

METERING PUMPS

KEMPION

KM Series

KM Series

Diaphragm Type Metering Pump

Instruction Manual



**CHEON-SEI IND.CO.,LTD.
PUMPLAND DIVISION**

Instruction

Thank you very much for purchasing CHEON-SEI KM metering pump. Before beginning operation, please read this instruction manual carefully. We hope the pump will provide you with many years of trouble-free operation.

Checking points on unpacking

- 1) Are the products the same as you ordered?
- 2) Are all accessories included?
- 3) Is there any visible damage caused by vibration or shock during transport?
- 4) Are any of the screws loose or missing?

We take great care to assure our products leave the factory in perfect condition. However, in the event that this pump is found to be defective, please report the details to CHEON-SEI or your local representative. We will do our best to solve the problem as quickly as possible.

Warranty

1. CHEON-SEI will warrant all products to be free of defects in material or workmanship for a period of eighteen(18) months from date of shipment or one(1) year from the date of installation, whichever occurs first.

2. Any customer complaints will be reviewed by CHEON-SEI. CHEON-SEI will provide such technical advice and assistance as necessary to resolve customer complaints on a timely basis.

3. CHEON-SEI's liability for any breach of this warranty shall be limited solely to replacement or repair at the sole option of CHEON-SEI of any part or parts found to be defective during the warranty period, provided the product is properly installed and is being used as originally intended.

The customer must notify CHEON-SEI of any breach of this warranty within the above mentioned warranty period.

Defective parts must be shipped by customer or Agency to CHEON-SEI's point of manufacture, transportation charges prepaid.

We will make every efforts to minimize losses and damage resulting from defect. However, please bear in mind that we cannot guarantee against damage resulting from problems with consumable parts, unsuitable or incorrect operation, or natural disaster, etc.

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1 Notice for Safety

1-1 Introduction

- To use the products safely, the signs will be showed on the manual.
- Please keep the manual certainly for important matters of safety.
- The signs and indications are as followings.

 **Warning** Person death or serious injury will be occurred if warnings is not kept by wrong handling.

 **Caution** Person injury or property damage will be occurred if cautions is not kept by wrong handling.

1-2 Cautions for Use Condition

Caution

- The pump should never be used for kinds of liquids which caused liquid end parts to be damaged.
- Please keep as followings or may be caused trouble.
 - Ambient temperature : 0~40°C
 - Temperature of handling liquid : 0~50°C where head materials are GFPP, PVC, PVdF.
0~80°C where head materials are SS304, SS316.
 - Piping Pressure : below maximum discharging pressure indicated on the Specifications.

1-3 Cautions for Handling Condition

Warning

- Install the pump at place not to touch by outsider or children except authorized person.
- Put off power and stop pump and other equipments when repair or disassembly pump. Electric shock may be caused, if power is on during working.
- Do not operate when discharge valve is closed or do not close valve during operation. Pump and piping may be damaged with exaggerated pressure rising and liquid spout when operation under valve closing.
- Be careful not to insert fingers or alien materials on rotation or going & returning equipments when pump operation. Hurt may be occurred when touch during operation.
- Do not touch with wetted hand. Electric shock may be occurred.
- Use specified accessories certainly. Accident or trouble may be occurred.
- Absolutely do not modify pump arbitrarily, accident or trouble may be occurred.
- In case of vague liquid for dangerous objects and character, wear safety equipments certainly as like gloves and goggles when repair and check of pump.

⚠ Caution

- Absolutely do not use pump damaged, accident or damage may be occurred.
- Do not install pump in place with heavy moisture and dust. Electric shock and trouble may be caused.
- Do not touch with bare hand on motor part when operation. A burn caused by high temperature may be occurred.
- Do not use other power except the power which is instructed on name plate of motor. Trouble and fire may be caused.
- Electric shock may be occurred unless earthing to earth line, connect to earth line certainly.
- Do work after releasing of pressure of discharge piping and eliminating liquid in liquid end prior to repair or maintenance of pump.
- Pump may be damaged when ambient temperature lows down below freezing point of liquid used. Do eliminate the liquid in pump and piping certainly after operation stop.
- Do proper protection under considering exposure of liquid, when pump and piping may be damaged.
- Dispose a disused pump in accordance with relation law.

2 Confirmation of Articles to be supplied

2-1 Check Point when Unpacking

- 1 Are the products the same as you ordered?
- 2 Are all accessories included?
- 3 Is there and visible damage caused by vibration or shock during transport?
- 4 Are and of the screws loose or missing?

We take great care to assure our products leave the factory in perfect condition. However, in the event that this pump is found to be defective, please report the details to CHEON-SEI or your local representative. We will do our best to solve the problem as quickly as possible.

2-2 Standard Accessories

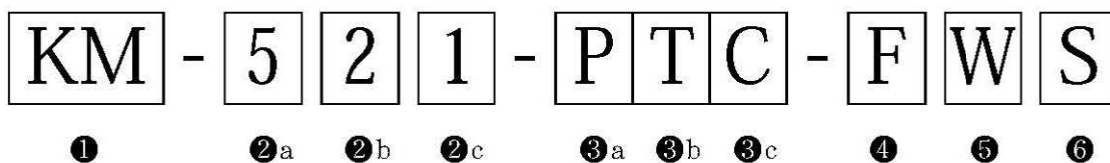
- 1 Instruction manual 1 Copy
- 2 Mounting bolts (With nut M8 × 35L) 4 Set
- 3 Hose (For only hose connection type) 3 M
- 4 Strainer foot valve (For only hose connection type) 1 Set
- 5 Anti-siphon check valve (For only hose connection type) 1 Set

3 General

This pump is diaphragm type metering pump of which discharge capacity is adjustable during operation. It reduces motor rotation using the worm mechanism, gives reciprocating motion to the pump shaft by eccentric cam, sucks a chemical liquid into the pump chamber diaphragm motion, and delivers the liquid by pressure.

The feeding volume can be accurately adjusted by simple dial-operation during either operation or stop.

4 Model Code



- ① Series Name : KM:KM Series (Diaphragm type Medium Sized metering pump)
- ② Model No. for Capacity $a b \times 10^c \Rightarrow 52 \times 10^1 = 520(\text{ml} / \text{min}) (60\text{Hz})$
- ③ Liquid-end Materials
 - a. Head P : GFPP(PVC), F : PVdF, S : SS304, 6 : SS316, X : Special
 - b. Diaphragm T : PTFE, E : EPDM, X : Special
 - c. Check ball C : CERAMIC, 6 : SS316, X : Special
- ④ Connection Type F : Flange, H : Hose, X : Special
- ⑤ Viscosity Limit W : Standard (0~100cP), V : High viscosity (100~2,000cP)
- ⑥ Power Supply S : 1 ϕ 220V, A : 3 ϕ 220/380 V, B : 3 ϕ 440V, X : Special
Respectively, 50/60Hz Combined Use

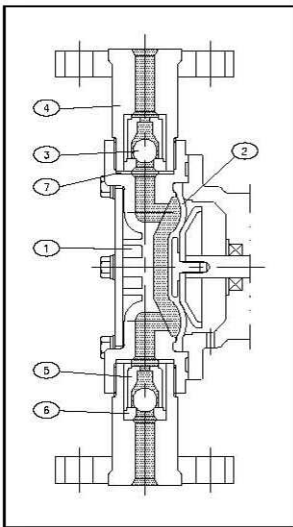
5 Specifications

Specs. Model	Max. Capacity (ml / min)		Max. discharge pressure (bar)	Stroke number(SPM)		stroke length (mm)	Diameter of diaphragm (mm)	Connection			Motor	Weight (kg)
	50Hz	60Hz		50Hz	60Hz			Hose		Flange		
								PVC	PTFE			
KM-500	42	50	10	95	114	3	30	$\phi 6 \times \phi 11$	$\phi 10 \times \phi 12$	KS10K 15A	60W	8.6
KM-121	104	125	10	95	114	4	36					8.6
KM-251	213	255	10	95	114	5	45					8.6
KM-521	433	520	7	95	114	6	55	$\phi 12 \times \phi 18$				8.9
KM-102	854	1025	5	95	114	6	68					8.9
KM-212	1792	2150	3	95	114	7	90	-				9.9

- Note) 1. Max. capacity are tested under the condition as follows.
 -Temperature : ambient -Liquid : Potable water -Discharge pressure : Max. discharge pressure.
2. Effective range of discharge volume
 - KM-500,121 : 25~100% - KM-251~212 : 20~100%
3. The standard material of the hose is that of the liquid end.
 - PVC hose is for PTC, PE6 type pumps.
 - PTFE hose is for FTC, ST6, 6T6 type pumps.
4. The limits of liquid temperature are 0~50°C and 0~80°C for PTC · FTC type and, ST6 · 6T6 type.
5. Ambient temperature limit is 0~40°C.
6. Self-priming capacity
 - KM-500,121 : 1 meter - KM-251~212 : 2 meter
7. The Munsell No. of painting is 0.6PB 4.8/10.6.
8. The contents on this data may be revised for improvement without prior notice.

