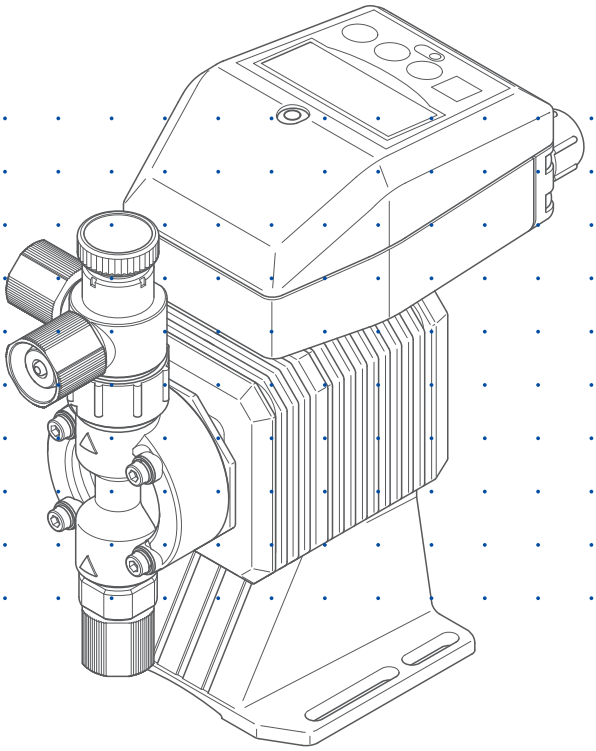
IWAKI PUMPS

Iwaki
Electromagnetic Metering Pump

EHN-YN



Instruction manual

Thank you for choosing our product.

⚠ Please read through this instruction manual before use.

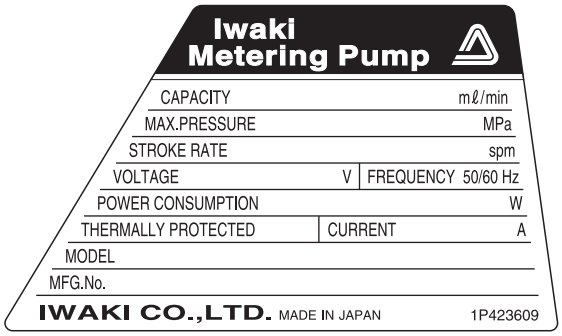
This instruction manual describes important precautions and instructions for the product. Always keep it on hand for quick reference.

Order confirmation

Open the package and check that the product conforms to your order. If any problem or inconsistency is found, immediately contact your distributor.

a. Check if the delivery is correct.

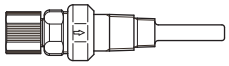
Check the nameplate to see if the information such as model codes, discharge capacity, discharge pressure and power voltage are as ordered.



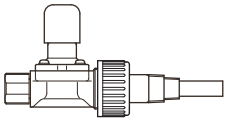
b. Check accessories are complete.

• A check valve or a back pressure valve
*The attached check valve and back pressure valve vary with pump models. See page 73 for accessory list.

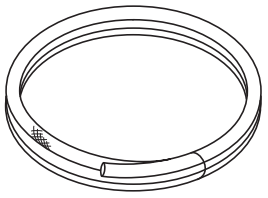
Check valve



Back pressure valve



• A 3m PVC braided tube (ø4×ø9 or ø8×ø13)
*ø4×ø9 or ø8×ø13 EVA tube is attached to the PP type.
*No tube is attached to all the FC and SH types.



c. Check if the delivery is damaged or deformed.

Check for transit damage and loose bolts.

Contents

Safety instructions

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

■ Symbols

In this instruction manual, the degree of risk caused by incorrect use noted with the following symbols. Please pay attention to the information associated with the symbols.

⚠ WARNING	**Indicates mishandling could lead to a fatal or serious accident.**
⚠ CAUTION	**Indicates mishandling could lead to personal injury or property damage.**

A symbol accompanies each precaution, suggesting the use of "Caution", "Prohibited actions" and specific "Requirement".

Caution marks


Caution


Electrical shock

Prohibition mark


Prohibited


Do not rework or alter

Requirement mark


Requirement


Wear protection


Grounding

⚠ Export restrictions

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control.
Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

⚠WARNINGS


Electrical shock

Turn off power before service

Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.


Requirement

Stop operation

If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.


Prohibited

Do not use the pump in any condition other than its intended purpose

The use of the pump in any conditions other than those clearly specified may result in failure or injury. Use this product in specified conditions only.


Do not remodel

Do not modify the pump

Alterations to the pump carries a high degree of risk. It is not the manufacturer's responsibility for any failure or injury resulting from alterations to the pump.


Wear protectors

Wear protective clothing

Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to MSDS precautions from the solution supplier.


Prohibited

Do not damage the power cable

Do not pull, knot or crush the power cable. Damage to the power cable could lead to a fire or electrical shock if cut or broken.


Prohibited

Do not operate the pump in a flammable atmosphere

Do not place explosive or flammable material near the pump.

⚠ CAUTIONS


Requirement

Qualified personnel only

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


Prohibited

Use specified power only

Do not apply power other than that specified on the nameplate. Otherwise, failure or fire may result. Ensure the pump is properly grounded.


Caution

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 runs dry for a long period (for more than 30 minutes), the pump head and the valve cases may deform by friction heat and consequently leakage results.


Prohibited

Keep electric parts and wiring dry

Risk of fire or electric shock. Install the pump where it can be kept dry.


Caution

Ventilation

Fumes or vapours can be hazardous with certain solutions. Ensure proper ventilation at the operation site.


Prohibited

Do not install/store the pump:

- In a flammable atmosphere.
- in a dusty/humid environment.
- Where ambient temperature can exceed 0-40ºC.
- In direct sunlight or wind & rain.


Requirement

Spill precautions

Ensure protection and containment of solution in the event of plumbing or pump damage (secondary containment).


Prohibited

Do not use the pump in a wet location

The pump is not waterproof. Use of the pump in wet or extremely humid locations could lead to electric shock or short circuit.


Grounding

Grounding

Risk of electrical shock! Always properly ground the pump. Conform to local electric codes.


Electrical shock

Install a GFCI (earth leakage breaker)

An electrical failure of the pump may adversely affect other devices on the same line. Purchase and install an earth leakage breaker separately.


Requirement

Preventative maintenance

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


Prohibited

Do not use a damaged pump

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


Requirement

Disposal of a used pump

Dispose of any used or damaged pump in accordance with local rules and regulations. If necessary, consult a licensed industrial waste disposal company.


Caution

Check the pump head bolts

Liquid may leak if any of pump head bolts become loose. Tighten the bolts evenly to the specified torque below in diagonal order before initial operation and at regular intervals.

Tightening torque

EHN-B11/-B16/-B21/-C16/-C21 : 2.16 N•m
EHN-B31/-C31/-C36 : 2.55 N•m


Requirement

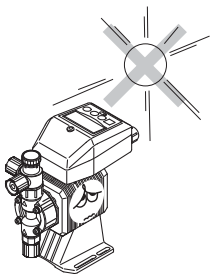
Install a relief valve

Install a relief valve on a discharge line near the pump so as to automatically release the discharge pressure when it exceeds the maximum level.

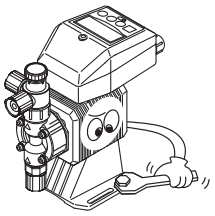
Precautions for use

- Electrical work should be performed by a qualified electrician. Otherwise, personal injury or property damage may result.

- Do not install the pump:
  –In a flammable atmosphere.
  –In a dusty/humid place.
  –In direct sunlight or wind & rain.
  –Where ambient temperature can exceed 40ºC or falls below 0ºC.
  Protect the pump with a cover when installing it out of doors.



- Select a level location, free from vibration, that won't hold liquid. Anchor the pump with four M5 bolts so it doesn't vibrate. If the pump is installed level, output may be affected.



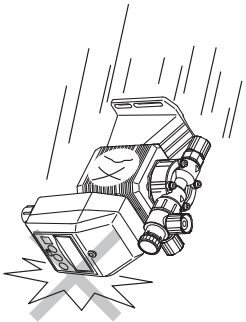
- When two or more pumps are installed together, vibration may be significant, resulting in poor performance or failure. Select a solid foundation (concrete) and fasten anchor bolts securely to prevent vibration during operation.

- Allow sufficient space around the pump for easy access and maintenance.

- Install the pump as close to the supply tank as possible.

- When handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution), install the pump in a cool and dark place. Flooded suction installation is strongly recommended.

- Use care handling the pump. Do not drop. An impact may affect pump performance. Do not use a pump that has been damaged to avoid the risk of electrical damage or shock.



- The pump has a rating of IP65, but is not waterproof. Do not operate the pump while wet with solution or water. Failure or injury may result. Immediately dry off the pump if it gets wet.

- Do not close discharge line during operation. Solution may leak or tubing may break. Install a relief valve to ensure safety and prevent damaged plumbing.

- Do not remove the control unit. Note that an applicable control unit differs with each drive unit. Do not attach a control unit to a different drive unit. Otherwise, an electrical circuit or the drive unit may fail.

- Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.

- Wear protective clothing when handling or working with pumps. Consult solution MSDS for appropriate precautions. Do not come into contact with residual solution.

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

Pump characteristics, features and part names are described in this section.

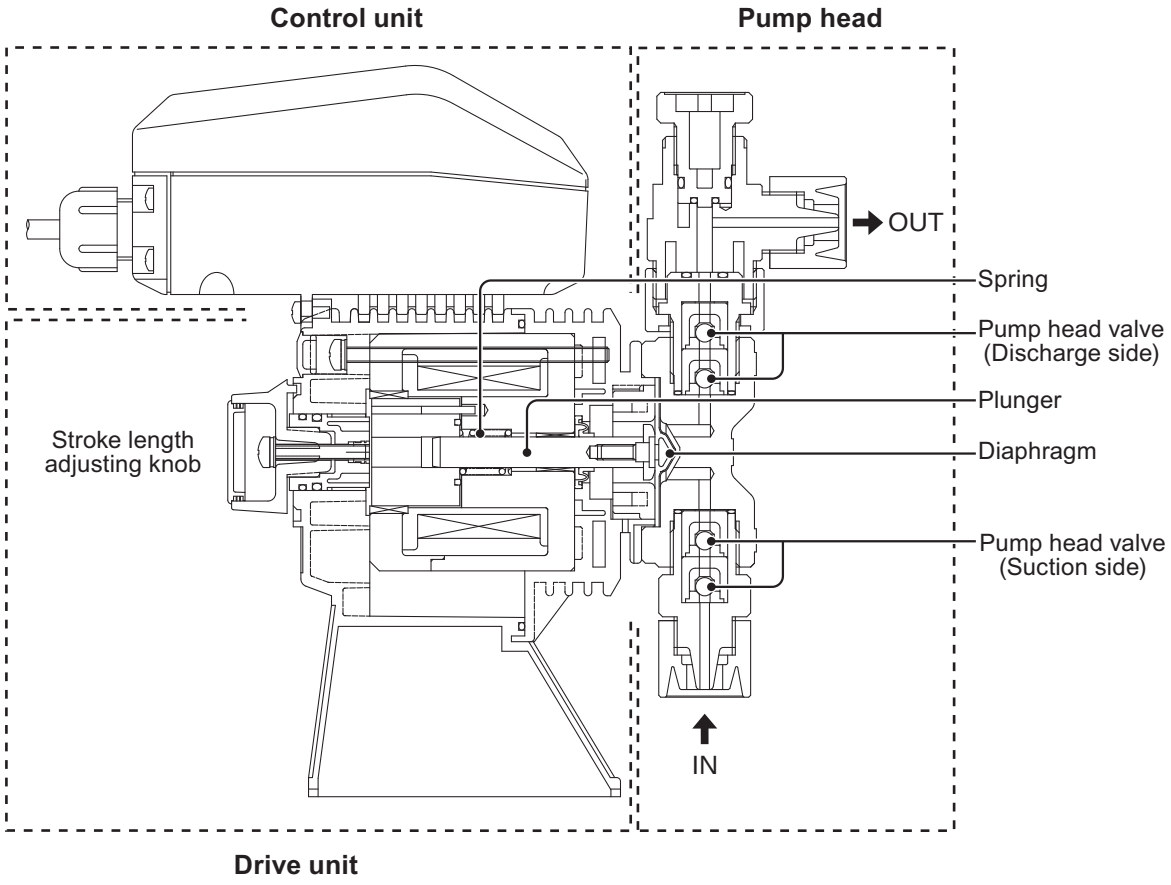
Introduction

Pump structure & Operating principle

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

Principle of operation

Electromagnetic force and spring force 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 operation

The EHN series is a multivoltage type (100-240VAC) and can be selected without concern for local power voltage.

● High turndown ratio

Offers a digitally-controlled range of 1-360 (1spm resolution).

● IP rating of 66

The sealed drive unit and control unit assure IP66.

*This pump is not water resistant. Protect the pump with a cover when installing it out of doors.

● External control

External signals through an analogue and a digital input can control operation. Use the analogue input to make proportional control and the digital input to run the pump with a multiplier or a divisor.

● Auto degassing system (Auto degassing type)

Enables gaseous liquid delivery, expelling gas to open air to prevent gas lock in the pump head.

● Auto restoration (FCM type)

The pump starts to run at a full speed (360spm) once a flow checker detects gas lock in the pump head.

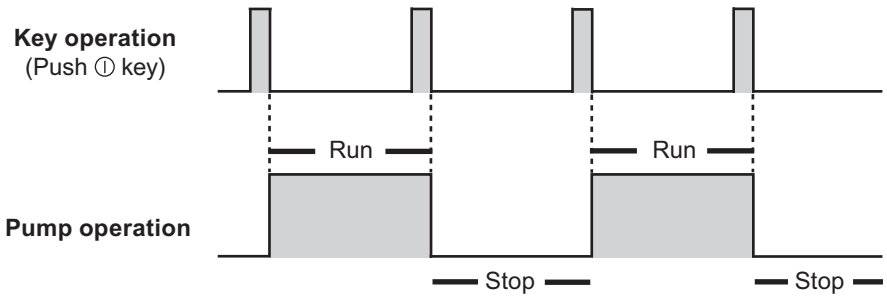
*The pump stops when having failed to resolve gas lock.

*The XFCM type flow checker can not be connected to the EHN-YN. Connect it to an external controller to make feed-back control.

Operational function

Manual mode

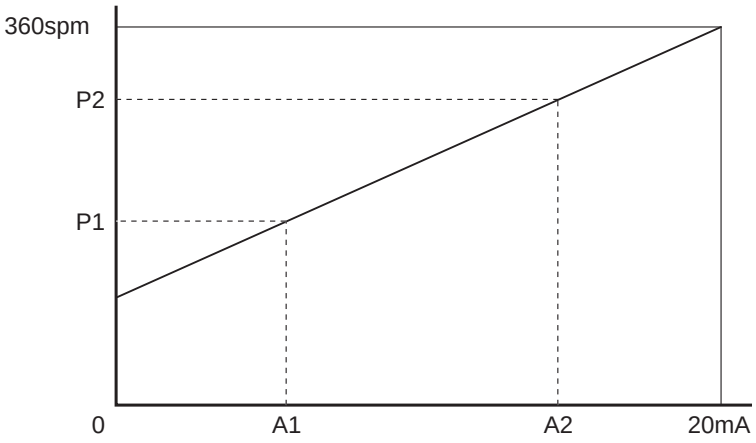
Run/stop the pump by the start/stop key. A stroke rate (MAN speed) can be changed in the range of 1-360spm by the up and the down keys at any time during operation or stop. See page 42 for detail.



EXT mode

■ Proportional control (Analogue control : See page 42)

The pump increases/decreases a stroke rate in the range of 0-360spm in proportion to 0-20mA.
Setting two points can draw a straight line. Depending on the position of the two points, 0spm may not come at 0mA or a stroke rate may go over 360spm (The maximum stroke rate is 360spm and the pump does not exceed that rate.).



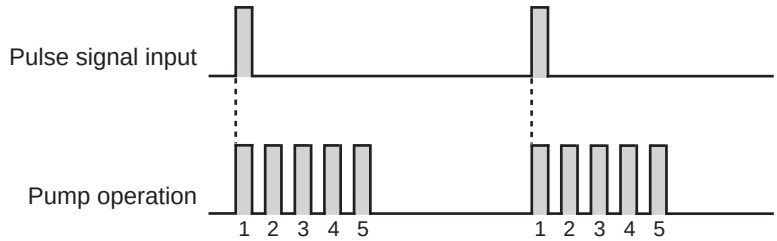
Conditions
a. A1 and A2 must be 20mA or below
b. P1 and P2 must be 360spm or below
c. A1 and A2 must be different mA
d. P1 and P2 must be different spm

■ Multiplier programming (Digital control : See page 44)

The pump operation by the external signal. Program a multiplier before operation. 1-999 shots can be allocated to one pulse signal. See page 44 for detail.

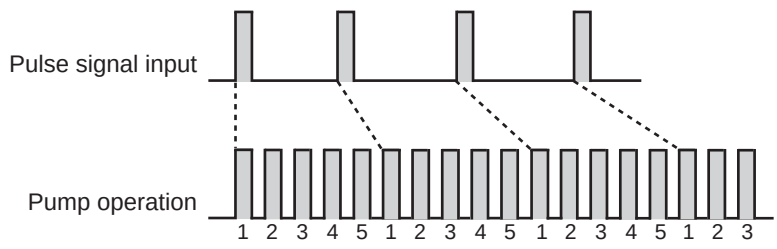
*In the EXT operation, the pump runs at a MAN speed.
*The pump makes one shot per pulse when a multiplier is programmed to 1.

Example) When the multiplier is programmed to 5, the pump makes five shots per signal.



A buffer works when the pump receives an external signal before the programmed shots per signal is completed.

*The buffer stores up to 255 pulses.



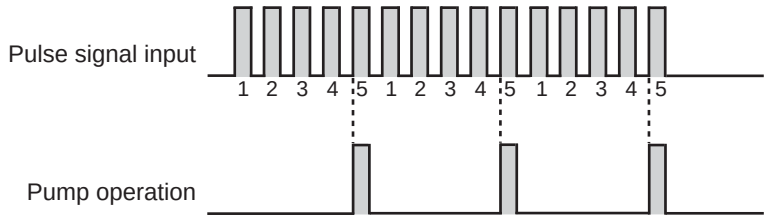
■ Divisor programming (Digital control : See page 46)

The pump operation by the external signal. Program a divisor before operation. 1-999 pulse signals can be allocated to make one shot.

*The pump can not run over a MAN speed even if a divisor is set to run the pump beyond that speed.

*The pump makes one shot per pulse when a divisor is programmed to 1.

Example) When a divisor is programmed to 5, the pump makes one shot every 5 signals.



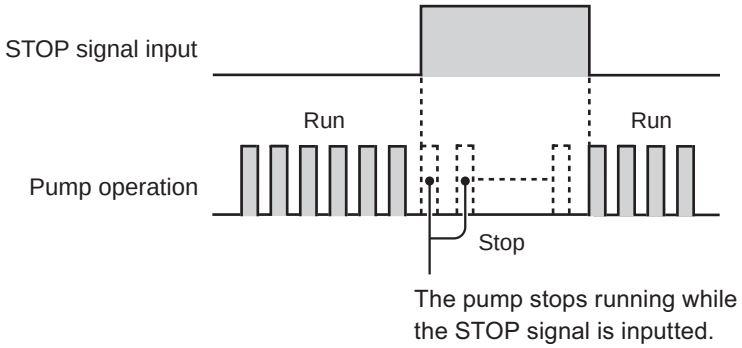
■ STOP function (See 48 page)

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 stops while receiving the STOP signal.

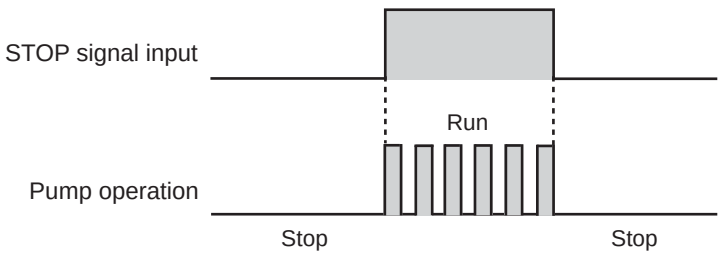
*The pump resumes operation when the stop signal is released.



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

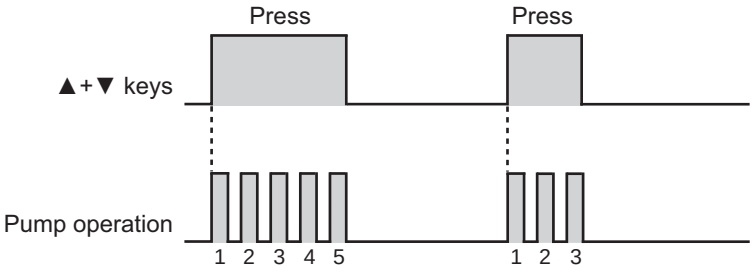
The pump runs while receiving the STOP signal.

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



■ Priming function (See page 49)

The pump runs at the maximum stroke rate while both the UP and DOWN keys are pressed. Use this function for priming or degassing.



■ Auto restoration (FCM type : See page 50)

The pump starts to run at a full speed (360spm) once a flow checker detects gas lock in the pump head. Program the following time periods before operation.

Pre-Alarm time programming

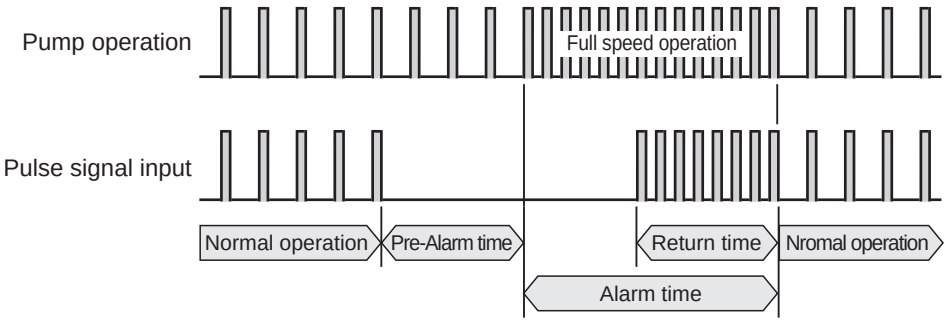
Set a time period from the detection of gas lock to the start of full speed operation. The pump keeps running along with setting during this period.

Alarm time programming

Set a time period of the full speed operation. The pump stops when having failed to resolve gas lock in this period.

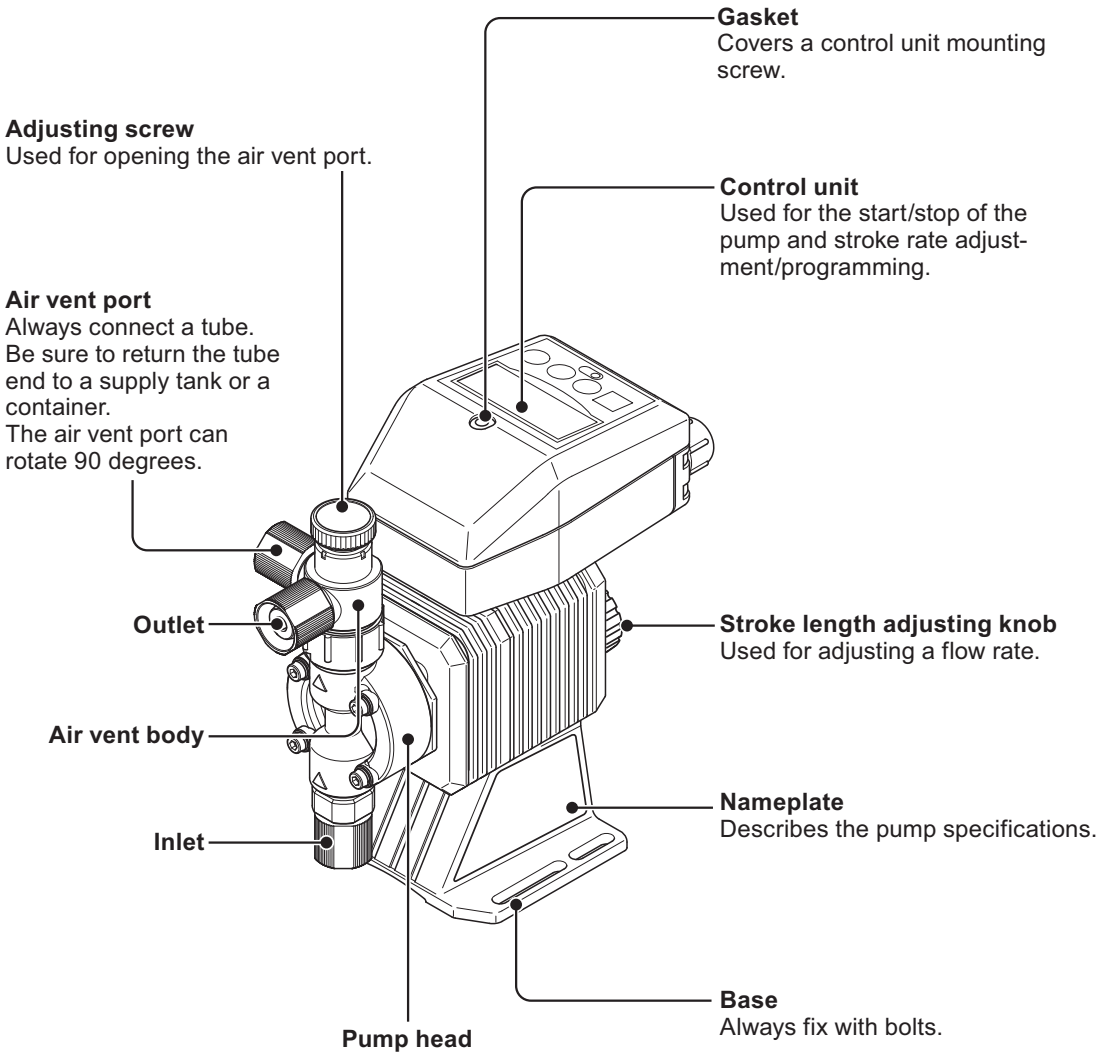
Return time programming

Set a time period from the resolution of gas lock to the resumption of set operation. The pump keeps running at the full speed during this period.



