IWAKI PUMPS

IWAKI Magnetic Drive Pump

AMP Series (Asia Edition)

Instruction Manual

⚠Read this manual before use of product

Thank you for selecting an Iwaki AMP Series Magnetic Drive Pump. This instruction manual deals with *"Safety instructions"*, *"Outline"*, *"Installation"*, *"Operation"*, and *"Maintenance"* sections. Please read through this manual carefully to ensure the optimum performance, safety and service of your pump.

Contents

This instruction manual should be kept on hand by the end user for quick reference.

Contact us or your nearest dealer if you have any questions.

Important instructions

For the Safe and Correct Handling of the Pump

- "Safety Instruction" section deals with important details about handling of the product. Before use, read this section carefully for the prevention of personnel injury or property damage.
- Observe the instructions accompanied with "WARNING" or "CAUTION" in this manual. These instructions are very important for protecting users from dangerous situations.
- The symbols on this instruction manual have the following meanings:

⚠ **WARNING**	**Nonobservance or misapplication of "Warning" sections could lead to a serious accident which may result in death.**
⚠ **CAUTION**	**Nonobservance or misapplication of "Caution" sections could lead to a personal injury or property damage.**

Types of Symbols

Indicates that "Warning" or "Caution" must be exercised. Inside this triangle, a concrete and practical image provided as a warning or caution message is depicted.

Indicates a prohibited action or procedure. Inside or near this circle, a concrete and practical image of the activity to be avoided is depicted.

Indicates an important action or procedure which must be performed or carried out without fail. Failure to follow the instructions herein can lead to malfunction or damage to the pump.

⚠ Export Restrictions

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control. Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

Safety instructions

⚠ WARNING

- **Access limitation**
  The magnet drive pump has a pair of strong magnets (the magnet capsule unit and drive magnet). The strong magnet field could adversely affect the persons who are assisted by electronic devices such as the pacemaker.


Prohibited

- **Turn off power before service**
  Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.


Turning off power

- **Wear protective clothing**
  Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to SDS precautions from the solution supplier.


Wear protective gear

- **Use an overhead crane or any other proper transporting machine**
  Two or more operators may be needed for ensuring safe transport depending on the pump size and weight.

- **Use the eye bolt or lifting holes**
  Use the eye bolt when lifting the pump only. If the pump and the motor are mounted on the baseplate, use lifting holes on the baseplate.

- **Do not modify the pump**
  Alterations to the pump carry a high degree of risk. It is not the manufacturer's responsibility for any failure or injury resulting from alterations to the pump.


No Remodeling

- **Daily inspection and maintenance**
  Daily inspection and maintenance are required for the prevention of chemical spray or leakage when handling explosive or flammable liquid, corrosive liquid, or harmful liquid.

- **Ventilation**
  Fumes or vapours can be hazardous with certain solutions. Ensure proper ventilation at the operation site.

- **Grounding**
  Risk of electrical shock! Always properly ground the pump. Conform to local electric codes.


Grounding

Safety instructions

⚠ CAUTION

- **Pay attention to magnet force**
  The pair of strong magnets in the pump and its magnetic force may adversely affect magnetic disks/cards or wrist watches. Do not bring them close to the pump.

- **Do not run pump dry**
  Do not run pump dry (operation without priming water or with a suction valve closed). Internal parts are excessively worn by friction heat and fatal pump damage results.

- **Qualified personnel only**
  The pump should be handled or operated by qualified personnel with a full understanding of the pump. Any person not familiar with the product should not take part in the operation or management of the pump.

- **Do not use the pump in any condition other than its intended purpose**
  The use of the pump in any conditions other than those clearly specified may result in failure or injury. Use this product in specified conditions only.

- **Static electricity**
  When low electric conductivity liquids such as ultra-pure water and fluor inactive liquid (e.g. Fluorinert) are handled, static electricity may generate in the pump and may cause static discharge. Take countermeasures to remove static electricity.

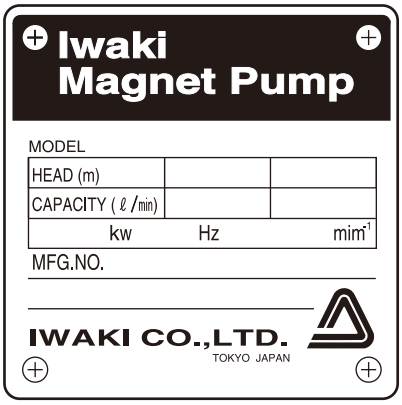
- **Commissioning**
  Friction heat builds up and damages the internal parts. Break in the pump to expel gas from the pump and piping, especially when handling liquids that generate gas bubbles (hydrogen peroxide or sodium hypochlorite).

- **Spill precautions**
  Ensure protection and containment of solution in the event of plumbing or pump damage (secondary containment).

- **Disposal of a used pump**
  Dispose of any used or damaged pump in accordance with local rules and regulations. If necessary, consult a licensed industrial waste disposal company.

Outline

1. Unpacking & Inspection



On unpacking the product, check the following points. If you find any problems, contact your nearest dealer.

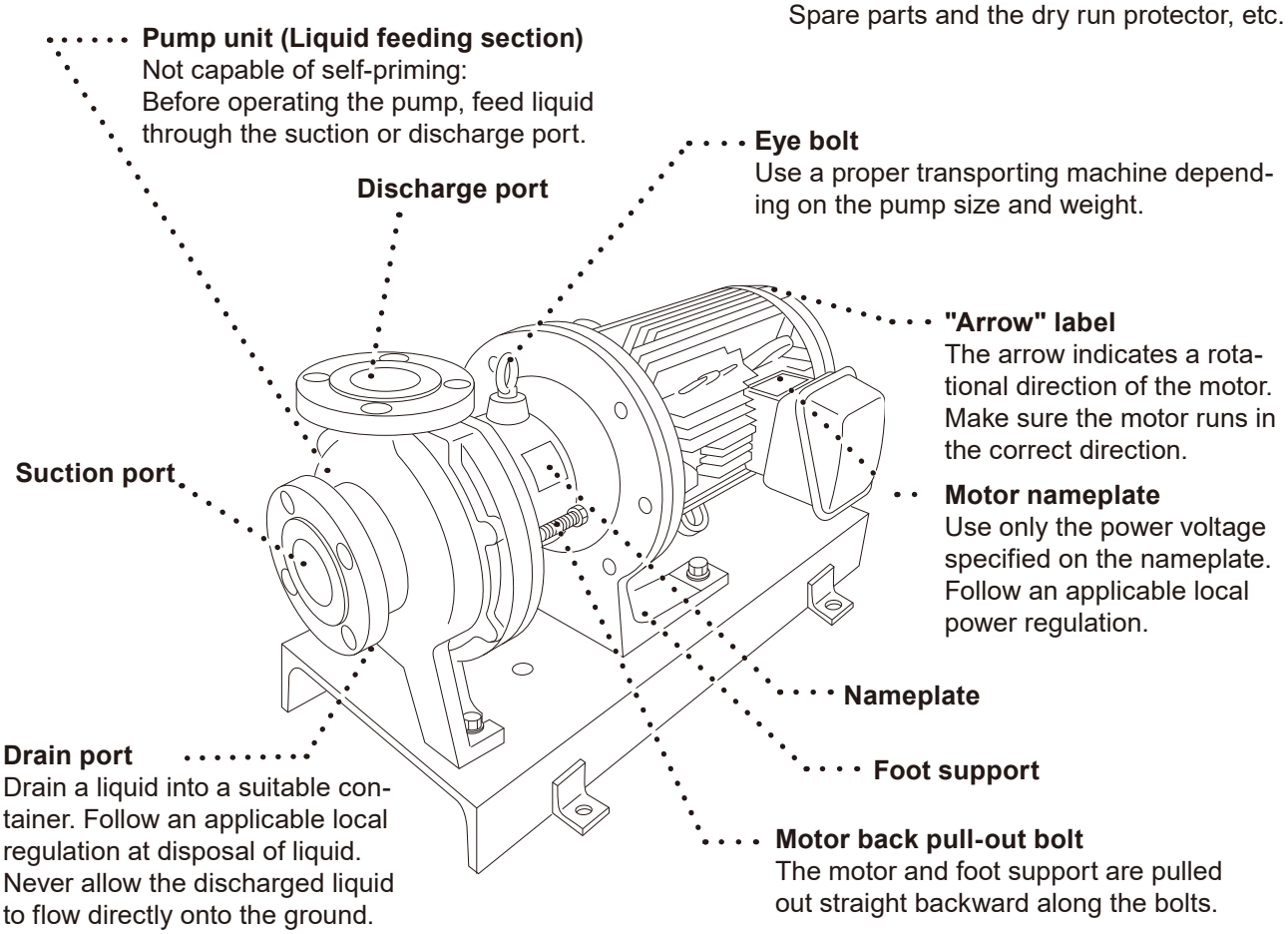
1. Check the information on nameplate and confirm the product is delivered as per order.