6

Materials of Standard Liquid End



part name	Materials Capacity	PTC(PE6)		FTC	ST6		6T6	
		500~102	212	500~212	500~102	212	500~102	212
① Head		GFPP	PVC	PVdF	SS304		SS316	
② Diaphragm		PTFE(EPDM)		PTFE	PTFE		PTFE	
③ Check Ball		CERAMIC(SS316)		CERAMIC	SS316		SS316	
④ Joint		GFPP	PVC	PVdF	SS304		SS316	
⑤ Ball Guide		GFPP	PVC	PVdF	PVdF	SS304	PVdF	SS316
⑥ Ball Seat		SANTOPRENE®	PVC	PTFE	PTFE	SS304	PTFE	SS316
⑦ O-ring/Paking		SANTOPRENE®	FKM	PTFE	PTFE		PTFE	

※ Material other than standard can be used for special purpose pump.
Please contact us or distributor in your area.

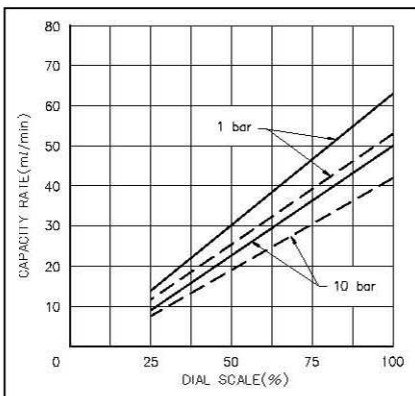
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Performance Curves

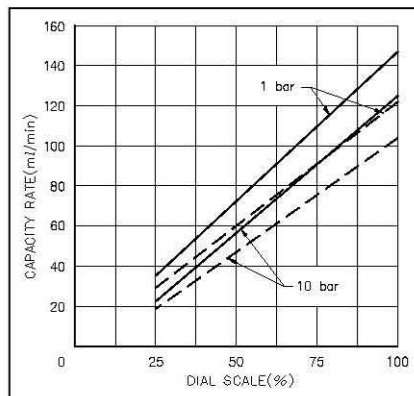
Condition : Room temperature, Clean water

— 60Hz, 50Hz

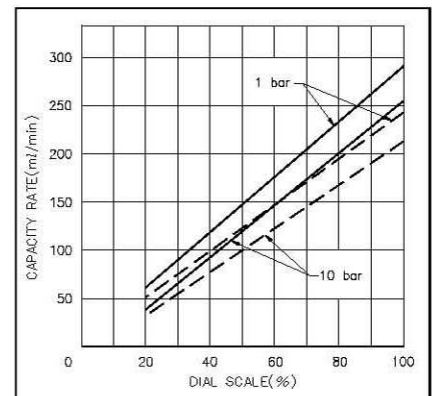
● KM-500



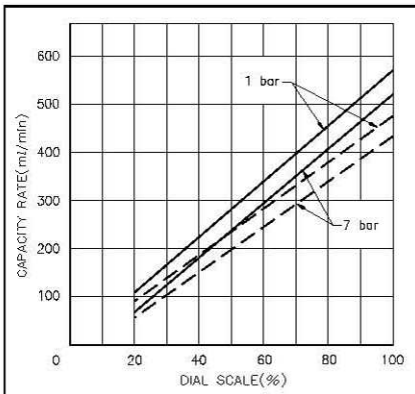
● KM-121



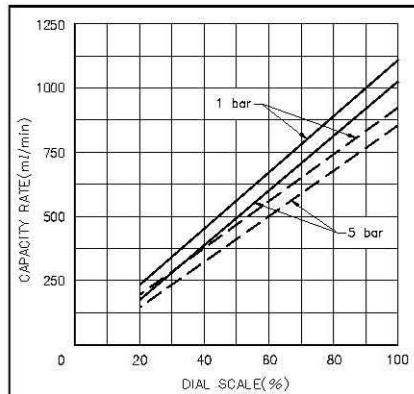
● KM-251



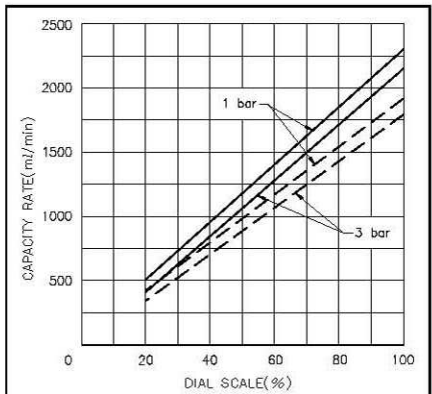
● KM-521



● KM-102

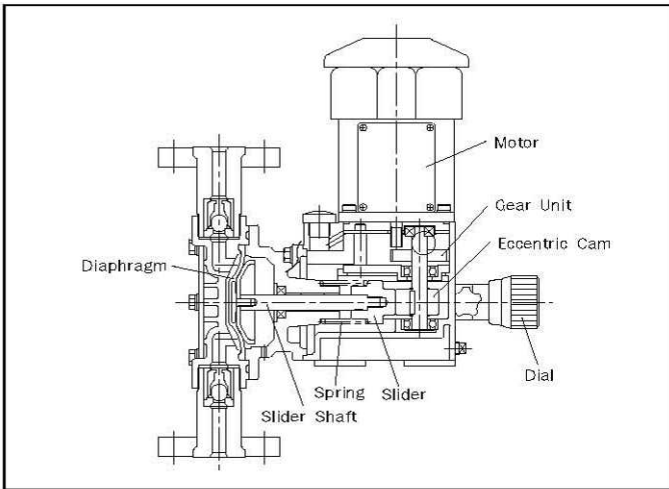


● KM-212



Note) The performance curves show examples at our testing facility under regular condition. Performance curves can be somewhat different at each local site.

8 Principle of Operation



The rotation of the motor is reduced by gear unit and then changed to a reciprocation by an eccentric unit (eccentric cam, slider and spring etc.).

This reciprocation is transmitted to a diaphragm by the slider shaft which is connected to the diaphragm directly, hereby operating the pump owing to the change the volume of diaphragm chamber, and the movement of check ball in pump head.

The stroke length is adjusted by the control of eccentric amount of slider with the adjusting dial.

9 Installation

9-1 Place of Installation

⚠ Caution

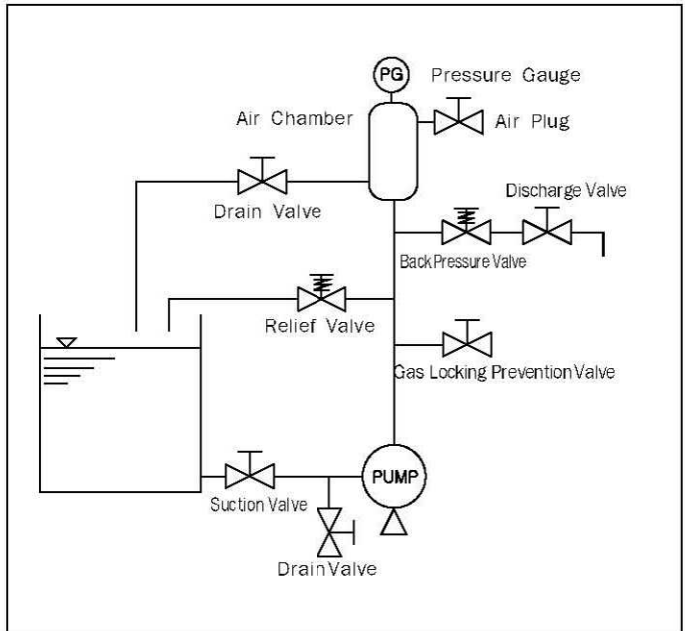
- Do not install the pump in place which ambient temperature is high (above 40°C) or lows down below freezing point, pump internal may be damaged.
- Do not install pump in place with heavy moisture and dust, or in place with rain, and wind, electric shock and trouble may be caused.