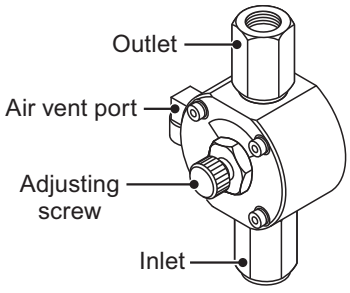
Part names

Pump

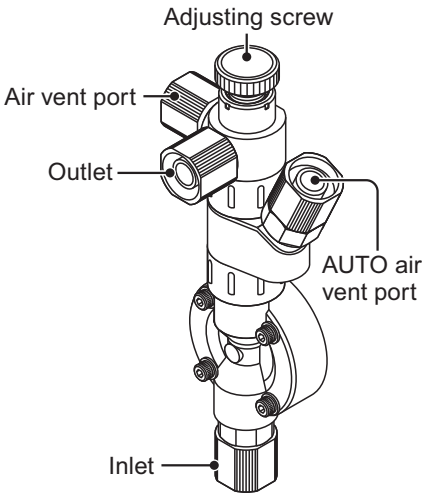


Pump heads

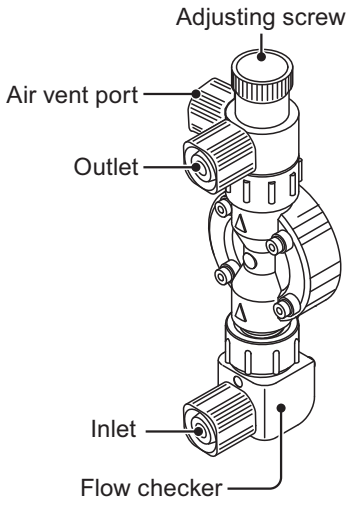
SH type

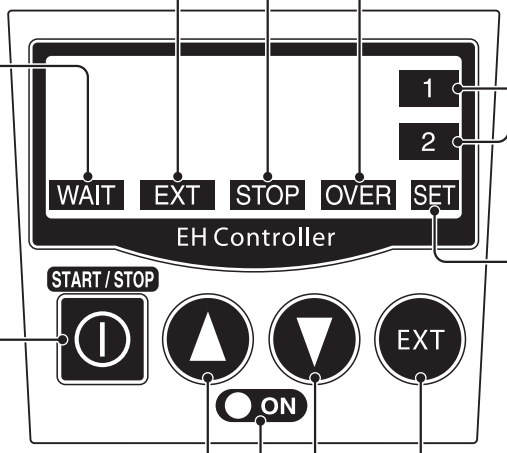


AUTO degassing type



FCM/XFCM type





STOP
Lights as the pump stops running by the STOP signal.

EXT
Lights during EXT operation.

WAIT
Lights during a wait state.

START/STOP key
Used for starting/stopping operation or entering a setting.

UP key
Used for increasing numeric values or scrolling up options.
Push this key while pressing the EXT key to call up the Analogue/ Digital selection mode.

ON LED
Lights as turning on power and flashes at each stroke.

DOWN key
Used for decreasing numeric values or scrolling down options.
Push this key while pressing the EXT key to program the EXT mode.

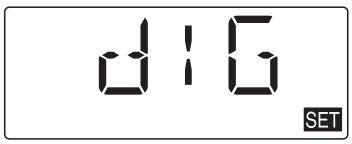
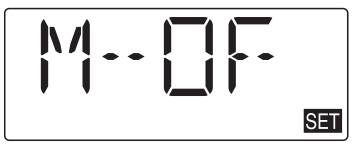
OVER
Lights when the pump is set to run over 360spm through an EXT mode.

Set point 1 and 2
Lights when set point 1 and 2 are being set for analogue control.

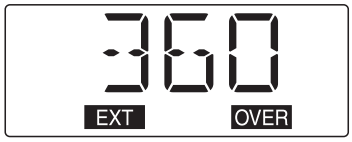
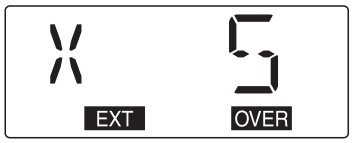
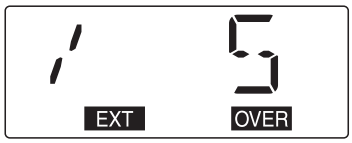
SET
Appears at the Analogue/ Digital selection mode or in the EXT mode programming.

EXT key
Used for starting EXT operation.

■ Basic displays

Display	States
	Manual mode. The pump is running at 360spm.
	A waiting state. "WAIT" indication appears. Numerical value shows a MAN speed.
	EXT mode with a multiplier 5. The pump is making five shots per signal.
	EXT mode with a divisor 5. The pump is making one short per 5-signal.
	EXT mode with analogue signals. The pump is running at 120spm.
	Analogue control is selected to EXT mode.
	Digital control is selected to EXT mode.
	Analogue control is being set.
	Digital control is being set.
	M-OF or M-ON is being set for STOP function. An input of STOP signal stops operation with the left choice (M-OF).

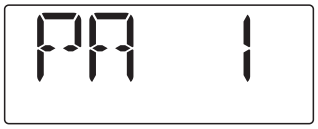
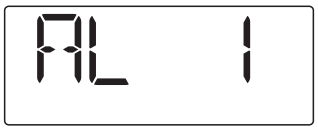
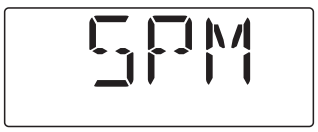
■ Alarm displays

Display	States
	"EXT" and "OVER" indications appear when the pump is set to run over 360spm by current signal input under analogue control, however, the pump does not exceed that maximum rate at any current value.
	"EXT" and "OVER" indications appear when the pump under digital control receives an external signal before the programmed shots per signal is completed. This unprocessed signal is stored (Max. 255 signals) and processed in series.
	"EXT" and "OVER" indications appear when the pump is set to run over a MAN speed by pulse signal input under digital control, however, the pump does not exceed the MAN speed at any number of signals, storing unprocessed signals (Max. 255 signals).

■ Other displays

Display	States
	The pump is running at the priming speed (360spm).
	Keypad is locked. Any key operation is cancelled. See page 49 to release this state.
	Keypad is locked. Any key operation is cancelled. See page 49 to release this state.
	Keypad is locked. Any key operation is cancelled. See page 49 to release this state.

■ Auto restoration displays (FCM type)

Display	States
	Pre-Alarm time is being set.
	
	Alarm time is being set.
	
	Return time is being set.
	
	
	Alarm out is being set.
	
	
	The pump is running at full speed after the detection of air lock.
	The pump has stopped after failing to remove air lock.

Identification codes

Each code represents the following information.

Pump

EHN - B 11 VC 1 YN - □□ - FCM
a b c d e f g h

a. Series name

EHN : Multivoltage electromagnetic metering pump

b. Drive unit (Average power consumption)

B : 20W
C : 24W

c. Diaphragm effective diameter

11 : 10mm 16 : 15mm 21 : 20mm
31 : 30mm 36 : 35mm

d. Wet end materials

Pump

Code	Pump head	Fitting	Valve	O ring	Valve seat	Gasket	Diaphragm
VC	PVC	PVC	Alumina ceramic	FKM	FKM	PTFE	PTFE +EPDM*
VH			HC276	EPDM	EPDM		
PC	GFRPP	GFRPP	Alumina ceramic	FKM	FKM		
PH			HC276	EPDM	EPDM		
PP			Alumina ceramic	FKM	PCTFE		
FC	PVDF	PVDF	Alumina ceramic	—	PCTFE		
SH	SUS316	SUS316	HC276	—	SUS316		

*EPDM is not a wet end.

Flow checker (FCM type)

Code	Body	Float	Plate	O ring
VC	PVC	PVC	PVC	FKM
VH				EPDM

Automatic air vent (Auto degassing type)

Code	Air vent valve guide A	Air vent valve guide B	Valve	Separate pin	Valve seat	O ring
VC	PVC	PVC	Alumina ceramic	Titanium	FKM	FKM
VH			HC276	HC276	EPDM	EPDM

Material code

PVC : Transparent polyvinyl chloride
PVDF : Polyvinylidene difluoride
FKM : Fluorine-contained rubber
PCTFE: Polymonochlorotrifluoroethyle
GFRPP : Glassfiber-reinforced polypropylene
EPDM : Ethylene-propylene rubber
PTFE : Polytetrafluoroethylene
HC276 : HASTELLOY C276

e. Tube connection I.D.

No.	Tube connection I.D.	Tube type
1	ø4×ø9	PVC braided tube or EVA tube
2*	ø4×ø6	Teflon or polyethylene tube
3*	ø6×ø8	Teflon or polyethylene tube
4	ø8×ø13	PVC braided tube or EVA tube
5*	ø9×ø12	Teflon or polyethylene tube
6	ø10×ø12	Teflon tube
9	Rc1/4 female thread	—

* means Special version. Others are standard specifications.

f. Control unit function

YN : High functional

g. Special version

55 : High compression type

NAE : Auto degassing type

h. Flow checker

FCM : Built-in flow checker (preinstalled or retrofitted)

XFCM: Built-in flow checker (external wiring)

Control unit

EHNC - B YN - □□

a b c d

a. Model

EHNC: Multivoltage control unit

b. Drive unit

B : 20W

C : 24W

c. Control unit function

YN : High functional

d. Special version

01-99 : Customized model

Installation

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

Points to be observed

Observe the following points when installing the pump.

- Be sure to turn off power to stop the pump and related devices before service is performed.
- If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.
- Do not place explosive or flammable material near the pump.
- Use of a damaged pump could lead to an electric shock or death.

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 select a flat floor free of vibrations and liquid can't stay. See page 10 for detail.

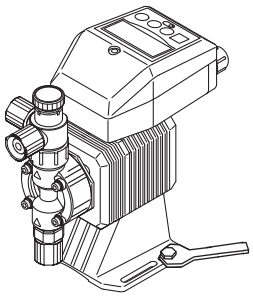
Build up a flooded suction system for the viscous liquid delivery.

2 Anchor the pump by four 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 reduce.



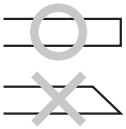
Plumbing

Connect tubes to the pump and install a check valve.

Before operation

• Cut the tube ends flat.

Tube end (Side view)



Necessary tools

• Adjustable wrench or spanner.

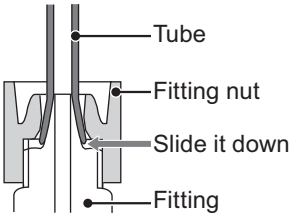
Tube connection

■ VC/VH/PC/PH/PP/FC types

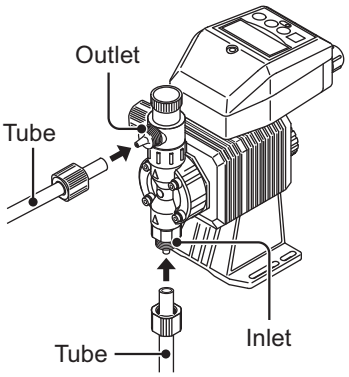
a. Pass a tube into the fitting nut and slide it down to the hose adapter as far as it will go. Then hand tighten the fitting nut.

b. Turn further the fitting nut 180 degrees clockwise with an adjustable wrench or spanner.

*The plastic fitting nut may be broken if it is tightened too much.

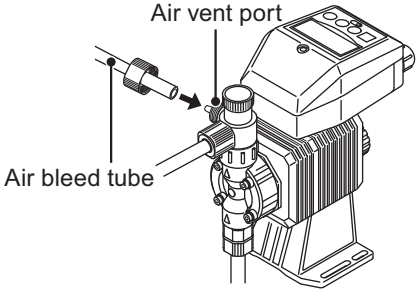


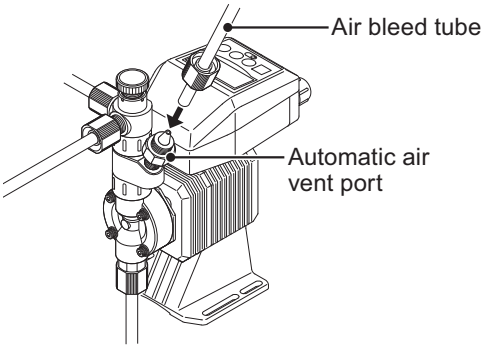
1 Connect tubes into the inlet and outlet.



2 Connect an air bleed tube into the air vent port or automatic air vent port (NAE type).

Route back the other tube end to a supply tank or a container.





NAE type

3 Determine an air vent port direction.

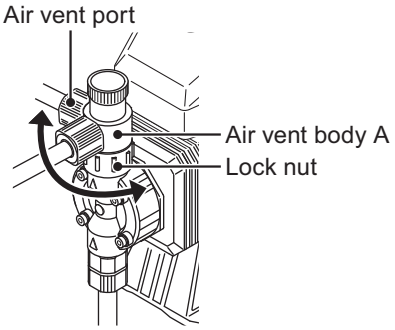
The air vent port can rotate 90 degrees.

a. Turn the lock nut anticlockwise.

b. Adjust the direction of the air vent port.

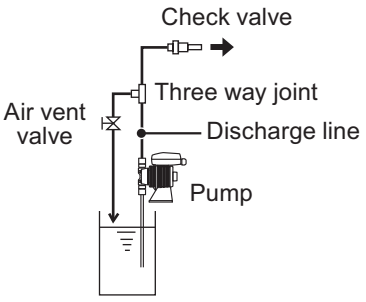
c. Hand-tighten the lock nut, holding the air vent body A.

d. Turn the lock nut 90 degrees clockwise further with an adjustable wrench or spanner.



NOTE

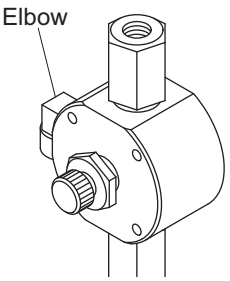
The air vent port is not provided to the EHN-31/-36 and FC types. Install an air vent valve as the right diagram shows. An optional air vent valve is available except for the FC type. See page 73 for detail.



■ SH/FC type (Rc1/4 female thread)

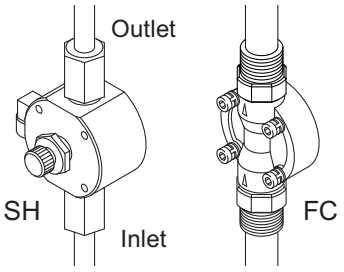
1 Fit the elbow into the pump head (SH type).

Wrap a sealing tape to the male thread of the elbow and then screw it into the threaded hole on the side of the pump head.



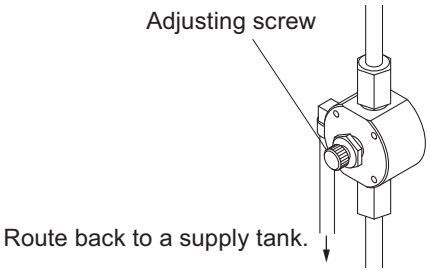
2 Connect a suction and a discharge pipe into the inlet and outlet.

The fitting has a Rc1/4 female thread. Use a sealing tape and connect applicable pipes to the fitting so as to reduce the possibility of a leak or air ingress.



3 Connect a ø4mm air bleed tube into the elbow (SH type).

Route back the other tube end to a supply tank or a container.



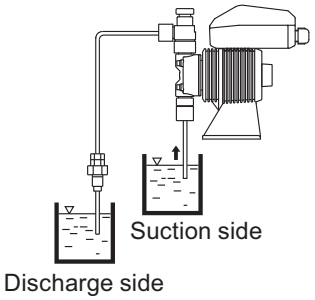
NOTE

The adjusting screw of the SH type is provided for reducing pressure from the pump head only. It can not release discharge line pressure. Install air vent valve on a discharge line for depressurization of that line.

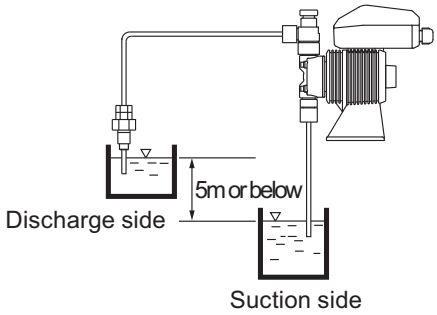
Check valve mounting

Install an optional check valve to the EHN-YN (or a back pressure valve to the FC type) for the prevention of a back flow, siphon and overfeeding.
In the following cases be sure to install the check valve.

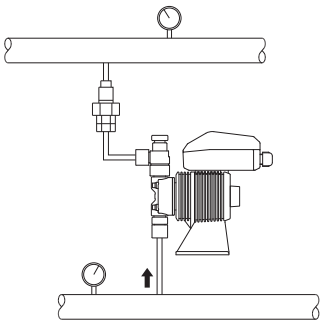
• A suction side liquid level is higher than a discharge side (See the diagram below). Or an injection point is below a suction side liquid level at atmospheric pressure.



• The elevation difference between two liquid levels is five meters or below, even if a discharge side liquid level is higher than a suction side.



• A suction side pressure is higher than a discharge side pressure.

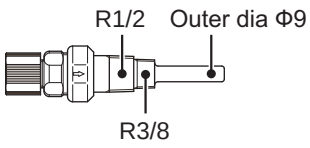


• A discharge pressure (including pipe resistance and discharge head) is below 0.13MPa. (0.049MPa for B31 and C36).

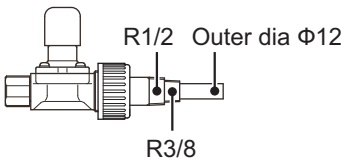
1 Mount a check valve at the discharge tube end.

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

CA check valve

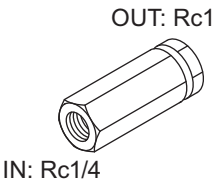


BVC back pressure valve (for FC type)



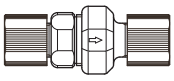
*The CS check valve designed for the SH type has a Rc1/4 thread connection.

CS check valve (for SH type)



*The CB check valve of which the both ends are tube connections is also available. Contact us or your nearest distributor.

CB check valve

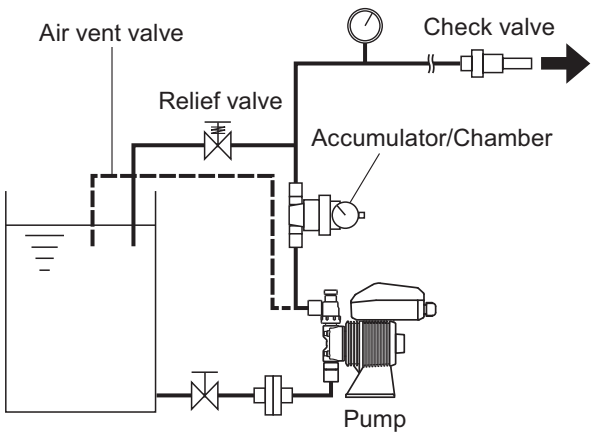


NOTE

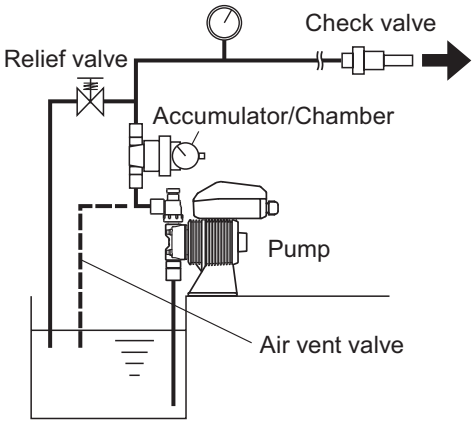
Periodically clean or replace a check valve with new one for the prevention of crystal clogging.

Tubing layout

Flooded suction application



Suction lift application



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

Wiring

Wiring for power voltage, earthing and external signals.

Points to be observed

Observe the following points during wiring work.

- Electrical work should be performed by a qualified electrician. Always observe applicable codes or regulations.
- Observe the rated voltage range, or the electrical circuit in the control unit may fail.
- Do not perform wiring work while electric power is on. Otherwise, an electrical shock or a short circuit may result. Be sure to turn off the power before wiring work.
- Be careful for electric power not to be turned on during work.
- Replacement of a power cable should be conducted by a manufacturer, his agency or a skilled person. Otherwise, an accident may result.

Necessary tools

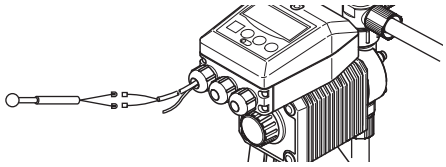
- Adjustable wrench or spanner
- Phillips screw driver
- Precision screw driver

Power voltage/Earthing

Points to be checked

- Check that power voltage is turned off.

1 Connect power cable via crimp contacts.

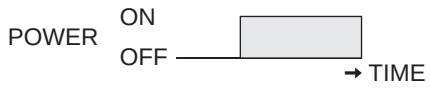


2 Earth the pumps

NOTE

- Do not share a power source with a high power device which may generate surge voltage. Otherwise an electronic circuit may fail. The noise caused by an inverter also affects the circuit.
- Energize the pump with a power voltage via a mechanical relay or switch. Do not fluctuate the voltage, or CPU may malfunction. See page 30 for the precautions for ON-OFF control by a mechanical relay.

When power voltage is applied at a sitting



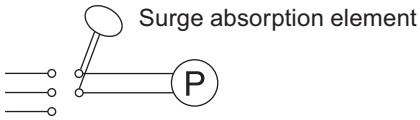
When power voltage is applied gradually

- Use a circuit protector (250VAC, 3A Medium speed) as necessary.
- Do not use a motor thermal relay.

Surge voltage

The electronic circuit in the control unit may fail due to surge voltage. Do not place the pump close to a high power device of 200V or more which may generate large surge voltage. Otherwise, take any of the following measures.

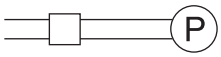
- Install a surge absorption element (such as a varistor with capacity of 2000A or more) via power cable or,



Recommended varisters. See manufacturer's catalogues for detail.

Panasonic	ERZV14D431
KOA	NVD14UCD430

- A noise cut transformer via the power cable.



Noise cut transformer

Precautions for ON-OFF control by a mechanical relay

The control unit is equipped with CPU. Always start/stop the pump by the STOP signal for ON-OFF control. Try not to turn on and off the main power. Otherwise, observe the following points.

- Do not turn ON/OFF power voltage more than six times per hour.
- When using a mechanical relay for ON-OFF operation, its contact capacity should be 5A or more. Contact point may fail if it is less than 5A.
- If a mechanical relay with the contact capacity of 5A is used, the maximum allowable ON/OFF operation is about 150,000 times. The contact capacity should be 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 point may fail by surge voltage.
- Use a solid state relay (SSR) as necessary (such as the OMRON G3F). See manufacturer's catalogues for detail.

Signal wire connection

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

Applicable cables

A cable diameter should be in the range of 7.6-7.8mm.

Four-core cable: VCTF-4 0.75mm²

Triplex cable: VCTF-3 1.25mm²

Duplex cable: UL, CSA SJT 18AWG/2

*The use of a noncompliant cable results in improper connection and reduced seal performance.

NOTE

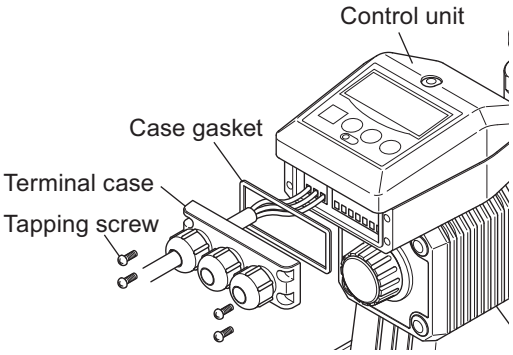
- Do not lay on these signal cables in parallel with a power cable. Otherwise noise is generated through the cables due to induction effect and it results in malfunction or failure.
- The following products are the recommended SSRs (Solid State Relays) for signal input. Any other SSRs may cause malfunction. See manufacturer's information for details on these SSRs.
  –OMRON G3FD-102S or G3FD-102SN
  –OMRON G3TA-IDZR02S or G3TA-IDZR02SM
- When using a mechanical relay for signal input, its minimum application load should be 5mA or below.
- Insert the DIN 4- or 5-pin female connector as far as it will go and then tighten the skirt to make a secure connection.

*Use either a no-voltage contact or an open collector for the input, STOP and AUX signals.
*Set pulse duration to 10-100ms and the number of pulses at or below 360 pulses per minute.

