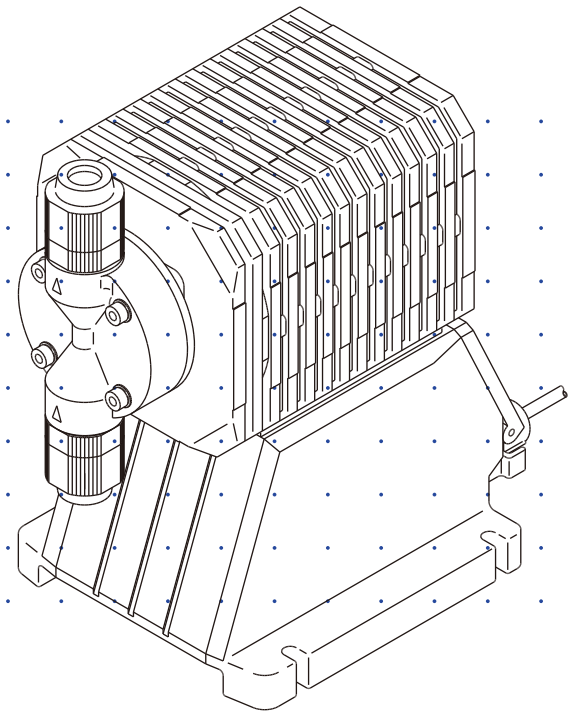
Iwaki
Electromagnetic Metering Pump

EH-E



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.

⚠ Veuillez lire attentivement ce mode d'emploi avant toute utilisation.

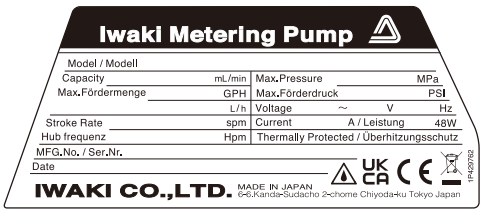
Ce manuel d'instructions décrit les précautions et instructions importantes pour le produit. Gardez-le toujours à portée de main pour consultation rapide.

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.

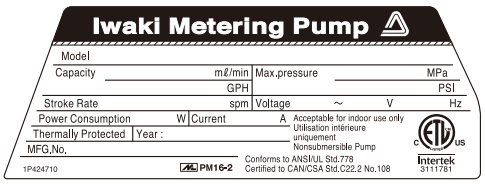
a. Check if the delivery is correct.

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

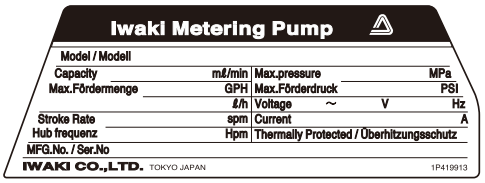


Spec label for the EU/GB markets

*The CE/UKCA markings on our product(s) are for us to market the product(s) into the European Union market / the Great Britain (England, Wales and Scotland) market, however, the CE/UKCA markings do not ensure any safety or conformity of the product(s) outside the EU/GB markets.
When the pump is incorporated into the equipment marketed in the EU/GB markets, such equipment must meet all the requirements of applicable directives/regulations.
In such a case, any person who places the equipment on the markets must carry CE/UKCA marks on the equipment as a manufacturer.



Spec label for the American/Canadian markets



Spec label for any area other than the EU/GB/American/Canadian markets

b. Check if the delivery is damaged or deformed.

Check for transit damage and loose bolts.

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Safety instructions / Consignes de sécurité

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

Veuillez lire attentivement cette section avant toute utilisation. Elle fournit d'importantes informations visant à empêcher toute blessure corporelle ou tout dommage matériel.

■ Symbols / Symboles

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

Dans le présent manuel d'instructions, le degré de risque lié à une utilisation incorrecte de l'équipement est indiqué par les symboles suivants. Veuillez prêter attention aux informations associées à chaque symbole.

⚠ **WARNING**	**Indicates mishandling could lead to a fatal or serious injury accident.**
⚠ **AVERTISSEMENT**	**Indique que toute erreur de manipulation peut conduire à un accident entraînant de graves blessures corporelles ou la mort.**

⚠ **CAUTION**	**Indicates mishandling could lead to personal injury or property damage.**
⚠ **ATTENTION**	**Indique que toute erreur de manipulation peut conduire à des blessures corporelles ou à des dommages matériels.**

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

Chaque mesure de sécurité est accompagnée d'un symbole, qui indique un "Avertissement", des "Actions interdites" ou une "Exigence" particulière.

Caution marks / Symbole d'avertissement

Caution / Attention — Electrical shock / Électrocution

Prohibition marks / Symbole d'interdiction

Prohibition / Interdiction — Do not remodel / Ne pas remanier

Requirement marks / Symbole d'exigence

Requirement / Exigence — Wear protectors / Porter des EPI — Grounding / Mise à la terre

⚠ Export Restrictions / Restrictions à l'exportation

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.

Les informations techniques contenues dans le présent manuel d'instructions peuvent être considérées dans vos pays comme une technologie contrôlée, en raison d'accords dans le cadre du régime international pour le contrôle des exportations.
Veuillez garder à l'esprit qu'un permis/une licence d'exportation peut être nécessaire pour la fourniture du présent manuel d'instructions, en raison de la réglementation relative au contrôle des exportations de votre pays.

⚠WARNING / AVERTISSMENT


Electrical shock
Électrocution

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.

Couper l'alimentation électrique de la pompe avant intervention
Intervenir sur la pompe sans avoir au préalablement coupé l'alimentation électrique peut déclencher des décharges électriques. Avant d'entreprendre n'importe quel type d'intervention, veillez à mettre la pompe et tout dispositif connexe hors tension à l'aide de l'interrupteur prévu à cet effet.


Requirement
Exigence

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

Arrêter le fonctionnement
Si vous détectez une anomalie ou des signes suspects et inhabituels pendant le fonctionnement, interrompez immédiatement les opérations et inspectez, résolvez les problèmes.


Prohibition
Interdiction

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.

Se conformer uniquement aux applications prévues
La pompe doit être utilisée conformément à l'usage pour lequel elle a été prévue et dans le respect de ses caractéristiques techniques. Toute utilisation non conforme peut entraîner un incident ou endommager le dispositif.


Do not remodel
Ne pas remanier

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

Ne pas modifier la pompe
Ne jamais modifier une pompe sous peine de causer un incident grave. Iwaki ne pourra en aucun cas être tenu responsable d'un incident ou de dégâts survenus à la suite d'une modification du dispositif.


Wear protectors
Porter des EPI

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 SDS precautions from the solution supplier.

Porter un équipement de protection
Toujours porter un équipement de protection (lunettes, gants résistants aux produits chimiques, masque, casque) durant le démontage, l'assemblage et la maintenance. Le travail effectué dictera le degré de protection. Référez-vous au SDS de la solution proposée par le fournisseur.


Prohibition
Interdiction

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.

Ne pas endommager le câble électrique
Ne pas tirer ou faire un nœud avec le câble électrique. Endommager un câble électrique pout provoquer une incendie ou une décharge électrique.

Prohibition
Interdiction

Do not operate the pump in a flammable atmosphere
Do not place explosive or flammable material near the pump.

Ne pas utiliser la pompe dans une atmosphère explosive
Pour votre sécurité, du matériel dangereux ou inflammable ne doit pas être placé près de la pompe.

⚠ CAUTION / ATTENTION

Requirement
Exigence

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 maintenance of the pump.

Opérateur qualifié uniquement
La pompe doit être manipulée ou utilisée par du personnel qualifié connaissant parfaitement la pompe. Tout autre personne étrangère ne doit pas prendre part à l'utilisation ou à la maintenance de la pompe.

Prohibition
Interdiction

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.

Utilisez une tension appropriée uniquement
Ne pas appliquer une autre tension que celle spécifiée sur la plaque signalétique sinon, il peut en résulter une panne ou une incendie. Assurez-vous également de la mise à la terre de la pompe.

Caution
Attention

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

Ne faite pas fonctionner la pompe à sec
Ne faite pas fonctionner la pompe à sec plus de 30 minutes (même lorsque la pompe fonctionne pour dégazer). Sinon, les visses de fixation de la tête peuvent se dévisser et il peut y avoir une fuite de liquide. Optimalisez l'installation de façon à ce que la pompe ne fonctionne pas à sec. Si la pompe fonctionne à sec pour une longue période (plus de 30 minutes), la tête de la pompe et le guide de clapets peuvent être déformés par friction causée par la chaleur et il en résulterait des fuites.

Prohibition
Interdiction

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

Ne mouillez pas les parties électriques ou les câbles
Risque d'incendie ou de décharge électrique. Installez la pompe dans un endroit sec.

Caution
Attention

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

Ventilation
Manipuler un produit toxique ou odorant peut provoquer une intoxication. Prévoyez une ventilation suffisante à l'endroit de la manipulation.


Prohibition
Interdiction

Do not install or store the pump:
• In a flammable atmosphere.
• In a dusty/humid environment.
• Where ambient temperature can exceed 0-40ºC (32-104ºF).
• In direct sunlight or wind & rain.
• Where ambient humidity can exceed 85%RH.
Protect the pump with a cover when installing it out of doors.

N'installez ou ne stockez pas la pompe dans les endroits suivantes:
• Dans une atmosphère inflammable.
• Dans un endroit poussiéreux ou humide.
• Dans une place où la température n'est pas comprise entre 0 et 40 °C.
• Directement sous le soleil, le vent ou la pluie.
• Dans un endroit où l'humidité ambiante est susceptible de dépasser la plage de 85% d'humidité relative.
Protégez la pompe par un capot si vous l'installez dehors.


Requirement
Exigence

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

Déversement accidentel
Prenez des mesures protectrices contre tout incident résultant d'un débit trop important de la pompe ou d'une casse de tuyauterie.


Prohibition
Interdiction

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.

N'utilisez pas la pompe sous l'eau
La pompe n'est pas complètement étanche. Utiliser la pompe dans l'eau ou dans un endroit très humide peut créer une décharge électrique ou un court-circuit.


Grounding
Mise à la terre

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

Mise à la terre
Veillez à ne pas faire fonctionner la pompe sans avoir au préalable prévu une mise à la terre. Celle-ci permettra d'éviter d'éventuelles décharges électriques. Vérifiez que le câble de mise à la terre est bien branché.


Electrical shock
Électrocution

Install a GFCI (earth leakage breaker)
An electrical failure of the pump may adversely affect other devices on the same line. Purchase and install a GFCI (earth leakage breaker) separately.

Détecteur de fuites à la terre
Un problème électrique peut affecter défavorablement le dispositif. Achetez et installez un détecteur de fuites à la terre.


Requirement
Exigence

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

Remplacement des pièces usées
Suivez les instructions de ce manuel pour remplacer les pièces usées. Ne démontez pas la pompe au-delà des instructions.

Prohibition
Interdiction

Do not use a damaged pump
Use of a damaged pump could lead to an electric shock or death.

N’utilisez pas une pompe endommagée
Utiliser une pompe endommagée peut provoquer une décharge électrique ou la mort.

Requirement
Exigence

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.

Elimination des pompes usées
Elle doit se faire en conformité avec les règles locales en vigueur (consultez une entreprise certifiée et spécialisée).

Caution
Attention

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

- Tightening torque: 2.55N•m

Serrez la tête de pompe
La pompe peut fuiter si les boulons sont desserrés. Resserrez les boulons diagonalement et uniformément avant la première utilisation Resserrez les boulons régulièrement pour éviter tout fuite.

- Couple de serrage: 2.55N•m

Requirement
Exigence

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.

Installer une soupape de décharge
Installez une soupape de décharge sur la conduite de refoulement à proximité de la pompe de manière à relâcher automatiquement la pression au refoulement lorsqu’elle dépasse le seuil maximal.

Caution
Attention

Solution compatibility
This pump has been evaluated for use with water only. The suitability of this pump for use with liquids other than water, such as acid and alkaline, is the responsibility of the user. For liquids other than water, select the best-suited liquid end material combination using a chemical compatibility chart.

Compatibilité avec la solution
Cette pompe a été évaluée pour l’utilisation avec l’eau uniquement. L’aptitude de cette pompe à être utilisée avec d’autres produits, tels que les acides et les alcalins, est de la responsabilité de l’utilisateur. Pour des liquides autres que l’eau, choisissez le matériel le plus compatible selon la résistance chimique.

Precautions for use / Précautions d'utilisation

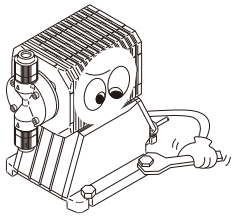
- Electrical work should be performed by a qualified electrician. Otherwise, personal injury or property damage may result.

  Le raccordement électrique de la pompe doit être effectué par du personnel qualifié sinon, il pourrait y avoir un dommage corporel ou incorporel.

Caution
Attention

- Select a level location, free from vibration, that won't hold liquid. Anchor the pump with four M6 bolts so it doesn't vibrate. If the pump is not installed level, output may be affected.

  Choisissez un endroit où il n'y a pas de vibrations et où le liquide peut s'évacuer. Fixez la pompe à l'aide de visses M6 de façon à ne pas avoir de vibrations. Si la pompe est inclinée, le débit peut être réduit.



- 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.

  Si plusieurs pompes sont installées ensemble, elles interagissent et les vibrations peuvent devenir importantes, ce qui engendre des performances médiocres ou des ratures. Choisissez un endroit solide et fixez les boulons correctement pour évitez les vibrations pendant le fonctionnement.

Caution
Attention

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

  Prévoyez de l'espace autour de la pompe pour faciliter l'accès et la maintenance.

Requirement
Exigence

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

  Installez la pompe le plus près possible du tank de produit.

Requirement
Exigence

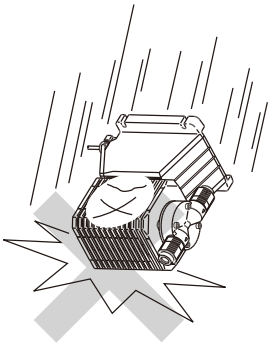
- When handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution), install the pump in a cool and dark place. Flooded suction installation is strongly recommended.

  Installez la pompe dans une place froide à l'abri du soleil lorsqu'il s'agit du dosage de produits dégazant tels que l'hypochlorite de sodium ou l'hydrazine. Mettre la pompe en charge est vivement recommandé.

Caution
Attention

- 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.

  Veillez à ne pas laisser tomber la pompe sur le sol. Un impact important pourrait réduire les performances de la pompe. Ne pas utiliser une pompe endommagée sinon il pourrait y avoir un courant de fuite ou une décharge électrique.



- 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.

  Le pompe est IP65 mais n'est pas complètement étanche. Ne pas laisser la pompe couverte de liquide pompé ou sous la pluie. Il pourrait y avoir des ratés ou préjudices. Si la pompe a été mouillée, sechez-la directement.

Caution
Attention

• 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.

Ne fermez pas la ligne de refoulement lorsque la pompe est en fonctionnement sinon il pourrait y avoir des fuites de liquide ou la tuyauterie pourrait céder. Installez une soupape de sécurité pour des raisons de sécurité et pour éviter tout dommage de la tuyauterie.


Caution
Attention

• 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.

N'enlevez pas l'unité de contrôle. Chaque partie électromagnétique a son propre unité de contrôle. Ne mettez pas autre unité de contrôle au module de puissance sinon il pourrait y avoir un court circuit ou un disfonctionnement de la partie électromagnétique.


Caution
Attention

• 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.

Le liquide au refoulement peut être sous pression. Relâchez la pression du refoulement avant de démonter la pompe ou d'enlevez le tubage pour éviter tout jet de liquide.


Requirement
Exigence

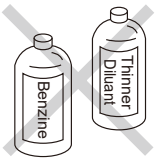
• Wear protective clothing when handling or working with pumps. Consult solution SDS for appropriate precautions. Do not come into contact with residual solution.

Portez un équipement de sécurité lorsque vous manipulez la pompe. Consultez le SDS pour utilisez les précautions appropriées. Evitez tout contact avec le liquide chimique.


Caution
Attention

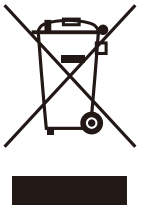
• Do not clean the pump or nameplate with a solvent such as benzine and thinner. This may discolour the pump or erase printing. Use a dry or a damp cloth or a neutral detergent.

