

IWAKI Hicera Pump

V series

Instruction Manual

 Read this manual before use of product

Thank you for selecting an Iwaki V Series Hicera 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.

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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 instruction

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 personal 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.

For exportation

Technology related to the use of goods in this instruction manual falls in the category of technology contained in the Foreign Exchange Order Attachment, which includes complementary export control of technology. Please be reminded that export license, which is issued by the Ministry of Economy, Trade, and Industry could be required, when this is exported or provided to someone even in Japan.

Safety instruction

WARNING

- **Turn off power before work**

Be sure to turn off power before starting maintenance/repair work. Make sure no one turns on power while working on the pump, otherwise it may result in a serious accident. Let other people know about the situation by displaying a notice such as "POWER OFF (Maintenance)" near power switch.



- **Stop operation**

On sensing danger or abnormality in operation, stop operation immediately and solve problems.



- **For a specified application only**

Use of the pump in any application other than those clearly specified may result in a personal injury or property damage.



- **Do not remodel the pump**

A remodelled pump will not be warranted. Also, we are not responsible for a personal injury or property damage due to modification.



- **Wear protective clothing**

Always wear protective clothing such as eye protection and protective gloves during pipework or dismantlement of the pump.



- **Protect the pump from getting wet or high humidity**

Risk of an electrical shock or a short circuit. The pump is not water-proof or dust-proof structure. Do not wet the pump or place in a highly humid place.



Safety instruction

CAUTION

- **Earthing**

Risk of electrical shock. Do not run the pump without earthing. Secure earth protection to reduce the risk.



- **Install an earth leakage breaker**

Risk of electrical shock. Do not run the pump without a leakage breaker. Secure a leakage breaker to reduce the risk.



- **Do not damage the power cable**

Do not pull or knot the power cable or place a heavy stuff on it. Damage to the power cable could lead to a fire or an electrical shock.



- **Observe instructions in this manual in dismantlement work**

Do not dismantle the pump beyond the extent of instructions in this manual.



- **Limitations on working and storage areas**

Do not install or store the pump in the following places where...

1. Ambient temperature exceeds 40°C or falls below 0°C.
2. in a flammable atmosphere



- **Disposal of the used pump**

Dispose of any used or damaged pump in accordance with relevant regulations. Consult a licensed industrial waste products disposing company.



- **A qualified operator only**

The pump must be handled or operated by a qualified person with a full understanding of the pump. Any person who is not familiar with this product should not take part in operation or management.



Safety instruction

CAUTION

- **For a specified power only**

Do not apply any voltage other than the specified one on the motor name-plate. Otherwise, damage or fire may result.



- **Do not run pump dry**

Do not run pump dry (Operation without liquid). Friction heat builds up during dry running operation and damages internal parts. If the pump is operated with a suction side valve closed or without priming, the pump runs dry.



- **Do not wet electric parts or wiring**

Risk of fire or electrical shock. Install the pump free from liquid spill.



- **Ventilation**

Poisoning may result when handling a harmful liquid. Keep good ventilation in your working area.



- **Countermeasure against efflux**

Take protective measures against accidental chemical efflux and splash at pump or piping breakage. Do not allow an outflow to directly soak into the ground.



- **Do not use a damaged pump**

Using a damaged pump could lead to an electric leak or shock.



Outline

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Outline

1. Unpacking & Inspection

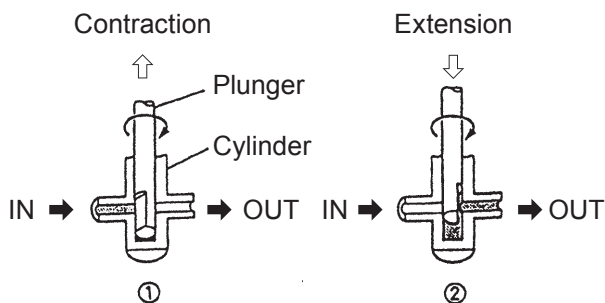
On unpacking the product, check the following points. If you find any problems, contact your nearest distributor.

1. Check the information on nameplate (model code, flow rate, head and voltage) to see if the product is delivered as per order.
2. Check for transit damage, deformation and loose bolts.

2. Product outline

The Hicera pump is a metering pump with ceramic wet ends such as a plunger, a cylinder and other related parts.

The plunger reciprocates and rotates in the cylinder where liquid is taken in from a suction line and then delivered to a discharge line.



1. The rotating plunger contracts to take in liquid into the cylinder from a suction line as the duct on the plunger passes the inlet.
2. The rotating plunger extends to let out liquid from the cylinder to a discharge line as the duct on the plunger passes the outlet.

- ⇌: Plunger reciprocation
→: Plunger rotation
➡: Flow direction

Outline

3. Model code

V - 05SLP 1 A 1 - X

a b c d e

a. Plunger diameter, Wet end materials, Flushing port

Code	Plunger dia (mm)	Plunger/Sylinder material	Pump head material	Flushing port	Applicable pumps
05SL	ø5	SiC/SiC	SCS14	—	V-05
05SLP	ø5	SiC/SiC	SCS14	Equipped	V-05
10AL	ø10	AL2O3/AL2O3	SCS14	—	V-10
10ALP	ø10	AL2O3/AL2O3	SCS14	Equipped	V-10
10SL	ø10	SiC/SiC	SCS14	—	V-10
10SLP	ø10	SiC/SiC	SCS14	Equipped	V-10
15AS	ø15	AL2O3/AL2O3	SUS304	—	V-15
15ASP	ø15	AL2O3/AL2O3	SUS304	Equipped	V-15
15SS	ø15	SiC/SiC	SUS304	—	V-15
15SSP	ø15	SiC/SiC	SUS304	Equipped	V-15

