Cheonsei

ISO 9001

KEMPION METERING PUMPS

PKD TYPE

Pulseless Diaphragm Pump

Instruction Manual

www.cheonsei.co.kr

Thank you for purchasing our PKD pump.
Read this manual before using the product. Handling and maintenance are explained in easy way. Read through this manual and use the product safely to assure pump performance and long service life. Please keep this instruction manual at the place where you can see it easily.

CONTENTS

1 Cautions for safety

1-1 Instruction

- Instruction Manual is described as below to use the product safely.
- Always follow the manual because it is very important for safety.
- Each symbol and its meaning are described as below.
  Regarding the BLDC M/C UNIT supplied by us, always follow all directions (i.e., warning, caution etc.) described in the instruction manual specially provided as well as warnings and cautions in this manual.

⚠ Warning

Death or serious injury may occur if handling the product in a wrong way without following a warning.

⚠ Caution

Injury or property damage may occur if handling the product in a wrong way without following a caution.

1-2 Caution for operation conditions

⚠ Caution

- Do not use this pump except for injecting liquid. It may cause an accident.
- Follow below condition; otherwise, it may cause trouble:
  Ambient temperature: 0 ~ 40℃
  Pipe pressure: Less than the maximum discharge pressure indicated in the specification/ capacity chart
  ※ Pressure over the allowable one may cause damage to the product, so install safety valves(i.e relief valve) and strainers at pipes.

1-3 Caution for handling

⚠ Warning

- Install this pump beyond the reach of children and/or unauthorized person
- Turn off the power and stop the pump & other equipments when repairing or disassembling pumps. If power is on during work, it may cause electric shock
- Please do not operate when the discharge valve is closed or do not close the valve during operation. Pump and Piping may be damaged with excessive pressure rising and liquid may spout when operation under valve closing.
- Be careful not to insert fingers or any foreign substances into rotating or reciprocating objects during operating pump. If you touch it during operation, you may get injury.
- Do not touch with wet hands. Electric shock may occur.
- Use only designated parts. If undesignated parts are used to the pump, it may cause accident & trouble.
- Do not arbitrarily reconstruct the pump. If the pump is arbitrarily reconstructed, it may cause accident & trouble.

1-4 Noise

- Maximum measured A-weighted emission sound Pressure level(LpA) : 72.0dB(A)

⚠ Caution

- Do not use damaged pump. It may cause accident.
- Do not install pump in the heavy moist or dusty place. It may cause electric shock and trouble.
- Do not touch motor with bare hands during operation. High temperatures can cause burns.
- Wear suitable protective clothing(gloves, mask, goggles, working clothes, & etc.) during assemble and disassemble work when pumping hazardous liquids or uncertain liquids.
- Do not use power other than that specified in the motor nameplate. Otherwise, it may cause malfunction or fire.
- Pump should be properly grounded. If pump is not grounded, it may cause electric shock.
- Work after releasing pressure from discharge piping and remove liquid from Liquid End Part prior to repair or maintenance of pump.
- Pump may be damaged when ambient temperature go down below freezing pont of liquid. Be sure to remove the liquid in the pump and piping after operation stop.
- Make proper protection in consideration of indeliberate leakage from damage of pump & Piping.
- Dispose of waste pump in accordance with related national law.

2 Product Comfirmation

2-1 Checklist after unpacking

Please check following points immediately after receiving the pump.
If the defect is found from pump, please request it to local agent or CHEONSEI.

1 Are the products the same as you ordered?
2 Is there any missing parts ?
3 Is there any visible damage caused by vibration or shock during transport?
4 Is there any loosened bolt or nut?

2-2 Standard Accessories

1 Instruction manual ..... 1 copy
2 Installation bolts ..... 4 sets

3 Overview

PKD series are a pulseless diaphragm metering pump which pulse rate of discharge capacity is reduced. Chemical is sucked and discharged by reciprocating diaphragm which is attached to Slider Shaft by Constant Velocity Cam after reducing the rotation of motor by Worm Gear. PKD series have double head. In case of BLDC M/C UNIT installed, stable capacity is maintained in low-speed, and feedback is quick.

4 Model Code

P	K	D	-	2	1	2	-	S	T	S	-	F	W	S	-	1	2
Ⓐ		Ⓑ		Ⓒ-a	Ⓒ-b	Ⓒ-c		Ⓓ-a	Ⓓ-b	Ⓓ-c		Ⓔ	Ⓕ	Ⓖ		Ⓗ	Ⓘ

Ⓐ Brand name PULSELESS MERTRING KEMPION

Ⓑ Type of wet side (classification by pump structure)

D : Diaphragm type(P : Plunger type)

Ⓒ Discharge amount

Ⓒa, Ⓒb / 2 1 = 21 , Ⓒc / 00 = 2(Number of last digit 0s)
= 2100 (mL/min)

Ⓓ Liquid End Material

a : Material code of head
P : PVC F : TEFLON S : STS304 6 : STS316
b : Diaphragm material code
T : PTFE E : EPDM
c : Check ball material code
C : CERAMIC S : STS304 6 : STS316

Ⓔ Connection type F : Flange connection X : Special

Ⓕ Viscosity limit W: Standard X : High viscosity

Ⓖ Power Supply

S : 3-phrase, 380~ 480V
A : 3-phrase, single phrase 200 ~ 230V (1.5KW-grade available only for 3-phrase)
(2.0KW-grade available only for 3-phrase 380~480V)
X : Special order

Ⓗ Junction pipe

1 : Attached 2 : Attached + Relife Valve 0 : Not attached

Ⓘ Remote Control Method

1 : Inverter
2 : BLDC M/C Unit(Auto)
3 : BLDC M/C Unit(Manual)
0 : Not attached

5 Material of standard wet side

Material code / Part name	Type	PTC		FTC		STS(6T6)		
		500~102	212~813	500~203	243~813	500~102	212~203	243~813
① Head		PP	PVC	PVDF	PVDF(PTFE)	SSC13(SSC14)		
② Diaphragm		PTFE(EPDM)		PTFE		PTFE		
③ Check ball		CERAMIC(STS304)		CERAMIC		STS304(STS316)		
④ Ball guide		PP	PVC	PVDF	PVDF(PTFE)	PVDF	SSC13(SSC14)	
⑤ Ball seat		FKM(EPDM)	PVC	PTFE(PVDF)		PTFE	STS304(SSC14)	
⑥ Joint		PP	PVC	PVDF		STS304(STS316)		
⑦ O-ring · packing		FKM(EPDM)	FKM	PTFE		PTFE		
⑧ Junction pipe		PVC		PVDF		STS304(STS316)		

Note) If you want other than the above standard material, please contact us for special order. (* means customized product)

6 Specification & capacity table

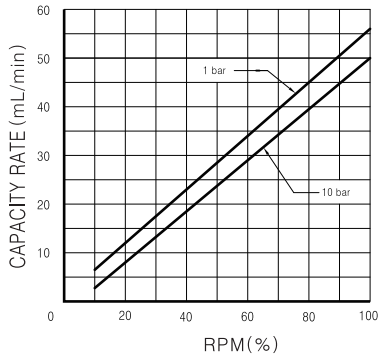
Specification	PKD Series															
	-500	-121	-241	-521	-102	-212	-412	-702	-143	-113	-203	-243	-333	-423	-613	-813
Max. discharge amount(mL/min)	50	120	240	520	1040	2100	4100	7000	14900	11200	20700	24000	33000	42000	61000	81000
Max. discharge pressure(bar)	10						8	5	3	7	5	7	5	3	3	3
Pulse rate(%) F/S	±5.0															
Stroke length(mm)	3	4		6				10			15	12.5	17.5		15	20
Max. stroke number(spm)	58		116	58	116	58	116	58	116	87						
Transfer-available temperature(°C)	STS, 6T6, : 0~80°C / PTC : 0~50°C / Ambient temperature : 0~40°C															
Connection(FLANGE)	KS 10K 15A							KS 10K 25A				KS 10K 40A			KS 10K 50A	
Motor(BLDC)	0.55kw / FR71							0.75kw / FR80				1.5kw / FR90				2.0kw

Note) 1. Maximum discharge amount means the discharged amount under the discharge-allowed pressure, in the standard state (room temperature, clean water).
2. The effective flow rate-controllable range is 20~100%. (Operation available within 10 ~ 100%)
3. To order special motor, such as explosion-proof motor, other than the standard motor specification, please contact us separately.
4. The weight means that of STS wet side including the standard motor.
5. In case of PTC or FTC wet side, the temperature of liquid to be handled is 0 ~ 50℃; in case of STS or 6T6, it is 0 ~ 80℃.
6. The liquid where slurry or solids is mixed is not acceptable for pulseless and/or metering injection.
7. The self-priming is 1M, and the ambient temperature is 0 ~ 40℃.
8. For painting, Munsell No. 0.6PB 4.8/10.6 or similar colored corrosion painting is used. (The special motor has the standard color specified by its manufacturer)
9. The pump specification and capacity may change without notice, for improvement.

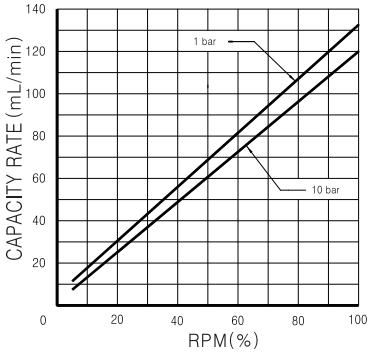
7 Performance curve

Condition: Room temperature, clean water, suction - (1M)

