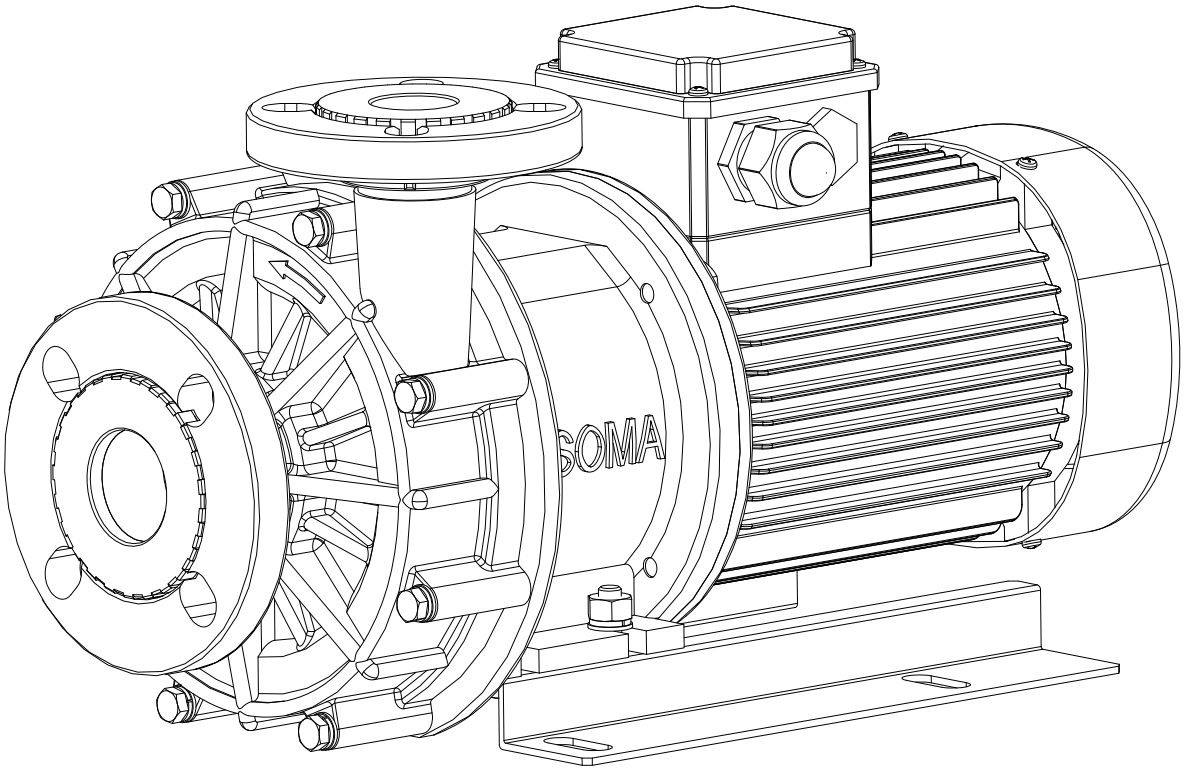
AMX SERIES

ISO 9001 - 2000 Reg. No. 059-A

MAGNETICALLY DRIVEN CHEMICAL PUMP

USER MANUAL



ASSOMA INC

Table of Contents

1.Foreword …….…….. 2
2.Inspecting the Pump Prior to Installation ……. 2
3.Notes for Operation …….. 2
3.1 Dry-Running …….. 2
3.2 Operating Temperature …….. 3
3.3 Concentrations, Viscosity and Specific Gravity ……..... 3
3.4 Particle Size (Sludge) ……...…. 3
3.5 Maximum Operating Pressure ……..…. 3
3.6 Minimum Flow ……..…. 4
4.Installation, Piping and Wiring ……. 4
4.1 Installation Location …….……. 4
4.2 Inlet and Outlet Piping ……...…. 4
4.3 Notes for Installing the Piping System …….. 5
4.4 Wiring ……..... 8
5.Operating Procedure and Notes …… 8
5.1 Notes Prior to Starting the Pump ……...…. 8
5.2 Starting Up the Pump ……...…. 8
5.3 Operating the Pump ……...…. 8
5.4 Shutting Down the Pump …….……..…. 9
6.Maintenance and Inspection ……. 9
6.1 Daily Inspection ……. 9
6.2 Periodic Maintenance ……..... 9
6.3 Preventive Maintenance ……..... 10
7.Incorrect Usage and Selection …….. 11
8.Repair and Warranty ……. 12
Appendix A: Disassembling the AMX Pump …….. 13
A.1 Preparing for Disassembly ……...…. 13
A.2 Assembly ……. 13
Appendix B: Parts List and Exploded View …… 14

1. Foreword

Thank you for purchasing an ASSOMA pump. To ensure proper operation and maximum efficiency, please read this instruction manual carefully. Failure to follow the recommended operating conditions outlined in this manual may result in serious personal injuries and/or equipment damage.

2. Inspecting the Pump Prior to Installation

(1) Check the pump exterior for any physical damage that may have been incurred during shipping.

(2) Use a small screwdriver to rotate the impeller of the motor's cooling fan. The fan should turn easily. If the fan feels tight or if there are unusual sounds, the interior of the pump may have been damaged during shipping.

