LANGO®

Solenoid Dosing Pump Instruction Manual

EN
Series





Carefully read and understand the manual before installation and operation.

Order confirmation

After unpacking, check the following points. Contact us or your nearest dealer if the delivery is imperfect.

a. Check if the delivery is as per order.

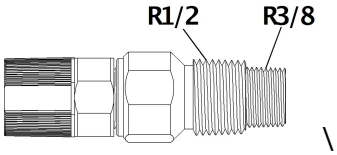
Check the nameplate to see if the discharge capacity, discharge pressure and voltage are as per order.

b. Check if accessories are complete.

- *A check valve*

* The attached check valve vary with pump models.

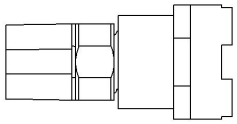
Check valve



- *A filter with foot valve*

* The attached filter with foot valve vary with pump models.

Filter with foot valve



- A tube (3m)
  (ø4×9 or ø8×13 PVC braided tube)



c. Check if the delivery is damaged or deformed

Check for transit damage and loose bolts.

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Safety instructions

Read through this section before use. This section describes important information for you to prevent personal injury or property damage.

■ Pictorial indication

In this instruction manual, the estimated risk of degree caused by incorrect use is ranked with the following pictorial indications. First, fully understand information on the pictorial indications.

⚠**WARNING**	Indicates mishandling could lead to a fatal or serious injury accident.

⚠**CAUTION**	Indicates mishandling could lead to personal or property damage.

Pictorial indication accompanies each precaution, suggesting "Caution", "Prohibition" and "Requirement".



⚠For exportation

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

⚠WARNING

Turn off power before work
Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before work.



Stop operation
On sensing any abnormality or dangerous sign, suspend operation immediately and inspect/solve problems.



Do not use the pump in anything other than a specified purpose
The use of the pump in any purpose other than those clearly specified may result in failure or injury. Use this product in a specified condition.



Do not modify the pump
Remodeling the pump carries a high degree of risk. We are not responsible for any failure or injury results from remodeling.



Wear protective clothing
Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a work cap during dismantlement, assembly or maintenance work.



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



Do not use the pump in a flammable atmosphere
Do not place dangerous or flammable goods near the pump for your safety.



⚠CAUTION

A qualified operator only

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



Use a specified voltage only

Do not apply any voltage other than the one specified on the nameplate. Otherwise, failure or fire may result. Also, be sure to earth the pump.



Do not run pump dry

Do not run pump dry for more than 30 minutes (even when the pump runs for degassing). Otherwise, the pump head fixing screws may loosen and liquid may leak. Optimise your system in order for the pump not to run dry. If the pump run dry for a long period (for more than 30 minute), the pump head and valve case may deform by friction heat and consequently leakage results.



Do not wet electric parts or wiring

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



Ventilation

Poisoning may result when handling a toxic or odorous liquid. Keep good ventilation in your operating site.



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

- Under a flammable atmosphere or in a dusty/humid place.
- Ambient temperature is beyond 0-40 degrees Celsius.
- Under direct sunlight or wind & rain.



Countermeasure against efflux

Take a protective measurement against an accidental chemical overflow results from pump or piping breakage.



Do not use the pump in a water place

The pump is not totally waterproof. The use of the pump in water or high humidity could lead to electrical shock or short circuit.



Earthing

Risk of electrical shock. Always earth the pump.



Install an earth leakage breaker

Risk of electrical shock. Do not use the pump without a leakage breaker. Purchase separately.



Wear part replacement

Follow instructions in this manual for wear part replacement. Do not dismantle the pump beyond the extent of the instructions.



Do not use a damaged pump

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



Disposal of the used pump

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



Tighten the pump head

Liquid may leak if pump head fixing bolts are loose. Tighten the bolts diagonally and evenly before initial operation. Also, periodically tighten the bolts for the prevention of leakage.

Tightening torque

EN-B10/15/20, C15/20 : 2.16 N•m

EN-B30, C30/35 : 2.55 N•m



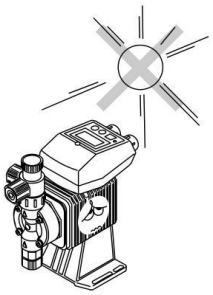
Precautions for use

- Electrical work shall be performed by a qualified operator. Otherwise, personal or property damage accident may result.

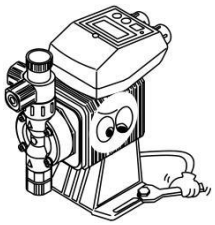


- Do not install the pump in the following places where...
  - Under a flammable atmosphere or in a dusty/humid place.
  - Under direct sunlight or wind & rain.
  - Ambient temperature is beyond 0-40 degrees Celsius.

  Protect the pump with a cover when installing it out of doors.



- Select a level location where is free from vibration and liquid can't stay. Fix the pump with M4 bolts so as not to vibrate. If the pump is installed at a tilt, the flow may reduce.



- When two or more pumps are installed, the pump operation interacts each other and vibration becomes significant, resulting in poor performance or failure of internal electrical devices. Select an installation location where tolerates vibration to enough degree.



- Keep a wide maintenance space around the pump.



- Install the pump as close to a supply tank.



- Install the pump in a cool and dark place when handling liquids that readily generate gas bubbles such as sodium hypochlorite or hydrazine solution. Flooded suction mounting is strongly recommended when using the pump with a supply tank.



- Be careful not to drop the pump onto the floor. A strong impact may reduce pump performance. Do not use a pump which has once damaged. Otherwise an electrical leak or shock may result.



- The pump is a light water-/dust-proof structure of IP65, but is not totally waterproof. Do not have the pump wet with the liquid handled or rainwater.



- Never wet the pump head, control unit and drive unit. Otherwise, Failure or an accident may result. Immediately wipe off liquid if the pump has got wet.



- Do not close the discharge line during operation. Otherwise, liquid may leak or tubing may break.



- Remove the control unit only when necessary. Note that an applicable control unit differs with each drive unit. Do not attach a control unit to an inapplicable drive unit. Otherwise, an electrical circuit or the drive unit may fail.



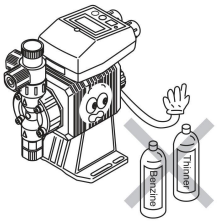
- Release the pressure from the discharge line before dismantling the pump or removing tubing. Otherwise, chemical liquid gushes out.



- Be careful not to come in contact with residual liquid.



- Do not clean the pump or nameplate with a solvent such as benzene and thinner. This may discolour the pump or erase printing. Use a dry cloth or a wet cloth with water or neutral detergent.



Outline

The information such as characteristics, features and part names are described in this section.

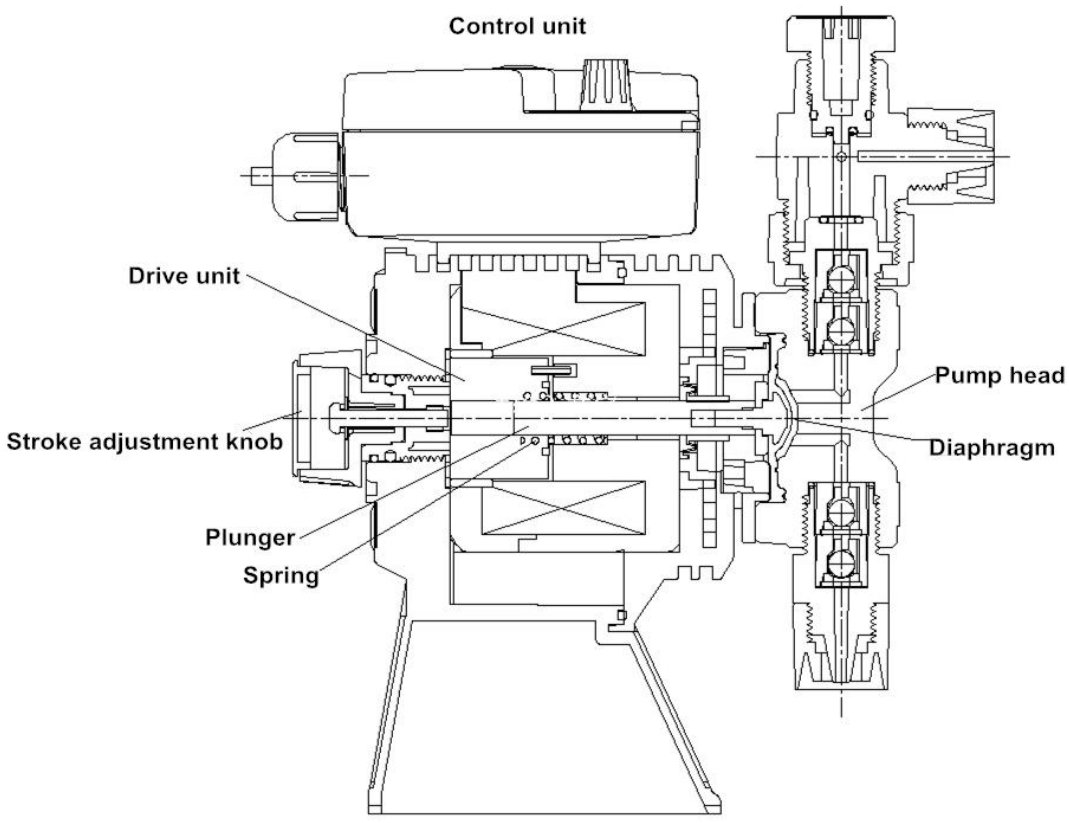
Introduction

Pump structure & Operating principle

The EN series is a diaphragm dosing pump which consists of a pump head, drive unit and control unit. A diaphragm is directly driven by electromagnetic force.

Principle of operation

Control unit send the 4~20mA signal to Drive unit. The 4~20mA signal controls the electromagnetic force and spring force in order to make reciprocating motion. The reciprocating motion is transferred to a diaphragm through a plunger and then volumetric change occurs in the pump head. This action transfers liquid along with pump head valve action.



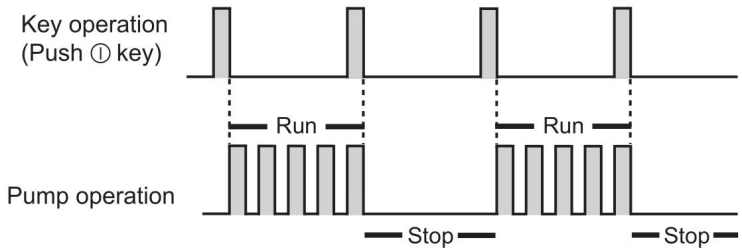
Features

- **Multivoltage**
  All the EN series is multivoltage type (AC100-240V) and can be selected without concern for local power voltage.
- **High resolution**
  Digitally-controlled spm range is 0～360. The stroke length shifts for a fine flow adjustment.
- **Waterproof and dustproof structure**
  The sealed drive unit and control unit assure IP65.
  * This pump is not completely water resistant. Protect the pump with a cover when installing it out of doors.

Operational function

- **Control unit setting and operation (see page 45)**

The start/stop of the pump by key operation



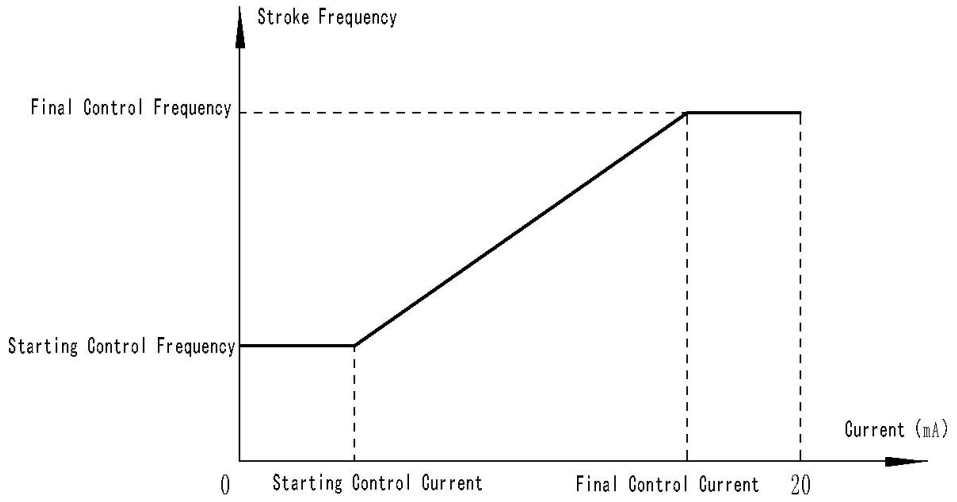
*Manual operation can be done at any time during operation or stop.

