FC200 + Aluminum Frame Motor		Standard motor
12	Lap joint	2	GFR PP	CFR ETFE	
13	Flange	2	GFR PP		JIS10K

14	Base	1	GFR PP	GFR PP (Black)	
15	O-ring	1	EPDM/FPM (G-180)		FPM: Dai-el
16	O-ring	2	EPDM/FPM (AS568-120)		FPM: Dai-el
17	Hexagonal bolts	8	SUS304 (M10 x 35)		With SW, W
18	Hex. socket head cap bolts	6	SUS304 (M6 x 12)		
19	Hex. socket head cap bolts	4	SUS304 (M8 x 25)		With SW, W

*1: The SiC bearing is only +ETFE.

YD-400*GS

Specifications

Model			4000GS1	4001GS3	4002GS3	4003GS3	4005GS3
Bore (Suction x Discharge)			40A (1.5”) x 40A (1.5”)		50A (2.0”) x 40A (1.5”)		
Motor output			0.4kW (1/2)	0.75kw (1)	1.5kW (2)	2.2kW (3)	3.7kW (5)
Standard specifications (mL/min)	50Hz	S.G.1.05	11 - 100	15 - 150	-	-	-
		S.G.1.1	-	-	19 - 200	23 - 200	-
		S.G.1.3	9 - 100	12 - 150	17 - 200	21 - 200	-
		S.G.1.4	-	-	-	-	25 – 200
		S.G.1.5	7.5 - 100	10.5 - 150	14.5 - 200	19.5 - 200	-
	60Hz	S.G.1.05	11 - 100	15 - 150	-	-	-
		S.G.1.1	-	-	19 - 200	25 - 200	34 – 200
		S.G.1.3	7.5 - 100	12 - 150	16 - 200	24 - 200	31 – 200
		S.G.1.5	-	10 - 150	14.5 - 200	20.5 - 200	28 – 200
Weight: kg/ lbs.			**16.5/36**	**19.5/ 43**	**25.5/56**	**27.5/60**	**41.5/91**
Max TDH & Capacity (ft./gpm)	**60Hz**	**S.G.1.05**	**48.8 / 52.8**	**57.4 / 77.9**	**-**	**-**	**-**
		S.G.1.1	**-**	**-**	**84.3 / 100.4**	**104.3/118.8**	**129.6/118.9**
		S.G.1.3	**36.1 / 47.6**	**52.5 / 68.7**	**75.1 / 92.5**	**96.5 / 113.6**	**120.1/118.9**
		S.G.1.5	**-**	**46.6 / 63.4**	**70.2 / 87.2**	**83.7 / 116.2**	**108.6/118.9**

- The nameplate is labeled Max TDH and capacity for U.S.A.
- The weight is based on the pump with a Japan standard motor.

YD-400*GSF

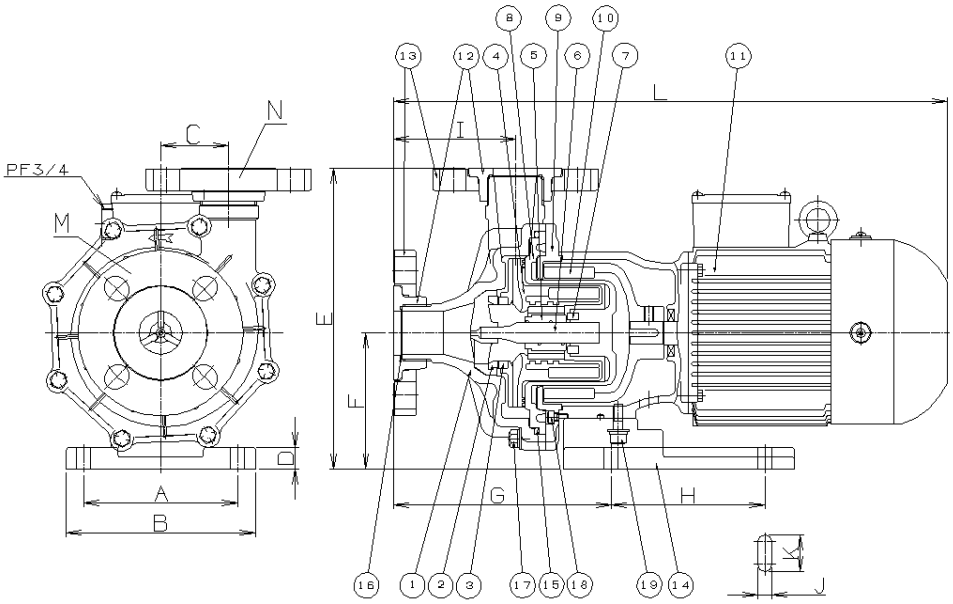
Specifications

Model			4000GSF1	4001GSF3	4002GSF3	4003GSF3	4005GSF3
Bore (Suction x Discharge)			40A (1.5”) x 40A (1.5”)		50A (2.0”) x 40A (1.5”)		
Motor output			0.4kW (1/2)	0.75kw (1)	1.5kW (2)	2.2kW (3)	3.7kW (5)
Standard specifications (mL/min)	50Hz	S.G.1.2	8.5 - 100	12 - 150	18 - 200	21 - 200	-
		S.G.1.3	-	-	-	-	25 – 200
		S.G.1.5	7 - 100	9 - 150	15 - 200	19 - 200	-
		S.G.1.9	5.5 - 100	8 - 150	12.5 - 200	15.5 - 200	-
	60Hz	S.G.1.2	9 - 100	11.5 - 150	17.5 - 200	22.5 - 200	30 - 200
		S.G.1.5	6 - 100	9 - 150	14 - 200	19.5 - 200	27.5 – 200
		S.G.1.9	-	9 - 150	10.5 - 200	15 - 200	23 - 200
Weight: kg/ lbs.			**17.5/ 38**	**20.5/ 45**	**27/ 59**	**29/ 63**	**43/ 94**

Max TDH & Capacity (ft./gpm)	**60Hz**	**S.G.1.2**	**35.4 / 47.6**	**54.1 / 66.1**	**78.4 / 87.2**	**93.8 / 105.7**	**114.8/111.0**
		S.G.1.5	**31.2 / 42.3**	**44.3 / 60.8**	**68.6 / 79.3**	**85.3 / 95.1**	**107.0/105.7**
		S.G.1.9	**-**	**38.4 / 55.5**	**55.8 / 71.3**	**70.5 / 84.5**	**92.9 / 105.7**

- The nameplate is labeled Max TDH and capacity for U.S.A.
- The weight is based on the pump with a Japan standard motor.