- 1 The pump should be installed as near to suction tank as possible and should be easily accessible for inspection and maintenance. It is recommended that the pump be placed lower than the suction liquid level.
- 2 Take sufficient space around the pump so as to facilitate maintenance and check. In order to ensure safety during disasters such as floods, an emergency plan should be established for the motor and power distribution unit.
- 3 For foundation of pump, the surface should not be tilted.
- 4 Prepare a concrete foundation or a rigid base plate to support fully the weight of the pump.

9-2 Piping

- 1 The piping should be done under the best condition of the suction and discharge.
- 2 The best piping arrangement of minimum loss is based on straight runs with as few bends and fitting as possible. And do not make such a room in the pipe to collect air.
- 3 All piping should be supported independently so that unnecessary weight and vibration are not transmitted directly to the pump. Flexible piping is recommended to avoid damaging the plastic pump head especially.

- 4 when feeding a high or low temperature liquid, be care to prevent the pump from suffering thermal stress.
- 5 When feeding a sedimental slurry, do not make a U-shaped bend in the middle of the pipe distribution system.
- 6 When feeding a viscous liquid, poisonous liquid or coagulative liquid, provide a washing pipe line for maintenance and inspection.
- 7 When selecting a piping material, check thoroughly its corrosion resistance to the liquid to be treated and the pressure to be applied to the pipe.
- 8 When using the adhesive for PVC piping, please do not allow to soak the adhesive into the pump.
- 9 Before the pipe distribution, wash thoroughly the inside of the pipe and remove the protective cover fitted to the discharge port and suction port of pump.
- 10 The reciprocating pump should be provided with a relief valve. Be sure to fit a relief valve to the discharge pipe near the pump.
- 11 When a diluted liquid is used, the liquid is frozen in the pump head and the pipe in winter, sometimes breaking the pump. So, please provide a drain valve at the suction / discharge pipe. And wash inside of pump with water for the interval operation.



9-3 Suction Piping Work

- 1 Be sure to fit the suction pipe according to the forced feed method. The diameter of the suction pipe should be larger than or same with that of the pump suction diameter.
- 2 Carefully fit the joint of the suction pipe in such a manner that no air is sucked in it. If air flows into the suction pipe, the pumping capacity will not be stabilized.

9-4 Discharge Piping Work

- 1 Provide a relief valve near the discharge pipe of the pump. and do not install any other valves between the pump and the relief valve.
- 2 Use a discharge pipe whose withstanding pressure is higher than the pressure setting of the relief valve. Also, carefully fit the joint of the discharge pipe.

⚠ Caution

- In case that the flange is made of plastic material, do not tight the bolt excessively. Otherwise, It can be damaged.
- Prior to initial operation after installation, check if the liquid is leaking from the part of connection.

9-5 Wiring

⚠ Caution

- Do not touch with wetted hand, electric shock may be occurred.

⚠ Caution

- Check voltage constant and frequency of motor prior to wiring, and connect to specified power.
- Earth grounding wire with wiring to protect electric shock.
- Entrust to electrical technician for wiring.
- Install specified magnetic switch and thermal relay to control and maintenance, etc. of pump.
- Do use standardized goods for wiring and be carefully safety in accordance with technical standard and wiring regulations.
- Connect power of motor to set rotation direction, reverse rotation of motor may be caused trouble.

- 1 Standard motors of pump are 1 ϕ 220V, combination 3 ϕ 220/380V and 3 ϕ 440V.
- 2 Connect wiring for using power with reference to wiring diagram attached on name plate or terminal box cover of motor.
- 3 Connect according to direction indicated by arrow of name plate for rotation direction of motor (clockwise from fan direction of motor). If rotation is reverse, change 2 among 3 wires(except 1 phase).
- 4 Method of motor wiring (when combination 3 ϕ 220/380V)

220V wiring	380V wiring
①-⑥ ←	┌ ⑥ ① ← ├ ④ ② ← (Y wiring) └ ⑤ ③ ←
②-④ ← (Δ wiring)	
③-⑤ ←	

10 Operation

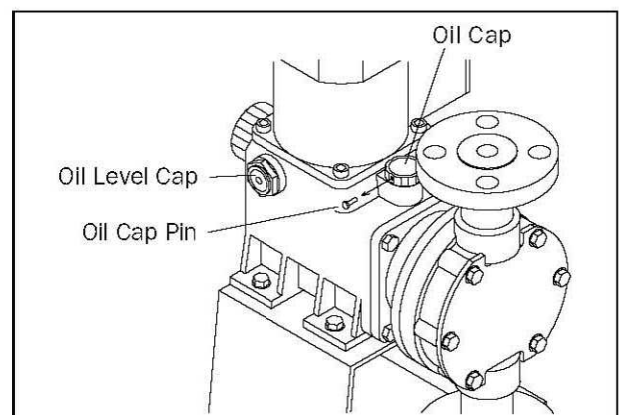
10-1 Preparation

⚠ Caution

- It is dangerous due to damage of piping with pressure rising and liquid spout when alien materials is inserted in valve on discharge piping of pump.
- Some water may be remained in pump head after final performance test. Remove the water in pump head and dry the pump necessarily, to avoid the problem that may be caused by abnormal phenomena of some liquid which may be occurred by a relation with water.

When pump operation is first after installation, please check as followings.

- 1 Check every parts of the pump for defects, loosened bolts, oil leakage, etc.
- 2 Check the oil gauge to see if the drive unit is filled with the specified amount of oil and pull out the oil cap pin(black color).
- 3 Check the each parts for operating and transferring liquid and power condition, etc.



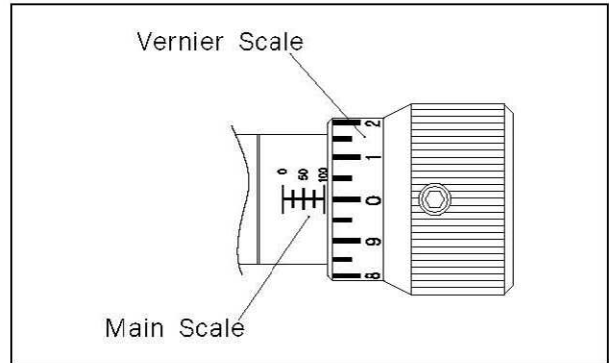
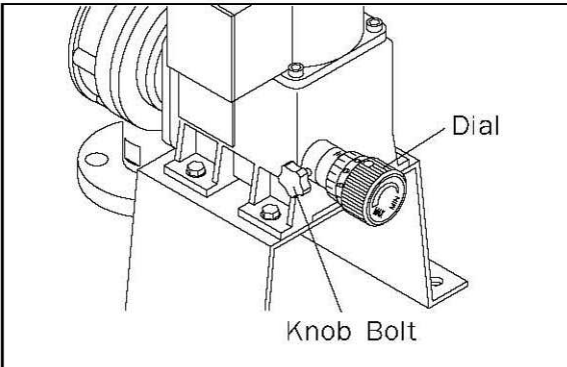
10-2 How to Adjust the Stroke Length

⚠ Caution

- Be careful not to turn dial gauge below 0% or above 100%.