- **EXT operation (see page 46)**

The pump operation by the external signal.
The external operation is available after the direct proportion or inverse proportion programming.

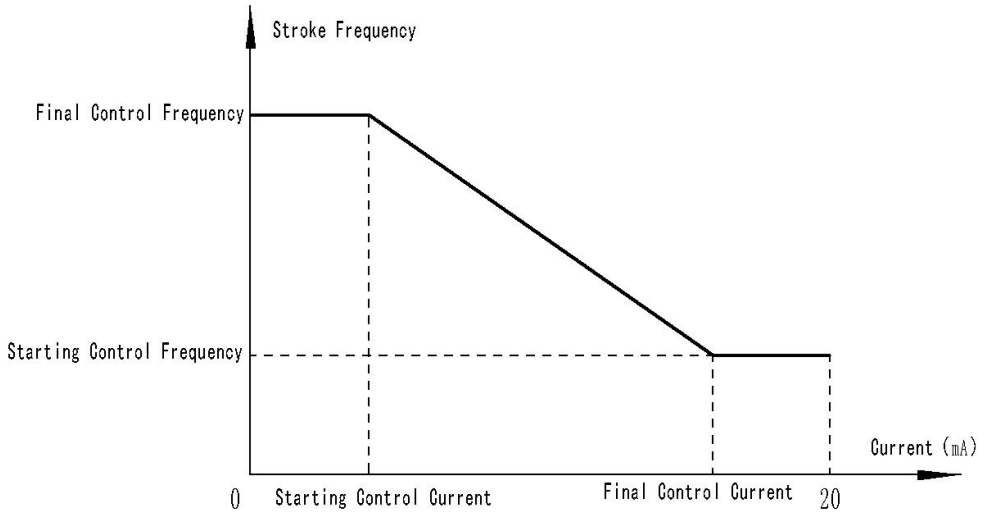
EXT The direct proportion programming (See page 50)

For EXT 0～20mA signal, set up the starting control frequency and final control frequency , calibrate external input the starting control frequency corresponding to the starting control current, calibrate external input final control frequency corresponding to the final control current ,in the EXT Mode, the pump receives the external 0 ~ 20mA signal to carry out the direct proportion work. The minimum working frequency is the set starting control frequency, the maximum working frequency is the final control frequency.



EXT The inverse proportion programming (See page 50)

For EXT 0～20mA signal, set up the starting control frequency and final control frequency , calibrate external input the starting control frequency corresponding to the final control current, calibrate external input final control frequency corresponding to the starting control current, in the EXT Mode, the pump receives the external 0～20mA signal to carry out the inverse proportion work. The minimum working frequency is the set starting control frequency, the maximum working frequency is the final control frequency.



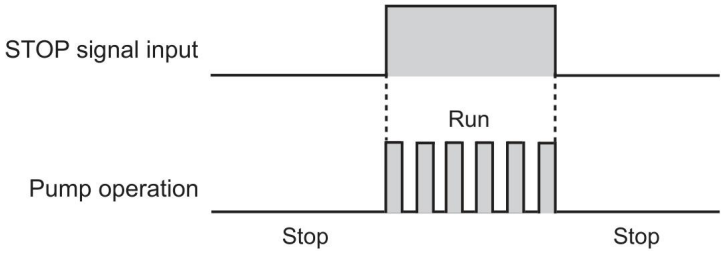
● **STOP function (See 51 page)**

The start/stop of the pump can be controlled by the external STOP signal.

Operation stop at the stop signal input: "M-OF"

The pump runs while receiving the STOP signal.

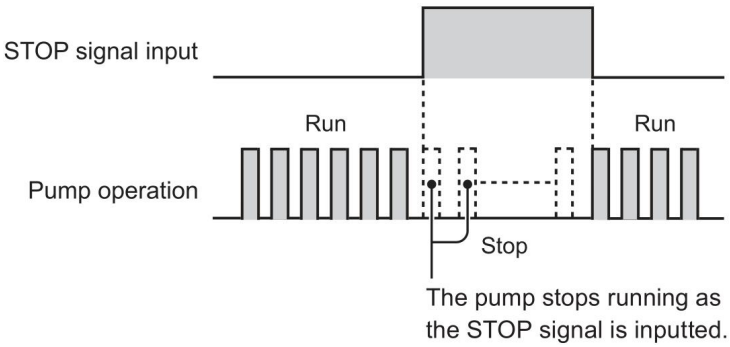
*The pump stops operation when the stop signal is released.



Operation starts at the STOP signal input: "M-ON"

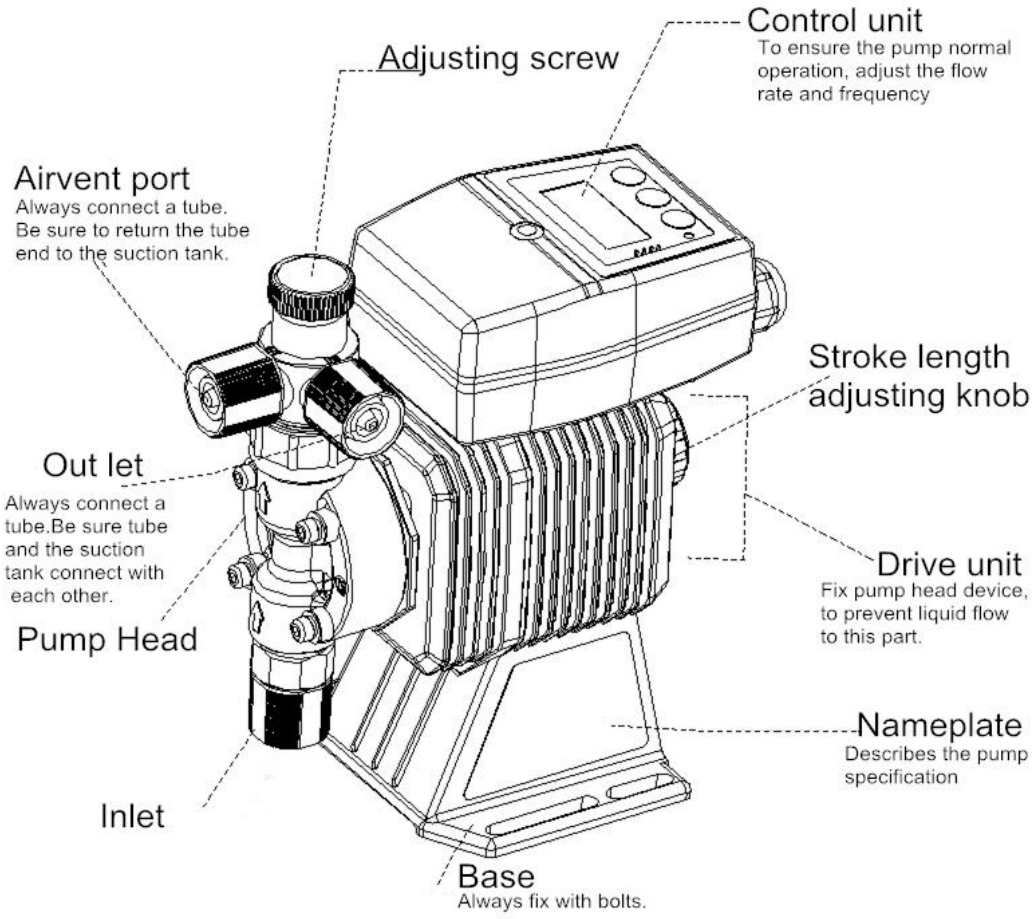
The pump stops while receiving the STOP signal.

*The pump resumes operation when the stop signal is released.



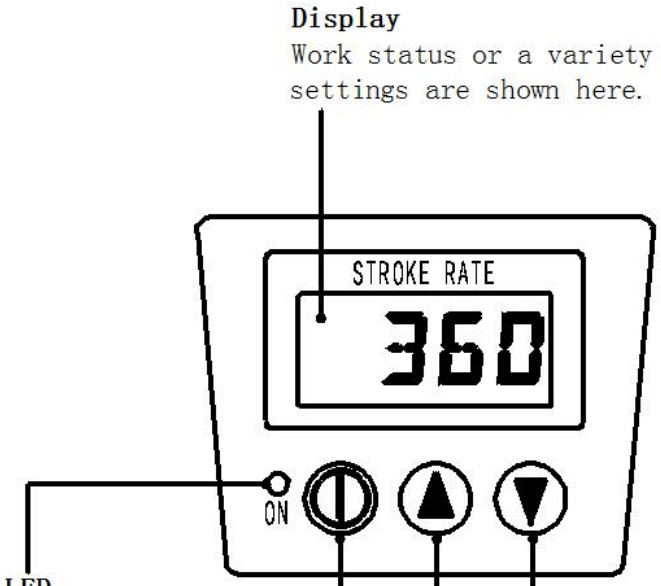
Part names

Pump

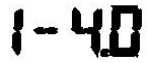
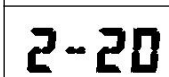
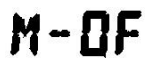


* The air vent port is not provided to the EN-□30•35 .

Operational panel



■ **Basic displays & Pump states**

	“ON” LED lights	**“ON” LED blinks**
	The STOP signal stops the pump from working.	—
	When the STOP signal is received, the pump stops working and is in the manual mode.	—
	In the EXT setting, calibrate the external 4mA signal.	
	In the EXT setting, calibrate the external 20mA signal.	—
	In EXT Mode, set the starting control frequency of 0~360 stroke/min, and "000" is the factory default value.	—
	In EXT Mode, set the final control frequency of 0~360 stroke/min, and "360" is the factory default value.	—
	The STOP function is set to M-OF. When M-ON is selected, it displays M-ON.	—
	—	In EXT Mode, the "+" represents the direct proportional operation, and "-" represents the inverse proportional operation. "360" represents the current running speed, and the running speed varies with the external signal.
	The pump works in manual mode. The display value is the stroke rate.	The pump works in manual mode. The display value is the flush.
	—	The button is locked manually. The keystroke operation in this state is invalid. "360" represents the current running speed, and the key lock function should be removed before operation.
	—	The button is locked automatically. The keystroke operation in this state is invalid. "360" represents the current running speed, and the key lock function should be removed before operation.

Identification codes

The model codes of the pump/drive units and the control unit represent the following information.

Pump/Drive units

EN - B 10 VC W 1

a b c d e f

a. Series name

EN: 4～20mA Signal Model

b. Drive unit code (Average power consumption)

B: 20W

C: 24W

c. Diaphragm effective diameter

10/15/20/30/35

d. Flow end materials

Code	Pump head	Valve	O ring	Valve seat	Gasket	Diaphragm
VC	PVC	ceramic	FKM	FKM	PTFE	PTFE + EPDM (EPDM is not a wet end.)
VH		ceramic	EPDM	EPDM		

Material code

PVC : Transparent polyvinyl chloride

EPDM : Ethylene-propylene rubber

FKM : Fluorine-contained rubber

PTFE : Polytetrafluoroethylene

e. Power-supply voltage

W: AC100-240V

f. Tube connection bore code

No.	Tube connection bore	Tube type
1	ø4×9	PVC braided tube (PVC)
2	ø8×13	PVC braided tube (PVC)

Installation

This section describes the installation of the pump, tubing and wiring. Read through this section before work.

Observe the following points when installing the pump.

- Be sure to turn off power to stop the pump and related devices before work.
- Upon sensing abnormal condition or a dangerous sign, stop the work immediately. Remove problems before resuming work.
- Do not place dangerous or flammable goods near the pump for your safety.
- Risk of an electrical leak or shock. Do not use a damaged pump.

Pump mounting

Select an installation location and mount the pump.

Necessary tools

- Four M5 bolts (pump mounting)
- Adjustable wrench or spanner

1 **Select a suitable place.**

Always fix the pump on a flat floor free of vibration. See page 10 for detail.

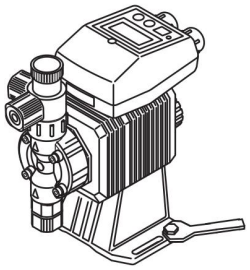
Flooded suction is recommended when handling a gaseous liquid such as sodium hypochlorite

2 **Fix the pump by the M5 bolts.**

Be sure to fix the pump at four points.

NOTE

Install the pump horizontally. If the pump is installed at a tilt, the flow may reduces.

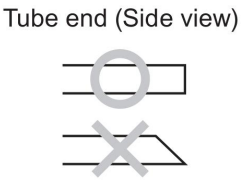


Pipework

Connect tubes to the pump and install a check valve.

Before operation

- Cut the tube ends flat.