Pump head material code L: SCS14 (Lost-wax casting) for the V-05, 10

S: SUS304(machining) for the V-15

b. Joint

- 1: ø6mm SUS tube joint (V-05/-10)
- 2: ø10mm SUS tube joint (V-05/-10)
- 3: ø13mm SUS joint (V-15)
- 4: Rc1/4" SUS female thread joint (V-05/-10)
- 5: Rc3/8" SUS female thread joint (V-15)
- 6: Other joints

c. Induction motor speed reduction ratio

A: 1/150 **B:** 1/75 **C:** 1/30 **D:** 1/15 **E:** 1/7.5 **F:** 1/5 **G:** 1/3

d. Power voltage

- 1: 100VAC single-phase motor
- 2: 200VAC single-phase motor
- 3: 200VAC three-phase motor
- 4: 100-115VAC single-phase motor
- 5: 220-230VAC single-phase motor
- 0: Other motors

e. Special version code

X: Custom design (Contact us for detail)

Outline

4. Specification

50/60Hz

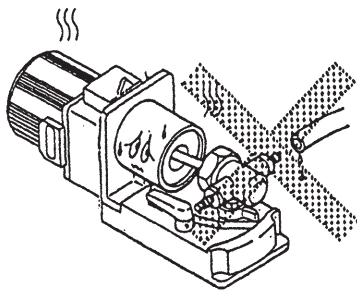
Model	Gear ratio	Speed (rpm)	Max. flow (ml/min)	Max.press. (MPa)	Tube joint (mm)	Standard motor	Mass (kg)
V-05SL1A5	1/150	9/11	1.6/1.9	0.7	ø6 SUS tube joint	Induction motor 100VAC 15W	2.3
V-05SL1B5	1/75	19/23	3.3/4.0				
V-10□L1A5	1/150	9/11	6.0/7.0				
V-10□L1B5	1/75	19/23	13/16				
V-10□L1C5	1/30	48/58	33/40				
V-10□L1D5	1/15	96/116	67/81				
V-10□L2E5	1/7.5	193/232	135/163	0.6	ø10 SUS tube joint	Induction motor 100VAC 25W	3.0
V-10□L2F5	1/5	290/348	203/245	0.4			
V-10□L2G5	1/3	483/580	338/409	0.3			
V-15□S3E5	1/7.5	193/232	559/673	0.5	ø13 SUS tube joint	Induction motor 100VAC 40W	8.0
V-15□S3F5	1/5	290/348	841/1009	0.3			
V-15□S3G5	1/3	483/580	1400/1682	0.2			

- Either A: AL₂O₃/AL₂O₃ or S: SiC/SiC comes in □:
- Performance values in the above table are based on pumping clean water at ambient temperature.
- The revolution per minute is based on use of clean water and varies with liquid characteristics.
- Discharge capacity per revolution when the pump head is at an angle of 20°.
 - Approx. 0.17ml/rev for V-05
 - Approx. 0.7ml/rev for V-10
 - Approx. 2.9ml/rev for V-15
- The maximum suction lift with clean water is 4 meters and varies with liquid characteristics.
- Flush out crystallizing or adhesive liquid from the pump head after operation. Use of the pumps with flushing ports is recommended.

Installation

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Installation



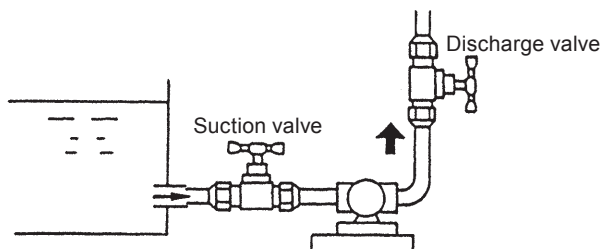
1. Before installation

1. Do not run pump dry (except for the start-up dry running to fill the pump head with liquid.)

Friction heat builds up in the pump head during dry running and the plunger seizes in the cylinder.

2. Do not close valves

Closed-discharge operation causes a sharp pressure rise and may result in pump failure or motor burning out. Be sure to open a suction line and a discharge line before operation.



3. Degassing

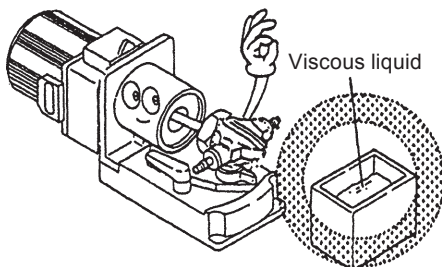
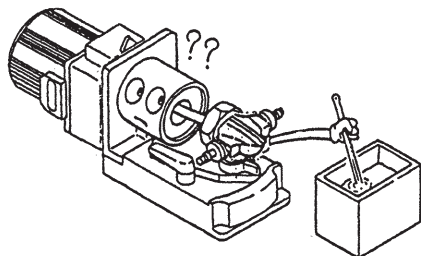
Fully open a discharge line and set the pump head angle to 20° (the maximum stroke length). Run the pump in this condition to expel air from the pump and tubing.

4. Temperature influence

A flow rate, liquid viscosity, vapour pressure and corrosion resistance changes with liquid temperature.

⚠ CAUTION:

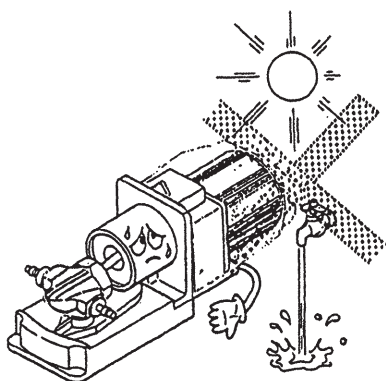
The allowable liquid temperature range is 0-80°C. Apply heat-resistant grease to the motor bearing or use a cooling fan to cool down motor temperature when liquid temperature exceeds 65°C.