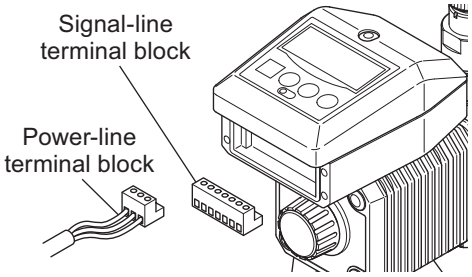
1 Remove the terminal case.

Remove four screws and take out the terminal case.

*The terminal case is sealed by a case gasket. Do not forget to fit the gasket when mounting the case to the control unit.

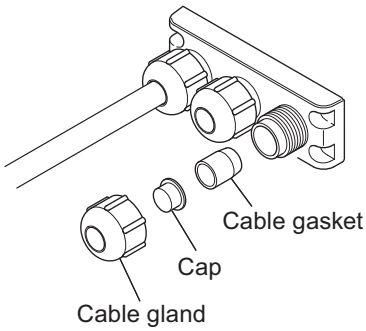


2 Remove a power line and a signal line terminal block from the PCB in the control unit.



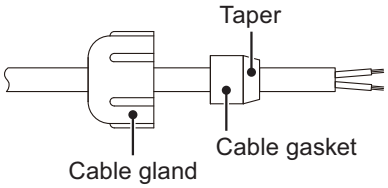
3 Remove a cable gland and a cap and pull out a cable gasket.

*The cap is not used as long as a cable is connected.



4 Pass an external signal cable into the terminal case via the cable gland and the cable gasket.

*Be careful not to oppositely orient the cable gasket.



5 Connect the external signal cable.

a. Use a precision screwdriver to connect signal wires to the signal-line terminal block.

b. Attach the power-line and signal-line terminal blocks to the PCB.

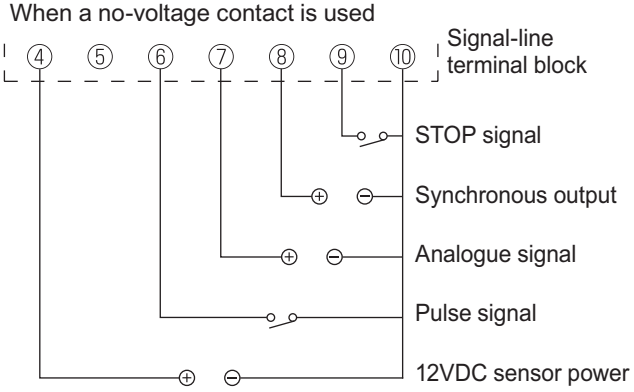
c. Adjust the slackness of the signal cable, pulling it out.

d. Hand-tighten the cable nut.

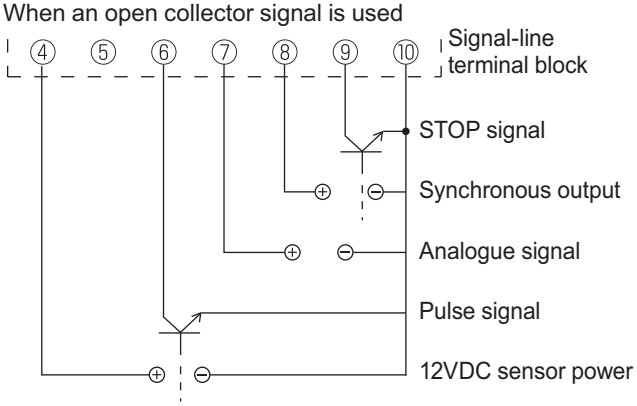
*The external signal cable should be sealed by the cable gasket.

Wiring diagram

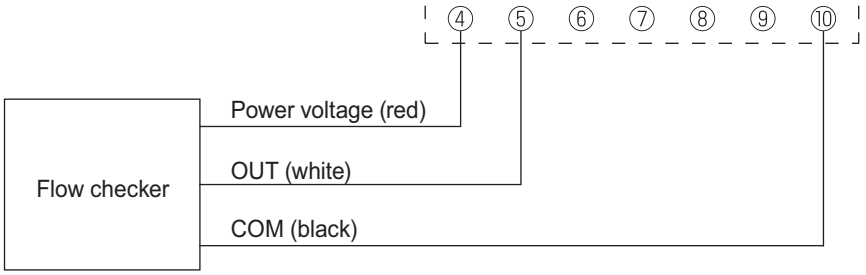
When a no-voltage contact is used



When an open collector signal is used



When a flow checker is used



*Observe polarity. Reverse polarity upsets the proportional control or may break PCB.

*Pay attention to polarity for the stop and pulse signal input with an open collector. The terminal 6 and 9 are plus (+), and terminal 10 is minus (-). The maximum applied voltage from these terminals is 12V at 5mA.

*Use an external power source when using the synchronous output (PhotoMOS relay). The maximum applied voltage to the output is 24VAC/DC at 0.1A.

*Use the terminal 4: Power voltage (red), 5: OUT (white) and 10: COM (black) as above when connecting the flow checker

6 Mount the terminal case to the control unit.

Fasten fixing screws evenly to 0.3N•m.

NOTE

Always check that the case gasket are fitted. Otherwise, the liquid may enter the control unit and failure may result.

Operation

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

Before operation

Check a 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 a supply tank is enough.
- Tubing is securely connected and is free from leakage and clogging.
- Discharge/suction valves are opened.
- Power voltage range is correct.
- 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, and this can lead to leakage. Be sure to retighten the bolts evenly to the specified tightening torque below in diagonal order before starting operation.

Tightening torque

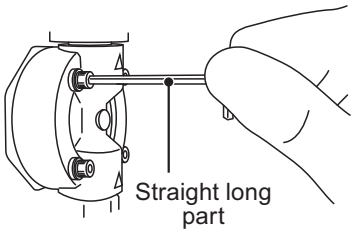
Model code	Torque	Bolts
EHN-B11/-B16/-B21	2.16 N•m	M4 Hex. socket head bolt
EHN-B31	2.55 N•m	M4 Hex. socket head bolt
EHN-C16/-C21	2.16 N•m	M4 Hex. socket head bolt
EHN-C31	2.55 N•m	M4 Hex. socket head bolt
EHN-C36	2.55 N•m	M5 Hex. socket head bolt

*Tighten fixing bolts once every three months.

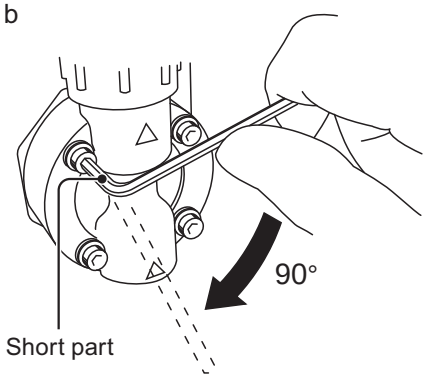
■ Use of a hexagon wrench instead of a torque wrench

Fasten the fixing bolts as tight as can be by the hand with the straight long part of a hexagon wrench (a) and further turn the bolts clockwise 90 degrees with the short part (b).

a



b



Degassing

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

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

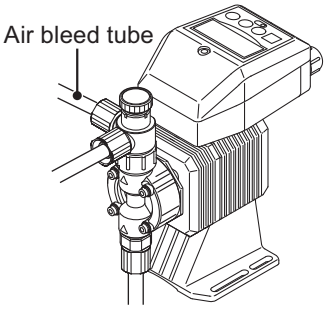
NOTE

- Both gas and chemical come out together through an air bleed tube. Place the end of the tube in a supply tank or a 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.

■ EHN-B/-C 11/16/21 VC/VH/PC/PH/PP/SH

Points to be checked

- An air bleed tube is connected to the pump.



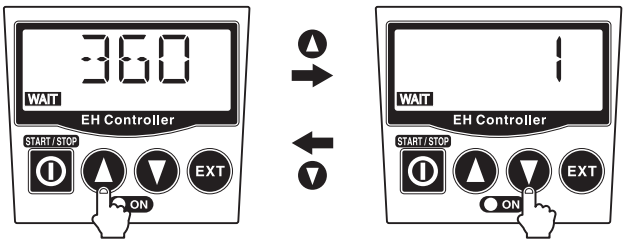
1 Turn on power.

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

*The pump waits in the manual mode when the power is turned ON with a default setting or calls up the last selected mode with other settings.

2 Set stroke rate to 360spm.

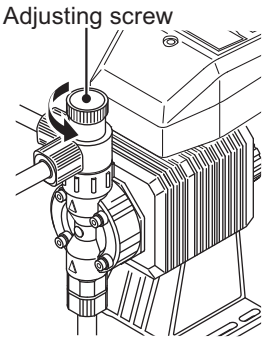
- spm increases/decreases as pushing the UP/DOWN keys.
- Press and hold either key for more than three seconds for quick change. Quick change stops at 1 or 360spm. 1 or 360rpm skips to 360 or 1spm when the key is released and pushed once.



3 Rotate the adjusting screw two revolutions anticlockwise to open the air vent port (1/4 revolution for the SH type).

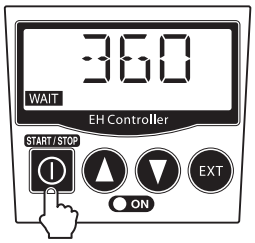
*Do not rotate the screw three revolutions. Otherwise, the adjusting screw may come off with solution spray.

*Switch the screw to OPEN position for the SH type.



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

The LED blinks at each shot.



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.

8 Check connections for leakage.

Degassing has now been completed.

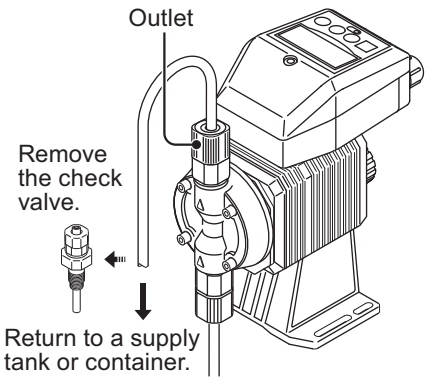
■ EHN-B/-C 11/21 FC and EHN-B/-C 31/36 VC/VH/PC/PH/PP/FC

The air vent port is not provided to the EHN-B/-C 11/12 FC type and all the EHN-B/-C 31/36 types. Install an air vent valve on a discharge line for degassing. See page 26 for detail. Follow the procedure below to conduct degassing if the air vent valve is not available.

1 Connect a discharge tube and route back the other tube end to a supply tank or a container.

*Remove the check valve from the discharge tube if it is installed.

*After liquid replacement in a supply tank or a long period of stoppage, an 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.



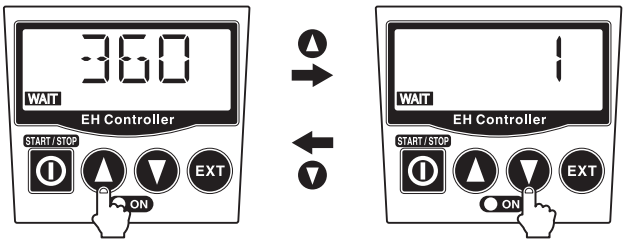
2 Turn on power.

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

*The pump waits in the manual mode when turning on power with a default setting or calls up a previous mode at the last shutoff.

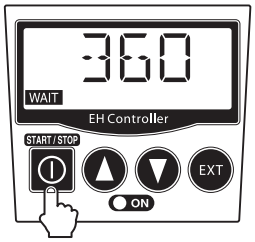
3 Set a stroke rate to 360spm.

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



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 re-connect the discharge tube to an injection point.

7 Check connections for leakage.

Degassing has now been completed.

Flow rate adjustment

A flow rate can be adjusted by adjusting a 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 a flow rate by stroke rate adjustment. Use stroke length adjustment for the range where stroke rate adjustment can not reach. Determine a suitable stroke rate and a stroke length, taking account of operating conditions and liquid characteristics.

1 Change a stroke rate with stroke length 100% to adjust a flow rate.
See "Stroke rate adjustment" on page 38 and "Stroke length adjustment" on page 39 for detail.

2 Measure a flow rate.

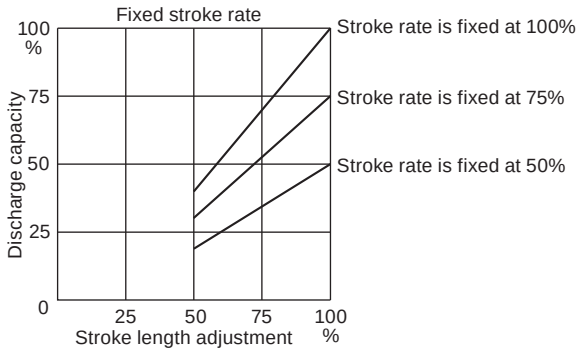
3 If a flow rate is lower than a specified level, increase a stroke rate and measure the flow again.

4 Change a stroke length for fine adjustment.

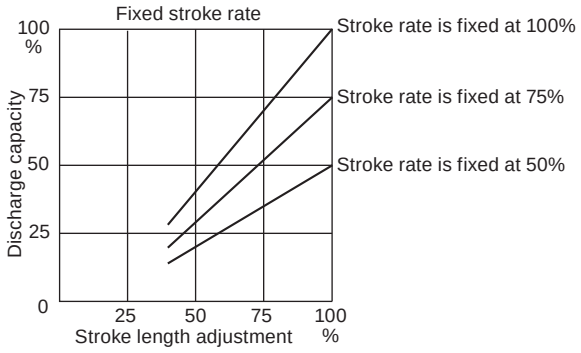
5 Measure the flow again to see the specified level is obtained.

■ Flow rate, stroke rate and stroke length

B type



C type

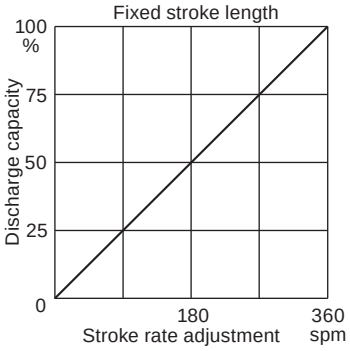


■ Precautions of flow rate adjustment

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

■ Stroke rate adjustment

A stroke rate can be set by keypad operation from 1 to 360spm. The relation between a flow rate* and a stroke rate is shown as below.

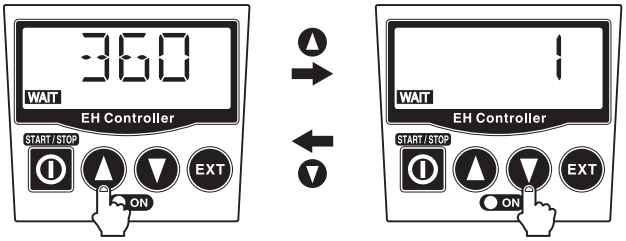


*The flow rate described on the nameplate is at 100%.

1 Turn on power and call up manual mode.

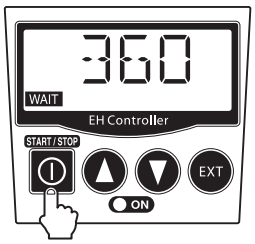
2 Use the UP or DOWN key to adjust a stroke rate.

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



3 Push the start/stop key.

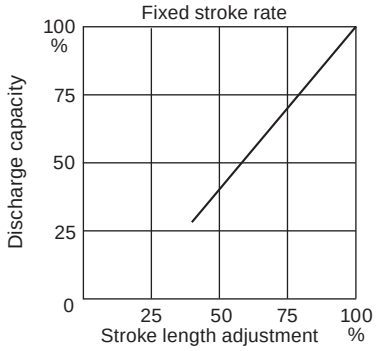
The ON LED blinks at each shot during operation.



■ Stroke length adjustment

A 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 a stroke length is shown as below.



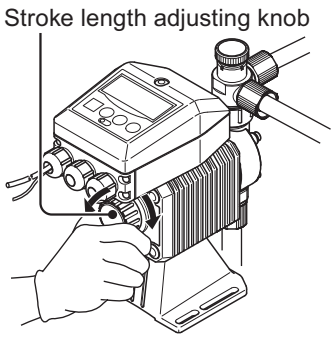
*The flow rate described on the nameplate is at 100%.

NOTE

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

1 Turn on power and push the start/stop key to run the pump.
The ON LED blinks during operation.

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



Operation

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

Clean wet ends and the inside of piping.

• Run the pump with clean water for about 30 minutes to rinse chemicals off.

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 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 and remove foreign matters.

• If gas is in the pump head, expel gas and readjust a flow rate. See "Degassing" on page 34 and "Flow rate adjustment" on page 37 for detail.

Operation programming

Operation at each mode is individually set and controlled by keypad operation. Select a proper mode to make optimal operation.

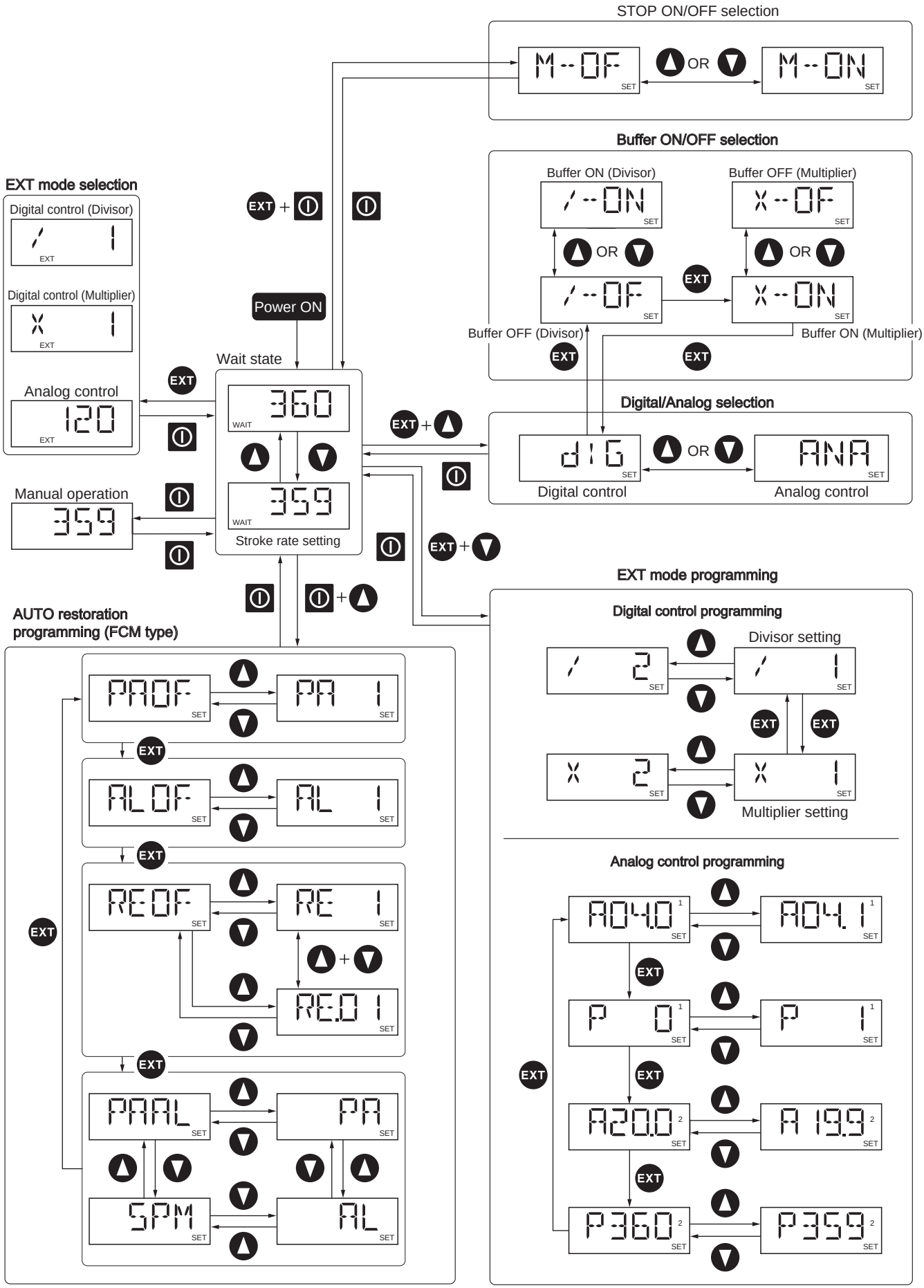
Mode	Parameters	Default	Setting ranges	Minimum increment/decrement
Manual	Stroke rate*1	360	1-360	1*2
Dig/Ana selection	Digital/Analog	dIG (Digital)	dIG (digital)/ANA(Analog)	-
EXT mode	Multiplier (Digital)	X1	1-999	1*2
	Divisor (Digital)	/1	1-999	1*2
	Analog	4.0mA at Set point 1	0.0-20.0	0.1
		0spm at Set point 1	0-360	1
		20.0mA at Set point 2	0.0-20.0	0.1
		360spm at Set point 2	0-360	1
Buffer ON/OFF	Multiplier	XON	XOF XON	-
	Divisor	/OF	/OF /ON	-
STOP function*3	M-ON/M-OF	M-OF	M-ON/M-OF	-
Auto restoration*4	Pre-Alarm time	OFF	OFF/ 1-60min	1*2
	Alarm time	OFF	OFF/ 1-60min	1*2
	Return time	OFF	OFF/ 1-60min, 1-60sec	1*2
	Alarm out	PA AL	PA AL/ PA/ AL/ SPM	-

*1 The pump runs at the MAN speed during operation with multipliers.

*2 spm increases/decreases as pushing the UP/DOWN keys. Press and hold either key for quick change.

*3 Pay attention to unintentional operation of the pump. The pump starts to run as returning to the manual mode as long as the pump with M-ON setting is receiving the STOP signal.

*4 The FCM type only


STOP ON/OFF selection
M--OF
SET
OR
M--ON
SET
Buffer ON/OFF selection
Buffer ON (Divisor)
Buffer OFF (Multiplier)
/--ON
SET
X--OF
SET
OR
OR
/--OF
SET
EXT
X--ON
SET
Buffer OFF (Divisor)
Buffer ON (Multiplier)
EXT
EXT
EXT mode selection
Digital control (Divisor)
/ 1
EXT
Digital control (Multiplier)
X 1
EXT
Analog control
120
EXT
EXT + ⏻
⏻
Power ON
Wait state
EXT
⏻
360
WAIT
359
WAIT
Stroke rate setting
EXT + ▲
EXT + ▼
⏻
Digital/Analog selection
d!G
SET
OR
ANA
SET
Digital control
Analog control
Manual operation
359
⏻
⏻
⏻
⏻ + ▲
EXT mode programming
Digital control programming
Divisor setting
/ 2
SET
/ 1
SET
EXT
EXT
X 2
SET
X 1
SET
Multiplier setting
AUTO restoration
programming (FCM type)
PAOF
SET
PA 1
SET
EXT
ALOF
SET
AL 1
SET
EXT
REOF
SET
RE 1
SET
▲ + ▼
RE.01
SET
EXT
PAAL
SET
PA
SET
SPM
SET
AL
SET
EXT
Analog control programming
A04.0 1
SET
A04.1 1
SET
EXT
P 0 1
SET
P 1 1
SET
EXT
A20.0 2
SET
A 19.9 2
SET
EXT
P360 2
SET
P359 2
SET
EXT

Operation

Read this section before operation.

Manual operation

Run or stop the pump by keypad operation.

1 Supply the rated power voltage to the pump.

The ON LED lights and a previous mode at the last shutoff returns.

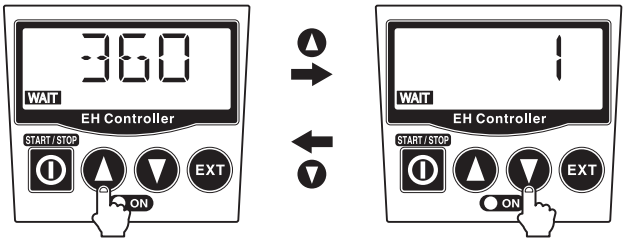
*The pump waits in the manual mode when turning on power with a default setting.

2 Push the start/stop key to return to the wait state.

"WAIT" indication appears.

3 Use the UP or DOWN key to adjust stroke rate (MAN speed).

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



4 Push the start/stop key to start operation.

The ON LED blinks at each shot during operation.

EXT operation

The pump operation is controlled by the external signal.

■ Analog control programming

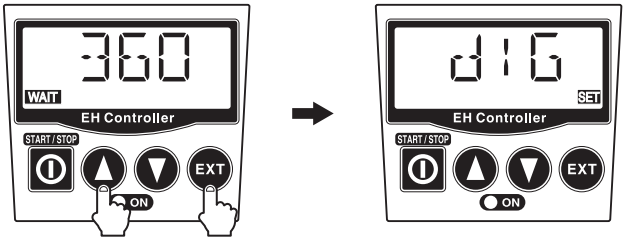
Set the pump to run in between 0-360spm in proportion to 0-20mA.

1 Push the start/stop key to return to the wait state.

"WAIT" indication appears.

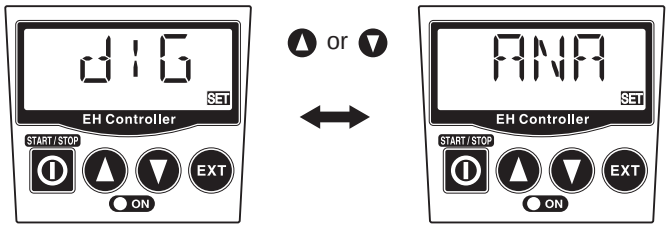
2 Push the UP key while pressing the EXT key to call up the Digital/Analog selection.