Outline dimension / structure



Dimension of YD-400*GS (F) series

	A	B	C	D	E	F	G	H	I	J	K	L	M/N
4000GS(F)1	110	140	51	18	216	95	150	98	87	12	18	423	40A/40A
4001GS(F)3	130	160	57.5	18	254	115	184	130	103	Φ12		468	40A/40A
4002/4003GS(F)3	208	260	65	21	261	116	156	200	89	14	36	490	50A/40A
4005GS(F)3	230	260	65	20	280	135	156	261	89	36	14	531	50A/40A

Parts name & material

No.	Parts name	Qty	Material		Remarks
			YD-GS	YD-GSF	
1	Front casing	1	GFR PP	CFR ETFE	
2	Liner ring	1	Alumina Ceramics + GFR PPS	Alumina Ceramics + CFR ETFE	Integrated molding
3	Mouth ring	1	CFR PTFE		
4	Impeller	1	GFR PP + PP + Magnet	CFR ETFE + Magnet	Integrated molding
5	Bearing	1	CFR PTFE/Carbon/Alumina Ceramics/SiC *1		+GFRPPS/+ CFR ETFE
6	Shaft	1	Alumina Ceramics		
7	Rear thrust ring	1	Alumina Ceramics		
8	Rear casing	1	GFR PP	CFR ETFE	
9	Rear casing support	1	FC200		
10	Outer magnet	1	FCD450– 10 + Magnet		
11	Motor with bracket	1	FC200 + Aluminum Frame Motor		Standard motor
12	Lap joint	2	GFR PP	CFR ETFE	

13	Flange	2	GFR PP	GFR PP (Black)	JIS10K
14	Base	1	GFR PP / FC200		4005GS(F):FC200
15	O-ring	1	EPDM/FPM		FPM: Dai-el
16	O-ring	2	EPDM/FPM		FPM: Dai-el
17	Hexagonal bolts	6/8	SUS304 (400.401:M8 / Other:M10)		With SW, W
18	Hex. socket head cap bolts	6	SUS304 (M6)		
19	Hex. socket head cap bolts	4	SUS304 (M8)		With SW, W

*1: The SiC bearing is only +ETFE.

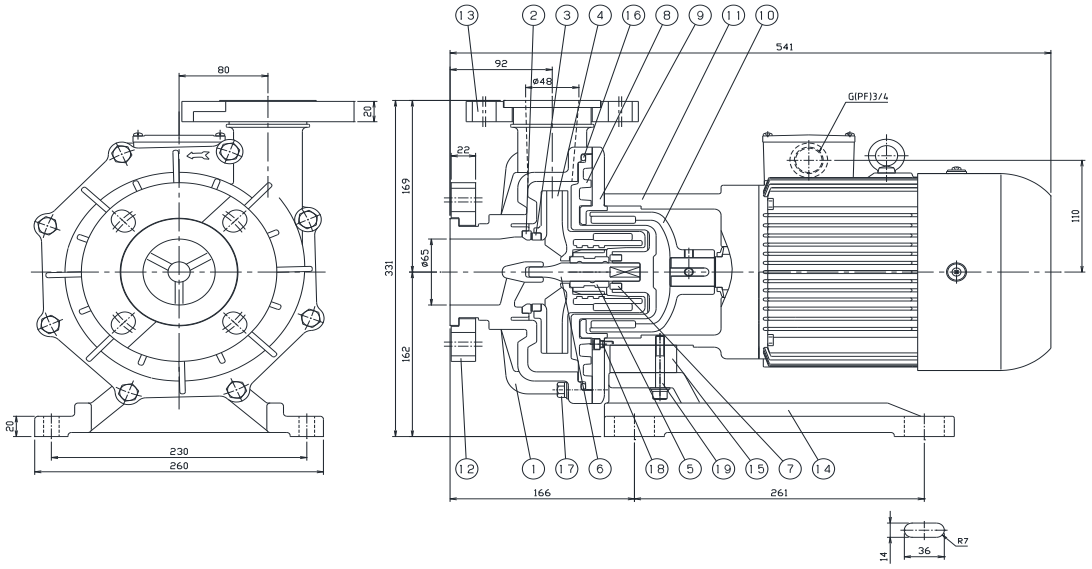
YD-5005GS

Specifications

Model			5005GS1(3)
Bore (Suction x Discharge)			65A x 50A
Motor output			3.7Kw
Standard specifications (m_L/min)	50Hz	S.G.1.1	20 – 500
		S.G.1.3	18 – 500
		S.G.1.5	15 – 500
	60Hz	S.G.1.1	20 – 500
		S.G.1.3	18 – 500
		S.G.1.5	15 – 500
Weight: kg/ lbs.			45/ 99

- The nameplate is labeled Max TDH and capacity for U.S.A.
- The weight is based on the pump with a Japan standard motor.

Outline dimension / structure



Parts name & material

No.	Part name	Qty	Material	No.	Part name	Qty	Material
1	Front casing	1	GFR PP	11	Motor with bracket	1	Aluminum frame, etc
2	Liner ring	1	Alumina ceramics	12	Separated flange 65A	2	GFR PP
3	Mouth ring	1	CFR PTFE	13	Separated flange 50A	2	GFR PP
4	Impeller	1	GFR PP+PP+Magnet	14	Pump base	1	FC200

5	Bearing	1	CFR ETFE+SiC *2	15	Base biscuit	1	FC200
6	Shaft	1	Alumina ceramics	16	O-ring	1	EPDM/FPM
7	Rear thrust ring	1	Alumina ceramics	17	Hexagonal bolts	8	SUS304 (M10)
8	Rear casing	1	GFR PP	18	Hex. socket head cap bolts	6	SUS304(M6)
9	Rear casing support	1	FC200	19	Hex. socket head cap bolts	4	SUS304(M8)
10	Outer magnet	1	FCD450-10+Magnet				

*2: The bearing material is only CFR ETFE+SiC.