2. Check for transit damage, deformation, and loose bolts.

! Tighten the rear casing support mounting bolts by 85 N•m.

3. Check if accessories are included.

Bolt for back pull-out:
M12×100mm (2pcs)
Optional accessories (if ordered):
Spare parts and the dry run protector, etc.



⚠CAUTION
When cleaning the pump, do not wipe the nameplates, labels or the pump body with any solvent.

2. Model code

AMP40 - 150 1 KK F 075 J - D 2

a b c d e f g h i

a. Pump discharge bore

	Suction		Discharge
40:	50	×	40
50:	65	×	50
65:	80	×	65

b. Nominal impeller diameter

110 - 165 (mm)

c. Impeller code

1

d. Bearing/Spindle material

KK: SiC/SiC CF: High density carbon/High purity ceramic

e. Motor type

F: Flanged motor

f. Motor output

037: 3.7 kW 055: 5.5 kW 075: 7.5 kW
110: 11 kW 150: 15 kW 185: 18.5 kW

g. Flange/Motor standards

J: JIS pump flange + JIS motor
A: ANSI pump flange + JIS motor
I: ISO pump flange + IEC motor

h. Drain/Custom product

	Drain	Base plate	Special version
A	Without drain	With base plate	Standard
S			Customized
D	With drain		Standard
X			Customized
B	Without drain	Without base plate	Standard
Y			Customized
E	With drain		Standard
Z			Customized

i. Number of motor poles

2: Two pole motor

NOTE: In this manual, model code is simplified by using pump discharge bore code (**a**) and impeller range code (**c**).

3. Operating conditions

1. Permissible pressure

Pump permissible pressure is 1.0MPa. Do not allow the pump discharge pressure to exceed the limit.

2. Slurry liquid

Slurry liquid can not be used except for the KK type of SiC bearing. The KK type can handle slurry in the following conditions:

- Slurry concentration up to 5 wt%
- Slurry hardness up to 80 Hs
- Slurry size up to 50 μm

Contact us for detail before slurry transfer.

NOTE: Not only friction parts but also plastic parts are worn when handling slurry liquid. Note that periodic pump change is needed.

3. Performance change along with specific gravity and viscosity

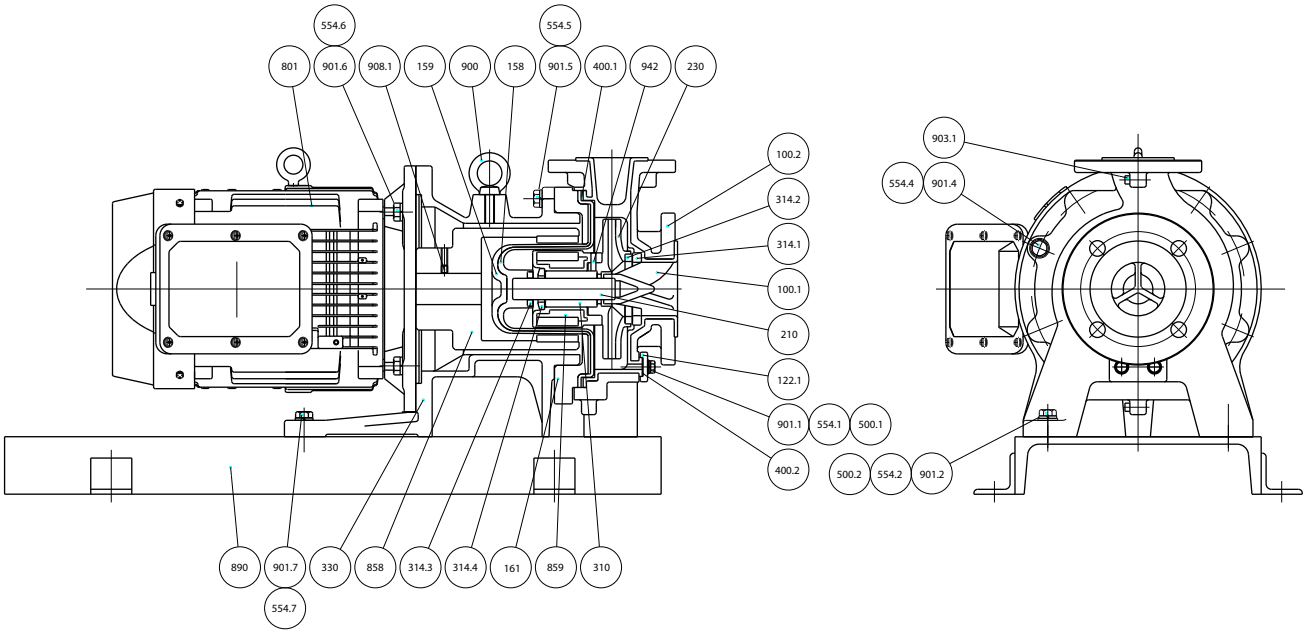
Shaft power, discharge capacity and discharge head vary with specific gravity and viscosity. The pump has been made in accordance with the specified operating condition at order phase. If the operating condition has been changed since then, contact us before use of the pump.

4. Influence by liquid temperature

Viscosity, vapour pressure and corrosiveness vary with the temperature change. Pay attention to the change of liquid characteristics.

- Liquid temperature range: 0-80˚C
- Ambient temperature range: 0-40˚C
- Ambient humidity range: 35-85% RH

4. Part names



NO.	Parts name	Q'ty	NO.	Parts name	Q'ty
100.1	Front casing	1	554.2	Spring washer	2
100.2	Cover	1	554.4	Spring washer	8
122.1	Drain plate	1	554.5	Spring washer	4
158	Rear casing	1	554.6	Spring washer	4
159	Rear casing cover	1	554.7	Spring washer	2
161	Rear casing support	1	801	Motor	1
210	Spindle	1	858	Drive magnet unit	1
230	Impeller	1	859	Magnet capsule unit	1
310	Bearing	1	890	Base plate	1
314.1	Liner ling	1	900	Eye bolt	1
314.2	Mouth ring	1	901.1	Hex. head bolt	2
314.3	Rear thrust ring	1	901.2	Hex. head bolt	2
314.4	Rear ring	1	901.4	Hex. head bolt	8
330	Bracket	1	901.5	Hex. head bolt	4
400.1	Gasket	1	901.6	Hex. head bolt	4
400.2	Drain gasket	1	901.7	Hex. head bolt	2
500.1	Plain washer	2	903.1	Hex. head bolt	5
500.2	Plain washer	2	908.1	Hex. socket set screw	2
554.1	Spring washer	2	942	Pin	2