Ne nettoyez pas la pompe ni la plaque signalétique à l'aide d'un solvant comme du benzine ou du diluant. Cela risque de décolorer la pompe ou d'effacer des données inscrites dessus. Utilisez un chiffon sec ou humide, ou un détergent neutre.



• In accordance with the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), this product features the crossed-out wheelie bin symbol. When this product is disposed of in household wastes, toxic components included in it can cause major environmental and human health problems. Use appropriate waste collection systems for recovery and recycling. Contact your local distributor or nearest Iwaki company for the detailed collection systems.

Conformément à la directive européenne 2012/19/UE relative aux déchets d'équipements électriques et électroniques (DEEE), ce produit porte le symbole de la poubelle barrée. Lorsque ce produit est jeté avec les ordures ménagères, les composants toxiques qu'il contient peuvent causer des problèmes environnementaux et de santé humaine majeurs. Utiliser des systèmes de collecte des déchets appropriés pour la récupération et le recyclage. Contactez votre distributeur local ou la société Iwaki la plus proche pour connaître les systèmes de collecte détaillés.



Overview

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

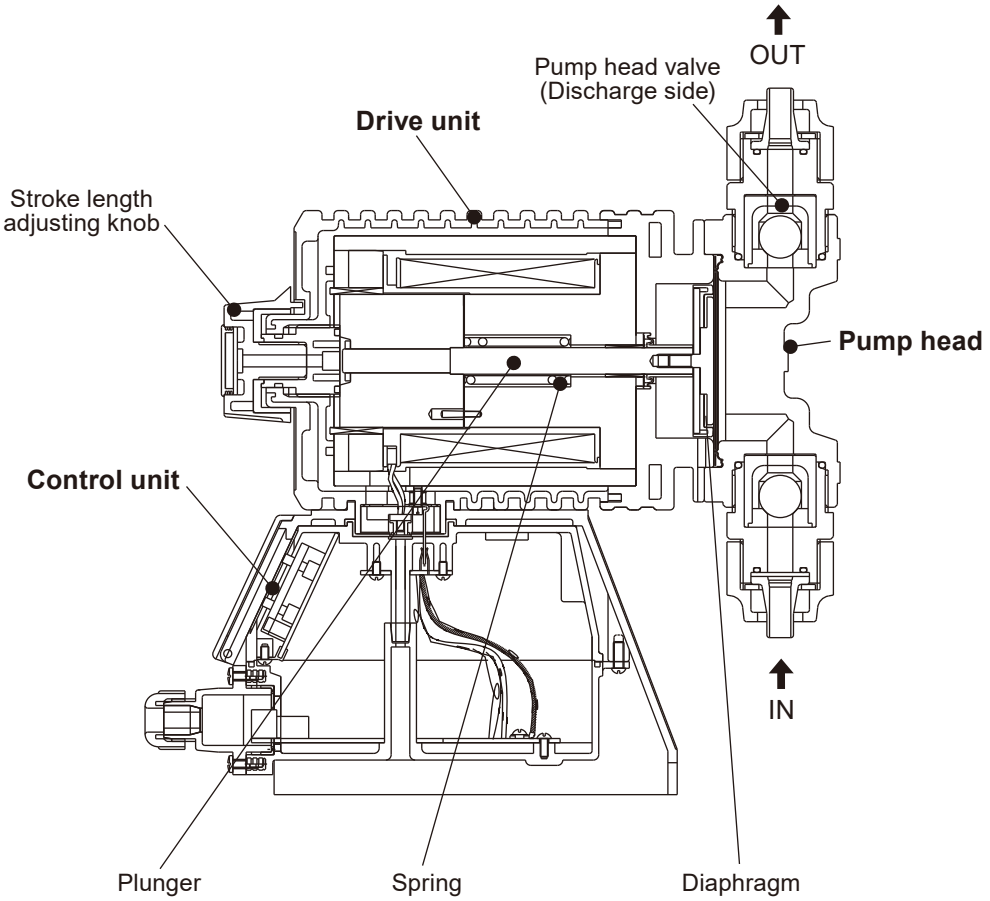
Introduction

Pump structure & Operating principle

The EH-E 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 mechanism transfers liquid along with pump head valve action.



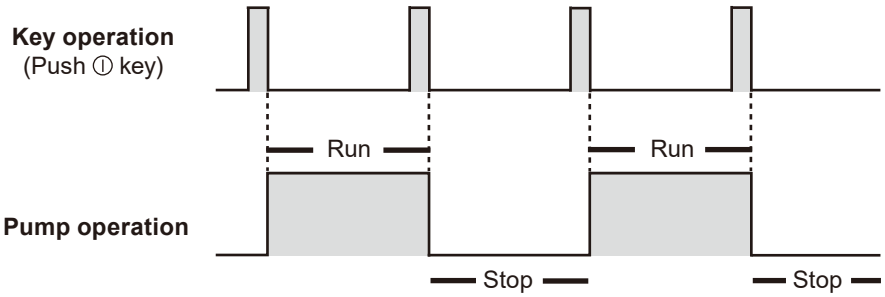
Features

- **High turndown ratio**
  Offers a digitally-controlled range of 1-360 (1spm resolution).
- **Waterproof and dustproof structure**
  The sealed drive unit and control unit assure IP65.
  *This pump is not waterproof. Protect the pump with a cover when installing it out of doors.
- **External control**
  External signals through an analogue input 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.

Operational function

Manual mode

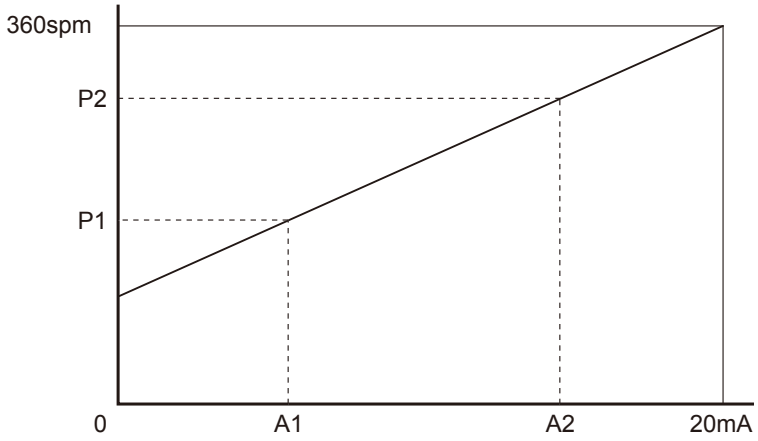
Run/stop the pump with the start/stop key. A stroke rate (MAN speed) can be changed in the range of 1-360spm with the UP and the DOWN keys at any time during operation or stop. See page 45 for detail.



EXT mode

■ Proportional control (Analogue control: See page 46)

The pump increases/decreases a stroke rate in the range of 0-360spm in proportion to 0-20mA.
An optimal proportional line must be established beforehand based on two different operating points (P1-A1, P2-A2). Extra attention for unexpected pump behaviour may be needed for this type of control. In the following control line, for example, 0spm does not come at 0mA. In other cases, the pump speed may reach 360spm before 20mA (however, the pump does not run over 360spm at any mA-spm setting.).



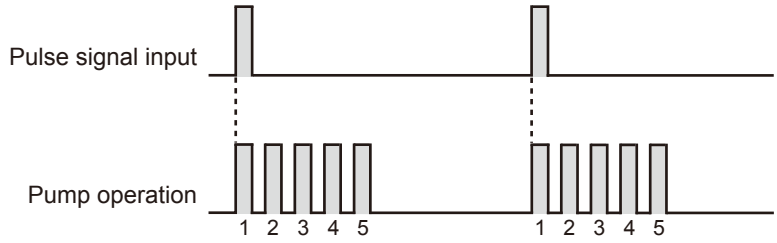
Conditions
a. A1 and A2 must be 20mA or below
b. P1 and P2 must be 360spm or below
c. A1 and A2 must be different mA
d. P1 and P2 must be different spm

■ Multiplier setting (Digital control: See page 48)

The pump increases/decreases a stroke rate by the external signal and the multiplier. Set a multiplier (1-999 strokes) per pulse in advance of operation.

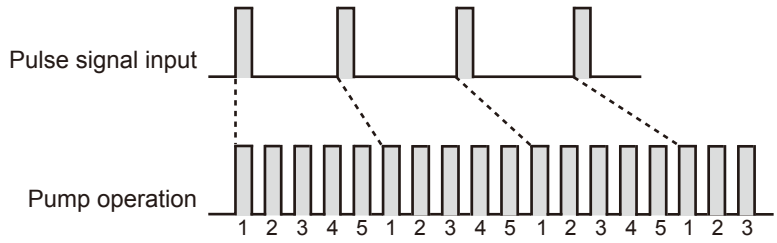
*In the digital control with a preset multiplier, the pump does not run over the MAN speed at any pulse rate.
*The pump makes one stroke per pulse when a multiplier is set to 1.
*Every time the pump is cycled with the STOP signal, the pump continues to run for the preset multiplier per pulse (if the pump is paused at the moment the first three strokes are completed, for example, the pump restarts to finish the remaining 4th and 5th strokes right after pausing is cancelled.).

Example) When the multiplier is set to 5, the pump makes five strokes per signal.



With the multiplier buffer ON ("X-ON"), the buffer stores unprocessed pulse signals, which are entered to exceed the MAN speed.

*The unprocessed pulse signals are stored for up to 64535 strokes.

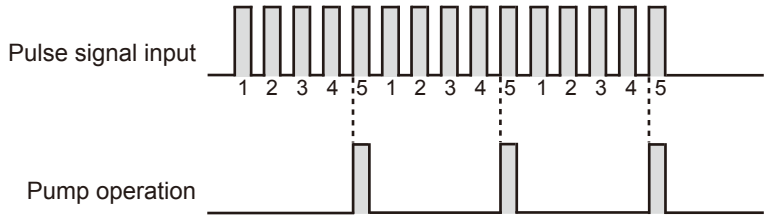


■ Divisor setting (Digital control: See page 51)

The pump increases/decreases a stroke rate by the external signal and the divisor. Set a divisor (1-999 pulse rates) per stroke in advance of operation.

*In the digital control with a preset divisor, the pump does not run over 360 spm at any pulse rate.
*The pump makes one stroke per pulse when a divisor is set to 1.
*Every time the pump is cycled with the STOP signal, the pump continues to run along with the preset divisor (if the pump is paused at the moment the first three pulses are entered, for example, the pump restarts right after the remaining 4th and 5th pulses are entered.).

Example) When the divisor is set to 5, the pump makes one stroke every 5 signals.



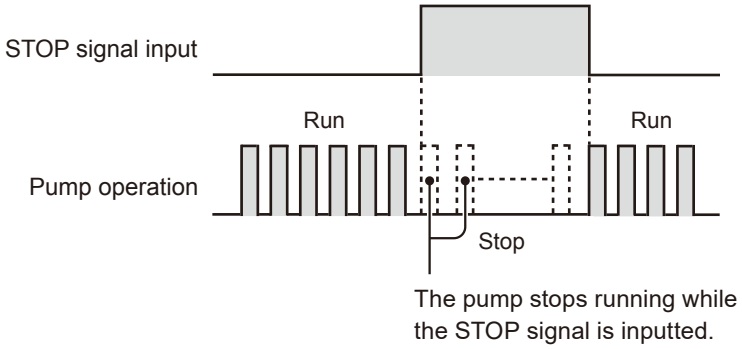
With the divisor buffer ON ("/-ON"), the buffer stores unprocessed pulse signals, which are entered to exceed the maximum speed of 360spm.

*The unprocessed pulse signals are stored for up to 64535 strokes.

■ STOP function

The pump stops while receiving the external STOP signal.

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

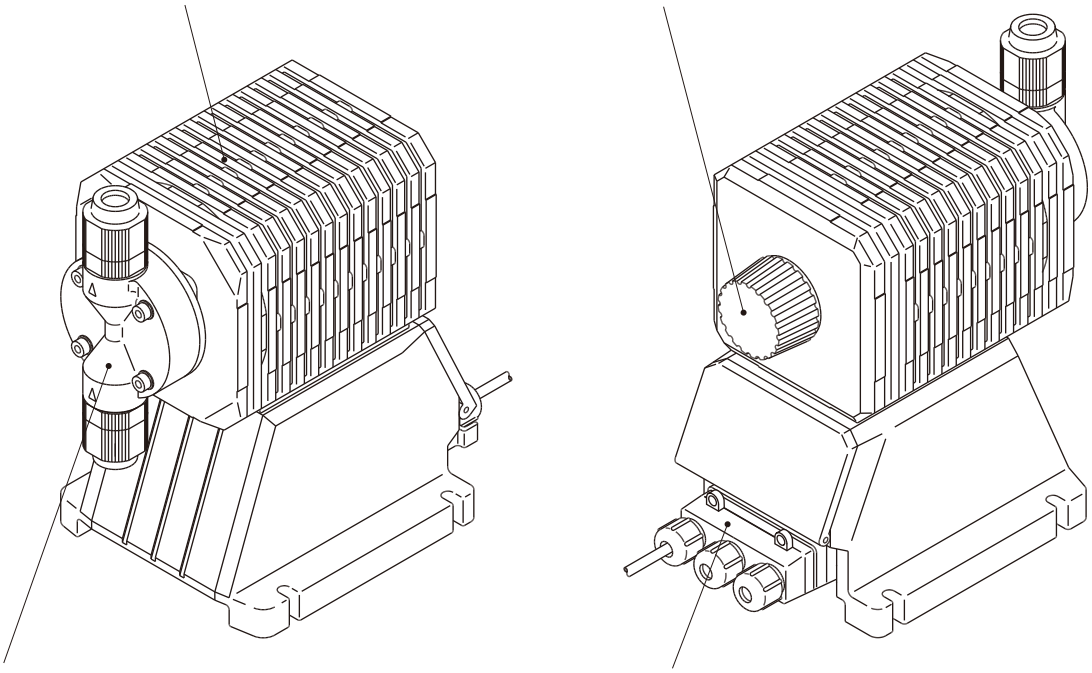


Part names

Pump

Drive unit
Reciprocates the diaphragm by means of the built-in solenoid actuator.

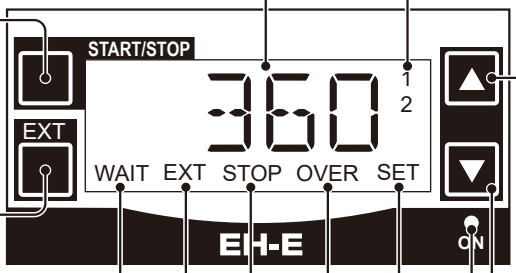
Stroke length adjusting knob
Used for adjusting a flow rate in the range of 20-100%.



Pump head
The reciprocating motion raises volumetric change in the pump head in order to deliver liquid.

Control unit
Used for the start/stop of the pump and the setting/adjustment of the stroke rate.

Operation panel



Display
shows pump setting/state.

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

EXT key
Used for starting EXT operation.

WAIT
Lights during a wait state.

EXT
Lights during EXT operation.

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

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

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.

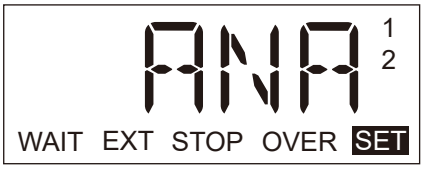
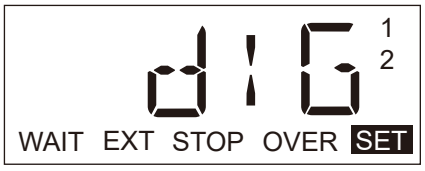
DOWN key
Used for decreasing numeric values or scrolling down options.
Push this key while pressing the EXT key to program the EXT mode.

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

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

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

■ Basic displays

Display	States
	Manual mode. The pump is running at 360spm.
	A waiting state. "WAIT" indication appears. Numerical value shows the MAN speed.
	EXT mode with a multiplier 5. The pump is making five strokes per signal.
	EXT mode with a divisor 5. The pump is making one stroke 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.