Handling instructions

Normal prohibited usage should include avoiding dry running or reverse rotation. However, additional attention should be paid since the magnetic force of the pump is powerful.

1) Do not handle this magnet pump if you wear a life function maintenance device such as a cardiac pacemaker or any other electric device. The magnet inside the pump is several times stronger than ordinary magnets that are used every day.
2) Do not place your hands between the magnets. If there are ferrous items such as knives, scissors, or heavy iron metal objects near the magnet, the magnets will be attracted instantly and may cause injury. It may also crack the plastic material surrounding the magnet due to the impact.
3) Do not place products that can be easily de-magnetized, such as floppy disks, computer memory, and magnetic tapes near the pump.

✧ **Prohibited on conventional magnet pumps**

1 Dry Running

Dry running generates heat from friction caused by contact of the parts at the shaft and bearing. This can thermally deform the resin parts around the shaft and bearing. As a result, the impeller will eccentrically rotate, and the parts of the pump will be damaged due to abnormal operation caused from it.

- Running the pump with the suction valve closed with no priming liquid will cause dry running.

2 Liquid with slurry

Do not use the magnet drive pump for liquid with slurry in general. Even if transferring a slurry liquid with a low concentration by a pump, the pump will be damaged and the parts will wear faster, resulting in a shorter life.

- This occurs when the pipe is installed to pump up from the bottom of the tank.
  (Be sure to consult with us in advance when using it for transferring slurry liquid.)

3 Cavitation*

Continuing to operate the pump with cavitation may cause vibration of the pump, deterioration of basic performance, or damage to the inner surface of the casing.

Possible causes are a long suction pipe, thin pipe, many bent parts, high temperature of liquid, strainer clogging, etc.

*Cavitation is a phenomenon caused when pressures inside a liquid becomes low locally, generating air bubbles.

(The impact when air bubbles break creates noise and vibration. It also causes surface erosion

and performance degradation.)

4 Erosion

The product is mainly made of resin material such as GFR PP or CFR ETFE. Consult with us regarding corrosion resistance to chemicals before selecting a model to purchase. The pump life may be shortened depending on the liquid type and temperature. Be sure to consult with us when you change the liquid to be transferred or usage conditions.

Installing / Piping precautions

1 Precaution to take during installation

(1) If a large amount of air enters in the pump during operation, it will not pump properly and causes failure.
- Set the height of 50cm (20 inches) or higher from the suction inlet to the liquid surface in the tank.
- Install piping in the most direct path to avoid air collection in the suction pipe.
- Install the suction pipe toward the pump with an upward slope of 1/100 or more.
- Use a suction pipe with a bore larger than that of the pump. If the bore is different, use an eccentric reducer to make the upper part level.

(2) Install a strainer at the suction inlet to prevent foreign objects from entering the pipe. Clean the strainer periodically to remove clogging to minimize loss resistance.

(3) It is recommended to install check valves on the discharge pipe to prevent “water hammer”. Below that, install a bypass pipe for air exhaust when the below conditions occur.
- The discharge pipe is long, or the capacity exceeds 10m (32 ft) or more.
- The tip of the discharge pipe is higher than 9m (29 ft) above the liquid level in the suction tank.
- Two or more pumps are used in parallel.

(4) Provide bent parts or expansion joints on the pipe to prevent pump deformation and liquid leakage caused by thermal expansion of pipe.

(5) The main parts inside the pump are made of resin. Therefore, handle with care to avoid any impact.

(6) Arrange the pipe flange and pump flange parallel and do not overtighten the bolts.
Bolt: M16, Recommended tightening torque: 19.6N・m or 200kgf・cm

(7) When assembling to the pipe, match the dimensions with the pump. If they are not assembled properly, the pump casing may be damaged.

(8) Do not turn the pipe after fixing the pipe to the pump flange.

(9) When using the pump outdoors, use the water proof cable clamp at the service entrance to prevent rainwater from entering the terminal box.

2 Do not place load on pipe

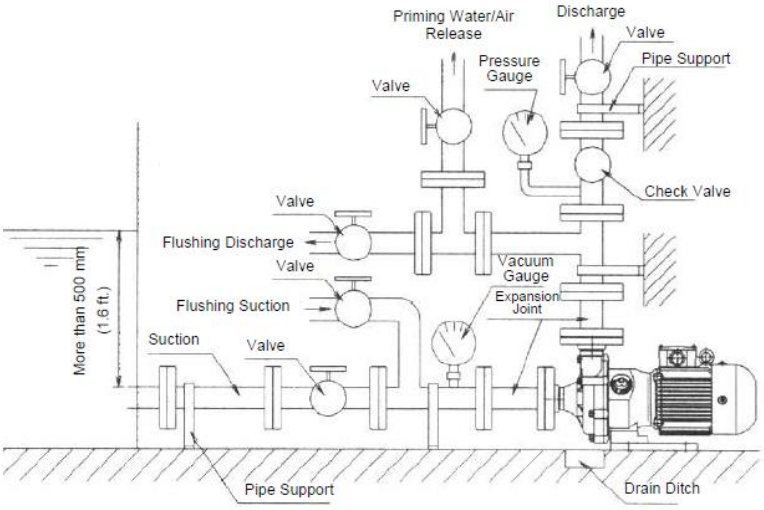
(1) Install the pipe support to support the piping load completely.

(2) When using with high temperature liquid (104F/40C degrees and higher), install bent parts or expansion joints in the pipe so that the load will not be applied to the pump caused from thermal expansion of the pipe.

3 Drain Ditch

(1) In case of liquid spillage, arrange a drain ditch to flow into the wastewater pit.
(2) If a drain ditch cannot be arranged, provide a drain pan.

