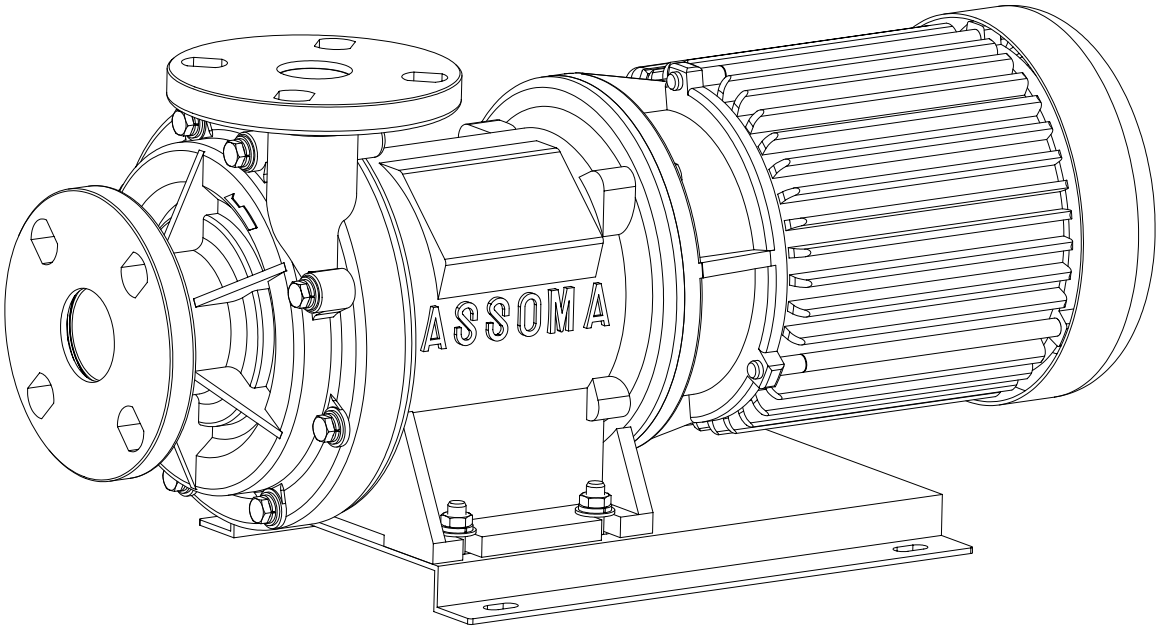
AMD SERIES

ISO 9001 - 2000 Reg. No. 059-A

MAGNETICALLY DRIVEN CHEMICAL PUMP

USER MANUAL



ASSOMA INC

Table of Contents

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, and motor power, voltage and frequency. Check these data to ensure they comply with your order and application.

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.
(3) We recommend using a dry-run protector to detect dry-run occurrences to avoid causing unnecessary damage to the pump.

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. Please consult the distributor for the temperature range suitable for your chemicals.
(3) 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) 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 table 3.1 for the recommended maximum operating pressure for our AMD SERIES pumps.

Unit: kg / cm^2

Operating Temperature ^{o}C	20	40	60	80
AMD-440,441	3.5	3.3	3	2.5
AMD-552,553,555	4.5	4.3	4	3.6

Table 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 3.2 for the recommended minimum flow rate:

Unit: l/min

Operating Temperature ^{o}C	20	40	60	80
AMD-440,441	15	20	25	30
AMD-552,553,555	20	25	35	50

Table 3.2

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 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. 4.1) 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. 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. 4.2) 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. 4.4) 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. 4.4) 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. 4.4) 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. 4.1)
	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. 4.1) 2. A priming piping must be installed if the suction system does not employ positive pressure, i.e. upward suction. (see Fig. 4.1) 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 2kg/cm^2 and flow rate exceeds 3m/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.