■ Alarm displays

Display	States
	"EXT" and "OVER" indications appear when the pump under analogue control is set to run over 360spm with the external current signal, however, the pump speed does not exceed that maximum rate at any current value.
	If the multiplier buffer is turned on ("X-ON"), "EXT" and "OVER" indications appear when the pump under digital control (with multiplier) receives an extra pulse which exceeds the MAN speed pulse rate. Also, an unprocessed signal is stored for up to 64535 strokes. If it's turned off, it won't store any unprocessed signals, and also the "OVER" indication won't appear at any spm.
	If the divisor buffer is turned on ("/-ON"), "EXT" and "OVER" indications appear when the pump under digital control (with divisor) receives an extra pulse which exceeds the maximum design speed of 360spm. Also, an unprocessed signal is stored for up to 64535 strokes. If it's turned off, it won't store any unprocessed signals, and also the "OVER" indication won't appear at any spm.

Identification codes

Each code represents the following information.

Pump

EH - E 31 PC - 23U P E 8 - ____
a b c d e f g h i

a. Series name

EH : Electromagnetic metering pump

b. Drive unit (Average power consumption)

E : 48W

c. Diaphragm effective diameter

31 : 30mm 36 : 35mm 46 : 45mm 56 : 55mm

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 (bonded to EPDM)
V6			SUS316 equivalent	EPDM	EPDM		
VE			Alumina ceramic				
PC	GFRPP	GFRPP		FKM	FKM		
PE				EPDM	EPDM		
VM	Machined PVC	Machined PVC		FKM	FKM		
FC	PVDF	PVDF		—	PCTFE		
SH	SUS316	SUS316	HC276		SUS316		
HP6	GFRPP	GFRPP	SUS316 equivalent	EPDM	PCTFE		

Material code

PVC : Polyvinyl chloride
PVDF : Polyvinylidene difluoride
FKM : Fluorine-contained rubber
PCTFE : Polychlorotrifluoroethylene
SUS316 : Austenitic stainless steel
GFRPP : Glassfiber-reinforced polypropylene
EPDM : Ethylene-propylene rubber
PTFE : Polytetrafluoroethylene
HC276 : HASTELLOY C276

e. Power voltage

Code	Rated power voltage	Allowable voltage range	Power frequency
11U (USA)	115VAC	90-126VAC	50/60Hz
23U (USA)	230VAC	207-253VAC	
20E (Asia/Europe)	220/230/240VAC	198-264VAC	

f. Power cord

P : Power plug
No code : Insulated crimp spade connector

g. Control unit function

E : E type

h. Tube size

Code	Tube I.D. × O.D.	Wet end materials code
4	ø8mm × ø13 mm	VC/V6/PC/VM
5	ø9mm × ø12 mm	VC/V6/PC/VM
6	ø10mm × ø12 mm	FC
8	ø3/8" × ø1/2"	VC/V6/VE/PC/PE/VM/FC
9	Rc 1/4"	SH
10	NPT 1/4"	SH
11	ø10mm × ø16 mm	VC/V6/PC/VM
14	Rc 3/8"	SH
15	NPT 3/8"	SH
21	ø15mm × ø22 mm inlet and ø9mm × ø12 mm outlet	HP6
22	ø15" × ø22" inlet and ø3/8" × ø1/2" outlet	HP6

i. Special version

No code : Standard type

01-99 : Customized wet ends and tube sizes

Control unit

EHC - 23U P E - ____

a b c d e

a. Model

EHC : Multivoltage control unit

b. Power voltage

Code	Rated power voltage	Allowable voltage range	Power frequency
11U (USA)	115VAC	90-126VAC	50/60Hz
23U (USA)	230VAC	207-253VAC	
20E (Asia/Europe)	220/230/240VAC	198-264VAC	

c. Power cord

P : Power plug

No code : Insulated crimp spade connector

d. Control unit function

E : E type

e. Special version

No code : Standard type

01-99 : Customized model

HV : Highly viscosity type

Installation

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

Points to be observed

- 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. Install a pump in such a way that the plug can easily be removed under those conditions.
- 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 M6 bolts (pump mounting)
- An adjustable wrench or spanner

1 Select a suitable place.

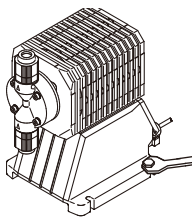
Select a level location, free from vibration, that won't hold liquid. See page 10 for detail. Flooded suction installation is strongly recommended when handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution).

2 Anchor the pump with four M6 bolts.

Be sure to fix the pump at four points.

NOTE

If the pump is not installed level, output may be affected.



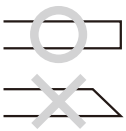
Plumbing

Connect tubes to the pump and install a check valve.

Before operation

• Cut the tube ends flat.

Tube end (side view)



Necessary tools

• An adjustable wrench or spanner.

Tube connection

Points to be observed

- Use the applicable tube size at each pump for ensuring rated/stable pump output. See page 21 as well.
- Keep the suction line length to 1m (3.3feet) or shorter.
- The maximum suction lift of this pump is 1m or 3.3feet (with dry valves). Take this into your consideration when building up your pump tubing system.
- Flooded suction installation is strongly recommended when handling liquids that generate gas bubbles (sodium hypochlorite or hydrogen peroxide solution) in order to reduce entrapped air in the pump head and tubing.

■ EH-E VC/V6/VE/PC/PE/VM/FC/HP6

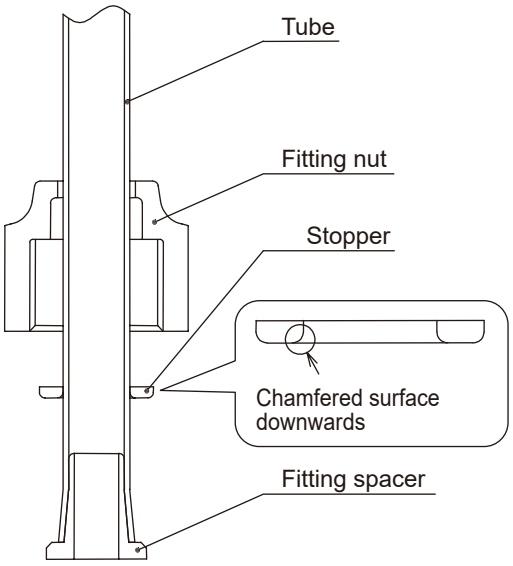
a. Pass the tube through the fitting nut and the hose stopper, and then slide it down onto the fitting spacer until it bottoms out.

*If the tube is not fitted properly, the tube may come off with a solution leak or spray.

*Some tubing may be too firm to be pushed until it bottoms out of the fitting spacer. Wet the tapered area of the fitting spacer to give it some lubricity, or immerse the tube end into a warm water (40°C/104°F or below) to give it more flexibility.

*Always mount the hose stopper in place with the chamfered surface facing the fitting spacer for ensuring the stopper crushes into the tube and fitting spacer a little. Otherwise, a solution leak/spray or short suction lift could result.

*Always use the applicable tube size at each pump, or the tube may come off.



b. Put the tube end (fitting spacer) onto the fitting. Then hand tighten the fitting nut.

c. Retighten the fitting nut by turning it further 180 degrees with an adjustable wrench or spanner so it crushes into the tube a little.

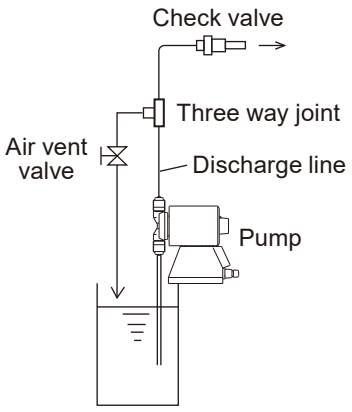
*Do not use excessive force when tightening the plastic fitting nut.

*Make sure the O ring is in place (beneath the fitting spacer), or a solution leak/spray or short suction lift could result.

1 Connect tubes into the inlet and outlet.

NOTE

The EH-E series do not have the air vent port (except pumps with the SH wet end code) so the main flow line (discharge side) must be branched to establish an open-ended air vent line for ensuring a safe pump system. For pumps with the VC, V6, PC, VM or HP6 wet end codes; however, we can optionally provide the AV-E air vent if requested. Contact us or your distributor for more information.



2 Connect the check valve or the back pressure valve at the end of the discharge line.

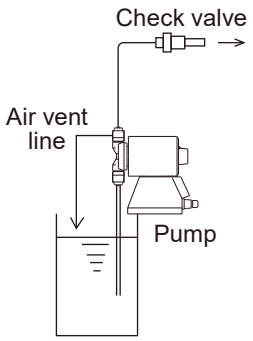
■ EH-E SH

1 Joint tube connectors or pipes into the pump inlet and outlet.

For the EH-E 31SH/36SH, the pump inlet and outlet have a Rc1/4" female thread.

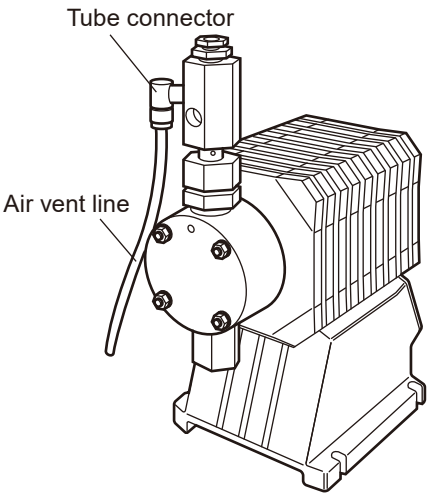
For the EH-E 46SH/56SH, they have a Rc3/8" female thread.

*Use a sealing tape and tighten tube connectors or pipes to the pump inlet and outlet so as to reduce the possibility of a leak or air ingress.



2 Connect an O.D.4mm (31SH/36SH) or an O.D.10mm (46SH/56SH) air bleed tube to the air vent body over the tube connector.

Liquid pressure is released from the air vent line in the form of solution spray. Route back the other tube end (open-ended) to a supply tank or a container.



3 Connect the check valve at the end of the discharge line.

■ EH-E with the optional AV-E air vent

1 Connect tubes into the pump inlet and outlet.

2 Connect an 8×13mm, 9×12mm, 10×16mm, or 3/8"×1/2" tube (depending on the AV-E air vent port size) to establish an air vent line.

Liquid pressure is released from the air vent line in the form of solution spray. Route back the other tube end (open-ended) to a supply tank or a container.

3 Connect the check valve at the end of the discharge line.

■ Accumulator/Air chamber

Install an accumulator or an air chamber in the discharge line.

NOTE

Dampen the flow pulsation so the discharge line won't vibrate too much.

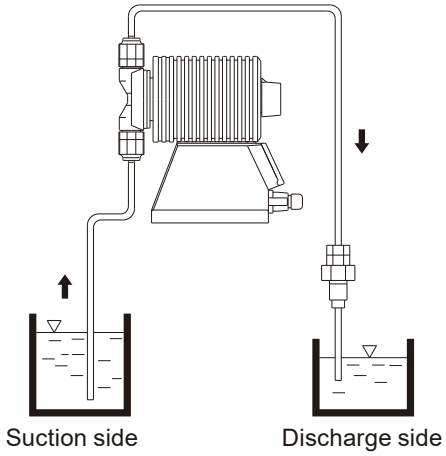
Optional check valve mounting

In the following cases, install an optional check valve to the EH-E series pump (or a back pressure valve to the FC type) for the prevention of a back flow, siphon and overfeeding.

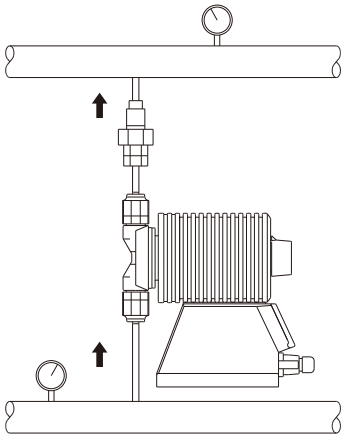
NOTE

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

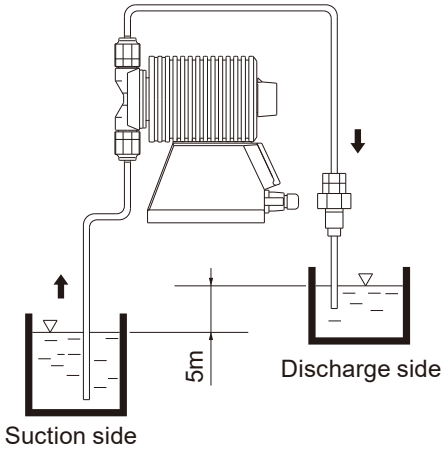
• A suction side liquid level is higher than a discharge side or an injection point at atmospheric pressure.



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



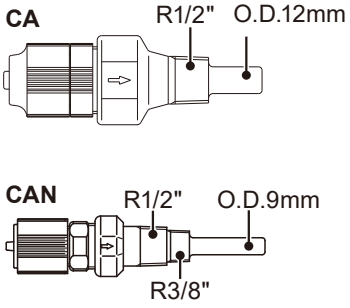
• A discharge side liquid level is higher than a suction side but the distance is 5m (16.4feet) or below.



• A discharge pressure (including pipe resistance and discharge head) is below 0.13MPa (0.05MPa for EH-E56).

When the CA or CAN check valve is used:

- Mount the CA or CAN check valve at the end of an 1m (3.3feet) or longer discharge tube.
- A tube can be fitted to the CA/CAN check valve outlet (O.D.12mm/9mm). Also, a pipe can be fitted to the valve outlet over either R1/2" (CA/CAN) or R3/8" (CAN) male thread provided on it. Cut off the an unused part and adjust the connection length as necessary.



■ Tube connection to the optional CA check valve inlet

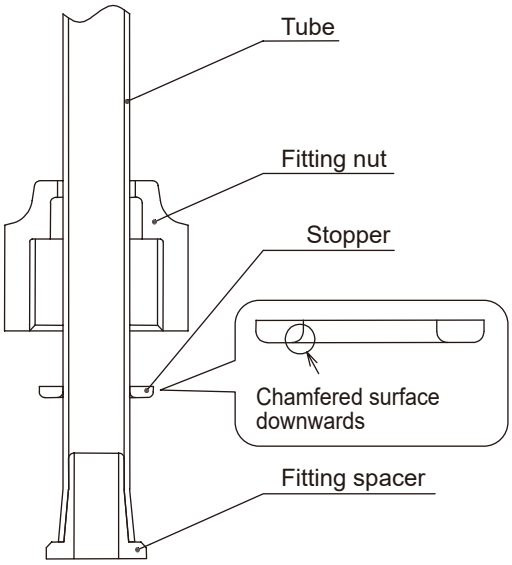
1 Pass the tube through the fitting nut and the hose stopper, and then slide it down onto the fitting spacer until it bottoms out.

*If the tube is not fitted properly, the tube may come off with a solution leak or spray.

*Some tubing may be too firm to be pushed until it bottoms out the fitting spacer. Wet the tapered area of the fitting spacer to give it some lubricity, or immerse the tube end into a warm water (40°C/104°F or below) to give it more flexibility.

*Always mount the hose stopper in place with the chamfered surface facing the fitting spacer for ensuring the stopper crushes into the tube and fitting spacer a little. Otherwise, a solution leak/spray or short suction lift could result.

*Always use the applicable tube size at each pump, or the tube may come off.



2 Put the tube end (fitting spacer) onto the fitting. Then hand tighten the fitting nut.

3 Retighten the fitting nut by turning it further 180 degrees with an adjustable wrench or spanner so it crushes into the tube a little.

*Do not use excessive force when tightening the plastic fitting nut.

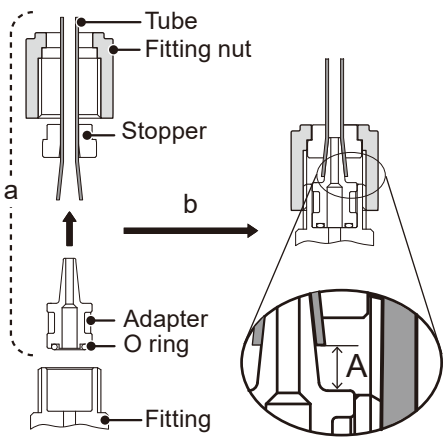
*Make sure the O ring is in place (beneath the fitting spacer), or a solution leak/spray or short suction lift could result.

■ Tube connection to the optional CAN check valve inlet

1 Pass the tube through the fitting nut and stopper, and then slide it down onto the adapter to the following depth or farther.