Recommended Example of Pipe Layout



Operating precautions

1 Check before operation

(1) Clean well inside the pipes and tanks. If dust or foreign objects get inside the pump, not only the performance will decrease, but it can cause a failure.
(2) Make sure that the flange bolts are securely tightened. Loose bolts may cause liquid leakage, which may cause personal injury and/or damage to other equipment.
(3) Open the suction and discharge valves to pour priming liquid, and release air. Make sure there is no liquid leakage once again.
(4) Check the rotational direction of the motor.
If the direction is reversed, in the three-phase power supply, switch two of the three cables. It should be a clockwise rotation when viewed from the motor fan.

2 Dry running prohibited

Sliding parts are cooled by self-circulation with pumped liquid. Never operate if there is no liquid in the pump, as the heat generated may damage the pump. If dry running ever occurs, do no pour liquid suddenly. Wait more than one hour before operation. Sudden flow of liquid into the pump may rapidly cool the heated sliding parts, which may cause irreparable damage.

3 Accidental liquid seal operation (Both suction & discharge valves are closed.)

If the pump is operated with the suction & discharge valves closed, the inside is subjected to high pressure and temperature. Disassembling the pump in this condition is dangerous as steam and hot water will be spewed. Make sure that the temperature has dropped sufficiently before proceeding.
If inside the pump is damaged from liquid seal operation, the entire pump may need to be replaced.

4 Temperature range of the liquid used

Vapor pressure, viscosity, and corrosiveness will change depending on the temperature of the liquid used. With that in mind, use the pump under conditions that allow for a sufficient margin.

- Temperature range of the liquid used: GS: 32-158F/ 0 – 70C degrees
  GSF: 32-176F/ 0 – 80C degrees

5 Change of the specific gravity or viscosity of the liquid used
When the specific gravity or viscosity of the liquid used changes significantly, the pump performance capacity, efficiency, and shaft power will change depending on the properties of the pumped liquid. With those characteristics in mind, use the pump under conditions that allow for a sufficient margin.

6 Limit of the pump pressure resistance
Make sure that the discharge pressure of the pump does not exceed the pressure limit in the table below.

Model	2500GS(F)1	2501GS(F)1(3)	2502GS(F)1(3)	2503GS(F)1(3)		
Limit (MPa)	→	→	→	0.6		
	4000GS(F)1	4001GS(F)1(3)	4002GS(F)1(3)	4003GS(F)1(3)	4005GS(F)1(3)	5005GS1(3)
	0.23	0.32	→	→	0.6	0.4

7 Change of usage conditions
The pump is manufactured based on the specifications that we discussed before the purchase. However, if you need to change the usage conditions, consult with us.

8 Frequent cycling
Frequent cycling of a pump may shorten the pump lifespan. Turn on the pump less than six times in an hour.

9 Minimum flow rate
Operate the pump at the capacity higher than the following figure.

Model	**Minimum flow rate**
2500GS(F)1, 2501GS(F)1(3), 4000GS(F)1, 4001GS(F)1(3)	10 L/min (2.6gpm)
2502GS(F)1(3), 2503GS(F)1(3), 4002GS(F)1(3), 4003GS(F)1(3), 4005GS(F)1(3), 5005GS1(3)	20 L/min (5.2gpm)

Maintenance / Consumable parts

1 Daily check
(1) Check that the pump is operating smoothly without vibration or abnormal noise.
(2) Compare the current value during operation with the rated current value and check that the operating load is normal. Also, make sure that the discharge pressure, capacity, and current value are not abnormal compared to previous measurements.
(3) Check the liquid level in the suction tank. (The liquid level should be 50cm (20 inches) or higher from the pump suction inlet.)

2 Periodical check
(1) Periodically conduct overhaul for efficient operation.
(2) When changing the installation location or carrying for repair, drain and wash the pump with water thoroughly to ensure safety.

3 Consumable parts check

Check the following consumable parts periodically and replace them if necessary.

(1) Mouth ring (No. 3 on P7, 9,10)
- Check the degree of wear of the mouth ring from the impeller side. Replace if the groove on the mouth ring is no longer present.

(2) Bearing (No.5)
- Check for visible cracks or damage.
- Check there is not a large rattle between the shaft.

(3) Rear thrust ring (No.7)
- Check for cracks or damage.

(4) Shaft (No.6)
- Check for cracks or damage.

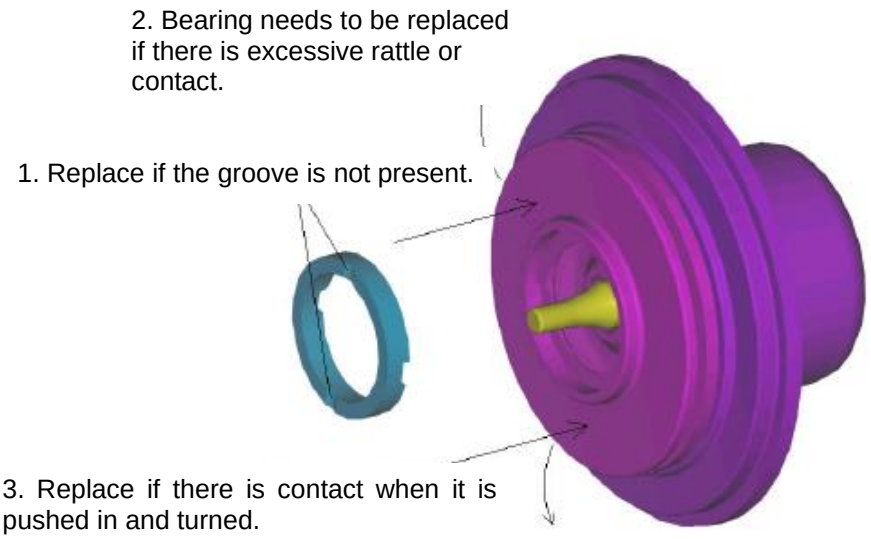
(5) Liner ring (No. 2)
- Check for cracks or damage on Alumina ceramics.