(3) If there is any damage to the pump, contact the shipping company and the distributor immediately to determine who should pay for the damage, and to arrange for replacement parts.

(4) Each pump has a nameplate, indicating the pump model, MFG number, rated head, flow rate, motor power, voltage and frequency. Check these data to ensure they comply with your order and application.

(5) When using versatile motor with 50Hz and 60Hz compliance, be sure to use suitable diameter of impeller according to the frequency of power. A wrong diameter can cause the motor overload (frequency is too high) or insufficient pump performance (frequency is too low).

(6) The information of nameplates on motor and pump is key for operation setup and pump maintenance. Please keep the nameplate intact for reference.

(7) The nameplate of a pump indicates the optimum point of its operation. Therein,
Total Head= Static Head + Dynamic Head.

$$Total \quad Head = H_s + \frac{V_2^{\,2} - V_1^{\,2}}{2g}$$

3. Notes for Operation

3.1 Dry-Running

(1) Our pump use the transfer fluid as its internal cooling system, therefore, dry-running the pump can cause the temperature to rise to a dangerous level that may seriously damage the pump.

(2) If dry-running occurs, switch off the pump immediately, let it cool for at least an hour before priming the pump to prepare it for normal operation. **NOTE:** Do not subject the

pump to rapid cooling, which may damage the internal parts (thermal shock).

(3) We recommend using a dry-run protector to detect dry-run occurrences to avoid causing unnecessary damage to the pump. Please contact ASSOMA distributor near your area for such apparatus.

3.2 Operating Temperature

(1) Operating temperature may change the fluid's viscosity, vapor pressure, and corrosiveness. Please ensure that your pump is operating within the proper temperature range.

(2) The optimal temperature range for pumping pure water is $5^{o}C$~$80^{o}C$.

(3) Please consult the distributor for the temperature range suitable for your chemicals.

(4) We recommend the operating environmental temperature to be between $5^{o}C$~$40^{o}C$.

3.3 Concentrations, Viscosity and Specific Gravity

(1) A change in a fluid's concentration will usually affect its viscosity and specific gravity. Other physical properties like corrosiveness, may also change with the fluid's concentration, therefore, the selected pump material should be able to withstand the corrosive properties of the fluid.

(2) When the fluid's viscosity and/or specific gravity differ from that of water, the shaft power, flow rate and pump head may change also.

3.4 Particle Size (Sludge)

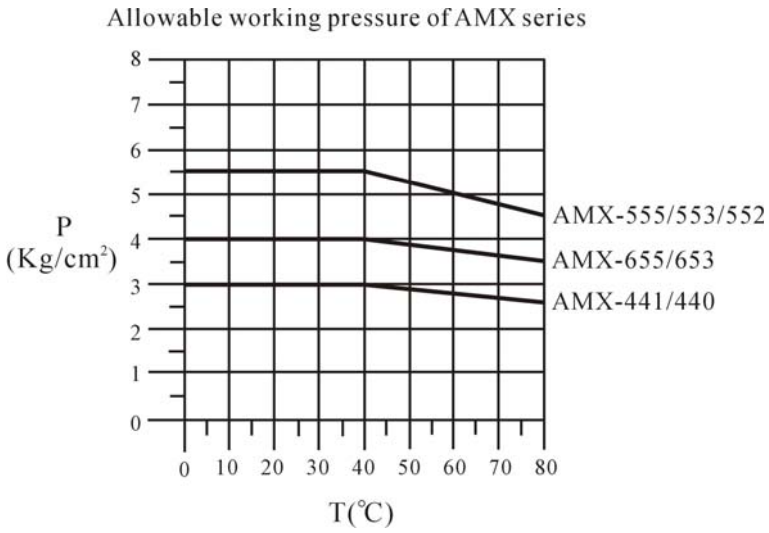
(1) In principle, it is not recommended to carry fluid with small particles. The service life of a pump can be greatly shortened by pumping fluids that carry small particles or sludge. Its service life is dependent on the concentration of the particles, its size, and hardness.

(2) For particle concentration less than 5%, particle size smaller than 50 μm, and hardness within 80Hs, our SV model, which has SiC bushings, can be used. However, a shorter-than-normal service life can be expected.

3.5 Maximum Operating Pressure

The pump's maximum operating pressure is dependent on the operating temperature and the structure of the pump. Please refer to figure 3.1 for the recommended maximum operating pressure for our AMX SERIES pumps.

Fig. 3.1



3.6 Minimum Flow

Our pump uses the pumped fluid as its cooling and lubricating system. A low flow rate may result in increasingly high temperature within the pump, and increased radial and axial force, thus, affecting the pump's performance and service life. Please use table 3.1 for the recommended minimum flow rate:

Table 3.1 Unit: Liter/min

Operating Temperature ^{o}C	20	40	60	80
AMX-655/653	50	50	70	100
AMX-555/545	30	30	40	50
AMX-553/552/543/542	20	20	30	40
AMX-441/440	15	15	20	30

Note: The above data is based on water. For volatile or viscous fluids, consult your local distributor.