5. Viscous liquid

The pump is capable of handling liquid up to 20,000 cP, but then keep pump rotation speed lower as viscosity gets higher, especially when liquid viscosity is 500 cP or more. Contact us for detail.

Installation

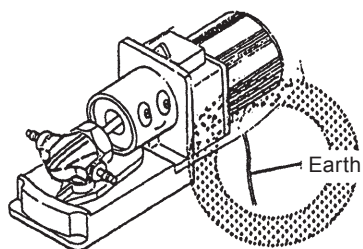


6. Precipitation or Crystallization

Flush out liquid that has property of precipitation or crystallization from the pump head.

⚠ CAUTION

If the pump is left before flushing, the plunger may be stuck in the cylinder. In this case the pump does not start to run.



7. Operating conditions

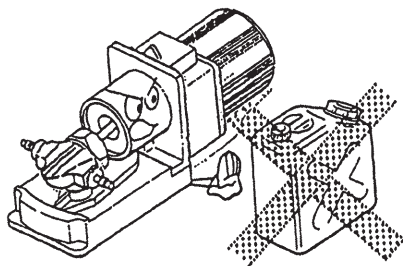
Do not cover the motor tight. Avoid areas where ambient temperature exceeds 40°C or ambient humidity exceeds 85% RH. Do not wet the pump, or an electrical leak or a fire may result.

8. Earthing

Be sure to earth the pump. Install an earth leakage breaker as necessary.

⚠ CAUTION

If an earth leakage breaker has worked to open a circuit, turn off a main power-supply switch. Always determine a root cause and solve problems before resuming operation.

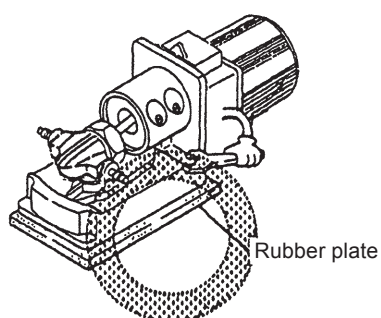
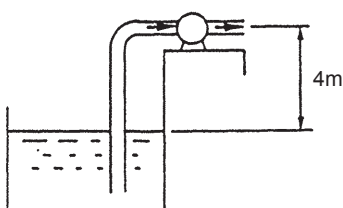
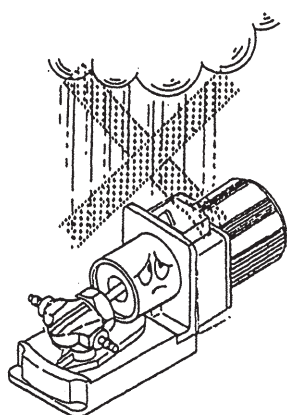


9. Take preventative measures for fire and dust

⚠ CAUTION

Do not place a dangerous or a flammable substance near the pump. Protect the motor from dust.

Installation



2. Installation/Piping/Wiring

■ Installation

1. Select an installation location where is convenient for maintenance. Ambient temperature should not exceed 40°C or falls below 0°C. Observe the maximum ambient humidity of 85%RH. Do not install the pump out of doors.

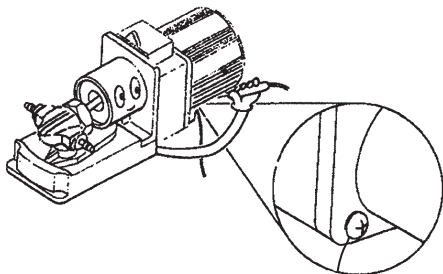
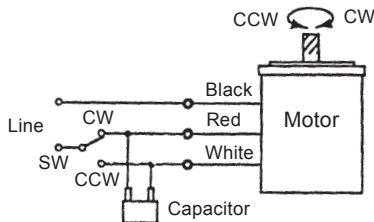
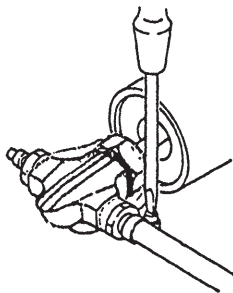
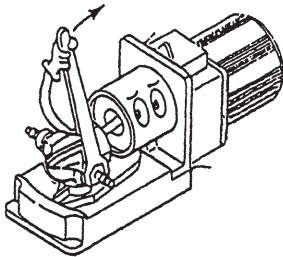
⚠ CAUTION

When installing the pump, be careful not to impact the pump. A strong impact may adversely affect pump performance. The pump can be mounted either vertically or horizontally. A flow direction can be reversed by inverting motor rotation.

2. The maximum suction lift is 4 meters based on operation with clean water and changes according to liquid characteristics.

3. Fix the pump with M5 screws. Place a rubber plate beneath the pump base to reduce noise or oscillation as necessary.

Installation



■ Plumbing

1. Have tubing length shortest with the minimum number of bends in order to reduce pipe resistance.
2. The inlet and outlet ports should be completely sealed for the prevention of air ingress into a flow line. Especially, an imperfect suction line connection entrains air and reduces performance.
3. Select tubes in accordance with an inlet and an outlet bore.
A tube should be resistant to both the specified pressure and the specified liquid.

■ Wiring

Check power-supply voltage and the rated voltage of the pump motor before wiring. Observe an applicable electric code.

■ Earthing

Remove one of fitting screws on the motor mounting flange and the paint under the screw for connecting an earth wire.