Necessary tools

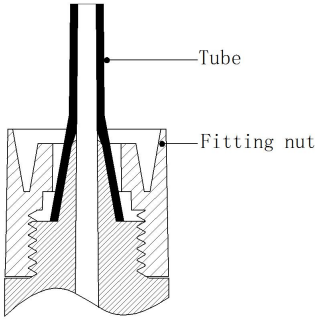
- Adjustable wrench or spanner

Tube connection

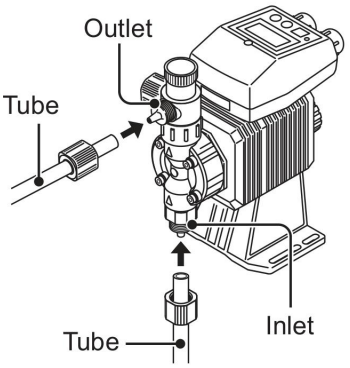
a. Pass a tube into the fitting nut and insert a tube end all the way seated on the fitting. Then hand tighten the fitting nut.

b. Retighten the fitting nut by turning it 180 degrees with an adjustable wrench or spanner.

* The fitting nut is made by plastics and may be broken if it is tightened too much.

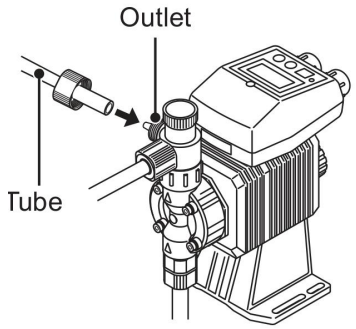


1 **Connect tubes into the inlet and outlet.**



2 **Connect an air bleed tube into the air vent port.**

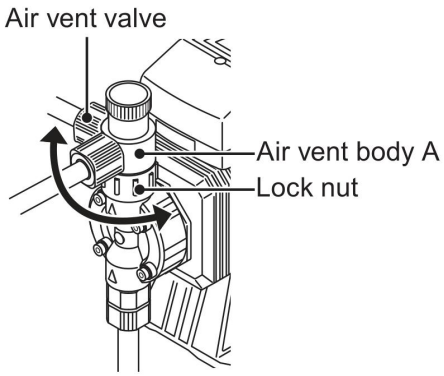
Place the tube end in the supply tank or another container.



3 **Direction of the air vent port.**

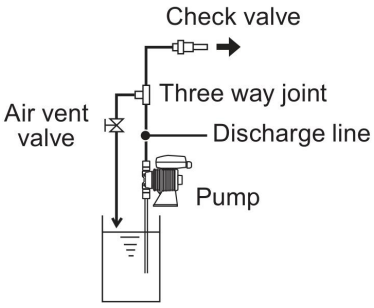
The air vent port can rotate 90 degrees.

a. Turn the lock nut anticlockwise.
b. Adjust the direction of the air vent port.
c. Turn the lock nut clockwise and fix it, holding the air vent body A.
d. Further tighten the lock nut by turning it 90 degrees with an adjustable wrench or spanner.



NOTE

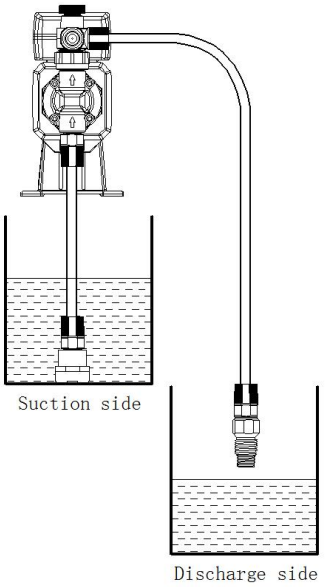
The air vent port is not provided to the EN-30•35 types. Install an air vent valve.
See the right diagram. Optional air vent valves are available.



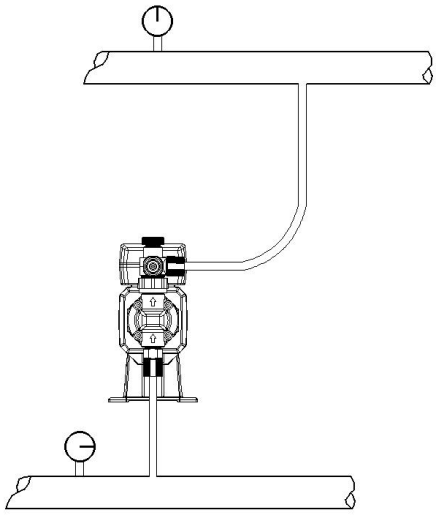
Check valve mounting

The EN series is equipped with a check valve for the prevention of a back flow, siphon and overfeeding.
In the following cases be sure to install the check valve.

- The suction side liquid level is higher than the discharge side (See the diagram below). Or an injection point is below the suction side liquid level at atmospheric pressure.

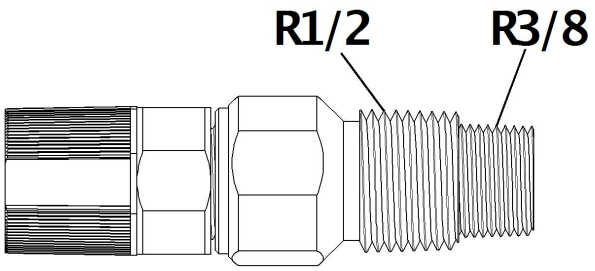


- Suction side pressure is higher than the discharge side pressure.



1 **Mount the check valve at the discharge tube end.**

* The CA check valve have R1/2,R3/8 thread connections as well as tube connection. Cut off and adjust the connection length to fit the check valve into tubing.

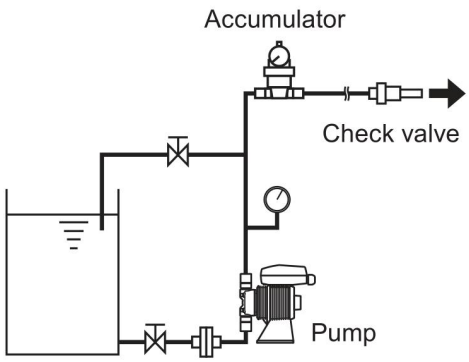


NOTE

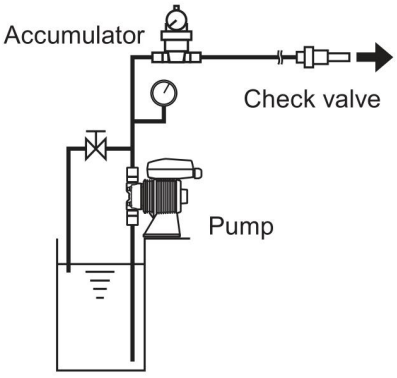
Periodically clean or replace the check valve with new one because it may be clogged by crystal.

Tubing layout

Flooded suction application



Suction lift application



* Flooded suction is recommended when handling a gaseous liquid such as sodium hypochlorite.

Wiring

Wiring for the power source, earthing and external signal.

Observe the following points during wiring work.

- Electrical work shall be performed by a qualified operator. Always observe applicable codes or regulations.
- Observe the rated voltage range. Otherwise the electrical circuit on the control unit may break.
- Do not perform wiring work while the power is on. Otherwise, an electrical shock and short circuit may result, and consequently the pump may fail. Be sure to turn off power before wiring work.
- Be careful for the power not to be turned on during work.

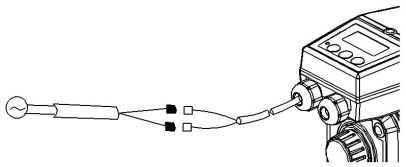
Necessary tools

- Adjustable wrench or spanner
- Phillips screw driver
- Precision screw driver

Power supply/Earthing

Check that the main power is turned off.

1 **Connect power cable via crimp contacts.**



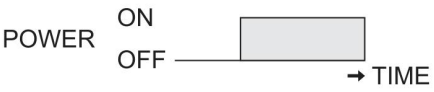
2 **Earth the pump.**

Be sure to earth the pump.

NOTE

- Do not share a power source with a high power equipment which may generate surge voltage. Otherwise electronic circuit may fail. The noise caused by the inverter also affects the electronic circuit.
- Power voltage should be charged at a sitting via a switch or a relay. Otherwise CPU may malfunction. See page 28 for the precautions for ON-OFF control by the relay.

When the power is applied at a sitting



When the power is applied gradually

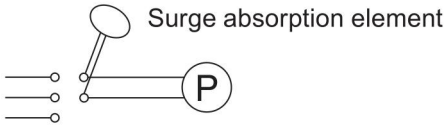


Surge voltage

The electronic circuit in the control unit may fail due to surge voltage. Do not place the pump close to the high power equipment of 200V or more which may generate large surge voltage.

If the use near the high power equipment is inevitable, take any of the following measures.

- Install a surge absorption element (ex. a varister with capacity of 2000A or more) via power cable.



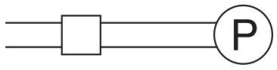
Recommended varisters

Panasonic ERZV14D431

KOA NVD14UCD430

See manufacturer's catalogues for detail.

- Install a noise cut transformer via power cable.



Noise cut transformer

Precautions for ON-OFF control by the relay

The control unit is equipped with CPU. Always start/stop the pump by the STOP signal. Do not start/stop the pump by turning ON/OFF power because it may adversely affect CPU.

If there is no choice but to turn ON/OFF power, observe the following points.

- Do not turn ON/OFF the power more than six times per hour.
- When using a relay for ON-OFF operation, its contact capacity should be 5A or more. Contact point may fail if contact capacity is less than 5A.
- If the contact capacity of 5A is used for the EN, the maximum ON/OFF operation is about 150,000 times. Use the relay with the contact capacity of 10A or more when making ON-OFF operation over 150,000 times or sharing a power source with a large capacity equipment. Otherwise a contact may fail by surge voltage.
- Use non contact transistor relay as necessary (ex. OMRON G3F). See manufacturer's catalogues for detail.

External input cable

Points to be checked

- Check that the main power is turned off.
  The pump is still charged right after turning off power. Wait for one minute before wiring.

Applicable cables

A cable diameter shall be 7.8mm.

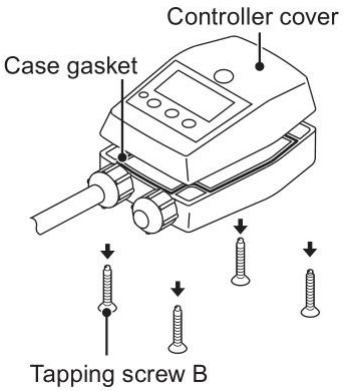
Triplex cable: VCTF-3 1.25mm 2

Duplex cable: UL, CSA SJT 18AWG/2

* The use of a cable diameter other than 7.8mm results in improper connection and reduced seal performance.

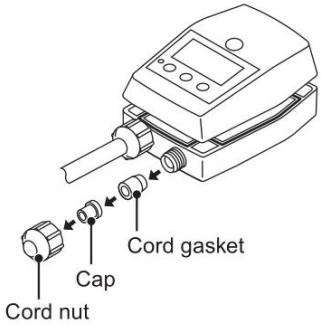
2 **Remove four screws (B) from the bottom of the control unit to detach the controller cover.**

* The controller cover can not be totally removed because the screen on the controller cover and the PCB on the controller case are connected via cable.
* The controller cover and the controller case are sealed by a case gasket. Do not forger to fit the case gasket when mounting the controller cover.



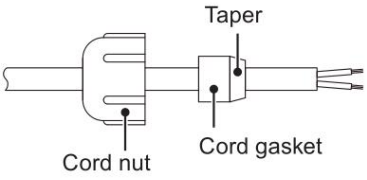
3 **Remove a cord nut and a cap and pull out a cord gasket.**

* The cap is no longer used.



4 **Pass the external signal cable into the control unit via the cord nut and the cord gasket.**

* Be careful not to oppositely orient the cord gasket.



5 **Connect an external signal cable.**

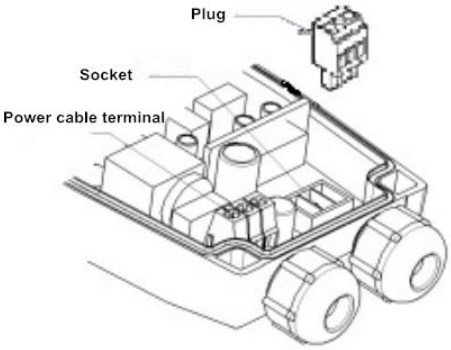
a. Detach the plug from the socket.

b. Use a precision screwdriver to connect the signal wires on the plug and then attach the plug to the socket.

c. Adjust the slackness of the external signal cable, pulling it out.