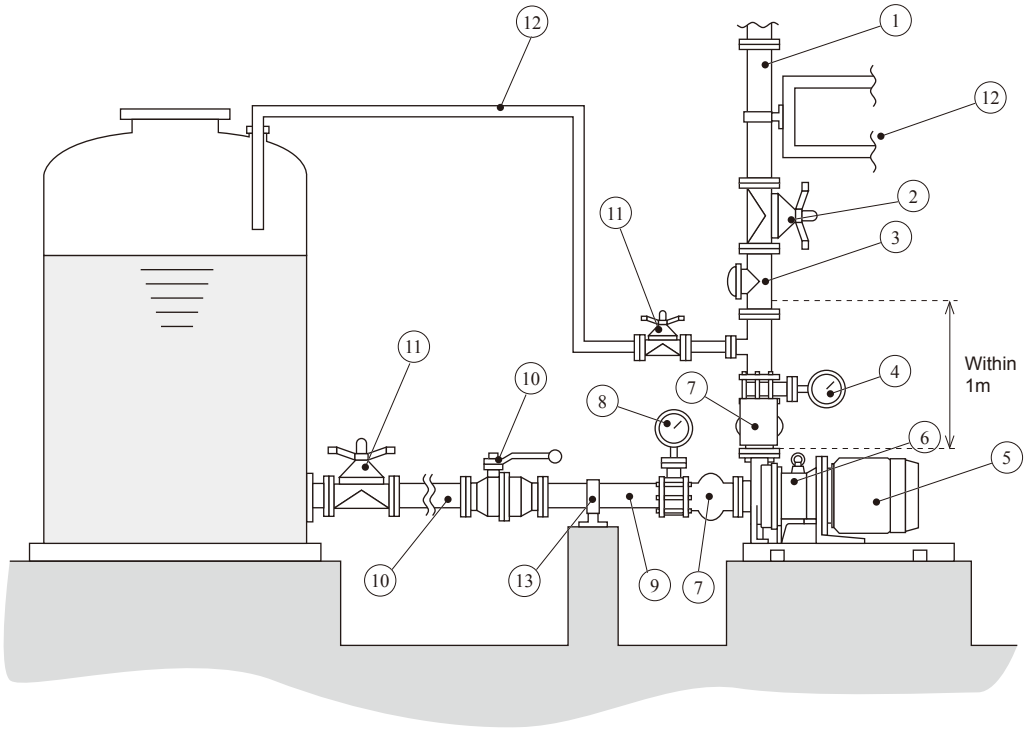
See the construction drawing for details.

Installation

Installation

1. Before installation

Example of recommended piping



① Discharge pipe
② Discharge valve
③ Check valve
④ Pressure gauge
⑤ Motor
⑥ Pump
⑦ Flexible joint
⑧ Vacuum gauge
⑨ Suction pipe
⑩ Suction valve
⑪ Gate valve
⑫ Air vent piping
⑬ Pipe support

1. Installation location

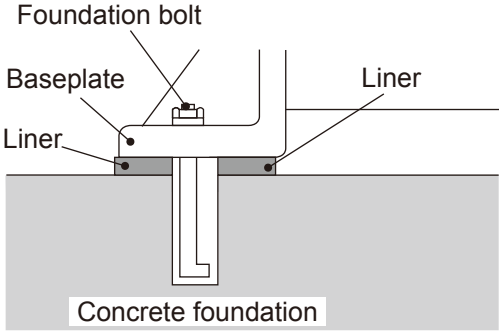
- The pump should be installed on a flat foundation where is free from vibration or torsional force.
- Spacing for the motor removal (for back pull out) and maintenance (assembly and dismantlement) are needed.
- Installation surface should be larger than the pump base.

2. Positioning

- Install the pump as close to the supply tank in flooded suction system.
- If the flooded suction system can not be realized, install the auxiliary piping for priming and a foot valve at the suction pipe end.

3. Pump mounting

- See the diagram below for mounting the pump in the foundation.
- For the pump without the base plate, note that the pump can not be dismantled with the foot supports of the cover and bracket fixed in the foundation.



2. Piping

■ Tightening torque between discharge/ suction ports and pipes

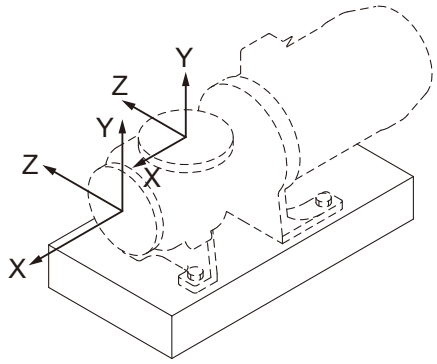
Connections between the pipes and the pump ports should be tightened according to the table below.
The tightening torque is the figure when metallic flanges and rubber gaskets are used.

Tightening torque (RV)

Bolt size	Tightening torque
M16	79 N•m

■ Piping load and momentum

The permissible piping weight and moment to the pump are as below.



Permissible stress to the pump flange

Direction of load	Load (kN)			
	Outlet flange		Inlet flange	
	AMP 40 & 50	AMP 65	AMP 40 & 50	AMP 65
Fx	0.71	1.07	0.89	1.33
Fy (Compressive/Tensile stress)	0.89/0.44	1.33/0.67	0.58	0.89
Fz	0.58	0.89	0.71	1.07

Permissible moment to the pump flange

Direction of load	Moment (kN•m)			
	Outlet flange		Inlet flange	
	AMP 40 & 50	AMP 65	AMP 40 & 50	AMP 65
Mx	0.46	0.95	0.46	0.95
My	0.35	0.72	0.35	0.72
Mz	0.23	0.47	0.23	0.47

Installation

■ Suction line

1. Flooded suction application

Always realize the flooded suction.

2. Suction line bore

A suction line bore should be equal to or larger than pump inlet.

3. Shortest line length

Have the shortest length with the minimum number of bends.

4. Straight line length

A suction line should be laid on straight from the pump inlet.

When the pump inlet bore is 50A or smaller, the straight line length should be of 500 mm or longer.

When the pump inlet bore is 65A or larger, the straight line length should be eight times longer than inlet bore. For the easy pump removal and maintenance, install a removable pipe of 300mm in straight line.

5. Air pocket

Do not make any projection or arched line where air may be trapped.

The suction line should be laid with a rising gradient of 1/100 toward the pump.

6. Use of the eccentric reducer

If the pump inlet bore is different from that of the suction line, use the eccentric reducer. Upper side should always be level. The air may be trapped if it is mounted upside down.

7. Gate valve installation

In flooded suction, always install a gate valve on the suction line for overhaul & inspection.

8. Flushing line

Install a flushing line for cleaning the pump when handling a harmful liquid.

9. Suction line end

The suction line end should always be at least 500 mm lower than a liquid level for the prevention of entrained air.

10. In a piping system other than the flooded suction

- The distance between the end of suction line and the bottom of the supply tank should be 1 to 1.5 times wider than the suction line bore.
- Be sure to install a foot valve or a check valve on the suction line.

11. Piping support

Use metal supports so that the pump is not subject to piping weight or thermal stress.

12. Connections

Each connection must be completely sealed so that air can not be entrained. Otherwise, insufficient suction or the seizure of bearing may result.

■ Discharge line

1. Discharge piping bore

When the discharge piping is long but the piping bore is equal to the pump outlet bore, the specified performance may not be obtained because pipe resistance becomes high. Calculate pipe resistance in advance to decide a discharge piping bore.

2. Discharge valve installation

Install a discharge valve on the piping about 1m away from the pump. The air bleed piping should be provided near the discharge valve in order to prevent the air from remaining.

3. Gate valve installation

Install a gate valve on the discharge piping to adjust flow rate and to protect the motor from overload. If a check valve is installed, the optimum installation order is : Pump → Check valve → Gate valve.

4. Pressure gauge

A pressure gauge is required on the discharge piping to check operating conditions such as discharge capacity and head.

5. Check valve

A check valve is required in the following cases.

- Discharge piping length is between 15 and 20 meters.
- Actual head is higher than 15 meters.
- The distance between the liquid level in the tank and the top end of discharge piping is 9 meters or more.
- Two pumps run in parallel.

6. Air vent

Install an air vent on the discharge piping when the horizontal piping length is between 15 and 20 meters.

7. Drain

Install a drain valve when draining of liquid is required (to protect the pump from freezing, etc.).

8. Piping support

Support the piping by pipe supports so that the piping weight does not totally weigh the pump.

9. Priming piping

A priming line is required on the discharge piping when piping is not flooded suction.

3. Wiring

Electrical works or wiring must be carried out by a qualified person according to local laws or regulations.