Tube size (I.D.×O.D.)	Depth (A)
ø8×ø13	5mm
ø9×ø12	7mm

*Some tubing may be too firm to be pushed onto the adapter. Wet the tapered area of the adapter to give it some lubricity, or immerse the tube end into a warm water (40°C/104°F or below) to give it more flexibility.
*Do not use a tube that is hardened, swollen, discolored, cracked, worn, or sticky.



2 Make sure the adapter has the O ring at the bottom.
*Or solution spray may result.

3 Put the tube end (adapter) onto the fitting. Then hand tighten the fitting nut.

4 Retighten the fitting nut by turning it further 180 degrees with an adjustable wrench or spanner so it crushes into the tube a little.
*Do not use excessive force when tightening the plastic fitting nut.
*Do not reuse the same crushed tube end to reseal the tubing. Cut off the end and start with new tubing to ensure a new seal is established.
*Keep these parts dry and clean so the tube is crushed properly and the risk of solution spray is eliminated.
*Keep electric parts and wiring dry to eliminate the risk of fire or electric shock.
*When removing the connection, if the adapter has become stuck in the crushed tube and the stopper and those parts cannot be separated, contact us for a new adapter/stopper to ensure crush mount of the tube.

■ Pipe connection to the optional CS check valve inlet/outlet

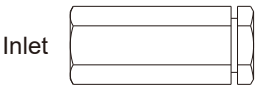
1 Connect pipes into the inlet and outlet of the CS check valve.

For the EH-E 31SH/36SH, use the CS-1S that has a Rc1/4" female thread on its inlet and outlet.

For the EH-E 46SH/56SH, use the CS-2S/-2SL that has a Rc3/8" female thread on its inlet and outlet.

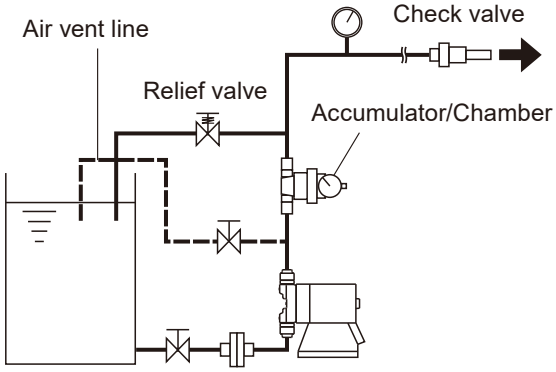
*Use a sealing tape and connect pipes to the inlet and outlet so as to reduce the possibility of a leak or air ingress.

CS check valve

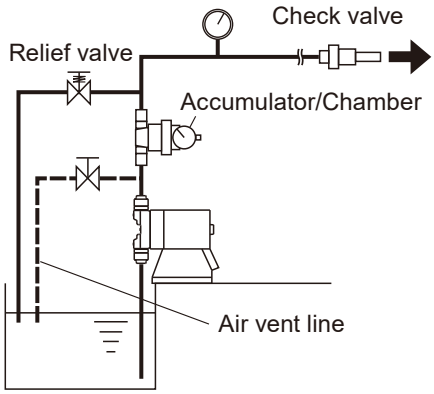


Tubing layout

Flooded suction application



Suction lift application



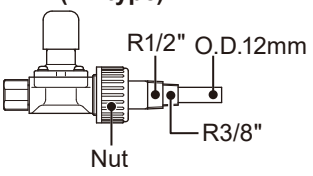
*Flooded suction installation is strongly recommended when handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution).

■ Tube connection to the optional BVC back pressure valve inlet

When the BVC back pressure valve is used for pumps with FC wet end code:

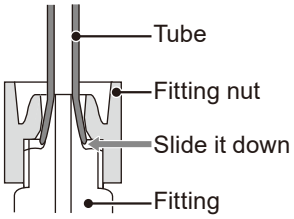
- Mount the BVC at the end of a vertical line. Always mount this back pressure valve its discharge side upwards. Do not mount it either downwards or horizontally. A wrong mounting direction will reduce the flow check performance of the BVC.
- If plumbing is extended further beyond the mounting location of the BVC, do not install a shut-off valve on that extended line. This product will be damaged if the shut-off valve is closed unintentionally during operation.
- If plumbing is extended further beyond the mounting location of the BVC, always keep the pressure in that extended plumbing half or lower than the set pressure of the BVC.
- The BVC has the R1/2" and R3/8" thread connections as well as an O.D.12mm tube connection. Cut off an unused part and adjust the connection length as necessary.
- Replace gaskets with new ones every time when the nut is loosened or the BVC is taken apart. Fasten the nut by 9.0N•m after putting them together so the gasket is crushed properly to ensure the new sealing.

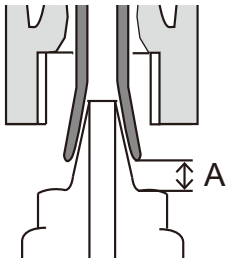
BVC (FC type)



1 Pass the tube through the fitting nut, and then slide it down onto the fitting to the following depth or farther.

Tube size (I.D.×O.D.)	Depth (A)
ø8×ø13	2mm
ø9×ø12	4mm





2 Hand tighten the fitting nut.

3 Retighten the fitting nut by turning it further 180 degrees with an adjustable wrench or spanner so it crushes into the tube a little.

*Do not use excessive force when tightening the plastic fitting nut.
*Do not reuse the same crushed tube end to reseal the tubing. Cut off the end and start with new tubing to ensure a new seal is established.
*Some tubing may be too firm to be pushed onto the fitting to the designated depth shown above. Wet the tapered area of the fitting to give it some lubricity, or immerse the tube end into a warm water (40°C/104°F or below) to give it more flexibility.

■ BVC set pressure setting

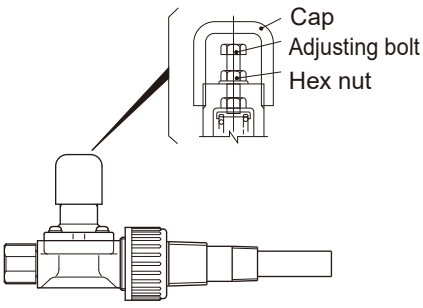
The set pressure of the back pressure valve is adjusted to your designation (with clean water) when shipped from our factory; however, further adjustment will be needed along with an actual opening pressure in your operating conditions or when the valve is taken apart for maintenance and then put together afterwards.

1 Remove the cap if attached and loosen a hex nut.

2 Check the discharge pressure gauge to determine at which pressure the back pressure valve opens to flow liquid.

If the valve opens at lower pressure than the optimal level, gradually turn the adjusting bolt clockwise to raise the opening pressure (that is the set pressure).

If the valve opens at higher pressure, gradually turn the adjusting bolt counter-clockwise to reduce the opening pressure.



3 After the adjustment, tighten the hex nut and replace the cap.

Wiring

Wiring for power voltage, earthing and external signals.

Points to be observed

- Electrical work should be performed by a qualified electrician. Always observe local electric codes.
- 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

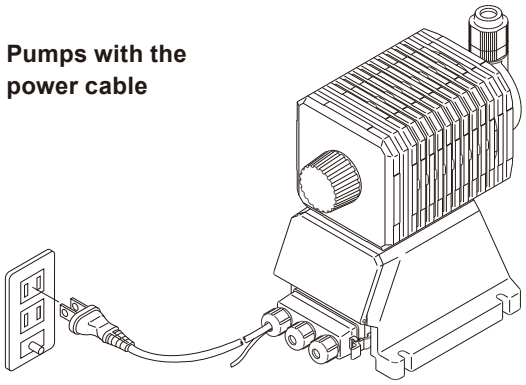
- Check that power voltage is turned off.
- Pump model and the rated power voltage.

NOTE

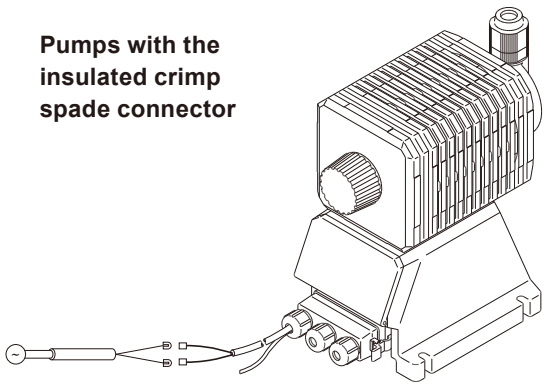
An electrical circuit or the drive unit may fail. Do not attach the control unit to a different drive unit. An applicable control unit differs with each drive unit.

1 Connect power cable via crimp contacts.

Pumps with the power cable



Pumps with the insulated crimp spade connector

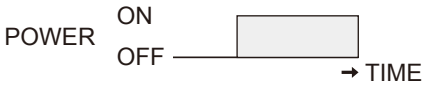


2 Earth the pump.

NOTE

- Do not share a power source with a high power device which may generate a surge voltage. Otherwise an electronic circuit may fail. The conductive 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 below for the precautions for ON-OFF control with a mechanical relay.

Apply power sharply



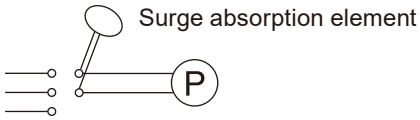
Do not apply gradually

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

Surge voltage

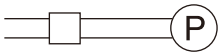
The electronic circuit in the control unit may fail due to a surge voltage. Do not place the pump close to a high power device of 200V or more which may generate a large surge voltage. Otherwise, take any of the following measures.

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



Recommended varistors. See manufacturer's catalogues for detail.
Panasonic ERZV14D431

- A noise cut transformer via the power cable.



Noise cut transformer

Precautions for ON-OFF control by cycling power

The control unit is equipped with a CPU. To ensure the CPU to work properly, always start/stop the pump with the STOP signal for ON-OFF control. Try not to turn on and off the main power. Otherwise, observe the following points:

- Ensure the minimum OFF time of 10 minutes.
- When using a mechanical relay for ON-OFF operation, its contact capacity should be 5A or more. Or a contact point may break.
- If a mechanical relay with the contact capacity of 5A is used, the maximum allowable number of power cycles is limited to 150,000 times. Use the contact capacity of 10A or more when the power cycles exceed that number or when a power source is shared with a large capacity equipment which may cause a surge voltage and damage a contact point.
- Even the large mechanical relay may not last forever. If further longer life is desirable, use a SSR (Solid State Relay) such as the OMRON G3F that does not have a mechanical contact point. Note this product is not designed to be operated with a zero-crossing SSR. See manufacturer's catalogs and make sure a non zero-crossing SSR is selected.

Signal wire connection

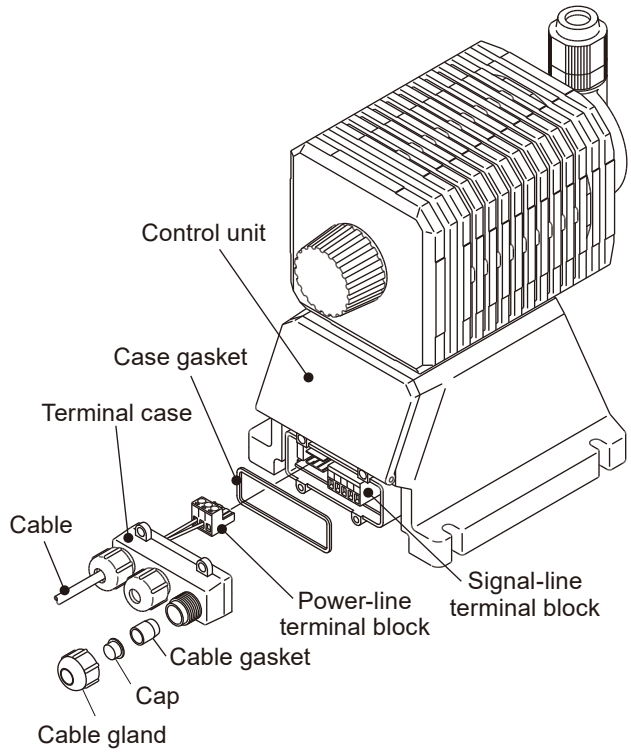
Check that power voltage is turned off. The pump is still charged right after turning off power. Wait for one minute before wiring. Take the appropriate steps shown below for ensuring safe electric wiring.

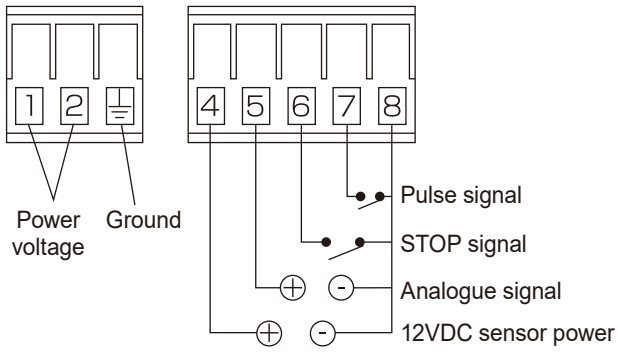
Applicable cables

Cable outer diameter: 7.6-7.8mm.

Cable type: UL/CSA SJT 18AWG/2 duplex cable

*The use of a cable with a smaller O.D. can break a connection point of the cable or impair water-/dust-tightness of the pump.





NOTE

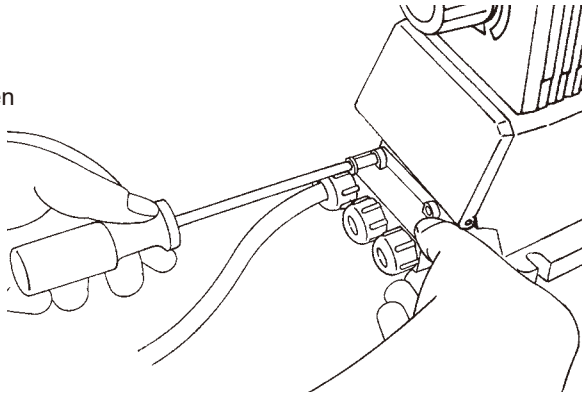
- Do not lay on these signal cables in parallel with a power cable. Otherwise the electromagnetic induction noise is generated and malfunction or failure may result.
- When using an external SSR for signal input, such a semiconductor relay must be capable of handling the maximum applied voltage from the pump (5V with 1.1mA).
  See specs of the selected SSR. The OMRON G3TA-IDZR02S-US SSR or the G3TA-IDZR02SM-US SSR at least meets the requirement.
- When using an external mechanical relay for signal input, such a relay must be capable of handling the maximum applied voltage from the pump (5V with 1.1mA).
- Connect the signal cables to external devices which are protected by double or reinforced insulation.

*Use either an external no-voltage contact or an external open collector for the signal line wiring.
*Set pulse duration to 10-100ms and the number of pulses at or below 360 pulses per minute.

1 Detach the terminal case.

Remove four screws and take out the terminal case.

*The gasket is provided to keep water-/dust-tightness between the parts. Make sure it's always in place.



2 Remove the detachable signal-line terminal block from the PCB in the control unit.

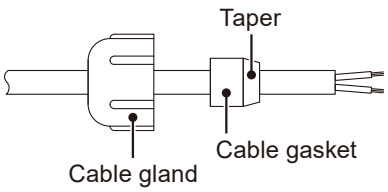
Remove the detachable power-line terminal block if necessary.

3 Remove a cable gland and a cap to 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.



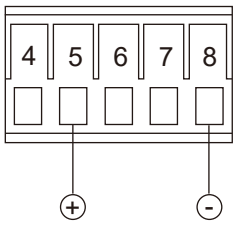
5 Connect the external signal cable.

Remove the end of the insulating tube to the extent of 5mm (0.2") in advance. Also, use a precision screwdriver to connect signal wires to the signal-line terminal block (by 0.4N·m).

When using analogue control:

Electrically-connect your device to Terminals 5 (+) and 8 (-) to send 0-20mA current signal. Pay attention to polarity. Internal resistance is 250Ω.

*Reverse polarity of the analogue signal input upsets the proportional control or may break the PCB.

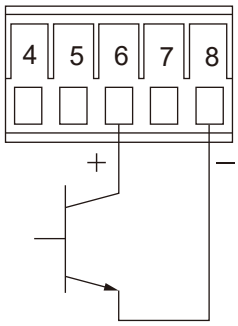


When using an open collector for STOP function:

Electrically-connect your device to Terminals 6 (+) and 8 (-). Pay attention to polarity. When using an external SSR for signal input, such a semiconductor relay must be capable of handling the maximum applied voltage from the pump (5V with 1.1mA).