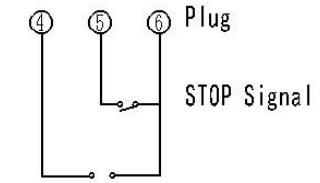
d. Securely hand tighten the cord nut.

* The external signal cable is sealed by the cord gasket.



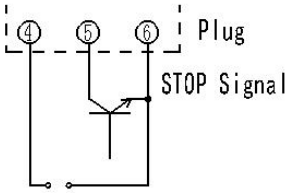
Wiring diagram

When a no-voltage contact is used



4-20mA current signal

When an open collector signal is used



4-20mA current signal

6 **Attach the controller in a reverse way of the item 1 and 2.**

Tightening torque

Fixing screw (For mounting control unit)	0.39 N•m
Tapping screw A (For mounting control unit)	0.39 N•m
Tapping screw B (For mounting control cover)	0.8 N•m

NOTE

Always check that gaskets (a rubber cap, fixing screw gasket and a case gasket) are fitted. Otherwise, the liquid may enter the control unit and failure may result.

Operation

Run the pump after pipework and wiring is completed.
This section describes pump operation and programming.

Before operation

Check the flow rate, tubing and wiring. And then perform degassing and flow rate adjustment before starting operation.

Points to be checked

Before operation, check if...

- Liquid level in the supply tank is enough.
- Tubing is securely connected and is free from leakage and clogging.
- Discharge/suction valves are opened.
- Proper power voltage is applied to the pump.
- Electrical wiring is correct and is free from the risk of short circuit and electrical leakage.

Retightening of pump head fixing bolts

Important

The pump head fixing bolts may loosen when plastic parts creep due to temperature change in storage or in transit.
This can lead to leakage. Retighten the pump head fixing bolts before starting operation.
Always tighten the bolts diagonally. See below for the tightening torque at each model.

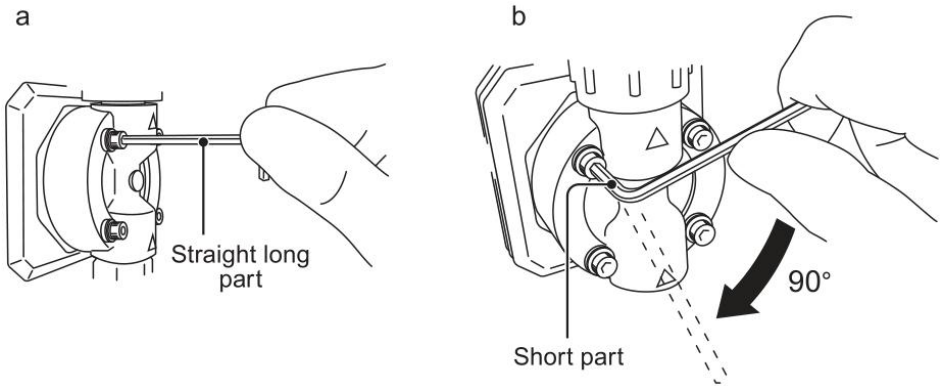
Tightening torque

Model identification code	Torque	Bolts
EN-B10/B15/B20,C15/C20	2.16 N•m	M4 Hex. socket head bolt
EN-B30	2.55 N•m	M4 Hex. socket head bolt
EN-C30	2.55 N•m	M4 Hex. socket head bolt
EN-C35	2.55 N•m	M4 Hex. socket head bolt

*Tighten fixing bolts once every three months.

■ **Use of hexagon wrench instead of a torque wrench**

Tighten the fixing bolts with the straight long part of a hexagon wrench (a) and further turn the bolts clockwise 90 degrees with the short part (b).



Degassing

The gas needs to be expelled from the pump and tubing by degassing. Normal operation can not be obtained with gas in the pump. Perform degassing in the following cases.

- When the pump starts to run for the first time
- When the flow rate is too low
- After liquid is replaced in the supply tank
- After a long period of stoppage
- After maintenance and inspection

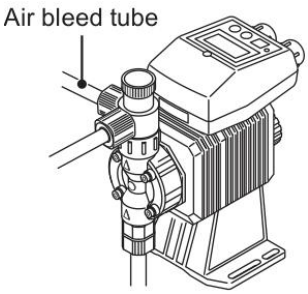
NOTE

- Both gas and chemical come out together through air bleed tube. Place the end of the tube in the supply tank or another container.
- Some chemicals may cause skin trouble or damage component parts. When your hand or component parts get wet with chemical liquid, wipe off immediately.

■ **EN- [B10/B15/B20/C15/C20] [VC]**

Points to be checked

- An air bleed tube is connected to the pump.

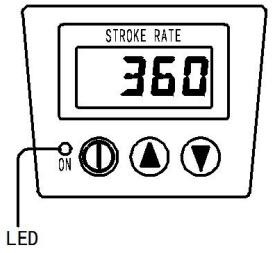


1

Turn on power.

The LED lights and a display related to the current mode appears on the screen.

* The pump enters the wait state in the manual mode when turning on power with a default setting. The pump calls up the last screen at a shutoff if it was not in a default setting.



2

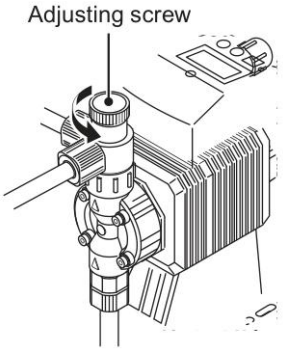
Program the stroke rate to 360spm.

- This programming is not necessary when the display already shows 360. Move to the next step.
- See page 39 "Stroke rate adjustment" for detail.

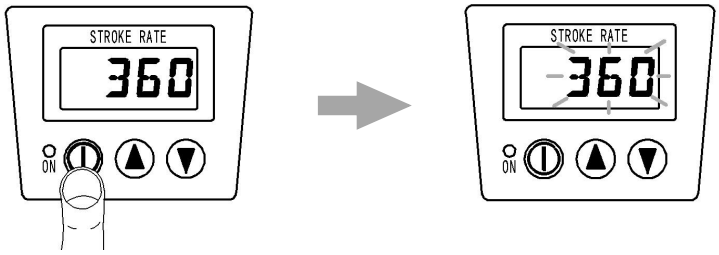
3

Rotate the adjusting screw two revolutions anticlockwise to open the air vent port.

* Do not rotate it three revolutions. Otherwise, liquid may comes out from the air vent port.



4 **Push the start/stop key and run the pump for more than ten minutes.**



5 **Push the start/stop key and stop the pump.**

6 **Rotate the adjusting screw clockwise to close the air vent port.**

7 **Check liquid is discharged.**

*Degassing is required again if the pump does not discharge liquid.

8 **Check connections for leakage.**

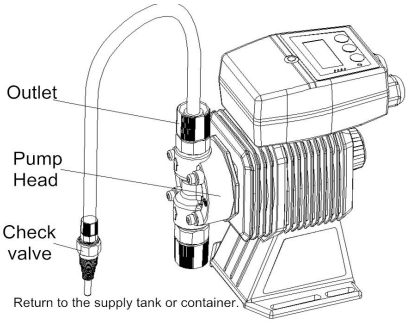
Degassing has now been completed.

■ **EN- [B30/C30/C35] [VC]**

The air vent port is not provided to the EN-30/35 VC types.
Install an air vent valve on the discharge line for degassing. See page 23 for detail. Follow the procedure below to conduct degassing if the air vent valve is not available.

1 **Connect a discharge tube and place the tube end in the supply tank or another container.**

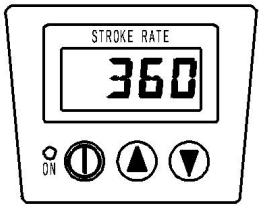
* Remove the check valve from the discharge tube if it is installed.
* When resuming the pump operation after liquid replacement in the supply tank or after a long period of stoppage, the internal pressure may remain in the pump or tubing. Removing the check valve at this state, liquid may gush out. Wrap a waste cloth around the check valve connection for the prevention of gushing.



2 **Turn on power.**

The LED lights and a display related to the current mode appears on the screen.

* The pump enters the wait state in the manual mode when turning on power with a default setting. The pump calls up the last screen at a shutoff if it was not in a default setting.

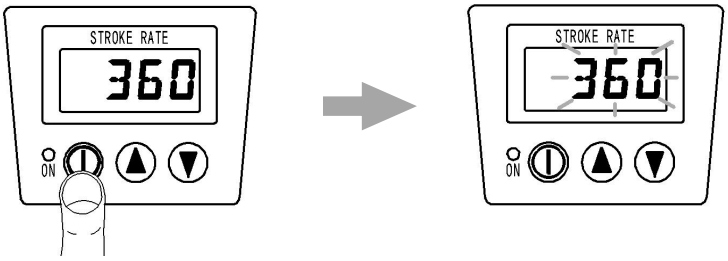


3 **Program the stroke rate to 360spm.**

- This programming is not necessary when the display already shows 360. Move to the next step.
- See page 38 "Flow rate adjustment" for detail.

4 **Push the start/stop key and run the pump for more than ten minutes.**

The LED and spm indication blink during operation.



5 **Push the start/stop key and stop the pump.**

6 **Check that gas has been expelled from the pump head and liquid is pumped. Then reconnect the discharge tube to tubing system.**

7 **Check connections for leakage.**

Degassing has now been completed.

Flow rate adjustment

A flow rate can be adjusted by the stroke rate and stroke length.
The stroke rate is indicated in spm (stroke per minutes).
Stroke rate adjustment is a main way to adjust a flow rate.
Stroke length is the moving distance of the plunger.
A flow rate per shot can be controlled by changing stoke length. The widest moving distance is defined as 100% stroke length.
First adjust the flow rate by stroke rate adjustment. Use stroke length adjustment for the range where stroke rate adjustment can not reach.
Determine a suitable stroke length and stroke rate, taking account of the pump operating condition and liquid characteristics.

The following procedure is recommended.

1 **Change a stroke rate with stroke length 100% to adjust a flow rate.**

- See "Stroke rate adjustment" on page 39 and "Stroke length adjustment" on page 41 for detail.

2 **Measure a flow rate.**

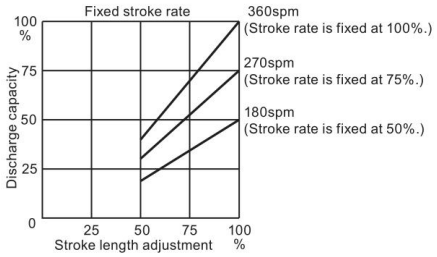
3 **If the flow rate is lower than a specified level, increase the stroke rate and measure the flow again.**

4 **Change the stroke length for fine adjustment.**

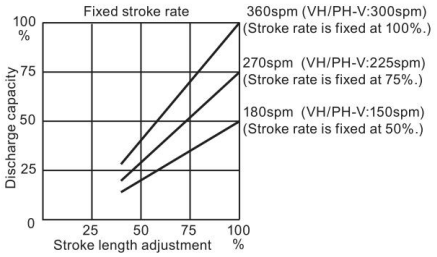
5 **Measure the flow again to see the specified level is obtained.**

Flow rate, stroke rate and stroke length

B type



C type



Precautions of flow rate adjustment

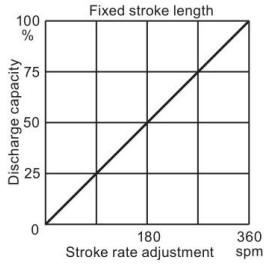
- **When back pressure is high**
  Set stroke length to 100% and adjust the flow by changing a stroke rate.
- **When the flow rate per shot greatly influences the reaction in neutralization or titration application**
  Shorten the stroke length to reduce the flow rate per shot. And then adjust the flow by changing a stroke rate.
- **When pumping gaseous liquid such as sodium hypochlorite (NaClO) and hydrazine solution ($N_2H_2O_2$)**
  Set stroke length to 100% and adjust the flow by changing stroke rate.
  Air lock may occur when stroke length is set short.

■ Stroke rate adjustment

Stroke rate can be set by keypad operation.

The stroke rate can be programmed from 0 to 360spm .

The relation between a flow rate* and stroke rate is shown as below.

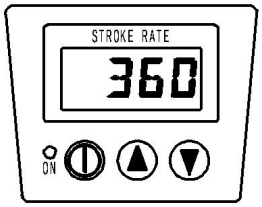


*The flow rate described on the nameplate is at 100%.