"dIG"(digital) or "ANA"(analog) will appear.



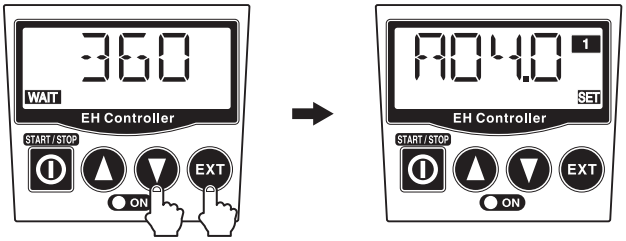
3 Select "ANA".

Scroll through "dIG" and "ANA" selection by the UP and DOWN keys.

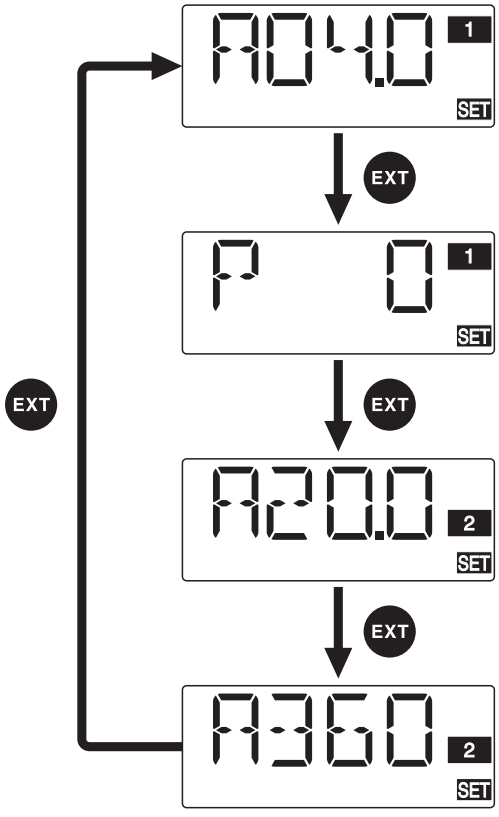


4 Push the start/stop key to return to the wait state.

5 Push the DOWN key while pressing the EXT key to program the analog control.



6 Program the SET1 & 2.



Use the UP and DOWN keys to enter a current value at SET 1.
*Default value is 4.0mA.

Use the UP and DOWN keys to enter spm at SET 1.
*Default value is 0spm.

Use the UP and DOWN keys to enter a current value at SET 2.
*Default value is 20.0mA.

Use the UP and DOWN keys to enter spm at SET 2.
*Default value is 360spm.

7 Push the start/stop key to return to the wait state.

8 Push the EXT key to start analog control.

■ Digital control programming

The pump operation is controlled by the external (pulse) signal. Set a multiplier or a divisor before operation.

NOTE

- The pump runs at a MAN speed in the digital control. If a MAN speed is set to 200spm, the pump does not run over the speed even though a multiplier is set to run the pump at 360spm.
- A MAN speed skips from 100 to 1spm by pushing the UP key once. Pay attention to this point when programming a stroke rate for the prevention of erroneous programming.
- Do not enter the EXT signal during the programming.

Multiplier programming

Program the number of shots per signal to control the pump. The number of shots can be programmed from 1 to 999.

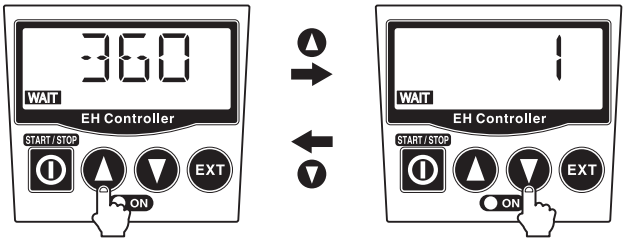
*The pump makes one shot per pulse when a multiplier is programmed to 1.

1 Push the start/stop key to return to the wait state.

"WAIT" indication appears.

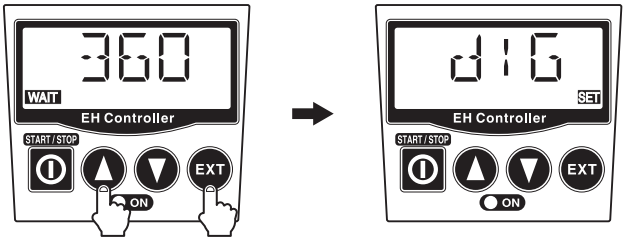
2 Use the UP or DOWN key to adjust stroke rate (MAN speed).

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



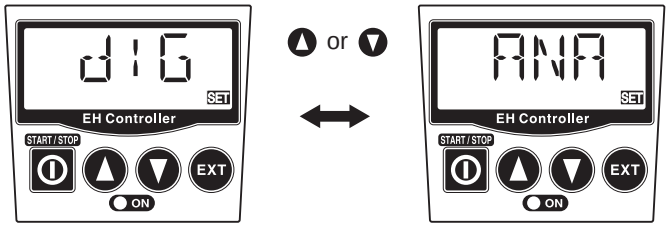
3 Push the UP key while pressing the EXT key to call up the Digital/Analog selection.

"dIG"(digital) or "ANA"(analog) will appear.



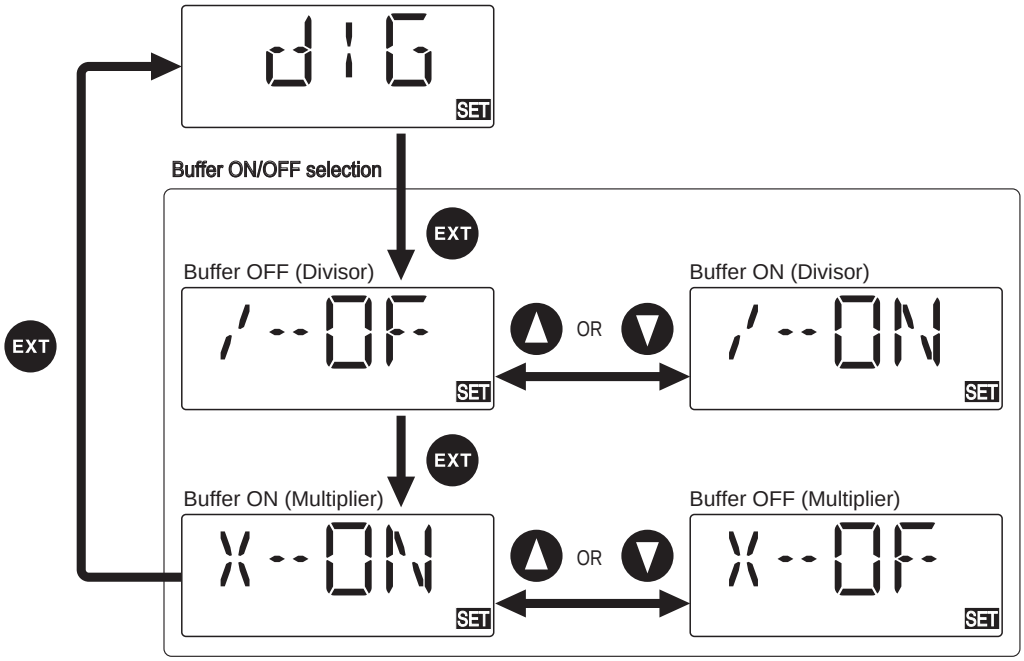
4 Select "dIG".

Scroll through "dIG" and "ANA" by the UP and DOWN keys.



5 Push the EXT key to call up the buffer ON/OFF selection.

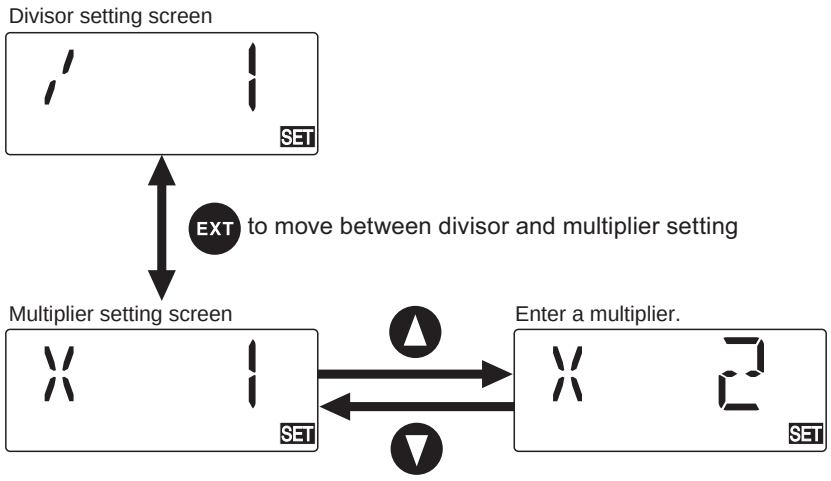
Scroll through "X-ON" and "X-OFF" by the UP and DOWN keys.



6 Push the start/stop key to return to the wait state.

7 Push the DOWN key while pressing the EXT.

8 Set a multiplier.



9 Push the start/stop key to return to the wait state.

NOTE

Do not forget to push the start/stop key. Otherwise, setting is not entered.

10 Push the EXT key to start digital control.

Divisor programming

Program the number of signals per shot to control the pump. The number of signals can be programmed from 1 to 999.

NOTE

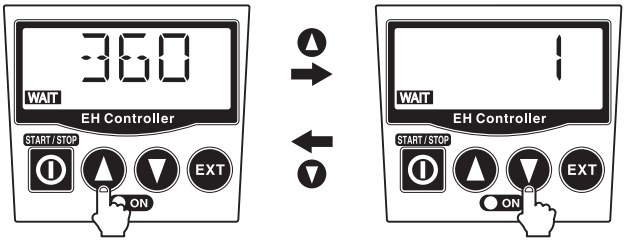
- If a divisor is programmed to 1 so as to make one shot per pulse and the input interval of the external signal is close to a MAN speed (but not exactly in synchronization), irregular operation may occur. This irregular operation occurs as the external signal is cancelled. Note that this is not malfunction. In order to avoid this phenomenon, perform 1:1 operation by programming a multiplier to 1.

1 Push the start/stop key to return to the wait state.

"WAIT" indication appears.

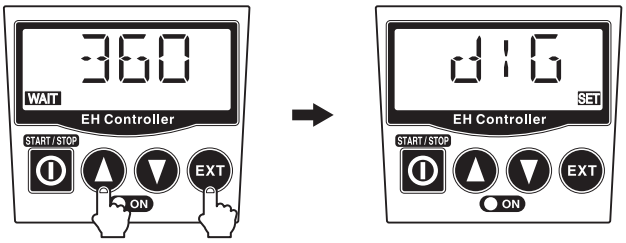
2 Use the UP or DOWN key to adjust stroke rate (MAN speed).

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



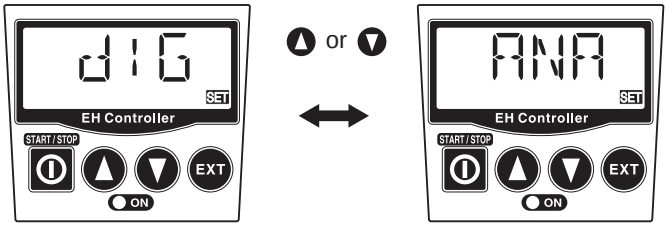
3 Push the UP key while pressing the EXT key to call up the Digital/Analog selection.

"dIG"(digital) or "ANA"(analog) will appear.



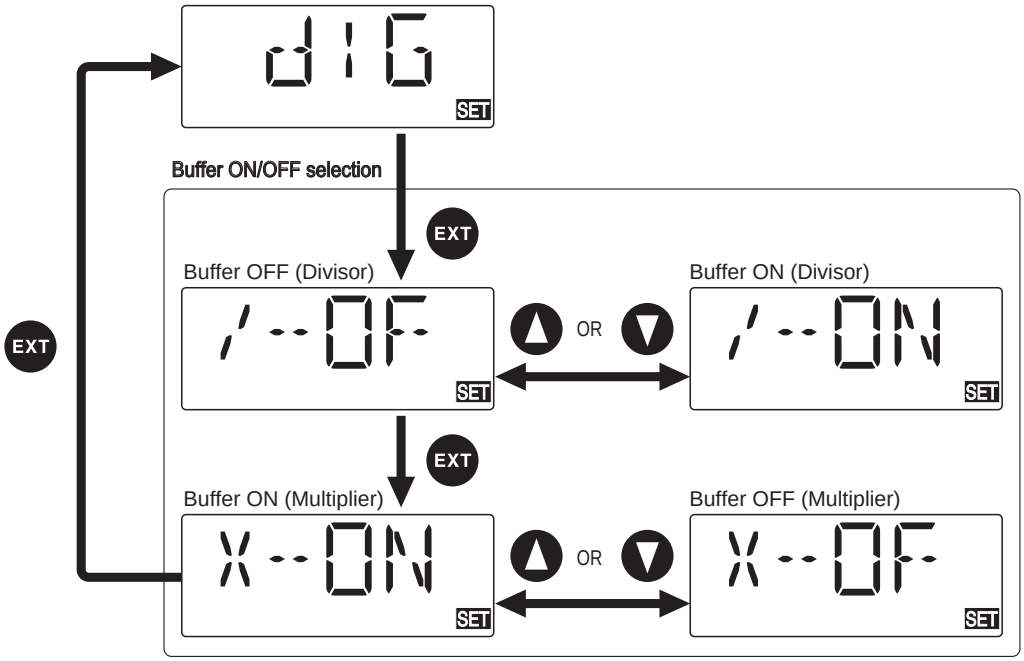
4 Select "dIG".

Scroll through "dIG" and "ANA" by the UP and DOWN keys.



5 Push the EXT key to call up the buffer ON/OFF selection.

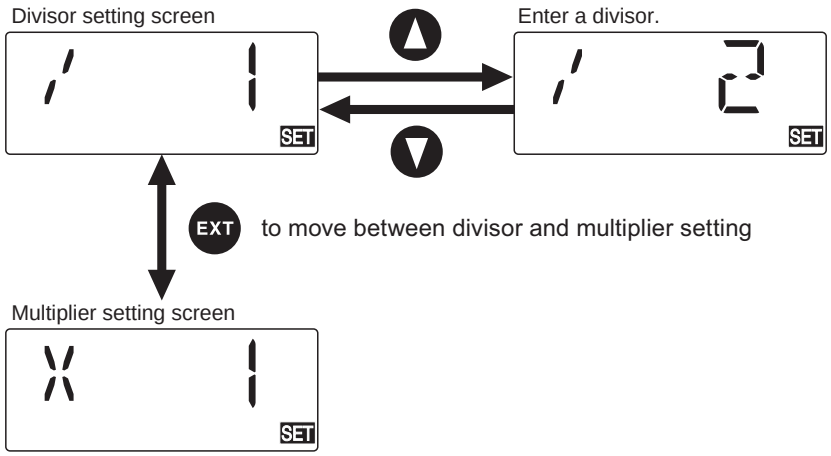
Scroll through "/-ON" and "/-OFF" by the UP and DOWN keys.



6 Push the start/stop key to return to the wait state.

7 Push the DOWN key while pressing the EXT key.

8 Set a divisor.



9 Push the start/stop key to return to the wait state.

NOTE

Do not forget to push the start/stop key. Otherwise, setting is not entered.

10 Push the EXT key to start digital control.

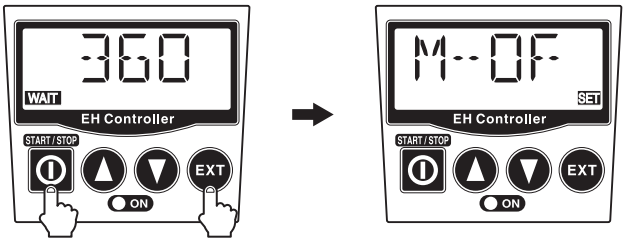
STOP function

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

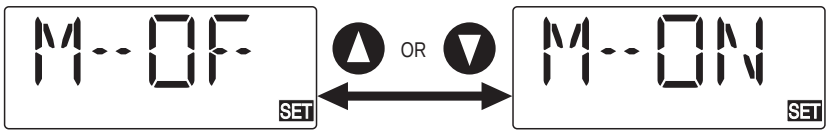
- **Operation stop at the stop signal input: "M-OF"**
  The pump stops while receiving the stop signal.
- **Operation resumption at the stop signal input: "M-ON"**
  The pump runs while receiving the stop signal.

1 Push the start/stop key to return to the wait state.
"WAIT" indication appears.

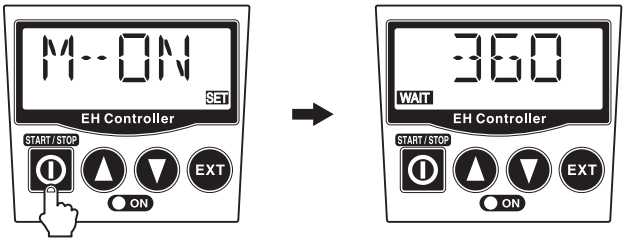
2 Push the start/stop key while pressing the EXT key to call up the STOP ON/OFF selection.
"M-OF" or "M-ON" will appear.



3 Select "M-OF" or "M-ON".
Scroll through "M-OF" and "M-ON" by the UP and DOWN keys.



4 Push the start/stop key to return to the wait state.
"STOP" indication appears when the pump is stopped by the STOP signal.



Keypad lock

Keypad lock can be active for the prevention of erroneous key operation.

NOTE

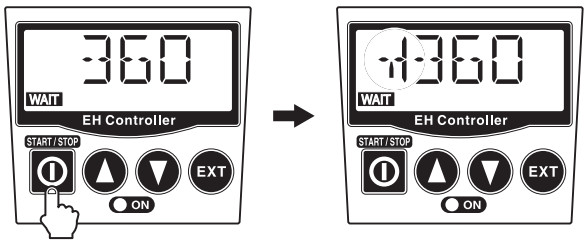
• Any key operation is not acceptable when the keypad lock is active. In an emergency, turn off the main power to stop operation. In this case, keypad lock state is recalled when the pump is turned on.

■ Keypad lock activation

1 Press and hold the start/stop key for 3 seconds.

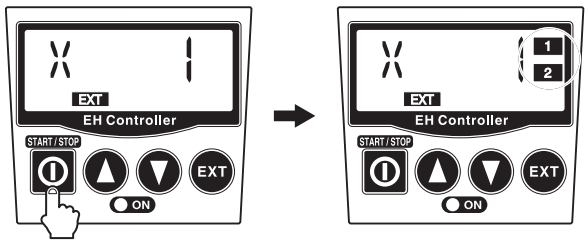
The following displays will appear.

Manual operation



3 sec

Digital control



3 sec

■ Keypad lock release

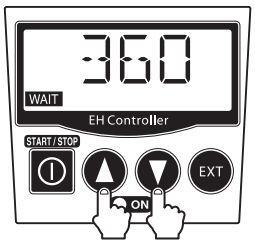
1 Press and hold the start/stop key for 3 seconds to release a keypad lock.

Priming function

This key operation runs the pump at the maximum stroke rate in operation.

1 Press and hold both the UP and DOWN keys.

The pump runs at the maximum stroke rate while both the keys are pressed.



Auto restoration (FCM type)

NOTE

• A long period of dry running damages the pump. Do not set the Alarm time over 30 minutes for the pump not to continue to run dry.

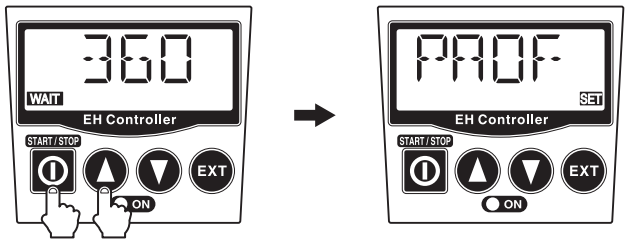
■ Auto restoration programming

1 Push the start/stop key to return to the wait state.

"WAIT" indication appears.

2 Push the UP key while pressing the start/stop key.

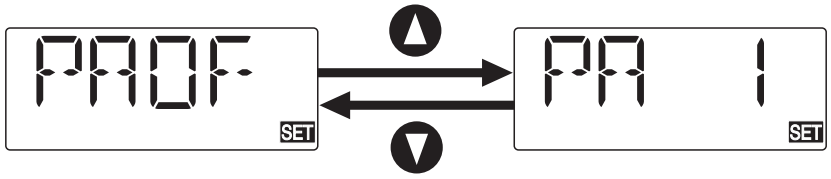
Pre-Alarm time programming screen will appear.



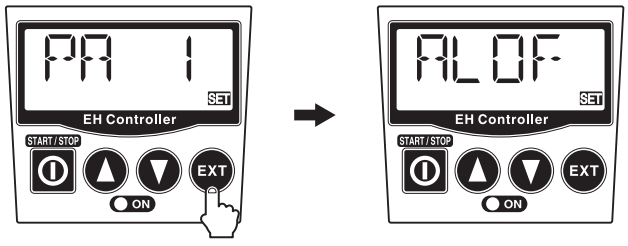
3 Use the UP or DOWN key to adjust Pre-Alarm time.

• The time increases/decreases in the range of 1-60 minutes as pushing the UP/DOWN keys.

• Press and hold either key for three seconds for quick change. Quick change stops at 60min or "PAOF". 60min or "PAOF" skips to "PAOF" or 60min when the key is released and pushed once.



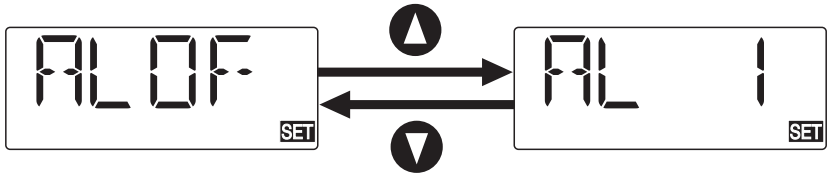
4 Push the EXT key.



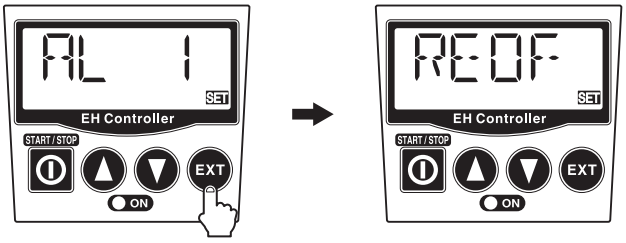
5 Use the UP or DOWN key to adjust Alarm time.

• The time increases/decreases in the range of 1-60 minutes as pushing the UP/DOWN keys.

• Press and hold either key for three seconds for quick change. Quick change stops at 60min or "ALOF". 60min or "ALOF" skips to "ALOF" or 60min when the key is released and pushed once.

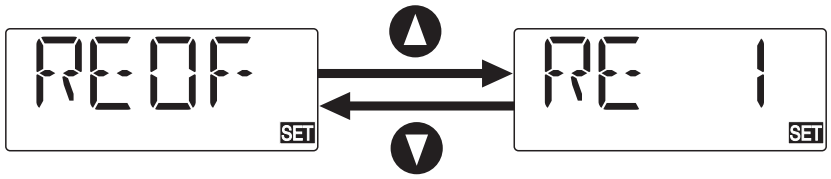


6 Push the EXT key.

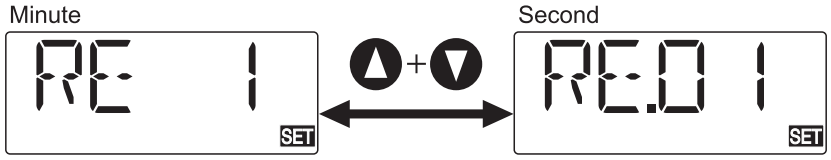


7 Use the UP or DOWN key to adjust Return time.

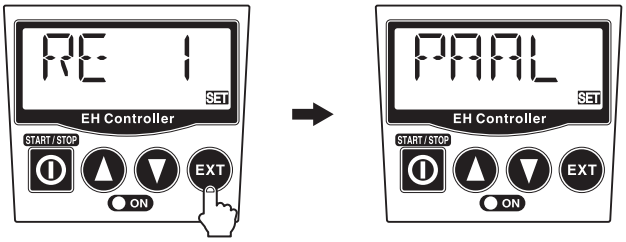
- The time increases/decreases in the range of 1-60 minutes/seconds as pushing the UP/DOWN keys.
- Press and hold either key for three seconds for quick change. Quick change stops at 60 min/sec or "REOF". 60min/sec or "REOF" skips to "REOF" or 60min/sec when the key is released and pushed once.