Operation

<i>1. Operation</i>	<i>15</i>
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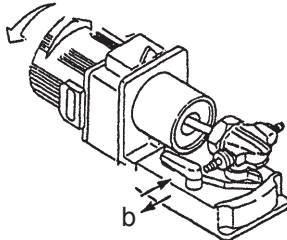
Operation

1. Operation

Do not run pump dry or run it with a discharge valve or a suction valve closed.

■ Starting process

Operate the pump according to the following procedure after installation, tubing and wiring of pump.

No.	Points to be checked	Procedure
1	Tubing, wiring and voltage	<ul style="list-style-type: none"> • See "■ Plumbing" and "■ Wiring" sections. • Check the spec label to see if the power supply voltage is correct.
2	A discharge and a suction line.	<ul style="list-style-type: none"> • Fully open both suction and discharge valves.
3	Rotational direction	<ul style="list-style-type: none"> • Check if the direction of rotation is correct. Prime the pump and run the motor for just a moment to check a flow direction.  <ul style="list-style-type: none"> • Counter clockwise (CCW) CCW rotation seen from the motor end. Liquid flows in the direction of "a". • Clockwise (CW) CW rotation seen from the motor end. Liquid flows in the direction of "b".
4	Starting	<ul style="list-style-type: none"> • Run the pump for a while and check liquid flows without a hitch. Upon finding abnormality, turn off power and solve the cause of abnormality. Refer to "Troubleshooting" section.
5	Operation	<ul style="list-style-type: none"> • Make sure air has been expelled from the pump and a tubing system completely. If not, an accurate flow rate can not be obtained. Angle the pump head to 20° and run the pump until air is expelled completely. After air is all eliminated, adjust discharge pressure to a specified level. • Flow rate can be adjusted from 0 to the maximum by changing the pump head angle.
6	Points to be checked during operation	<ul style="list-style-type: none"> • Do not allow foreign matters to enter the pump. Foreign matters may cause the plunger to be locked or damaged, hindering a liquid circulation.

Install a dampener to reduce pulsation as necessary. Contact for us for detail.

■ Stoppage

No.	Points to be checked	Procedure
1	Wet ends	<ul style="list-style-type: none"> • Flush the pump head with clean water after operation with sticky or settling liquid. Dismantle the pump head for cleaning as necessary.
2	Before a long period of stoppage	<ul style="list-style-type: none"> • Drain liquid from the pump head and dismantle it for cleaning before a long period of stoppage.

Operation

■ Daily inspection

See the following check items in operation. On detection of abnormality, stop operation immediately. Take measures referring to the item "Trouble shooting".

No.	States	Points to be checked	How to check
1	Pumping	• If liquid is pumped.	Flow meter or visual inspection
		• If discharge pressure/ suction pressure is normal.	Check specification.
2	Noise and vibration	• If abnormal noise or vibration occurs. They are signs of abnormal operation.	Visual or audio inspection
		• Place a rubber plate beneath the pump base to reduce noise or oscillation as necessary.	
3	Air ingress from pump head joints and a suction line	• If leakage occurs.	Visual inspection
		• If pumped liquid includes air bubbles, check lines for leakage and retighten as necessary.	
4	High surface temperature of the pump and the motor	• Pump surface temperature gets higher along with liquid temperature.	Touch or use a thermometer
		• Motor surface temperature should be 40°C higher than ambient temperature, or below.	