- Use the electromagnetic switch which conforms to the motor specifications of voltage and capacity etc.
- When installing the pump out of doors, take a measure to prevent rain water from getting into the switch when wiring.
- Install the electromagnetic or the push-button switch apart from the pump.
- The star-delta starter, inverter, or soft starter is recommended to start the motor of 5.5kW or more.
- Check the rotational direction of the motor before electric wiring.

* See the instruction manual of the motor manufacturer for the motor detail.

4. Protection equipment

It is recommended to install the following monitoring devices in order to protect the pump.

1. Current sensor/ Power sensor	The sensors monitor the motor load and stop the pump on the detection of load change, giving an alarm.
2. Pressure sensor	The sensor monitors the starting pressure and stops the pump on the detection of pressure change, giving an alarm.
3. Flow sensor	The sensor monitors the discharge flow and stops the pump on the detection of flow change, giving an alarm.
4. Level sensor	The sensor monitors the liquid level and stops the pump when it falls below the specified level, giving an alarm.

It is recommended to install two or more monitoring devices. The more monitoring devices, the more possibility of protecting the pump.

The DRN series dry running protector (electric current sensing type) is also available as an option. Contact us for detail.

Operation

Operation

1. Before operation

⚠CAUTION

- Never run pump dry or shut off a suction valve during operation. Otherwise the pump fails in a short period.
- Check the rotational direction of the pump. Clockwise seen from the motor end is a correct direction. Operation in the reverse direction may cause pump damage. Always carry out rotation check with the pump full of liquid.
- Stop the pump within one minute if cavitation occurs.
- Do not run the pump when air enters the suction line.
- Stop the pump immediately when the magnet coupling is disconnected. The magnet force reduces if the pump keeps on running for more than one minute in this condition.
- The maximum number of ON-OFF operation should be within six times an hour. Frequent ON-OFF operation can reduce the pump life.
- Keep liquid temperature change within 80˚C through operation and stopping.
- Close the discharge valve and then start the pump to avoid water hammer (and slowly open the discharge valve to the desired level).
- Closed-discharge operation should be within one minute. If the pump runs with a discharge valve closed for a long time, the liquid temperature inside the pump rises and it damages the pump.
- If power is interrupted when the pump is running, switch off and close a discharge valve.
- Take extra care so that the discharge pressure does not exceed the pump limit.
- When high temperature liquid is transferred, the pump surface becomes very hot. Take a protective measure against burns. Before disassembling the pump or piping, leave them more than one hour to cool them down. See below.

Liquid temperature	Surface temperature (at ambient 40°C)
80°C	75°C

- In case the pump noise affects human health or the communication to secure a safety, provide a noise reduction cover. Be careful not to reduce cooling effect by a motor fan.

Pump model	Noise level
AMP40-1, AMP50-1	90dB (A scale - one meter)
AMP65-1	95dB (A scale - one meter)

2. Operation

Make sure any abnormal, dangerous conditions or leakage are not found on the pump and piping before the operation. Do not operate the pump without inspecting/solving problems.

1. Fully close a discharge valve and fully open a suction valve.

2. Prime the pump.

- If the pump is in flooded suction system, fully open both discharge and suction valves.
- If the pump is other than flooded suction system, prime the suction piping as well as the pump.

3. Check rotating direction of the motor.

- Close a discharge valve. Power the motor for a quick moment (within a second) in order to check the rotation direction. A correct direction is shown with an "arrow" mark on the pump (Clockwise seen from motor fan side).
- Check if the motor fan smoothly stops when it is powered off.

NOTE: If the motor does not stop smoothly, check rotating parts.

4. Air elimination

- Before full operation, eliminate the air in the pump.
- Fully open the valve on the air bleed piping. Run the pump for one second and repeat it 3 to 5 times for air elimination.
- After the air elimination, fully close the discharge valve.

NOTE: In case air bleed piping is not equipped, repeat the momentary run several times with a discharge valve open.

5. Starting operation

- Start the pump with a discharge valve fully closed. Stop the closed-discharge operation within one minute.
- Confirm that discharge pressure rises to the shut off pressure.
- Gradually open discharge valve to obtain the specified pressure (capacity).

NOTE: Pay attention to the over-load caused by an excessively opened valve.

Precautions on operation

1. Check for loose bolts on the pump. Retighten the rear casing support mounting bolts by the specified torque of 85N•m.
2. When the pump keeps running in negative rotation, the pump breaks.
3. Closed-discharge operation should be within one minutes.
4. Make sure that a flow rate is always equal to or more than the minimum one. The operation below the minimum flow can reduce the lubricant and cooling functions on the sliding parts. This could lead to failure. Minimum discharge capacity is 50 L/min.

3. Shutdown

1. Slowly close a discharge valve.

Quick closing by a solenoid valve may cause water hammer and damages the pump. Be sure to slowly close any discharge valve.

2. Switch off and stop the pump.

Check that the pump stops smoothly. If the pump stops roughly, inspect it.

NOTE: If pump operation is stopped in cold weather, liquid inside the pump cavity may freeze and damage the pump. Be sure to drain liquid completely. If the liquid is harmful, empty and then flush it out. In case of a short term shut down, which does not allow removal of liquids, use a band heater to prevent liquid from freezing.

NOTE: In the event of service power failure, turn the power switch off and close the discharge valve.

NOTE: If the system is empty, see page 17 to prime the pump and take the full steps to reboot the pump and the system.

Maintenance

1. Troubleshooting

Troubles	Symptom		Cause	Check & Countermeasures
	When a discharge valve is closed.	When a discharge valve is opened.		
Liquid can not be discharged.		The readings of pressure/ vacuum gauges fluctuate and drops to zero.	• Priming liquid level is too low. • Dry running	• Stop and prime the pump and resume operation.
	The pump can not be primed.		• The foot valve malfunction due to foreign matter clogging.	• Clean the foot valve.
	After starting, the pressure drops as a discharge valve is opened.	The readings of pressure/ vacuum gauges fluctuate and drops to zero.	• Air ingress through the suction pipe end or seal face.	• Check if suction pipe connections are completely sealed. • Check if liquid level in supply tank is not too low.
			• A disconnection of the magnet coupling	• Check if the motor is not overloaded by checking amperage. • Check if foreign matters do not lock the impeller or magnet capsule. • Check if voltage is normal.
	Pressure gauge keeps showing low pressure.		• Low pump speed • The pump rotates in reverse.	• Check wiring or motor. • Correct wiring.
Discharge capacity is too low.	Pressure & vacuum are normal.	Vacuum is high.	• The strainer is clogged with foreign matters.	• Remove foreign matters.
		Vacuum is very high.	• Air pocket in suction line	• Check and correct suction line.
			• Foreign matters are clogged at impeller inlet.	• Remove foreign matters.
		The readings of pressure gauge & vacuum gauge fluctuate.	• Air ingress from suction pipe or seal face.	• Check pipe connections and retighten as necessary.
			• Discharge piping clogs with foreign matters.	• Remove foreign matters or scale from pump/piping.
		Vacuum gauge indicates high but pressure is normal.	• Resistance such as air pocket in suction line.	• Check if there is no arched pipework.

Troubles	Symptom		Cause	Points to be checked & Countermeasures
	When discharge valve is closed.	When discharge valve is opened.		
Discharge capacity is too low.	Pressure & vacuum are normal.	Pressure is high but vacuum is normal.	• Actual head is too high or pipe resistance is too large.	• Check actual head and pipe resistance.
	Pressure is low and vacuum is very low.	Pressure and vacuum are low.	• Motor rotates in reverse.	• Interchange motor wiring.
Motor is overheated.			• Power voltage is low.	• Check voltage or frequency.
			• Overload	• Check specific gravity and viscosity of liquid.
			• Ambient temperature is too high.	• Keep a good ventilation.
Discharge capacity is rapidly reduced.		Vacuum gauge indicates high figure.	• Suction piping clogs with foreign matters.	• Remove foreign matters.
Pump vibrates.			• Poor foundation	• Reinstall the pump.
			• Loose mounting bolts.	• Retighten the bolts.
			• Cavitation occurs.	• Remove the cause of cavitation.
			• The bearing is worn or melted.	• Replace as necessary.
			• Magnet capsule or spindle is broken.	• Replace as necessary.
			• Dynamic balance of drive magnet is upset.	• Remove the cause. Replace as necessary.
			• Motor bearing is worn.	• Replace bearing or motor.

