Cheonsei METERING PUMPS KEMPION

CHEONSEI METERING PUMPS

SP-A Series

Solenoid Metering Pumps

Instruction Manual

www.cheonsei.co.kr

Thank you very much for purchasing CHEONSEI SP-A Series.
Before beginning operation, please read this instruction manual carefully. Correct handling, repair, & maintenance are described easily.
Please use this pumps safely to be guaranteed performance & long life of the pump after reading this instruction manual.
Please keep this instruction manual at the place where you can find it easily.

Contents

1 Notice for Safety

1-1 Introduction

- To use the products safely, the signs are showed on the manual as below.
- As it is a matter of safety, please be sure to keep the directions in manual.
- The sign and indications are as follows.

⚠ Warning

Person death or serious injury will be occurred, if warning 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 Operating Condition

⚠ Caution

- Do not use this pump for other purposes except liquid injection.
  Otherwise it may cause trouble.
- Please keep the followings, otherwise it may cause trouble.
  Ambient temperature : 0~40℃
  Temperature of the handling liquid : Head material of PP & PVDF 0~50℃
  Piping pressure : Below the max. discharge pressure indicated on the Specifications.
  Do not use this pump to transfer the liquids containing slurry.

1-3 Cautions for Handling Condition

⚠ 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.
- 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.
- Do not touch with wetted hand. Electric shock may be occurred.
- 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.

⚠ 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.
- 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.

⚠ Caution

- 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 point 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.

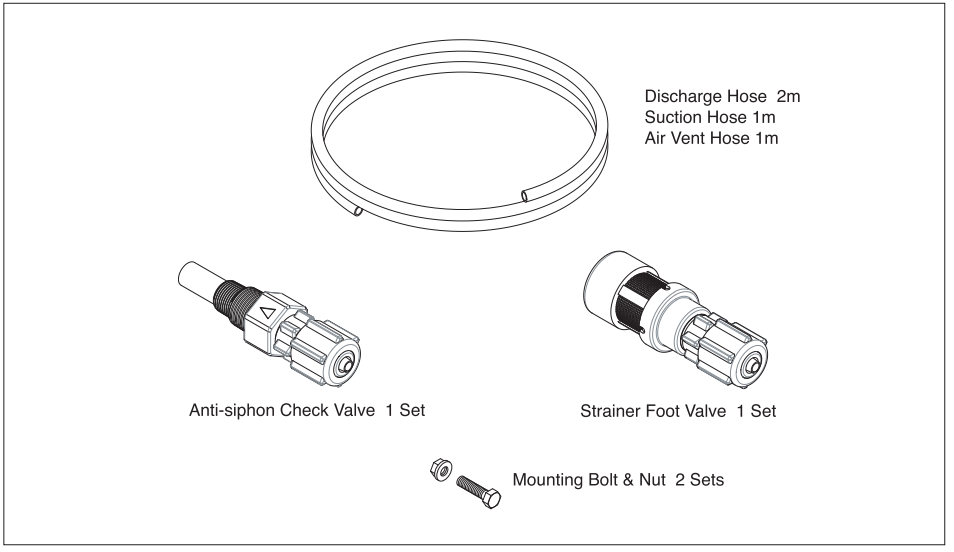
2 Confirmation of Product

2-1 Check point when 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. Is specification correct as 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



3 General

Solenoid Metering Pump SP-A Series is reciprocating diaphragm metering pump which have a solid & compact structure and liquid end part of strong chemical resistance.
It can be used for injection of Boiler Chemical, Chlorine Disinfectants, & Food Additives, and used for dosing chemicals in various industrial fields including physico-chemical fields, semiconductor device, water treatment, waste water treatment filed, & etc.

4 Model Code

SP	-	A	20	-	P	F	C	-	1	W	S	-	1	1	0
①		②	③		④-a	④-b	④-c		⑤	⑥	⑦		⑧	⑨	⑩

① **Series Name**	SP: SP Series			
② **Control Panel Type**	A: Automatic or Advanced			
③ **Nominal Capacity**	20 : 20 mL/min			
④ **Liquid End Material**	(a) Head	P:PP	F:PVDF	
	(b) Ball Seat	F:FKM	E:EPDM	V:FKM(ETP)
	(c) Check Ball	C:CERAMIC	S:SS316	
⑤ **Hose Standard**	1: ø4 × ø6 2: ø4 × ø9(Braided PVC) 3: ø6 × ø8 4: ø6 × ø11(Braided PVC) 5: ø5 × ø8			
⑥ **Valve Structure**	W:Standard(0~100mPa .s) V:High Viscosity(100~1000mPa .s) ※ In case of high viscosity, spring is installed in the valve.			
⑦ **General Specification**	S:Standard B:Boiler F:Relief Valve G:Boiler + Relief Valve ※ In case of Boiler type, discharge hose is nylon and the body of Anti-siphon Check Valve is PPS.			
⑧ **Control Specification**	1:Manual 2:Manual +Add. Func. 3:PULSE(1:1) 4:PULSE(1:1)+Add. Func. 5:4~20mA 6:4~20mA+Add. Func. 7:PULSE(DIV/MUL)+4~20mA+Add. Func. ※ Additional Function is Input of Level Switch, Output of Alarm, & Remote RUN/STOP.			
⑨ **Power Supply**	1:AC220V(198~242V) 2:AC240V(216~264V) 3:AC115V(104~127V) ※ Common:1 Phase 50/60Hz			
⑩ **Power Cord**	0:2m of Power Cord without Plug 1:2m of Power Cord & Plug			

5 Specifications

Spec. \ Model		SP-A20	SP-A40	SP-A60	SP-A100	SP-A200
Max. Capacity (mL/min)		17	35	60	110	200
Max. Discharge Pressure (bar)		16	12	8	5	3
Stroke Number (SPM)		150				
Stroke Length (mm)		1.0 (40~100%)		1.25 (30~100%)		
Hose	Suction · Discharge	ø4 × ø6, ø4 × ø9		ø6 × ø8, ø6 × ø11, ø5 × ø8		
	Air Vent	ø4 × ø6				
Self-priming (m)		1.5	2			
Viscosity Limit (mPa·s)	Standard	50		100		
	High Viscosity	500		1000	800	500
Weight (kg)	PP Material	2.4			2.5	
	PVDF Material	2.5			2.6	

Electrical Data	Average Power Consumption(W)	Rated Current(A)	Protection Class	Insulation Class
	17	0.5/0.8(115V)	IP65	F

Note) 1. Max. capacity is the volume at max. discharge pressure.
2. Repeatability is ±2%F.S.(Full Scale) and noise is within 70dB.
3. Setting pressure of Relief Valve is ±10% of max. discharge pressure.
4. Specification can be changed for improvement without prior notice.

6 Standard Liquid End Materials

Ⅰ Standard Liquid End Materials

Part / Type	Head	Diaphragm	Check Ball	Ball Seat	Ball Guide	Joint	O-ring	Hose	
								Discharge	Suction
PFC	PP	PTFE	CERAMIC	FKM	PP	PP	FKM	PE	PVC
								Braided PVC	
PFS	PP	PTFE	SS316	FKM	PP	PP	FKM	PE	PVC
								Braided PVC	
PEC	PP	PTFE	CERAMIC	EPDM	PP	PP	EPDM	PE	PVC
								Braided PVC	
FVC	PVDF	PTFE	CERAMIC	FKM(ETP)	PVDF	PVDF	FKM(ETP)	PTFE	

Note) In case of Boiler type, discharge hose is nylon.