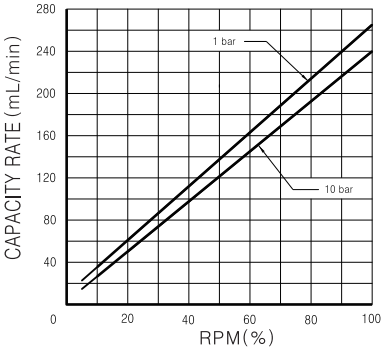
● PKD-500



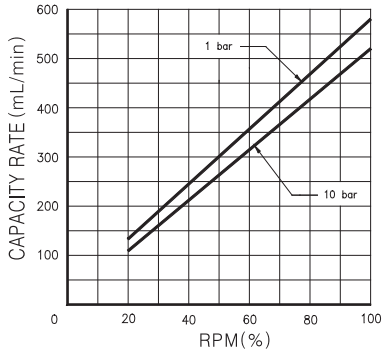
● PKD-121



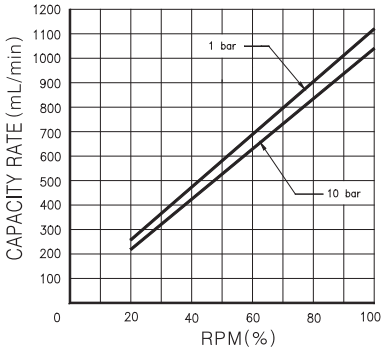
● PKD-241



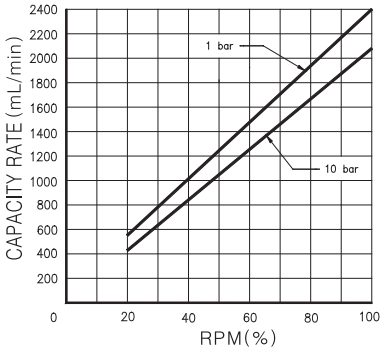
● PKD-521



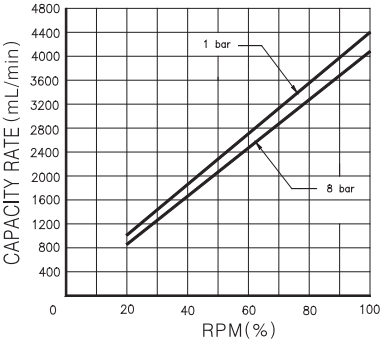
● PKD-102



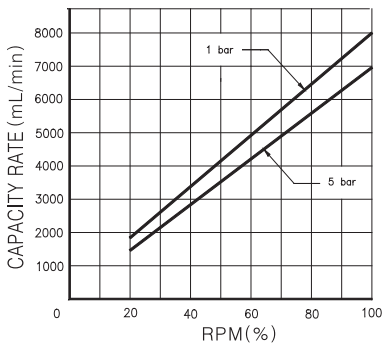
● PKD-212



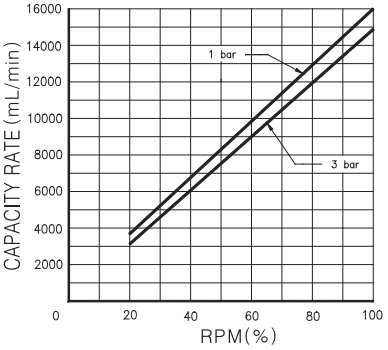
● PKD-412



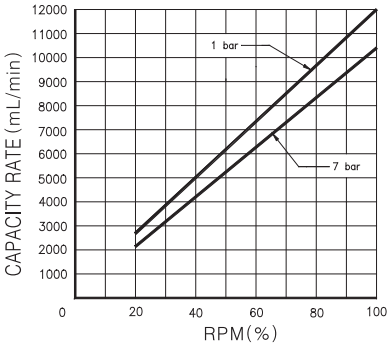
● PKD-702



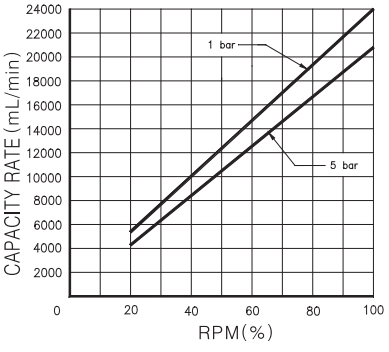
● PKD-143



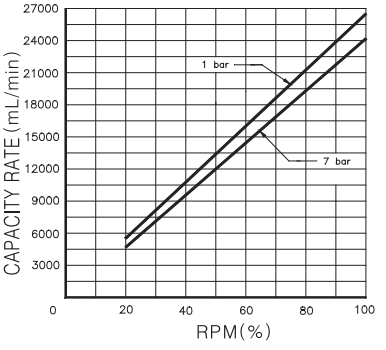
● PKD-113



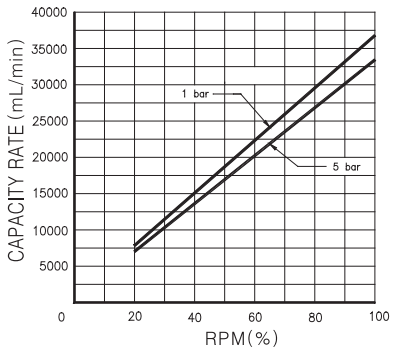
● PKD-203



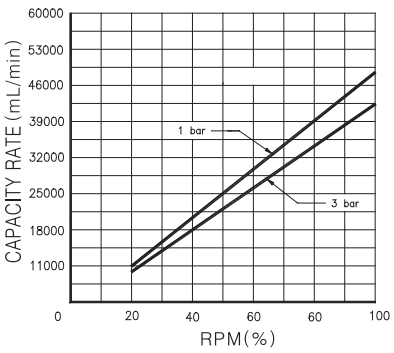
● PKD-243



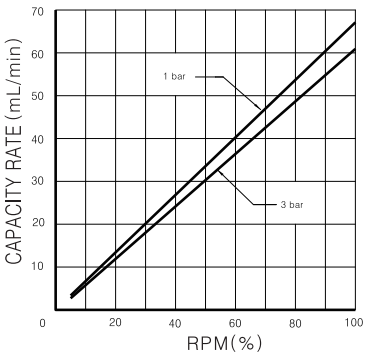
● PKD-333



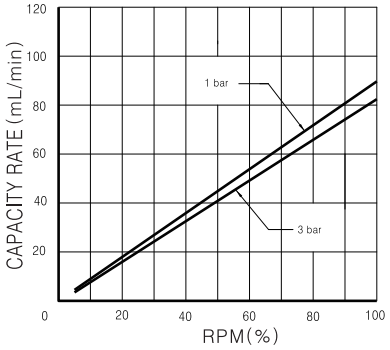
● PKD-423



● PKD-613



● PKD-813



Note)
Above performance curves were tested at our testing equipment under the fixed condition(Clean Water, Room Temperature, & 1m of Suction Head).
Therefore, performance curves can be somewhat different in accordance with condition of job site after installation.

8 Operation principle and structure

8-1 Operation principle

Fig. A General metering pump(Single Head)

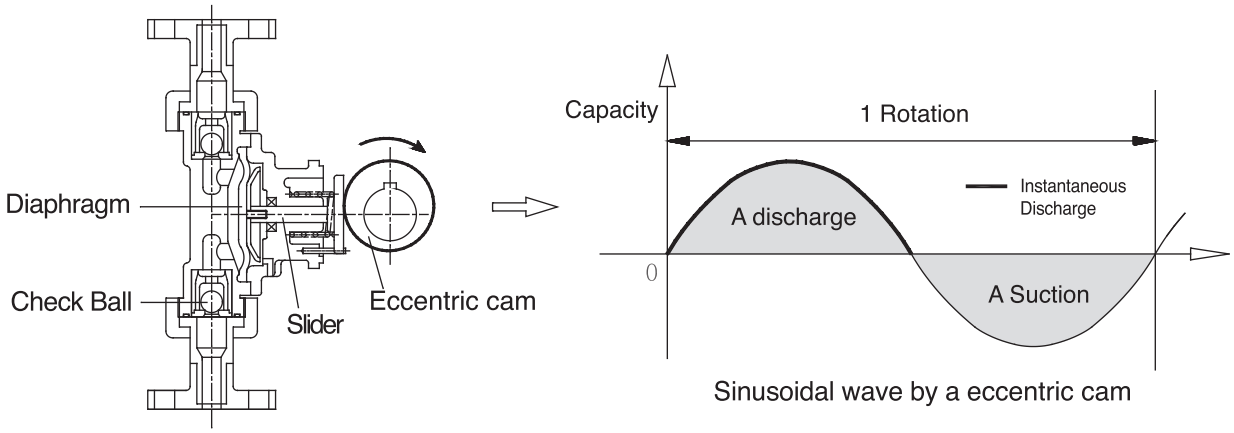


Fig. A General metering pump Sinusoidal wave by a eccentric cam

<Figure A> shows the pulse wave by a eccentric cam for a general metering pump. The pulse of metering pumps generates when the eccentric cam is used to convert the power of the motor into reciprocating motions. This eccentric cam is a circular object with the eccentric amount of e, so the reciprocating velocity of the diaphragm has sinusoidal wave. This is why the discharge flow rate has pulses.

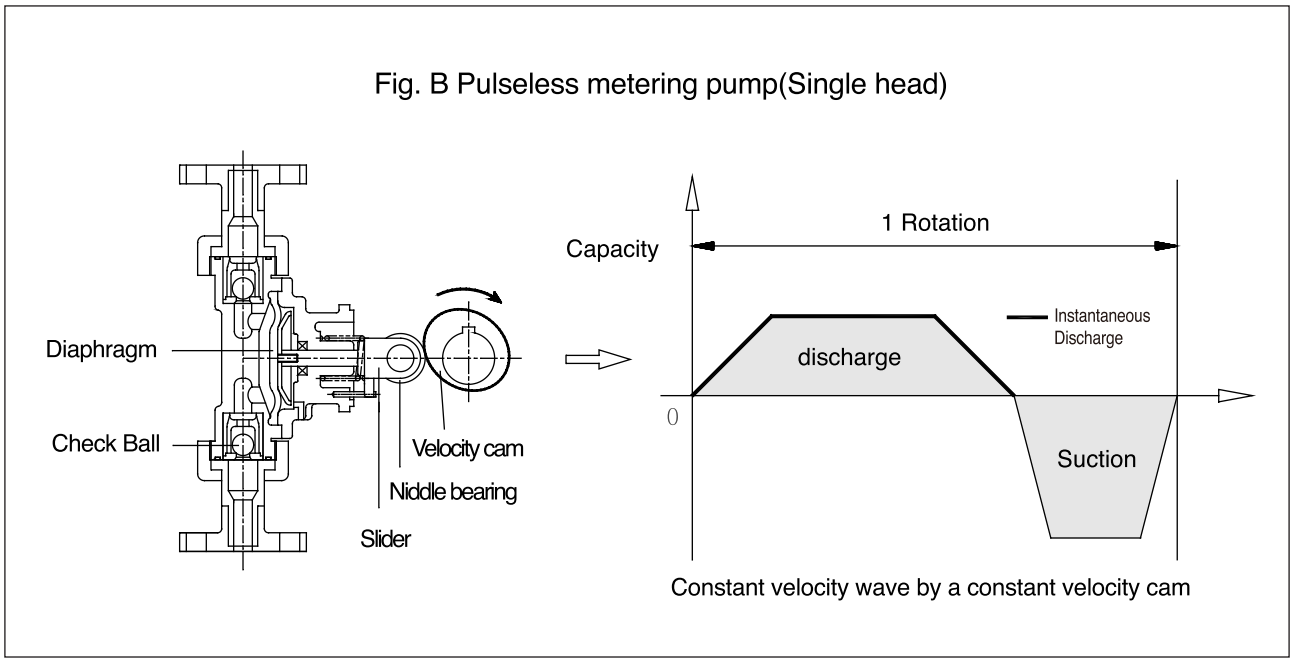


Fig. B Pulseless metering pump constant velocity wave by a constant velocity cam

<Figure B> shows the pulse wave of a constant velocity cam, having a constant velocity section in the flow rate. Because the constant velocity cam operates the diaphragm in a constant velocity, the discharge flow rate is constant, too. The constant flow rate in this section is the pulseless flow rate. However, the reciprocating metering pump always has a suction section if it has a discharge one, so in order to obtain constant pulseless flow rate, two wet sides should be used to have constant discharge.

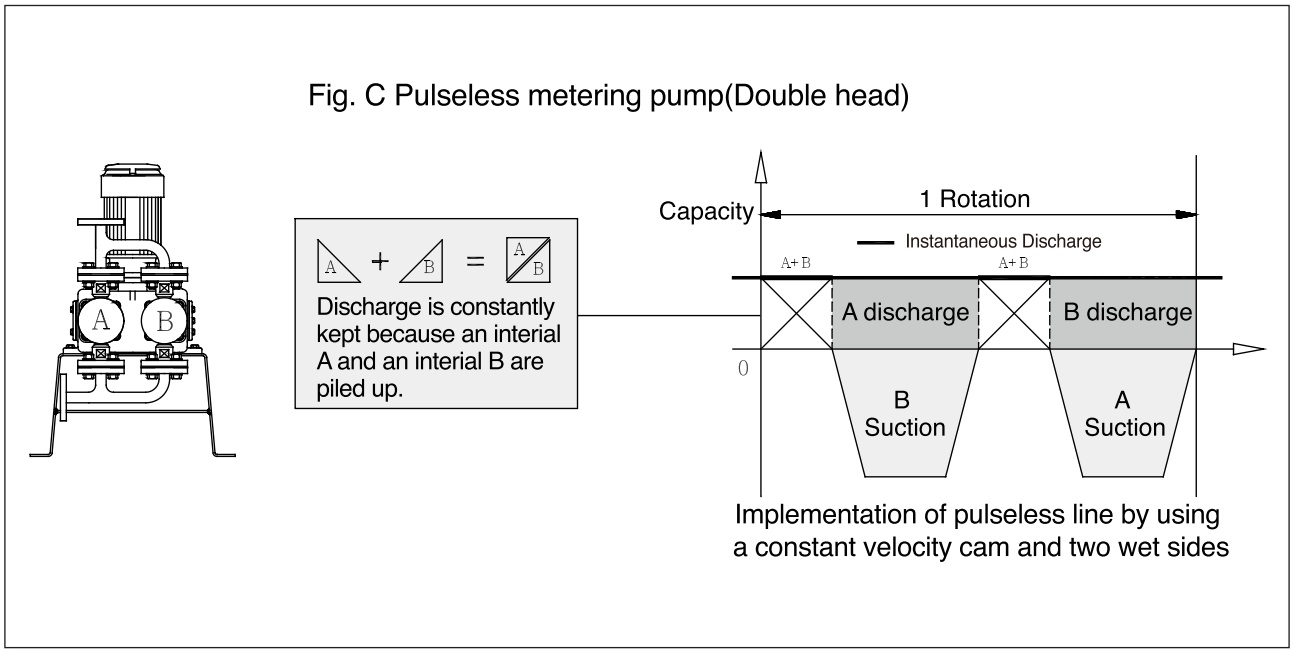
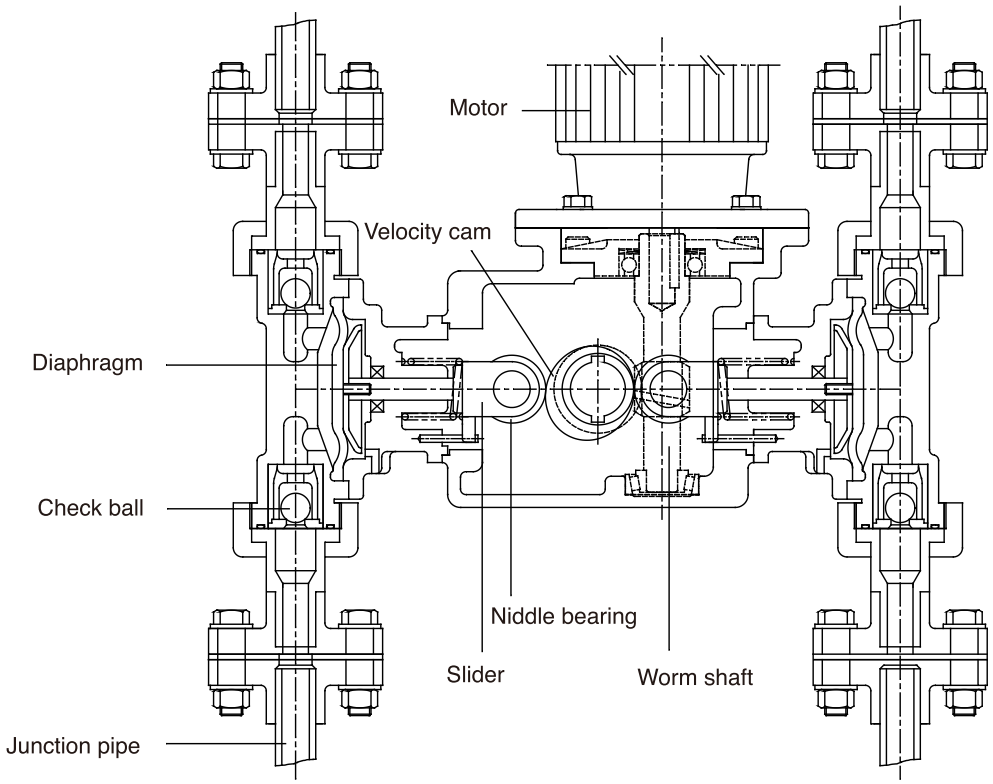


Fig. C Pulseless metering pump implementation of pulseless line by using a constant velocity cam and two wet sides

8-2 Inside structure



9 Installation

9-1 Installation Place

⚠ Caution

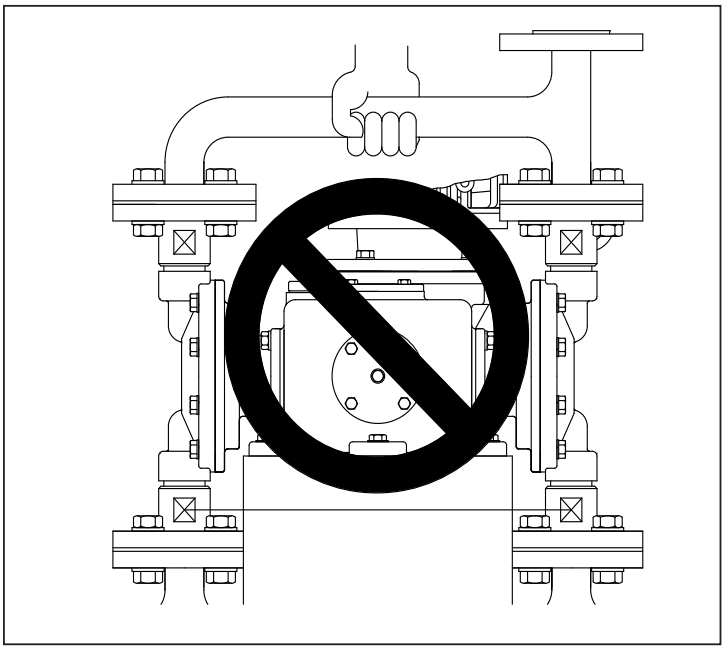
- Do not install the pump at the place of which ambient temperature is higher than 40℃ or lower than the freezing point. The inside of the pump may be damaged.
- For stable operation, do not install it at a dusty and damp place.
- Do not apply external force to junction pipes of the pump. The pump may be deformed or damaged.