1 **Turn on power and call up manual mode.**

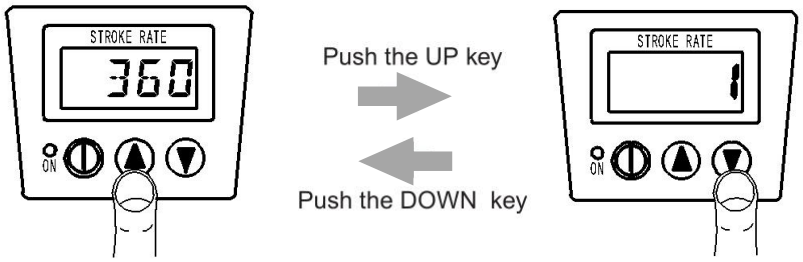
Enter manual mode to indicate spm on the screen.

- Push the EXT key when "EXT" or ".0"-".360" is on the screen.
- When "STOP" or "-STOP" appears on the screen, see "STOP function cancellation" on page 51 and release the STOP function.



2 **Use the UP or DOWN key to adjust stroke rate.**

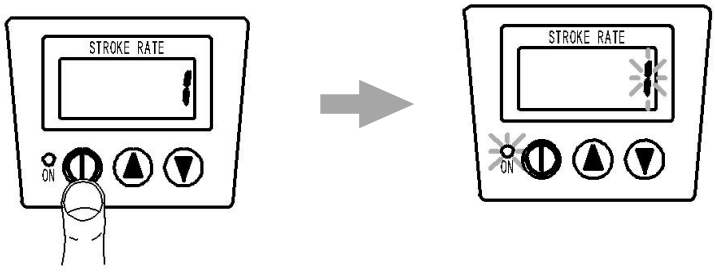
- spm increases/decreases as pushing the UP/DOWN keys.
- Press and hold either key for more than three seconds for quick change. Quick change stops at 1 or 360spm. 1 or 360spm skips to 360 or 1spm when the key is released and pushed again.



3 **Push the start/stop key.**

The LED and spm indication blink as the pump starts to run.

- They blink in sync with the pump operation.

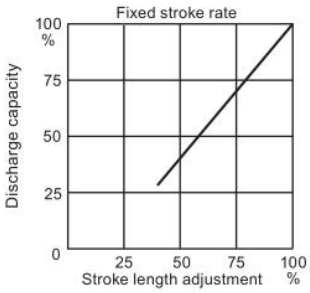


■ **Stroke length adjustment**

Stroke length can be adjusted when the moving distance of the plunger is changed by the stroke length adjusting knob.

The stroke length adjustment range is 50-100% for the B type, 40-100% for C type.

The relation between a flow rate* and stroke length is shown as below.



*The flow rate described on the nameplate is at 100%.

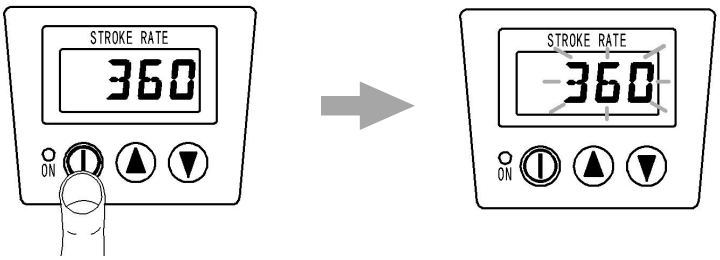
NOTE

Do not rotate the stroke length adjusting knob when the pump is not running.

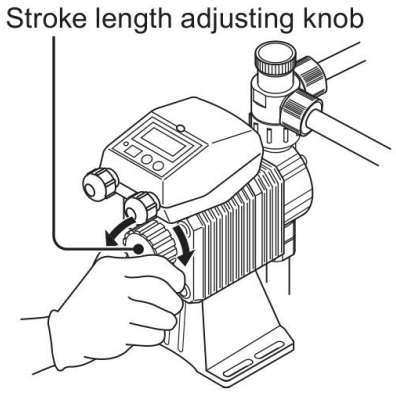
Operation

1 **Turn on power and push the start/stop key to run the pump.**

The LED and spm indication blink during operation.



2 **Rotate the stroke length adjusting knob and adjust a flow rate while the pump is running.**



Before a long period of stoppage (One month or more)

Clean the insides of pump head and tubing.

- Run the pump with clean water for about thirty minutes to rinse the insides of the pump head and tubing.

Before unplugging the pump

- Always stop the pump by key operation. Wait for three seconds before unplugging the pump. Otherwise, the last key operation to stop the pump may not be put in memory. In this case the pump unintentionally starts to run as powered on, discharging liquid.

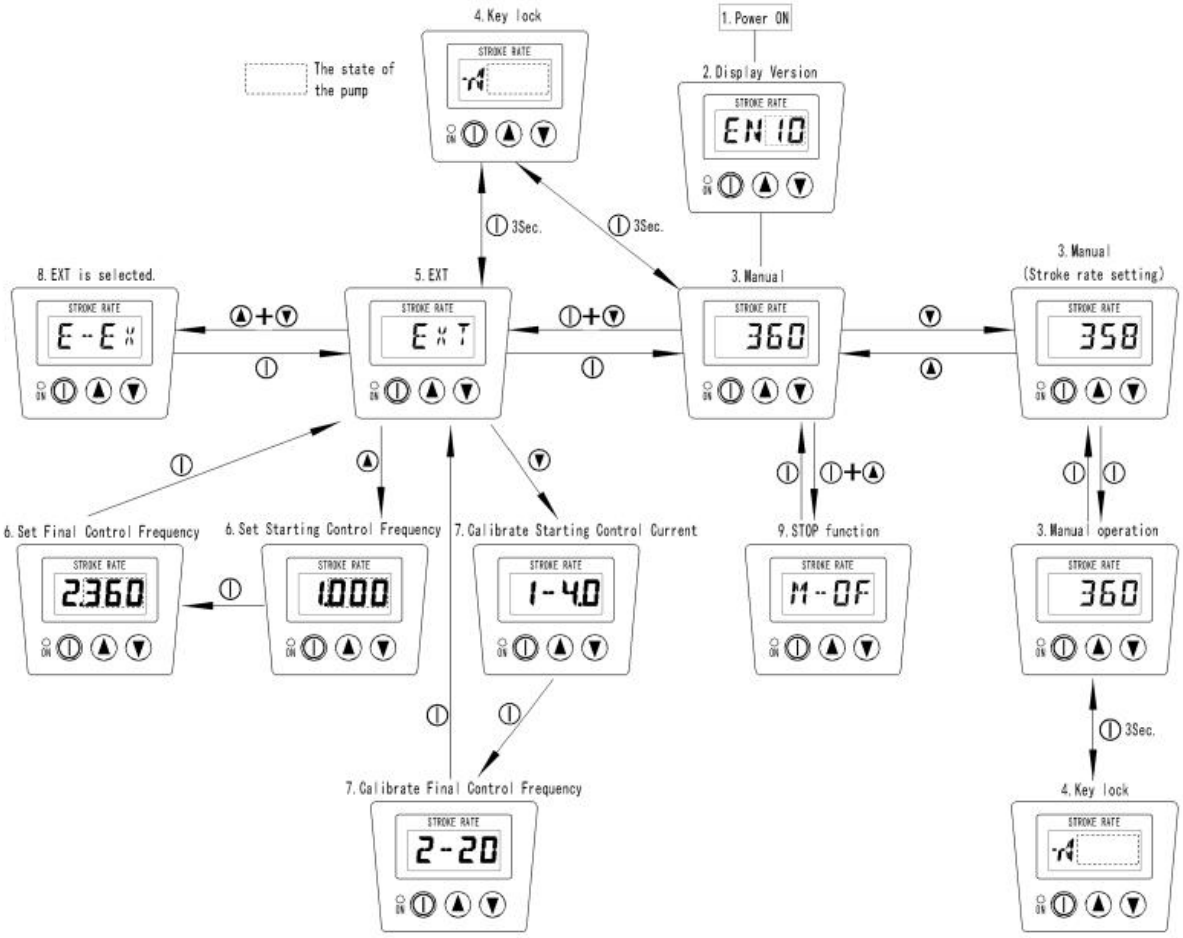
When the pump does not transfer liquid at resuming operation.

- Clean the valve sets, removing foreign matters.
- If gas is in the pump head, expel gas and readjust the flow rate. See "Degassing" on page 33 and "Flow rate adjustment" on page 38 for detail.

Operation programming

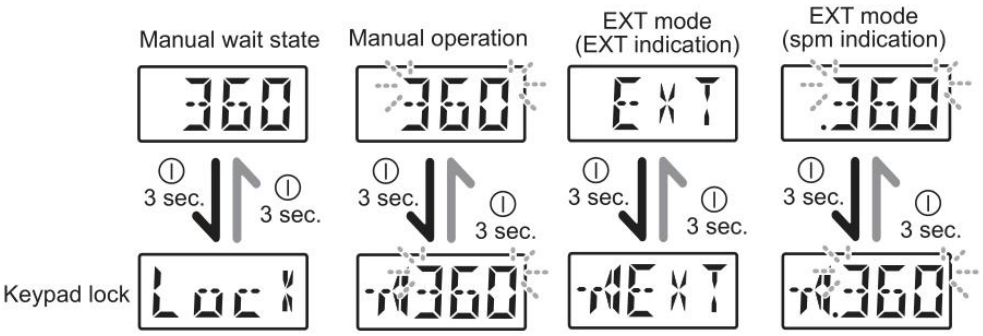
The pump operation is programmed and controlled by a control unit.
The pump is controlled in different ways at each operation mode.

Programming flow



Keypad lock

Key operation is not accepted in the following displays once keypad lock became active.

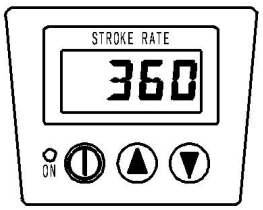


Control unit setting and operation

1

Turn on the power

When you turn on the pump power first time, the program version is briefly displayed, and then present a manual waiting mode. The second and later turn on the power of the pump, showing the mode of power outage last time.

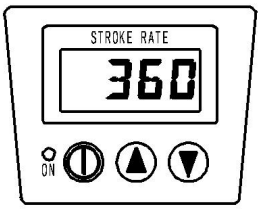


2

Enter manual mode.

If no charge (0 ~ 360) is displayed on the display screen, press the button to enter Manual mode. The display screen shows "EXT", press the ⏻ keys. "STOP" or "-STOP" the display results show that the STOP function has started. First, stop the STOP function.

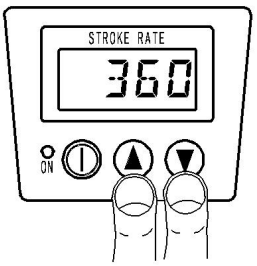
How to cancel the STOP function, see page 51.



3

Set stroke rate.

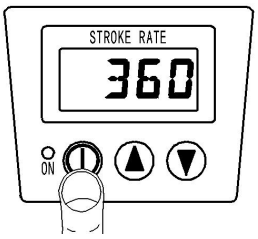
Press▲or▼key to change the stroke shows in the display screen. If it is held continuously▲or▼for more than 3 seconds, stroke rate changes rapidly. In this case, the fast digital change stops at 1 or 360spm. Release the button, then press▲or▼ button again, 1 or 360spm skips to 360 or 1spm when the key is released and pushed again.



4

Start / stop of pump .

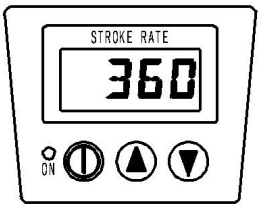
When press ⏻ key one time, pump starts. "ON" indicator light and stroke rate blink. When press the ⏻ button again, the pump stop working. The "ON" indicator stops blink.(When stroke rate slow down, the "ON" indicator blink slowly)



EXT operation

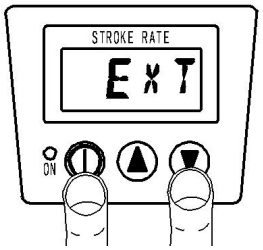
1 **Turn on power.**

When you turn on the pump first time , the program version is briefly displayed, and then present a manual waiting mode. If the pump is in EXT Mode during the last outage, then after the second time, the display shows "EXT", if "STOP" or "-STOP" is displayed, then cancel the turn off function firstly, because now the STOP function is at startup state. How to cancel the STOP function, see page 51.



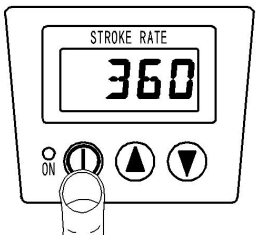
2 **Set EXT operation mode.**

In manual waiting mode, hold ⏻ button,press▼button, then pump into the EXT Mode.When the pump enters the EXT operation mode, it will synchronize with the EXT input signal.



3 **Return to manual mode**

Press ⏻ key returned to a manual waiting mode. The display screen displays stroke rate.