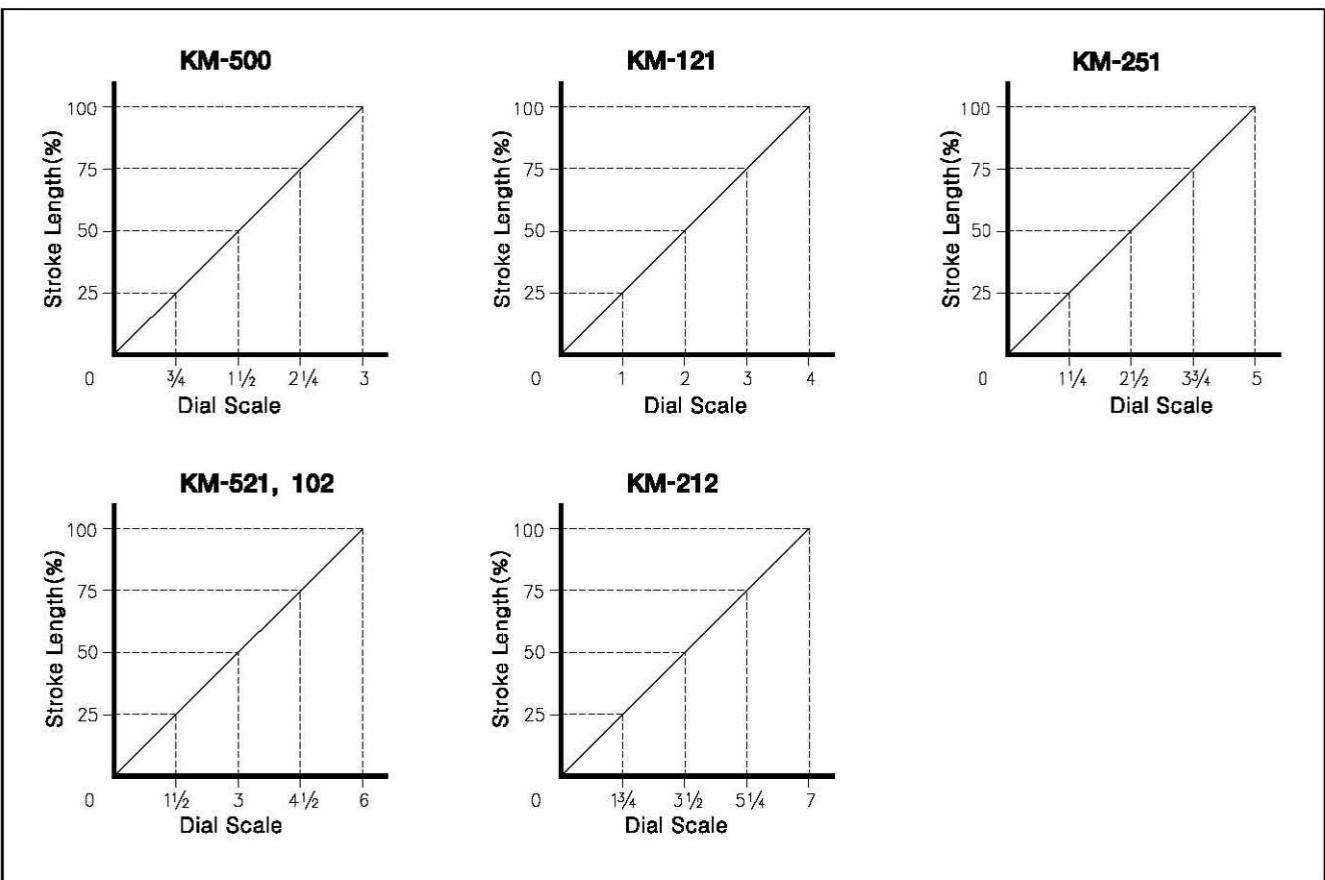
The stroke length is adjusted by control of eccentric amount of slider with the adjusted dial. Please adjust the dial while the pump is running.

- 1 Select a proper stroke length in accordance with the test data of the pump. The stroke length dial is graduated in % (percentage).
- 2 Loosen of dial shaft setting knob bolt (counterclockwise).



- 3 Set a proper stroke length

The proper stroke length is obtained by adding a value on the main scale to a value on the vernier. And please refer to the below diagram on the operating amount of diaphragm, corresponding to the stroke length from 0% to 100%.



- 4 After setting stroke length, fix dial shaft to turn knob bolt as clockwise not to move dial when pump operates.

10-3 Operation

Warning

- Operate pump after opening certainly of valves on discharge piping and suction piping. Pump and piping may be damaged with exaggerated pressure rising and liquid spout if operation under valve closing.

When running the pump for the first time after installation, follow the procedures below.

- 1 Turn on the power switch of the motor and the motor should be rotated clockwise when viewed from the motor fan cover side.
- 2 Set the stroke length at 0%.
- 3 Continue to run the pump for a warm-up period 5 minutes with the stroke length set at 0%.
 - ※ In a cold district, the pump may sometimes be overloaded(Amperage is over the rating) for a while just after starting running. This is because the temperature of oil in the pump is not enough high. In this case, continue no-load running until the oil temperature rises sufficiently.
- 4 Purge the internal air of the pump by supplying a liquid into the pump, opening the air vent valve of the discharge pipe or by gradually increasing the stroke length in such a manner that no pressure is applied to the discharge side(Please refer to the recommended piping plan.(Article 9-2)).
- 5 Set the stroke length at 100% and run the pump for a warm-up period of 30 to 60 minutes.
- 6 If no abnormality is found during the warm-up running, gradually increase the pressure to the discharge side and set it at the required. In this case, check that the amperage of motor is within the rated value and no abnormality is found in each part.

10-4 Checking the Discharge Volume

If no abnormality is found in the pump, check the discharge volume under the actual running conditions, using a gauge such as measuring cylinder etc.

- 1 When no remarkable variation in the discharge volume is found as the result of repeated measurements and the discharge volume keeps diagrammatical linearity as against the stroke length, the pump is judged to be normally running.
- 2 Make a diagram of relationship between the discharge volume and stroke length under the actual running conditions and determine an optimum discharge volume in accordance with this diagram.
- 3 When the discharge volume is increased or decreased by changing the stroke length, measure the discharge volume after about a minute.
 - ※ When the pump test data is requested together with order, we submit our In-Plant test data. The pump test data are the test results obtained by using clear water of normal temperature. So, note that these are not obtained from an actual piping and actual liquid.

10-5 Re-starting to Run the Pump After it is Stopped

- 1 In cold weather, because the pump can be damaged by freezing, the remaining liquid inside pump and pipe should be discharged by no-load running after opening of drain valve which is on the suction side of pipe.
- 2 When starting to run the pump after it is stopped for a short period of time(Within a week), it can be started at a desired stroke length and a prescribed discharge pressure.
- 3 However, when starting to run again the pump after stopped for a long period of time(Over a week), be sure to set the stroke length at 0% and continue no-load running for a few minutes until the pump drive unit is thoroughly lubricated.

10-6 Precautions

- 1 Be sure to provide the pipe on discharge side with a safety valve.
- 2 Because the liquid inside air-chamber is in contact with the air directly, the compressed air is somewhat soluble in the liquid. As the time goes by, the volume of air will be dwindle away, and finally the air chamber will be unable to be functional enough. Fill up the air inside the air-chamber periodically.

11

Maintenance And Inspection

Warning

- Electric shock may be caused when work, put off power and stop pump and equipments.
- Be careful big accidents may be occurred when put fingers or cloth in rotator.

Caution

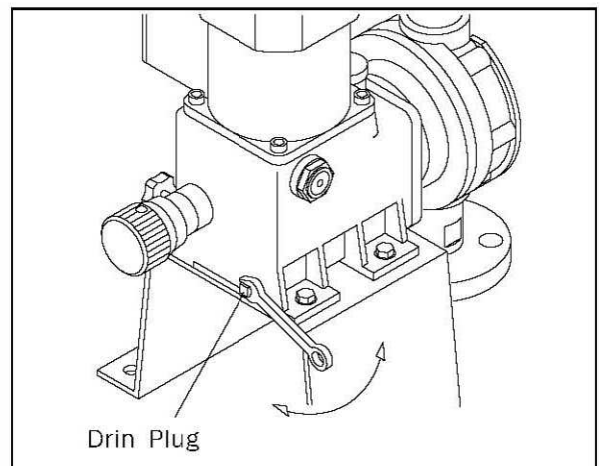
- Wear safety equipments certainly when work of disassembly or assembly.
- Do work after release discharge piping pressure, and remove the remained liquid in the pump head prior to repair or maintenance.

11-1 Daily Inspection

- 1 Check that the pump runs smoothly.
- 2 Check that the discharge volume and discharge pressure are not changed. Check that the amperage of the motor is normal.
- 3 Check for no leakage in the liquid end.
- 4 Check the reduction gear and inside of gear box for oil shortage, leakage and dirt.
- 5 If spare pump is provided, run it from time to time. Also, keep up it well condition for running at any time.

11-2 Regular Inspection

- 1 Inspection of discharge valve and suction valve
Inspect them every 6 months. And if an abnormal flaw or wear is found at the time of inspection, replace the value with a new one. And in case of slurry or viscous liquid, the inspection should be always performed.
- 2 Inspection of diaphragm
The diaphragm is an wearing part. It's service life varies according to the running condition of the pump. Inspect it every 1~2 months and if any deterioration is found at this time, replace it with a new one.
- 3 Changing oil in the drive unit
 - ① Oil change interval : Change oil of the drive unit, every 12 months. However, when emulsification or deterioration of the oil is found, immediately change the oil.
 - ② Recommended oil quantity : 500 ml
 - ③ How to change oil in the drive unit
First, remove the oil cap and drain plug, and drain the used oil. Next, clean the inside with flushing oil. Then, supply new oil up to the specified level of the oil gauge(dot of red color).
 - ④ Recommended oil
Omala oil(#220) of Shell company (※)
Gear oil(#630) of Mobile company
Sparta EP220 of Esso
Meropa 220 of LG Caltex
Super Gear EP220 of SK
Daphne Gear lube 220S of S-Oil
Note) (※) is used oil by Cheon-Sei.