1 Keep the pump out of the direct rays of the sun, rain and/or wind.
2 Install the pump at a well ventilated place in summer and at a place where the transferred liquid is not frozen in winter.
3 If possible, install the pump at a place which is lower than the minimum surface of liquid in the tank.
4 For easy maintenance and repair, secure enough surrounding space. Install the pump with consideration of safety of motor and electric wiring in case of flooding.

5 The floor should be even, and the installation place should be free from vibration caused by other machines.
6 Install the pump with props which can support the pump fully, while referring to the foundation drawing. Use the level instrument so that the pump can be attached horizontally.
7 Pay attention not to have water or used liquid invade the BLDC motor during cleaning the pump. If water invades, an electrical accident may occur due to fire or electric shock.

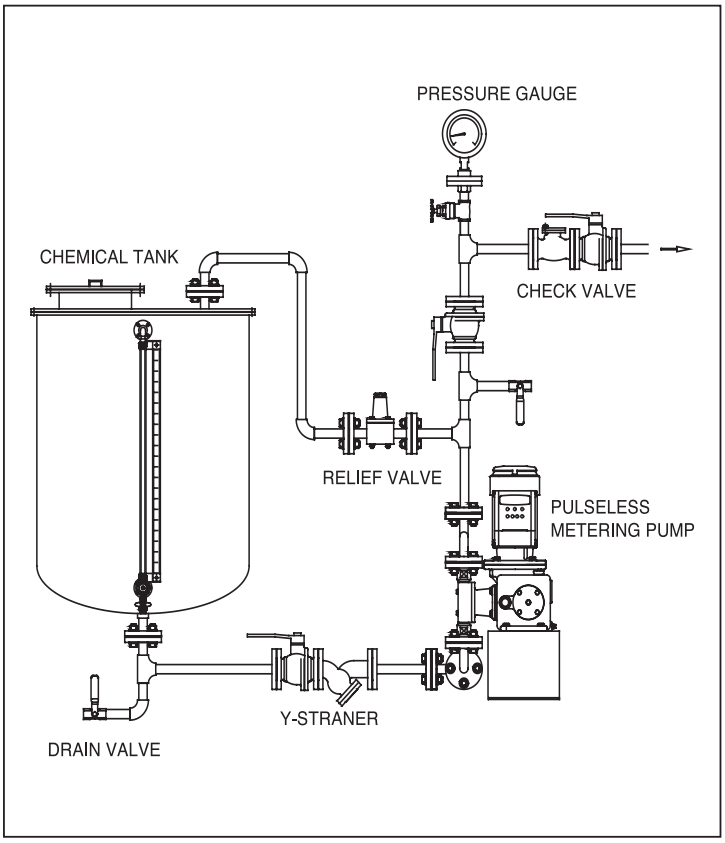
9-2 To Move the Pump

To move the pump, grab the wet side head and bed firmly. Be careful for the junction pipe not to have external force.
※ Never grab the junction pipe by hand to move it. (Especially, in case of PVC or PVDF material, the junction pipe may be damaged.)



9-3 Pipe(General caution)

1 Decide the piping system which can sufficiently satisfy suction & discharge condition.
2 Piping should be short and less bending as far as possible and be careful not to make the cavity at which air stay.
3 Install piping support lest piping load fall on the pump. Especially, in case of liquid end material of PVC, be careful about handling.
4 Be careful that pump is not to be influenced with thermal stress of piping when transferring hot liquid or cold liquid.
5 Don't make U shaped bend in the piping when transferring easily precipitable slurry.
6 Install a flushing pipe line for maintenance and inspection when transferring viscous liquid, poisonous liquid, or coagulative liquid.
7 Choose the piping material that has sufficient corrosion resistance to the liquid and can endure the pressure applied in the piping.
8 Connect piping after flushing the inside of piping cleanly and remove the inspection sticker for preventing entrance of foreign substance on the discharge port.
9 Protect the piping with insulating material or keeping warm device, if the liquid may freeze inside of piping. In addition, Install drain valve at the suction & discharge side in order to drain the liquid inside piping after operation stopped.



9-4 Suction Pipe

1 Suction piping is made with drop method as far as possible. Also, the diameter of the suction piping should be larger than or same with the suction diameter of the pump.
2 Carefully connect the joint of suction piping in order to prevent air inflow into the piping. Discharge rate of pump can be destabilized by air Inflow into the piping.
3 Make piping length of suction side as short as possible. If it is too long, cavitation occurs and regular discharge rate can't be assured.
4 Install a strainer on the suction piping because it make unstable performance that foreign substances flows into pump head.

9-5 Discharge Pipe

1 Use a discharge pipe of which internal pressure is higher than the set value of the safety valve.
2 If discharged at the pressure less than the atmospheric pressure, keep the pipe end higher than the level of the tank, or install the back pressure valve to prevent siphon phenomenon.
(Please get consulation before installation of back pressure valve because pulse rate can be slightly increased.)

9-6 Electrical wirning

⚠ Warning

- Do not touch the product with wet hands. You may get an electric shock.

⚠ Caution

- Before wiring, check voltage, phase, & frequency of BLDC M/C UNIT and connect the pump with correct power. It may cause trouble and fire, if connecting with incorrect power.
- Pump should be properly grounded in order to prevent electric shock.
- Entrust the wiring to electrical engineer.
- Install regulated Magnet Switch and Thermal Relay for the adjustment and maintenance of the pump.
- Use standardized parts in wiring and fully pay attention to safety in accordance with the technical standard & wiring regulation of the electrical equipment.

10 Operation

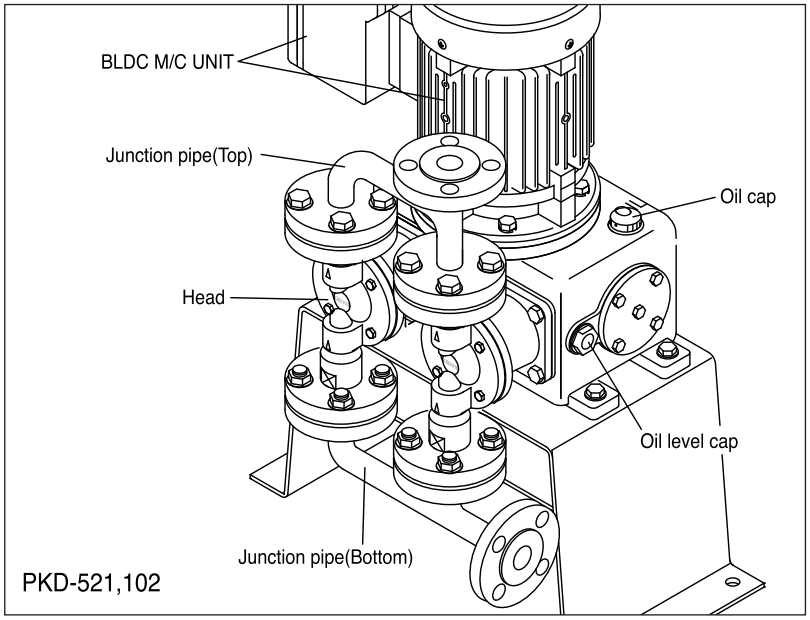
10-1 Driving preparation

⚠ Caution

- When foreign substances are held in the discharge pipe of the pump, the pipe may be damaged due to pressure increase and people can be hurt due to liquid burst-out, so always be careful for foreign substances not to come into the pipe.
- To handle hazardous liquid, always wear the protective equipment (i.e., protective gloves, mask, protective glasses, liquid-resistance working clothes etc.).
- Some water may be remained in the liquid end part of pump after final performance test. In case of use for some liquids reacting radically to water, remove water in the pump and dry the pump necessarily.

10-1 Driving preparation

1. Check if there is oil leakage caused by any damaged parts or loosened bolt. Excessive leakage of working oil may affect the discharge volume.
2. Check the oil gauge to see if the driving part of pump is filled with the oil of regulated amount.
   The normal position of the oil level is the middle red point of the gauge.
3. Remove the black pin of the oil cap. This is attached to prevent oil leakage during delivery.
4. Check if all of accessories, liquid to be transferred, and power supply necessary for pump operation are ready.



10-2 Driving

1. Open the suction and discharge valves.
2. Check the rated power and turn on the pump. Check if the motor fan rotates clockwise. (When the inverter or general motor is used)
3. Open the discharge side up to the atmospheric pressure, and increase the discharge amount slowly up to 50%. Check if the transferred liquid reaches the junction pipe. Connect to the flange of the discharge side. And than, operate test run for 30minutes.
   Caution) When the ambient temperature is low, overload may occur temporarily due to low temperature of lubricant. Wait until the lubricant temperature increases with no load.
4. If there is no error found during test run, increase the pressure of the discharge side up to the setting one. Check if the BLDC controller works properly or if every part works properly.

10-3 Control of discharge amount

⚠ Warning

- Do not use the controller (BLDC M/C UNIT) below 10%.

The discharge amount can be controlled by the controller (BLDC M/C UNIT).
The controller can operate within 10 ~ 100%, but its effective flow rate-controllable range is 20 ~ 100%. (Within 20 ~ 100%, the discharge amount is stable)

10-4 Restart of pump

1. In case of stop pump operation for short period(less than 1 week), run the pump at a desired stroke length & prescribed discharge pressure after air bleed operation.
2. In case of stop pump operation for a long period(more than 1 week), the pump should be run at atmospheric pressure of discharge side for several minutes before going into normal operation. Do not start regular operation before above warming up.(Set the controller to 50%)
3. It is concern that pump is damaged by freezing during winter season. Without regard to stop perioed of operation, drain the liquids in the piping and pump by operating dry run after opening the drain valve on the suction piping.

⚠ Warning

- Do not operate when suction valve and discharge valve are closed or do not close suction valve and discharge valve during operation.
- Pump and piping may be damaged with excessive pressure rising and liquid may spout when operation under valve closing.

10-5 Confirmation of discharge amount

If pump has no problem, check the discharge volume under actual running condition with measuring device such as mass cylinder.

1 If discharge volume had no fluctuation after repeated measurements, the pump is judged to be running normally.

2 When the discharge amount increases/decreases by changing the motor speed, measure the discharge amount one minute or more after the change.
Note) If you request the test report, we submit the test report which has been performed at normal temperature and with clean water. The result may vary depending on on-site pipes and transferred liquid.

10-6 Pulse rate increase

The pulse of the metering pump largely depends on pipes and transferred liquid.
(Since the factory test condition is not same as your on-site condition, the result may be different.)
Besides, if the pump operates after a long stop, its metering performance and pulse rate may change due to adherence of transferred liquid to the check valve etc., so, always clean the inside of the wet side to keep it for a long stop duration. The increase of the pulse rate after the warranty may result from life time of parts, so please refer to "14. Consumable Parts". For other questions, please contact us.

11 Maintenance & Inspection

⚠ Warning

- Turn off the power and stop the pump & other equipments when repairing or disassembling pump, otherwise it may cause electric shock.
- Be careful of big accidents caused by inserting fingers or cloth in rotator.

⚠ Caution

- Wear suitable protective clothing during assembly and disassembly work.
- Work after releasing pressure from discharge piping and remove liquid from Liquid End Part prior to repair or maintenance of pump.

11-1 Inspection before operation

1 Check the level of liquid tank and, if it is insufficient, supplement the liquid.
2 Check if the suction & discharge valve are opened.
3 Check if piping is safe and undamaged.
4 Check electrical wiring if there are no electrical short & disconnection.

11-2 Inspection during operation (Daily inspection)

1 Check the level of liquid tank and, if it is insufficient, supplement the liquid. Specially, be careful in the process which handle the chemical solution or required Air-Free circumstance.
2 Check if liquid or air is leaked out the Joint or other parts. If necessary, fasten it again. If leakage doesn't stop, check O-ring and/or Packing of each parts and replace the damaged O-ring and/or Packing with new one.
3 Check if noise sounds from the motor or pump.
4 Check if the oil in the driving part is sufficient or leaky. If insufficient, refill the oil up to regulated level of the oil level gauge.
5 Check if there is no problem in the setting discharge rate & discharge pressure.
6 Check if the pressure gauge is normal.