4. Installation, Piping and Wiring

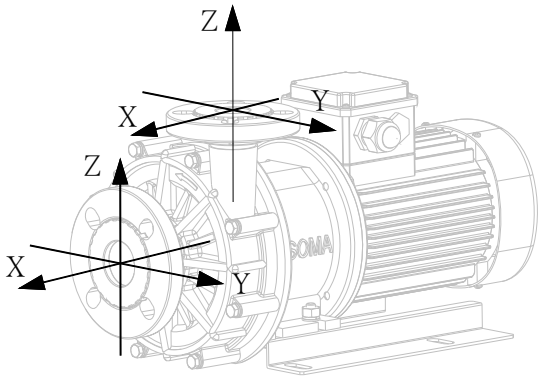
4.1 Installation Location

(1) The pump should be close to the ground and located near the inlet tank.
(2) There should be sufficient space reserved around the pump to facilitate future maintenance and repairs.
(3) The pump and its wiring should be placed in a relatively dry environment, protected from possible flooding.

4.2 Inlet and Outlet Piping

(1) AMX RF type flange is flexible for piping assembly with rotatable screw holes.
(2) The screw for AMX flange is M16 or 5/8". The torque required is 5 N-m.
(3) The pipes should have adequate structural support and shouldn't over its allowable load on the pump.

Fig. 4.1



Flange Size	SUCTION							
	Force (N)				Moment (N-m)			
	Fx	Fy	Fz	∑F	Mx	My	Mz	∑M
40A	120	100	100	180	20	30	20	60
50A	120	100	100	180	30	50	30	75
65A	150	120	120	200	30	50	30	75
	∑F＜180				∑M＜75			

Flange Size	DISCHARGE							
	Force (N)				Moment (N-m)			
	Fx	Fy	Fz	∑F	Mx	My	Mz	∑M
40A	100	120	100	180	20	30	20	60
50A	120	150	120	200	30	50	30	75

※ Note: The above data is based on operating temperature under 40℃.

Fig. 4.2

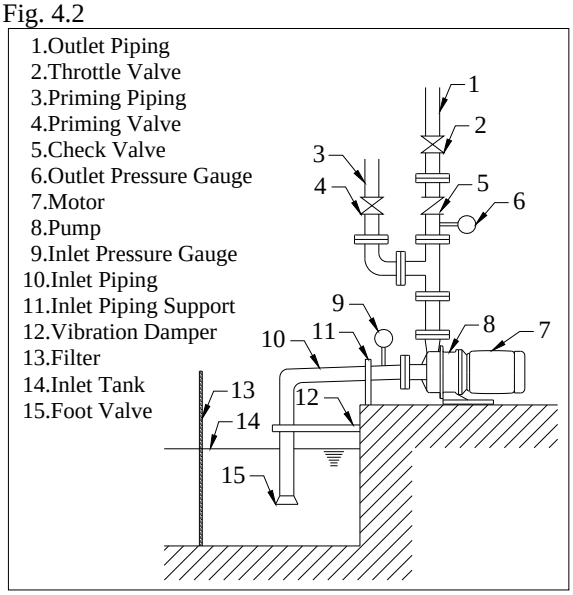


Fig. 4.3

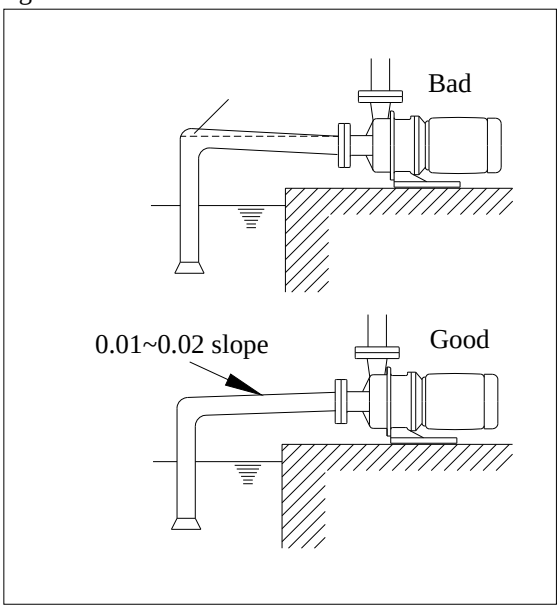


Fig.4.4

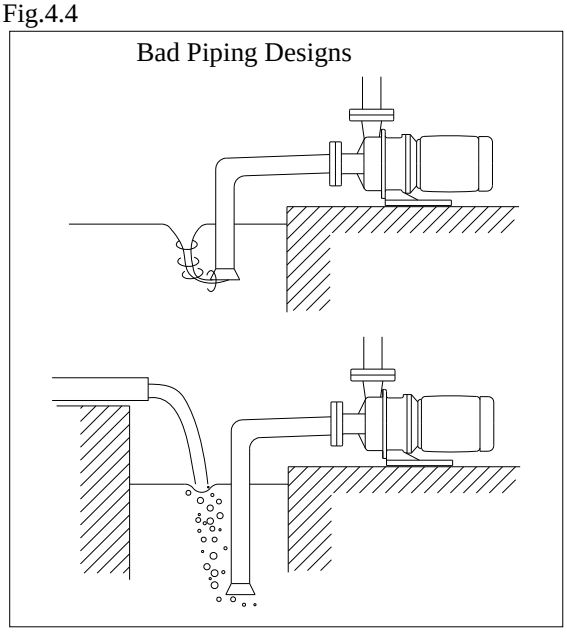
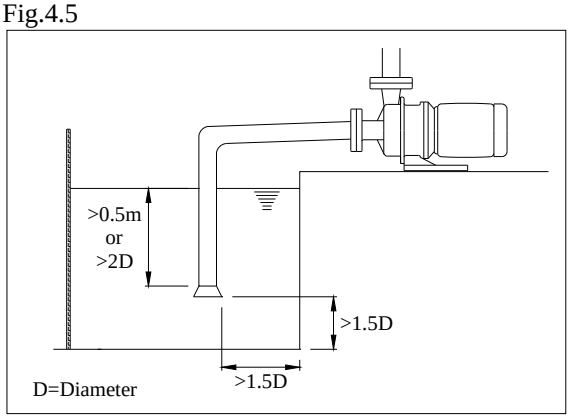