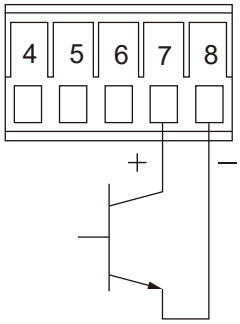
When using a no-voltage contact for STOP function:

Electrically-connect your device to Terminals 6 (+) and 8 (-). Pay attention to polarity. When using an external mechanical relay for signal input, such a relay must be capable of handling the maximum applied voltage from the pump (5V with 1.1mA).



When using an open collector for pulse control:

Electrically-connect your device to Terminals 7 (+) and 8 (-). Pay attention to polarity. When using an external SSR for signal input, such a semiconductor relay must be capable of handling the maximum applied voltage from the pump (5V with 1.1mA).



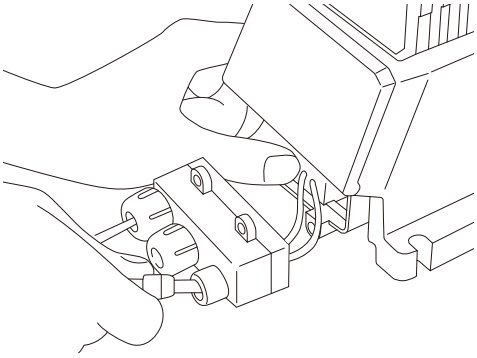
When using a no-voltage contact for pulse control:

Electrically-connect your device to Terminals 7 (+) and 8 (-). Pay attention to polarity. When using an external mechanical relay for signal input, such a relay must be capable of handling the maximum applied voltage from the pump (5V with 1.1mA).

6 Mount the signal line terminal block wired to the PCB in the control unit.

NOTE

Fit the block until it "clicks". If it's not mounted properly, the pump may fail.



7 Mount the terminal case to the control unit.

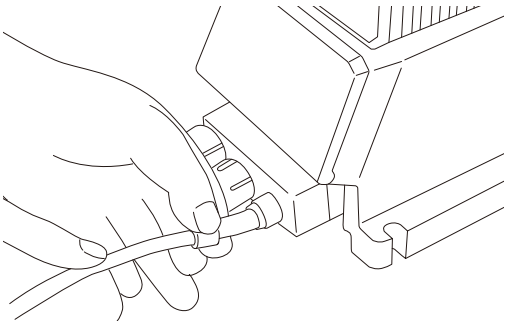
Fasten fixing screws evenly to 0.5N•m.

NOTE

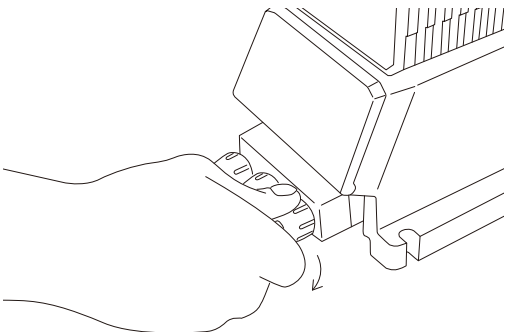
Always use the same mounting screws for ensuring good water-/dust-tightness to the control unit.

8 Push the cable gasket into the terminal case.

Adjust the slackness of the signal cable if necessary.



9 Tighten the cable gland.



Operation

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

Before operation

First check tubing and wiring are correct. 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

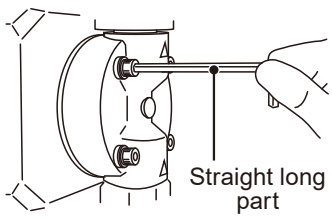
Important

The pump head fixing bolts may loosen when plastic parts creep due to temperature change in storage or in transit. This could lead to a chemical leak. Be sure to retighten the bolts tighten the bolts diagonally and evenly by 2.55 N•m before initial operation and at regular intervals (every three months).

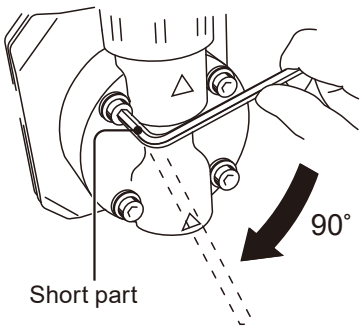
■ Use of a hexagon wrench instead of a torque wrench

Fasten the fixing bolts as tight as can be 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 in the pump and tubing is the obstacle to liquid delivery and needs to be expelled before the pump is started. Especially:

- 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 are performed.

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 are harmful or even attack dry end parts. Wash/wipe chemicals off immediately if getting wet.
- Tighten the fittings and the nuts by 5.0N·m (EH-E 31/36) or 7.0N·m (EH-E 46/56) before initial operation and at regular intervals.

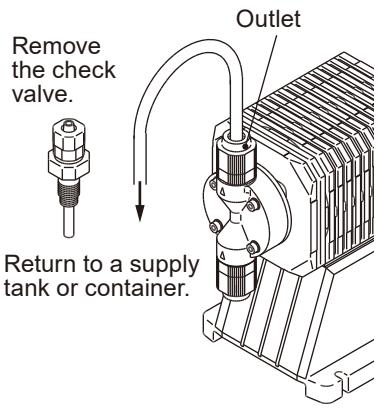
■ EH-E VC/V6/PC/VM/FC/HP6

No air vent port is provided to these pumps; however, you can expel air for full pump operation, taking steps below. Otherwise, you can branch the main flow line (discharge side) and establish an open-ended air vent line.

1 Connect a discharge tube to the pump outlet 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.

*Solution in the discharge line may be under pressure. To avoid solution spray, release the pressure from the discharge line before the check valve is removed.



2 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 the power is turned on with the factory default setting.

3 Set a stroke rate to 360spm.

- spm increases/decreases every time the UP/DOWN key is pushed.
- Press and hold either key for three seconds for quick change.

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

The WAIT indication disappears and the pump starts to run.

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

6 Check that gas has been expelled from the pump head.

Repeat the run-and-see step until liquid is outputted from the pump outlet.

7 Connect the discharge tube to the main flow line.

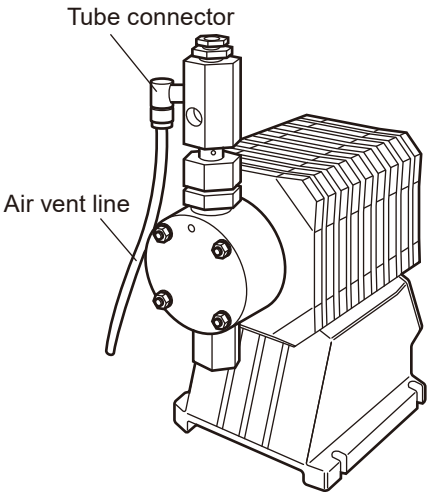
8 Check connections for leakage.

Degassing has now been completed.

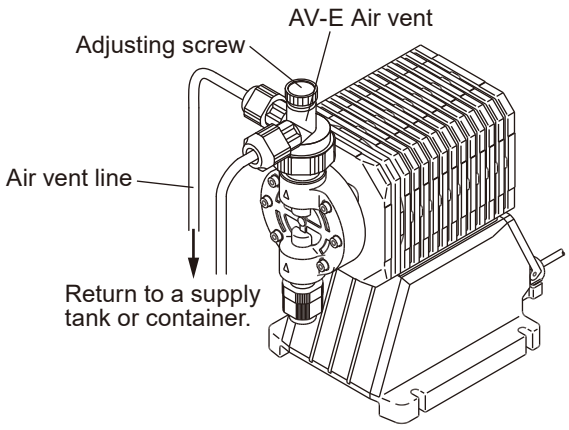
■ EH-E SH or EH-E with the optional AV-E air vent

Points to be checked

- Check that air vent line is connected to the pump.



EH-E SH



EH-E with AV-E Air vent

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 the power is turned on with the factory default setting.

2 Set a stroke rate to 360spm.

- spm increases/decreases every time the UP/DOWN key is pushed.
- Press and hold either key for three seconds for quick change.

3 Fully open the manual air vent port by turning the adjusting screw CCW by 360° (EH-E SH) or 720° (EH-E with the AV-E air vent).

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

The WAIT indication disappears and the pump starts to run.

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

6 Close the manual air vent port by turning the adjusting screw CW.

7 Check that gas has been expelled from the pump head.

Repeat the run-and-see step until liquid is outputted from the pump outlet.

8 Check connections for leakage.

Degassing has now been completed.

Flow rate adjustment

The flow rate can be changed by adjusting a stroke rate and a stroke length.

The stroke rate represents the pump speed in spm (stroke per minute). The stroke rate adjustment is the main way to adjust the flow rate from the pump.
The stroke length represents the moving distance of the plunger. The widest moving distance is defined as 100% stroke length. The stroke length adjustment is used for determining the optimal flow volume per stroke (fine adjustment of the pump flow).
First adjust a flow rate by means of stroke rate adjustment. Use stroke length adjustment for the range where stroke rate adjustment can not reach. Note the optimal stroke length change with operating conditions and liquid characteristics.

1 Change the stroke rate with the stroke length 100% to the specified level.
See the "Stroke rate adjustment" section on page 41 and the "Stroke length adjustment" section on page 42 for detail.

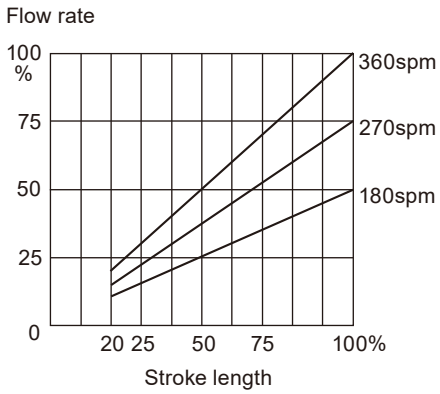
2 Measure the flow rate.

3 If the flow rate is lower/higher than the specified level, increase/decrease the stroke rate and measure the pump flow again.

4 Change the stroke length for fine adjustment.

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

■ Flow rate, stroke rate and stroke length

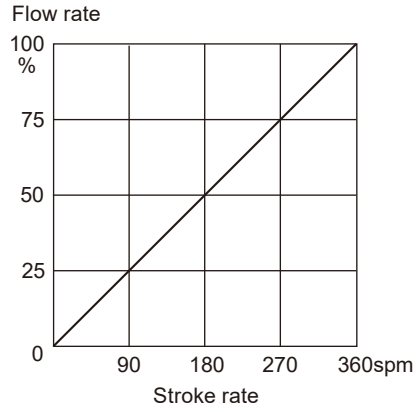


■ Precautions of flow rate adjustment

- **When back pressure is high,** set stroke length to 100% and adjust the pump flow by changing the stroke rate.
- **When each dose greatly affects a chemical reaction in neutralization or titration application,** shorten the stroke length to reduce the flow rate per stroke. And then adjust the pump flow by changing the stroke rate.
- **When handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution),** set the stroke length to 100% and adjust the pump flow by changing the stroke rate. Note gas lock may occur when the stroke length is set too short.

■ Stroke rate adjustment

The stroke rate can be set by keypad operation from 1 to 360spm. The relation between the flow rate* and the stroke rate is shown as below and it's linear.

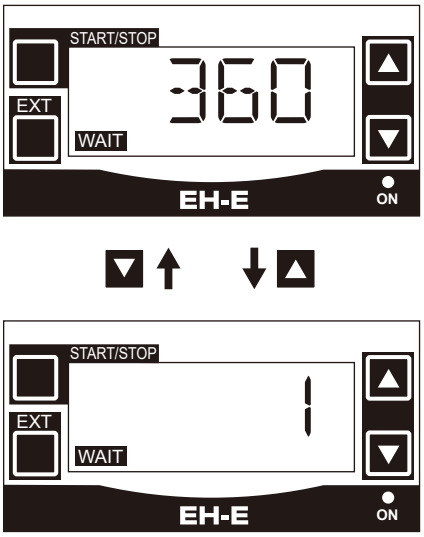


*The nameplate shows the maximum (100%) output with the full stroke rate and length.

1 Turn on power and call up manual mode.

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

- spm increases/decreases every time the UP/DOWN key is pushed.
- Press and hold either key for three seconds for quick change.

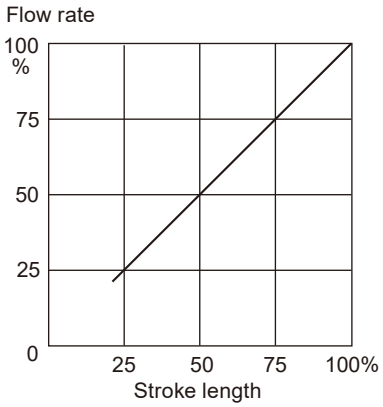


3 Push the start/stop key.

The ON LED blinks at each stroke during operation.

■ Stroke length adjustment

The stroke length can be adjusted when the moving distance of the plunger is changed with the stroke length adjusting knob. The stroke length adjustment range is generally 20-100%; however, it is limited to 50-100% range when the EH-E with the SH wet end code is used.



*The nameplate shows the maximum (100%) output with the full stroke rate and length.

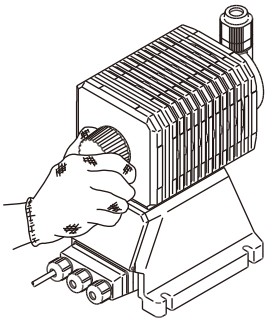
NOTE

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 the liquid volume per stroke.



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 from the pump head and piping.

Before unplugging the pump

• Always stop the pump by key operation and wait for seven (7) 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.

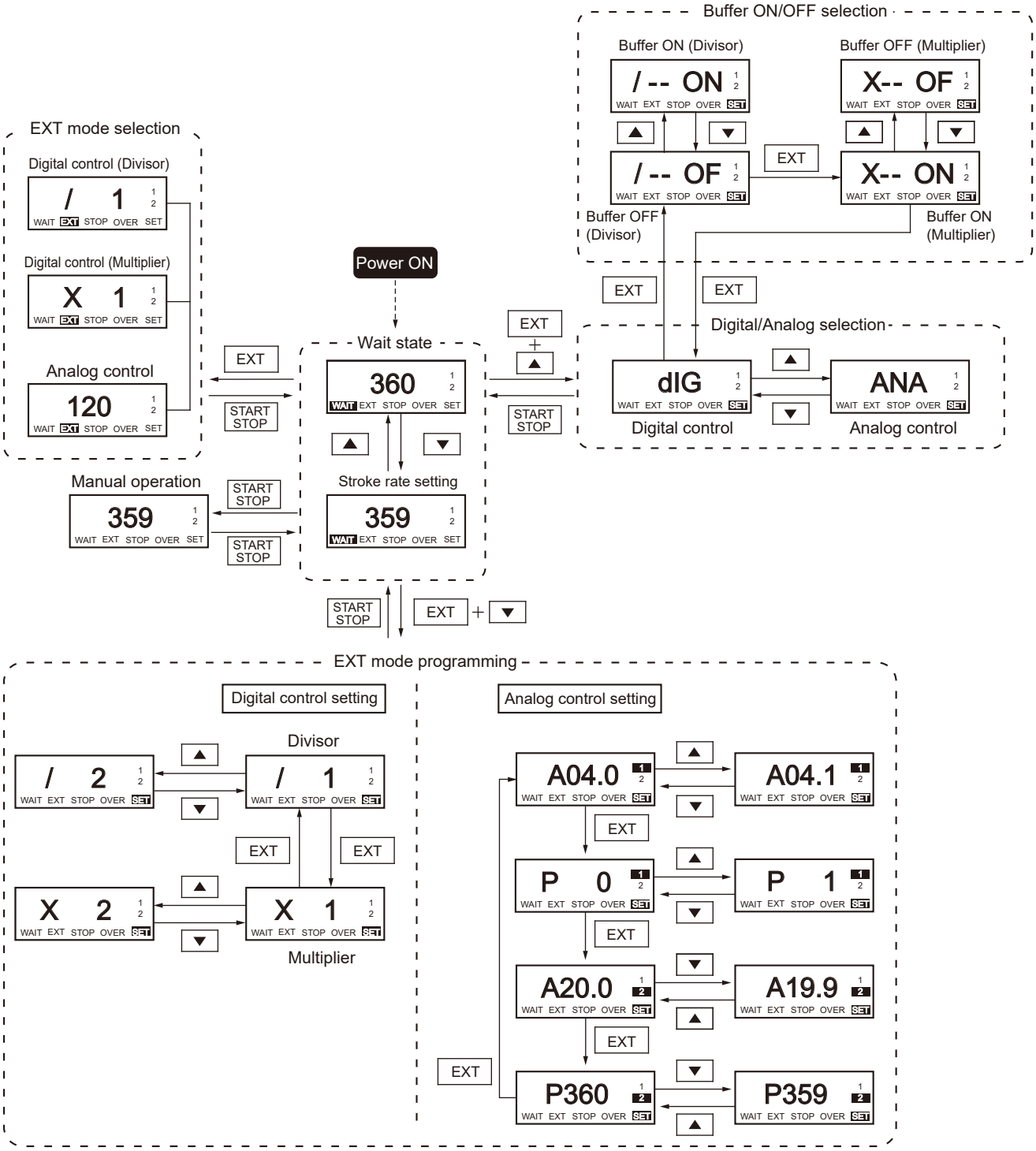
• Clean the valve sets and remove foreign matters.