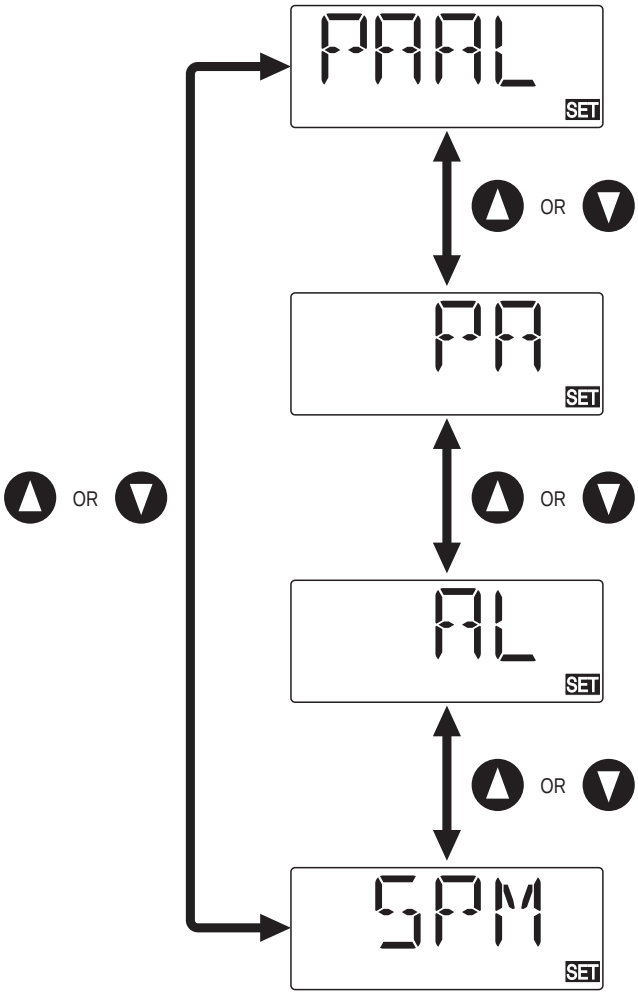
Push the UP and DOWN keys together to change a time unit in between min and sec.



8 Push the EXT key to program the Alarm output behaviour.



9 Use the UP or DOWN key to set behaviour at each item.



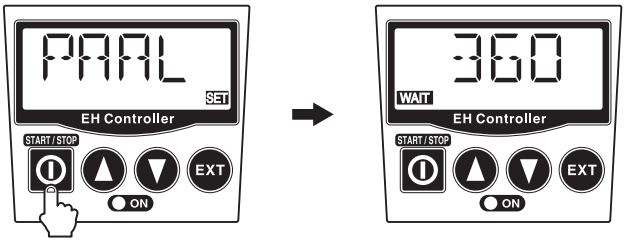
The pump keeps outputting an alarm signal during the Pre-Alarm time and Alarm time and when the pump has failed to remove gas lock and stopped running.

The pump keeps outputting an alarm signal during the Pre-Alarm time and Alarm time.

The pump outputs an alarm signal when the pump has failed to remove gas lock and stopped running.

The pump outputs a pulse signal(100ms) at each pump shot.

10 Push the start/stop key to return to the wait state.

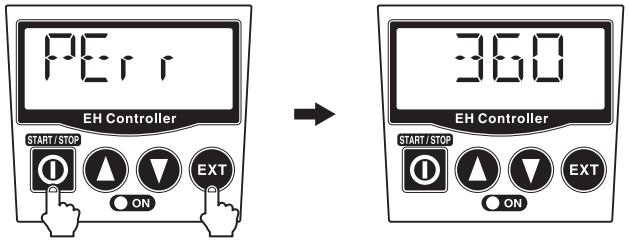


Error codes

■ Reset of "PErr" (Full speed operation to resolve air lock)

1 Push the start/stop key while pressing the EXT key.

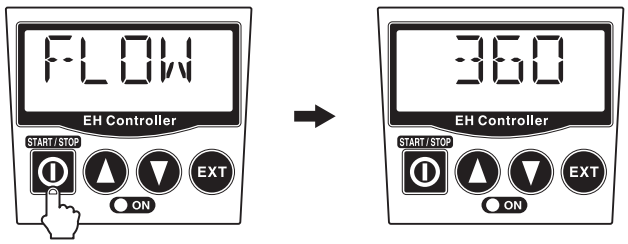
The pump resumes normal operation.



■ Reset of "FLOW" (Suspended operation after failing to resolve gas lock)

1 Push the start/stop key.

The pump waits in the manual mode.



Maintenance

This section describes troubleshooting, maintenance, wear part replace- ***ment, exploded views and specifications.***

Points to be observed

Observe the following points during maintenance work.

- Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.
- Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during dismantlement, assembly or maintenance work.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed. 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.

NOTE

- We do not assure material suitability in specified application and are not responsible for any failure due to corrosion or erosion.
- Contact your distributor or a manufacturer of the host machine which our product is built in for repair.
- Be sure to drain chemicals and clean the inside of the pump before return so that a harmful chemical does not spill out in transit.

Troubleshooting

First check the following points. If the following measures do not help remove problems, contact your nearest distributor.

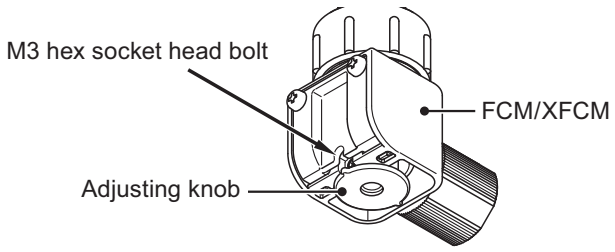
■ Pump

States	Possible causes	Solutions
The pump does not run (The LED does not light or the screen is blank.).	Power voltage is too low.	• Observe the allowable voltage range of 90-264VAC
	The pump is not powered.	• Check the pump is switched on if any. • 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 pumped up.	Gas lock in the pump	• Expel air. See page 34.
	Stroke length is too short.	• Run the pump with full stroke length and then with proper length.
	Air ingress through a suction line	• Reroute tubing.
	A valve set is installed upside down.	• Reinstall the valve set.

States	Possible causes	Solutions
Liquid can not be pumped up.	Valve gaskets are not installed.	• Install valve gaskets.
	Foreign matters are stuck in the pump head valves.	• Dismantle, inspect and clean the valves. Replace as necessary.
	A ball valve is stuck on a valve seat.	• Dismantle, inspect and clean the valve. Replace as necessary.
A flow rate fluctuates.	Air stays in the pump head.	• Expel air. See page 34.
	Overfeeding occurs.	• Mount a check valve. See page 25.
	Foreign matters are stuck in the pump head valves.	• Dismantle, inspect and clean the valves. Replace as necessary.
	Diaphragm is broken.	• Replace the diaphragm.
	Pressure fluctuates at an injection point.	• Maintain a pressure constant at an injection point by optimising tubing or by relocating the point.
Liquid leaks.	The fitting or the air vent body is mounted loose.	• Retighten them.
	The pump head is mounted loose.	• Retighten the pump head. See page 33.
	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.
"PErr" or "FLOW" code appears in operation at an intended flow rate. Or Auto restoration does not work properly.	Sensor cable connection is loose or disconnected.	• Secure the connection.
	A float is stuck in the flow checker.	• Clean the flow path of the flow checker. • Change a float position by the adjusting knob.
	Air ingress through a suction line	• Reroute tubing. • Secure tube joints.
	A strong magnetic field affects the float motion.	• Keep the operation site free from a magnetic field.
	AUTO restoration setting error	• Check PA, AL and RE time setting.

NOTE

Shift a float position along with liquid characteristics to optimise float motion. This adjustment is important for the flow checker to transmit pulse signals correctly. The adjusting knob is located beneath the flow checker. First loosen the M3 hex socked head bolt and then rotate the adjusting knob.



Inspection

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

Daily inspection

Check the following points. Upon sensing abnormality, stop operation immediately and remove problems according to "Troubleshooting".

When wear parts come to the life limit, replace them with new ones. Contact your distributor 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 specifications.
		• If liquid has deteriorated, crystallized or precipitated.	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 pumped liquid includes air bubbles, check lines for leakage and retighten as necessary.	Visual or audio inspection

Periodic inspection

Retighten the pump head mounting bolts evenly to the following torque in diagonal order.

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

Tightening torque

Model code	Torque	Bolts
EHN-B11/-B16/-B21	2.16 N•m	M4 Hex. socket head bolt
EHN-B31	2.55 N•m	M4 Hex. socket head bolt
EHN-C16/-C21	2.16 N•m	M4 Hex. socket head bolt
EHN-C31	2.55 N•m	M4 Hex. socket head bolt
EHN-C36	2.55 N•m	M5 Hex. socket head bolt

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

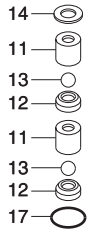
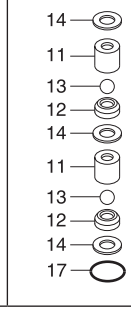
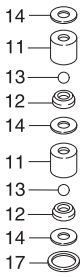
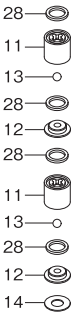
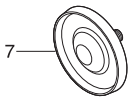
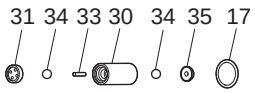
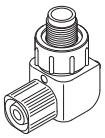
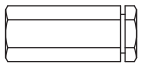
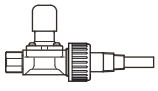
Wear part replacement

To run the pump for a long period, wear parts need to be replaced periodically.
It is recommended that the following parts are always stocked for immediate replacement.
Contact your nearest distributor for detail.

! Precautions

- Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.
- Rinse wet ends thoroughly with tap water.
- Each time the pump head is dismantled, replace the diaphragm and the valve sets with new ones.

Wear part list

	Parts					# of parts	Estimated life
Pump	Valve set	VC•VH•PC•PH	PP	FC	SH	2 sets	8000 hours
							
	Diaphragm					1	
	O ring	 (except the B31/36 and the FC/SH types)				See page 67-70	
	AUTO air vent valve set (NAE type)					1 set	
	Flow checker (FCM/XFCM)					1	
Check valve	Check valve poppet (O ring)					1	
	Check valve spring					1	
	CS check valve (SH)					1	
BP valve	Back pressure valve with the BVC check valve (FC)					1	

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

Before replacement

First release pressure from the pump head and discharge line.

1 Stop pump operation.

2 Rotate the adjusting screw or open an air vent line to release pressure.

NOTE

- Do not rotate the adjusting screw anticlockwise three revolutions or more from the closed position. Otherwise, the adjusting screw may come off with solution spray.
- Rotation of the SH type adjusting screw doesn't release a discharge line pressure. Always provide an air vent line to release the line pressure.

3 Check that liquid comes out from the air vent port and gas/liquid pressure has been released from the pump head and discharge line.

NOTE

The 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.

Valve set replacement

■ Discharge valve set disassembly/assembly

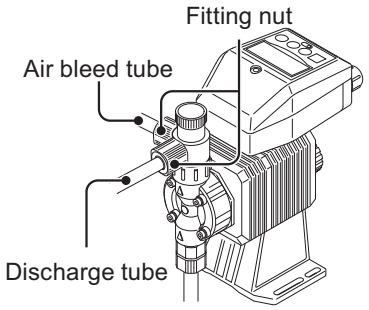
Necessary tools

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

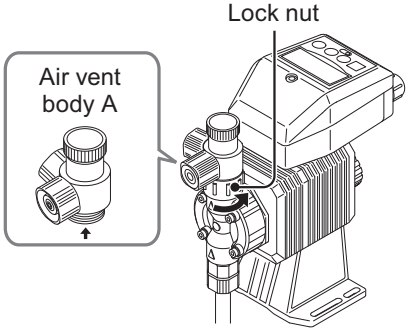
*Unfix the pump base before disassembly.

EHN-B/-C 11/16/21

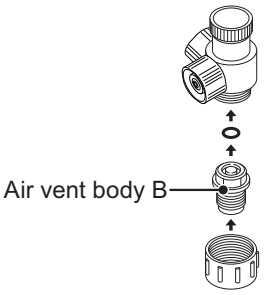
1 Loosen the fitting nut to remove a discharge tube and an air bleed tube.



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.



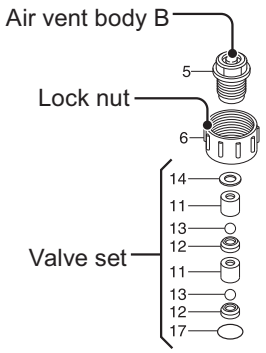
4 Pull out the valve set by a pair of tweezers.

5 Place a new valve set into the pump head and screw the air vent body B 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.

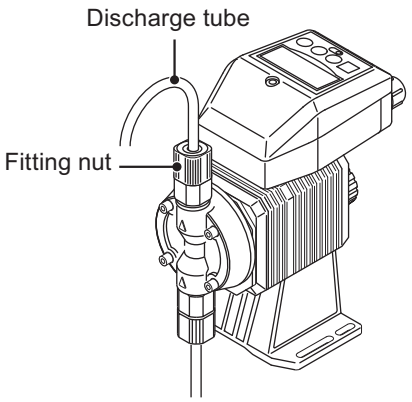


*VC•VH•PC•PH

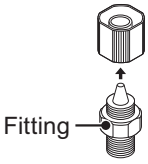
6 Remount the air vent body A and connect tubes.

EHN-B/-C 31/36 VC/VH/PC/PH and all FC/SH types

1 Remove the fitting nut to remove the discharge tube.



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



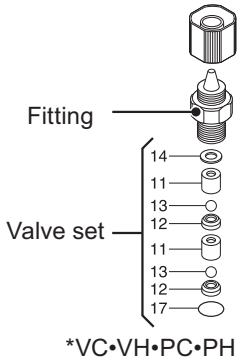
3 Pull out the valve set by a pair of tweezers.

4 Place a new valve set into the pump head. Hand-tighten the fitting into the pump head as far as it will go. Retighten it further 90 degrees with 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.



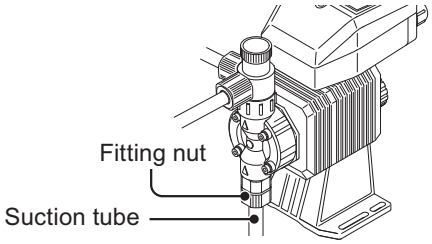
5 Reconnect the discharge tube.

■ Suction valve set disassembly/assembly

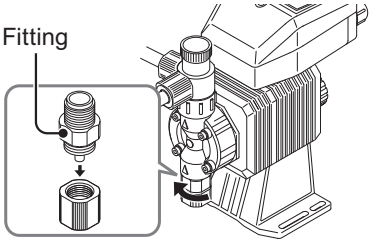
NOTE

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.



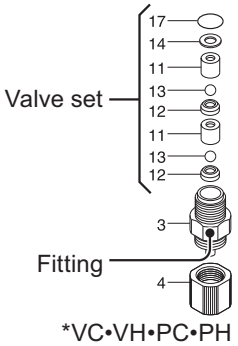
3 Pull out the valve set by a pair of tweezers.

4 Hand-tighten the fitting with the valve set in it into the pump head as far as it will go. Retighten it by a further 1/4 turn with 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.

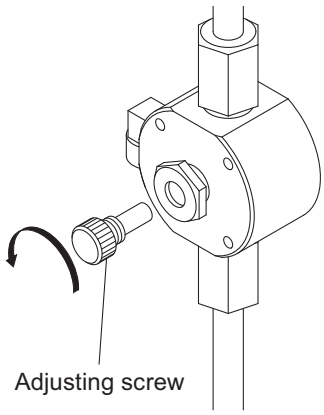
*Keep the valve set free from dust or foreign matters.



5 Reconnect the suction tube.

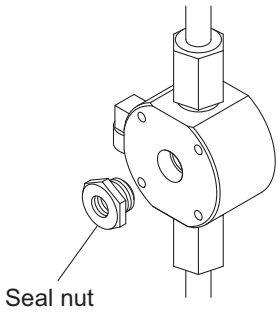
Air vent valve set replacement (SH type)

1 Rotate the adjusting bolt anticlockwise until it comes off.



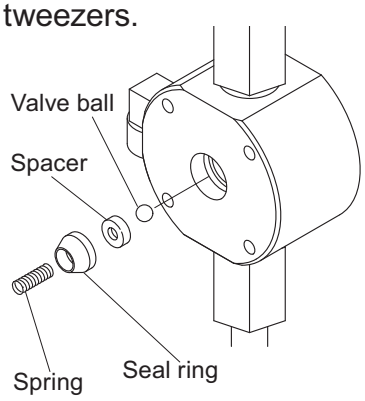
2 Rotate the seal nut clockwise by an adjustable wrench or a spanner until it comes off.

*Seal nut threads are left-handed.



3 Pull out the spring, seal ring, spacer and valve ball by a pair of tweezers.

*Seal nut threads are left-handed.

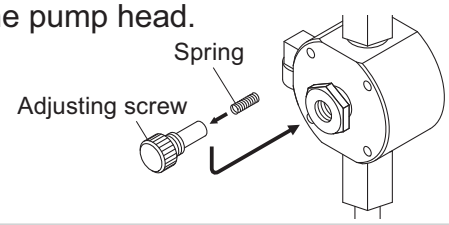


4 Replace the seal ring, spacer and valve ball with new ones.

*Keep free from dust.

5 Hand-tighten the seal nut with the valve set in it into the pump head as far as it will go. Retighten it by a further 1/4 turn with an adjustable wrench or a spanner.

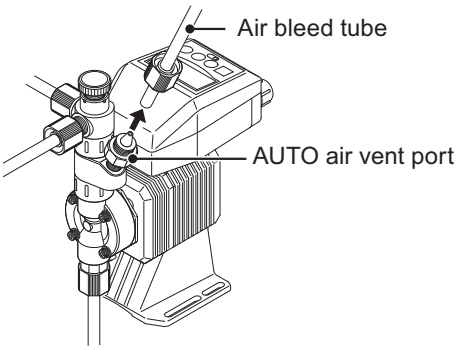
6 Hand-tighten the adjusting bolt with the spring in it into the pump head.



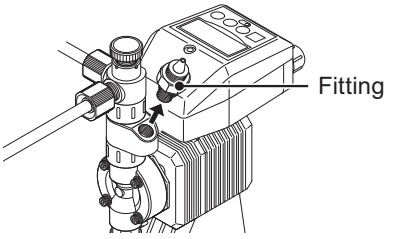
Air vent valve set replacement (NAE type)

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

*Be careful not to get wet with a residual chemical.



2 Loosen and remove the fitting.



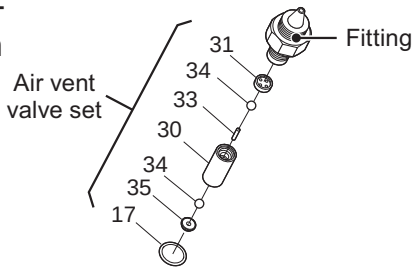
3 Take the air vent valve set out of the fitting adapter.

4 Place a new air vent valve set into the fitting and then hand-tighten it into the fitting adapter as far as it will go. Retighten the fitting by a further 1/4 turn with 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 air bleed tube.

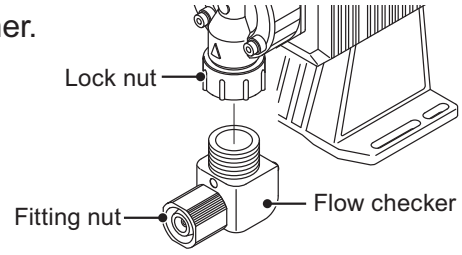
Flow checker replacement (FCM/XFCM)

Necessary tools

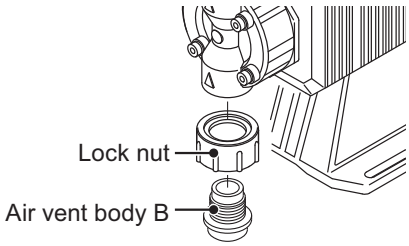
• Adjustable wrench or spanner • 17mm box wrench • A pair of tweezers

1 Loosen the fitting nut to remove a suction tube from the flow checker.

2 Loosen the lock nut by an adjustable wrench or a spanner.



3 Remove the air vent body B by an adjustable wrench or a spanner.



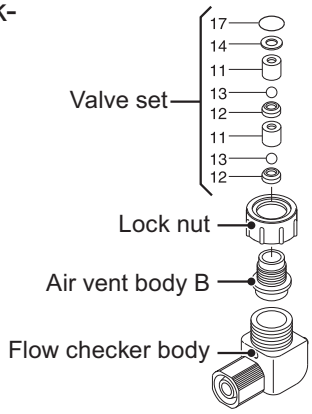
4 Pull out the valve set by a pair of tweezers.

5 Replace the valve set into the air vent body B of another flow checker. Hand-tighten the air vent body B with the valve set in it into the pump head as far as it will go.

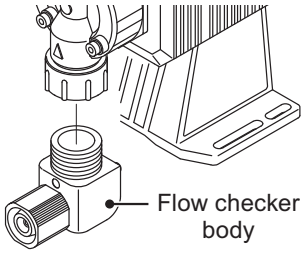
*Be careful not to misarrange the valve set or misplace upside down. Otherwise, leakage or flow rate reduction may result.

*Do not forget to fit O rings and gaskets.

*Keep the valve set free from dust or foreign matters.

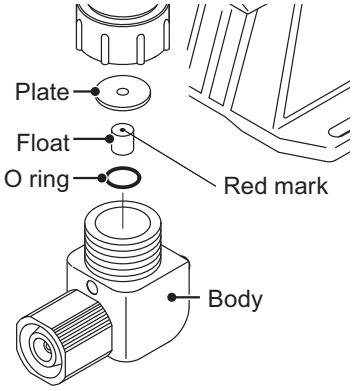


6 Fit and hand-tighten the flow checker body.



NOTE

- Do not displace the plate, float and O ring. These parts must be placed in the right order.
- Always mount the float with the red-mark end first.



7 Reconnect the suction tube.

Diaphragm replacement

Necessary tools

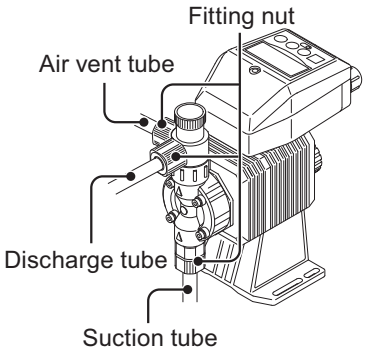
- Adjustable wrench or spanner
- Hexagon wrench
- Torque wrench

NOTE

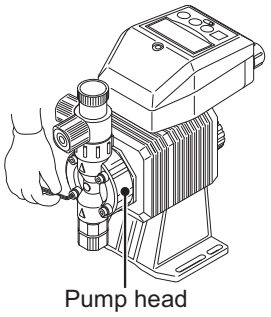
Pay attention not to loose diaphragm spacers. Always apply a proper number of diaphragm spacers. 0 or a few diaphragm spacers are inserted between the retainer and plunger for the adjustment of diaphragm location. Note that the number of diaphragm spacers varies with pump model.

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.

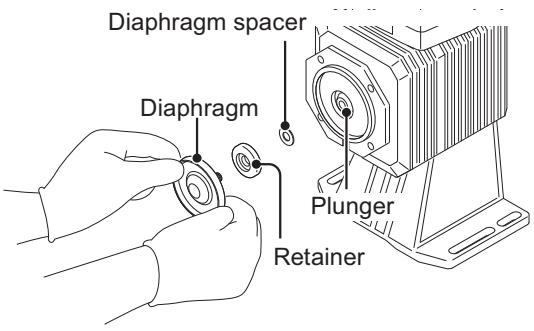


3 Remove the pump head with a hexagon wrench.



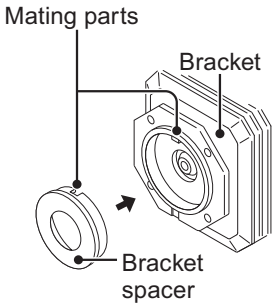
4 Rotate and remove the diaphragm from the plunger (pump shaft).

5 Slide a retainer and diaphragm spacer(s) onto the screw of a new diaphragm.



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 new diaphragm into the plunger as far as it will go.

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 evenly to the following torque in diagonal order.