Fig.4.5



4.3 Notes for Installing the Piping System

Procedure		Items to Note
Inlet Piping	General requirements	1. Suction condition must satisfy **NPSHa>NPSHr+0.5m** 2. Reduce inlet head as much as possible. Use straight and short piping. 3. The pipes should have adequate structural support and shouldn't use the pump as its primary support. (see Fig. 4.2) 4. When designing supports, consider the effects of temperature changes on the supports to avoid thermal stress. 5. Inlet piping and connectors should be installed properly to prevent sucking in air. (see Fig. 4.4) 6. The piping system should not have upward bumps that may collect air. The inlet piping should also have a 0.01~0.02 slope increase towards the pump. (see Fig. 4.3) 7. There should not be any elbows for at least 5 times the pipe diameter from the opening of the pump. The elbow closest to the pump opening should be a long radial elbow.
	Inlet piping	1. There should be at least a 1.5 diameter distance between the pipe inlet and the closest tank wall to prevent circulation. (see Fig. 4.5) 2. The submerge depth of the inlet should be at least 0.5m or at least twice the pipe diameter below the liquid surface. (see Fig. 4.5) 3. There should be a distance of at least 1.5D between the bottom of the tank and the beginning of the inlet pipe opening. (see Fig. 4.5) 4. If there are two or more inlet piping in the same tank, they should be placed at least 3D apart to prevent mutually disrupting each other's flow.
	Foot valve	1. Please install a foot valve if upward suction is used. (see Fig. 4.2)
	Self-priming cylinder	1. If suction method is upward suction, please install a self-priming cylinder to prevent dry-running due to a leaking foot-valve. 2. The size of the self-priming cylinder should have a minimum liquid level of at least 0.5m above the opening of the pump.

	Control valve	1. A control valve should be installed to make disassembling of the pump easier. The valve should only be shut off when the pump is to be detached for maintenance or repairs. 2. We recommend the use of valves that have the least loss when fully opened, like a gate valve.
	Filter	1. It is generally not recommended to install a filter in front of a pump, which can unpredictably increase suction system resistance. 2. If a filter has to be used, it should be cleaned regularly to ensure a smooth flow.
	Vacuum gauge	1. The material used should be corrosion resistant, otherwise, a pressure gauge diaphragm should be used. 2. During operation, if the vacuum gauge reading fluctuates, either there are air bubbles in the system or cavitation has occurred.
Outlet Piping	General requirements	1. The weight of the outlet piping should be properly supported to prevent putting excessive stress on the pump. (see Fig. 4.2) 2. A priming piping must be installed if the suction system does not employ positive pressure, i.e. upward suction. (see Fig. 4.2) 3. The flow rate in the outlet piping should not exceed 3m/sec. 4. The ability for each component in the piping system to withstand pressure should be calculated, to determine the maximum allowable operating pressure.
	Priming piping	1. Upward suction pumps that do not have a self-priming cylinder should have a priming piping system.
	Pressure gauge	1. Pressure gauge used should be able to read beyond the maximum operating pressure. 2. Pressure gauge should be made of material that is corrosive resistant, otherwise a diaphragm should be used. 3. A valve can be installed on the piping that leads to the pressure gauge, to facilitate maintenance and to lengthen the gauge's service life. 4. During operation, if the pressure gauge reading fluctuates, either there are air bubbles in the system or cavitation has occurred.
	Check valve	A check valve should be installed in the following situations: 1. Discharge pressure exceeds 1.5kg/cm^2 and flow rate exceeds 2.5m/sec. 2. Two or more pumps share the same outlet piping system. 3. To prevent back flow (water hammer) from damaging the pump during unexpected power outages.
	Control valve	1. A control valve can be used for controlling the flow of fluids. Do not run the pump with the control valve closed for an extended period of time. 2. When starting the pump, always start with a closed valve, and then slowly open the valve to obtain the desired operating pressure and flow. Always open or close the valve gradually.
	Exhaust valve	1. A vent should be installed if the horizontal section of the outlet piping is very long.

4.4 Wiring

The wiring system should be done properly, using premium equipment and complying with rules and standards set by the electrical company. The following recommendations should also be implemented:

(1) Please use magnetic relays that have the same power ratings as the pump's motor.
(2) When using the pump for outdoor applications, please make sure the switch is protected from rain.
(3) Magnetic relays and on-off switches should be installed properly and away from the pump.