(6) Impeller (No. 4)
- Replace if there are any signs of wear or corrosion around the impeller.

(7) Rear casing (No. 8)
- Check for signs of wear or corrosion in the rear casing, and check for signs of wear and cracks on the back side.

(8) Front casing (No. 1)
- Replace if there are any signs of wear or corrosion in the front casing.

(9) O-ring (No. 15, 16)
- Replace if the rubber is hardened, its elasticity is lost, and/or cracking occurs due to deterioration or swelling.



4 Replacing consumable parts (Replace these parts as a complete set.)

Replace a set part listed below as a whole when any component is damaged.

(1) Front casing set
- Front casing + Liner ring + Lap joint + Flange + O-ring

(2) Impeller set
- Impeller + Mouth ring + Bearing

(3) Rear casing set

- Rear casing + Rear thrust ring + Shaft

Disassembly & Assembly

Since the magnetic force of the pump is powerful, be careful when handling during disassembly and assembly. Make sure to completely close the suction and discharge valves when disassembling and assembling.

1. Disassembly
   (1) Drain the liquid in the pump and wash the inside of the pump thoroughly.
   (2) Loosen and remove hex. bolts in the front casing to remove from the rear casing support.
   (3) Pull out the impeller forward. Handle with care to not scratch each part.
   Be careful not to get your fingers caught as it will try to return by magnetic force.
   (4) Put a sharp object such as a scraper between the rear casing and rear casing support, and lift it lightly to remove it forward.
   (5) When removing the flange from the front casing, tap the parts gently with a plastic hammer and remove it from the lap joint.

2. Assembly
   Assembly occurs in the reverse order of disassembly. Clean the sliding parts and O-rings thoroughly not to have dust or scratches. Also tighten the bolts evenly.
   The bolt tightening torque is as follows;

Model	Tightening torque
4000GS(F)1, 4001GS(F)1(3)	7.5N・m
2501GS(F)1, 2501GS(F)1(3), 2502GS(F)1(3) 2503GS(F)1(3), 4002GS(F)1(3), 4003GS(F)1(3) 4005GS(F)1(3), 5005GS1(3)	10.0N・m

NOTE:

(1) Since the magnetic force is extremely powerful, use plastic or wooden spacers not to injure your fingers.
(2) When re-assembling the pump after disassembly, it is always recommended to replace with new O-rings. If installed with deformed O-rings, liquid leakage can occur.
(3) After assembly is completed, remove the motor fan cover and turn the motor fan by hand to check that the impeller rotates smoothly.

Assembling the pump with standard off-the-shelf motor

(1) Put the standard off-the-shelf motor on the workbench with the motor shaft-side up. The opposite side of terminal box should be located right in front of you.

(1)' Only for 5HP
Insert and tighten the bolts to secure the bracket firmly to the motor mounting plate.
Bolts: CAP M10x20 4pcs

(2) Insert and tighten the bolts with washers to secure the bracket (with mounting plate for 5HP) to the motor. The base installation side of the bracket should be located at the opposite side of the terminal box.

Bolts and washers:
4000GS(F) --- Hex. bolts M8x25 4pcs
Spring washers M8 4pcs

4001-4003GS(F) --- Hex. bolts M10x25 4pcs
2500-2503GE(F) --- Spring washers M10 4pcs

4005,5005GS(F) --- Hex. bolts M12x30 4pcs
Spring washers M12 4pcs

(3) Insert the motor shaft into the hole of the outer magnet until the upper face of the outer magnet has located at 13mm (0.05 inches) above the upper surface of bracket.

Insert two bolts into the fixing holes of outer magnet with hex. wrench from the hole (see the arrow) of the bracket. Tighten them to secure the outer magnet to the motor shaft.

(4) Tighten the bolts to secure the base to the bracket.

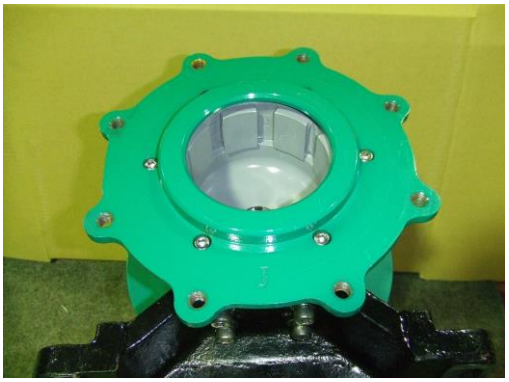
Bolts:
4000-4003GS(F) --- CAP M8x25(W/SW) 4sets
2500-2503GS(F)

4005GS(F) --- CAP M8x30 (W/SW) 4sets

5005GS --- CAP M8x45 (W/SW) 4sets

(5) Tighten the bolts to secure the rear casing support to the bracket which the marked “S” is the downside (side of the base).

Bolts:
CAP M6x12 6pcs



(6) Install the rear casing into the opening of the rear casing support. Carefully insert the impeller set into the rear casing along the pump shaft. There is a strong magnetic attraction between the impeller and the outer magnet. Do not pinch your fingers.
Install the O-ring to the rear casing.

O-rings:
4000GS(F) --- P-140
4001GS(F) --- G-160
4002-4005GS(F) --- G-180
2500-2503GS(F)
5005GS --- G-220

(7) Tighten the bolts to secure the casing to the rear casing support.