12 Cause of Trouble and Troubleshooting

⚠ Caution

- If the pump has a something wrong, interrupt the electric power of pump immediatley.

Item	Troubles	Troubleshooting number
A	AMotor does not run.	1, 2, 3, 4, 12, 13
B	Discharge quantity is short.	5, 6, 7, 8, 9, 11, 14, 15, 18, 19, 20
C	Discharge quantity is excessive.	9, 10, 15
D	Discharge quantity is unstable.	5, 6, 7, 8, 10, 11
E	Liquid is not discharged.	5, 6, 7, 8, 14, 15, 18
F	Discharge pressure does not rise.	5, 6, 7, 8, 14, 16, 17, 18
G	Liquid is not sucked.	5, 6, 7, 8, 14, 19, 20
H	Liquid leaks.	15, 19, 20
I	Electric currenry of motor is high.	1, 2, 4, 12, 22
J	Excessive vibration and loud noise.	1, 5, 8, 12, 22
K	Oil leaks.	21
L	Reduction gear is excessively heated.	12, 15, 22

No.	Cause of Trouble	Troubleshooting
1	Defect of motor.	Replace.
2	Disconnection or bad connection of wire.	Connect or replace.
3	Power fuse is burnt out.	Check for cause and take countermeasure.
4	Voltage drop.	Check for cause and take countermeasure.
5	Insufficient NPSH (Cavitation).	Examine suction condition.
6	Check ball or ball seat is worn out.	Replace.
7	Valve(Check ball, ball seat, Ball guide) is clogged.	Disassemble and clean.
8	Suction discharge pipe or strainer is clogged.	Disassemble and clean.
9	Stroke length dial is shifted.	Readjust.
10	Shortage of minimum required differential pressure.	Install backpressure valve in the discharge pipe.
11	Fluctuation in pump strokes.	Check power supply, motor and reduction gear.
12	Overload (Excessive discharge pressure).	Check discharge line.
13	Improper power supply specification.	Check.
14	Air is sucked from suction line.	Inspect pipe and readjust.
15	Condition(Liquid, temperature, pressure, etc.) is changed.	Reexamine pump specifications.
16	Defect of pressure gauge.	Replace .
17	Dust is clogging mouth of pressure gauge.	Clean.
18	Leak from relief valve.	Readjust pressure setting of relief valve.
19	Defect of diaphragm.	Replace.
20	Defect of O-ring, Packing in Valve.	Replace.
21	Defect of oil seal and O-ring.	Replace.
22	Lubricating oil of dive unit is not proper.	Check oil quantity and stain.

13 Replacement of Parts

⚠ Caution

- Wear safety equipments certainly, because the remained liquid in pump internal may be flowed when disassembly or assembly.

Refer to the name of the components in section 18 「Structure and Name of Each Parts」 for disassembly and assembly.

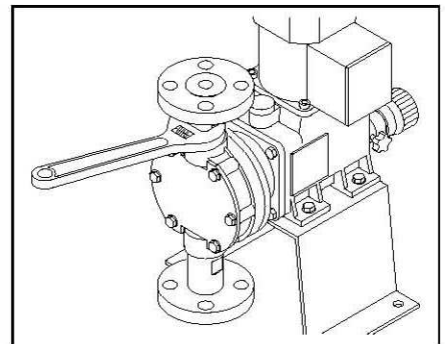
13-1 Replacement of Ball Seat, Ball Guide, Check Ball

I Disassembly

- ① Loosen suction and discharge piping.
- ② Take out valve(Ball Seat, Ball Guide, Check Ball) after untightening of connection parts of suction and discharge piping. In case of plastic material (below KM-102), it can be loosen by hand.
- ③ Replace by new parts for Check Ball or Ball Seat, etc., with abnormal scar or abrasion.

II Assembly

- ① Assembly valve with reference to articles of 「Structure and Name of Each Parts」.
- ② Assembly with tightening valve fully to tighten connection part of suction and discharge piping.
- ③ Be carefully to leak liquid even though tightening when damage parts of packing or o-ring.
- ④ Assembly piping of discharge and suction.



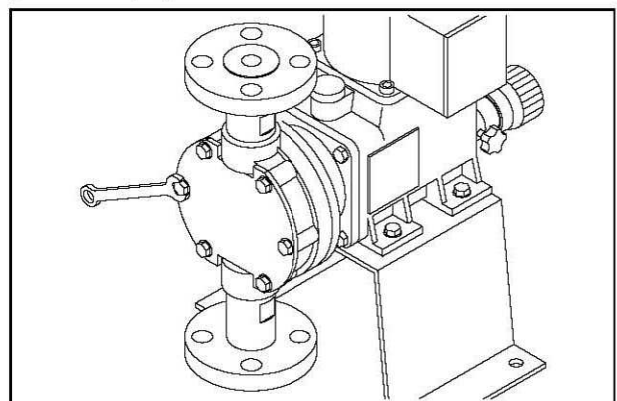
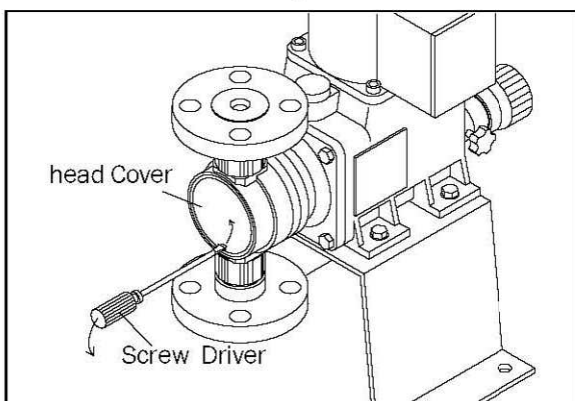
⚠ Caution

- Assembly correctly according to sequence(top: Ball Guide, middle: Check Ball, bottom : Ball Seat). If the sequence is wrong, liquid backward and pump may be damaged.

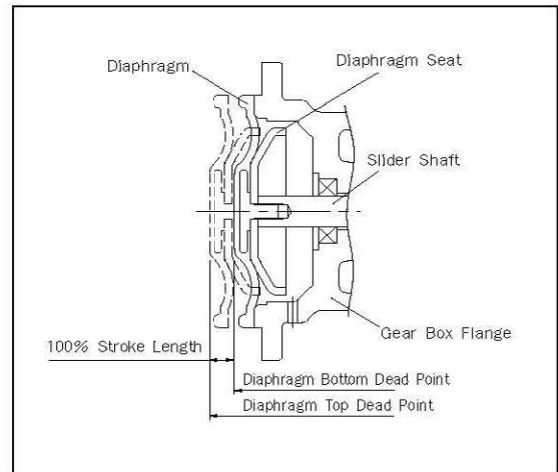
13-2 Replacement of Diaphragm

I Disassembly

- ① Remove the suction and discharge pipes.
- ② In case of plastic material (below KM-102), upfasten the fixed bolt on the pump head by L-Wrench, after disassembling of head cover by driver. Other than that, upfasten the fixed bolt on the pump head, by spanner.



- ③ Set stroke length to 0% and turn off when the diaphragm comes to the top dead point. And turn the diaphragm counterclockwise, then the diaphragm can be simply removed. Replace a new diaphragm, if any worn or deformed part is founded.



2 Assembly

- ① Fix the diaphragm firmly to the slider shaft by turning it clockwise.
- ② Set stroke length 100% of bottom dead point, before reassembly the pump head. In this case, connect power supply and run motor temporarily by on-off until the diaphragm will be located to the bottom dead point.
- ③ Tighten fix bolt of pump head till disappear of gap between flange face of gearbox(Support Ring) and pump head.

Model	KM-500~251	KM-521,102	KM-212
Torque	30 kgf · cm	50 kgf · cm	75 kgf · cm

- ④ Connect piping of discharge and suction to arrange connection parts of discharge and suction as reverse sequence of disassembly.

⚠ Caution

- Liquid leakage may be occurred when fix pump head with head bolts, so tighten equally as reciprocal diagonal direction.

14 Consumable Parts and Spare Parts

14-1 Consumable Parts

Part Name	Q' ty for one pump head	Estimated service life (For continuous operation)
Check Ball	2(4)	1 year
Ball Guide	2(4)	1 year
Ball Seat	2(4)	1 year
O-ring/Packing	2	1 year
Diaphragm	1	4000 hour
Oil Seal	1	1 year

Note) 1. The quantity which is showed in “()” ,is applicable to KM-500~251 model.