5. Operating Procedure and Notes

5.1 Notes Prior to Starting the Pump

(1) Check the motor's power rating, including frequency, voltage and wiring.
(2) Recheck to make sure all the parts (flange, pump casing, base plate, etc.) are securely fastened.
(3) Fill the pump with liquid (priming) to remove any air within the pump and suction piping.
(4) Check to ensure the inlet valve is open.
(5) Using a screwdriver, rotate the motor's cooling fan to ensure it is not too tight or stuck.

5.2 Starting Up the Pump

(1) Check the direction of rotation of the motor by rapidly switching on and off the power.
(2) Close the outlet valve and start up the pump.
(3) Slowly open the outlet valve when the motor has reached a stable speed. Adjust the outlet valve to obtain the desired operating pressure or flow rate.

5.3 Operating the Pump

(1) Shut down the pump immediately in the case of cavitation or dry-running.
(2) If decoupling should happen, shut down the pump to prevent reducing the magnet's strength.
(3) During power outages, shut off the pump's power supply and close the outlet valve.
(4) When switching on the pump with the outlet valve closed, the outlet pressure should increase. If the pressure fails to rise, or if the pressure is too low, shut down the pump and check the piping and wiring.

NOTE: Outlet Pressure = Inlet Pressure + Pump Pressure

Pump Pressure (kg/cm^2) = Fluid Specific Gravity * Pump Head / 10

5.4 Shutting Down the Pump

(1) Close the outlet valve slowly to prevent damage to the pump due to reverse fluid flow (water hammer).

(2) Shut off the pump. It should stop gradually. If not, check the interior of the pump for problems.

(3) The pump should be checked periodically. If the pump is used in a cold operating environment (relative to the fluid's freezing point), the fluid may crystallize even if the pump is shut down for a very short amount of time. To prevent crystallization, a drain plug should be included in the piping system or a heating system could be used to maintain the temperature during shutdown.

6. Maintenance and Inspection

6.1 Daily Inspection

Table 6.1

Appearance	1. Check for oxidation or corrosion of the front casing, bracket, and base plate. 2. Check for leakage of the pump and the piping system.
Operation	1. Check for irregular sounds and vibrations. 2. Check the in-tank fluid levels and inlet/outlet pressures. 3. Check the power supply and motor loading. 4. Check and test-run backup pumps regularly to ensure they can function properly when needed.

6.2 Periodic Maintenance

(1) The following parts (see Table 6.2) should be inspected quarterly.

(2) Disassembling, assembly and precautions please refer to Appendix A.

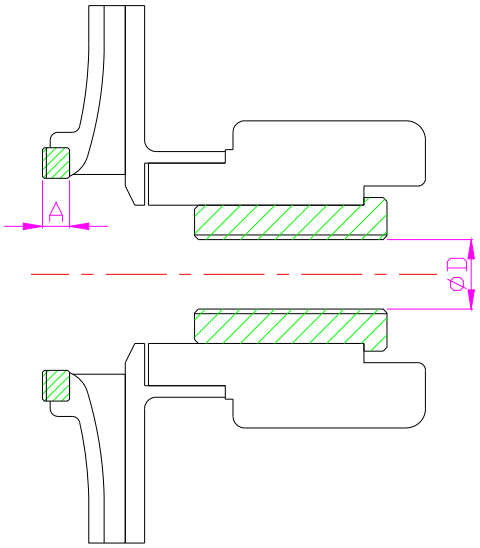
Table 6.2

Part Name	**Inspection Item**	**Solution**
Front and rear casing	1. Cracks. 2. Scratch marks (except when pumping particle laden fluids). 3. Crystallization or sludge. 4. Shaft support loose or deformed.	1. Replace. 2. Contact the distributor. 3. Clean. 4. Contact distributor.
Front casing o-ring	1. Deformed, corroded or swollen.	1. Replace.
Impeller and magnet assembly	1. Scratch marks or cracks. 2. Cracked bearing or crystallization. 3. Bearing displays signs of some wear and tear. 4. Crystallization and other sludge. 5. Foreign objects stuck in impeller. 6. Impeller deformed.	1. Contact distributor. 2. Contact distributor. 3. Replace if worn excessively. 4. Clean. 5. Remove the objects. 6. Contact distributor.
Shaft and thrust ring	1. Scratch marks. 2. Cracks.	1. Contact distributor. 2. Replace.

Table 6.3

Wear limit	AMX-440/441		AMX-552/553/555/653/655	
	A(mm)	D(mm)	A(mm)	D(mm)
Thickness upon shipment	6	15	7	18
Thickness upon replacement	<5	>15.5	<6	>18.5