For front casing
4000GS(F) --- Hex. bolts M8×35 (W/SW) 4sets
Hex. bolts M8×60 (W/SW) 2sets

401GS(F) --- Hex. bolts M8×35 (W/SW) 6sets
Hex. bolts M8×60 (W/SW) 2sets

4002-4005GS(F) --- Hex. bolts M8×35 (W/SW) 6sets
2500-2503GS(F) --- Hex. bolts M8×60 (W/SW) 2sets

5005GS --- Hex. bolts M10×35 (W/SW) 6sets

Hex. bolts M10×80 (W/SW) 2sets

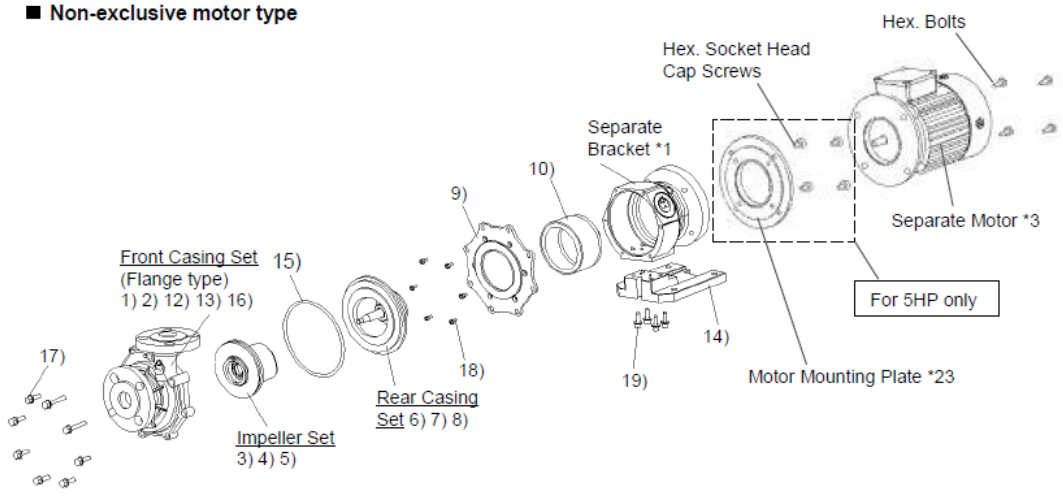
Assembling the pump delivered without separate motor

(1) Remove the hex. bolts (6 or 8 pcs) at the front side and the front casing.
(2) Remove the pump base from the bracket.
(3) Fix the bracket to the motor (see (3) on P17), and insert the motor shaft into the outer magnet. (see (4) on P18)
(4) Assemble the rest parts in the same procedure of “2-3. Assembling the pump with standard off-the-shelf motor” from (5) on P18.

The following is the NEMA frame No. and the motor bolt size for the NEMA motor used in the U.S.A.

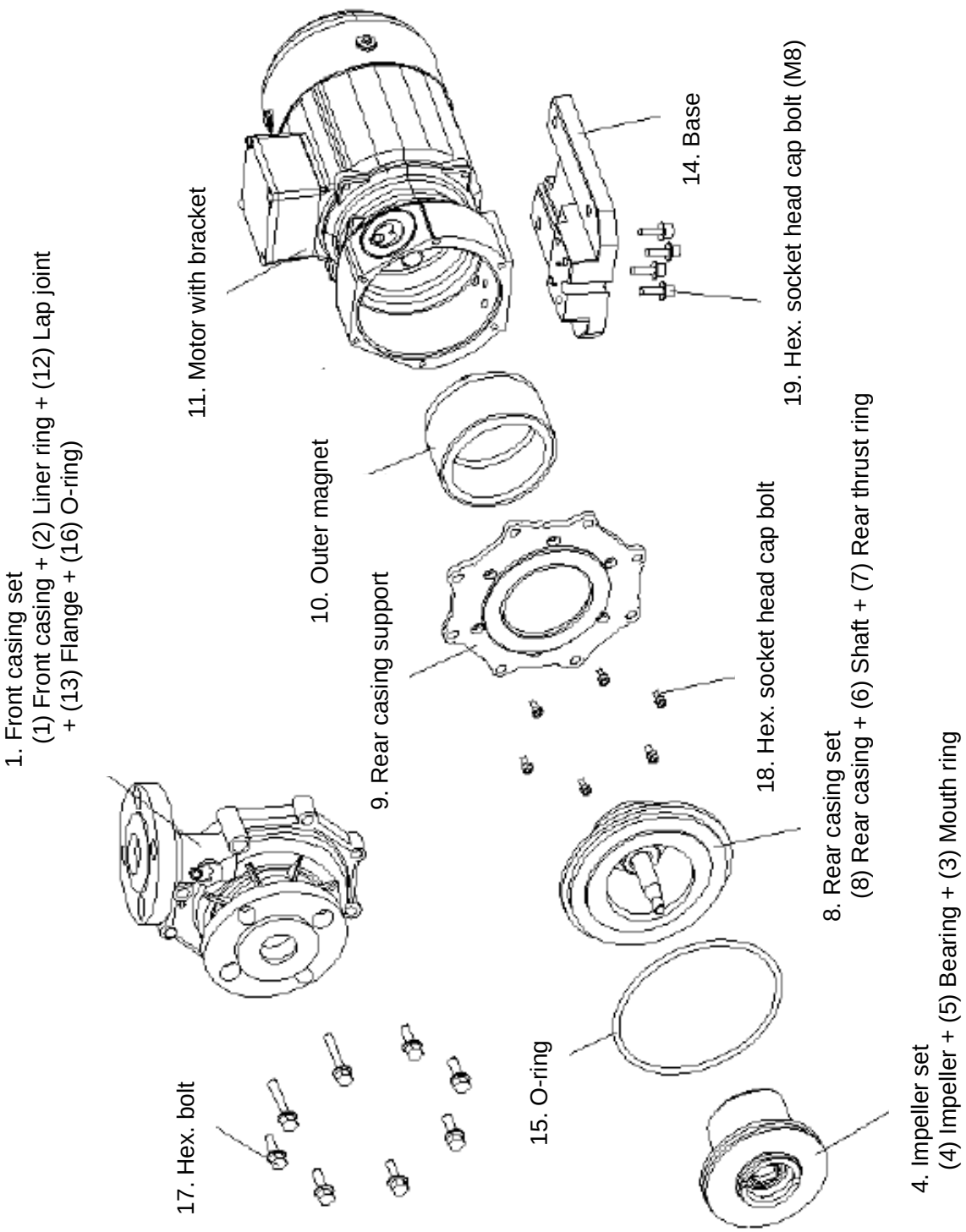
Model	HP	NEMA Frame	Motor Bolt Size	Q'ty
2500/400GS(F)	4-Mar	56C	3/8" x 1.5"	4
2510/4001GS(F)	1	56C	3/8" x 1.5"	4
2502/4002GS(F)	2	56C	3/8" x 1.5"	4
2503/4003GS(F)	3	56C	3/8" x 1.5"	4
4005/5005GS(F)	5	184TC	1/2" x 1"	4