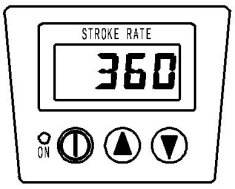
NOTE

- When the pump is in EXT operating mode, the maximum stroke rate is equal to the stroke rate shown in manual operation mode.
- For example, when the manual mode display speed is 200 spm, the EXT Mode of speed to 200 spm, even if the external signal received 360 spm, pump will also work with 200 spm.

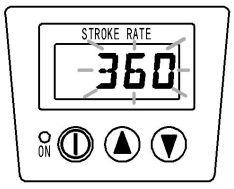
Keypad lock

1 **The state of the pump when keyboard lock can start**

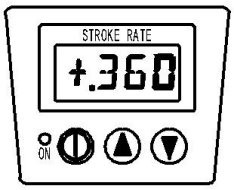
Manual Waiting mode

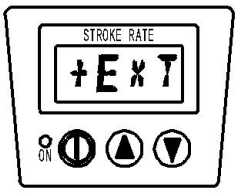


In Manual operation



EXT Mode



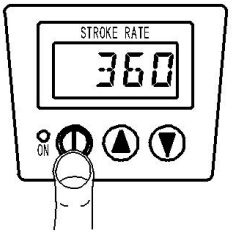


Shows one of the modes that the above keyboard lock can start.

2 **Start the keyboard lock function**

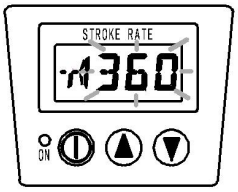
When display any keyboard lock mode(see right figure), press ⏻ key 3 seconds.

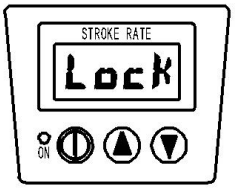
During in Manual operation



During Manual operation mode locking period, the key symbol will be displayed. The monitor displays "Lock" when the mode is manual waiting. The keystroke is invalid.

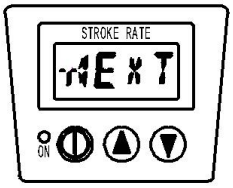
Manual operation mode **Manual Waiting mode**

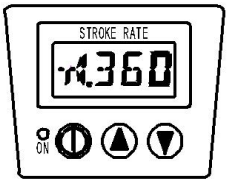




EXT locked mode

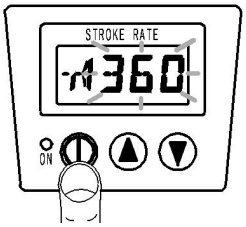
During the EXT locked mode, the key symbol will be displayed. The keystroke is invalid.





3 **Disable keyboard lock function.**

In manual operation mode, when the keyboard lock, press the ⏻ button for 3 seconds.The key symbol disappears, and the keystroke operation takes effect.



NOTE

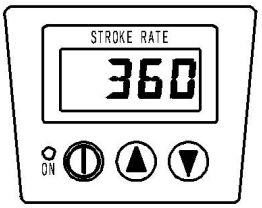
- When keylock is locked, all keystrokes are invalid. If need to stop the pump urgently, turn off the main power supply. When the power is turned on again, the pump reset button is still locked.
- When the pump work under the action of the STOP signal, and the keyboard lock, can press ⏻ key 3 seconds, but the display screen shows the "STOP" or "STOP".If the STOP function is canceled, the STOP function display will become a keylock function display.

Calibrate of electrical signal

1 **Turn on power.**

When you turn on the pump power first time, the program version is briefly displayed, and then present a manual waiting mode. If the pump is in EXT mode during the last outage, then turn on power in the second time, after restart the pump and the pump will be in EXT operation mode, the display screen shows "EXT".

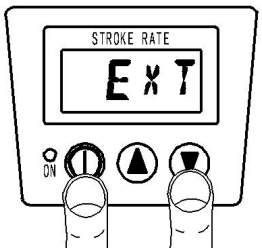
If "STOP" or "-STOP" is displayed, STOP function is at start up state. Firstly cancel the STOP function. How to cancel the STOP function, see page 51.



2 **Into EXT mode.**

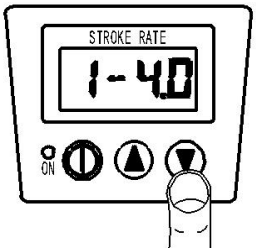
In manual waiting mode, hold ⓘ button, press ▼ button, then pump into the EXT operation mode.

At this stage, if there is no current signal, the screen displays "DISC".



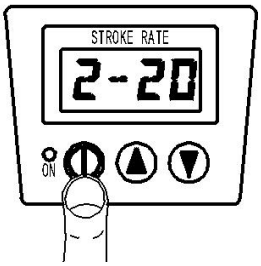
3 **Enter the starting control current signal calibration interface.**

Press ▼ enters the starting control current signal calibration interface. At this time, the external input starting control current signal.



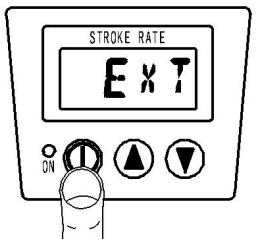
4 **Enter the final control current signal calibration interface.**

Press ⓘ entered the final control current signal calibration interface. At this time external input the final control current signal.



5 **Return to EXT mode**

Press ⓘ into EXT mode.

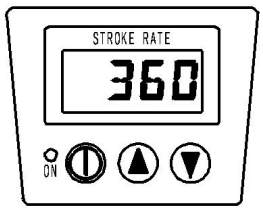


Set starting/final control frequency

1 Turn on power.

When you turn on the pump power first time, the program version is briefly displayed, and then present a manual waiting mode. If the pump is in EXT mode during the last outage, then turn on power in the second time, after restart the pump and the pump will be in EXT operation mode ,the display shows "EXT".

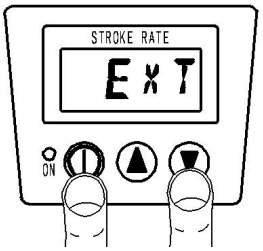
If "STOP" or "-STOP" is displayed, STOP function is at start up state. Firstly cancel the STOP function. How to cancel the STOP function, see page 51.



2 **Into EXT mode.**

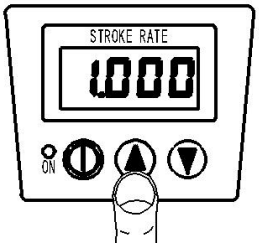
In manual waiting mode, hold ⏻ button, press▼ button, then pump into the EXT operation mode.

At this stage, if there is no current signal, the screen displays "DISC".



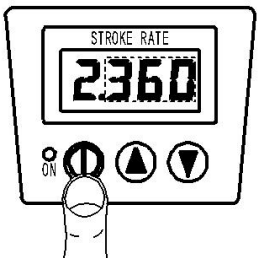
3 **Enter the starting control frequency calibration interface.**

Press▲enters the starting control current signal calibration interface.The original value of the factory is "000", and the starting control frequency is set according to ▲or ▼key.



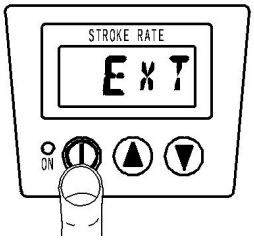
4 **Enter the final control frequency calibration interface.**

Press⏻enters the final control current signal calibration interface.The original value of the factory is "360", and the final control frequency is set according to ▲or ▼key.



5 **Return to EXT mode.**

Press ⏻ into EXT mode.



NOTE

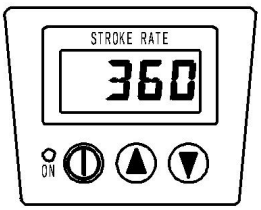
- If the input the starting control frequency value entered in the "1.000" interface is smaller than the final control frequency in the "2.360" interface, it is a direct proportional control; Conversely, it is inversely proportional control.

The EXT operation displays the selection mode

1 **Turn on power.**

When you turn on the pump power first time, the program version is briefly displayed, and then present a manual waiting mode. If the pump is in EXT mode during the last outage, then turn on power in the second time, after restart the pump and the pump will be in EXT operation mode ,the display shows "EXT".

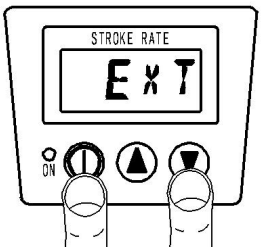
If "STOP" or "-STOP" is displayed, STOP function is at start up state. Firstly cancel the STOP function. How to cancel the STOP function, see page 51.



2 **Into EXT mode.**

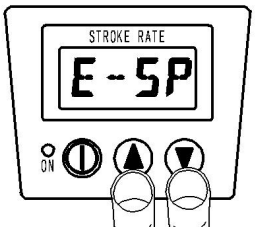
In manual waiting mode, hold ① button, press▼ button, then pump into the EXT operation mode.

At this stage,do not enter any signals at this stage..



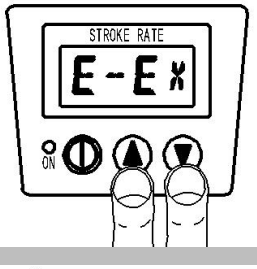
3 Enter the EXT operation ,display choice model

Press the ▲button, then press▼, turn to EXT operation display choice model.



4 Choose "EXT" display or the SPM

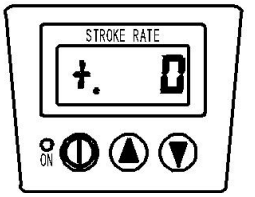
Use▲ or▼ key, in the EXT operation selection mode to select EXT display or SPM display .

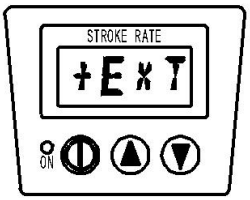


5 Return to EXT mode

Press ① return SPM mode,when choose to show SPM.The right figure "+.0" or "-.0" shows that the "+" is the direct proportion, and the number is accelerated with the increase of the external input signal current;The "-" is the inverse proportional, and the number decreases with the increase of external input signal current.

When choosing EXT display, press ① return EXT mode.The left figure "+EXT" or "-ext" shows that the "+" is the positive ratio, which increases with the increase of external input signal current.Display "-" is the inverse proportion, with the increase of external input signal current decreases.





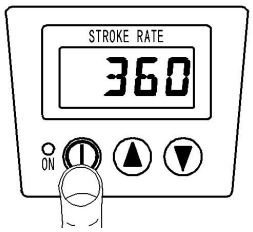
NOTE

- The actual frequency of the pump is reflected by the SPM value displayed on the monitor. It does not reflect the external current signal high or low received.

STOP function setting and relieve

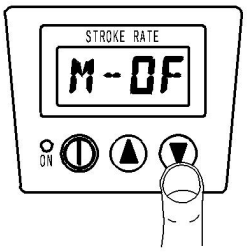
1 **Enter manual waiting mode.**

If pump is in EXT mode, press the ⏻ keys. "STOP" or "-STOP" the display results show that the STOP function has started.



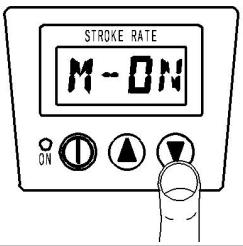
2 **Enter STOP setting display**

In manual waiting mode, press ⏻ key, then press▲ the button, make "M -OF" (factory setting) or "M - ON" displayed on the screen.



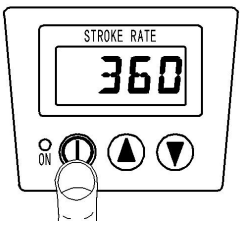
3 **Change STOP Settings.**

Press the button▲or▼key to select "M-OF" or "M-ON".



4 **Determine the STOP set value and return to the manual waiting mode.**

Press ⏻ set to make sure the set point, and then return to manual waiting mode.



NOTE

- M-ON: when the STOP signal is entered, the pump stops.
  M-OFF: when the STOP signal is entered, the pump starts.

Maintenance

This section describes troubleshooting, inspection, wear part replacement, exploded views and specifications.

Important

- Observe instructions in this manual for maintenance, inspection, dismantlement and assembly. Do not dismantle the pump beyond the extent of the instructions.
- Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a work cap during dismantlement, assembly or maintenance work.
- Be sure to turn off power to stop the pump and related devices before work. See below.

Before unplugging the pump

Always stop the pump by key operation. And wait for three seconds before unplugging the pump. Otherwise, the last key operation to stop the pump may not be put in memory. In this case the pump unintentionally starts to run as powered on, discharging liquid.

Troubleshooting

First check the following points. If the following measures do not help removing problems, contact us or your nearest dealer.