2. Replacement period is forecast, not guarantee. The period is subject to condition of using

14-2 Spare Parts

- ① Spare parts for 3 years : • Bearing • Eccentric cam
- ② Spare parts for over 3 years : • Motor • Gear unit • Slider • Slider shaft • Spring

15 Warranty

Warning

- Cheon-Sei will not warrant if the pump is reconstructed arbitrarily or used by other parts except specified parts. And be cautious not to be compensated for a various expense happened by a accident and trouble.

- 1] Cheon-Sei will warrant all products to be free of defects in material or workmanship for a period of eighteen(18) months from date of shipment or one(1) year from the date of installation, whichever occurs first.
- 2] During guarantee period repair or change of pump is free of charge, if trouble or damage of pump due to design or manufacturing of Cheon-Sei. (* Consumable parts are excluded.)
- 3] Repair or change for pump having a trouble or damage caused by the following reasons should be charged regardless of the guaranteed period.
 - ① Trouble or damage of pump expired guarantee period
 - ② Trouble of using by careless handling
 - ③ Trouble or damage due to using parts except of specified by Cheon-Sei.
 - ④ Trouble or damage due to repair or reconstruction by person except by Cheon-Sei or designated by Cheon-Sei.
 - ⑤ Trouble by inevitability of fire or natural calamity.

16 Repair Service

Caution

- Prior to sending the pump for repair, wash the pump head's internal clearly.
- Do not return the pump if the pump has been used with harmful and fatal liquids to health.

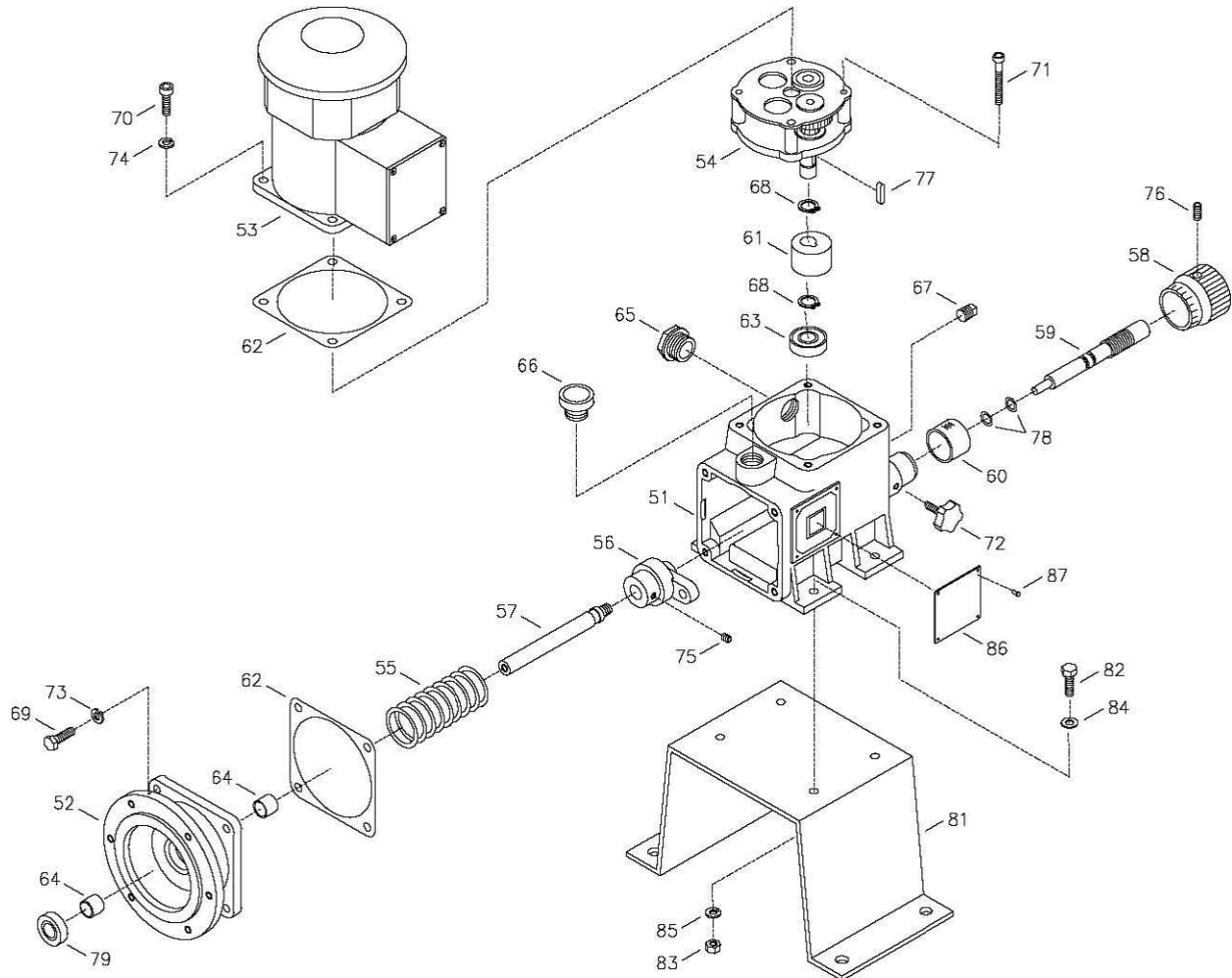
- 1] Contact to A/S Department of Cheon-Sei or Local Distributor as shown on back of the manual when occurred abnormal of pump or has inquiry.
- 2] Inform following items when request repair of pump.
 - ① Model Name and Production No. as shown on name plate of pump.
 - ② Used period and using condition, status, transfer liquid.
- 3] Inquire to Local Distributor whether charge or not for repair when expired guarantee period of pump.
- 4] Minimum retain period of performance parts for repair of Cheon-Sei is 5 years from the date of production.

17 Accessory

- 1] Back Pressure Valve
In case that overfeed or siphon phenomena is occurred, according to piping condition, a discharge liquid flows with a excessive quantity during operation, or liquids flows continuously despite stoppage of pumping.
- 2] Relief Valve
This is the valve to be opened automatically when the pressure in the piping is occurred excessively. Usually, the excessive pressure could be occurred , in case that alien material is entered into inside of discharge piping or valve is closed on discharge piping.
- 3] Air Chamber
Usually, a reciprocating pump has a peculiar pulsation which results in vibration of piping and overfeed phenomena. Air Chamber will be used to solve such a problem caused by pulsation.

18 Structure and Name of Each Parts

18-1 Driving Parts



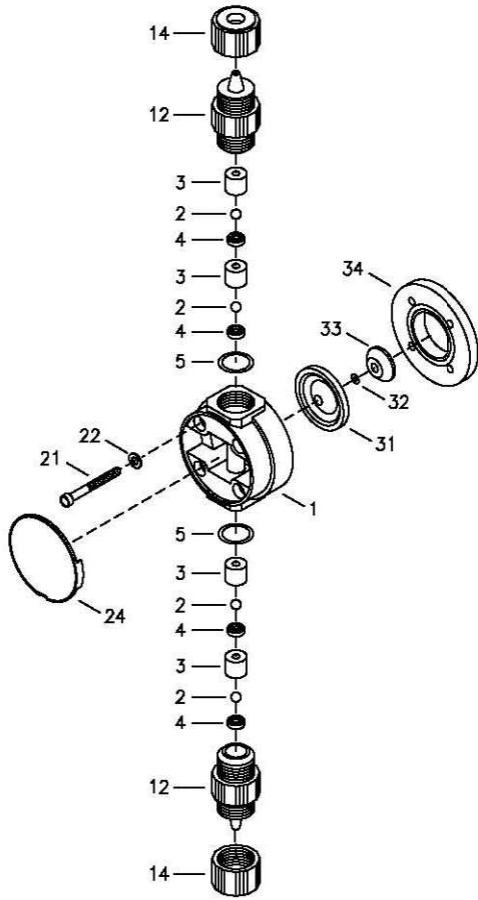
No.	Part Name	Q' ty
51	Gear box	1
52	Gear box flange	1
53	Motor	1
54	Gear unit	1
55	Spring	1
56	slider	1
57	Slider shaft	1
58	Dial	1
59	Dial shaft	1
60	Dial indicator	1
61	Eccentric cam	1
62	Gasket	2

No.	Part Name	Q' ty
63	Bearing(Ball)	1
64	Bearing(D.U.)	2
65	Oil level cap	1
66	Oil cap	1
67	Bolt(Squ. head)	1
68	Snap ring	2
69	Bolt(Hex. head)	4
70	Bolt(Wrench)	4
71	Bolt(Wrench)	2
72	Bolt(Pen. knob)	1
73	Washer(Spring)	4
74	Washer(Spring)	4