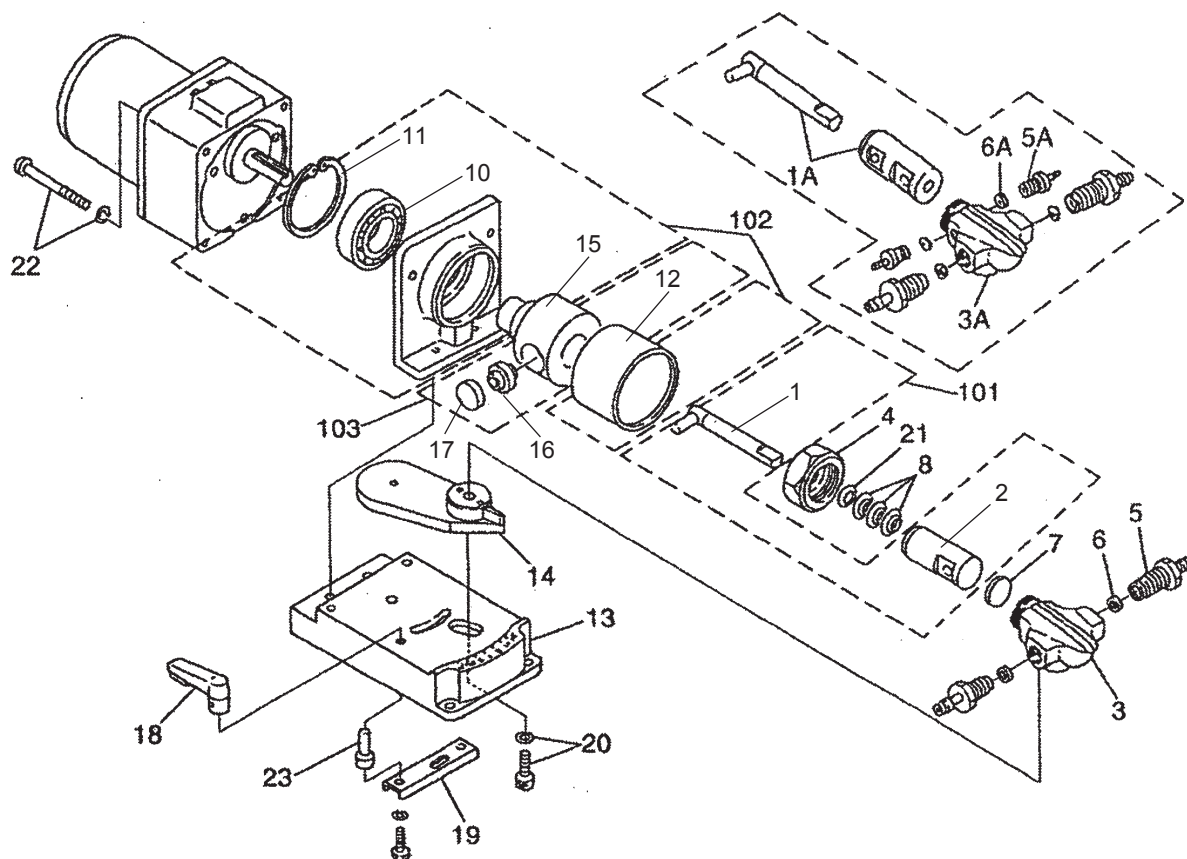
Maintenance

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Maintenance

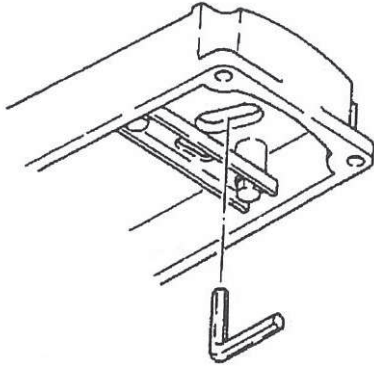
1. Disassembly & Assembly

■ Exploded view (V-05/-10)



No.	Part names	Q'ty	Remarks	No.	Part names	Q'ty	Remarks
1	Plunger	1	Al ₂ O ₃ /SiC	14	Mounting plate	1	
2	Cylinder	1	Al ₂ O ₃ /SiC	15	Drive joint	1	AL
3	Pump head	1	SCS14	16	Spherical bearing	1	
4	Cap nut	1	SUS303	17	Cap	1	
5	Tube joint	2	SUS316	18	Lock lever	1	Zn
6	Joint seal	2	PTFE	19	Lock bar	1	
7	Head seal	1	PTFE	20	Hex. sock head bolt (with sw)	1	SUS304
8	Lip seal	3	PTFE	21	Back seat	1	PTFE
9	Bearing case	1	AC4C	50	Induction motor	1	
10	Bearing	1	6004ZZ	101	Plunger ass'y	1	
11	Stop ring	1		102	Bearing case ass'y	1	
12	Joint cover	1	AL	103	Drive joint ass'y	1	
13	Base	1					

Maintenance



■ Dismantlement (V-05/-10)

Follow the procedure below to take apart the pump head.

1. *Remove tube connections from the pump head.
Be careful not to get wet with chemical liquid.
Wipe chemicals off immediately when your hand or component parts get wet.*
2. *Remove the base (13) from a foundation.*
3. *Release the lock lever (18) and direct the pump head to 10° position.*
4. *Loosen the hex socket head bolt (20) via the hole beneath the base (13) and unfix the connection between the pump head (3) and the mounting plate (14).*
5. *Take out the pump head (3) from the drive joint ass'y (103) with the cylinder and plunger (1) in it.*
6. *Remove the cap nut (4) from the pump head and pull out the cylinder (2) with the plunger (1) in it.*
7. *Pull out the plunger (1) by rotating it in the cylinder (2).*
8. *Pull out the lip seals (8) by rotating them slowly on the plunger.*
Be careful not to damage lip seals. Clean all parts thoroughly after dismantlement.

Maintenance

■ Assembly (V-05/-10)

Follow the procedure below to put together the pump head.

1. Insert the head seal (7) first and then the cylinder (2) into the pump head (3).

Make sure the flow paths of the cylinder lie directly beneath those of the pump head. The head seal of the V-05 has mounting direction. Always direct its concave side to the cylinder (2).

2. Fit the joint seals (6) into the tube joints (5) and then screw these joints into the pump head (3) to softly hold the cylinder.

3. First slide the cap nut (4), then the back seat and the lip seals (8) onto the plunger (1) as far as they will go. Softly rotate the lip seals on the plunger when sliding them onto it. See the enlarged photo on the left for the mounting direction of the lip seals.

Do not bend or scratch the lip seals. Degrease and clean the plunger with benzine or thinner after this process.