2 **Strainer Food Valve**

Type \ Part	Body	Joint	Check Ball	Ball Seat	Ball Guide	O-ring
PFC,PFS	PP	PP	CERAMIC	FKM	PP	FKM
PEC	PP	PP	CERAMIC	EPDM	PP	EPDM
FVC	PVDF	PVDF	CERAMIC	FKM(ETP)	PVDF	FKM(ETP)

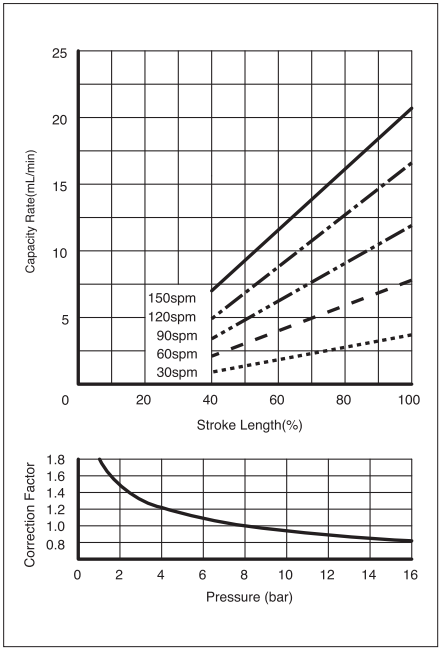
3 **Anti-siphon Check Valve**

Type \ Part	Body	Joint	Plug Head	Spring	O-ring
PFC,PFS	PP	PP	FKM	HC-276	FKM
PEC	PP	PP	EPDM	HC-276	EPDM
FVC	PVDF	PVDF	FKM(ETP)	HC-276	FKM(ETP)
Boiler	PPS	PPS	EPDM	HC-276	EPDM

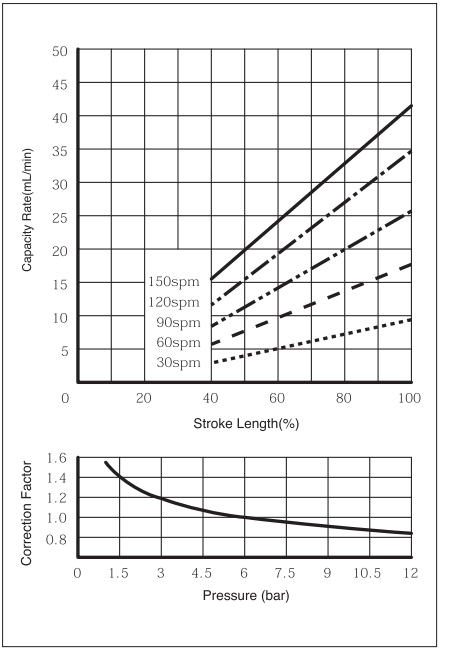
7 Performance Curves

※ Condition : Clean water, Room temperature, Suction head - 1m

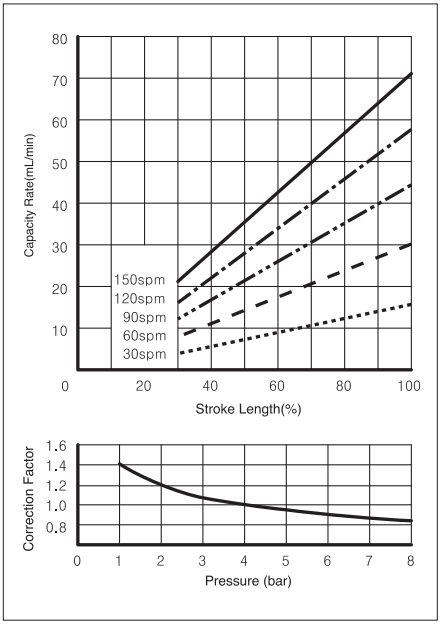
■ **SP-A20**



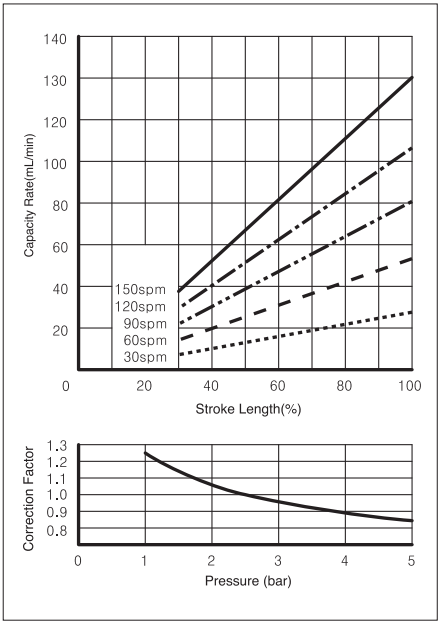
■ **SP-A40**



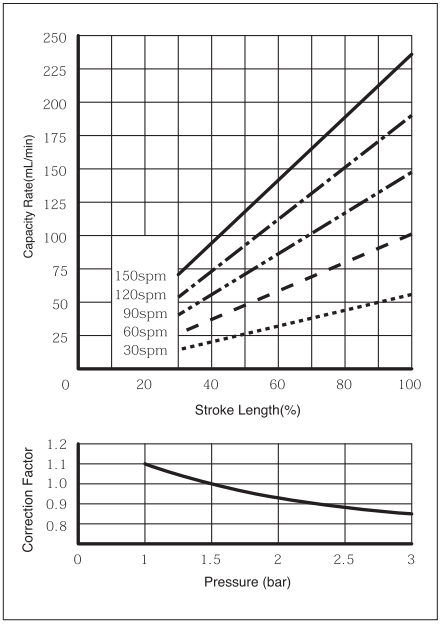
■ SP-A60



■ SP-A100



■ SP-A200



Note) 1. Above performance curves were tested at our testing equipment under the fixed condition(Clean water, Room temperature, Suction head - 1m). Therefore, performance curves can be somewhat different in accordance with condition of job site.

2. Way to understand performance curves
   Ex.) In case of SP-A200,
   Capacity Rate is 150mL/min at 80% of Stroke Length & 120SPM of Stroke Number. If discharge pressure is 1bar, correction factor will be 1.1 and expected capacity rate will be 165mL/min (1.1×150mL/min = 165mL/min)

3. Capacity rate can be changed according to piping condition of suction & discharge. For effective use, measure the discharge rate(make out performance curve) when trial operation, after installation.

4. if test of capacity rate is regularly operated, operator can know exchange cycle for the consumable parts in Liquid End part.