States	Possible causes	Solutions
The pump does not run. (LED does not appear. Blank screen.)	Power voltage is too low.	• Recover the power voltage to a normal level. Allowable voltage range:AC100-240V
	The pump is not powered.	• Check the switch if it is installed. • Correct wiring • Replace a breaking wire to new one.
	An electronic circuit in the control unit is failed.	• Replace the control unit.
Liquid can not be sucked up.	Air lock in the pump	• Expel air. See page 33.
	Stroke length is too short.	• Run the pump at 100% stroke length and adjust it to proper length.
	Air ingress through suction line.	• Correct tubing.
	A valve set is installed upside down.	• Reinstall the valve set.
	Valve gaskets are not installed.	• Install valve gaskets.
	Foreign matters are stuck in the pump head valves.	• Dismantle, inspect and clean the valve. Replace as necessary.
	A ball valve is stuck on a valve seat.	• Dismantle, inspect and clean the valve. Replace as necessary.
The flow rate fluctu-ates.	Air stays in the pump head.	• Expel air. See page 33.
	Overfeeding occurs.	• Mount a check valve. See page 24.
	Foreign matters are stuck in the pump head valves.	• Dismantle, inspect and clean the valve. Replace as necessary.
	Diaphragm is broken.	• Replace diaphragm.
	Pressure fluctuates at an injection point.	• Review tubing layout to maintain a pressure constant at an injec-tion point or change an injection point in a constant pressure.

Liquid leaks	Loose fit of the fitting or the air vent body.	• Retighten them.
	Loose fit of the pump head.	• Retighten the pump head. See page 32.
	O rings or valve gaskets are not installed.	• Install O rings and valve gaskets.
	Diaphragm is broken.	• Replace the diaphragm.
	Excessive discharge pressure.	• Check that a discharge line is not closed. • Check if tubing is not clogged.

Inspection

Perform daily inspection and periodic inspection to keep pump performance and safety.

Daily inspection

Check the following points. Upon sensing abnormal condition, stop operation immediately and remove problems according to "Troubleshooting".
When wear parts come to the life limit, replace them by new ones. Contact us or your nearest dealer for detail.

No.	States	Points to be checked	How to check
1	Pumping	• If liquid is pumped.	Flow meter or visual inspection
		• If the suction and discharge pressure are normal.	Check specification.
		• If liquid is deteriorated, crystallized or settled?	Visual or audio inspection
2	Noise and vibration	• If abnormal noise or vibration occurs. They are signs of abnormal operation.	Visual or audio inspection
3	Air ingress from pump head joints and a suction line	• If leakage occurs. • If discharge liquid includes air bubbles, check lines for leakage and retighten as necessary.	Visual or audio inspection

Periodic inspection

Retighten the pump head mounting bolts diagonally according to the following torque.

* Mounting bolts may loosen in operation. How fast the bolts start to loosen is depending on operating conditions.

Tightening torque

Model identification code	Torque	Bolts
EN-B10/15/20,C15/20	2.16 N•m	M4 Hex. socket head bolt
EN-B30	2.55 N•m	M4 Hex. socket head bolt
EN-C30	2.55 N•m	M4 Hex. socket head bolt
EN-C35	2.55 N•m	M4 Hex. socket head bolt

*A hexagon wrench can be used for a torque wrench. See page 33.

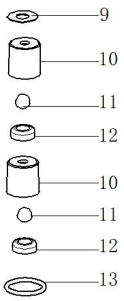
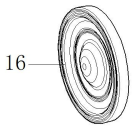
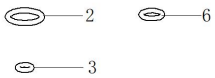
Wear part replacement

For a long operation wear parts need to be replaced periodically.
It is recommended that the following parts are always stocked for immediate replacement. Contact us or your nearest dealer for detail.

Precautions

- When dismantling the pump, pay attention to the residual liquid in the pump.
- Rinse wet ends thoroughly with water.
- Each time the pump head is dismantled, replace the diaphragm, O rings, valve gaskets and valve sets with new ones.

Wear part list

Parts		# of parts	Estimated life
Valve set	VC 	2 sets	8000hours
Diaphragm		1	
O ring	 (except the B-30,-35)	See page 65.	

* Wear part duration varies with the pressure, temperature and characteristics of the liquid.
* The estimated life is calculated based on the continuous operation with ambient clean water.

Before replacement

First release the pressure from the pump.

1 **Stop the pump operation.**

2 **Rotate the adjusting screw two revolutions anticlockwise to open the air vent port.**

NOTE

Do not rotate it three revolutions or more. Otherwise, liquid may comes out from the adjusting screw.

3 **Check that liquid comes out from the air vent port and the internal pressure has been released.**

NOTE

The internal pressure may not be expelled completely as long as liquid does not come out. In this case run the pump until the pressure is released.

** For the EN-30/35, the air vent port is not equipped. Install an air vent valve on a discharge line and release the pressure by opening the valve. See page 23.*

Valve set replacement

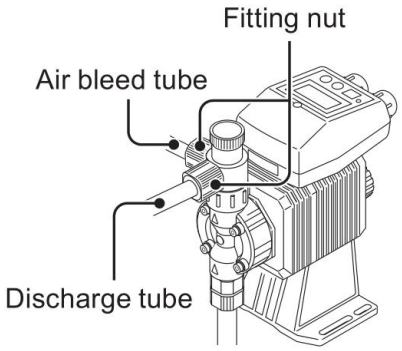
■ **Discharge valve set dismantlement/assembly**

Necessary tools

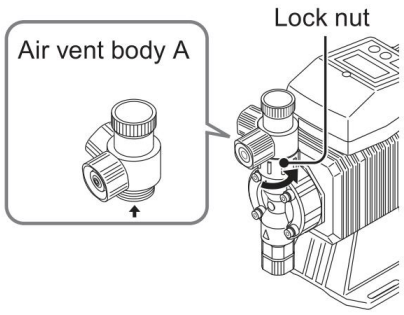
- Adjustable wrench or spanner
- 17mm Box wrench
- A pair of tweezers

**Unfix the pump base before work.*

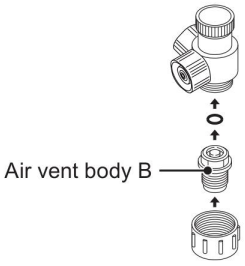
1 **Loosen the fitting nut and remove a discharge tube and an air bleed tube.**



2 **Turn the lock nut anticlockwise by an adjustable wrench and remove the air vent body A.**



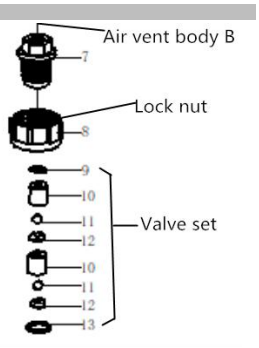
3 **Remove the air vent body B by the 17mm box wrench.**



4 **Pull out the valve set by a pair of tweezers.**

5 **Place a new valve set into the pump head.**
Screw the air vent body B into the pump head through the lock nut.

* Be careful not to misarrange the valve set or misplace upside down. Otherwise, leakage or flow rate reduction may result.
* Do not forget to fit O rings and gaskets.
* Keep the valve set free from dust or foreign matters.

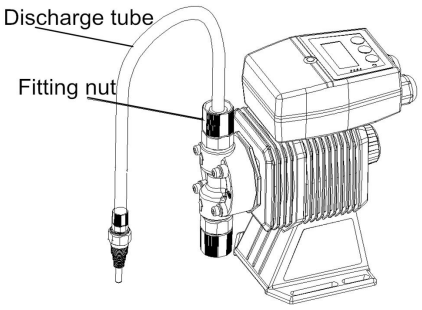


***VC**

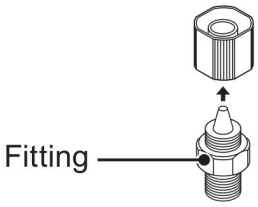
6 **Remount the air vent body A and connect tubes.**

EN-B30/C30/C35

1 **Remove the fitting nut to remove the discharge tube.**



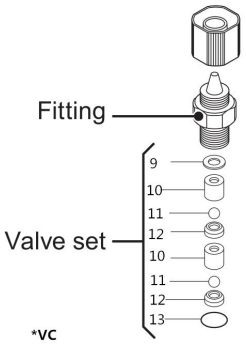
2 **Remove the fitting by an adjustable wrench or a spanner.**



3 **Pull out the valve set by a pair of tweezers.**

4 **Place a new valve set into the pump head. Screw the fitting into the pump head and turn it clock-wise about 90 degrees by an adjustable wrench or a spanner.**

* Be careful not to misarrange the valve set or misplace upside down. Otherwise, leakage or flow rate reduction may result.
* Do not forget to fit O rings and gaskets.
* Keep the valve set free from dust or foreign matters.



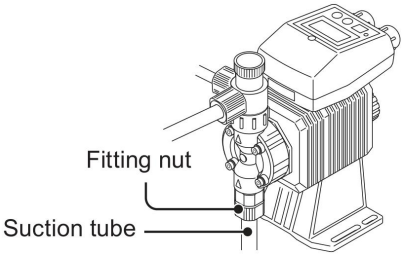
5 **Reconnect the discharge tube.**

■ **Suction valve set dismantlement/assembly**

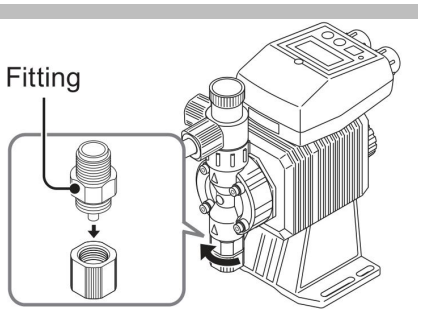
NOTE

Be careful not to drop the valve set.

1 **Remove the fitting nut to remove the suction tube.**



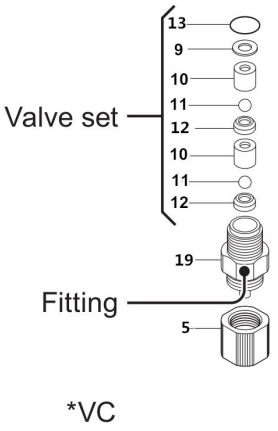
2 **Remove the fitting by an adjustable wrench or a spanner.**



3 **Pull out the valve set by a pair of tweezers.**

4 **Screw the fitting into the pump head with the valve set in it and turn it anticlockwise about 90 degrees by an adjustable wrench or a spanner.**

* Be careful not to misarrange the valve set or misplace upside down. Otherwise, leakage or flow rate reduction may result.
* Do not forget to fit O rings and gaskets.
* Keep the valve set free from dust or foreign matters.



*VC

5 **Reconnect the suction tube.**

Diaphragm replacement

Necessary tools

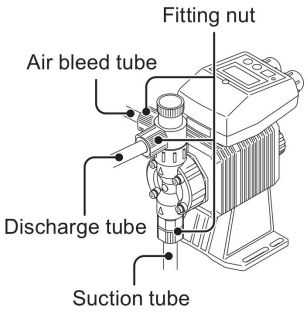
- Adjustable wrench or spanner
- Hexagon wrench
- Torque wrench

NOTE

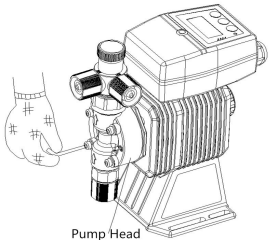
Pay attention not to lose diaphragm spacers. Always apply a proper number of diaphragm spacers. 0 or a few diaphragm spacers are inserted between the retainer and plunger for the adjustment of diaphragm location. Note that the number of diaphragm spacers varies with pump model. Some pumps may use no spacer.

1 **Run the pump and set the stroke length to 0%. Then stop the pump.**

2 **Loosen the fitting nuts and remove a suction tube, a discharge tube and an air bleed tube.**

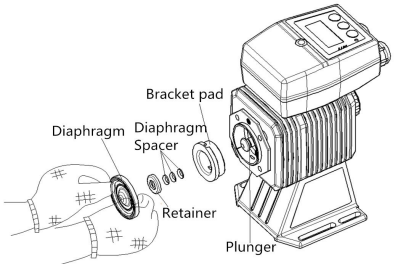


3 **Remove the pump head by a hexagon wrench.**



4 **Rotate and remove the diaphragm from the plunger (pump shaft).**

5 **Set a retainer and diaphragm spacer(s) on the diaphragm screw.**



NOTE

- Fit the retainer to the diaphragm with its round edge to the diaphragm.
- Check that the bracket spacer is in place. Refit the bracket spacer into the bracket, combining mating parts as necessary.

6 **Screw the diaphragm all the way seated in the plunger.**

7 **Run the pump and set the stroke length to 100%. Then stop the pump.**

8 **Mount the pump head.**

Tighten the pump head fixing bolts diagonally and evenly.