4. Hold the plunger pin and pass the plunger (1) through the cylinder (2), rotating it from side to side.

5. Tighten the cap nut (4) to the pump head by a torque in between **20 and 30kgf•cm**.

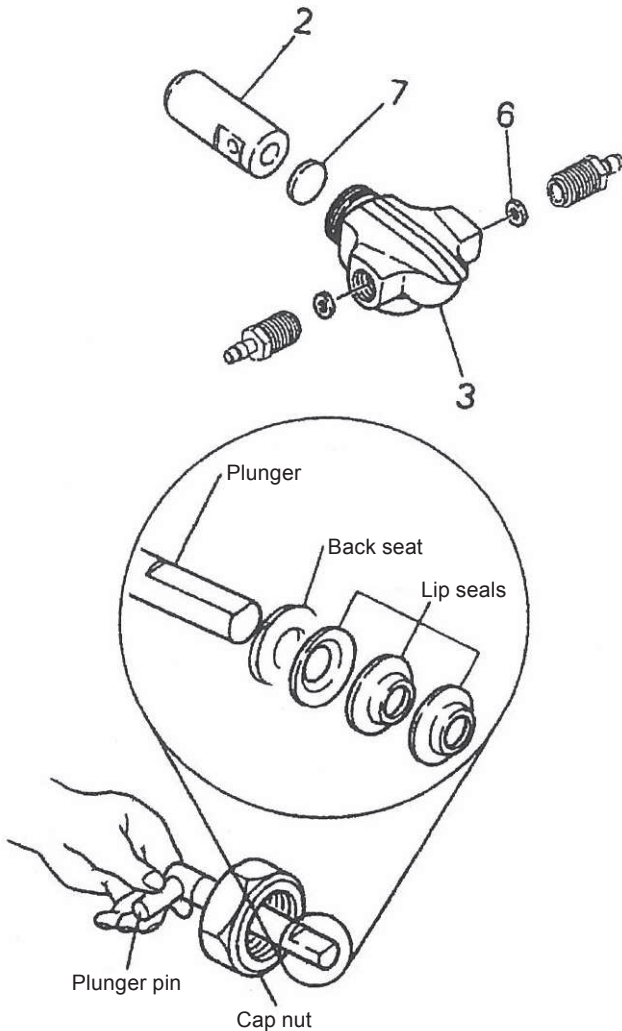
6. Tighten the tube joints to the pump head by **15kgf•cm**.

Do not tighten the tube joints too much, or they deform the cylinder and prevent the rotation of the plunger.

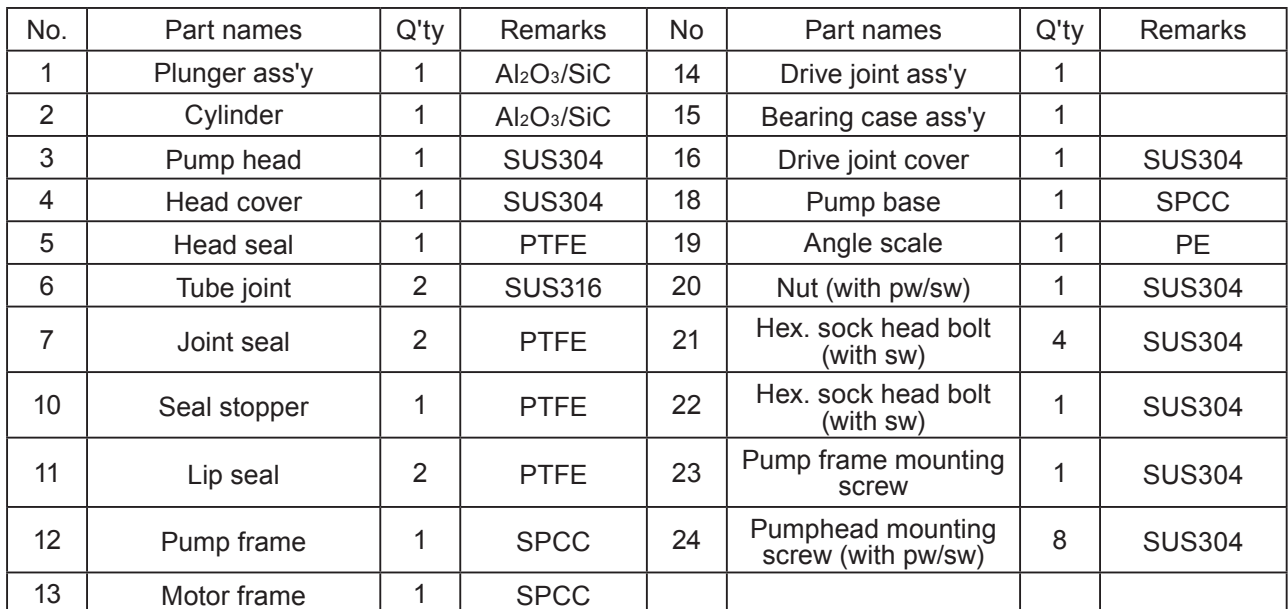
7. Pull out the plunger end from the pump head and fit the plunger pin into the spherical bearing in the drive joint ass'y (103).

Adjust the direction of the spherical bearing as necessary. Always grease the plunger pin to keep good lubrication performance.

8. Place the pump head onto the mounting plate (14) and direct the pump head to 10° position. Fix the connection between the pump head (3) and the mounting plate (14) with a spring washer and the hex socket head bolt (20) via the hole beneath the base (13).



■ Exploded view (V-15)



Maintenance

■ Dismantlement (V-15)

Follow the procedure below to take apart the pump head.

1. *Remove all tube connections from the pump head.*

Be careful not to get wet with chemical liquid. Wipe chemicals off immediately when your hand or component parts get wet.

2. *Remove the pump base (18) from a foundation.*

3. *Unscrew the pump frame mounting screw (23) and the hex socket head bolt (22) to separate the pump frame (12) from the motor frame (13).*

4. *Unhook the plunger ass'y (1) from the drive joint ass'y (14).*

5. *Pull out the plunger ass'y (1) by rotating it in the cylinder (2).*

Do not roughly withdraw the ass'y, or lip seals may be damaged.

6. *Remove four pumphead mounting screws (24) on the pump frame (12) to separate the pump head (3).*

7. *Unscrew and take away all the tube joints (6) from the pump head (3).*

8. *Unscrew and remove all the four head cover mounting screws to detach the head cover (4) from the pump head (3).*

9. *Withdraw the cylinder (2) from the pump head (3).*

Clean all parts thoroughly after dismantlement.

10. *Pull out the lip seals (11) and seal stopper (10) by rotating them slowly on the plunger.*

Do not bend or scratch the lip seals. Clean all parts thoroughly after dismantlement.

Maintenance

■ Assembly (V-15)

Follow the procedure below to put together the pump head.