2. Maintenance & Inspection

⚠ WARNING

- **Do not have the medical electronics close to magnet.**
  Any person who is equipped with the medical electronic such as a pacemaker should not be close to the magnet of pump.
- **Pay attention to magnet force**
  The magnet force is powerful. Take care not to catch the finger in metal parts.

■ Periodic inspection (Every six months)

Part names	Inspection items	Measures
Drive magnet unit	● If there is a friction trace. ● If the drive magnet housing is correctly mounted or if the hex. socket set screws are not loosened. ● Decentering of the magnet and motor shaft (Max.1/10mm).	○ If abnormality is found, contact us. ○ Remount the drive magnet to motor shaft or retighten the set screws. ○ Retighten the hex. socket set screws or replace the drive magnet (Contact us for replacement.).
Rear casing	● If there is a friction trace in inner surface. ● If there is a crack on wet-end material. ● If the rear thrust ring is worn. ● If the inside is dirty.	○ If abnormality is found, consult us. ○ Replace as necessary. ○ If it is worn, contact us. ○ Clean the inside.
Magnet capsule	● If there is a friction trace on surface. ● If there is a crack on surface. ● Measure the bearing inner bore. ● If the impeller is secured to the magnet capsule.	○ If abnormality is found, contact us. ○ If abnormality is found, contact us. ○ Replace it if it is worn beyond the wear limit. ○ If it is loose, replace or contact us.
Impeller	● Measure the mouth ring thickness. ● If there is a crack. ● If there is a cavitation trace. (Abnormality related to the mouth ring such as wear and seizure.) ● If the impeller is not clogged. ● If the impeller is deformed.	○ Replace as necessary. ○ Replace as necessary. ○ Remove the cause of cavitation. ○ Remove clogs. ○ Replace as necessary.
Front casing	● Wet-ends are dirty. ● If there is a crack. ● If there is an abnormal wear, crack and friction trace on liner ring. ● If drain is clogged. ● If gasket is swelled or O ring is cracked. ● If there is a friction trace.	○ Clean them. ○ Replace as necessary. ○ Contact us if abnormality is found. ○ Clean the drain. ○ Replace as necessary. ○ Contact us.
Spindle	● If there is a crack. ● If the bearing is worn beyond the limit.	○ Replace as necessary. ○ Replace as necessary.
Rear casing support	● If the rear casing support mounting bolts are not loose.	○ Retighten the bolt by 85N•m. ○ When a frequent ON-OFF operation is made or liquid temperature fluctuates, retighten the bolt periodically.

■ Wear limits of bearing and spindle

Model	Bearing inner diameter		Spindle outer diameter	
	Before use	Wear limit	Before use	Wear limit
AMP40-1, AMP50-1	26	27	26	25
AMP65-1	30	31	30	29

1. The values on the table shows wear limit at each part.

2. If the clearance between the inner diameter of the bearing and the outer diameter of the spindle exceeds 1 mm, either the bearing or spindle, whichever has greater wear, should be replaced regardless of the wear limit.

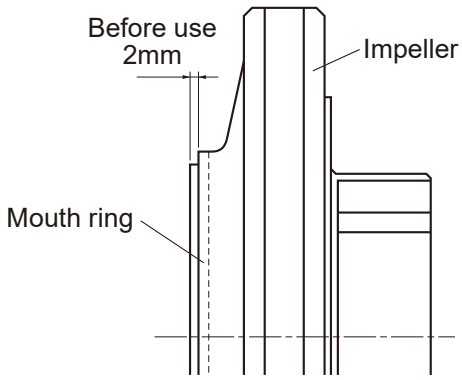
   Carbon bearing (CF) type: Normally the carbon bearing will be replaced first.
   SiC bearing (KK) type : Replace the bearing and spindle at the same time.

3. Sliding parts may suffer initial wear in an initial operation phase but this is not abnormal.

■ Wear limit of mouth ring

The step between the surfaces of the mouth ring and the impeller is 2 mm before use. Before the step becomes 0 mm, replace the mouth ring.

Model	Thickness of mouth ring	
	Before use	Wear limit
AMP40-1	8 mm	6 mm
AMP50-1, AMP65-1	9 mm	7 mm



3. Disassembly & Assembly

⚠ WARNING

- **Pay attention to magnet field**
  The magnet drive pump has a pair of strong magnets. The strong magnet field could adversely affect the persons who are assisted by electronic devices such as the pacemaker.


Prohibited

- **Do not catch the finger**
  The magnet force of the pump is powerful. Take care not to catch the finger in the bracket.


Caution

- **Wear protective clothing**
  Coming in contact with a harmful chemical liquid may cause eye or skin trouble. Wear protective clothing such as a protective mask, goggles, gloves during the work.


Wear protective gear

- **Turn off power during the maintenance work**
  Risk of electrical shock. Make sure the power source is turned off, and the pump and devices are stopped prior to the work.


Turning off power

⚠ CAUTION

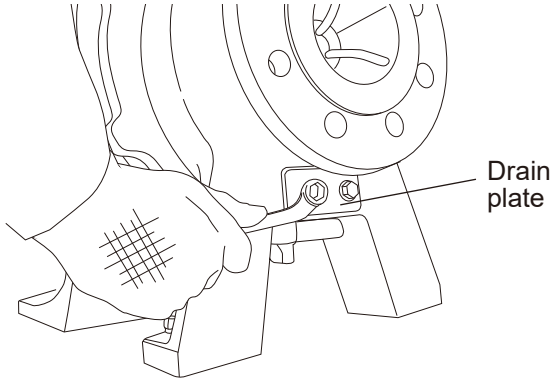
- **Pay attention to magnet force**
  The magnet force is powerful. Take care so that iron pieces and iron powder do not stick to the magnet of pump.

- The powerful magnet force can break the data of the magnetic card, disc or so. Do not have the magnetic product close to the magnet of pump.

Tool list

Following tools are necessary to disassemble and assemble the pump.

Tool	AMP40-1, AMP50-1, AMP65-1	Remarks
Spanner	13 mm, 19 mm, 24 mm	1 pc/each
Hex. wrench	4 mm, 5 mm	1 pc/each
Plastic round bar	34 mm dia. × 100 L	To remove & mount bearing
Plastic welder or industrial dryer	1 unit	
Handpress	1 unit	
A flathead screwdriver	1 pc	
Longnose pliers	1 pc	
Plastic hammer	1 pc	

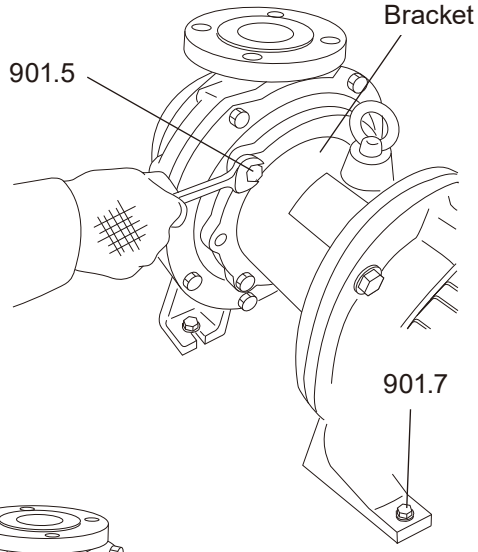


■ Pump casing disassembly

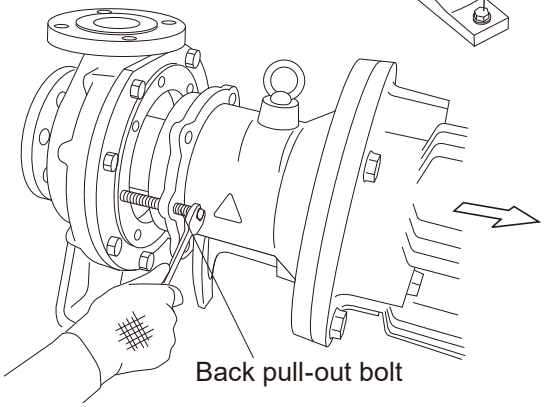
1. Remove the hex. bolts (901.1) and drain plate (122.1) to drain liquid out of the pump unit.
   For the pump model without drain, neutralize the liquid or flush the pump unit out. And then remove liquid by dismantling the pump or pipework.