Fig 6.1

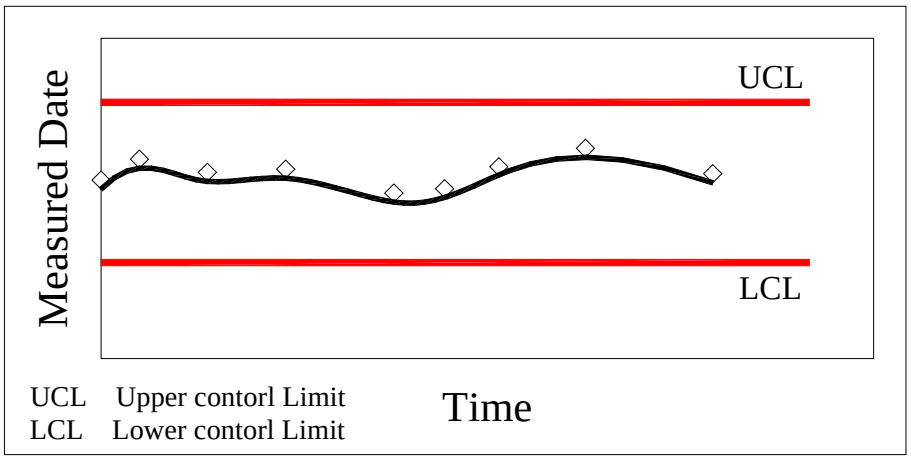


6.3 Preventive Maintenance

Operational data, like vibration, flow rate, voltage, etc. can be collected, and upper and lower limits can be set for each of the values. The collected data can be used for trend analysis (see Fig. 6.2), which can be a basis in which to determine when to carry out preventive maintenance.

The vibration value should be lower than 3.5mm/sec (measured on the surface of bracket), and the noise level should be below 80dB (at operating point).

Fig 6.2



7. Incorrect Usage and Selection

Table 7.1

	Abnormal Condition	Possible Effect/Damage
Incorrect System Calculations or Incorrect Pump Selected	System resistance too high or pump head too low	1. Insufficient or no flow. 2. Pump unable to effectively dissipate heat. 3. Excessive wear on bearing and thrust rings.
	Resistance lower than expected or pump head too high	1. Excessive flow. 2. Overloading of the motor. 3. NPSHa too low, resulting in cavitation.
	NPSHa too low, resulting in cavitation	1. High frequency vibration and noise. 2. Fracturing of the bearing and thrust rings. 3. Decreased pump performance and low flow rate. 4. Serious cases may result in dry-running.
	Specific Gravity higher than anticipated	1. Motor overloading. 2. Decoupling of the magnetic drive.
	Viscosity higher than anticipated	1. Motor overloading. 2. Decoupling of the magnetic drive. 3. Decreased pump performance and reduced flow.
	Wrong pump material selected	1. Corrosion and cracking. 2. Rapid corrosion and wearing of bearing. 3. Corrosion of the o-ring resulting in leakage.

Table 7.2

	Abnormal Condition	Possible Effect/Damage
Improper Piping or Layout	Inlet pipe not submerged sufficiently into the fluid or air sucked into piping system	1. Produce high frequency vibrations and noise. 2. Fracturing of the bearing and thrust rings. 3. Reduced pump performance. 4. Serious cases can lead to dry-running.
	Air pockets in inlet piping	1. Reduced pump performance. 2. Serious cases can lead to dry-running.
	Parallel pumps improperly installed	Improper suction, resulting in low efficiency, insufficient flow, cavitation or dry-running.
	Leaking foot valve or inlet piping	Fluids within pump leaks during shut-down period, resulting in dry-running when pump is restarted.

Table 7.3

	Abnormal Condition	Possible Effect/Damage
Improper Operation	Starting the pump without priming	Dry-running, causing damage to pump.
	Low speed or wrong rotation direction	Low fluid flow.
	Incorrect motor frequency or voltage	Overloading of the motor.
	Low inlet tank fluid level	1. Low performance and vibrations caused by sucked-in air. 2. Fracturing of the bearing and thrust rings. 3. Dry-running.

	Foreign objects stuck in impeller	1. Produce vibrations and noise. 2. Reduced efficiency and flow. Serious cases may result in dry-running.
	Low flow over extended period of time	1. Insufficient cooling of pump. 2. Excessive radial and axial force, reducing service life of bearing and thrust rings.
	Inlet valve closed	Dry-running, seriously damaging the pump.
	Transfer fluid temperature too high	1. Low NPSHa, resulting in cavitation. 2. Reduced strength of the magnet, resulting in decoupling.
	Fluid carries hard particles	1. Rapid wearing of the bearing. 2. Wearing of the impeller and casing surfaces.

Table 7.4

	Abnormal Condition	Possible Effect/Damage
Wrong System Calculation or Pump Selection	Deformation of the o-ring	Result in leakage.
	Damaged impeller	1. Resulting in vibrations and noise. 2. Reduced pump performance and fluid flow.
	Damaged motor bearings	1. Produce vibrations and noise. 2. Overloads the motor. 3. High motor temperature.
	Wear ring worn off	1. Produce vibrations and noise. 2. Overloads the motor.
	Wearing of the impeller bearings	1. Produce vibrations and noise. 2. May result in fracturing of the impeller shaft.
	Pump’s base screws loose	Produce vibrations and noise.
	Blockage of inlet piping or foot valve	1. Reduced pump performance and low flow rate or may result in cavitation. 2. Serious cases may result in dry-running.
	Blockage of the outlet piping	1. Low flow or no flow. 2. Pump unable to dissipate heat. 3. Serious cases may result in overheating of the pump and outlet piping

8. Repair and Warranty

When a problem arises, please read this instruction manual and try to troubleshoot the problem. If the problem cannot be found, or if replacement parts are needed, please call the distributor, and give them the following information:

(1) The pump model and MFG number indicated on the nameplate.

(2) The operating condition.

(3) The situation under which the pump fails.

Please refer to the warranty card for details of the warranty terms and conditions.