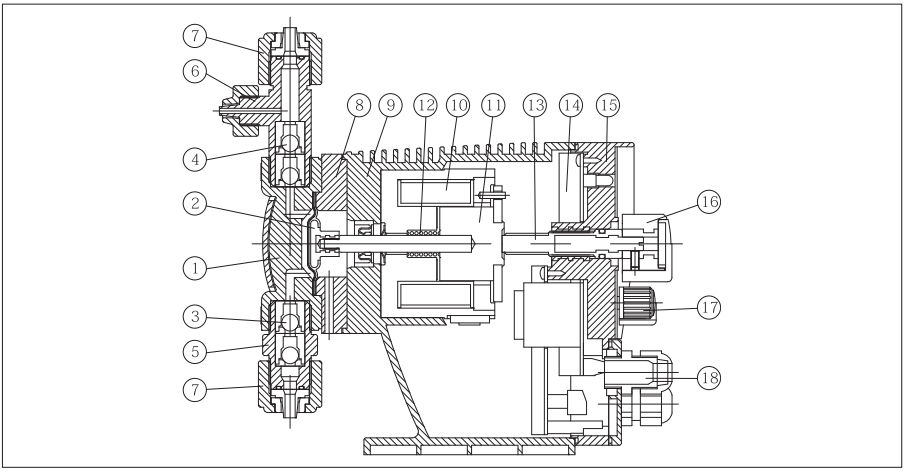
8 Principle of Operation & Structure

8-1 Principle of Operation

1. If electric power is supplied to the Solenoid Coil, magnetic field is generated in the Solenoid and Plunger moves forward by magnetic force, and, if electric power is shout down, magnetic field disappears in the Solenoid and Plunger moves backward by spring force.
2. Reciprocating motion of Solenoid Plunger is transferred to the Diaphragm connected with the end of Slider Shaft and Diaphragm can be reciprocated. Volumetric change occurs in the pump head by this reciprocating motor of Diaphragm.
3. When diaphragm moves backward, minus(-) pressure is generated in pump head. At this time, check ball of discharge side is closed in order to prevent flowing backward of liquid from piping of discharge side to pump head. On the contrary, check ball of suction side is opened so that liquid can be flowed into the pump head.
4. When diaphragm moves forward, plus(+) pressure is generated in pump head. At this time check ball of suction side is closed and check ball of discharge side is opened so that liquid can be discharged.
5. Capacity rate can be accurately controlled by adjustment of stroke length or stroke number.

8-2 Structure

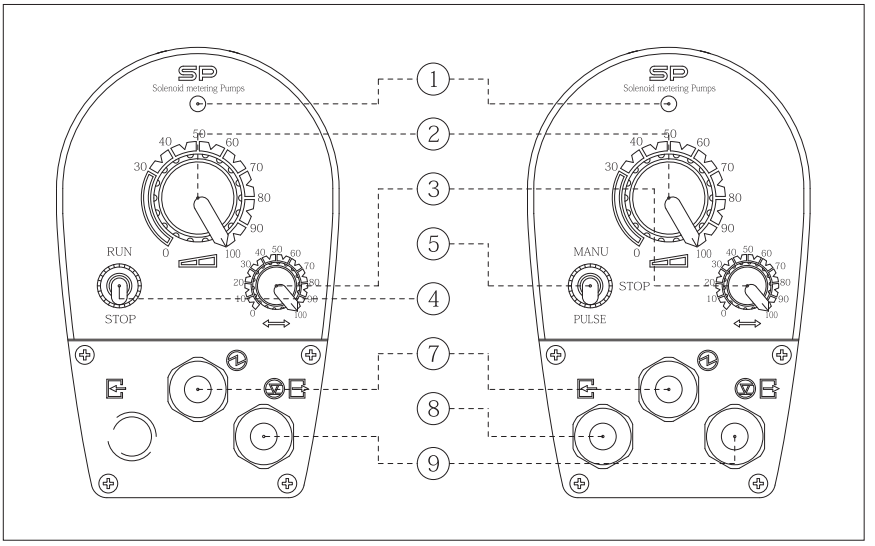
The pump consists of Liquid End Part, Driving Part, Control Part as follows.



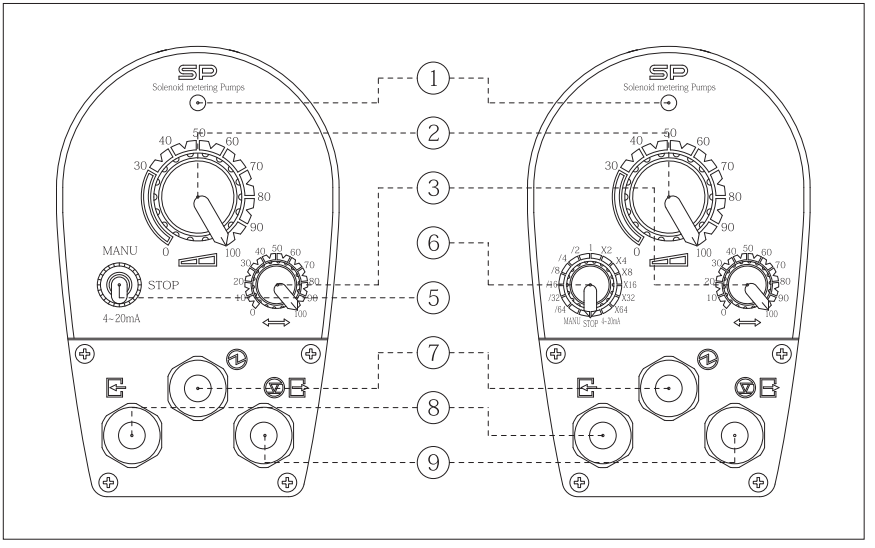
Liquid End Part		Driving Part		Control Part	
1	Head	9	Pump Housing	13	Stroke Shaft
2	Diaphragm	10	Solenoid Coil	14	Circuit Board
3	Check Valve of suction side	11	Solenoid Plunger	15	Control Panel
4	Check Valve of discharge side	12	Spring	16	Control Knob for Stroke Length
5	Joint			17	Control Knob for Stroke Number
6	Air Vent			18	Cable Socket
7	Hose Nut				
8	Support Ring				

8-3 Control Panel

■ Manual Control ■ PULSE(1:1) Control

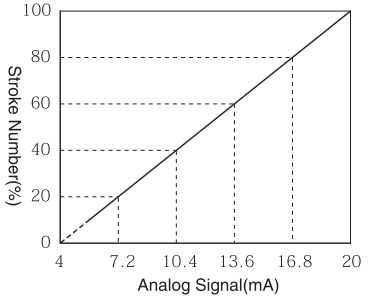


■ DC4~20mA Control ■ PULSE(DIV/MUL) & DC4~20mA Control



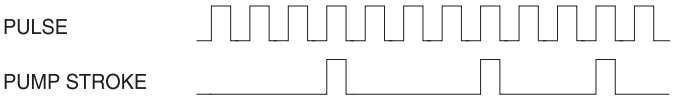
1: Status Lamp(LED)
2: Control Knob for Stroke Length
3: Control Knob for Stroke Number
4: Toggle Switch of 2 Stages
5: Toggle Switch of 3 Stages
6: Rotary Switch
7: Cable Socket for Power
8: Cable Socket for Input Signal
9: Cable Socket for Level Switch & Output Signal

1 Status Lamp(LED)
① Stand by : Green Lamp is lighted
② Operation : Green Lamp is flickered
③ Faulty Input Signal of DC 4~20mA : Yellow Lamp is lighted and Pump is stopped
④ Low level of Tank : Red Lamp is lighted and Pump is stopped
2 Operation by manual control according to Stroke Length and Stroke Number
3 Operation by automatic control according to external Input Signal
① Proportionally Automatic control of Stroke Number according to Analog Input Signal(DC4~20mA)