No.	Part Name	Q' ty
75	Set screw	1
76	Set screw	1
77	Key	1
78	O-ring	2
79	Oil seal	1
81	Bed	1
82	Bolt(Hex. head)	4
83	Nut(Hex.)	4
84	Washer(Flat)	4
85	Washer(Spring)	4
86	Name plate	1
87	Rivet	4

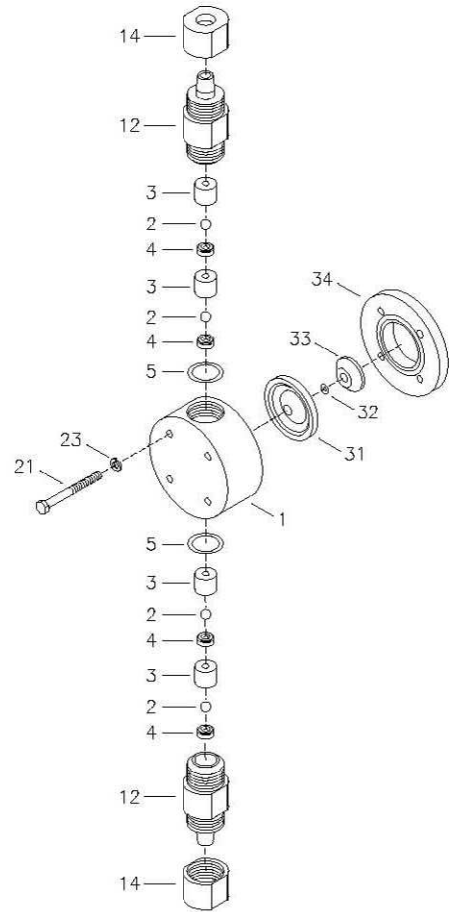
18-2 Liquid End Parts (Flexible hose type)

① Model : KM-500~251-PTC, PE6, FTC



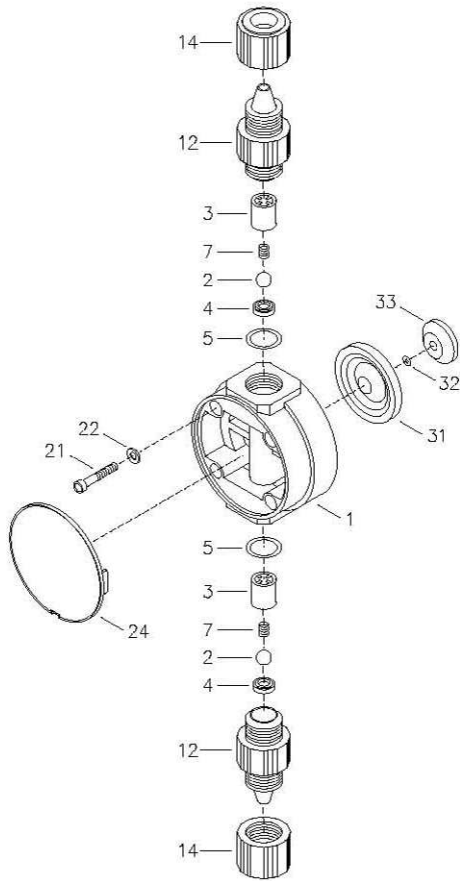
No.	Part Name	Q' ty
1	Head	1
2	Check ball	4
3	Ball guide	4
4	Ball seat	4
5	O-ring	2
12	Hose joint	2
14	Hose nut	2
21	Bolt(Wrench)	4
22	Washer(Flat)	4
24	Head cover	1
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1
34	Support ring	1

② Model : KM-500~251-ST6, 6T6



No.	Part Name	Q' ty
1	Head	1
2	Check ball	4
3	Ball guide	4
4	Ball seat	4
5	O-ring	2
12	Hose joint	2
14	Hose nut	2
21	Bolt(Wrench)	4
23	Washer(Spring)	4
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1
34	Support ring	1

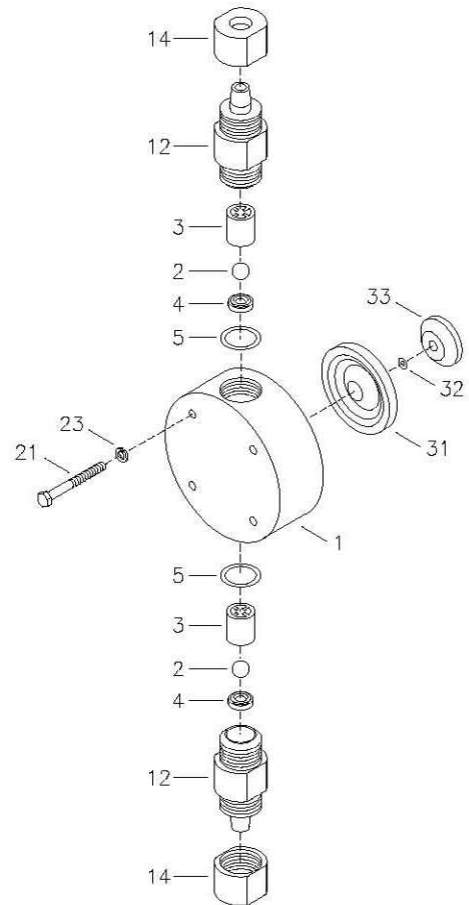
③ Model : KM-521-PTC, PE6, FTC
& High Viscosity Type



No.	Part Name	Q' ty
1	Head	1
2	Check ball	2
3	Ball guide	2
4	Ball seat	2
5	O-ring	2
7 ⁽¹⁾	Spring	2
12	Hose joint	2
14	Hose nut	2
21	Bolt(Wrench)	4
22	Washer(Flat)	4
24	Head Cover	1
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1

Notice) (1) For only high viscosity

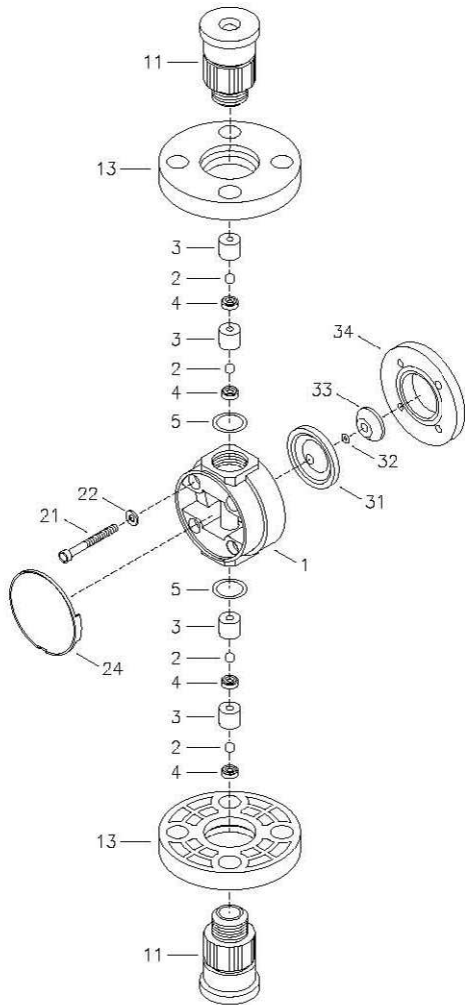
④ Model : KM-521-ST6, 6T6



No.	Part Name	Q' ty
1	Head	1
2	Check ball	2
3	Ball guide	2
4	Ball seat	2
5	O-ring	2
12	Hose joint	2
14	Hose nut	2
21	Bolt(Hex. head)	4
23	Washer(Spring)	4
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1

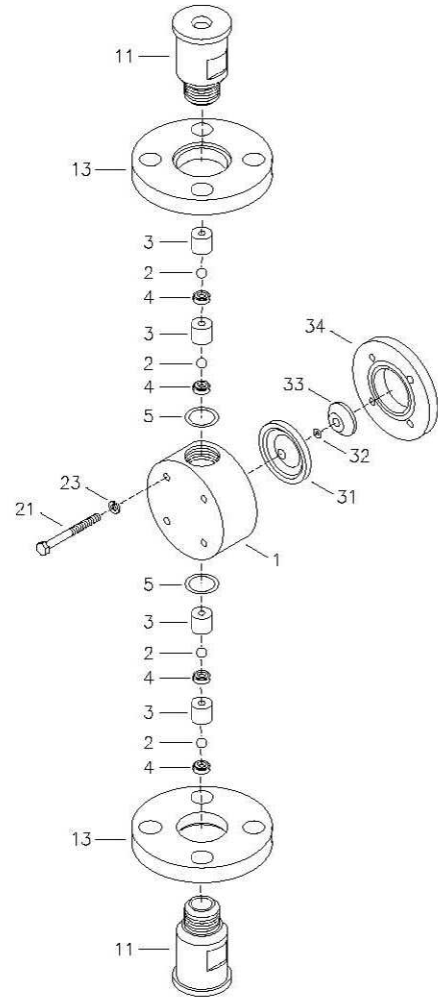
18-3 Liquid End Parts (Flange type)