1. *Insert the plunger ass'y (1) into the pump frame (12). And then slide the seal stopper (10) down onto the plunger ass'y as far as it will go.*
2. *Slide two lip seals (11) down onto the plunger ass'y as far as they will go, rotating each of them slowly, to align them back to back.*
Do not bend or scratch the lip seals. Degrease and clean the plunger with benzine or thinner after this process.
3. *Hold the plunger pin and pass the plunger (1) through the cylinder (2), rotating it from side to side. And then fit the cylinder into the pump head (3), making sure the cylinder flow paths lie directly beneath those of the pump head.*
4. *Fix the pump head with the pump frame (12) with the pumphead mounting screws.*
5. *Fit the joint seals (7) into the tube joints (6) and then screw these joints into the pump head (3) to softly hold the cylinder.*
6. *Place the head seal (5) on the top of the cylinder, on its concave side, and fasten the head cover (4) to the pump head (3) by **15kgf•cm**.*
Do not tighten the head cover too much, or it deforms the cylinder and prevent the rotation of the plunger.
7. *Tighten the tube joints (6) to the pump head by **15kgf•cm**.*
Do not tighten the tube joints too much, or it deforms the cylinder and prevent the rotation of the plunger.
8. *Pull out the plunger end from the pump head and fit the plunger pin into the spherical bearing in the drive joint ass'y (14).*
Adjust the direction of the spherical bearing as necessary. Always grease the plunger pin to keep good lubrication performance, or seizing or noise may result.
9. *Place the pump head onto the pump base (18). Fix the pump frame (12) with the pump frame mounting frame (23) plus the nut (20) and the hex socket head bolt (22). Do not fasten the bolt too much before adjusting the pump head angle to a specified point. The range of the pump head angle is in between 0 and 20°.*

Maintenance

2. Troubleshooting

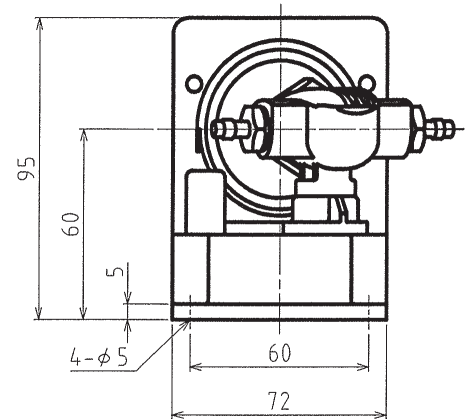
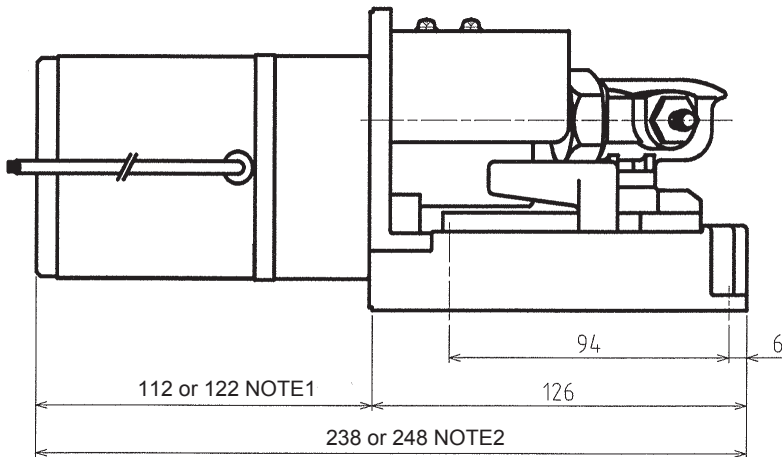
Problem	Cause	Countermeasures
The pump does not start to run.	Power is not supplied.	Supply power.
	Wrong wiring or disconnection	Correct wiring.
	Motor failure (winding disconnection or capacitor failure)	Replace motor.
	*Plunger seizing due to crystallization	Take apart the pump head and clean wet ends.
	High specific gravity or high viscosity	Use an applicable pump model.
The pump does not deliver liquid during operation.	Dry running	Replace both the plunger and cylinder.
	A suction and a discharge line is closed during operation.	Open both the suction and discharge lines.
	A supply tank is empty.	Replenish the supply tank.
	The motor is rotating the other way around.	Correct wiring.
A flow rate is too small.	Air ingress through a tube joint.	Keep tube joints air-tight.
	Pump rotation speed is too low.	Increase a rotation speed.
	A lip seal is crushed.	Replace as necessary.
	A suction line is crushed.	Replace as necessary.
Significant vibration or noise	Motor failure (winding disconnection or capacitor failure)	Replace motor.
	Dry running	Replace both the plunger and cylinder.
	Discharge pressure is too high.	Reduce discharge pressure.
	A suction and a discharge line is closed during operation.	Open both the suction and discharge lines.
	Air ingress through a tube joint.	Keep tube joints air-tight.
	Development of cavitation	Reduce a motor rpm, liquid temperature, and tubing resistance.
	*A supply tank is empty.	Replenish the supply tank.
	*Anchor bolts are loose.	Fasten anchor bolts.
	Sympathetic vibration with the pump and other parts of system	Place an anti-vibration rubber beneath the pump.
Liquid leaks.	A lip seal is crushed.	Replace as necessary.
Pump stops.	Wrong wiring or disconnection	Correct wiring.
	Motor failure (winding disconnection or capacitor failure)	Replace motor.
	Clogging due to foreign matters	Remove foreign matters. Replace parts if damaged.

* means major failure cases.