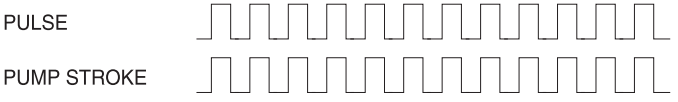


② PULSE : 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 Division selection
1:1 selection
1×2, 1×4, 1×8, 1×16, 1×32, 1×64 Multiplication selection
Pump perform the calculated stroke number(SPM) according to the selection

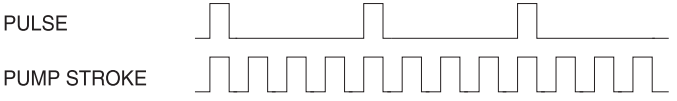
Ex.1) When Rotary Switch is located at "1/4"



Ex.2) When Toggle Switch of 3 Stages is located at "PULSE" or Rotary Switch is located at "1"



Ex.3) When Rotary switch is located at "x4"



Note) Even if a lot of PULSE is inputted, pump's Stroke Number can't exceed 150SPM.

4 When Tank is LOW Level according to Input Signal of Level Switch or Analog Input Signal is ERROR, Pump is stopped and Alarm Signal is outputted.
5 Pump can be remotely stopped or operated during Manual operation or Automatic operation by Input Signal.

9 Installation

⚠ Caution

- Do not install pump at the place where ambient temperature is higher than 40℃ or lower than freezing point. If the pump is installed at the place, internals of the pump may be damaged.

9-1 Installation Place

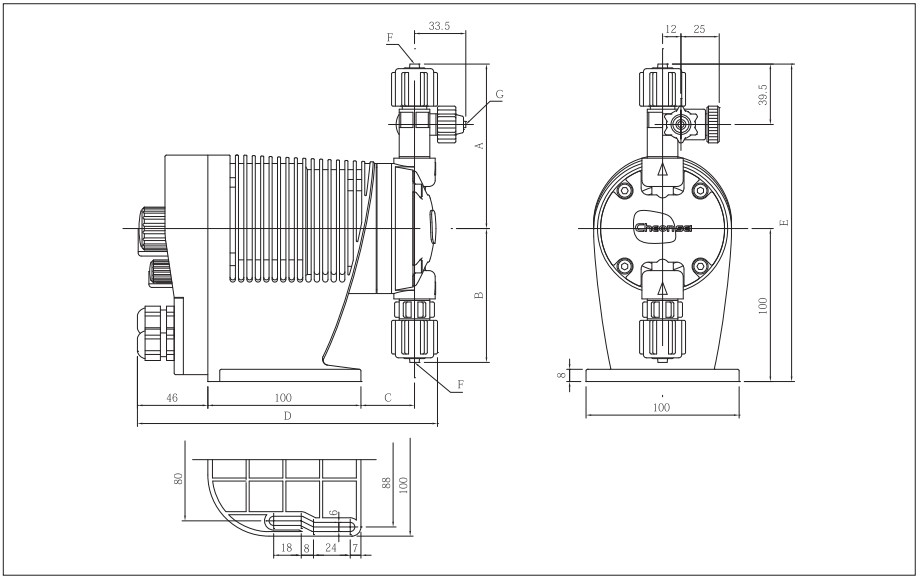
Please take into consideration of those conditions listed below.

1 Place where is out of the direct rays of light, rain, & wind.
Temperature rise of metal part, Heat deterioration of plastic part by direct rays of light and Damage & rust by sand, dust and rain may occur.
If the pump should be installed at outdoor, the pump should be protected by roof or cover in order to prolong the life time.

2 Place where is well ventilated in summer and not frozen in winter.
If pump is used in the closed room where is high temperature & humidity, solenoid will be overheated and rust of metal part will be accelerated.
If pump is used for the liquid which may freeze in winter, install warming or heating device.

3 Take sufficient space around the pump to facilitate maintenance or repair.
Several tools are used for disassembly of pump, therefore, fully consider enough space for using tools and work space when installing pump.

9-2 Dimension



Dimension \ Model	SP-A20	SP-A40	SP-A60	SP-A100	SP-A200
A	96.5	99	101	102.5	107.5
B	76.5	79	81	82.5	87.5
C	33.5	33.5	33.5	35	35
D	194.5	194.5	194.5	196	196
E	196.5	199	201	202.5	207.5
F	ø4 × ø6, ø4 × ø9		ø6 × ø8, ø6 × ø11, ø5 × ø8		
G	ø4 × ø6				

9-3 Piping

9-3-1 Pulsation

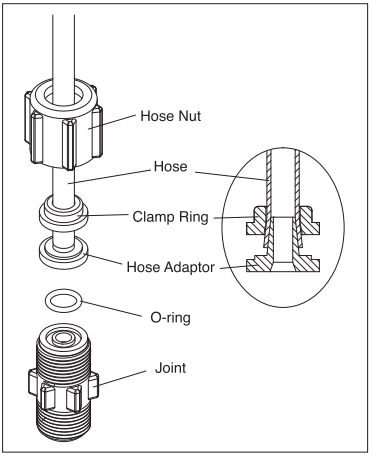
Pulsation which is the characteristic of metering pump occurs since the pump is reciprocating type.

➡ Can reduce pulsation by using Air Chamber.

Note) Possible piping length is changed according to Liquid Viscosity or piping diameter.
When changing piping diameter, be fully careful.

9-3-2 Installation of Piping

1. When bending the hose, be careful not to be folded.
2. Before inserting Hose to Hose Adaptor, insert Hose Nut & Clamp Ring, then be careful that Hose is not twisted, and connect Joint & Hose Nut.
3. Hose is vibrated because reciprocating metering pump makes pulsation.
   Support Hose in order not to be vibrated.
   (It is enough to support hose with string)
4. Install Hose in consideration of temperature condition.
   Specially, keep out of the direct rays of light in summer, consider freeze protection in winter.
   (Roof, cover, winterization, & etc.)
5. When re-connecting Hose after maintenance, re-connect after cut the end of Hose about min. 10mm.



■ Anti-siphon Check Valve

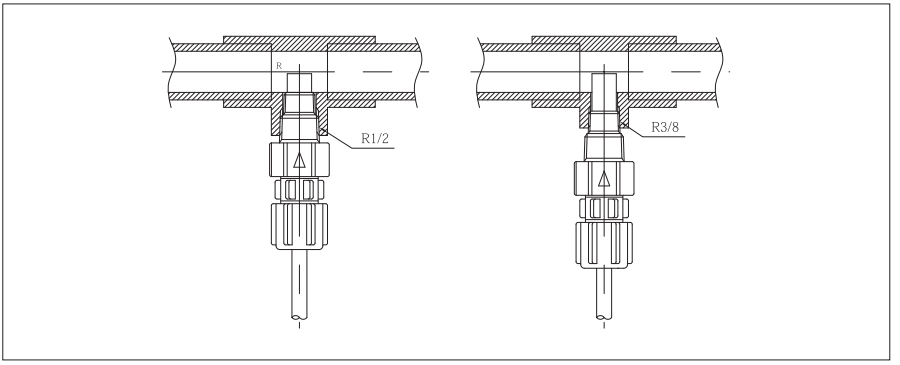
1. In case that injection port is open to atmosphere and its location is lower than liquid level in the tank.
   ➡ Siphon Phenomenon: although pump is stopped, liquid may continuously flow because location of discharge port is lower than liquid level in suction tank
   ➡ If there is constant pressure at injection port, it may be used as Check Valve.
2. When injecting to suction piping of centrifugal pump
3. When flow is much larger than rated capacity
   (In spite of upward piping, if piping length is too long, Overfeeding can be generated.)
   ➡ Overfeeding : Overfeeding stands for the excessive discharge flow due to abnormal function of the Check Valve caused by pulsation of the liquid in piping.
   Check carefully differential pressure if the differential pressure between suction side and discharge side is lower than 0.5~1 bar and discharge piping is too long.