⚠WARNING

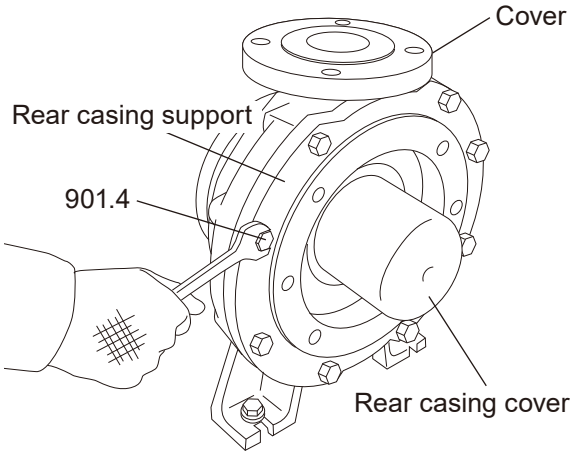
- Solution in the discharge line may be under pressure. Release the pressure from the pump and discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.
- Try to slowly loosen the hex head bolts just in case the pressure remains in the pump.



2. Remove two mounting hex. bolts (901.7) on the foot support.
3. Remove four pump unit mounting hex. bolts (901.5) on the bracket (330).

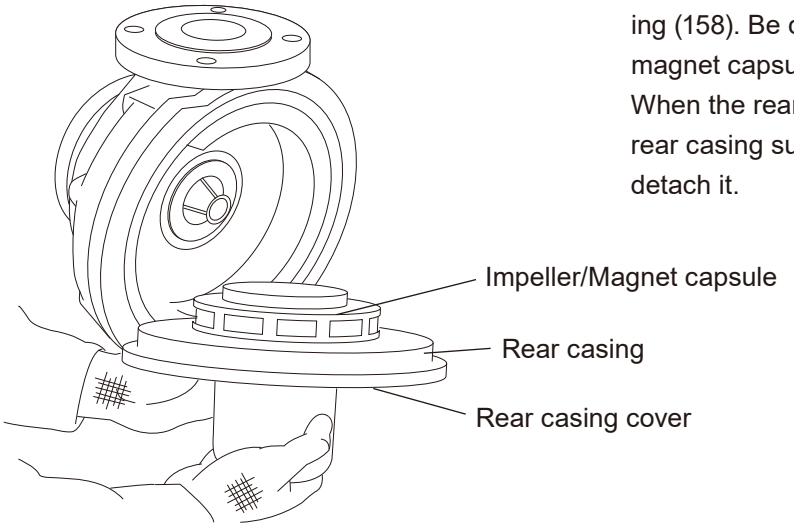


4. Pull the motor backward by alternatively screwing in the two bolts (M12×100: for back pull out). Screw in the bolts by approximately 80 mm.
5. Pull out the motor with bracket, lifting it using a crane. Draw the motor out straight so that the drive magnet (858) does not come in contact with the rear casing (158).
   Keep the motor balanced when it is lifted up.

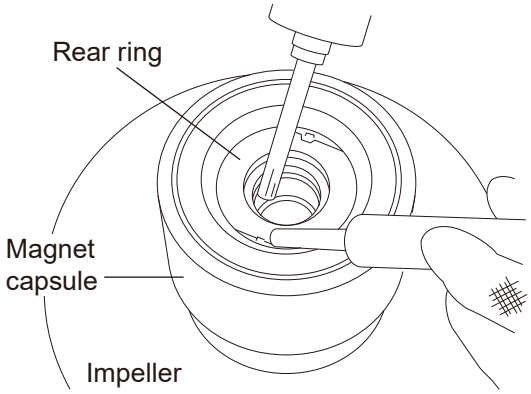


6. Unscrew the hex. bolts (901.4) which is fixing the rear casing support to the cover (100.2) and then remove the rear casing support.

NOTE: The rear casing and the rear casing cover may be removed together with the rear casing support.
Be careful not to drop the impeller (230)/ magnet capsule (859) unit from the rear casing.



7. Remove the rear casing cover (159) from the rear casing (158). Be careful not to drop the impeller (230)/ magnet capsule (859) unit from the rear casing.
When the rear casing can not be removed from the rear casing support, hit the bottom of the rear casing to detach it.

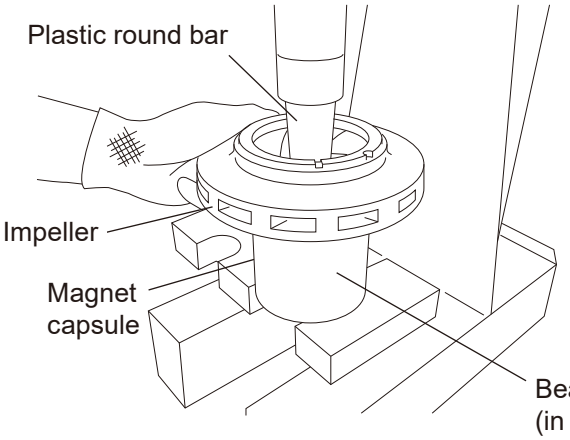


■ Removal of the impeller and bearing

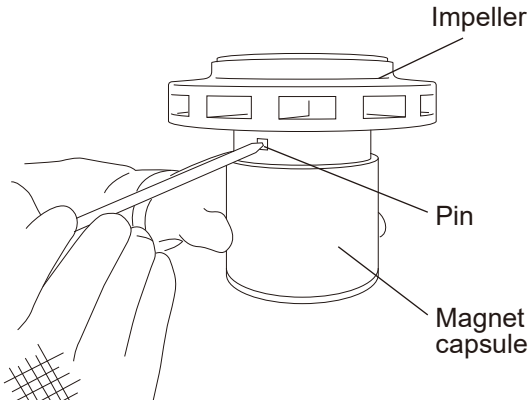
1. Heat the lugs on the rear ring (314.4) by a plastic welder or industrial dryer and open the lugs up.

2. Warm the impeller assembly in the hot water of 80˚C. If it is not warmed up enough, the bearing or the rear ring may break.

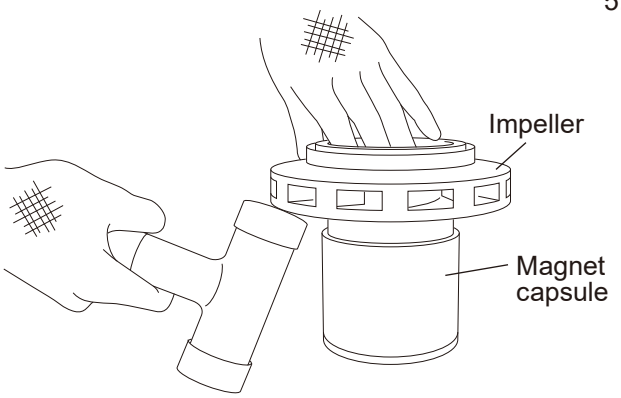
! Wear protective clothing for the prevention of scald.



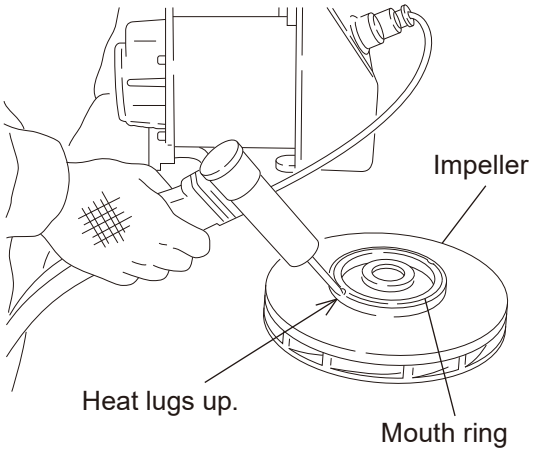
3. Apply the plastic round bar (34 mm dia. x 100 mm length,) to the impeller-side bearing end and then push out the bearing (310) and rear ring (314.4) using a hand press.