■ **Non-exclusive motor type**



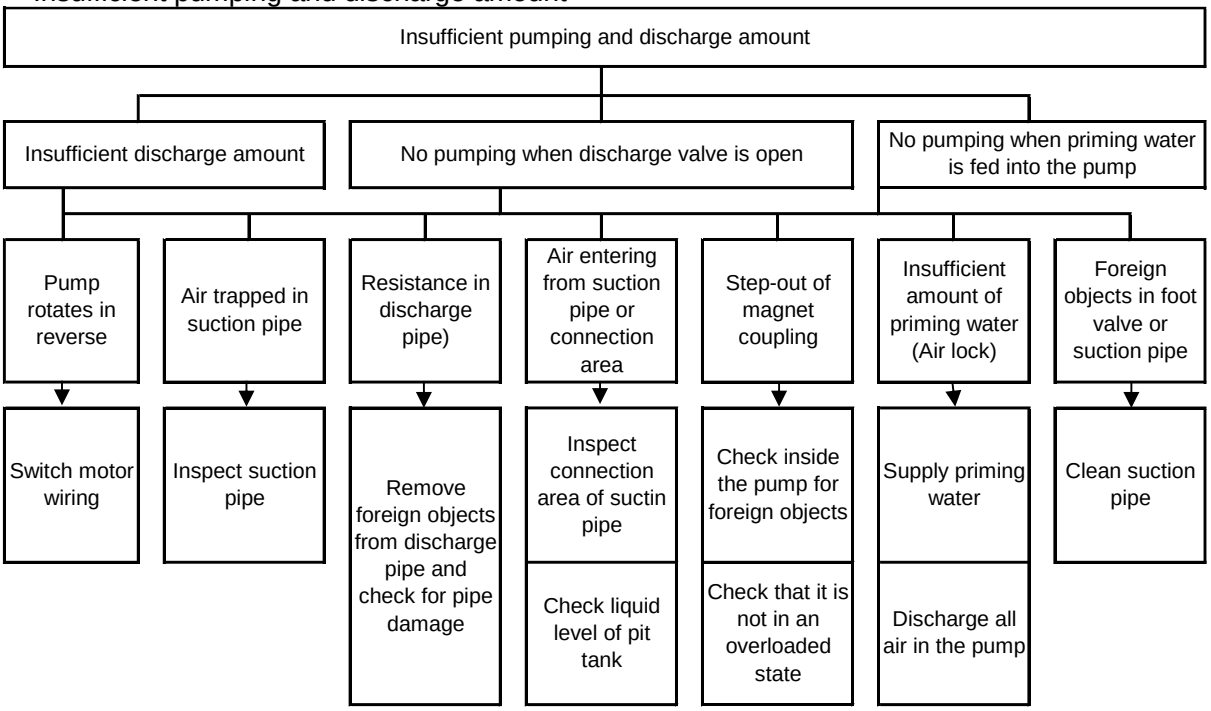
*1: Separate bracket is used for non-exclusive motor as an individual part.
(Separate NEMA bracket is used for the US version.)
*2: For 5HP motor, a motor mounting plate (FC) is added between the separate bracket and motor.
(NEMA motor mounting plate is used for the US version.)
*3: Separate NEMA motor is used for the US version.

Exploded view

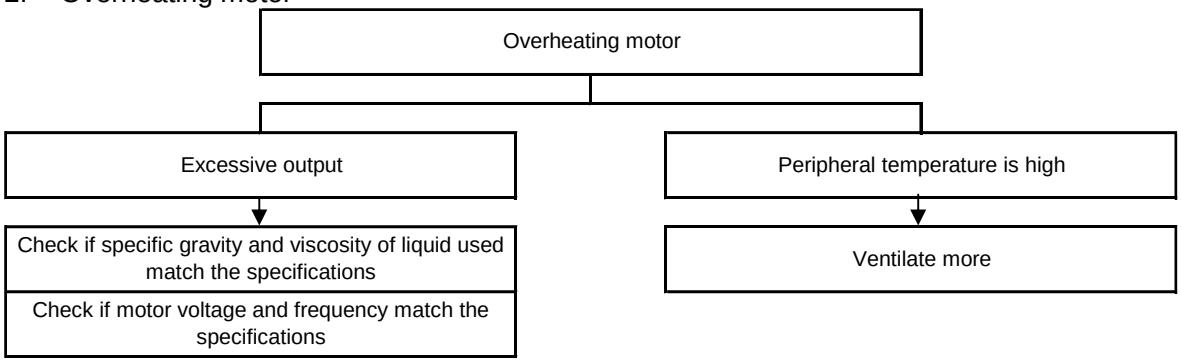


Troubleshooting

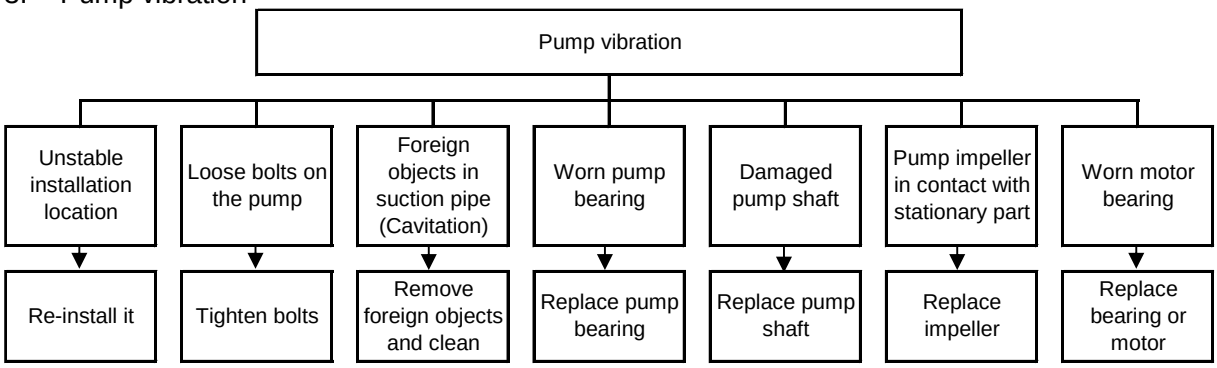
1. Insufficient pumping and discharge amount