Tightening torque

Model code	Torque	Bolts
EHN-B11/-B16/-B21	2.16 N•m	M4 Hex. socket head bolt
EHN-B31	2.55 N•m	M4 Hex. socket head bolt
EHN-C16/-C21	2.16 N•m	M4 Hex. socket head bolt
EHN-C31	2.55 N•m	M4 Hex. socket head bolt
EHN-C36	2.55 N•m	M5 Hex. socket head bolt

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

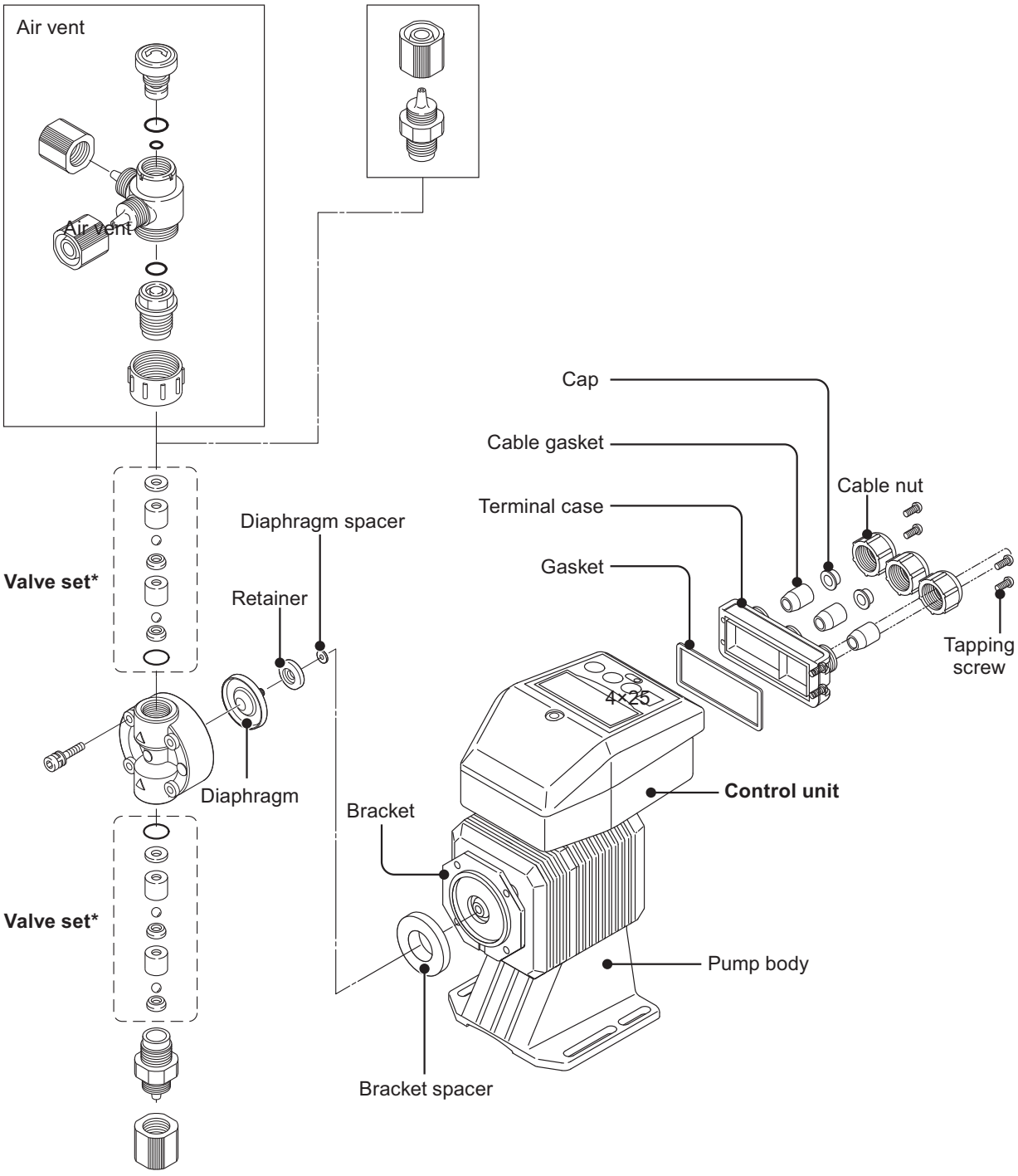
Exploded view

Pump head, Drive unit & Control unit

Do not dismantle the pump beyond the extent shown in the diagram below.

EHN-B/-C 11/16/21

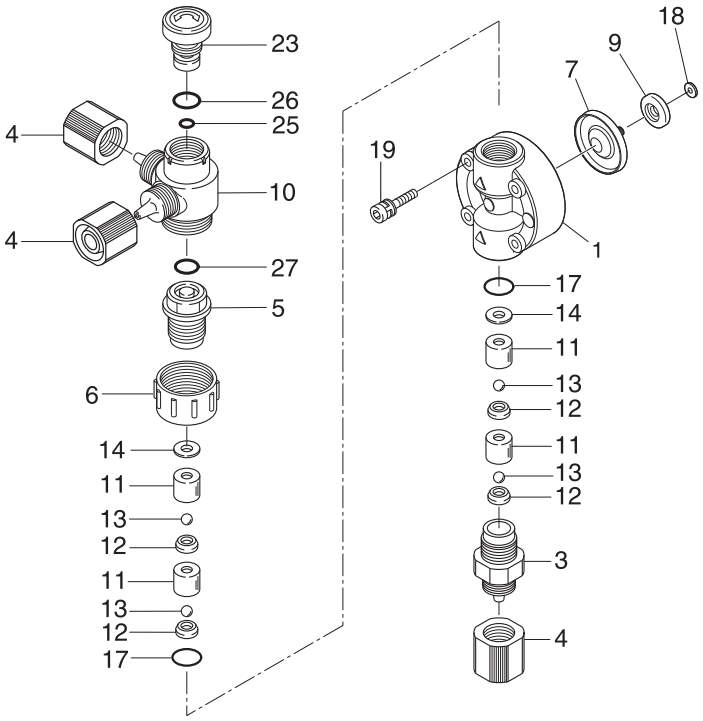
EHN-B/-C 31/36
EHN-C 36



*Pump head material and size differ with models.

Pump head

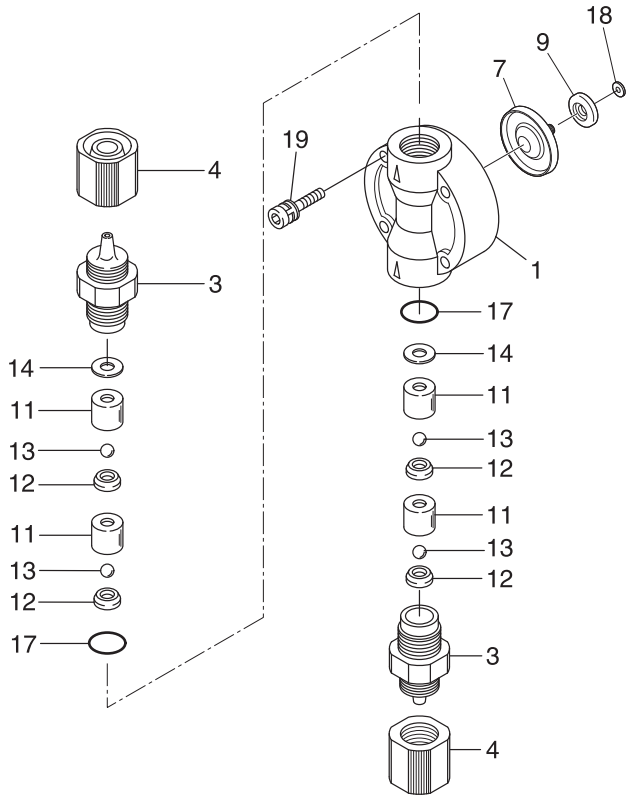
■ EHN-B11/-B16/-B21/-C16/-C21 VC/VH/PC/PH



No.	Part names	# of parts
1	Pump head	1
3	Fitting	1
4	Fitting nut	3
5	Air vent body B	1
6	Lock nut	1
7	Diaphragm	1
9	Retainer	1
10	Air vent body A	1
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket	2
17	O ring	2
18	Diaphragm spacer	*
19	Hex socket cap bolt [PW•SW]	4
23	Adjusting screw	1
25	O ring	1
26	O ring	1
27	O ring	1

*The number of diaphragm spacers varies with pump model.

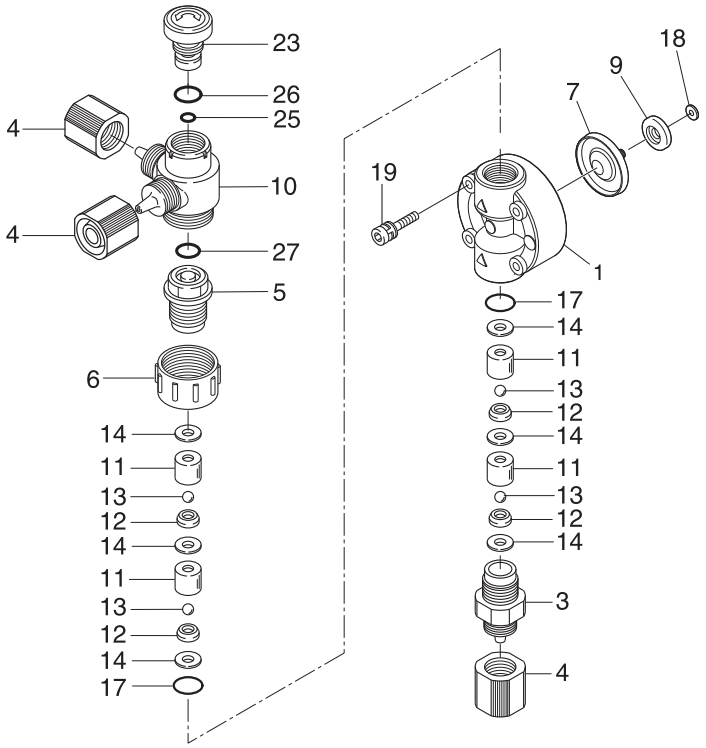
■ EHN-B31/-C31/-C36 VC/VH/PC/PH



No.	Part names	# of parts
1	Pump head	1
3	Fitting	2
4	Fitting nut	2
7	Diaphragm	1
9	Retainer	1
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket	2
17	O ring	2
18	Diaphragm spacer	*
19	Hex socket cap bolt [PW•SW]	4

*The number of diaphragm spacers varies with pump model.

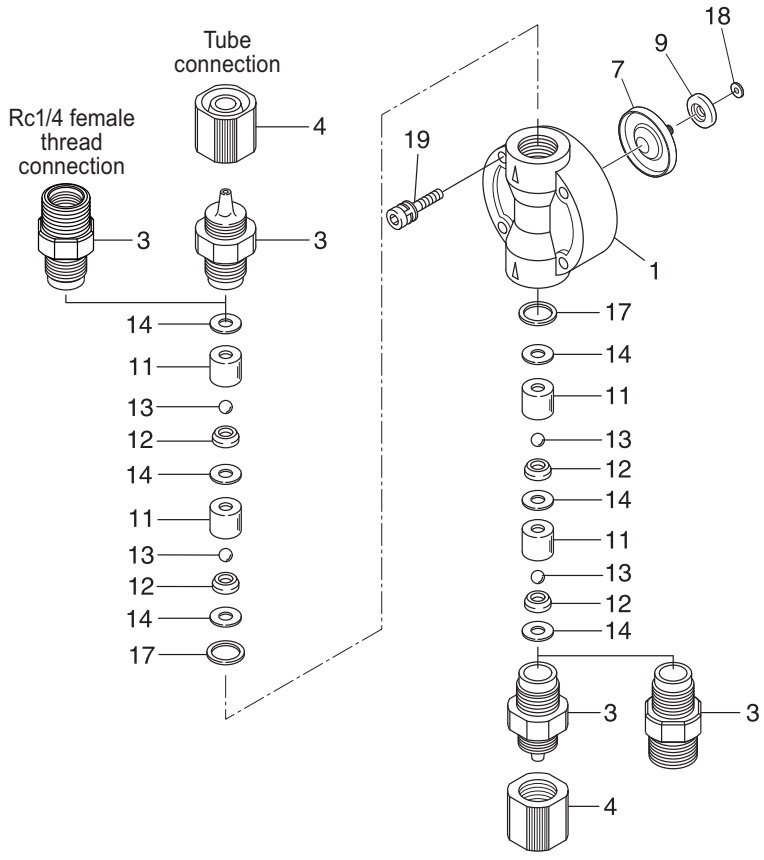
■ EHN-B11/-B16/-B21/-B31/-C16/-C21/-C31/-C36 PP



No.	Part names	# of parts
1	Pump head	1
3	Fitting	1(2)
4	Fitting nut	3(2)
5	Air vent body B	1(0)
6	Lock nut	1(0)
7	Diaphragm	1
9	Retainer	1
10	Air vent body A	1(0)
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket	6
17	O ring	2
18	Diaphragm spacer	*
19	Hex socket cap bolt [PW•SW]	4
23	Adjusting screw	1(0)
25	O ring	1(0)
26	O ring	1(0)
27	O ring	1(0)

*The parenthetic figures are for EHN-31/-C31/-C36.
*The number of diaphragm spacers varies with pump model.

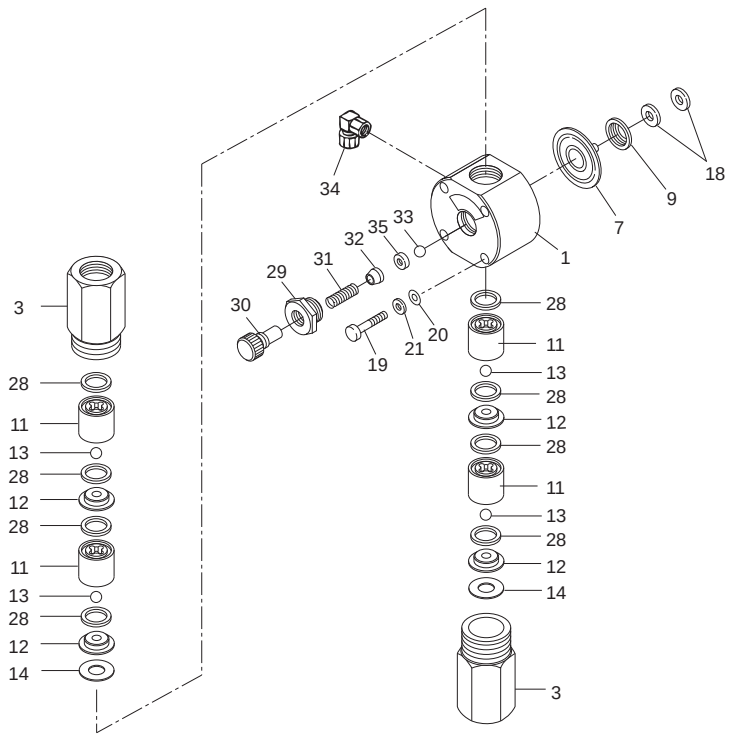
■ EHN-B11/-B16/-B21/-B31/-C16/-C21/-C31/-C36 FC



No.	Part names	# of parts
1	Pump head	1
3	Fitting	2
4	Fitting nut	2
7	Diaphragm	1
9	Retainer	1
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket	6
17	Gasket	2
18	Diaphragm spacer	*
19	Hex socket cap bolt [PW•SW]	4

*The number of diaphragm spacers varies with pump model.
*The Rc1/4 female thread connection type will not have the #4 fitting nut.

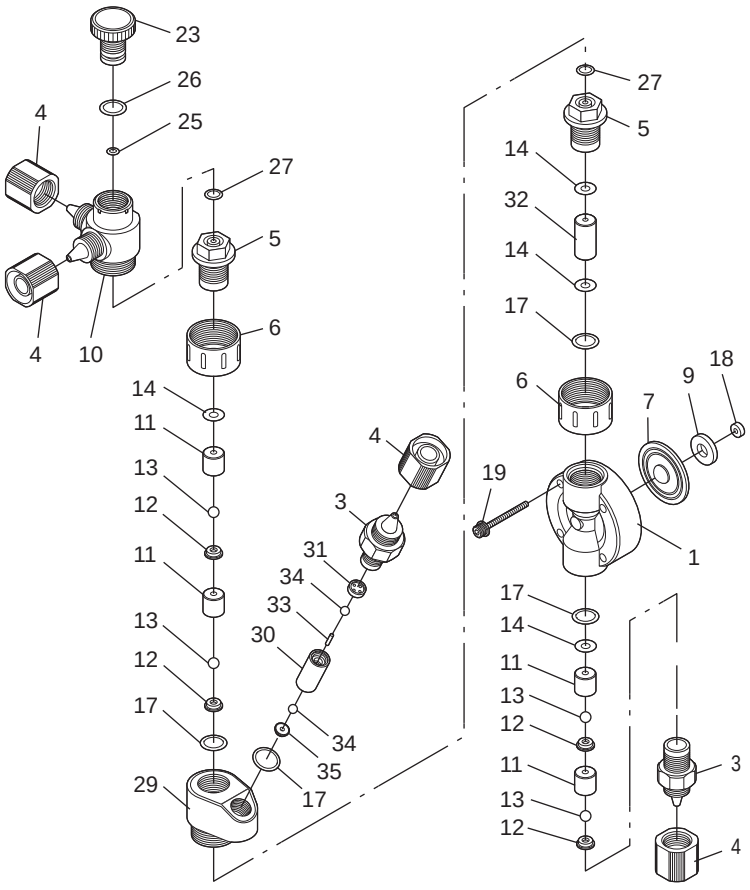
■ EHN-B11/-B16/-B21/-B31/-C16/-C21/-C31/-C36 SH



No.	Part names	# of parts
1	Pump head	1
3	Fitting	2
7	Diaphragm	1
9	Retainer	1
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket B	2
18	Diaphragm spacer	*
19	Hex socket cap bolt	4
20	PW	4
21	SW	4
28	Valve gasket A	8
29	Seal nut	1
30	Adjusting bolt	1
31	Spring	1
32	Seal ring	1
33	Valve ball	1
34	Tube connector	1
35	Spacer	1

*The number of diaphragm spacers varies with pump model.

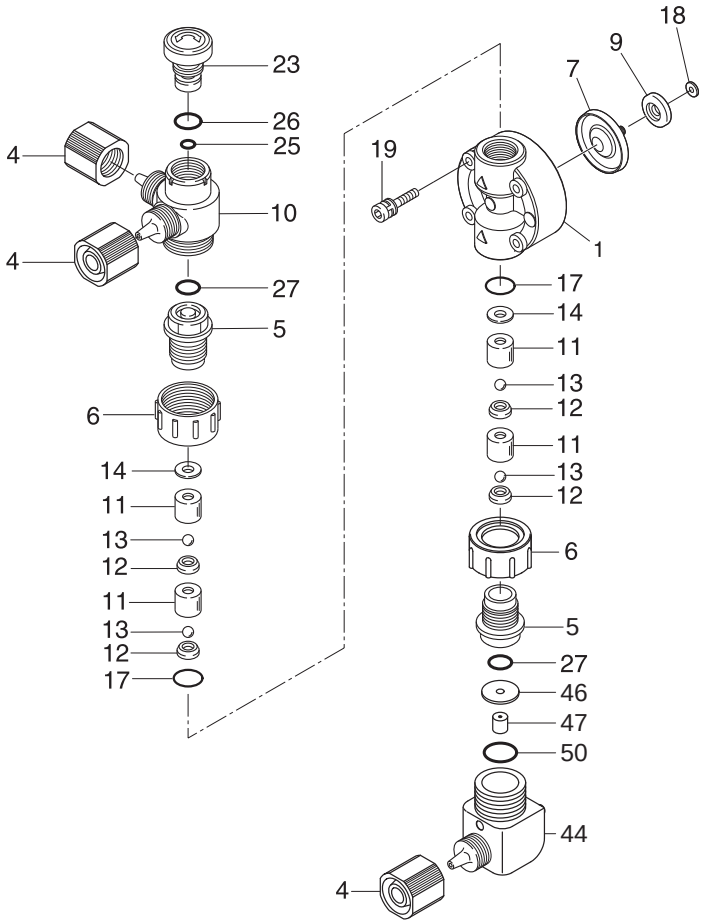
■ EHN-B11/-B16/-B21/-B31/-C16/-C21/-C31/-C36 -NAE



No.	Part names	# of parts
1	Pump head	1
3	Fitting	2
4	Fitting nut	4
5	Air vent body B	2
6	Lock nut	2
7	Diaphragm	1
9	Retainer	1
10	Air vent body A	1
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket	4
17	O ring (S14)	4
18	Diaphragm spacer	*
19	Hex socket cap bolt [PW•SW]	4
23	Adjusting screw	1
25	O ring (P4)	1
26	O ring (P10A)	1
27	O ring (P7)	2
28	Fitting adapter	1
30	Air vent valve guide A	1
31	Air vent valve guide B	1
32	Spacer	1
33	Separate pin	1
34	Valve	2
35	Valve seat	1

*The number of diaphragm spacers varies with pump model.

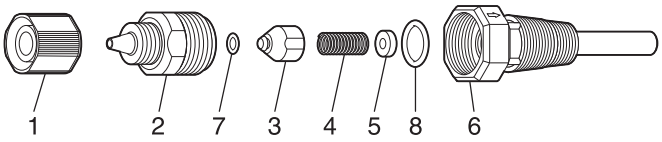
■ EHNB-11/-B16/-B21/-B31/-C16/-C21/-C31/-C36 -FCM/-XFCM



No.	Part names	# of parts
1	Pump head	1
4	Fitting nut	3
5	Air vent body B	2
6	Lock nut	2
7	Diaphragm	1
9	Retainer	1
10	Air vent body A	1
11	Valve guide	4
12	Valve seat	4
13	Valve	4
14	Valve gasket	2
17	O ring	2
18	Diaphragm spacer	*
19	Hex socket cap bolt [PW•SW]	4
23	Adjusting screw	1
25	O ring	1
26	O ring	1
27	O ring	2
44	Flow checker body	1
46	Plate	1
47	Float	1
50	O ring	1

*The number of diaphragm spacers varies with pump model.

Check valve (VC/VH/PC/PH)



No.	Part names	# of parts
1	Fitting nut	1
2	Valve case	1
3	Poppet	1
4	Spring	1
5	Spacer	1(0)
6	Valve fitting A	1
7	O ring	1
8	O ring	1

The parenthetic figure is for the CA-2 □□L-□.

Specifications/Outer dimensions

Specifications

Information in this section is subject to change without notice.

■ Pump

VC/VH/PC/PH/PP

Model code	Flow rate ml/min	Discharge pressure MPa	Stroke length mm (%)	Stroke rate spm	Connection mm	Power con. W	Current value A	Weight kg
EHN-B11	38	1.0	0.5-1.0 (50-100)	1-360	ø4×ø9	20	0.8	1.8
EHN-B16	65	0.7						
EHN-B21	100	0.4						
EHN-B31	230	0.2			ø8×ø13			
EHN-C16	80	1.0	0.5-1.25 (40-100)		ø4×ø9	24	1.2	2.9
EHN-C21	130	0.7						
EHN-C31	270	0.35			ø8×ø13			
EHN-C36	450	0.2						

FC

Model code	Flow rate ml/min	Discharge pressure MPa	Stroke length mm (%)	Stroke rate spm	Connection mm	Power con. W	Current value A	Weight kg
EHN-B11	38	1.0	0.5-1.0 (50-100)	1-360	ø4×ø6	20	0.8	1.8
EHN-B21	100	0.4						
EHN-C21	130	0.7	0.5-1.25 (40-100)		ø10×ø12	24	1.2	2.9
EHN-C31	270	0.35						
EHN-C36	410	0.2						

SH

Model code	Flow rate ml/min	Discharge pressure MPa	Stroke length mm (%)	Stroke rate spm	Connection mm	Power con. W	Current value A	Weight kg
EHN-B11	38	1.0	0.5-1.0 (50-100)	1-360	Rc1/4 female thread	20	0.8	2.4
EHN-B21	100	0.4						
EHN-C21	130	0.7	0.5-1.25 (40-100)			24	1.2	4.1
EHN-C31	270	0.35						
EHN-C36	410	0.2						

NAE

Model code	Flow rate ml/min	Discharge pressure MPa	Stroke length mm (%)	Stroke rate spm	Connection mm	Power con. W	Current value A	Weight kg
EHN-B11	30	1.0	0.5-1.0 (50-100)	1-360	ø4×ø9	20	0.8	1.8
EHN-B16	55	0.7						
EHN-C16	65	1.0	0.5-1.25 (40-100)			24	1.2	2.9
EHN-C21	110	0.7						

*These specifications were collected at the time of our shipping inspection and based on pumping clean water at ambient temperature and rated voltage.

*Flow rates were collected at the maximum discharge pressure, 100% stroke length and 100% stroke rate. A flow rate increases as a discharge pressure decreases.

*Allowable room temperature: 0-40°C

*Allowable liquid temperature: 0-40°C (0-60°C for the PC/PH/PP/FC/SH types)

*EHN-B21 PP and EHN-C16 PP are not available.

*Allowable power voltage deviation: ±10% of the rated range

■ Control unit

Operation mode	Mode	Manual
		EXT (Multiplier or divisor)
	Mode selection	Key operation
Stroke rate	Setting range	1-360spm
	Spm programming	UP and DOWN keys
STOP function	M-OF	The pump stops during contact input.
	M-ON	The pump runs during contact input.
	Input signal	No-voltage contact or open collector*1
EXT mode	Digital control	n (1-999) shots per signal (Multiplier)*2 n (1-999) signals per shot (Divisor)*3 1:1 operation with n=1 The pump runs at a MAN speed during this mode.
	Analog control	Set point 1 0-20mA, 0-360spm Set point 1 0-20mA, 0-360spm
	Input signal	No-voltage contact or open collector*1
Control function	PRIME	Max spm operation while the UP and DOWN keys are pressed.
	Keypad lock	Keypad lock and release
AUTO restoration	Pre-Alarm time	OFF/1-60min
	Alarm time	OFF/1-60min
	Return time	OFF/1-60min, OFF/1-60sec
Output	No voltage contact (photoMOS relay) 24VAC/DC 0.1A PA AL/PA/AL/SPM are settable.	
Indicator	Numeric indication	4-digit LCD
	Operation	Green LED (Blinks at each shot)
Buffer		Non-volatile memory
Power voltage*4		100-240VAC 50/60Hz

*1 The maximum applied voltage from the EHN-YN to an external contact is 12V at 5mA. When using a mechanical relay, the minimum application load should be 5mA or below.

*2 When the pump receives the external pulse signal during operation for the set number of shots per signal, the received signal is stored up to 255 pulses.

*3 When the external pulse signal is entered to run the pump over the MAN speed, the signal is cancelled.

*4 Observe the specified power voltage range. Otherwise failure may result. The allowable voltage range is 90-264VAC.