■ Mounting of Anti-siphon Check Valve

1 Install Rc3/8 or Rc1/2 of Female Thread at the injection point.
Fits both sizes because Anti-siphon Check Valve has both R3/8 and R1/2 of Male Thread.

2 Anti-siphon Check Valve is fragile against impacts since it is made by plastics such as PP, PVDF, & PPS, therefore, install it in a place sheltered from impacts and free from obstacles.

3 Cut off the end of the injection nozzle properly. It is suitable that the end of injection nozzle is positioned in the middle of water pipe.



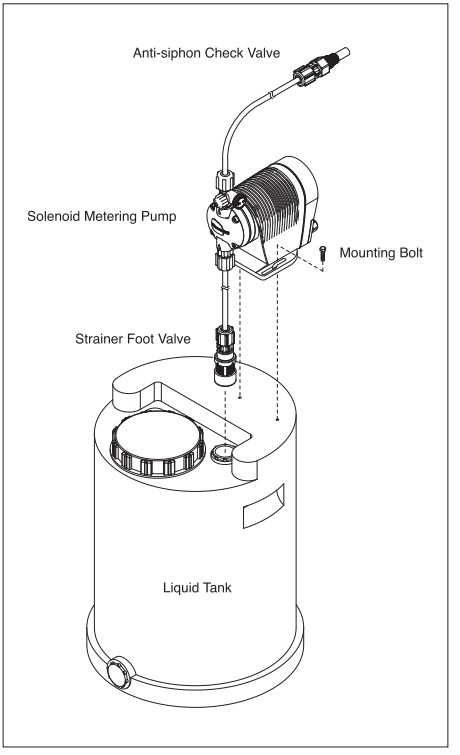
■ Installation on Liquid Tank

1 Fix the pump to the bracket on the tank, by using the Mounting Bolts supplied as standard accessories.

2 Pass the Hose Nut into the suction side hose and connect it to the Strainer Foot Valve.

3 Place the Strainer Foot Valve into the tank.

4 Pass the Hose Nut into the discharge side hose and connect it to discharge side Joint of pump.
Drive the Anti-siphon Check Valve into the injection point and connect the hose.

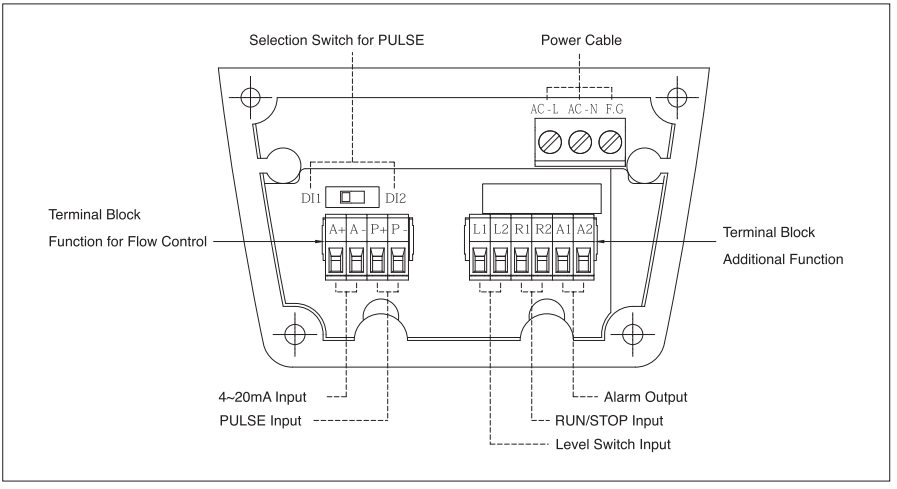


9-4 Electrical Wiring

> ⚠ Warning
>
> • Do not touch with wetted hand. Electric shock may be occurred.

> ⚠ Warning
>
> • Before wiring, check voltage, phase, & frequency 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.

1 Disassemble Terminal Cover after loosening tapping screw from Control Panel by (+) screwdriver.

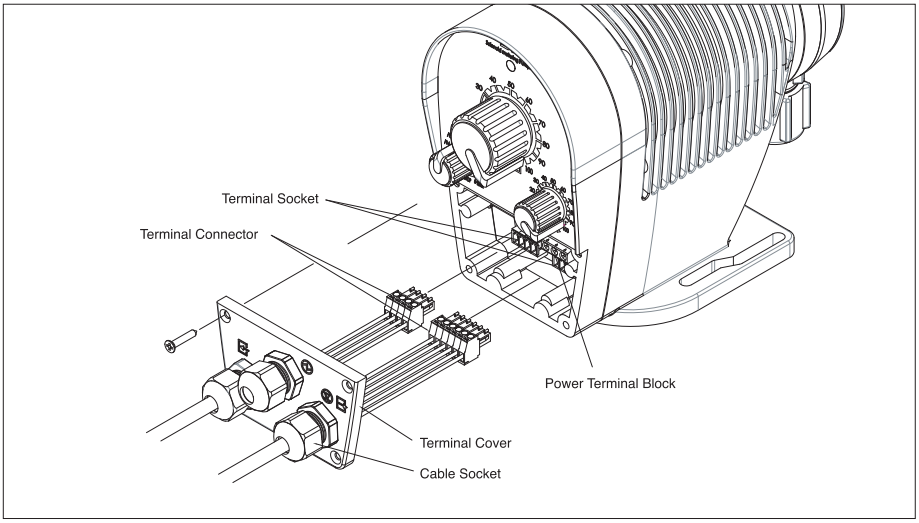


2 Connector inserted to Terminal Block
Separate the Terminal Connector connected to Terminal Block by Long Nose Plier and after passing the wire into the Cable Socket and inserting the wire to the Terminal Connector.
Fix it by (-) screwdriver.
Terminal Block for external contacts such as Level Switch is connected with jumper wire.
Before wiring, remove it.

3 Allowable wire standard for Terminal Block & Cable Socket is as follows.
① Terminal Block for Flow Control & Additional Function : AWG16~30
② Terminal Block for Power : AWG18~26
③ Cable Socket: External dia. ø4~ ø8

4 Put the Terminal Connector connected with wire into the Socket of Terminal Block and assemble the Terminal Cover.
Tighten the Cable Socket so that wire don't be fall out, after adjusting wire length.