Appendix A: Disassembling the AMX Pump

A.1 Preparing for Disassembly

(1) The magnets used in our AMX magnetic drive seal-less pumps have very strong magnetic strength. Take **extra** precautions when disassembling the pump to prevent personal injury and damage to electronic and magnetic equipments (like diskettes, magnetic stripe cards, etc.).

(2) For personal safety, wear protective gear, like corrosive resistant aprons and protective eyeglasses during disassembly, to prevent injuries caused by spilled chemicals.

(3) Be sure to write down detail sequence of disassembly for correct assembly in a later date.

A.2 Assembly

Please follow the reverse procedure for disassembly to assemble the AMX pump. However, during assembly, please pay attention to the following points:

(1) When pressing the shaft bearing into the impeller, make sure the cut ledge of the bearing matches the straight edge inside the impeller.

(2) To attach the outer magnet to the motor shaft, apply some grease to the shaft and using a mallet, drive the magnet down the shaft via a thick plastic plate (see Fig. A.1). Please be sure that the surface of magnet is free of iron particle.

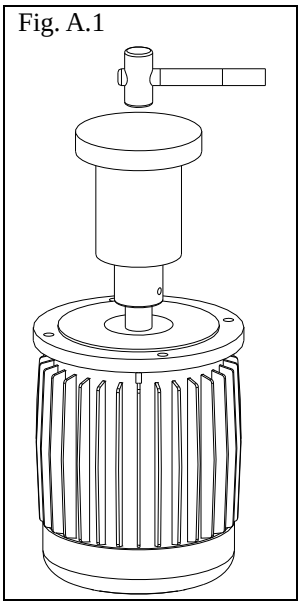
(3) Use a hand press to gradually and firmly press the shaft into the shaft support.

(4) When fastening the different parts of the pump, make sure to fasten the corresponding opposite screws in turn to ensure a uniform tightness.

(5) After the entire pump is assembled, use a small screwdriver to rotate the motor cooling fan to ensure everything is installed correctly.

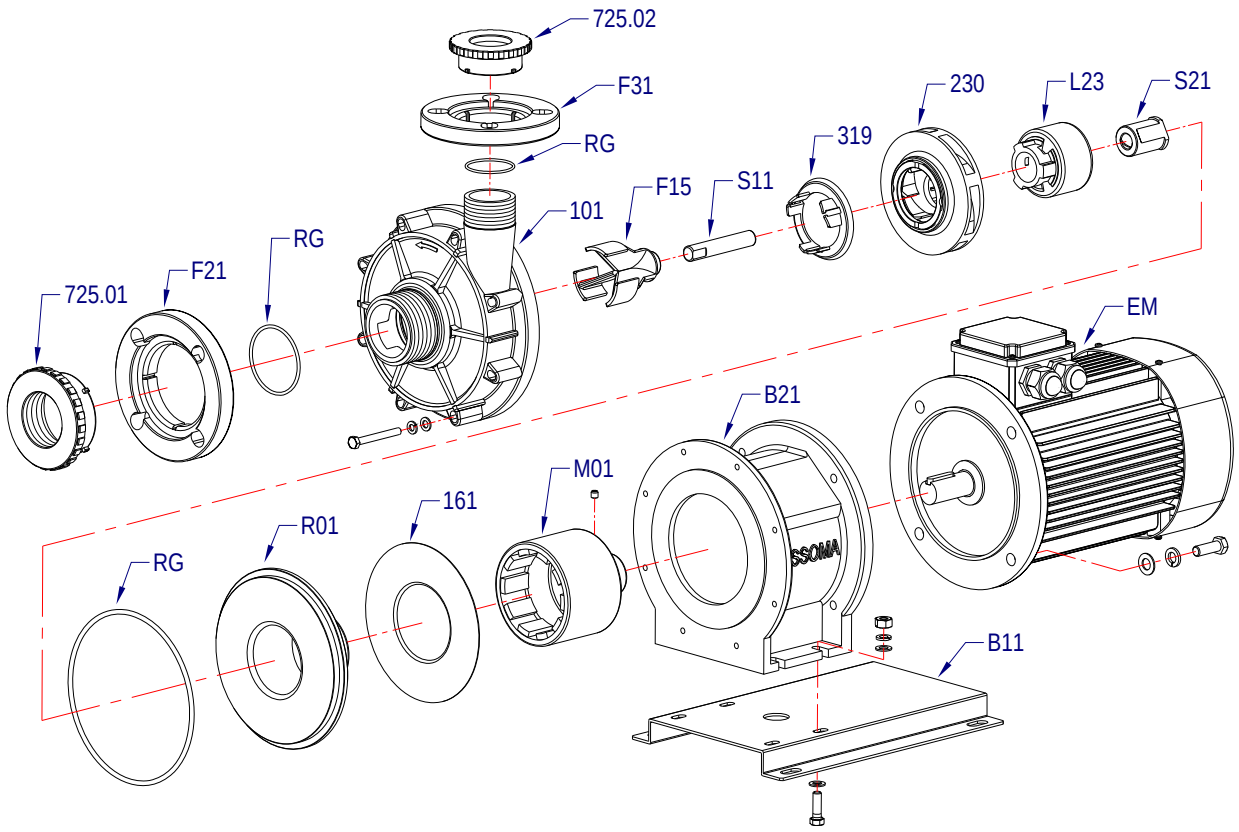
(6) The torque for fastening pump casing is 32±1 kgf-cm (3.2±0.1N-m).