■ Power cable

Conduction section area	0.75 [mm^2] (Duplex cable)
Length	1500 [mm]
Standard	VCTFK
Terminal treatment	Spade terminal (V1.25-YS4A or equivalent)

■ Pump colour

Blue	Munsell colour system 7.5PB 3/8
Red	Munsell colour system 5R 3/10

Accessories

Model code		Set pressure MPa	Connection bore mm	Wet ends	Applicable pump models	Wet end codes
	CA-1VC-4	0.17	ø4×ø9	PVC	EHN-B11/-B16/-B21 EHN-C16/-C21	VC
	CA-1VE-4					VH
	CA-2VC-8		ø8×ø13		EHN-C31	VC
	CA-2VE-8					VH
	CA-2VCL-8	0.05			EHN-B31 EHN-C36	VC
	CA-2VEL-8					VH
	CA-1V-4	0.17	ø4×ø9	GFRPP	EHN-B11/-B16/-B21 EHN-C16/-C21	PC/PP
	CA-1E-4					PH
	CA-2V-8		ø8×ø13		EHN-C31	PC/PP
	CA-2E-8					PH
	CA-2VL-8	0.05			EHN-B31 EHN-C36	PC/PP
	CA-2EL-8					PH
	CS-1S	0.2	Rc1/4	SUS316 Hastelloy C PTFE	EHN-B11/-B21 EHN-C21/-C31	SH
	CS-1SL	0.05			EHN-C36	
BP valve	BVC-1TV-4H	0.2	ø4×ø6	PVDF	EHN-B11/-B21/-C21	FC
	BVC-1TV-10H		ø10×ø12		EHN-C31	
		0.1			EHN-C36	

Options

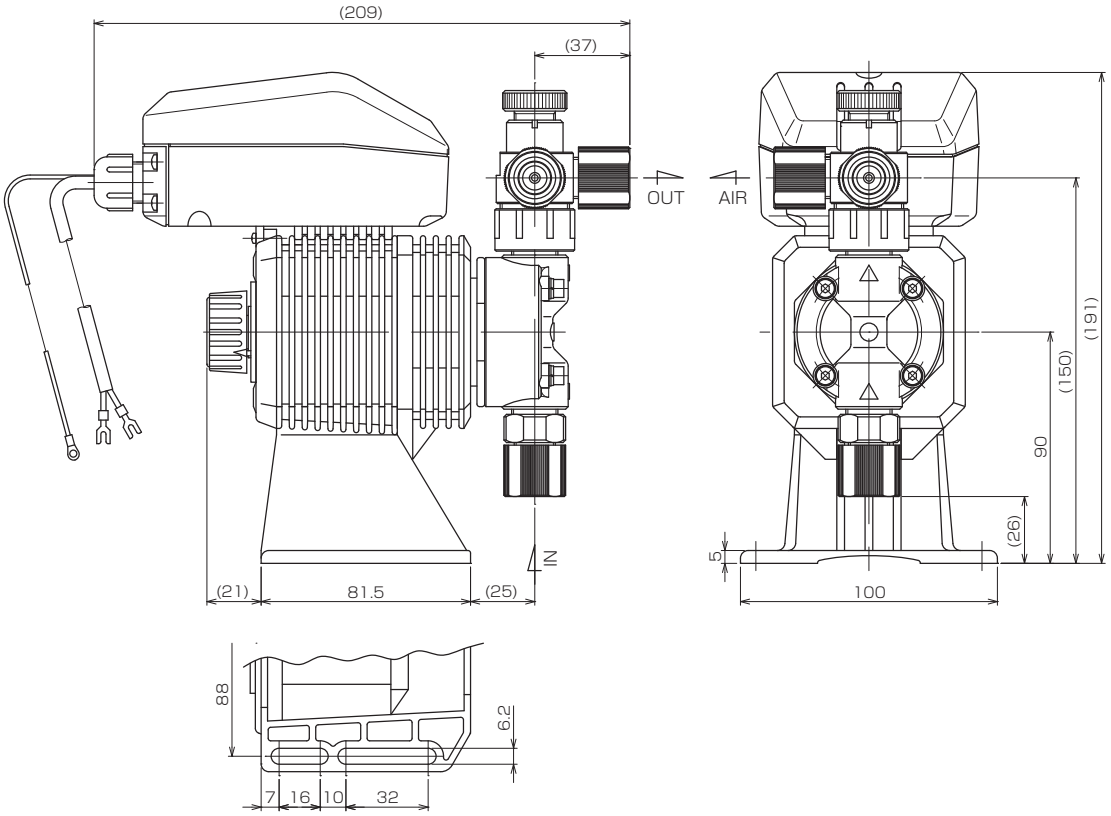
■ **Air vent valve**

Model	Connection	Material		Applicable pump	Wet end code
	Tube	Body	Rubber		
AV-E30/35VC-4	ø8×ø13	PVC	FKM	EHN-B31 EHN-C31/-C36	VC
AV-E30/35V6-4			EPDM		VH
AV-E30/35PC-4		GFRPP	FKM		PC
AV-E30/35P6-4			EPDM		PH

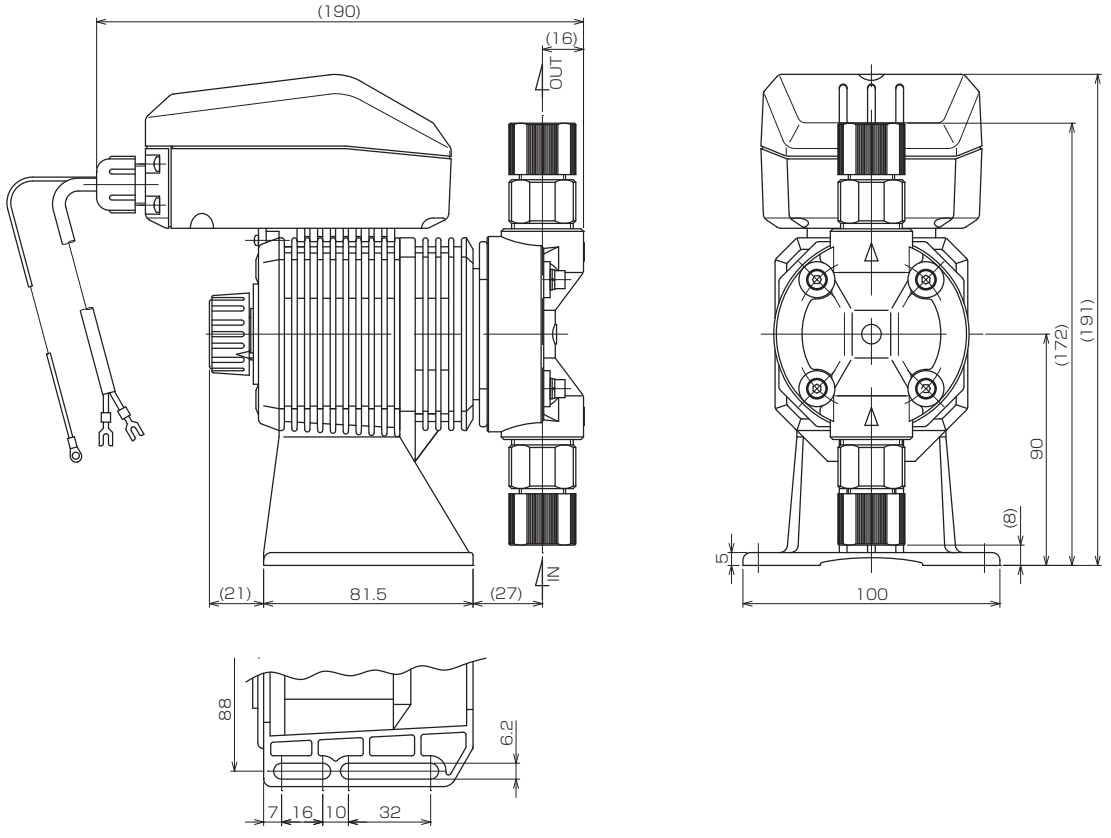
*For the connection of the ø9×ø12 tube, contact us.

Outer dimensions

■ EHN-B11/-B16/-B21 VC/VH/PC/PH/PP



■ EHN-B31 VC/VH/PC/PH/PP



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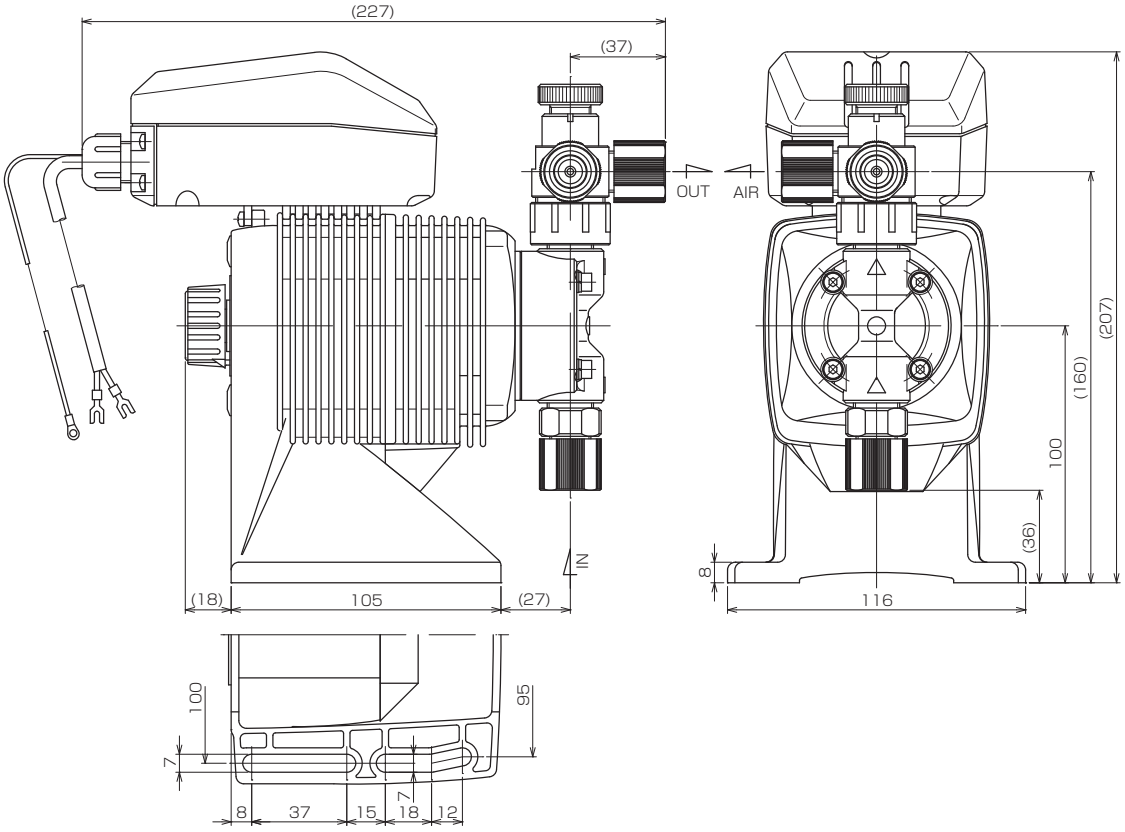
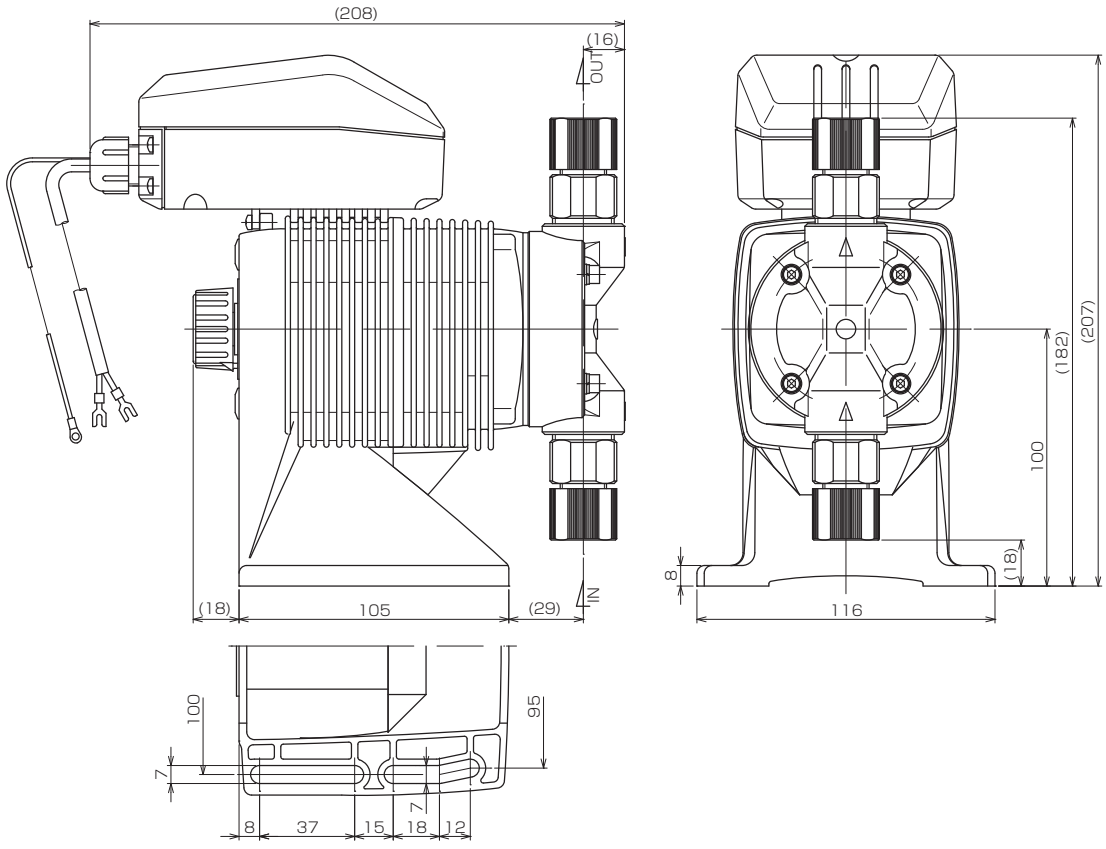
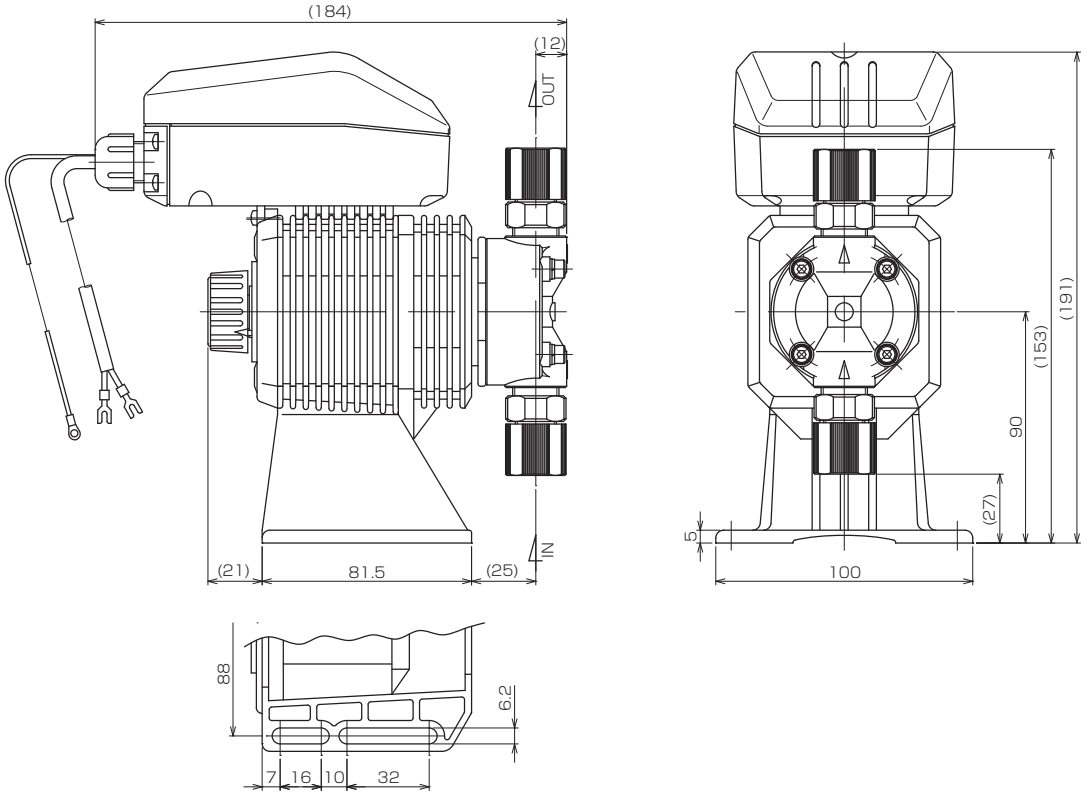


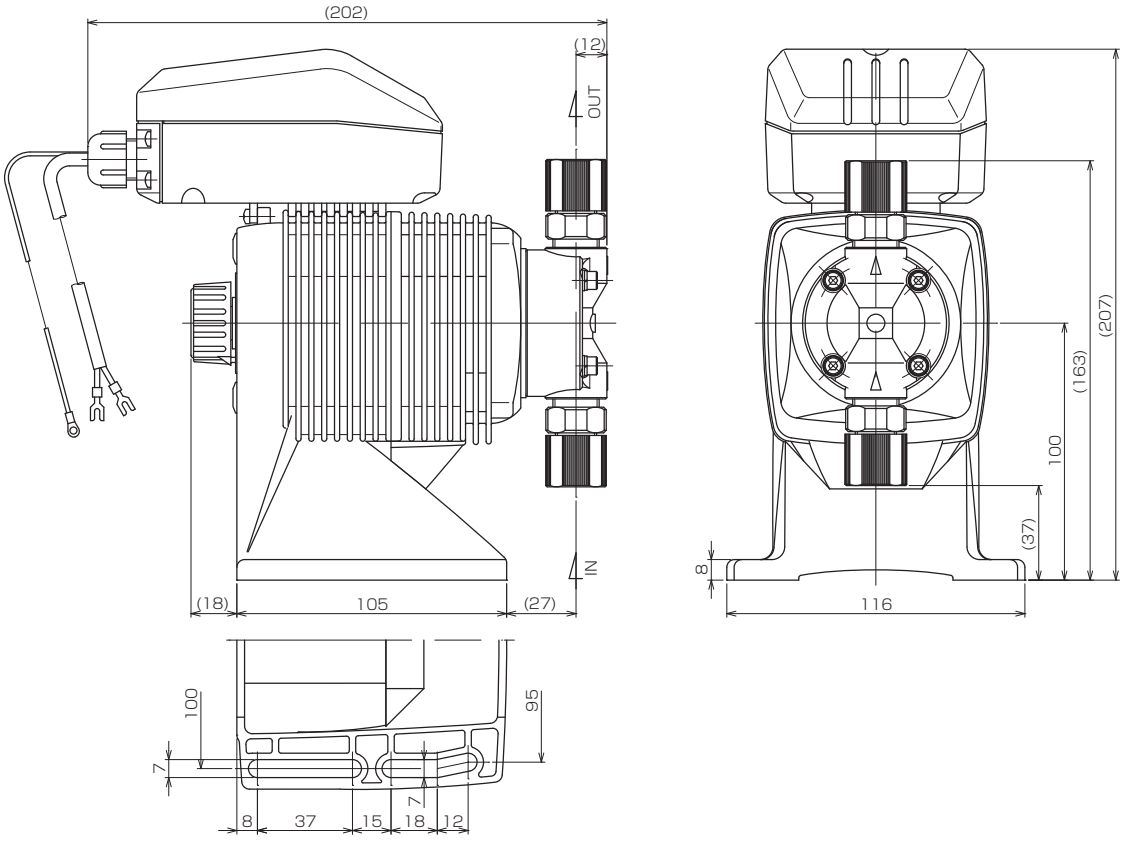
■ EHN-C31/-C36 VC/VH/PC/PH/PP



■ EHN-B11/-B21 FC



■ EHN-C21 FC



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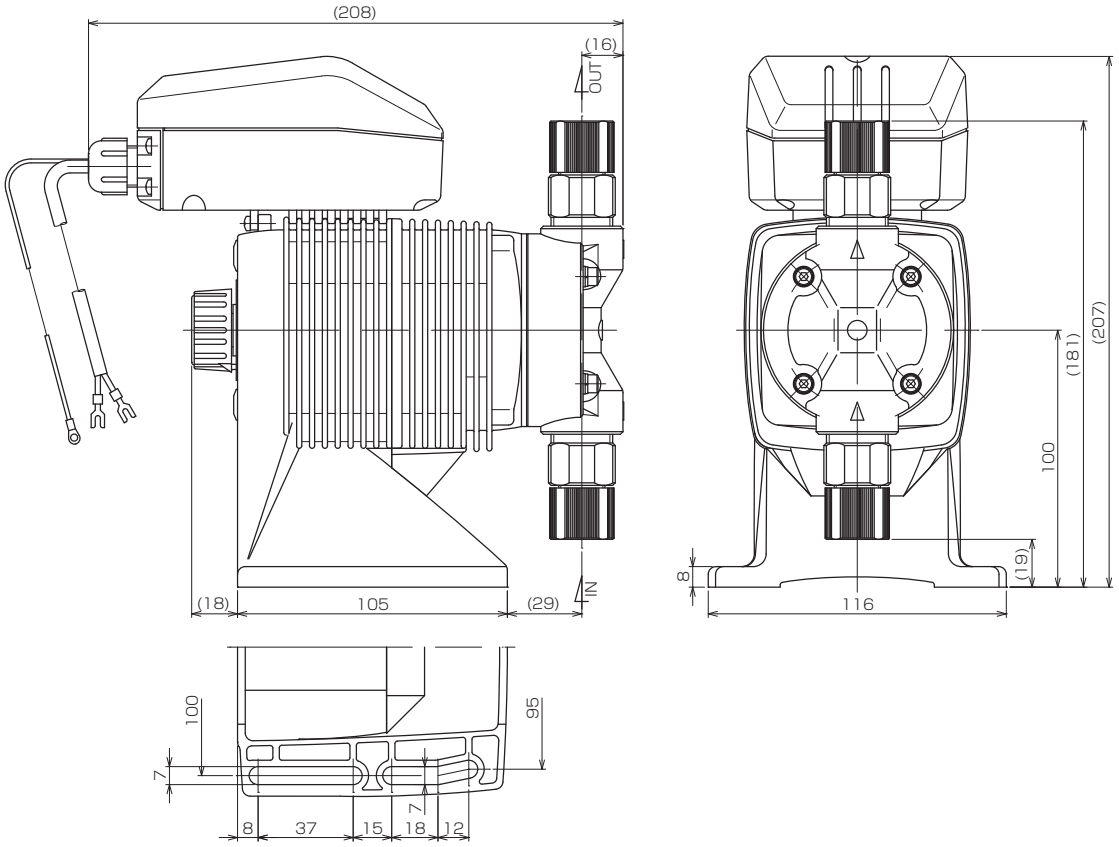
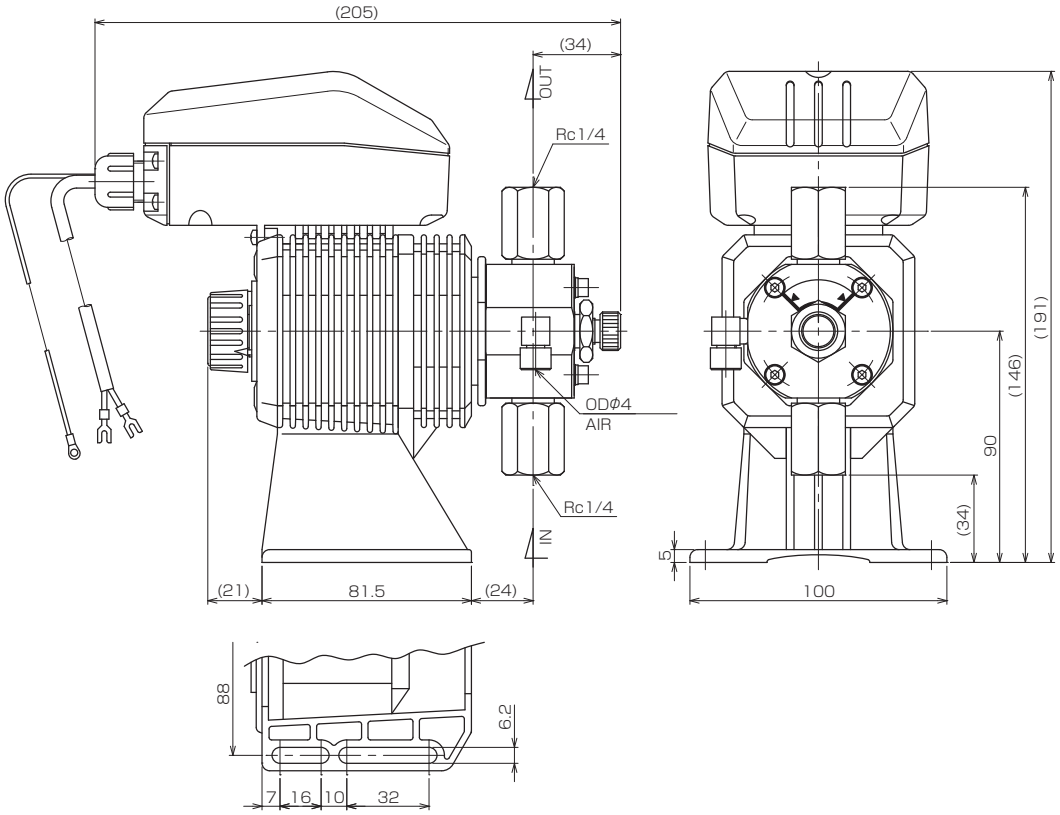