11-3 Long-term stop

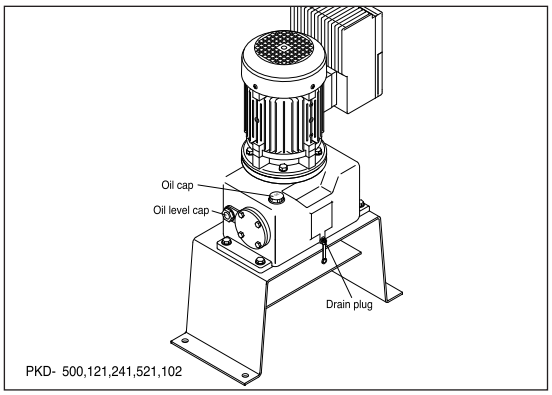
1 Wash inside Pump Head of suction side and flush water or cleansing solution through Pump Head for about 30 minutes.
2 Put the cover on the pump to protect the pump from dust and/or corrosion.
3 Check foreign substances lay on the Check Ball and Ball Seat before restarting the pump.

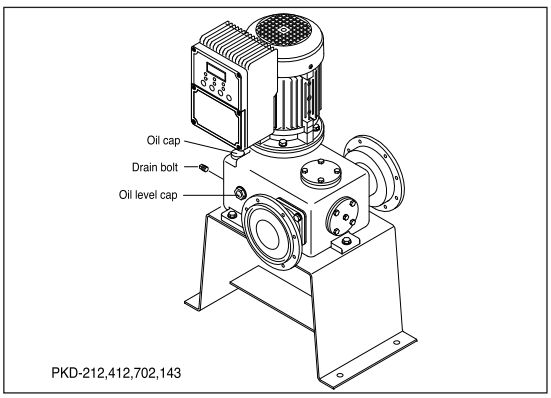
11-4 Supplement of oil

■ Change of oil in the driving part

① Changing interval
Change oil after 500 hours when initial operation after buying it, and thereafter, change oil every 4,000 hours of continuous operation. However, when emulsification or deterioration of the oil occurs, change the oil immediately.

② Changing method
Turn the dial to 0%, loosen the (square) plug with spanner, and drain the used oil.
Next, clean the inside with flushing oil.
After fastening the plug, refill new oil slowly through the oil inlet(Oil Cap) up to the regulated level(Red points) of the oil level cap





③ Recommended quantity

MODEL	PKD-521,102	PKD-212~143	PKD-113, 203	PKD-243~813
Suitable oil amount	1,350mL	1700mL	2800mL	7000mL

④ Recommended oil
- Shell's Omala oil #220 (※)
- Mobile's Gear oil #630
- Other gear oil with the viscosity grade of ISO VG220, SAE90

Note) (※) means the oil used by us.

⚠ Caution
- Always wear the protective equipment so that the skin and eyes are free from being touched by oil.
- Keep oil far away from flame or high-temperature object. Keep oil in the well-ventilated area.

12 Cause and measure of trouble

Troubles \ Causes	Coupling rubber is damage	Insufficient lubricating oil in driving part	Oil seal is damaged	Packing or O-ring of valve is dameged	Diaphragm is damaged	Leakage from safety valve	Pressure gauge is dameged	Change of dosing liquid	Air flow in suction piping	Power is incorrect	Overload (Over discharge pressure)	Change of pump stroke number	Over-transferred by shortage of minimum requirement differential pressure	Constant velocity cam is worn out	Strainer is clogged	Valve is clogged by foreign substance	Ball seat is worn out	Shortage of NPSH (Cavitation)	Low voltage	Fuse is shut off	Wrong wiring	Come OC or Err out on driver/ Motor hall device is damaged
Motor does not rotate										○										○	○	○
Low motor revolution speed										○	○	○							○			
Insufficient discharge amount				○	○	○		○	○			○		○	○	○	○	○				
Excessive discharge amount													○									
Unstable discharge amount				○		○		○	○	○		○	○		○	○	○	○				
Excessive motor current							○			○	○									○		○
No liquid coming-out				○	○	○		○	○						○	○	○	○				
No discharge pressure increase				○	○	○			○	○					○	○	○	○				
Too much leakage				○	○																	
Too many vibrations and too noisy		○	○							○	○				○			○				
No suction			○	○			○			○					○	○	○	○				
Too high temperature of a reducer unit		○					○		○		○											
Pulse rate increases			○	○	○	○	○	○	○	○			○	○			○					
Action to take	Exchange	Check the oil amount, type, and pollution	Exchange	Exchange	Exchange	Re-adjust the setting pressure of the safety valve; check and repair it.	Exchange	Re-examine the pump specification	Check the pipe and remove the cause.	Examine it	Check the discharge pipe system and remove the cause of overload	Check the power, motor, inverter and reducer.	Check the minimum requirement differential pressure	Exchange	Disassemble and clean it	Disassemble and clean it	Exchange	Check the suction condition	Check the inout power	Exchange the fuse; refer to BLDC instruction Manual.	Check electrical wiring; refer to BLDC instruction Manual	Remove the cause of OC (Overload); refer to BLDC instruction Manual

※ 1) Regular inspection is needed to maintain stable pulse rate.
2) For BLDC M/C UNIT controller, refer to the Instruction Manual. For other questions, please contact us.

13 Replacement of Parts

⚠ Warning

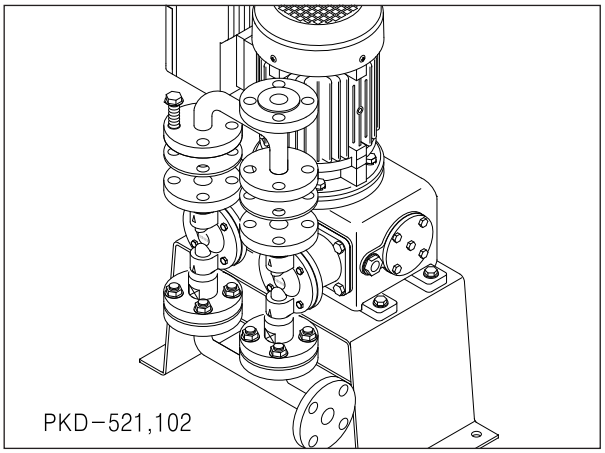
- People may be hurt, so pay extra attention when you handle large and heavy parts.
- Wear the protective equipment because any liquid which remains inside the pump may come out during disassembly and cause fatal injury to human body.

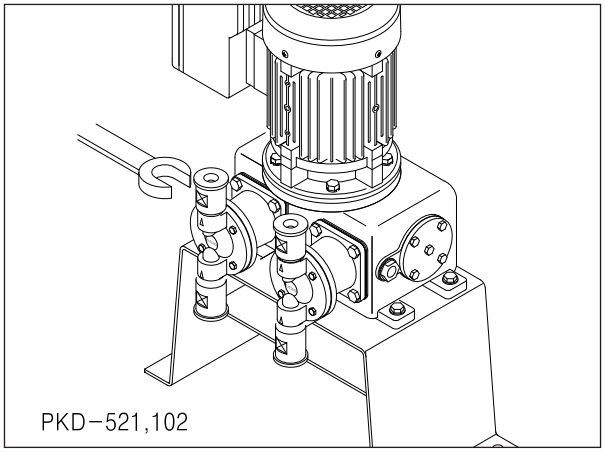
Refer to "18. structure and name of each parts" for assembly/disassembly.

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

[1] Disassembly

① Unfasten the pipes of the suction and discharge sides.
② Unfasten the junction pipes of the suction and discharge sides.
③ Loosen the joint flange of the suction and discharge parts, and take out the valve (ball seat, ball guide, check ball).
④ Check the damage & sticking of foreign substances on the each parts and replace or wash if necessary.


PKD-521,102


PKD-521,102

[2] Assembly

① Assemble the valve while referring to "18. structure and name of each parts".
② Assemble the joint flange of the suction and discharge parts, and tighten the valve.
③ If the packing or O-ring part is damaged, leakage may continue even if tightened.
④ Assemble the junction pipes of the suction and discharge sides.
⑤ Assemble the pipes of the suction and discharge sides.

⚠ Caution

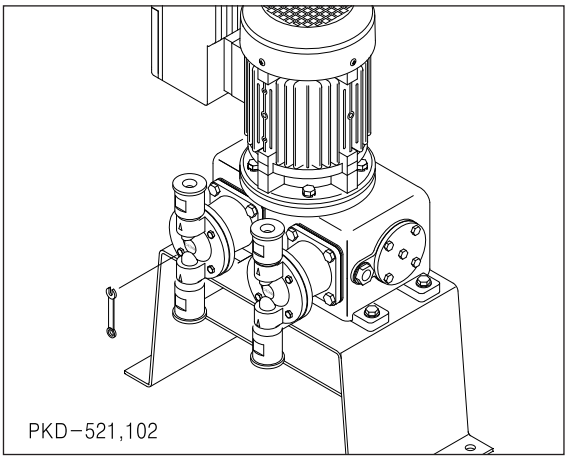
- Be careful to assemble valve parts correctly according to sequence (top : ball guide, middle : check ball, bottom : ball seat). If the sequence is wrong, liquid flow backward and pump may be damaged.

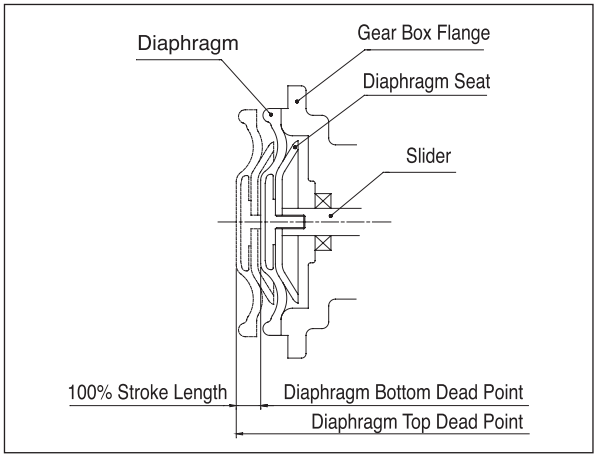
13-2 Replacement of Diaphragm

[1] Disassembly

① Unfasten the pipes of the suction and discharge sides.
② Unfasten the junction pipes of the suction and discharge sides.

③ Unfasten the pump head-fixing bolt with a wrench.
④ After setting the dial of the pump to 100%, disassemble the diaphragm from the slider by turning it counterclockwise. Disassemble another one in the same way.
⑤ If the diaphragm is worn out or damaged, exchange it with a new one.





2 Assembly

⚠ Caution

- Chemical could be leaked when assembling the head by bolt. Therefore tighten the bolts evenly and diagonally

① After setting the dial of the pump to 100%, Assemble the diaphragm to the slider by turning it clockwise.
② Assemble another one in the same way.
③ Tighten the bolts evenly and diagonally so that there is no gap between the head and the gear box flange.

Type	PKD-500~102	PKD-212,412,702,143, 113	203	243, 333,423	613, 813
Torque(Nm kgf · cm)	2.9(30)	11.8(120)	9.8(100)	15.7(160)	17.6(180)

※ Assemble the joint flange of the discharge and suction sides in accordance with the reverse order of disassembly. Connect the pipes of the discharge and suction sides.

13-3 Removal and assembly of the constant velocity cam (This section is provided for user's understanding)

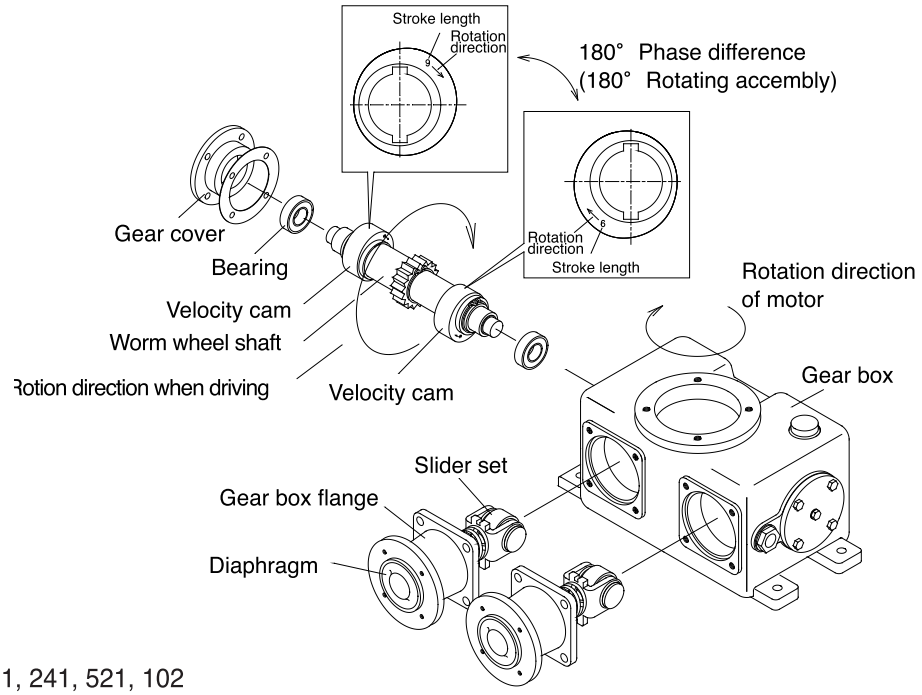
The drive unit of our pulseless metering pump consists of several parts necessary for pulseless pump, such as constant velocity cam, slider and worm gear. Especially, the pulse rate largely depends on the rotating and assembly directions of the constant velocity cam. Therefore, to disassemble or assemble the drive unit, refer to the directions in the Instruction Manual to keep the pump performance as well as safety.

1 Removal

To remove the drive unit, always disassemble the wet side first.
① Unfasten the pipes of the suction and discharge sides.
② Unfasten the junction pipes of the suction and discharge sides.
③ Unfasten the pump head-fixing bolt with a wrench. (Disassemble the check valve only if needed)
④ Unfasten the gear box flange and remove the slider from the gear box.
⑤ Remove the motor from the gear box. Carefully take out the worm shaft.
⑥ Disassemble the gear cover and remove the worm wheel shaft.
Disassemble other parts while referring to "18. structure and name of each parts".