4. Push off the pin (942) using a screw driver.



5. Remove the impeller (230) from the magnet capsule (859). If the impeller can not be removed, hit the impeller back lightly with the plastic hammer.



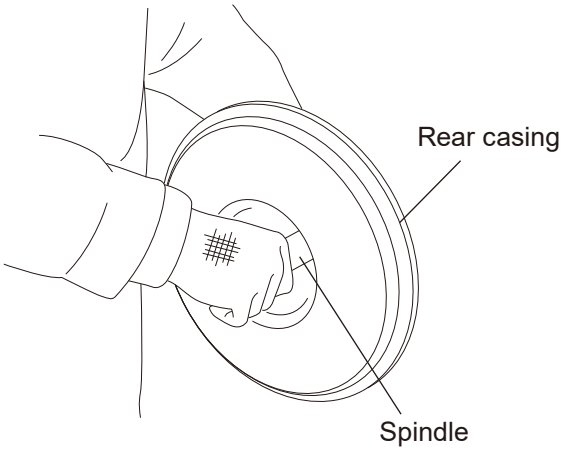
■ Mouth ring replacement

1. Heat the lugs on the mouth ring by a plastic welder or industrial dryer and open the lugs up.

2. Warm the impeller in the hot water of 80˚C and then replace the mouth ring (314.2) with new one.

! Wear protective clothing for the prevention of scald.

3. Heat the lugs on the mouth ring by a plastic welder or industrial dryer and then close the lugs down.

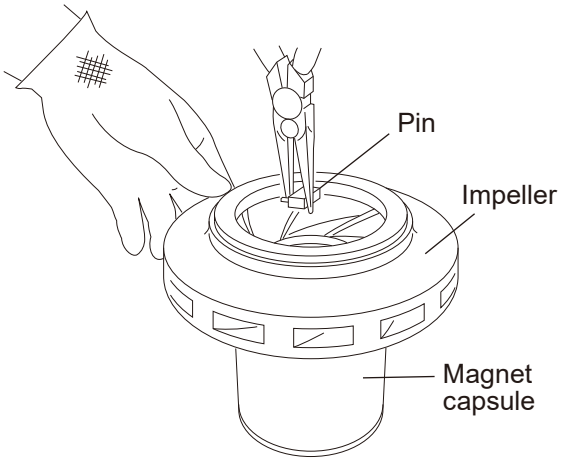


■ Spindle replacement

1. The spindle (210) is slightly pressed into the rear casing (158). Pull the spindle out by hand.
   Warm the rear casing in hot water if the spindle can not be pulled out. Then pull the spindle out by lightly moving it from side to side and up and down. The rear thrust ring (314.3) comes off as the spindle is removed.

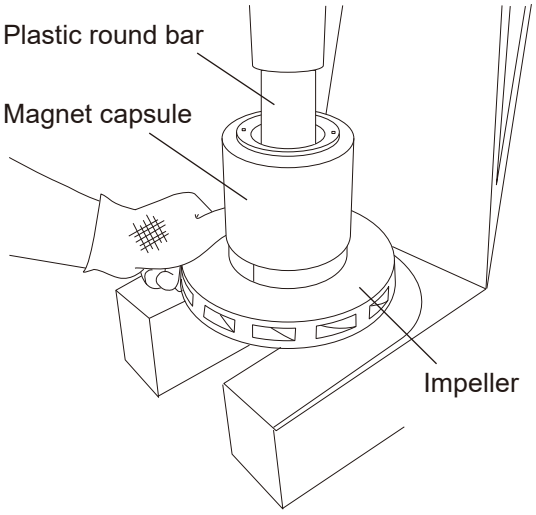
! Wear protective clothing for the prevention of scald.

2. Clean the insertion part of the spindle. Fit the rear thrust ring in the rear casing with no interference to the spindle insertion. Press the spindle into place by hand or with the hand press.



■ Impeller/Bearing mounting

1. Fit the impeller into the magnet capsule, mating the insert ports of the pin.
   Note that the mated connection of the impeller and the magnet capsule need to be machined. We have all the impeller machined in advance.
2. Insert the pin. Use pliers for easy insertion.

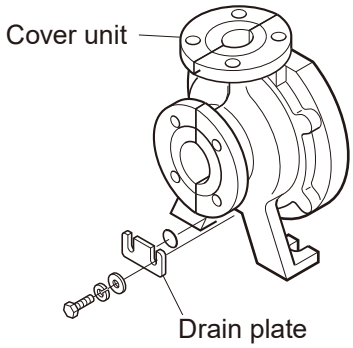


3. Turn the magnet capsule upside down with the impeller fitted. Warm the magnet capsule in the hot water of 80˚C. After it is warmed, press the bearing into the magnet capsule with the hand press.

! Check that the pin is fully inserted and there is no interference during press fitting.

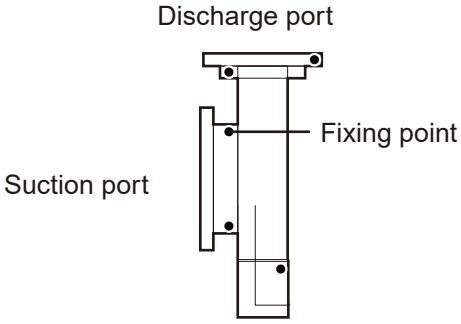
! Wear protective clothing for the prevention of scald.

4. Press the rear ring into the magnet capsule using the hand press. Heat the lugs on the mouth ring by a plastic welder or industrial dryer and then close the lugs down.



■ Front casing/Cover unit replacement

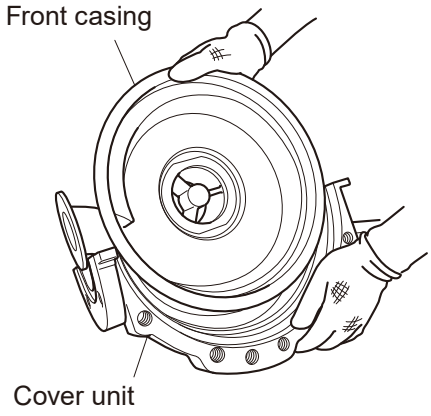
1. Remove the drain plate (122.1) from the cover unit (100.2)



Cover unit (side-view)

2. Remove all the hex. socket head bolts (903.1).
   The cover unit is fixed at the fixing points as shown in the left figure (The fixing points changes depending on the pump model.).

3. Detach the cover halves from the front casing



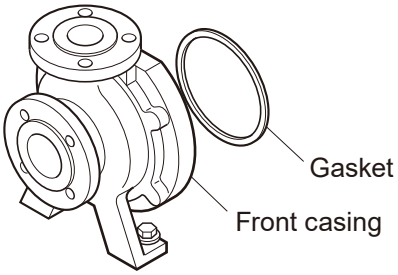
4. Align and install the new front casing into the covers.
   Clean any foreign matter or build-up on the contacting surfaces of the covers before putting them together.
   Should the front casing be hard to be mounted in the covers, heat the front casing in warm water to 90°C (194°F) to help this step.

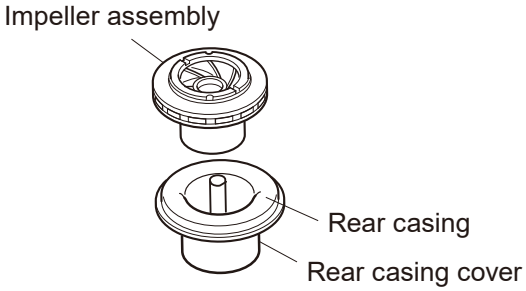
! Wear protective clothing for the prevention of scald.