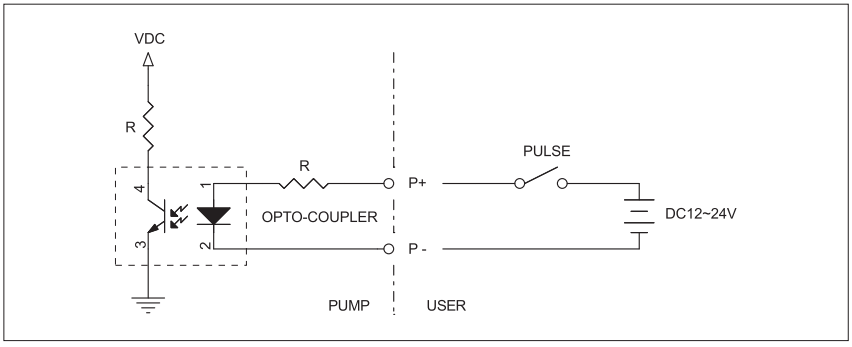
5 Power wires are 3 wires including ground. be careful not to confuse since Green & Yellow color are used for ground wire.



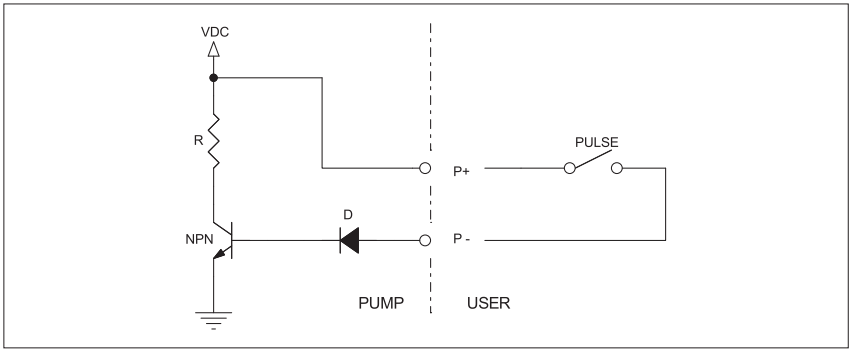
Ⅰ Diagram of Electric Circuit (Example)

① PULSE Input Signal: Min. PULSE Duration Time is 4ms

- DI1 Selection: VOLTAGE WITH OPEN CONTACT



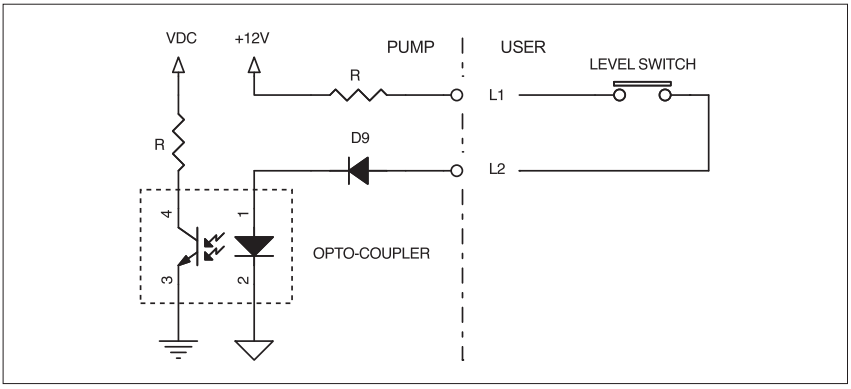
- DI2 Selection: NO VOLTAGE WITH OPEN CONTACT



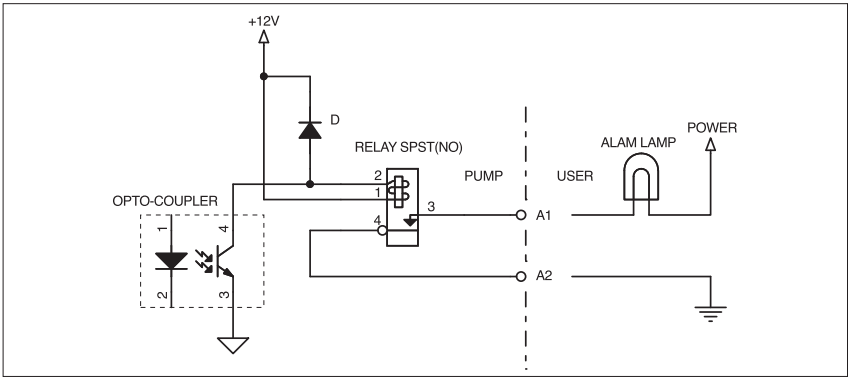
② DC4~20mA Input Signal

③ LEVEL SWITCH Input Signal : NO VOLTAGE WITH OPEN CONTACT

OPEN : LOW LEVEL CLOSE: NORMAL LEVEL

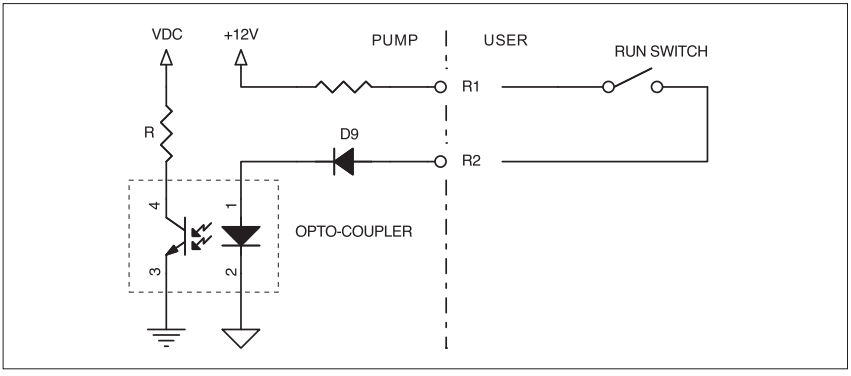


④ ALARM Output: DRY CONTACT (SPST) Contact Capacity: 3A 250VAC (5A 30VDC)



⑤ REMOTE RUN/STOP Input Signal : NO VOLTAGE WITH OPEN CONTACT

OPEN : PUMP STOP CLOSE: PUMP RUN



10 Operation

10-1 Start

⚠ Warning

- 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.

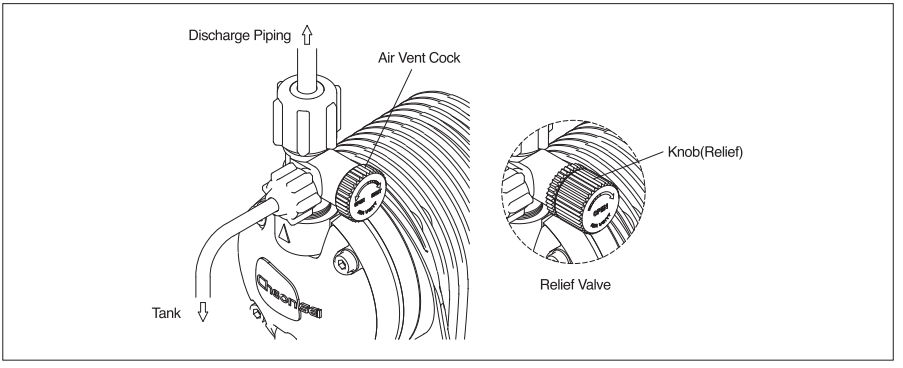
⚠ Caution

- When discharge valve of pump is clogged with foreign substance, pressure is raised and liquid is spouted and it cause damage of piping.
- Wear suitable protective clothing(gloves, mask, goggles, working clothes, & etc.) when pumping hazardous liquids.
- Some water may be remained in the pump after final performance test. In case of use for some liquids reacted to water, remove water in the pump and dry the pump necessarily.