2 Assembly

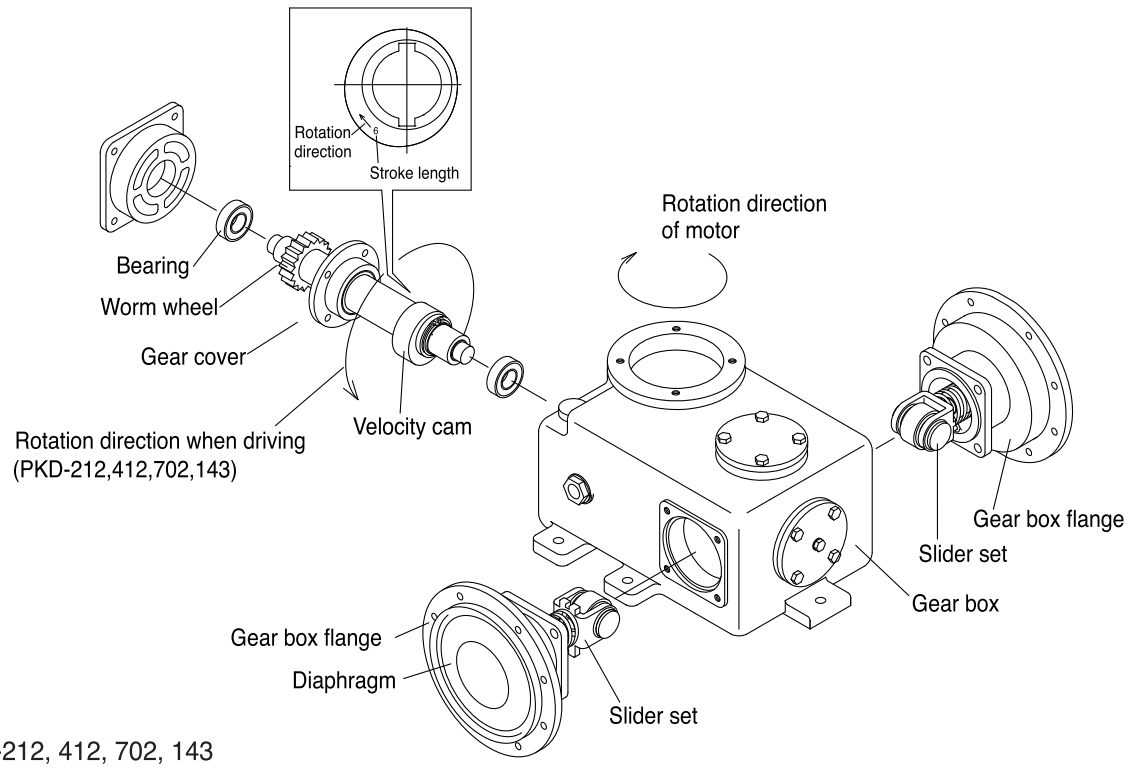
As the motor has rotating direction, the constant velocity cam has direction, too. Build the constant velocity cam with consideration of the rotating direction of the worm wheel shaft as shown in below figure.



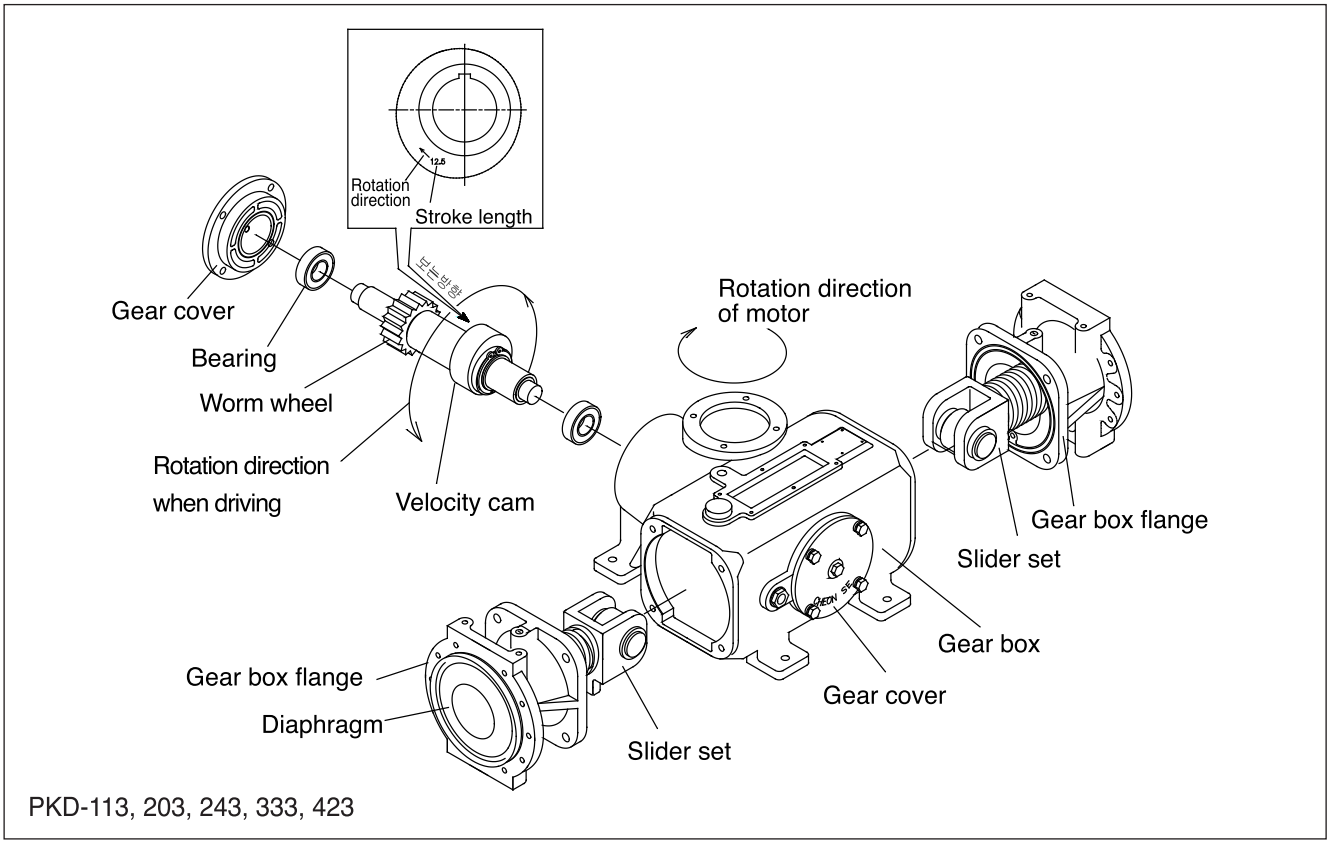
PKD-500, 121, 241, 521, 102

The arrow showing the rotating direction and the number showing the stroke length are engraved at the side of the constant velocity cam. Make sure that the arrow direction of the constant velocity cam is same as the rotating direction of the worm wheel shaft. After assembling the drive unit, operate the motor and compare with the diaphragm speed.(Normal if forward speed is faster than backward speed)

※ If the assembly direction (rotating direction) of the constant velocity cam is opposite, you cannot obtain the pulse rate as desired; besides, the product may be damaged, so always pay attention to the direction.



PKD-212, 412, 702, 143



PKD-113, 203, 243, 333, 423

14 Consumable Parts and Spare Parts

14-1 Consumable part

Part Name	Q'ty per 1 pump unit			
	PKD-500, 121, 241	PKD-521, 102	PKD-212~813	PKD-500~813
Check ball	8	4	4	1year
Ball guide	8	4	4	1year
Ball seat	8	4	4	1year
Diaphragm	2			4,000 hours
O-ring • Packing	4			1year
Oil Seal	2			1year
Worm gear	1			1year
Velocity cam	2		1	1year

※ The changing interval is the estimate, and it is not guaranteed. It may vary depending on on-site condition.

14-2 Spare Part

Spare part(s) for 3 years: bearing
Spare part(s) for 3 years or longer: motor

15 Warranty

⚠ Warning

- If the pump is reconstructed arbitrarily or the undesignated parts are used into the pump, Cheonsei will not warrant and Chensei is not responsible for any expense caused by accident or trouble.

1 Warranty period is one year from purchase date.
2 During warranty period, repair or change of pump is free of charge if trouble or damage of pump due to design or manufacturing of CHEONSEI. (※ Consumable parts are excluded.)
3 Repair or change product due to following reasons will be charged regardless the warranty period.
① Trouble or damage of pump expired warranty period.
② Trouble of using by careless handling.
③ Trouble or damage due to using non-designated part & reconstructing the pump arbitrarily.
④ Trouble by fire or natural disaste

16 Repair Service

⚠ Caution

- When the pump is sent to factory for repair service, clean out inside of pump.
- If the pump has been used for harmful & fatal liquid to health, please consult with before sending it.

1 Contact to CHEONSEI or local distributor as shown on back of the manual if you have any problem or questions.
2 If you want to repair, please inform the following.
① Model Name & manufacture number written in name plate
② Used period, using condition, state, and transfer liquid
3 If warranty period is over, it may charge according to repair part. Please contact with sales agent for more information.
4 Minimum retention period of parts for repair is 5 years from the date of production.

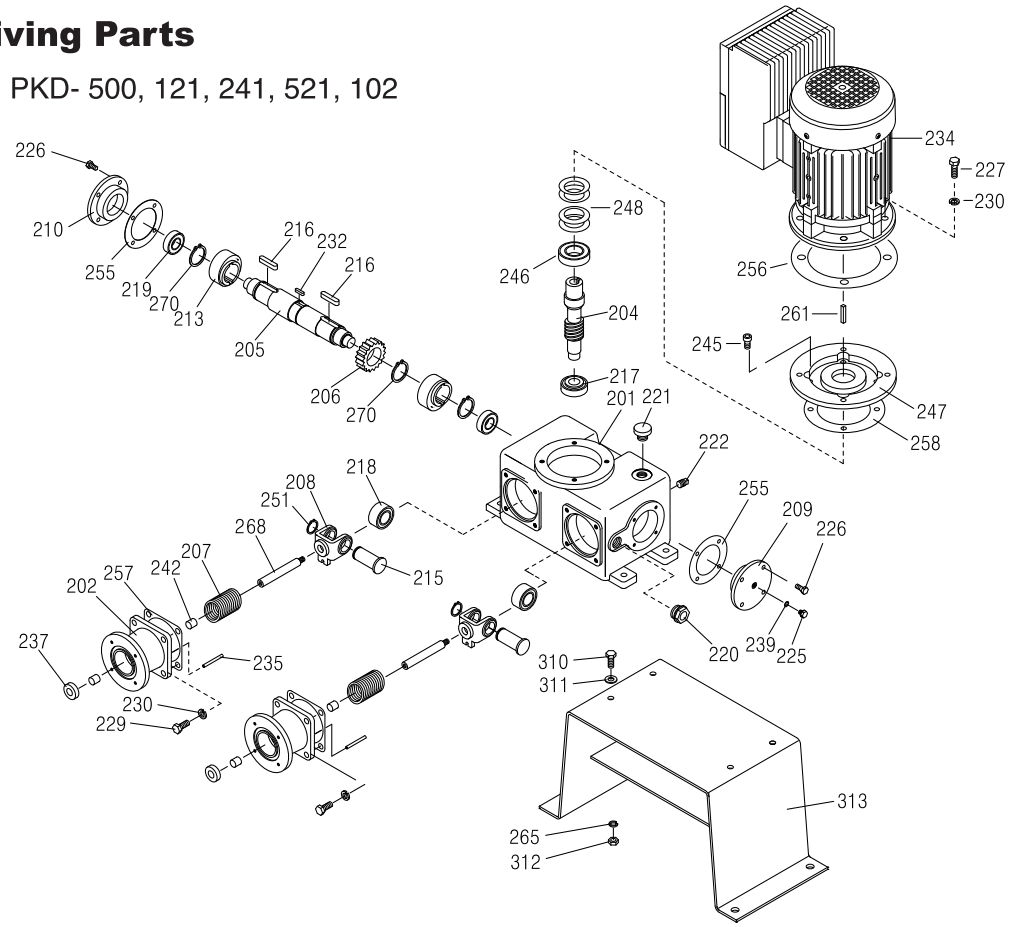
17 Accesories

1 Back Pressure Valve
According to the conditions of the piping, the discharge rate may be excessive or the pumping liquid may be continuously leaked in spite of stopping the pump which is caused by overfeed or siphon phenomena. The back pressure valve is for preventing such things.
2 Safety Valve(Relief Valve)
When the discharge pressure increases to more than a setting point due to choking the valve with debris or closing the valve, the safety valve will open automatically to relieve the pressure. Relief valve prevents pump and piping from damages.
3 Air Chamber
Reciprocating pump has a peculiar pulsation which results in vibration of piping and overfeed phenomena. Air chamber will be used to solve such problems caused by pulsation.