• If gas is in the pump head, expel gas and readjust a flow rate. See the "Degassing" section on page 37 and the "Flow rate adjustment" section on page 40 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 settings	Setting ranges	Minimum increment/decrement*2
Manual	Stroke rate	360	1-360	1
Dig/Ana selection	Digital/ Analog	dIG (Digital)	dIG (Digital)/ ANA(Analog)	-
Buffer ON/OFF	Multiplier	X-ON	X-OF or X-ON	-
	Divisor	/-OF	/-OF or /-ON	-
EXT mode	Multiplier (Digital)	X1	1-999	1
	Divisor (Digital)	/1	1-999	1
	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 selection
Buffer ON (Divisor)
Buffer OFF (Multiplier)
/ -- ON
X-- OF
/ -- OF
X-- ON
EXT
Buffer OFF (Divisor)
Buffer ON (Multiplier)
EXT mode selection
Digital control (Divisor)
/ 1
Digital control (Multiplier)
X 1
Analog control
120
Power ON
Wait state
360
EXT
START STOP
Digital/Analog selection
dIG
ANA
Digital control
Analog control
Manual operation
359
Stroke rate setting
359
EXT mode programming
Digital control setting
Divisor
/ 2
/ 1
X 2
X 1
Multiplier
Analog control setting
A04.0
A04.1
P 0
P 1
A20.0
A19.9
P360
P359
WAIT EXT STOP OVER SET

Operation

Read this section before operation.

Manual operation

Run or stop the pump by keypad operation.

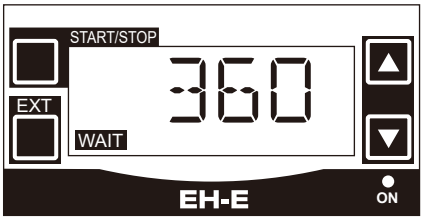
1 Supply the rated power voltage to the pump.

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

*The pump waits in the manual mode when the power is turned on with the factory default setting.

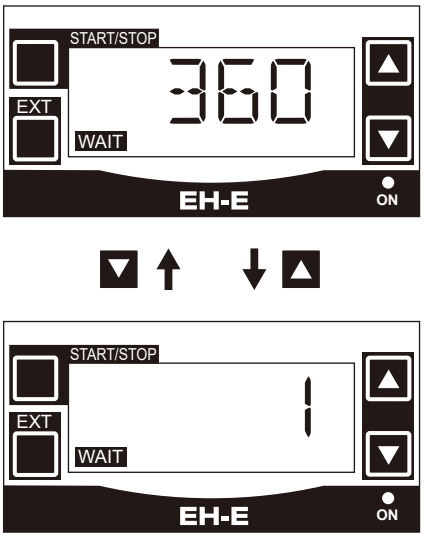
2 Push the start/stop key to return to the wait state.

"WAIT" indication appears.



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

- The stroke rate increases or decreases every time the UP or DOWN key is pushed.
- Press and hold either key for three seconds for quick change.



4 Push the start/stop key to start operation.

The ON LED blinks at each stroke during operation.

EXT operation

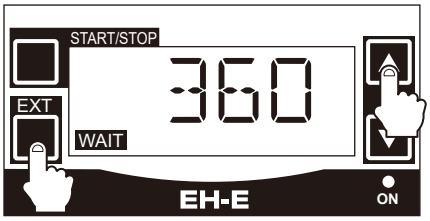
The pump operation is controlled with the external signal.

■ Analog control programming

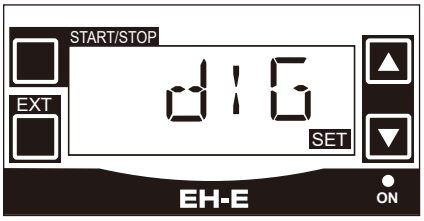
Set the pump to run in between 0-360spm in proportion to 0-20mA.

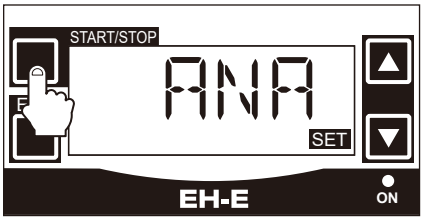
1 Push the start/stop key to return to the wait state.
"WAIT" indication appears.

2 Push the UP key while pressing the EXT key to call up the Digital/Analog selection.
"dIG"(digital) or "ANA"(analog) will appear.



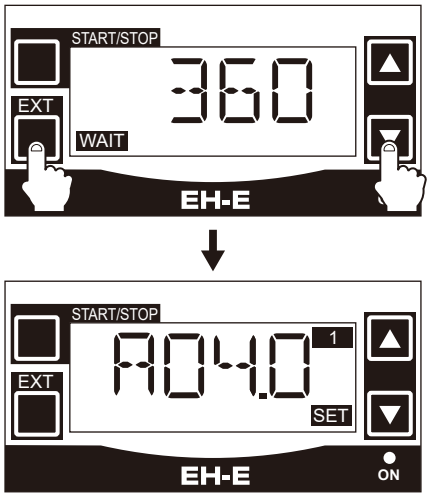
3 Select "ANA".
Scroll through "dIG" and "ANA" selection with the UP and DOWN keys.



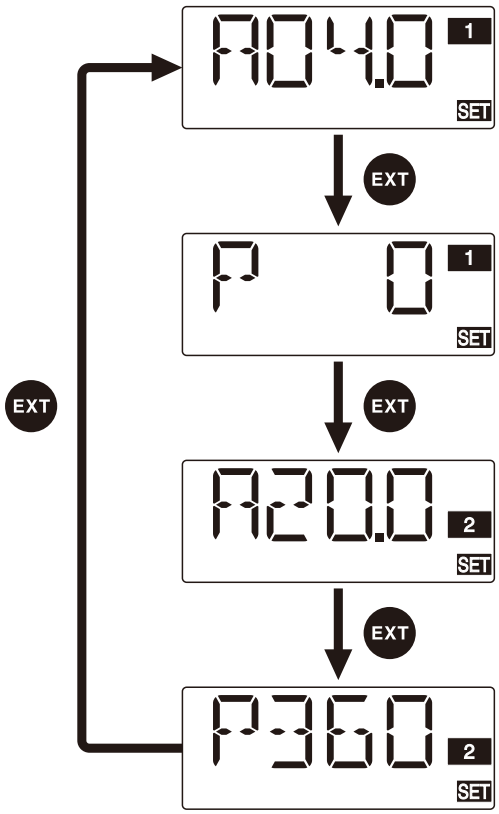


4 Push the start/stop key to return to the wait state.

5 Push the DOWN key while pressing the EXT key to call up the analog control setting mode.



6 Use the UP and DOWN keys to set the SET1 & 2 parameters.



Enter a current value at the SET 1.
*Default value is 4.0mA.

Enter a spm at the SET 1.
*Default value is 0spm.

Enter a current value at the SET 2.
*Default value is 20.0mA.

Enter a spm at the 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 the analog control.

NOTE

Do not enter the same current value or spm to the SET 1 and SET 2. This invalid setting will be cancelled with "ERR 1" indication. Enter the new value or spm afterward.

■ Digital control programming

The pump operation is controlled with the external (pulse) signal. Set a multiplier or a divisor as necessary for its intended purpose before operation.

Multiplier setting

The pump increases/decreases a stroke rate by the external signal and the multiplier. Set a multiplier (1-999 strokes) per pulse in advance of operation.

*The pump makes one stroke per pulse when a multiplier is set to 1.

NOTE

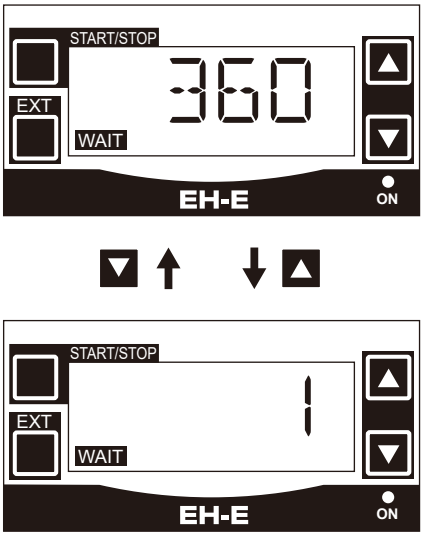
- The pump does not run over the manual stroke rate (MAN speed). If the MAN speed is set to 200spm, for example, the pump does not run over the speed with any multiplier or pulse rate.
- Do not enter the external signal to the pump while the digital control setting is changed.

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

"WAIT" indication appears.

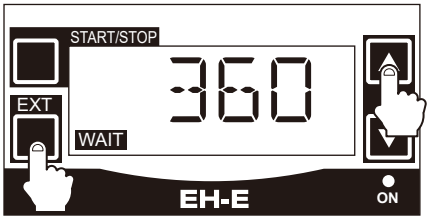
2 Use the UP or DOWN key to adjust the stroke rate (MAN speed).

- The stroke rate increases/decreases every time the UP or DOWN key is pushed.
- Press and hold either key for three seconds for quick change.



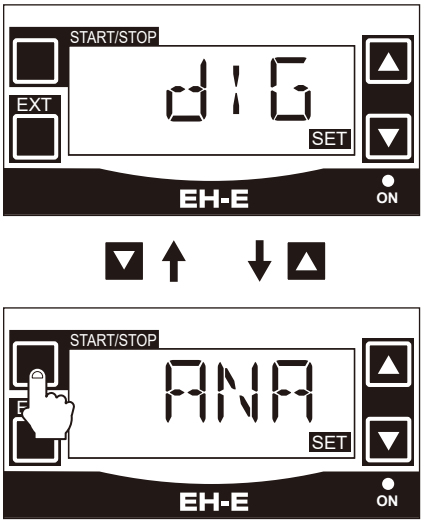
3 Push the UP key while pressing the EXT key to call up the Digital/Analog selection.

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



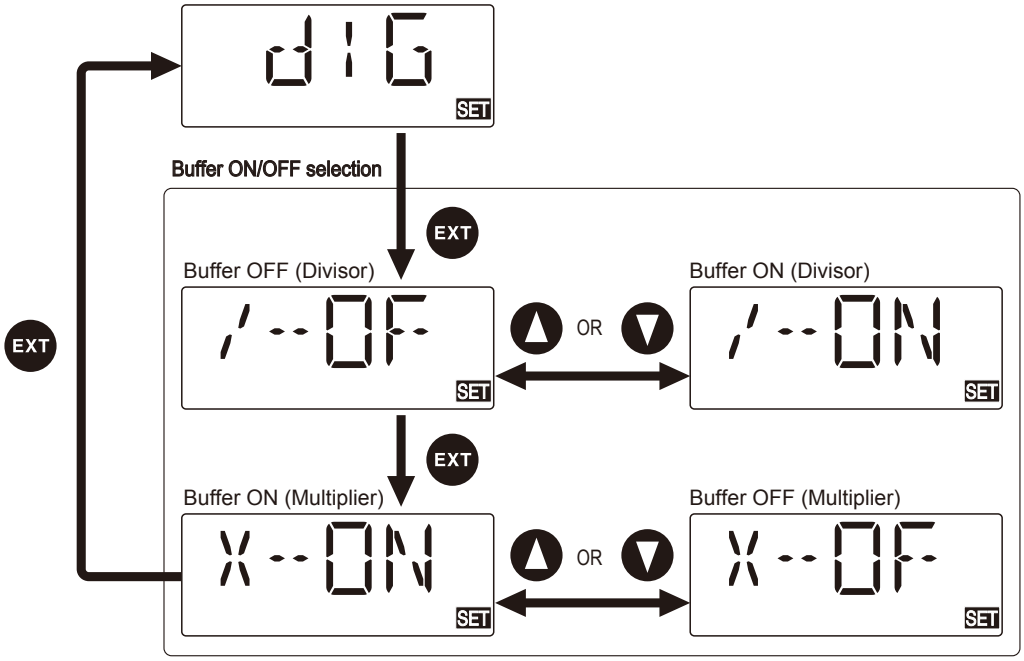
4 Select "dIG".

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



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

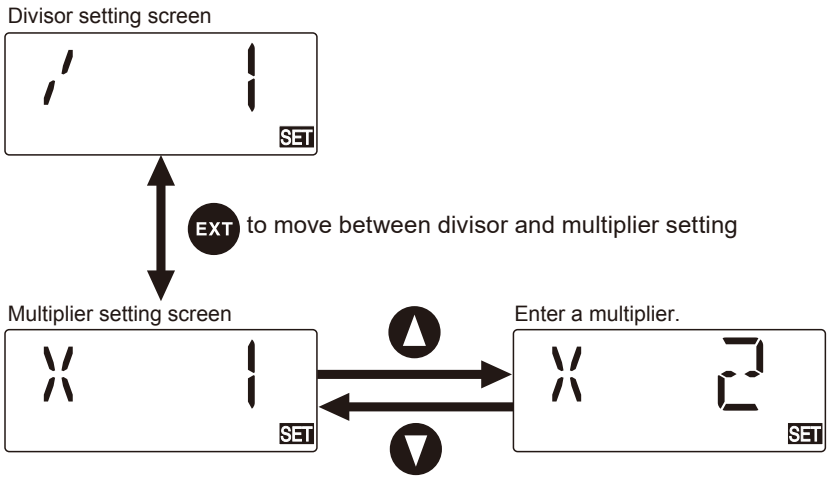
Scroll through "X-ON" and "X-OFF" with the UP and DOWN keys and push the EXT key to decide.



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 the digital control.

Divisor setting

The pump increases/decreases a stroke rate by the external signal and the divisor. Set a divisor (1-999 pulse rates) per stroke in advance of operation.

NOTE

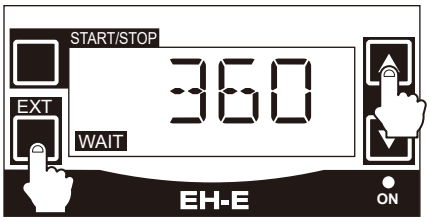
If a divisor is set to 1, the pump speed equals to the external pulse rate (1:1 operation). This operation, however, may be upset when the pulse rate has exceeded 360spm and the extra signals are cancelled. Although this is not malfunction, use of the multiplier is recommended to ensure steady 1:1 operation.

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

"WAIT" indication appears.

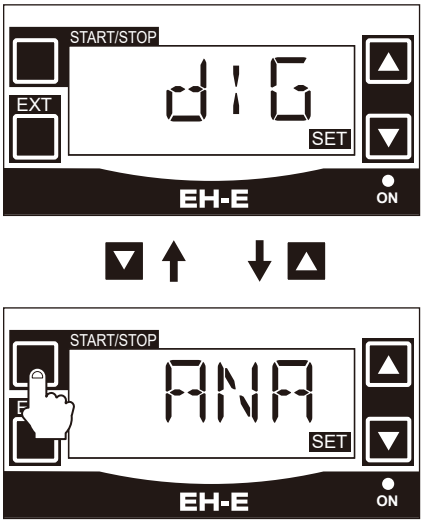
2 Push the UP key while pressing the EXT key to call up the Digital/Analog selection.