■ EHN-B11/-B21 SH



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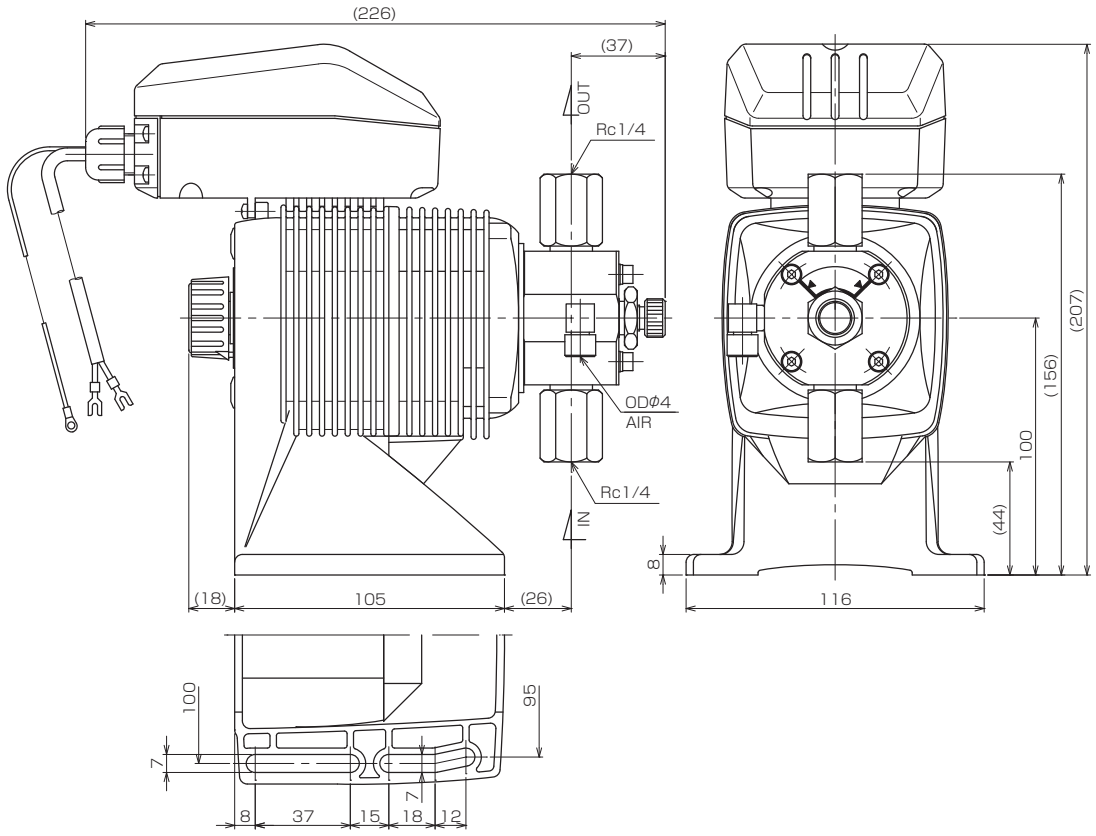

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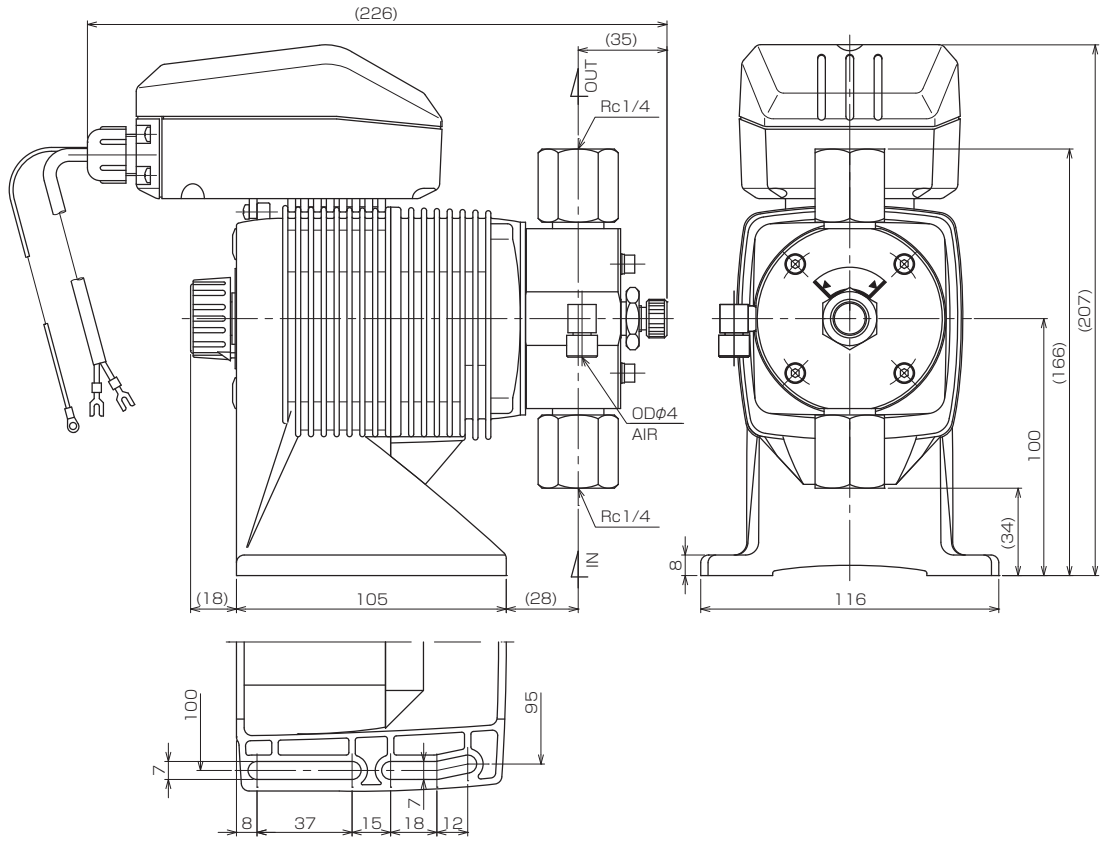

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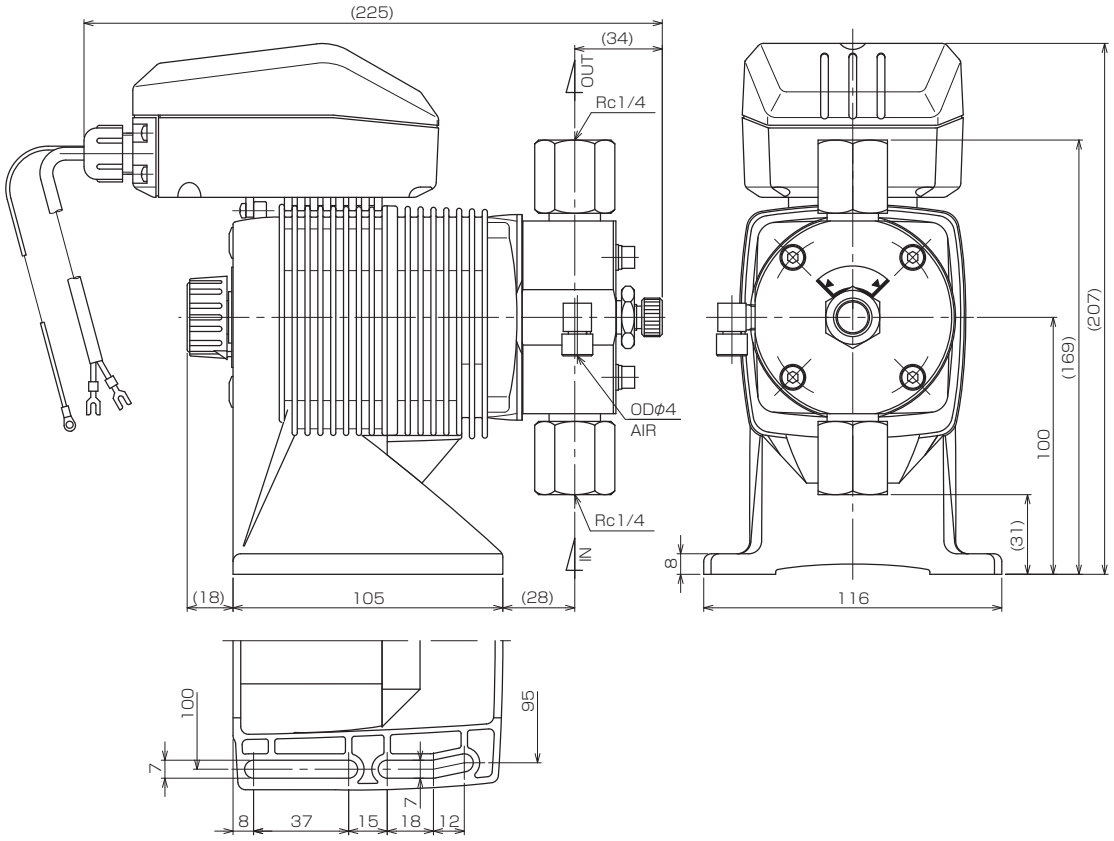
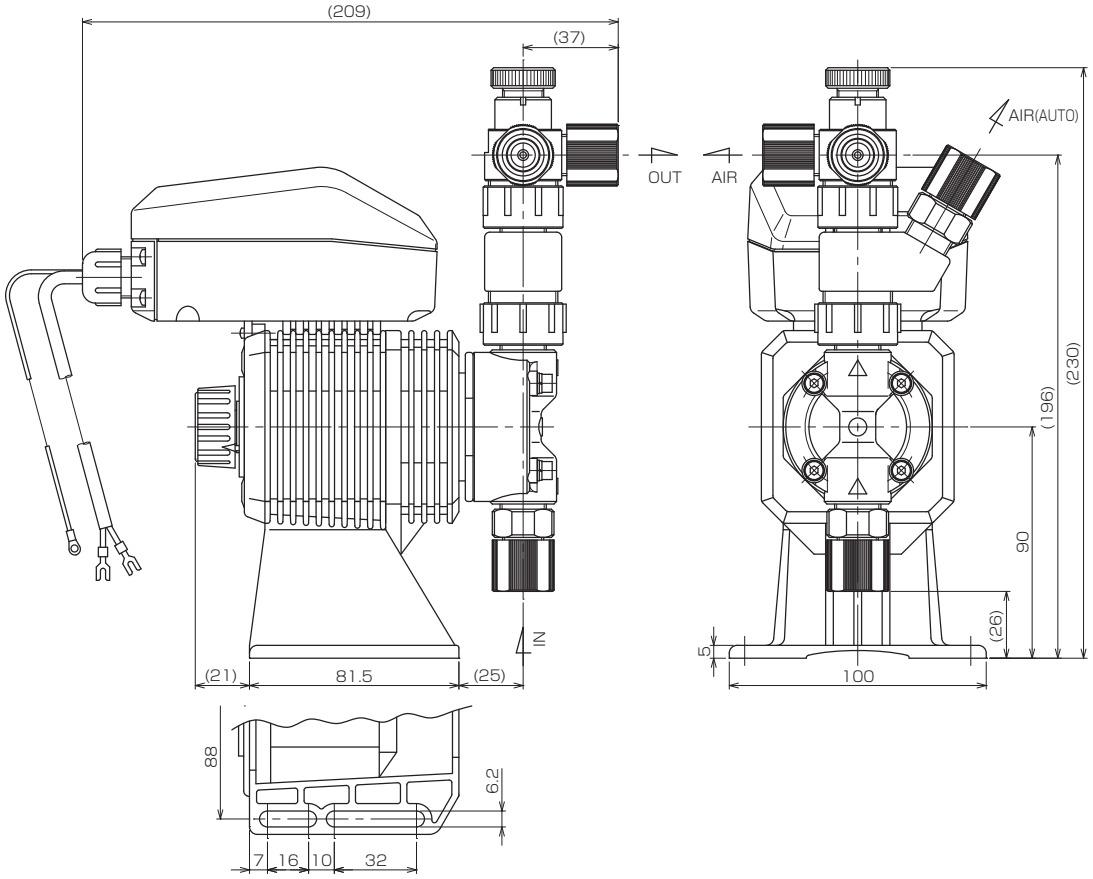


■ EHN-B11/-B16-NAE



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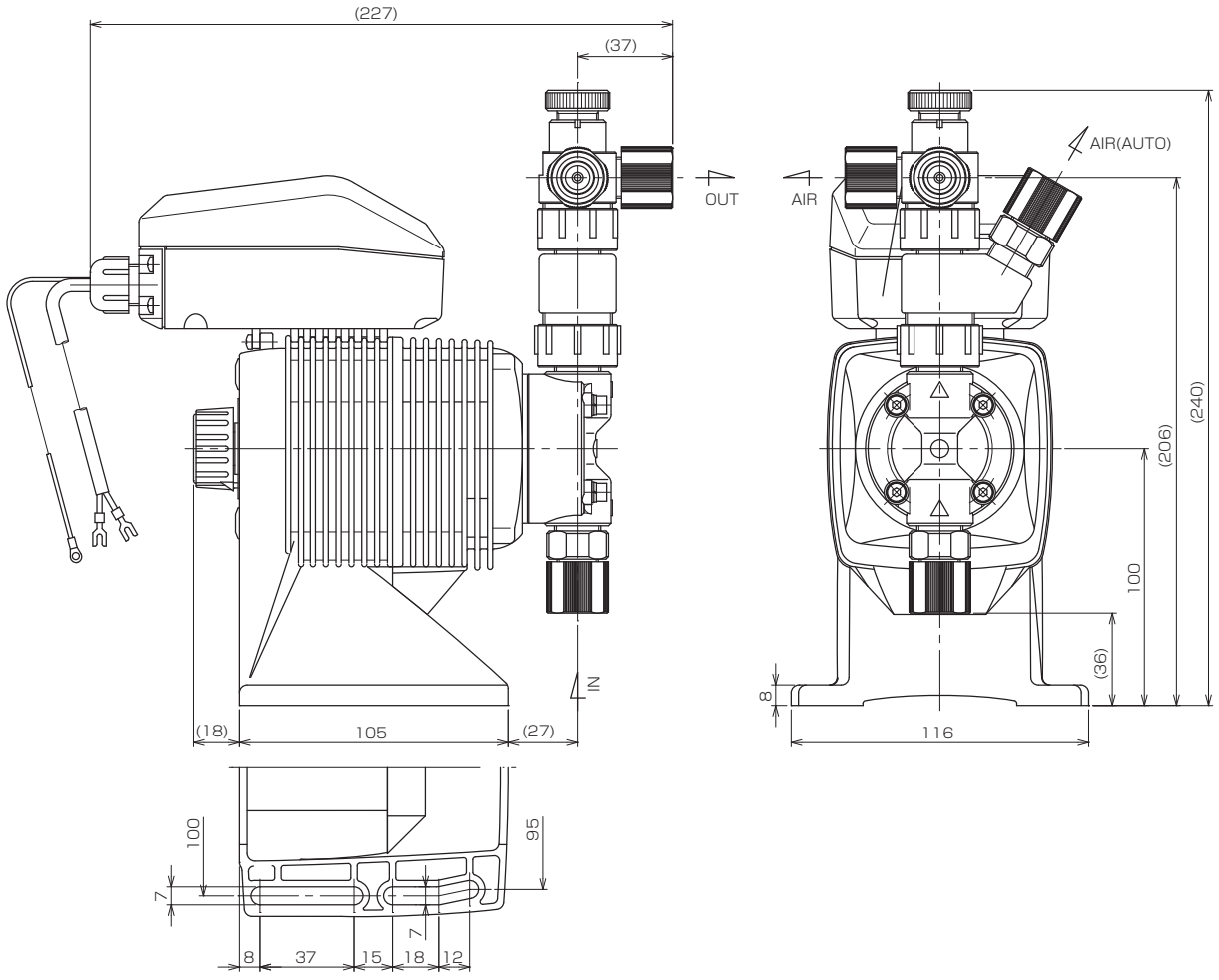

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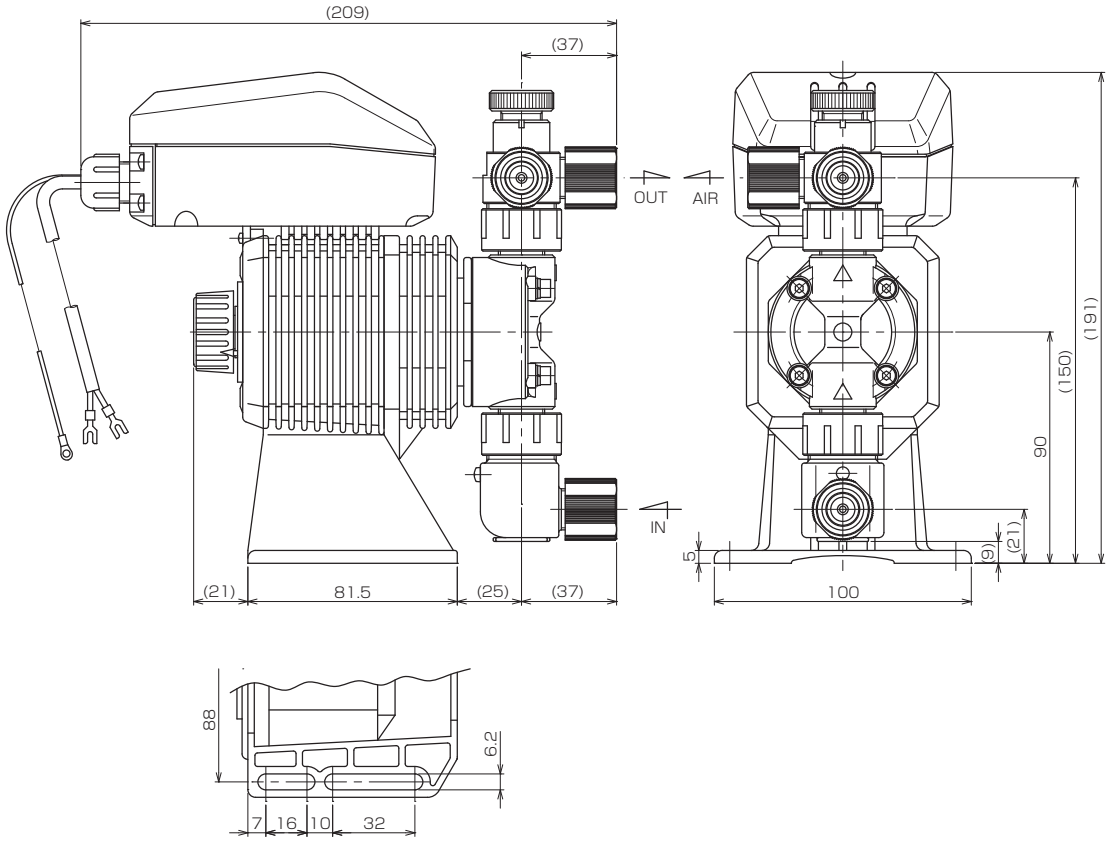

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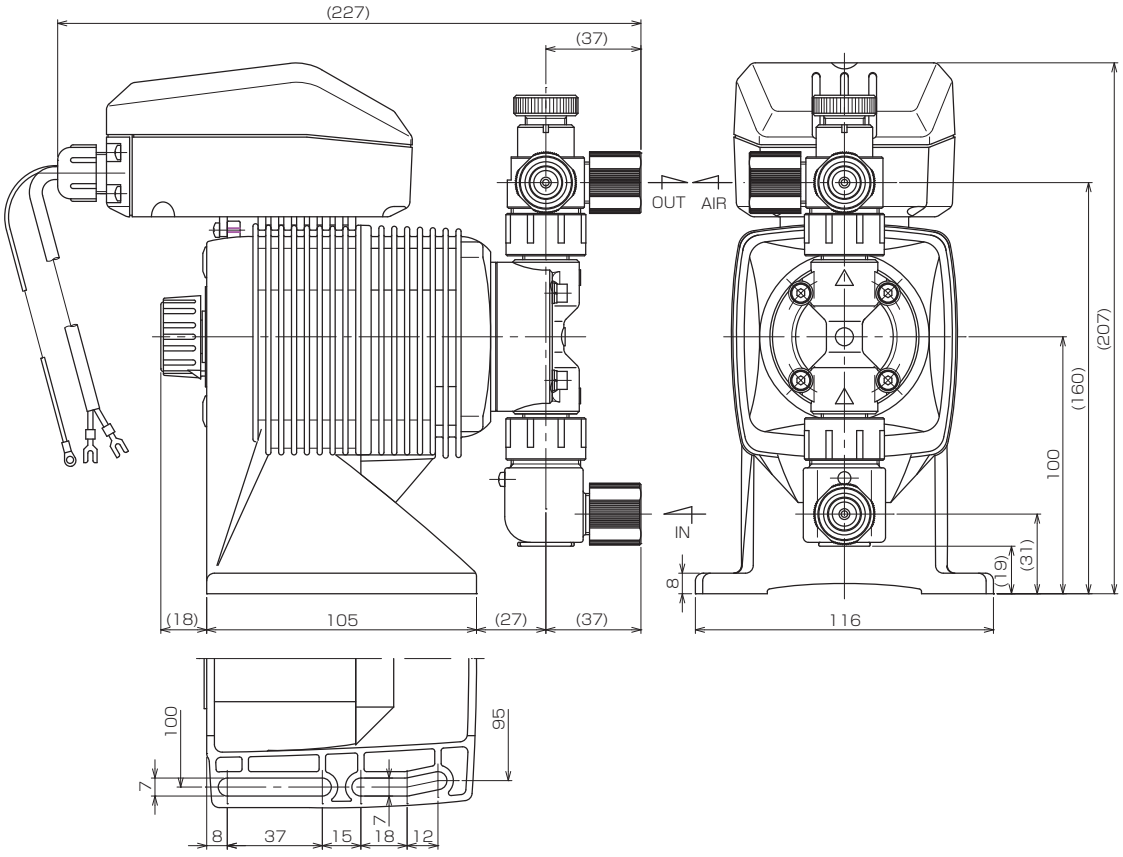

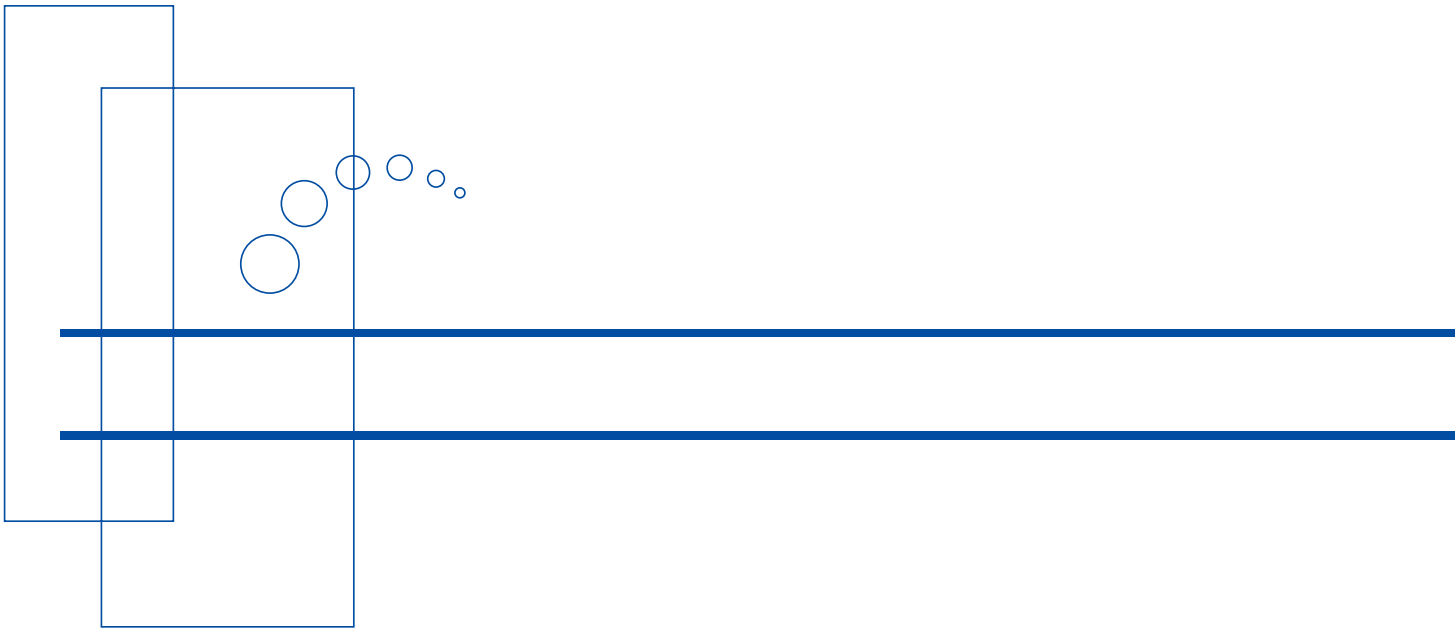

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