18 Structure and Name of Each Parts

18-1 Driving Parts

□ Model : PKD- 500, 121, 241, 521, 102

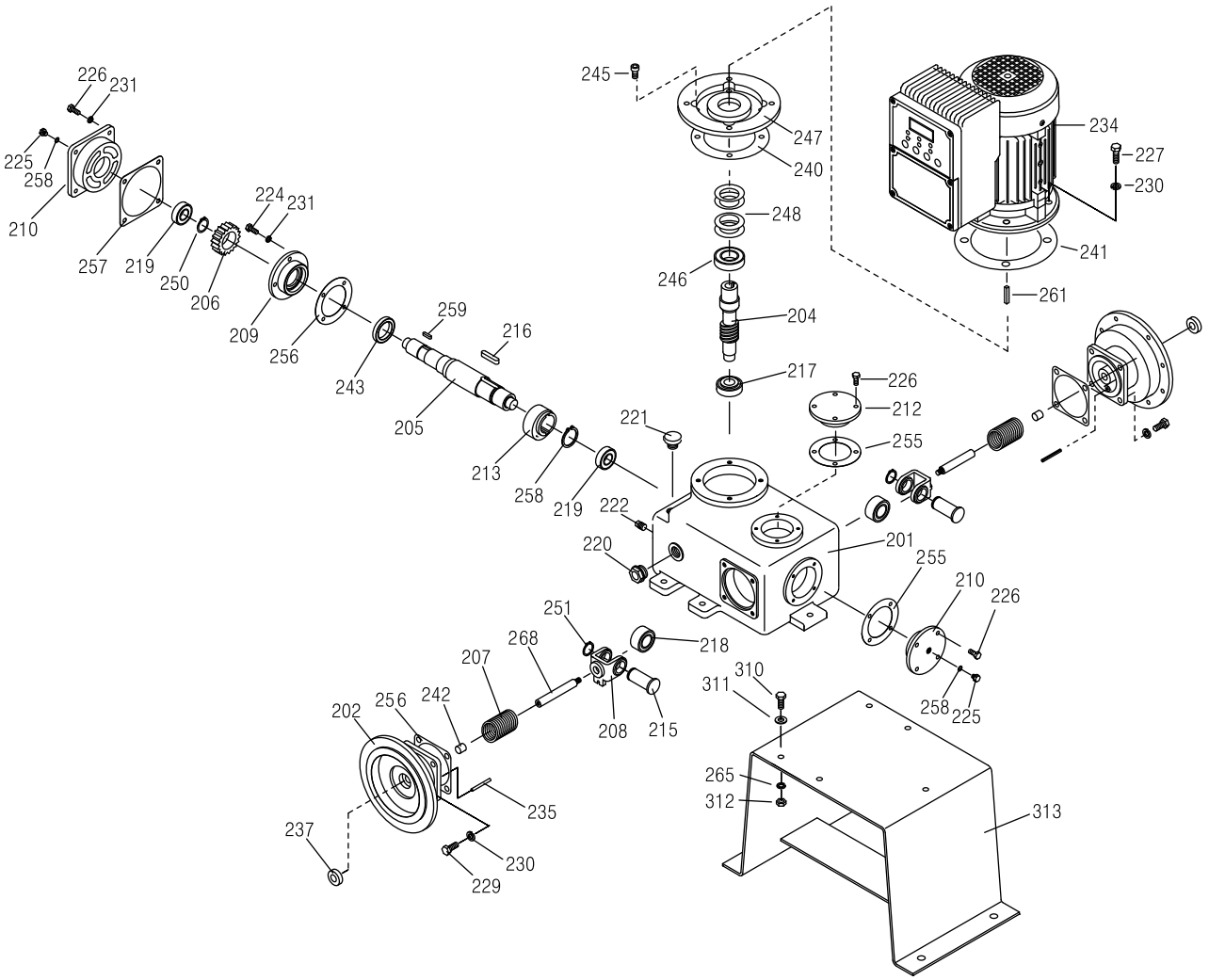


No.	Part Name	Q'ty
201	Gear Box	1
202	Gear Box Flange	2
204	Worm	1
205	Worm wheel shaft	1
206	Worm wheel	1
207	Spring	2
208	Slider	2
209	Gear Cover	1
210	Gear Cover	1
213	Velocity cam	2
215	Pin	2
216	Key	2
217	Bearing(Taper)	1
218	Bearing(Niddle)	2
219	Bearing(Ball)	2
220	Oil level cap	1
221	Oil cap	1
222	Drain plug	1
225	Bolt(Hex. head)	1

No.	Part Name	Q'ty
226	Bolt(Hex. head)	8
227	Bolt(Hex. head)	4
229	Bolt(Hex. head)	8
230	Washer(Spring)	8
232	Key	1
234	BLDC M/C UNIT	1
235	Spring pin	2
237	Oil Seal	2
239	Washer(Seal)	1
242	Bearing(Dry)	4
245	Bolt(Hex. head hole)	4
246	Bearing(Ball)	1
247	Attachment	1
248	Spring(Belleville)	4
249	Snap ring	2
250	Snap ring	1
251	Snap ring	2
255	Gasket	2
256	Gasket	1

No.	Part Name	Q'ty
257	Gasket	2
261	Key	1
265	Washer(Spring)	4
270	Snap ring	2
310	Bolt(Hex. head)	4
311	Washer	4
312	Nut(Hex. head)	4
313	Bed	1

2 Model : PKD- 212, 412, 702, 143

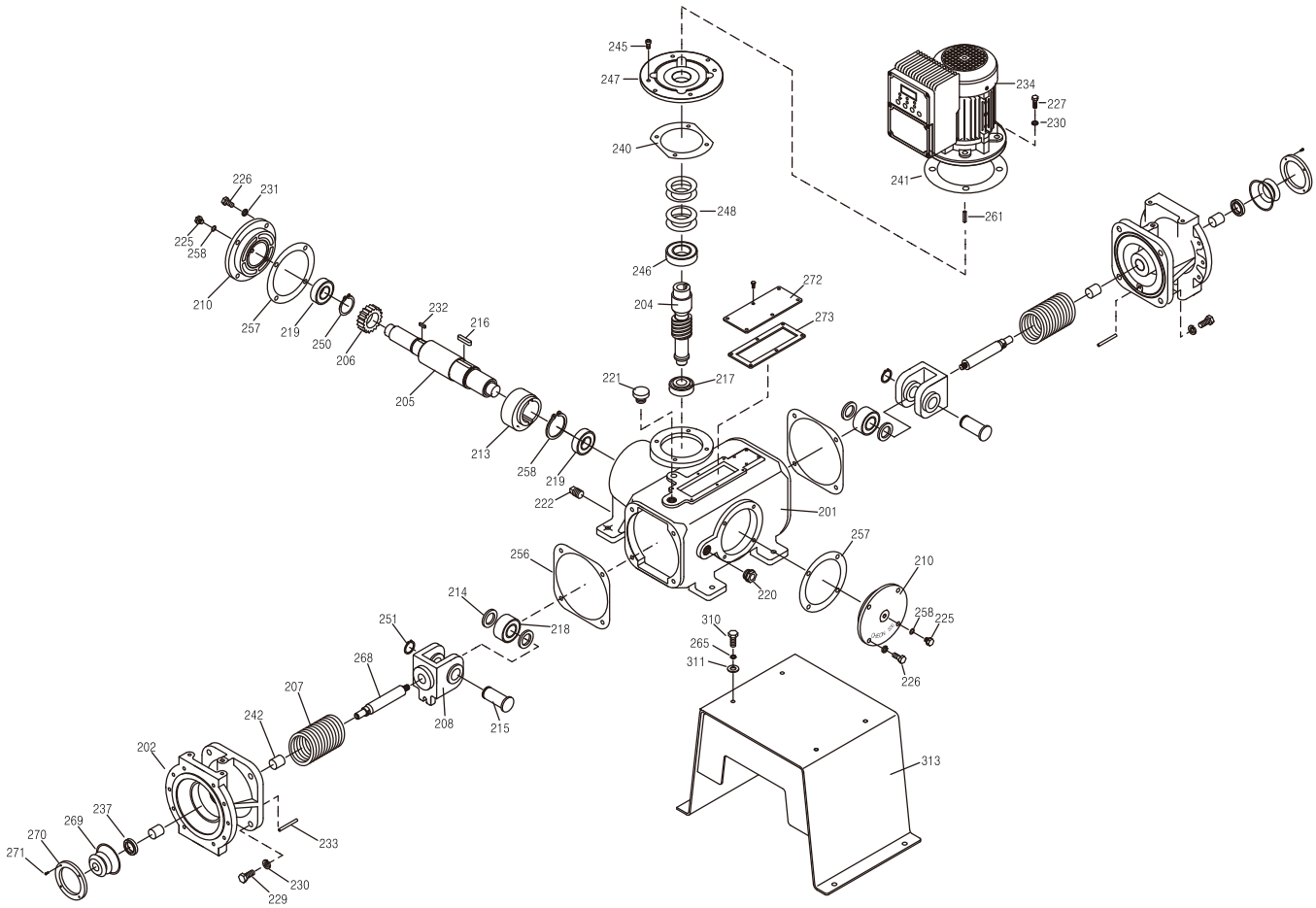


No.	Part Name	Q'ty
201	Gear Box	1
202	Gear BoxFlange	2
204	Worm	1
205	Worm wheel shaft	1
206	Worm wheel	1
207	Spring	2
208	Slider	2
209	Gear cover	1
210	Gear cover	1
211	Gear cover	1
212	Gear cover	1
213	Velocity cam	1
215	Pin	2
216	Key	1
217	Bearing(Taper)	1
218	Bearing(Niddle)	2
219	Bearing(Ball)	2
220	Oil level cap	1
221	Oil cap	1

No.	Part Name	Q'ty
222	Drain plug	1
224	Bolt(Hex. head hole)	4
225	Bolt(Hex. head)	2
226	Bolt(Hex. head)	8
227	Bolt(Hex. head)	4
229	Bolt(Hex. head)	8
234	BLDC M/C UNIT	1
235	Spring pin	2
236	Oil Seal	1
237	Oil Seal	2
241	Gasket	1
242	Bearing(Dry)	4
243	Bearing(Ball)	1
245	Bolt(Hex. head hole)	4
246	Bearing(Ball)	1
247	Attachment	1
248	Spring(Belleville)	4
250	Snap ring	1
251	Snap ring	2

No.	Part Name	Q'ty
258	Washer(Seal)	2
265	Washer(Spring)	4
310	Bolt(Hex. head)	4
311	Washer(Flat)	4
312	Nut(Hex. head)	4
313	Bed	1

3 Model : PKD- 113, 203, 243, 333, 423, 613, 813



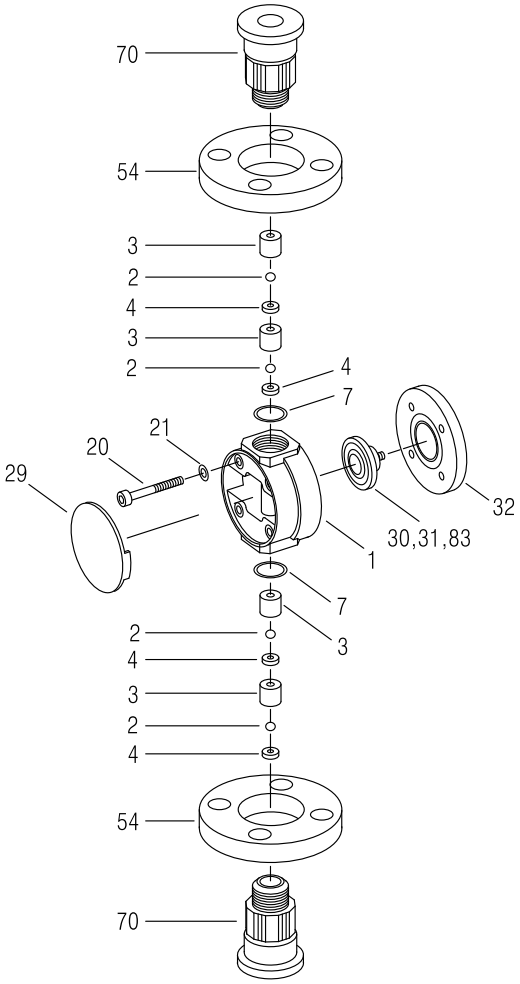
No.	Part Name	Q'ty
201	Gear Box	1
202	Gear Box Flange	2
204	Worm	1
205	Worm wheel shaft	1
206	Worm wheel	1
207	Spring	2
208	Slider	2
210	Gear Cover	1
213	Velocity cam	1
214	Color	4
215	Pin	2
216	Key	1
217	Bearing(Taper)	1
218	Bearing(Niddle)	2
219	Bearing(Ball)	2
220	Oil level cap	1
221	Oil cap	1
222	Drain plug	1
225	Bolt(Hex. head)	2

No.	Part Name	Q'ty
226	Bolt(Hex. head)	8
227	Bolt(Hex. head)	4
229	Bolt(Hex. head)	8
231	Washer(Spring)	8
232	Key	1
233	Washer(Spring)	8
234	BLDC M/C UNIT	1
235	Spring pin	2
237	Oil seal	2
239	Washer(Seal)	1
240	Gasket	1
241	Gasket	1
242	Bearing(Dry)	4
245	Bolt(Hex. head hole)	4
246	Bearing(Ball)	1
247	Attachment	1
248	Spring(Belleville)	4
250	Snap ring	1
251	Snap ring	2

No.	Part Name	Q'ty
256	Gasket	2
257	Gasket	2
258	Washer(Seal)	2
261	Key	1
265	Washer(Spring)	4
268	Slider shaft	2
269	Bellows(Except 113 and 203)	2
270	BellowsGuide(Except 113 and 203)	2
271	Bolt(Hex. head hole)	8
272	Inspection window	1
273	Packing(Inspection window)	1
310	Bolt(Hex. head)	4
311	Washer(Flat)	4
313	Bed	1