Tightening torque

Model identification code	Torque	Bolts
EN-B10/15/20, C15/20	2.16 N•m	M4 Hex. socket head bolt
EN-B30	2.55 N•m	M4 Hex. socket head bolt
EN-C30	2.55 N•m	M4 Hex. socket head bolt
EN-C35	2.55 N•m	M4 Hex. socket head bolt

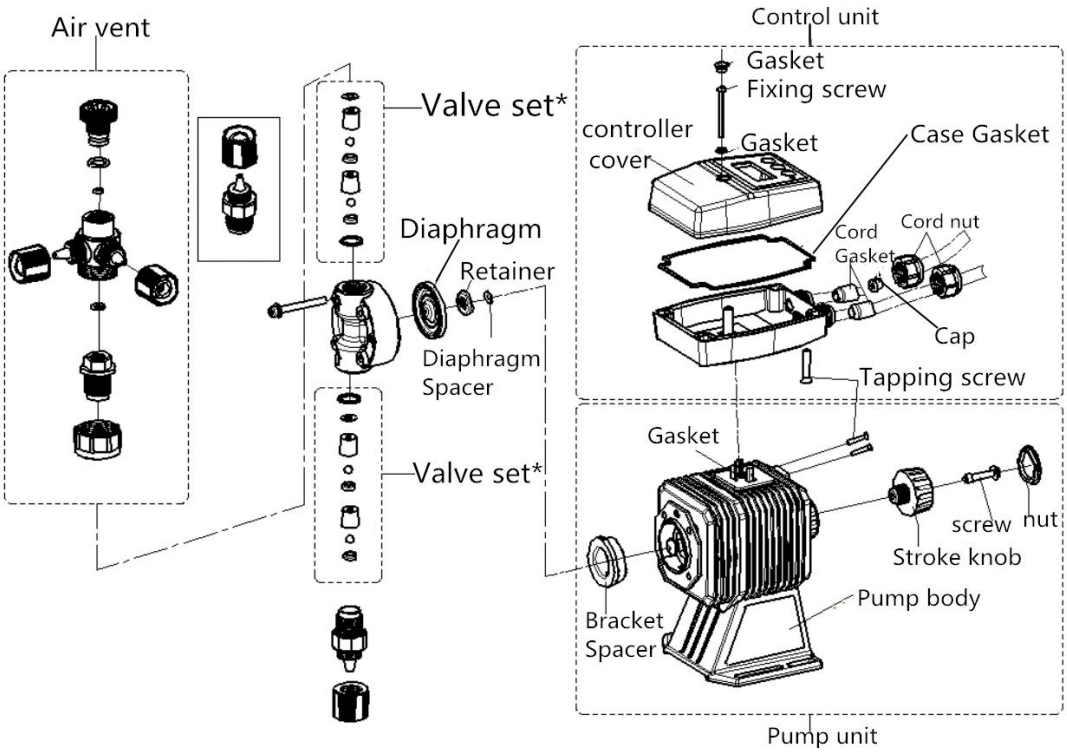
*A hexagon wrench can be used for a torque wrench. See page 33.

Exploded view

Pump head, Drive unit & Control unit

The pump in the diagram below is completely dismantled. Do not dismantle the pump beyond the extent shown in this instruction manual.

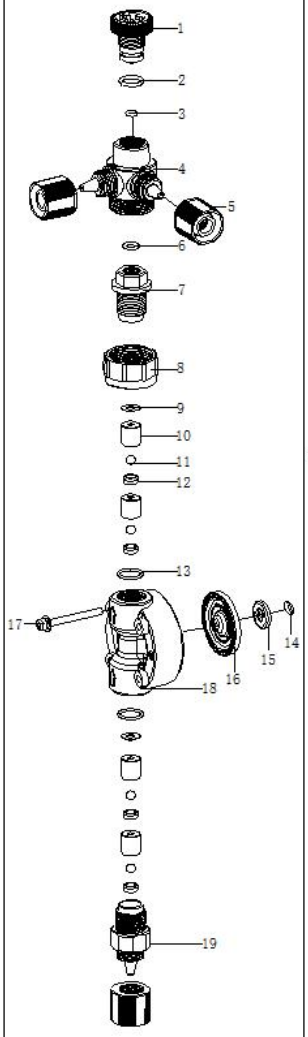
EN-10/15/20 EN-30/35



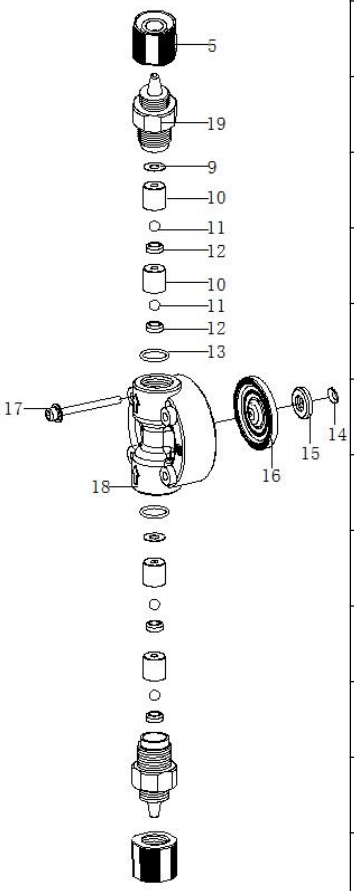
* Flow end materials and their sizes differ with models. See "Valve set replacement" on page 57 for detail.

Pump head

•EN-B10/15/20,C15/20



•EN-B30,C30/35



Parts List

Item	Part names	EN-B10/15 /20,C15/20	EN-B30, C30/35
1	Adjusting screw	1	（无）
2	O ring	1	（无）
3	O ring	1	（无）
4	Air vent body A	1	（无）
5	Fitting nut	3	2
6	O ring	1	（无）
7	Air vent body B	1	（无）
8	Lock nut	1	（无）
9	Valve gasket	2	2
10	Valve guide	4	4
11	Valve ball	4	4
12	Valve seat	4	4
13	O ring	2	2
14	Diaphragm spacer	（1）	（1）
15	Retainer	1	1
16	Diaphragm	1	1
17	Hex. socket head bolt [PW•SW]	4	4
18	Pump head	1	1
19	Fitting	1	2

Specification/Outer dimension

Specification

Specifications and apparent condition are subject to change without notice.

■ Pump unit

VC

Model code	Discharge amount mℓ/min	Discharge amount of each stroke mℓ/shot	Discharge pressure MPa	Stroke rate spm	Tube connec-tion bore mm	Power consumption W
EN-B10	38	0.05～0.11	1.0	0 - 360	ø4×9	20
EN-B15	65	0.09～0.18	0.7			
EN-B20	95	0.13～0.26	0.4			
EN-B30	200	0.28～0.56	0.2		ø8×13	
EN-C15	80	0.09～0.22	1.0		ø4×9	24
EN-C20	130	0.14～0.36	0.7			
EN-C30	270	0.30～0.75	0.35		ø8×13	
EN-C35	400	0.44～1.11	0.2			

1. The performance of the pump is obtained by clean water under a rated voltage and ambient temperature.
2. The above parameters are measured with clean water. The discharge amount increases when discharge pressure decreases.
3. Allowable ambient temperature: 0～40° C
4. Allowable liquid temperature: 0～40° C
5. Allowable voltage deviation: ±10% of the rated voltage

1) The allowable voltage range of special circumstances, such as the transmission of slurry, please consult us.

2) Due to product improvement, the product specifications may change without prior notice.

■ Control unit

Operation mode	Mode	Manual
		EXT (According to the current and setting the direct / inverse proportion operation)
	Switch	Key operation
Stroke rate	Setting range	0～360spm
	Setting method	UP or DOWN key
	Storage function memory function	Non-volatile memory
STOP Input	M-OF	The pump runs during contact input.
	M-ON	The pump stops during contact input.
	Input signal	No-voltage contact or open collector* 1
EXT Input	Upper limit frequency	According to the setting final control frequency value
	Pump control	Calibrate the external starting control current to set the starting control or final control frequency. Calibrate the external final control current to set the starting control or final control frequency. Work(direct proportion or inverse proportion) according to the external input signal.
	Input signal	0～20mA. DC(1-5V.DC)
	Operating frequency programmable range	0～360spm
Indicator	Numeric indication	4-digit LCD
	Operation	Green LED (Blinks at each shot)
Power voltage		AC100-240V 50/60Hz* 2

*1 The maximum applied voltage to the contact is 12V at 5mA. When using a contact type relay, the minimum application load should be 5mA or below.

*2 Observe the specified power voltage range. Otherwise failure may result. The allow-able voltage range is AC100-240V.

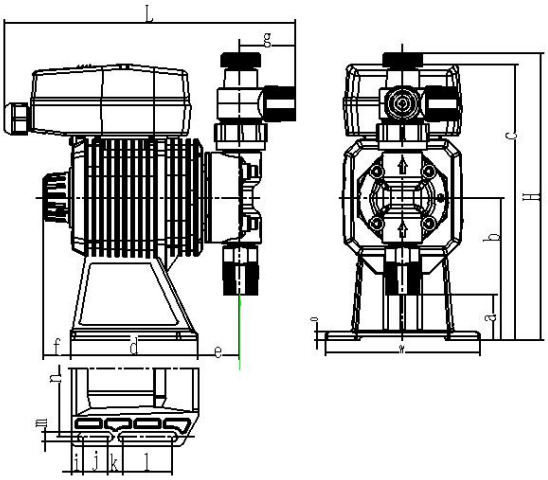
Accessories *Unit (mm)*

■ **Check valve**

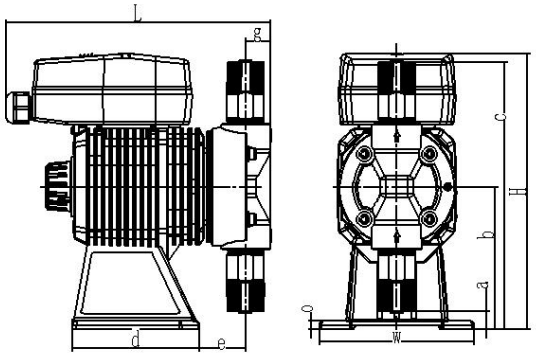
Model	Pipe joint(mm)		Material		Applied pump model
	Suction port	Discharge port	Valve	O-ring	
CA-11	ø4×9	R1/2 R3/8	PVC	FKM	B10/B15/B20/C15/C20
CA-12				EPDM	
CA-21	ø8×13			FKM	B30/C30/C35
CA-22				EPDM	

Outer dimensions

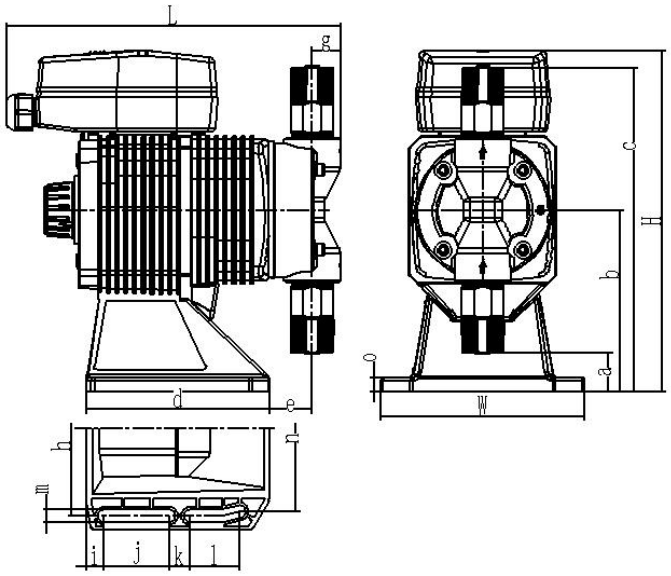
- EN-B10/15/20



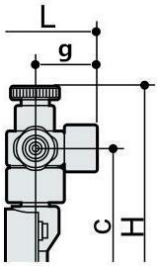
- EN-B30



- EN-C30/35



- EN-C15/20



Model	W	H	L	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
EN-B10/15/20	100	185	186	29	92	153	82	28	18	36	88	7	16	10	32	6.2	88	5
EN-B30	100	178	172	11	92	173	82	30	18	16	88	7	16	10	32	6.2	88	5
EN-C15/20	116	196	207	40	103	164	104	22	24	36	100	10	37	12	28	7	95	8
EN-C30/35	116	194	190	22	103	184	104	24	24	16.5	100	10	37	8.5	27	7	95	8

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Ver.: EN-M-2024/A