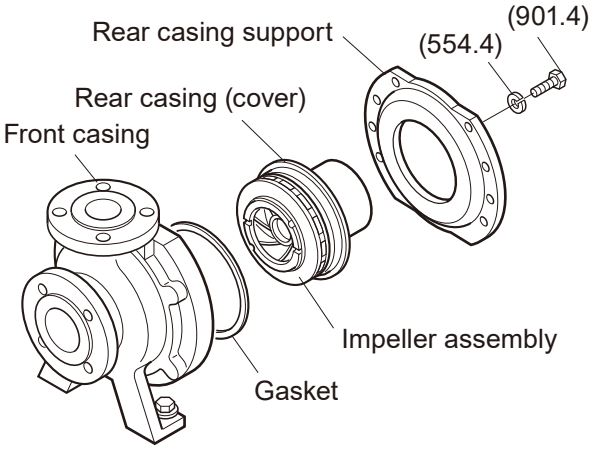
If the new cover units are used:
The cover halves have sharp edges on their contacting surfaces. Remove them with a metal file so that the front casing will not be damaged.
This pump uses a pair of strong magnets (the drive/driven magnets). Confirm that there are no metal pieces or other matter adhering to these magnets.
If necessary, use an air blow gun and a dry cloth to remove them.

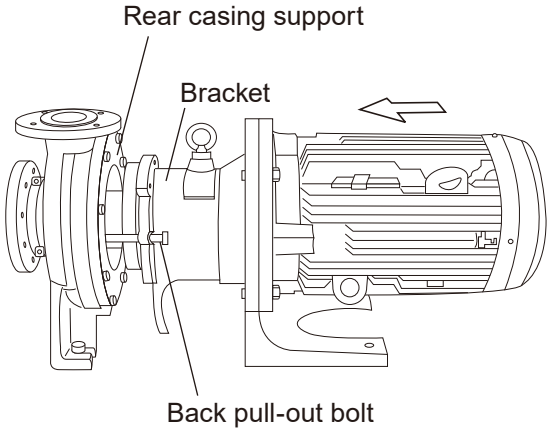
5. Secure all hex. socket head bolts tightly to fix the covers.

6. Tighten the drain cover hex. bolts.









■ Assembly

Assembly can be made in reverse procedures to dismantlement. Pay attention to the following points.

Gasket replacement

Always replace the gasket with new one every time the pump unit is assembled. Do not twist or catch the gasket in the parts. Clean the sealing surfaces before mounting.

Tightening of bolts

Tighten the bolts diagonally and evenly.

Cleaning magnet capsule

Waste metal such as Iron pieces can be attracted to the magnet capsule. Remove such foreign matters before assembly.

1. Place the gasket in the front casing (100.1).
2. Place the impeller assembly onto the spindle in the rear casing. Slowly rotate and fit the rear casing to the front casing.
3. Mount the rear casing cover and the rear casing support. And then tighten the rear casing support mounting hex. bolts by 85N•m diagonally and evenly.

NOTE: Loose the bolts (901.7) on the foot support before retightening the rear casing support mounting bolt.

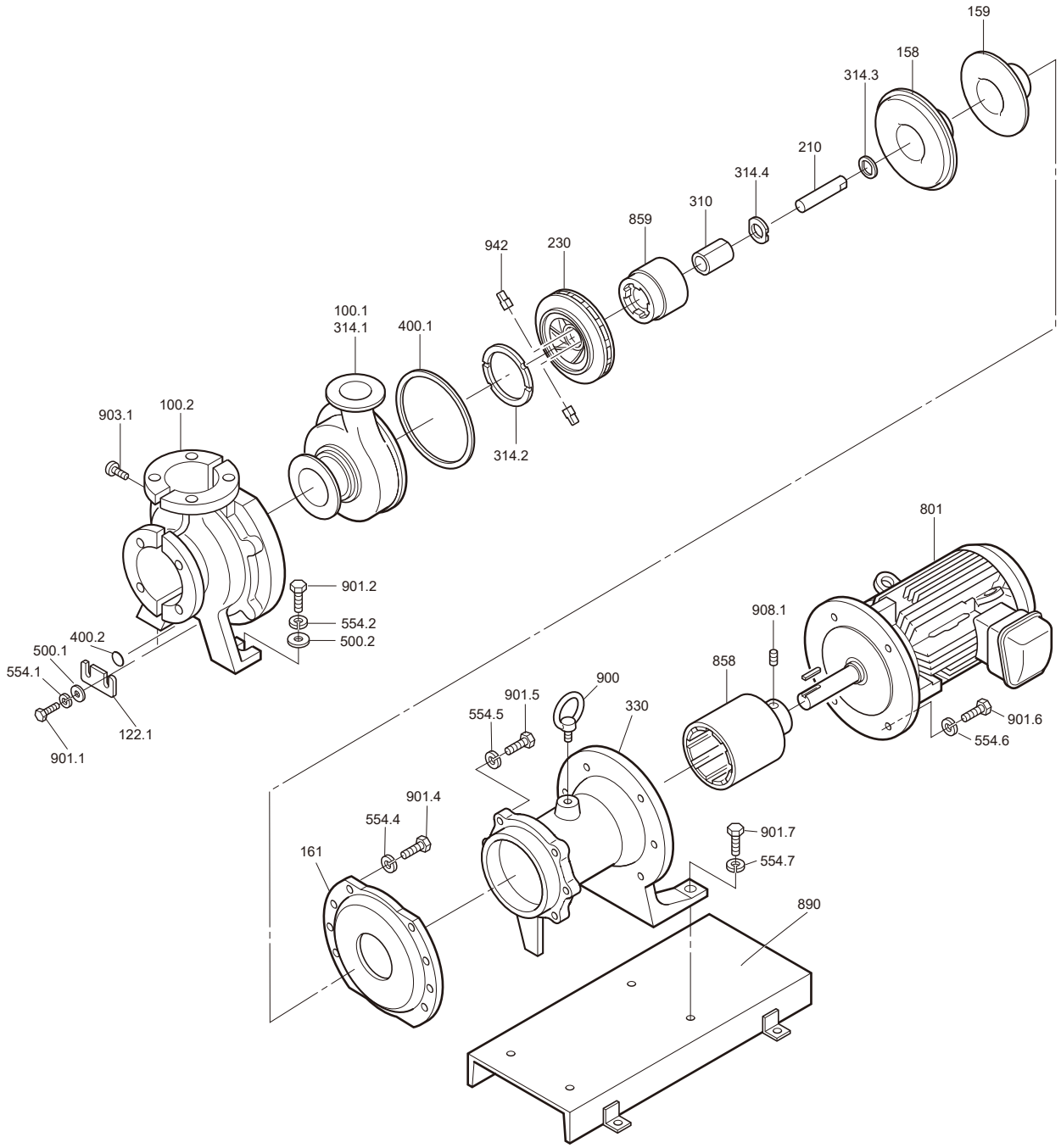
4. Remove foreign matters from the drive magnet on the motor shaft.
5. Screw the two bolts (M12×100: for back pull out) in the bracket half way. Direct the motor bracket to the pump unit parallel.
6. Slowly close the motor to the pump unit by alternatively unscrewing the two bolts (M12×100: for back pull out).

   Fit the motor straight to the pump unit so that the drive magnet (858) does not come in contact with the rear casing.

   Fix the bracket and the rear casing support by mounting hex. bolts.

! After assembly, retighten the rear casing support mounting bolts. Take care not to catch the finger in metal parts.

4. Spare & Wear parts



Maintenance

Always stock spare parts, especially wear parts, for a long period of continuous operation.
Contact us with the following items when placing an order for spare parts.

1. Part name and part number (See the exploded view.)
2. Model code and MFG.No (See the nameplate)
3. Drawing number (If you have an approved drawing.)

No.	Part names	ID	Material	Reference code		
				AMP40J/40A	AMP50J/50A	AMP65J/65A
210	Spindle	CF	Alumina ceramic 99.5%	AMP0012	AMP0012	Contact us.
		KK	SiC	AMP0013	AMP0013	
310	Bearing	CF	High density carbon	AMP0014	AMP0014	
		KK	SiC	AMP0015	AMP0015	
314.2	Mouth ring	CF	Filled PTFE	AMP0016	AMP0055	
		KK	SiC	AMP0017	AMP0056	
314.3	Rear thrust ring		PTFE	AMP0018	AMP0018	
400.1	Gasket, Casing		PTFE	AMP0024	AMP0024	
400.2	Gasket, Drain		PTFE	AMP0025	AMP0025	

Assembly parts are also available. Contact us for detail.

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