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



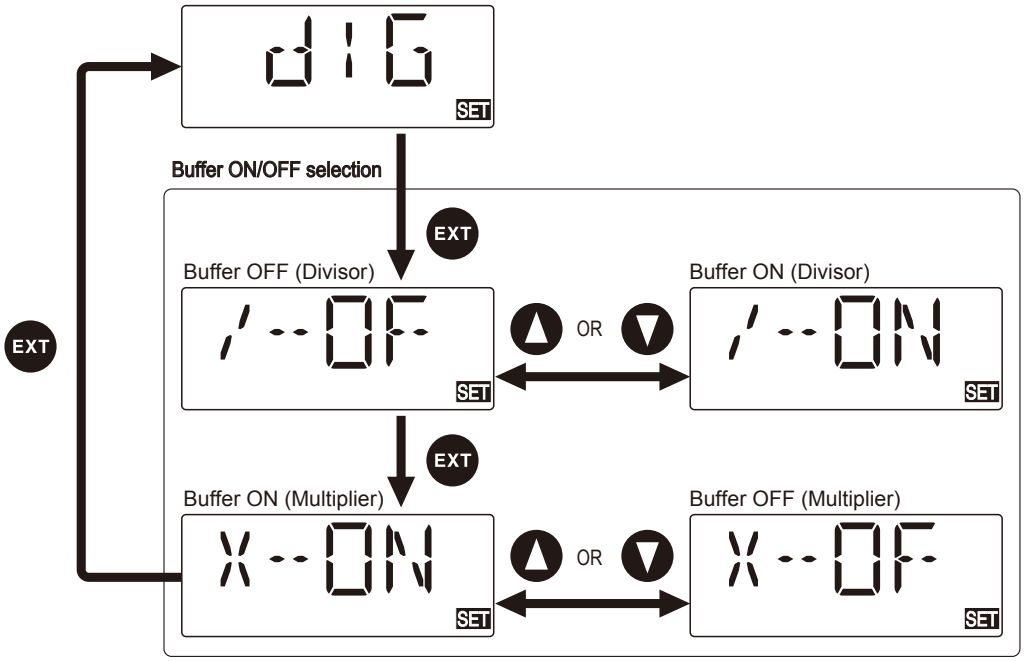
3 Select "dIG".

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



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

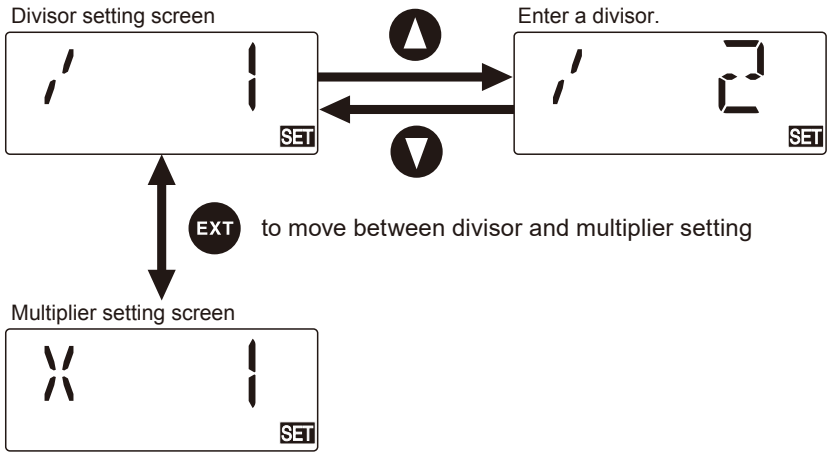
Scroll through "/-ON" and "/-OFF" with the UP and DOWN keys and push the EXT key to decide.



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

6 Push the DOWN key while pressing the EXT key.

7 Set a divisor.



8 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.

9 Push the EXT key to start the digital control.

Maintenance

This section describes troubleshooting, maintenance, wear part replacement, 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 disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to SDS precautions from the solution supplier.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.

Before unplugging the pump

Always stop the pump by key operation and wait for seven seconds, especially when disconnecting the pump from a piping system. Otherwise, the stop command may not be saved, and the pump may unintentionally start to run and deliver fluid into an imperfect piping system as it is powered on once again.

NOTE

- It's not the manufacture's responsibility for any failure due to corrosion or erosion occurred in your operating condition.
- When repair is needed to our pumps, contact us or the manufacturer of the machine in which our product is built.
- Be sure to drain chemicals and flush the inside of the pump before return. Or harmful chemicals may 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 each pump model. See page 20 for detail.
	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 37.
	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.	• Take apart, inspect and clean the valves. Replace as necessary.
	A ball valve is stuck on a valve seat.	• Take apart, inspect and clean the valve. Replace as necessary.
A flow rate fluctuates.	Air stays in the pump head.	• Expel air. See page 37.
	Overfeeding occurs.	• Mount a check valve. See page 26 or later.
	Foreign matters are stuck in the pump head valves.	• Take apart, 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 36.
	O rings or valve gaskets are not installed.	• Install O rings and valve gaskets.
	Diaphragm is broken.	• Replace the diaphragm.
	Excessive discharge pressure	• Check that a discharge line is not closed. • Check if tubing is not clogged.

Inspection

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

Daily inspection

Check the following points. If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems. See the "Troubleshooting" section as necessary.
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.	Pressure gauge
		• If liquid has deteriorated, crystallized or settled.	Visual or audio inspection
2	Noise and vibration	• If abnormal noise or vibration occurs. They are signs of abnormal operation.	Visual or audio inspection
3	Air ingress from the pump head joints and the suction line	• If pumped liquid includes air bubbles, check the line for leakage/loose connection and retighten as necessary.	Visual or audio inspection

Periodic inspection

Be sure to retighten the bolts tighten the bolts diagonally and evenly by 2.55 N•m before initial operation and at regular intervals (every three months).

*Mounting bolts may loosen in operation. How fast the bolts start to loosen is depending on operating conditions.
*A hexagon wrench can be used for a torque wrench. See page 36.

Wear part replacement

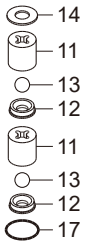
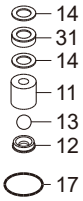
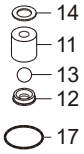
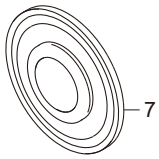
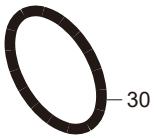
To run the pump for a long period, wear parts need to be replaced periodically.
It is recommended that the following parts are always stocked for immediate replacement.
Contact your nearest distributor for detail.

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 taken apart, replace the diaphragm, the O ring and the valve sets with new ones.

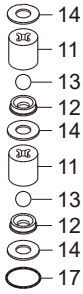
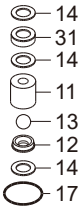
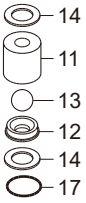
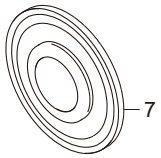
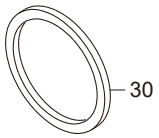
Wear part list

■ EH-E VC/V6/VE/PC/PE/VM

Parts				# of parts	Estimated life
	EH-E 31/36	EH-E 46	EH-E 56		
Valve set				2 sets	8000 hours
Diaphragm				1	
O ring				See page 67.	

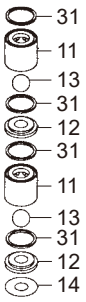
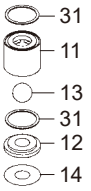
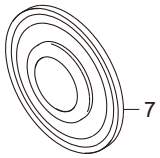
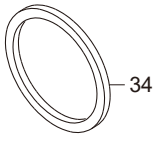
*Wear part duration varies with the pressure, temperature and characteristics of liquid.
*The estimated life is calculated based on pumping clean water at ambient temperature.

■ EH-E FC

Parts				# of parts	Estimated life
	EH-E 31/36	EH-E 46	EH-E 56		
Valve set				2 sets	8000 hours
Diaphragm				1	
O ring				See page 67.	

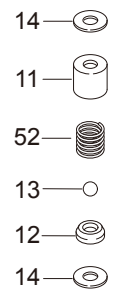
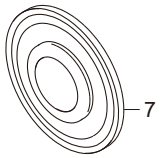
*Wear part duration varies with the pressure, temperature and characteristics of liquid.
*The estimated life is calculated based on pumping clean water at ambient temperature.

■ EH-E SH

Parts			# of parts	Estimated life
	EH-E 31/36	EH-E 46/56		
Valve set			2 sets	8000 hours
Diaphragm			1	
O ring			See page 68.	

*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.

■ EH-E HP6

Parts		# of parts	Estimated life
Valve set	EH-E 36 	2 sets	8000 hours
Diaphragm		1	
O ring		See page 69.	

*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 the discharge line.

■ Depressurization

In general, no air vent port is provided to the EH-E pump for depressurising the pump and the discharge line; however, you can branch the main flow line (discharge side) and establish an open-ended air vent line for safe depressurization.

For the EH-E with the SH wet end code or with the optional AV-E air vent, take the steps below.

1 Stop the pump operation.

2 Rotate the adjusting screw to release pressure.

NOTE

Do not rotate the adjusting screw counter clockwise two revolutions or more from the closed position. Otherwise, the adjusting screw may come off with solution spray.

3 Check the pump head and the discharge line are depressurized.

Liquid pressure is released from the air vent line in the form of solution spray.

NOTE

If pressurized liquid is not expelled, run the pump with an opened air vent line until pressure is removed.

Valve set replacement

■ Discharge valve set disassembly/assembly

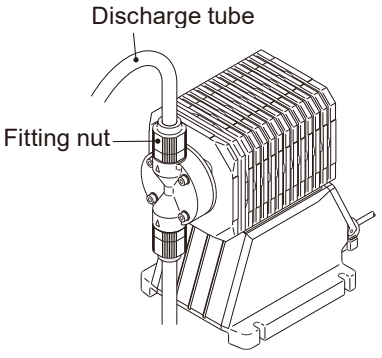
Necessary tools

- An adjustable wrench or spanner
- A 22mm or 30mm box wrench
- A pair of tweezers

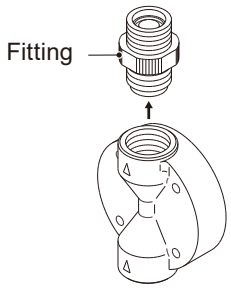
*Unfix the pump base before disassembly.

EH-E VC/V6/VE/PC/PE/VM/FC/HP6

1 Loosen the fitting nut to remove the discharge tube.



2 Turn the fitting counter clockwise with an adjustable wrench to remove.

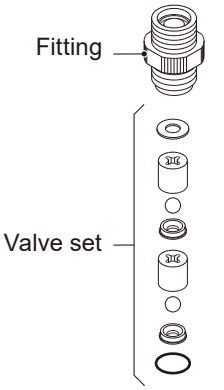


3 Pull out the valve set with a pair of tweezers.

4 Build up the new valve set into the pump head.

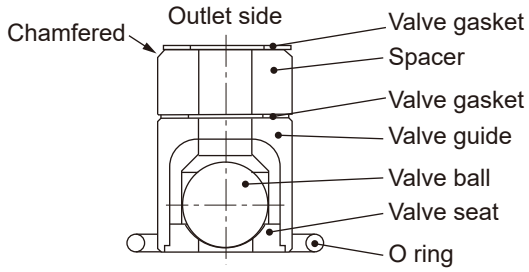
Hand-tighten the fitting into the pump head as far as it will go. Retighten it by a further 1/4 turn with an adjustable wrench or a spanner.

*A leak or an insufficient flow may result. Arrange the valve set in the correct parts order and direction.
*Be sure to fit O rings and gaskets in place.
*Keep the valve set clean.



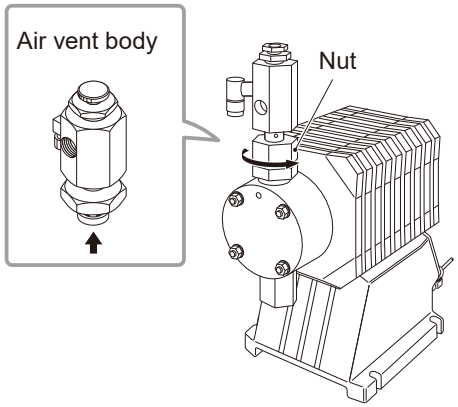
VC/V6/VE/PC/PE

*For the EH-E46 with VC/V6/VE/PC/PE/FC wet end code, mount the spacer with the following direction.

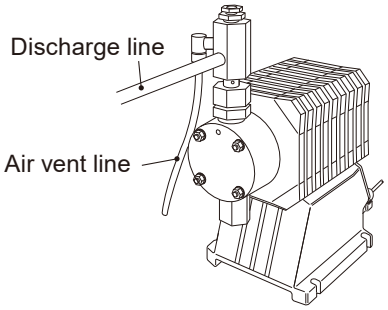


5 Remount the air vent body A and connect tubes.

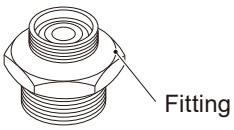
1 Remove the discharge line and the air vent line.

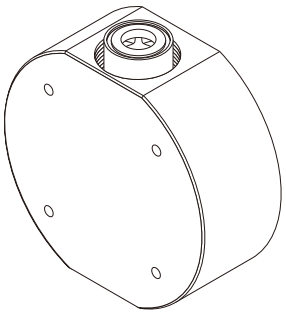


2 Use an adjustable wrench to turn the air vent body counter clockwise to remove.



3 Use an adjustable wrench to turn the fitting counter clockwise to remove.





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

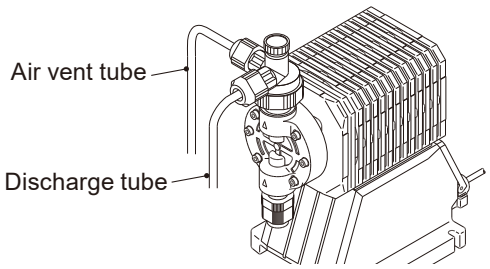
5 Build up the new valve set into the pump head. Tighten the fitting into the pump head by 5.0N·m (EH-E 31/36) or 7.0N·m (EH-E 46/56).

*A leak or an insufficient flow may result. Arrange the valve set in the correct parts order and direction.
*Be sure to fit O rings and gaskets in place.
*Keep the valve set clean.

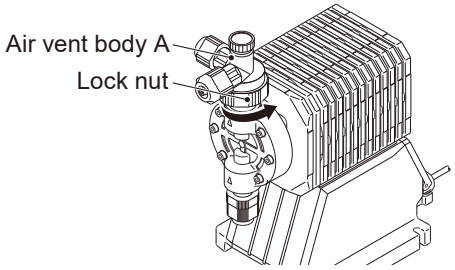
6 Remount the air vent body and connect tubes.

EH-E with the optional AV-E air vent

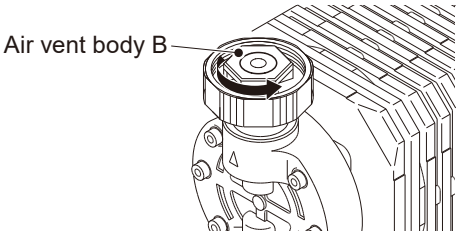
1 Loosen the fitting nut to remove the discharge tube and the air vent tube.



2 Use an adjustable wrench to turn the lock nut CCW and remove the air vent body.



3 Use a 22mm box wrench for the EH-E 31/36 or a 30mm for EH-E 46/56 to turn the fitting CCW to remove.



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

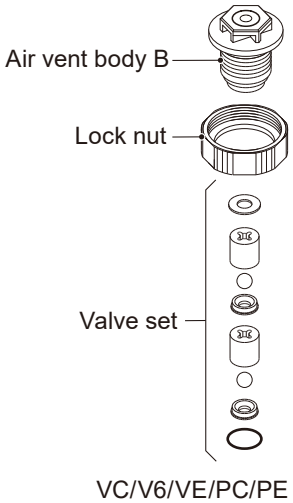
5 Build up the new valve set into the pump head.

Use a box wrench and tighten the air vent body B by 3.43N·m.

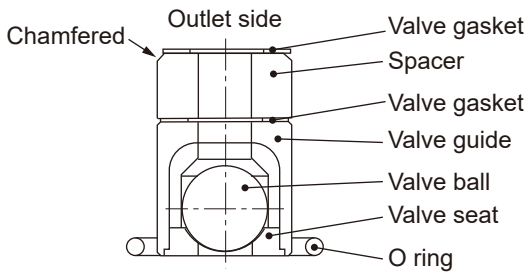
*A leak or an insufficient flow may result. Arrange the valve set in the correct parts order and direction.