1 Check if suction side and discharge side hose is tightly connected, and Hose of Air Vent is connected with Liquid Tank or other container.

2 Set each Control Knob to 100% and operate the pump after turning the Air Vent Cock counterclockwise about 1~ 1½ revolutions.
Confirm that liquid is flowed through Air Vent and start normal operation after closing the Air Vent Cock by turning it clockwise.

3 In case of the pump attaching Relief Valve, if the Knob of Relief Valve is clockwise turned about 90°, Air Vent Valve is opened. On the other hand, if the Knob of Relief Valve is clockwise turned about 90° again, Air Vent Valve is automatically closed by spring force.



10-2 Adjustment of Capacity Rate

⚠ Warning

- Do not turn the Control Knob of Stroke Length & Stroke Number below 0% or over 100%.

Since capacity Rate is controlled by both the Control Knob of Stroke Length and the Control Knob of Stroke Number, fine control of capacity rate is possible.

11 Repair and Maintenance

⚠ Warning

- Turn off the power and stop pump & other equipments before repair & maintenance, otherwise it may cause electric shock.

⚠ Caution

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

11-1 Check before Operation

1 Check the level of liquid tank and, if it is insufficient, supplement the liquid.
2 Check if the valves on the suction & discharge piping are opened.
3 Check if piping is loosened or damaged.
4 Check electrical wiring if there are no electrical short & disconnection.

11-2 Check during Operation

1 Check the level of liquid tank and, if it is insufficient, supplement the liquid. Specially, be areful for the process or chemical influenced by Air.
2 Check if liquid 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 pump.
4 Check if the needle of pressure gauge is located at normal range.

11-3 Maintenance prior to long shutdown

1 Wash inside Pump Head by drawing & discharging clean water for 30 minutes.
2 Put the cover on the pump to protect it from dust and/or corrosion.
3 Set the Control Knob of Stroke Length at 100% in order to prevent the deformation of diaphragm.
4 Check foreign substances lay on the Check Ball and/or Ball Seat before restarting the pump.

11-4 Other maintenance

1 When diluted liquid or high viscosity liquid is used at freezing place in the winter, install HEAT TRACING to prevent the pump from freezing because it causes the damage of the pump & other devices with freezing on the liquid end part of pump and inside piping.
2 Clean the inside of Tank and Joint every 3 months at least.

12 Cause of Trouble and Troubleshooting

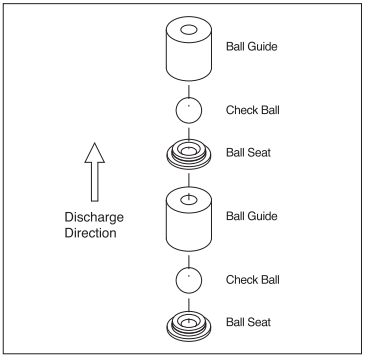
Trouble		Cause	Troubleshooting
Pump is running but liquid is not discharged.	Air is drawn	Leaks from joint or sealing part	Check o-ring & tighten
		Empty tank	Fill up and expel air
	Suction is not sufficient.	Strainer is clogged	Clean strainer & tank
		Pump head is filled with gas	Purge the gas by air vent cock
		Assembly direction of valve is wrong	Re-assemble the valve
		Ball Seat is worn out	Replace
		Short stroke length	Set stroke length at 100% and control discharge capacity by stroke number
Insufficient discharge rate		Check ball & ball seat are damaged	Replace
		Spring is broken	Replace
		Diaphragm is aged or broken	Replace
		Setting of knob is wrong	Readjust
		Liquid being treated is changed	Recheck the pump specifications
Leakage of liquid		Pressure is increased by foreign substance or clogging	Disassemble and clean
		Hose or diaphragm broken due to fatigue	Replace
		Head and joint are loosened	Tighten
		There is no o-ring	Insert o-ring
Pump dose not run	Status Lamp(LED) is off	Wrong voltage	Check voltage & correct
		Wrong wiring	Check the wiring & correct
		Disconnection of cable	Modify or replace
		Switch is cut off	Turn on switch
		Fuse is burnt out	Check the cause and replace fuse
		Defective magnetic switch	Replace
	Solenoid does not run	Unsuitable voltage	Connect suitable voltage
		Spring is broken	Replace
		Defective solenoid	Check the resistance & insulation

13 Replacement of Parts

> ⚠ Caution
>
> • Wear suitable protective clothing during assembly and disassembly work.

13-1 Replacement of Ball Seat and Check Ball

1 Disconnect the hose of suction & discharge from the pump.
2 Loosen the joint of suction & discharge side and take out valve parts(check ball, ball guide, & ball seat)
3 Check the damage & sticking of foreign substances on the valve parts and replace or wash if necessary.
4 When reassembling joints, be careful not to change assembly direction of the parts in upper joint & lower joint.
5 Specially, be careful not to forget assembly of o-ring, ball guide, & check.

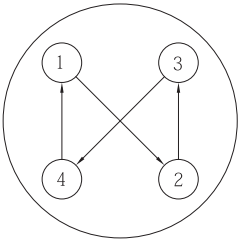


> ⚠ Caution
>
> • Be careful to assemble valve parts correctly according to sequence (top : ball guide, middle : check ball, bottom : ball seat). If the sequence is wrong, liquid flow backward and pump may be damaged.

13-2 Replacement of Pump Head

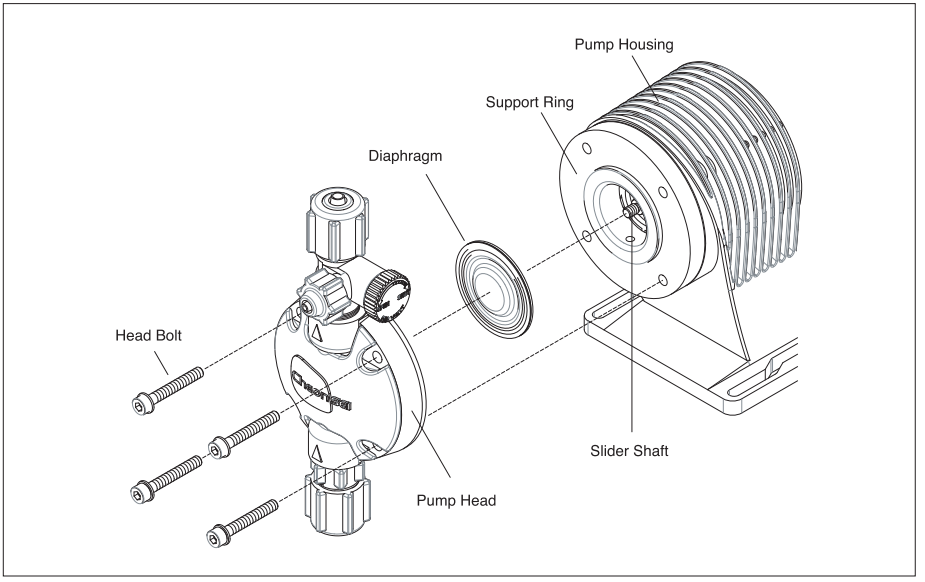
1 Disconnect the hose from the joint of suction and discharge side.
2 Loosen the head fixing bolts with hex. wrench.
Head is disassembled by pulling the head forward.
3 Assembly should be done with inverse sequence of disassembly.