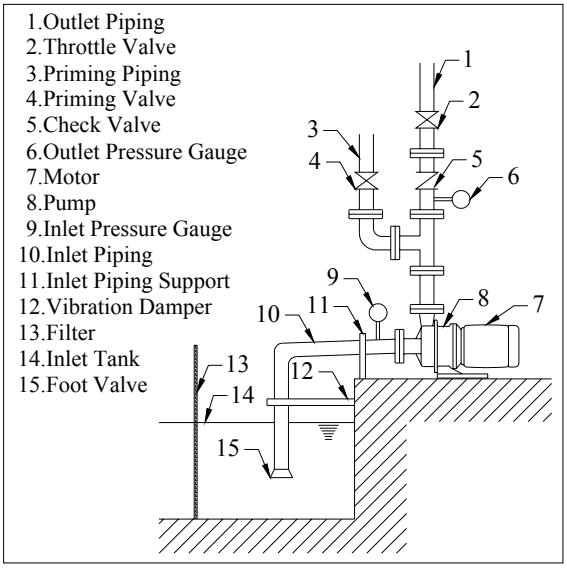


Fig. 4.1

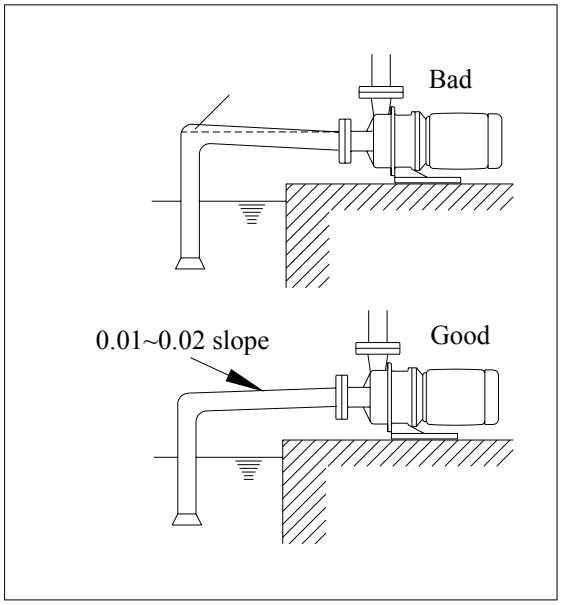


Fig. 4.2

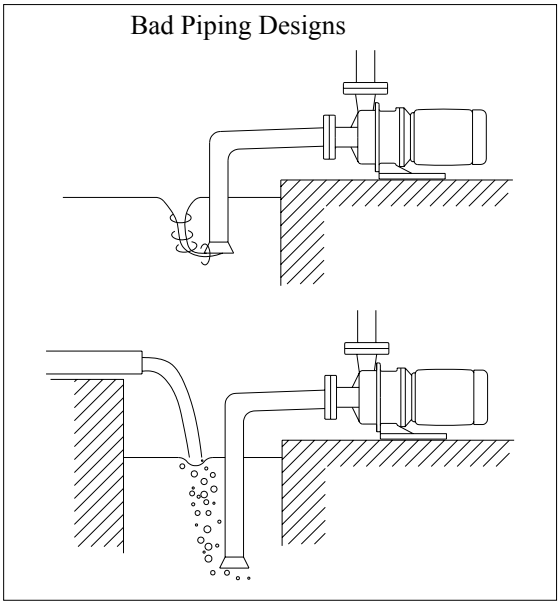


Fig. 4.3

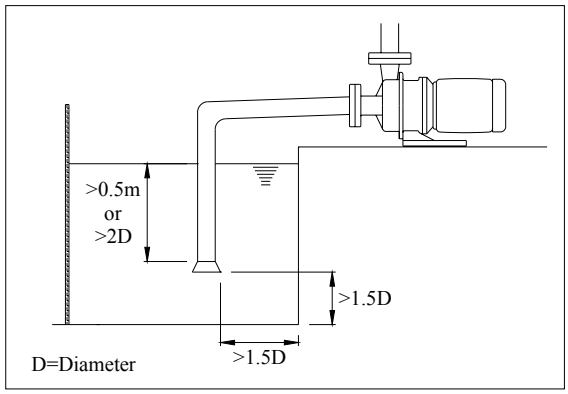


Fig. 4.4

4.3 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 (See 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.