2. Overheating motor



3. Pump vibration



WORLD CHEMICAL USA ("WCUSA")
STANDARD ONE-YEAR LIMITED WARRANTY
FOR SALES MADE ONLY IN THE UNITED STATES, CANADA

This limited warranty completely replaces the warranty issued by World Chemical Co., Ltd. relating to the below described Pumps.

WCUSA warrants its Magnetic Drive Pumps, Self-Priming Pumps, Oil Skimmer Systems, Vertical Pumps and Submersible Pumps ("Pumps") against defects in materials and workmanship for one year from the date of WCUSA's invoice to you for the affected Pump. This warranty requires you to return the Pump to WCUSA.

If there is a manufacturing defect, WCUSA will replace or repair the Pump with new or rebuilt parts at no charge to you. Please return the Pump to: World Chemical USA, 25691 Atlantic Ocean Dr. Unit B-15 Lake Forest, CA 92630.

When returning the Pump, include your name, address, daytime telephone number, and a description of the problem. No warranty work can be performed without this information.

Properly pack the Pump (preferably in the original carton) to prevent damage to the Pump in transit.

The repaired or replaced Pump will be warranted for a period equal to the remainder of the original one-year warranty.

All replaced Pumps, parts and components, shall become the property of WCUSA

This Limited Warranty does not cover: (a) defects or damage resulting from accident, misuse, abnormal use, abnormal conditions, improper storage, exposure to dirt, neglect, or unusual physical, electrical or electromechanical stress; (b) scratches, dents and cosmetic damage, unless caused by WCUSA; (c) Pump that has the serial number removed, defaced, damaged, altered or made illegible; (d) ordinary wear and tear; (e) defects or damage resulting from the use of Pump in conjunction or connection with other equipment not furnished or approved by WCUSA; (f) defects or damage resulting from improper testing, operation, maintenance, installation, service, caused by the use of unauthorized parts of service; (g) defects or damage resulting from external causes such as collision with an object, fire, flooding, dirt, windstorm, lightning, earthquake, exposure to weather conditions, or improper use of any electrical source; (h) irregularities or breakdowns due to chemical or hydrodynamic corrosion by liquid. We do not warrant the chemical resistance of the Pump to any chemical or to corrosion.

You will be responsible for paying for your own shipping costs for delivering the Pump to us. If we determine the Pump is covered by this warranty, we will return the new or repaired Pump to you at our expense. If we determine that the Pump is not covered by this warranty, we will return it at your expense.

WCUSA does not warrant accessory components, including, but not limited to, Impeller (including mouth ring and bushing), Rear Casing set (include shaft), O-Ring for Casing and other consumable parts.

REPLACEMENT OR REFUND OF THIS PUMP AS PROVIDED UNDER THIS LIMITED WARRANTY IS BE YOUR EXCLUSIVE REMEDY.

WE ARE NOT RESPONSIBLE OR LIABLE FOR ANY LOSS, INCONVENIENCE OR DAMAGE, WHETHER SPECIAL, DIRECT, INCIDENTAL, CONSEQUENTIAL, OR OTHERWISE, AND WHETHER KNOWN OR SHOULD HAVE BEEN KNOWN TO US, INCLUDING LOST PROFITS, GOODWILL, DAMAGE TO OR REPLACEMENT OF OTHER PUMPS AND PROPERTY AND PERSONAL INJURY RESULTING FROM ANY BREACH OF WARRANTY, THE INABILITY TO USE THE PUMP OR UNDER ANY LEGAL THEORY IN CONTRACT OR TORT. THESE WARRANTIES AND REMEDIES ARE YOUR SOLE AND EXCLUSIVE WARRANTIES AND REMEDIES IN CONNECTION WITH THE SALE AND USE OF THE PUMP. NO OTHER WARRANTIES, ORAL OR WRITTEN, EXPRESS OR IMPLIED, ARE GIVEN. OUR LIABILITY IS LIMITED TO THE ACTUAL PURCHASE PRICE YOU PAID TO THE RETAIL SELLER OF THE DEFECTIVE PUMP. EXCEPT TO THE EXTENT PROHIBITED BY LAW, ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE DURATION OF THIS LIMITED WARRANTY.

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, or do not allow a limitation on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you. You are advised to contact applicable state laws for a full determination of your rights. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

No dealer, agent or employee is authorized to make any modification, extension, change or amendment to this warranty. This warranty may not be assigned without the prior expenses written approval of WCUSA.

Repair

Notice:
For repair, consult the supplier. When returning a pump, thoroughly clean and pack the wet parts kit.

If irregularities are detected during operation, stop the operation immediately for check. (Refer to the section on “troubleshooting”).

(1) Consult your supplier or us for repair.
(2) Read this manual again and re-check before requesting repair.
(3) Inform the followings when requesting repair.
- Model name and serial number
- Use duration and situation
- Damages parts and condition
- Liquid (Name, Specific gravity, Temperature, Slurry)

If liquid leaks during transportation, it is very dangerous and make sure to clean inside thoroughly.

When ordering replaced parts, specify the name in the parts name list (P7, 9, 10). Although, inform the parts’ number and material, too.

Installation record

Model:	
Purchase date:	Serial number:
Start date:	Supplier:

World Chemical Co.,Ltd.

WORLD CHEMICAL CO., LTD. / Japan

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TEL : 86-0512-6579-8212 FAX : 86-0512-6579-8215