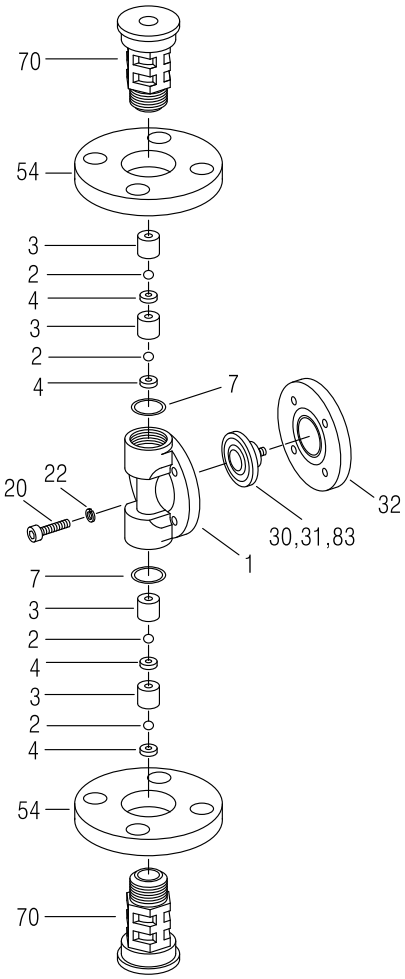
18-1 Liquid End Parts

1 Model : PKD-500, 121, 241-P□□, F□□



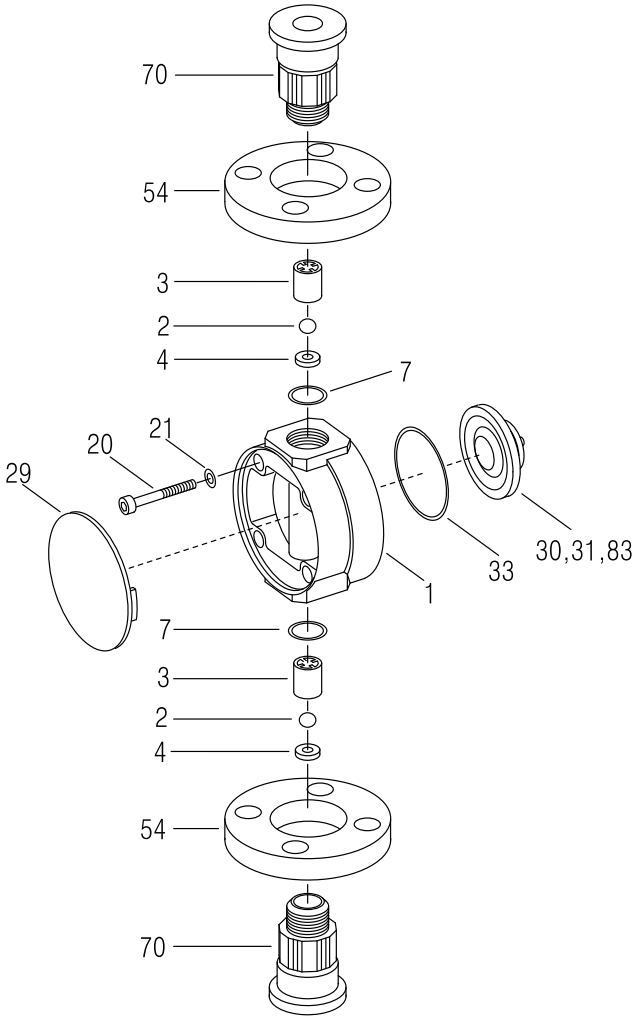
No.	Part Name	Q'ty
1	Head	2
2	Check Ball	8
3	Ball Guide	8
4	Ball Seat	8
7	O-ring	4
20	Bolt(Wrench)	8
21	Washer(Flat)	8
29	Head cover	2
(30)	Diaphragm	2
(31)	Diaphragm Seat	2
32	Support Ring	2
54	Flange	4
70	Joint	4
(83)	O-ring	2
30,31,83	Diaphragm Set	2

2 Model : PKD-500, 121, 241-S□□, 6□□



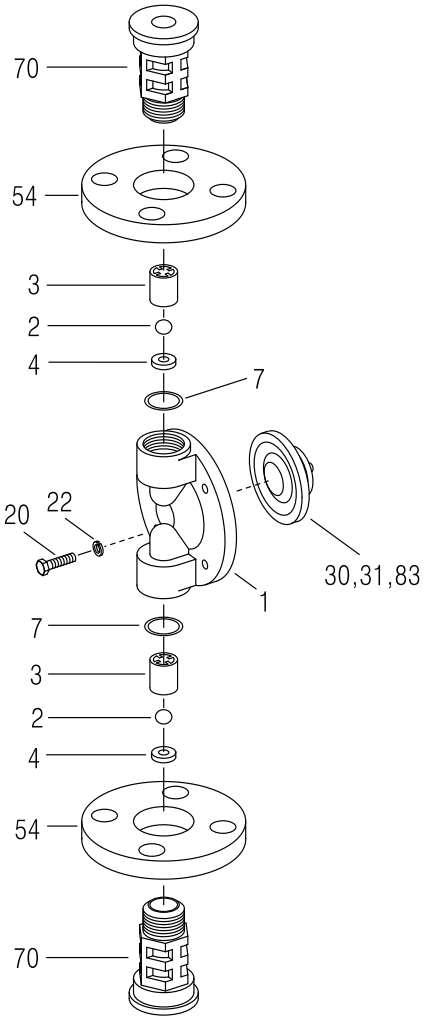
No.	Part Name	Q'ty
1	Head	2
2	Check Ball	8
3	Ball Guide	8
4	Ball Seat	8
7	O-ring	4
20	Bolt(Hex. head)	8
22	Washer(Spring)	8
(30)	Diaphragm	2
(31)	Diaphragm Seat	2
32	Support Ring	2
54	Flange	4
70	Joint	4
(83)	O-ring	2
30,31,83	Diaphragm Set	2

3 Model : PKD- 521, 102 - P□□, F□□



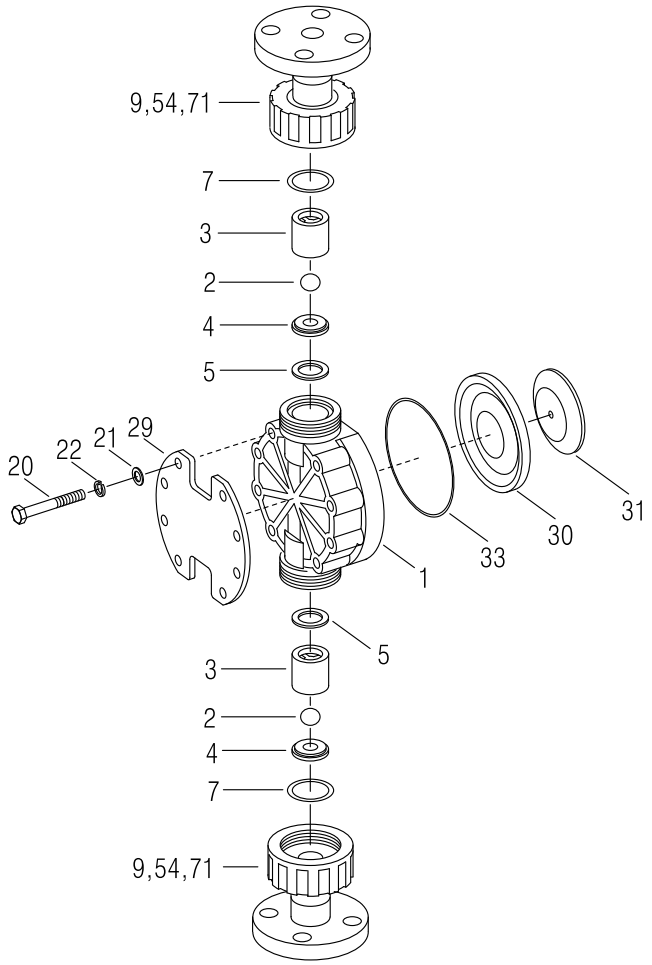
No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
7	O-ring	4
20	Bolt(Wrench)	8
21	Washer(Flat)	8
29	Head cover	2
(30)	Diaphragm	2
(31)	Diaphragm Seat	2
54	Flange	4
70	Joint	4
(83)	O-ring	2
30,31,83	Diaphragm Set	2

4 Model : PKD- 521, 102 - S□□, 6□□



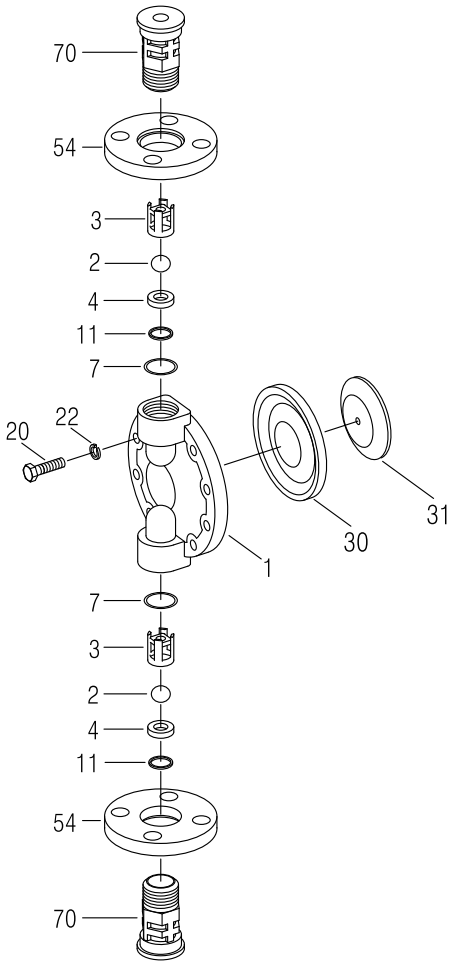
No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
7	O-ring	4
20	Bolt(Hex. head)	8
22	Washer(Spring)	8
(30)	Diaphragm	2
(31)	Diaphragm Seat	2
54	Flange	4
70	Joint	4
(83)	O-ring	2
30,31,83	Diaphragm Set	2

5 Model : PKD-212, 412, 702, 143, 113 - P□□, F□□



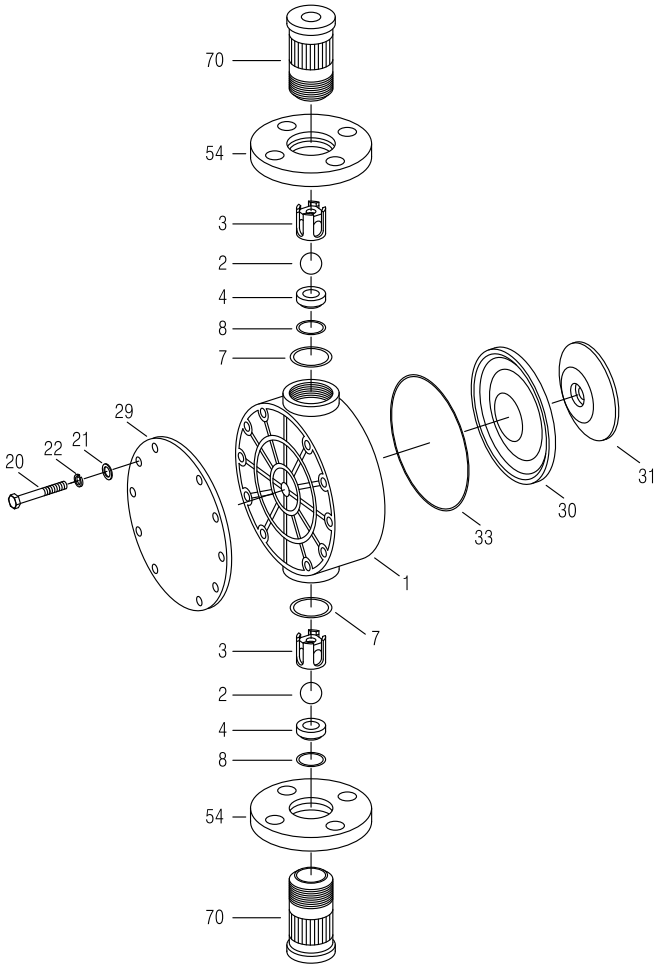
No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
5	Packing	4
7	O-ring	4
(9)	Union Nut	4
20	Bolt(Hex. head)	16
22	Washer(Spring)	16
29	Head compression plate	2
30	Diaphragm	2
31	Diaphragm Seat	2
(54)	Flange	4
(71)	Joint pipe	4
9,54,71	Joint(Flange)	4 set

6 Model : PKD-212, 412, 702, 143, 113 - S□□, 6□□



No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
7	O-ring	4
11	Gasket	4
20	Bolt(Hex. head)	16
22	Washer(Spring)	16
30	Diaphragm	2
31	Diaphragm Seat	2
54	Flange	4
70	Joint	4

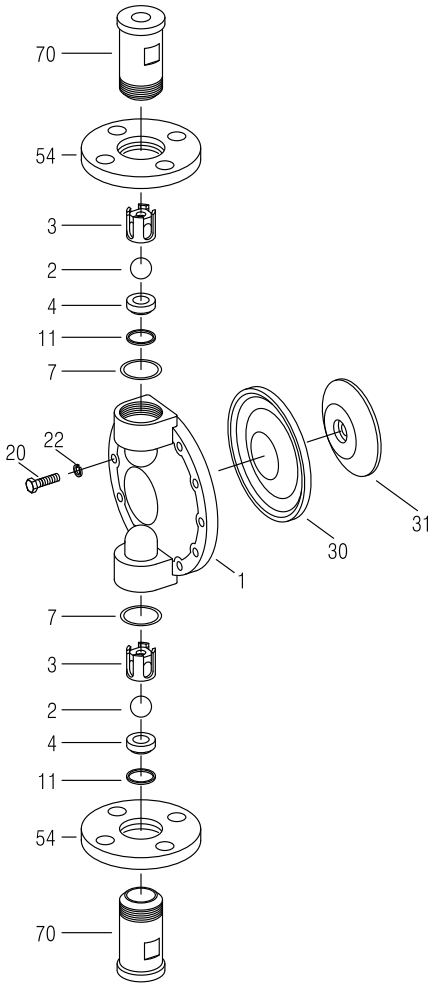
7 Model : PKD- 203 - P□□, F□□



No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
7	O-ring	4
8(1)	O-ring	4
20	Bolt(Hex. head)	20
22	Washer(Spring)	20
29	Head compression plate	2
30	Diaphragm	2
31	Diaphragm Seat	2
33	O-ring	2
54	Flange	4
70	Joint	4