> ⚠ Caution
>
> • When assemble the head with head bolt, tighten the head bolt in the order of right diagram.
> For example, if tighten the bolts in order of 1→3→2→4, leakage from the pump head may be caused by unequal tightening.
> • Suitable tightening force(torque) is 3N·m(30.4kgf·cm).



13-3 Replacement of Diaphragm

1 Disassemble pump head according to the procedure detailed in 13-2.
2 Set stroke length at 0%.
Diaphragm is screwed into the slider shaft and diaphragm can be easily disassembled by turning it counterclockwise.
3 After replacing diaphragm with new one, fix it to the slider shaft by turning it clockwise.



4 Set stroke length at 100% and assemble the pump head with head bolts.

14 Consumable Parts and Spare Parts

14-1 Consumable Parts

Part Name	Q'ty
Diaphragm	1
Ball Seat	4
Check Ball	4
O-ring	2
Spring(High Viscosity)	2

14-2 Spare Parts

• Hose Nut • Joint • Hose Adaptor • Clamp Ring • Ball Guide

15 Warranty

⚠ Warning

- If the pump is reconstructed arbitrarily or the undesignated parts are used into the pump, CHEONSEI will not warrant and CHEONSEI 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 disaster

16 Repair Service

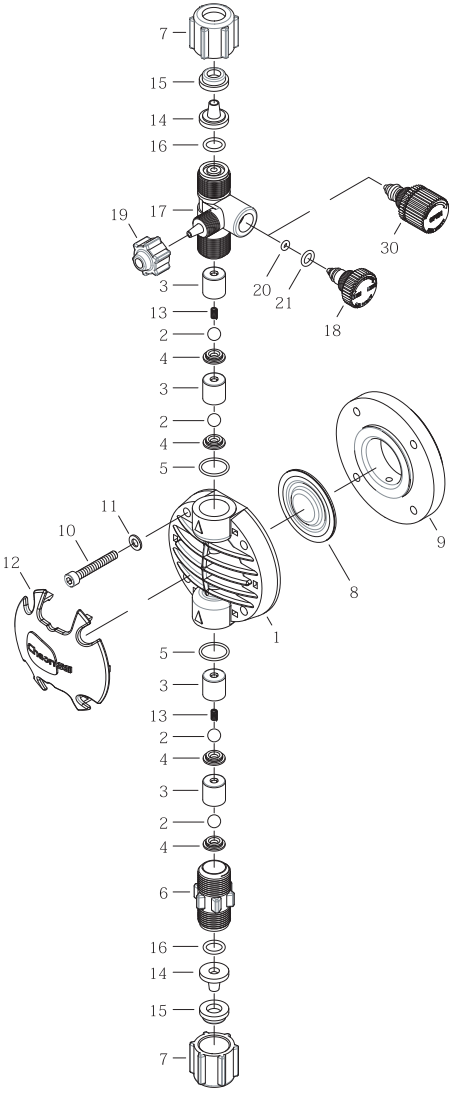
⚠ Caution

- When the pump is sent to factory for repair service, clean out inside of pump.
- Do not send the pump back, if the pump has been used for harmful & fatal liquid to health.

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 Structure and Name of Each Parts

17-1 Liquid End Parts

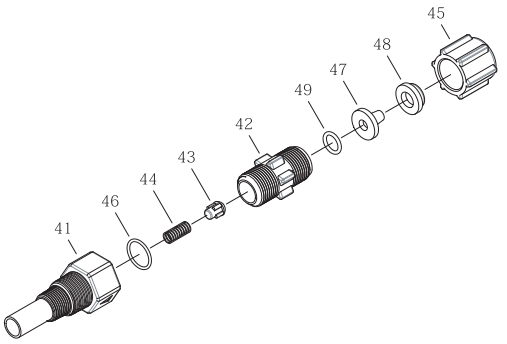


No.	Part Name	Q'ty
1	Head	1
2	Check Ball	4
3	Ball Guide	4
4	Ball Seat	4
5	O-ring	2
6	Joint	1
7	Hose Nut	2
8	Diaphragm	1
9	Support Ring	1
10	Bolt(Wrench)	4
11	Washer(Flat)	4
12	Head Cover	1
13(1)	Spring(High Viscosity)	2
14	Hose Adaptor	2
15	Clamp Ring	2
16	O-ring	2
17	Air Vent Body	1
18	Air Vent Cock	1
19	Hose Nut(Air)	1
20	O-ring	1
21	O-ring	1
30(2)	Relief Valve	1

Note 1) Only for High Viscosity Type
2) Only for Relief Valve Type

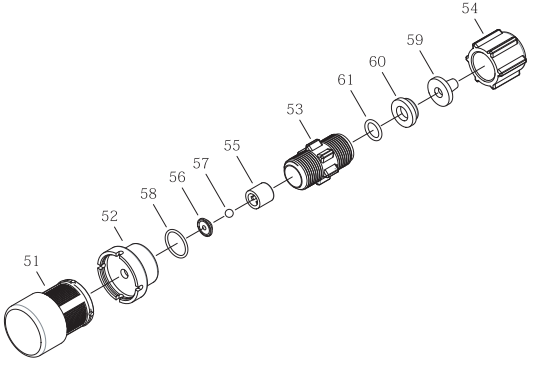
17-2 Accessories Parts

[1] Anti-siphon Check Valve



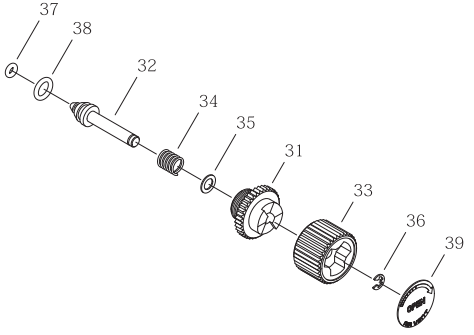
No.	Part Name	Q'ty
41	Siphon Body	1
42	Joint(Siphon)	1
43	Siphon Plug Head	1
44	Spring(Siphon)	1
45	Hose Nut	1
46	O-ring	1
47	Hose Adaptor	1
48	Clamp Ring	1
49	O-ring	1

[2] Strainer Foot Valve



No.	Part Name	Q'ty
51	Strainer	1
52	Adaptor(Strainer)	1
53	Joint(Foot)	1
54	Hose Nut	1
55	Ball Guide	1
56	Ball Seat	1
57	Check Ball	1
58	O-ring	1
59	Hose Adaptor	1
60	Clamp Ring	1
61	O-ring	1

[3] Relief Valve



No.	Part Name	Q'ty
31	Adaptor(Relief)	1
32	Relief Valve	1
33	Knob(Relief)	1
34	Spring(Relief)	1
35(1)	Spacer(Relief)	0~2
36	Snap Ring	1
37	O-ring	1
38	O-ring	1
39	Membrane(Relief)	1

Note 1) Quantity is changed according to model.

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