Fig. A.1



Appendix B: Parts List and Exploded View

No.	Part Name	No.	Part Name
725.01	Inlet flange adaptor	230	Front wear ring
F21	Inlet flange		Impeller
725.02	Outlet flange adaptor	L23	Magnet capsule
F31	Outlet flange	S21	Bearing
101	Pump casing	R01	Rear casing assembly
F15	Front support, shaft	161	Backup plate（except AMX-440）
S11	Shaft	M01	Drive magnet
319	Front buffer	B21	Bracket
	Front thrust ring	B11	Base
		EM	Motor
RG + No.	O-ring. According to No.AS568. Each type is refer to the sectional drawing.		



ASSOMA GLOBAL DISTRIBUTION NETWORK

♦ **Assoma Japan Co. Ltd.**
Tel: (81) 48-810-5481
Fax: (81) 48-810-5482
1-17-2, Higashi Urawa, Midori-ku, Saitama-city, Saitama, Japan 336-0926
E-mail: inaizumi@assoma.co.jp

♦ **A-Man Co., Ltd.**
Tel: (82) 31-434-9948
Fax: (82) 31-434-9916
Rm211, No. 2, Shihwa Machinery Selling Complex 2166-2 Jungwang-dong, Shiheung-City, Gyeonggi-do, Korea
E-mail: seanhong@a-man.co.kr

♦ **Crest Pumps Ltd.**
Tel: (44) 1425-627-700
Fax: (61) 1425-627-7100
7 Queensway, New Milton, Hampshire, BH25 5NN, UK
info@crestpumps.co.uk

♦ **Dynapumps**
Tel: (61) 8-9478-2722
Fax: (61) 8-9478-2750
88 Belgravia Street, Belmont WA 6104, Australia
E-mail: Charlie@dynapumps.com.au

♦ **P.V.S. Trading Engineering Co., Ltd.**
Tel: (66) 2-944-6810
Fax: (66) 2-944-6820
130/39-40 Moo 12 Soi Ramindra 40, Ramindra Rd., Klongkum, Bangkok 10230, Thailand
E-mail: pvsco@ksc.th.com

♦ **Tangerine Engineering Pte. Ltd.**
Tel: (65) 6748-6211
Fax: (65) 6748-9722
502 Chai Chee Lane, #01-03 CMKS Building, Singapore 49025
Email: sales@tangerine.com.sg

♦ **Assoma Inc. Taichung Office 協磁股份有限公司台中辦事處**
Tel: (886) 4-2462-2388
Fax: (886) 4-2462-6398
台中市西屯區福瑞街 160 號 8 樓之 2
E-mail: daniel@assoma.com.tw

♦ **Assoma Inc. Shanghai Office 上海協志貿易有限公司**
Tel: (86) 21-6768-1081
Fax: (86) 21-6764-8067
上海市松江區新橋鎮春申村金都西路 959 號 4 幢
E-mail: assomapump@vip. 163.com

♦ **Assoma Inc.Shanghai Office (Shenzhen Branch) 上海協志貿易有限公司深圳分公司**
深圳市南山區新科技園區科苑堅達大廈 5 樓 519 房
Tel: (86) 755-2650-0300
Fax: (86) 755-26501327
E-mial: assoma_sz@vip.163.com

♦ **Beijing Cen-Sun Technology Development Co., Ltd. 北京世紀朝陽科技發展有限公司**
Tel: (86) 10-8239-8036
Fax: (86) 10-8239-8026
北京市海淀區四環中路 209 號健翔園 6 號樓 2202 室
E-mail: feilu.lu@vip.163.com

♦**Prelead Industrial Co., Ltd. 台灣南部總代理怡台企業股份有限公司**
Tel: (886) 7-815-3030
Fax: (886) 7-815-3080
高雄市前鎮區興化街 135 號
E-mail: prelead@ms39.hinet.net

ASSOMA INC.

Tel: (886) 3-354-7606 Fax: (886) 3-354-7612 http://www.assoma.com.tw E-mail: sales@assoma.com.tw

No. 10, Alley 14, Lane 15, San-Te Street, Keng Kou Village, Lujhu Township, Taoyuan County, 338, Taiwan, R.O.C.

ASSOMA INC

NO.10, ALLEY 14, LANE 15, SAN-TE STREET, KENG KOU VILLAGE, TEL: 886-3-3547606~10
LUJHU TOWNSHIP, TAO YUAN COUNTY, 338, TAIWAN, R.O.C. FAX: 886-3-3547612~14

The fundamental safety and health requirements are met in accordance with the following norms:

- DIN EN 12100-1 Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology
- DIN EN 12100-2 Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles
- DIN EN 60204-1 Safety of machinery – Electrical equipment of machines – Part 1: General requirements
- DIN EN 809 Pumps and pump units for liquids – Common safety requirements.
- DIN EN ISO 4871 Acoustics – Declaration and verification of noise emission values of machinery and equipment
- ISO 15783 Seal-less rotodynamic pumps – Class II – Specification
- IEC 60034-1 Rotating electrical machines – Part 1: Rating and performance

The above-named company provides the technical documentations for inspection:

06/01/2011
ASSOMA INC. Taiwan

Date (DD/MM/YYY), Place

Ching-Chang Wang

R/D Department