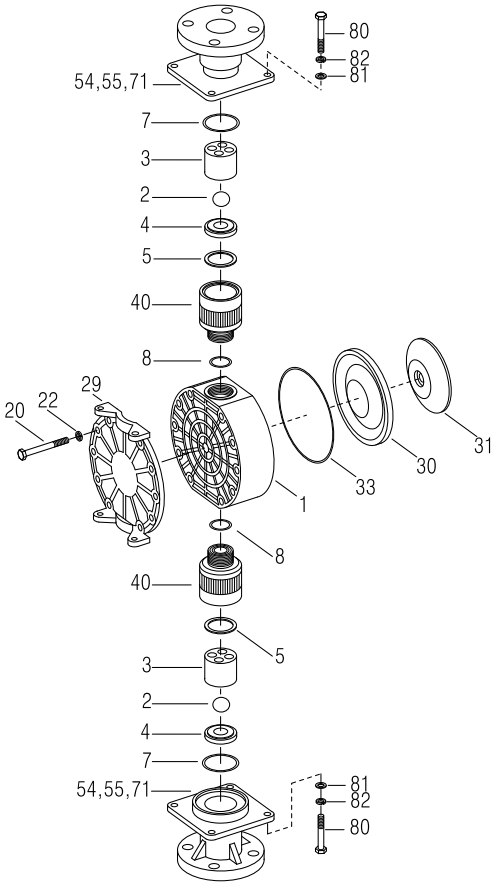
Note) 1. Applied to P type only

8 Model : PKD- 203 - S□□, 6□□



No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
7	O-ring	4
11	Gasket	4
20	Bolt(Hex. head)	20
22	Washer(Spring)	20
30	Diaphragm	2
31	Diaphragm Seat	2
54	Flange	4
70	Joint	4

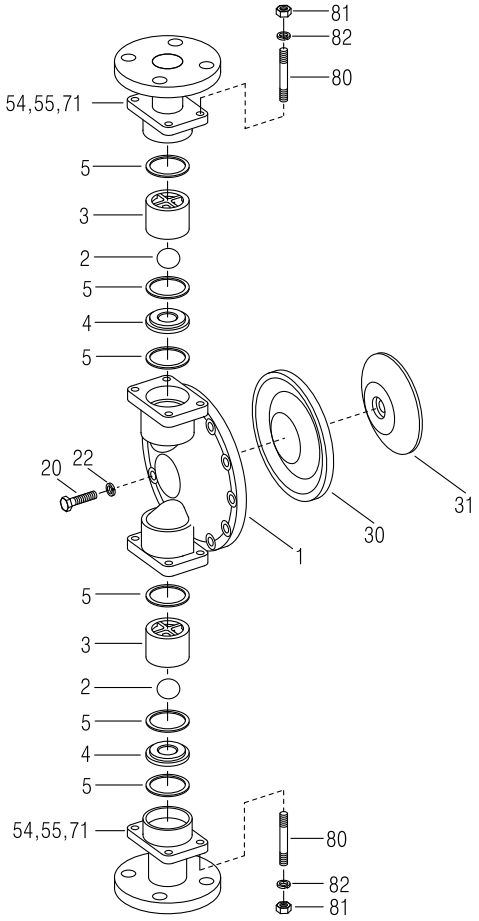
[9] Model : PKD- 243, 333 - P□□, F□□



No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
5(1)	Packing	4
7	O-ring(1)/Packing(2)	4
8	O-ring(1)/Packing(2)	4
20	Bolt(Hex. head)	20
22	Washer(Spring)	20
29	Head compression plate	2
30	Diaphragm	2
31	Diaphragm Seat	2
33	O-ring	2
40	Joint	4
(54)	Flange	4
(71)	Joint Pipe	4
54,55,71	Joint(Flange)	4 set
80	Bolt(Hex. head)	16
81	Washer(Flat)	16

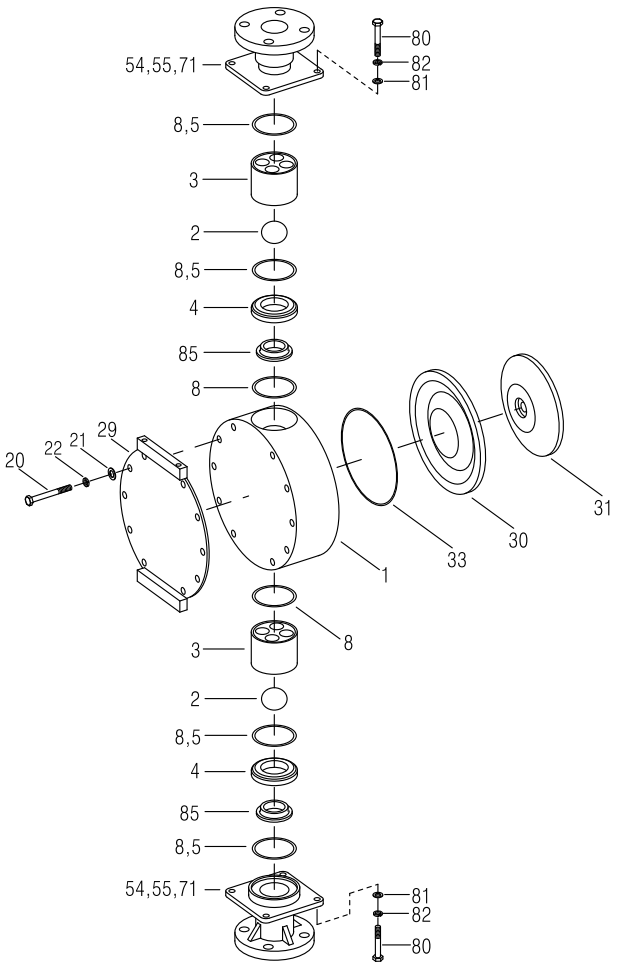
Note) 1. Applied to P□□ type only
2. Applied to F□□ type only

[10] Model : PKD- 243, 333 - S□□, 6□□



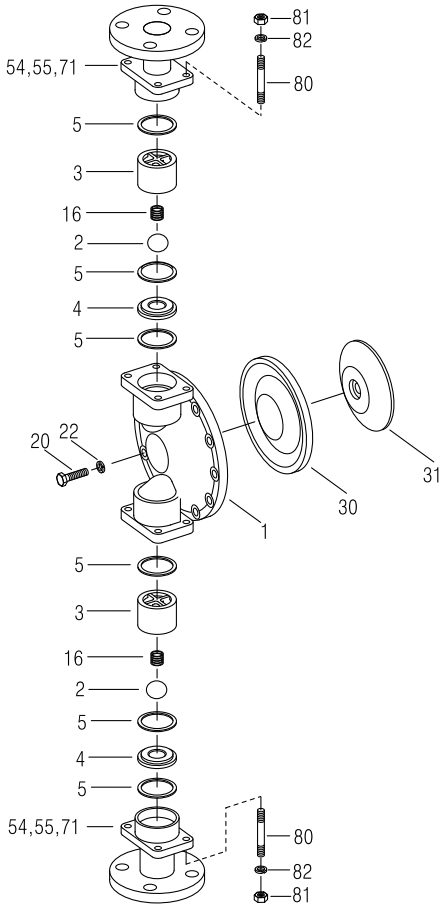
No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
5	Packing(Head)	4
20	Bolt(Hex. head)	20
22	Washer(Spring)	20
30	Diaphragm	2
31	Diaphragm Seat	2
(54)	Flange	4
(55)	Joint compression plate	4
(71)	Joint Pipe	4
54,55,71	Joint(Flange)	4 set
80	Bolt(Stud)	16
81	Nut(Hex. head)	16
82	Washer(Spring)	16

[11] Model : PKD- 423, 613, 813 - P□□, F□□



No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
5	Packing	8
8	O-ring	12
20	Bolt(Hex. head)	20
21	Washer(Flat)	20
22	Washer(Spring)	20
29	Head compression plate	2
30	Diaphragm	2
31	Diaphragm Seat	2
33	O-ring	2
(54)	Flange	4
(55)	Joint compression plate	4
(71)	Joint Pipe	4
54,55,71	Joint(Flange)	4 set
80	Bolt(Hex. head)	16
81	Washer(Flat)	16
82	Washer(Spring)	16
83	Teflon Seat	2
85	Ball Seat(Insert)	4

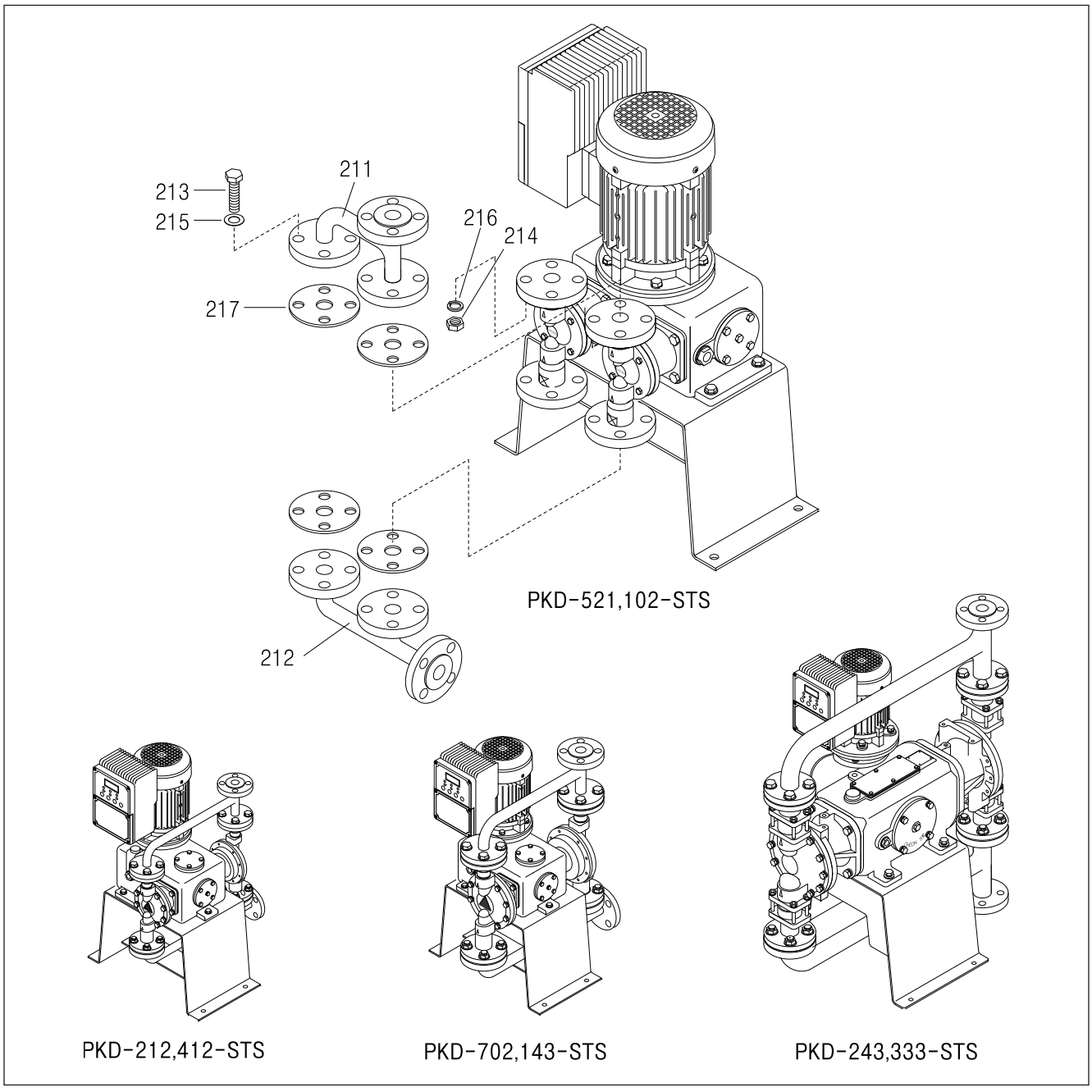
[12] Model : PKD- 423, 613, 813 - S□□, 6□□



No.	Part Name	Q'ty
1	Head	2
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
5	Packing(Head)	12
16	Spring(Valve)	4
20	Bolt(Hex. head)	20
22	Washer(Spring)	20
30	Diaphragm	2
31	Diaphragm Seat	2
(54)	Flange	4
(55)	Joint compression plate	4
(71)	Joint Pipe	4
54,55,71	Joint(Flange)	4 set
80	Bolt(Hex. head)	16
81	Nut(Hex. head)	16
82	Washer(Spring)	16

18-3 Junction Pipe Parts

Model : PKD- 500, 121, 241, 521, 102, 212, 412, 702, 143, 113, 203, 243, 333, 423, 613, 813
- S□□, P□□, F□□



FLANGE TYPE

No.	Part Name	Q'ty
211	Junction Pipe(Top)	1
212	Junction Pipe(Bottom)	1
213	Bolt(Hex. head)	16
214	Nut(Hex. head)	16
215	Washer(Flat)	16
216	Washer(Spring)	16
217	Gasket	4

Cheonsei

전세산업 |주|

40, ANSANTECOM-GIL, SANGNOK-GU,
ANSAN-SI, GYEONGGI-DO, KOREA
Phone : +82-31-508-1003
Fax : +82-31-419-3223
E-mail : cheonsei@cheonsei.co.kr
Homepage : http://www.cheonsei.co.kr