Table 6.1

6.2 Periodic Maintenance

(1) The following parts should be inspected quarterly.

(2) Refer to Appendix B for the part names.

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 6.2

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. 6.1), which can be a basis in which to determine when to carry out preventive maintenance.

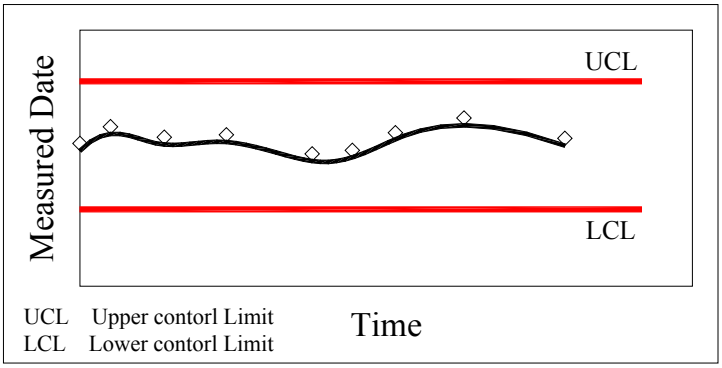


Fig. 6.1

7. Incorrect Usage and Selection

	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 7.1

	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 7.2

	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 7.3

	Abnormal Condition	**Possible Effect/Damage**
Improper Maintenance	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

Table 7.4

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 manufacturing serial 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 AMD Pump

A.1 Preparing for Disassembly

(1) The magnets used in our AMD 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.

A.2 Assembly

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

(1) 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, A.2 and A.3).

(2) The front thrust ring should be placed on the pump shaft prior to pressing it into the shaft support.

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

(4) The shiny surface of the front and rear thrust rings should be facing inwards (towards the shaft).

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

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

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

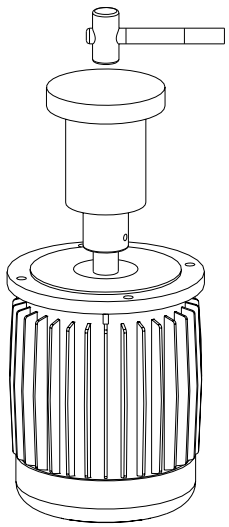


Fig. A.1

The interior bottom of drive magnet of AMD-440 should be higher than the top of motor shaft by 2 mm.

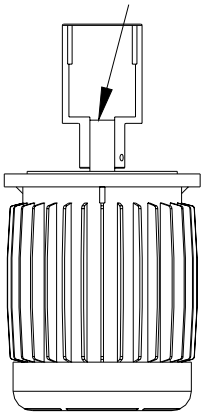


Fig. A.2

Model	h(mm)
AMD-441	131
AMD-552	184.5
AMD-553	184.5
AMD-555	187.5

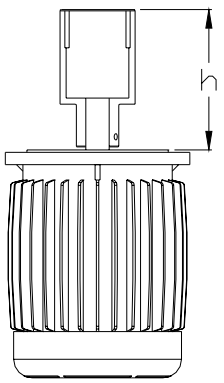


Fig. A.3

Appendix B: Exploded View and Parts List

No.	Part Name		No.	Part Name
F21	Inlet Flange		S21	Bushing
RG	O-ring		L02	Impeller
F31	Disc. Flange		S34	Rear Thrust Ring
F11	Front Casing		R01	Rear Casing Assembly
F15	Shaft Support		B21	Bracket
S39	Cushion Packing		B11	Base
S31	Front Thrust Ring		M01	Drive Magnet
S11	Shaft		EM	Motor