① Model : KM-500~251-PTC, PE6, FTC



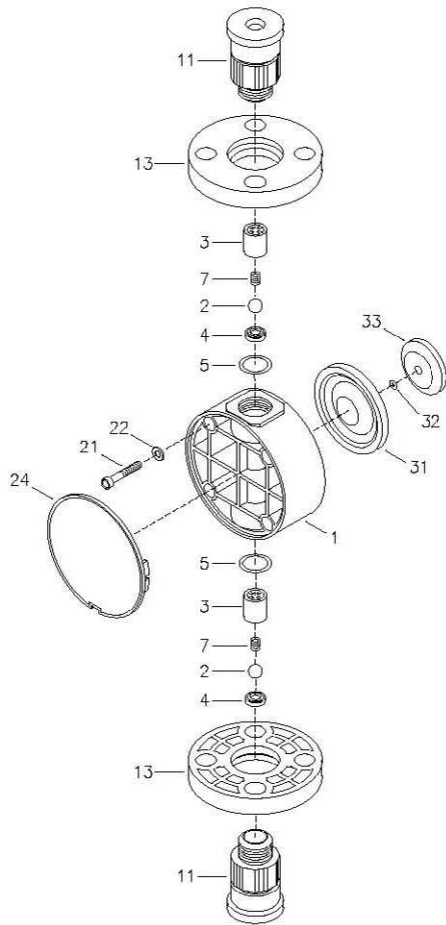
No.	Part Name	Q' ty
1	Head	1
2	Check ball	4
3	Ball guide	4
4	Ball seat	4
5	O-ring	2
11	Joint	2
13	Flange	2
21	Bolt(Wrench)	4
22	Washer(Flat)	4
24	Head cover	1
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1
34	Support ring	1

② Model : KM-500~251-ST6, 6T6



No.	Part Name	Q' ty
1	Head	1
2	Check ball	4
3	Ball guide	4
4	Ball seat	4
5	O-ring	2
11	Joint	2
13	Flange	2
21	Bolt(Hex. head)	4
23	Washer(Spring)	4
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1
34	Support ring	1

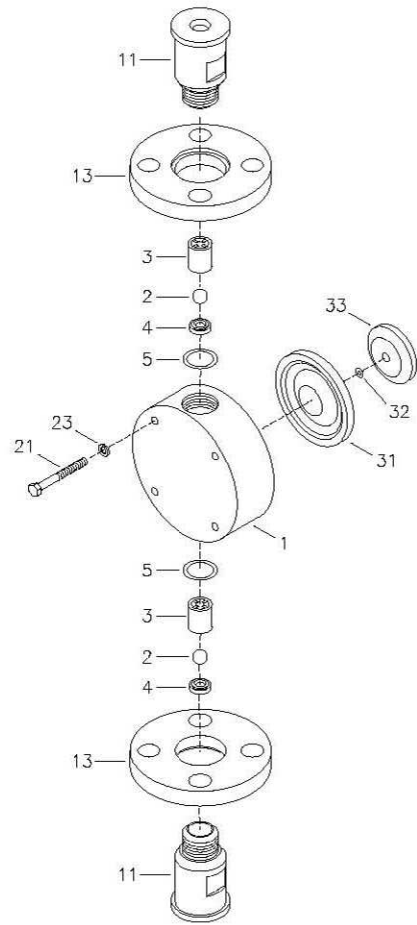
③ Model : KM-521, 102-PTC, PE6, FTC
& High Viscosity Type



No.	Part Name	Q'ty
1	Head	1
2	Check ball	2
3	Ball guide	2
4	Ball seat	2
5	O-ring	2
7 ⁽¹⁾	Spring	2
11	Joint	2
13	Flange	2
21	Bolt(Wrench)	4
22	Washer(Flat)	4
24	Head cover	1
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1

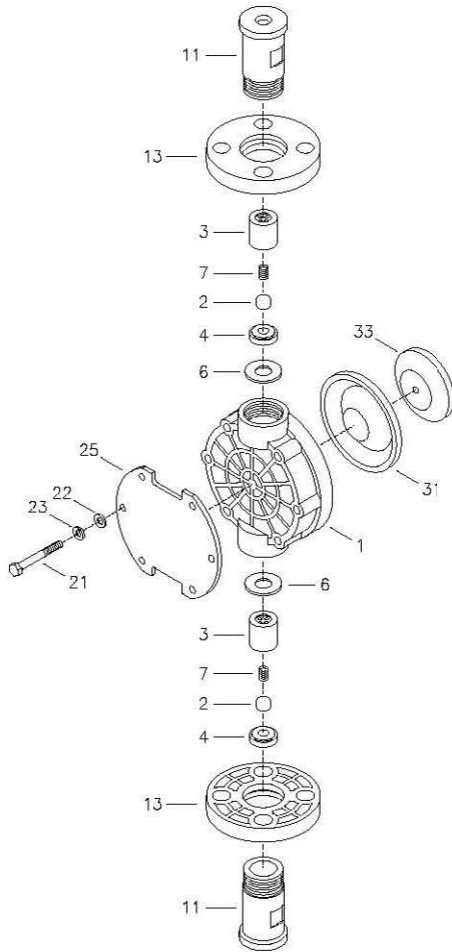
Notice) (1) For only high viscosity

④ Model : KM-521, 102-ST6, 6T6



No.	Part Name	Q'ty
1	Head	1
2	Check ball	2
3	Ball guide	2
4	Ball seat	2
5	O-ring	2
11	Joint	2
13	Flange	2
21	Bolt(Hex. head)	4
23	Washer(Spring)	4
31	Diaphragm	1
32	O-ring	1
33	Diaphragm seat	1

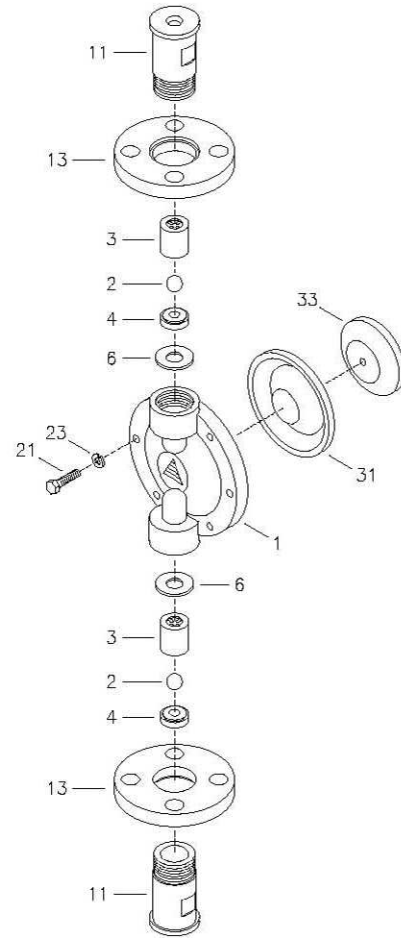
5 Model : KM-212-PTC, PE6, FTC
& High Viscosity Type



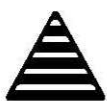
No.	Part Name	Q' ty
1	Head	1
2	Check ball	2
3	Ball guide	2
4	Ball seat	2
6	Packing	2
7 ⁽¹⁾	Spring	2
11	Joint	2
13	Flange	2
21	Bolt(Hex. head)	6
22	Washer(Flat)	6
23	Washer(Spring)	6
25	Head compression plate	1
31	Diaphragm	1
33	Diaphragm seat	1

Notice) (1) For only high viscosity

6 Model : KM-212-ST6, 6T6



No.	Part Name	Q' ty
1	Head	1
2	Check ball	2
3	Ball guide	2
4	Ball seat	2
6	Packing	2
11	Joint	2
13	Flange	2
21	Bolt(Hex. head)	6
23	Washer(Spring)	6
31	Diaphragm	1
33	Diaphragm seat	1



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