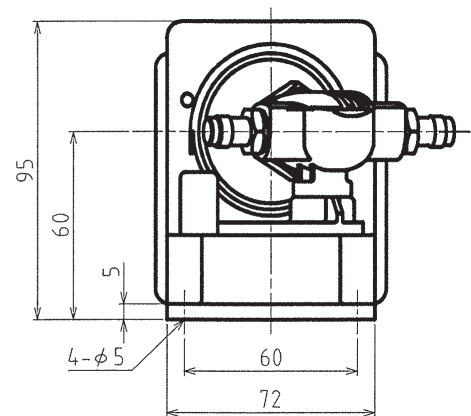
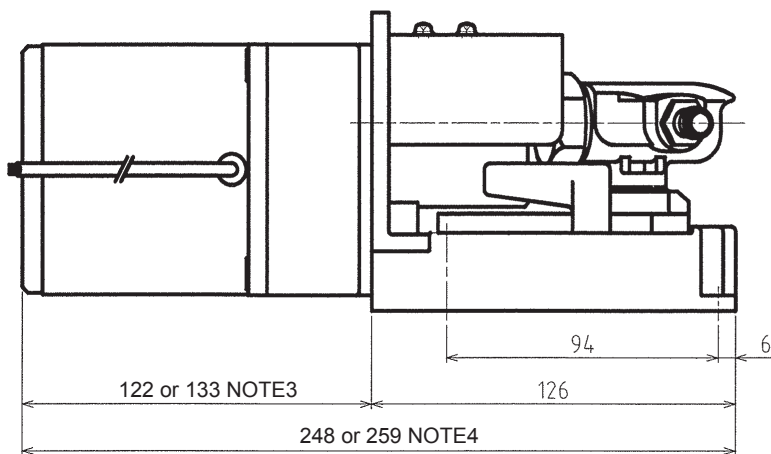
Maintenance

3. Dimensions

V-05/-10 (15W induction motor)

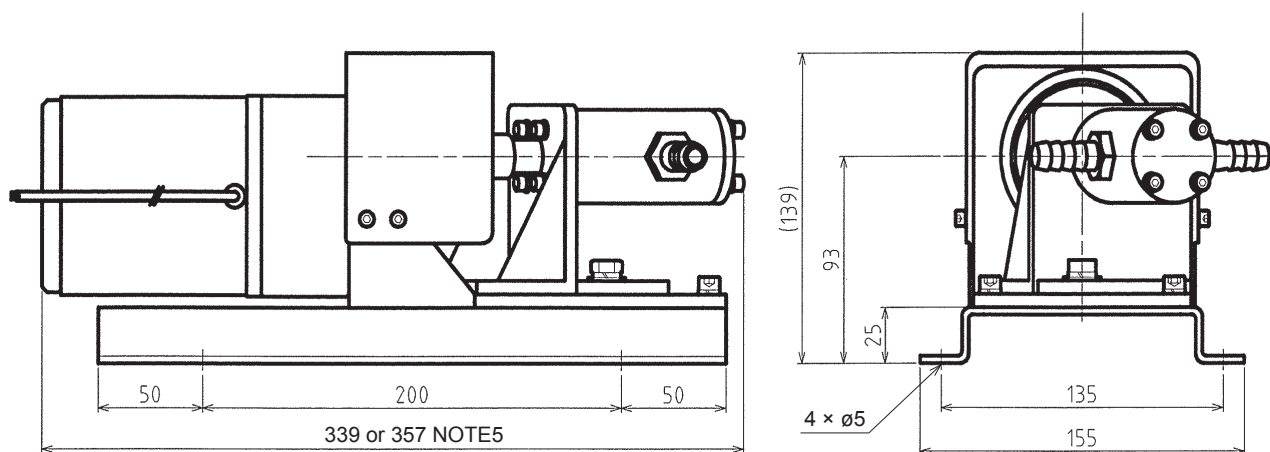


V-05/-10 (25W induction motor)



Maintenance

V-15



NOTE1: 112mm for the gear ratio of 1/3-1/15

122mm for the gear ratio of 1/30-1/150

NOTE2: 238mm for the gear ratio of 1/3-1/15

248mm for the gear ratio of 1/30-1/150

NOTE3: 122mm for the gear ratio of 1/3-1/15

133mm for the gear ratio of 1/30-1/150

NOTE4: 248mm for the gear ratio of 1/3-1/15

259mm for the gear ratio of 1/30-1/150

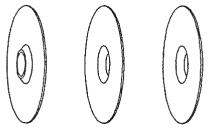



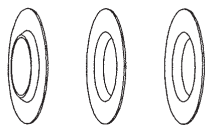



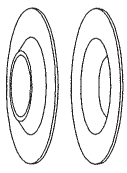


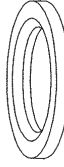
NOTE5: 339mm for the gear ratio of 1/3-1/15

357mm for the gear ratio of 1/30-1/150

Maintenance

4. Wear parts

Replace wear parts according to the estimated service life as shown below.

V-05	Parts	Lip seal	Joint seal	Head seal	Back seat
					
	Life	2000hr	Each maintenance	Each maintenance	Each maintenance
	Q'ty	3	2	1	1
V-10	Parts	Lip seal	Joint seal	Head seal	Back seat
					
	Life	2000hr	Each maintenance	Each maintenance	Each maintenance
	Q'ty	3	2	1	1
V-15	Parts	Lip seal	Joint seal	Head seal	Seal stopper
					
	Life	2000hr	Each maintenance	Each maintenance	When deteriorated
	Q'ty	2	2	1	1

Estimated service lives are calculated based on pumping clean water at ambient temperature and 0.3MPa, and change with liquid pressure, liquid temperature and liquid characteristics.



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