*Be sure to fit O rings and gaskets in place.

*Keep the valve set clean.



*For the EH-E46 with VC/V6/VE/PC/PE/FC wet end code, mount the spacer with the following direction.



6 Remount the air vent body A and connect tubes.

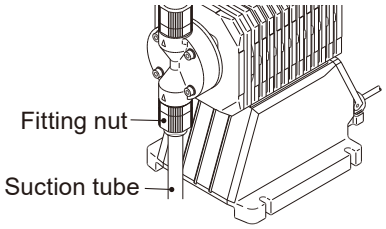
■ Suction valve set disassembly/assembly

NOTE

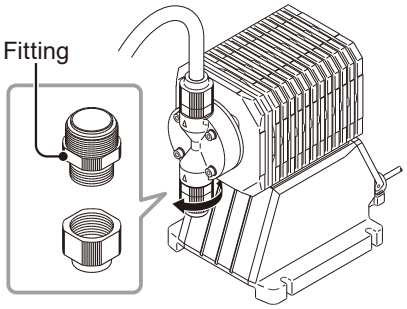
Be careful not to drop the valve set.

EH-E with the VC/V6/VE/PC/PE/VM/FC/HP6/SH wet end code or the optional AV-E air vent

1 Remove the fitting nut and the suction tube.



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



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

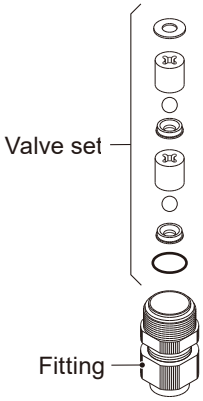
4 Place a new valve set into the fitting.

Hand-tighten the fitting 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.

*A leak or an insufficient flow may result. Arrange the valve set in the correct parts order and direction.

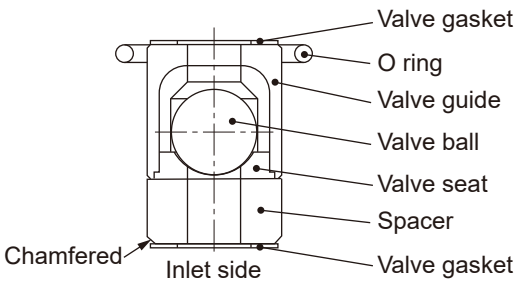
*Be sure to fit O rings and gaskets in place.

*Keep the valve set clean.



VC/V6/VE/PC/PE

*For the EH-E46 with VC/V6/VE/PC/PE/FC wet end code, mount the spacer with the following direction.

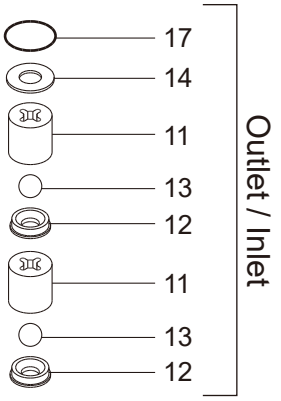


5 Reconnect the suction tube.

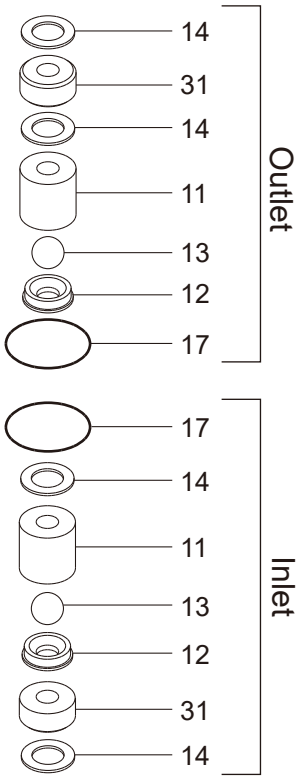
■ Valve set at each model

VC/V6/VE/PC/PE/VM*

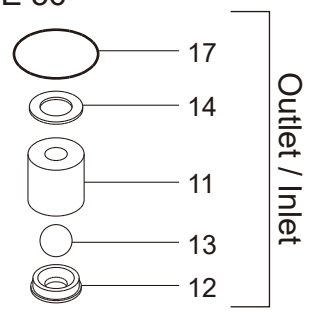
EH-E 31/36



EH-E 46

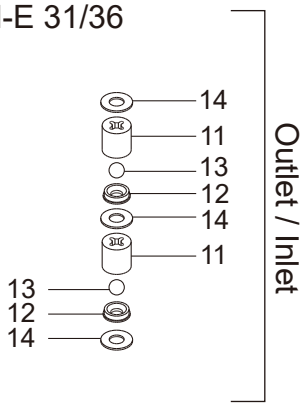


EH-E 56

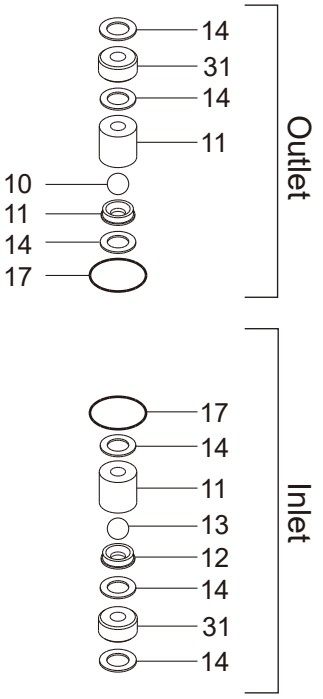


FC

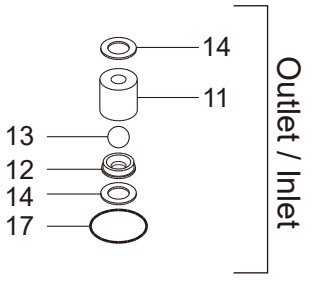
EH-E 31/36



EH-E 46

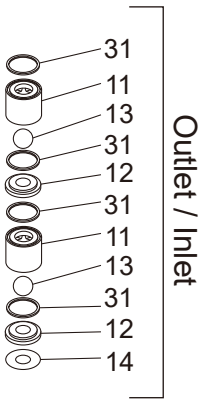


EH-E 56

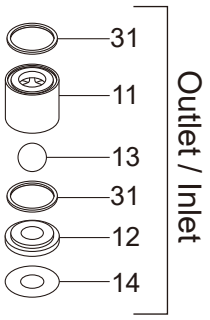


SH

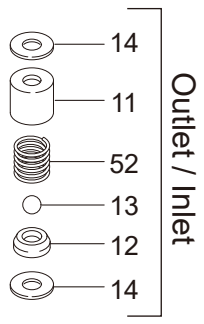
EH-E 31/36



EH-E 46/56



HP6



*The wet end material code of VM is available only for the EH-E 56.

Maintenance

Diaphragm replacement

Necessary tools

- A hexagon wrench
- A torque wrench

NOTE

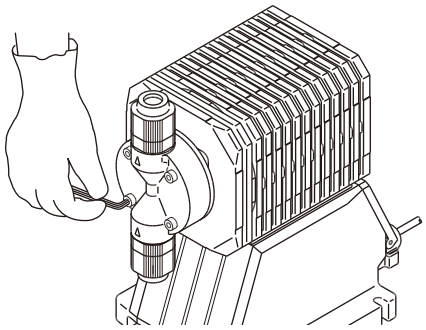
Pay attention not to lose diaphragm spacers. A few diaphragm spacers may be inserted between the retainer and plunger for the adjustment of a diaphragm location. Note that the number of diaphragm spacers provided varies at different pumps.

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

*Shorten the stroke length to 0% or just to the length the diaphragm can be removed.

2 Loosen the fitting nuts and remove the suction tube and the discharge tube.

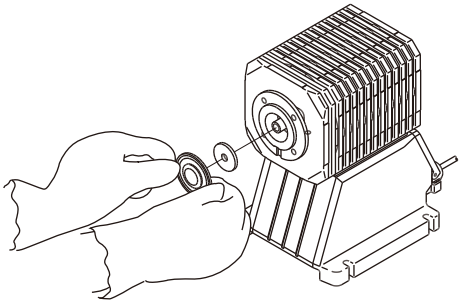
3 Remove the pump head with a hexagon wrench.



4 Unscrew the diaphragm from the plunger (pump shaft).

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

Screw the new diaphragm into the plunger as far as it will go.
Also, fit the retainer with its round edge to the diaphragm.



6 Run the pump and set the stroke length to 50%.

Stop the pump afterwards.

7 Mount the pump head.

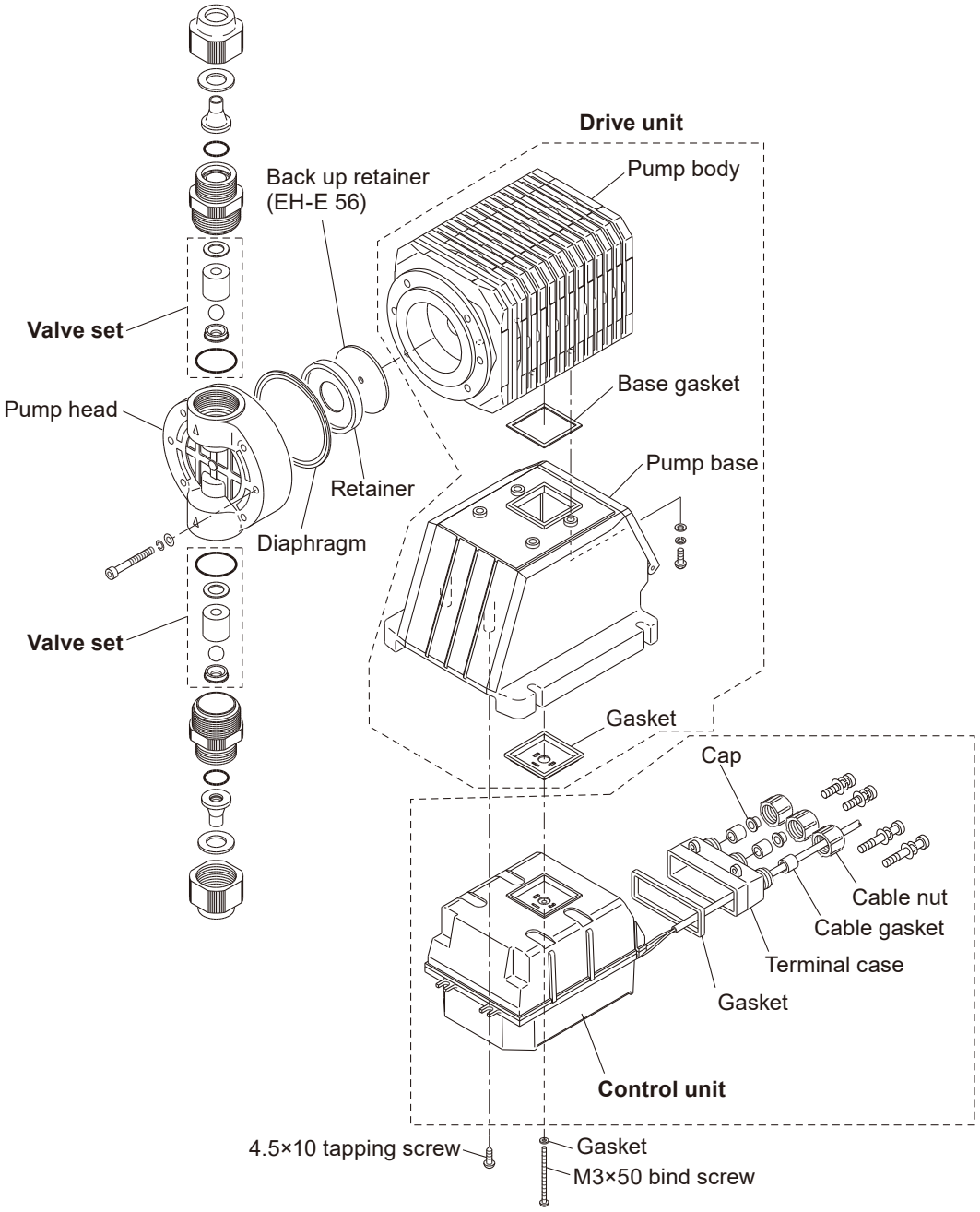
Tighten the pump head fixing bolts diagonally and evenly by 2.55 N•m.

*A hexagon wrench can be used for a torque wrench. See page 36.

Exploded view

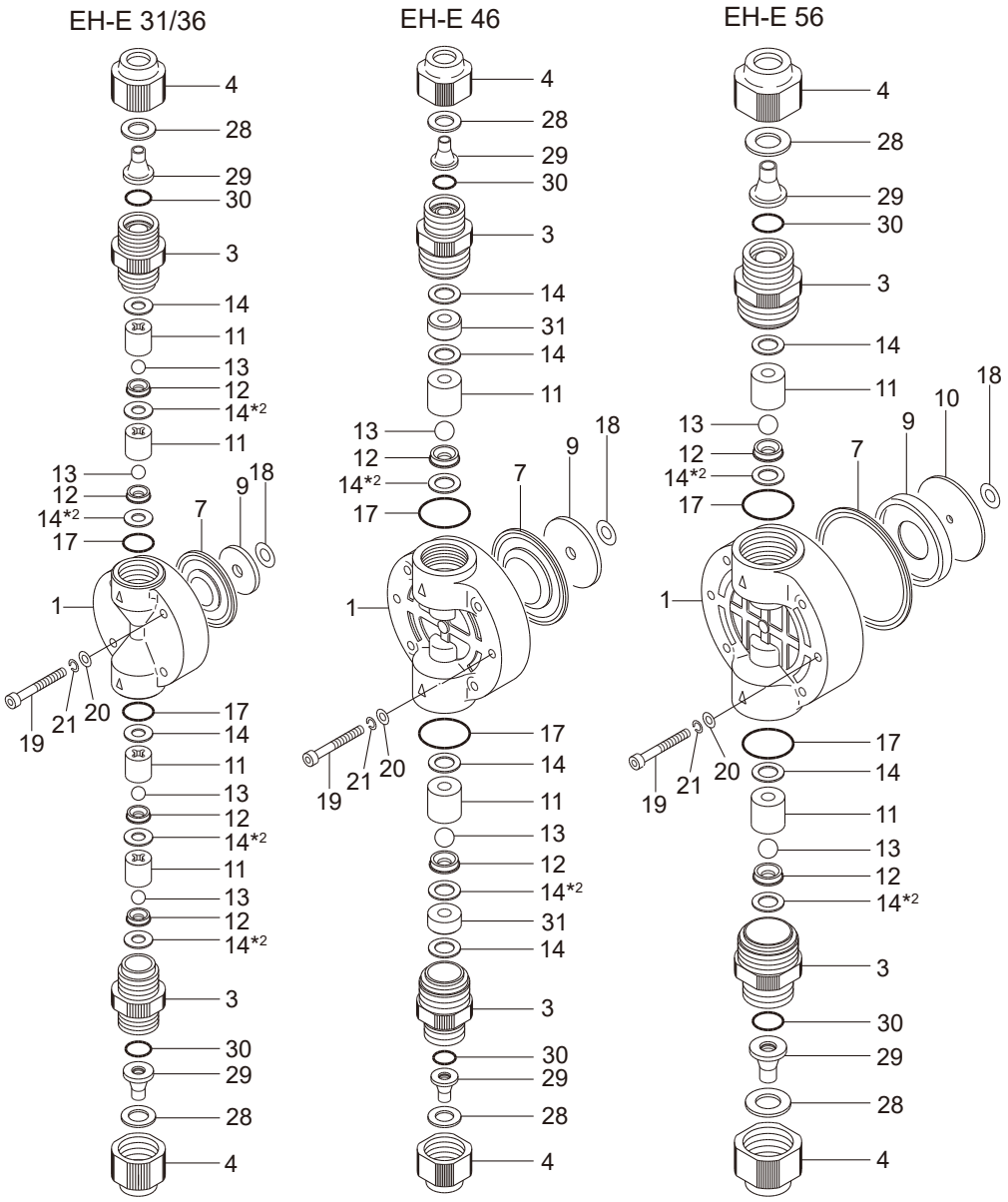
Pump head, Drive unit & Control unit

Do not take apart the pump beyond the extent shown in the diagram below.



*Pump head material and size differ with models.

■ EH-E 31/36/46/56 VC/V6/VE/PC/PE/VM/FC
EH-E 56 VM



No.	Part names	# of parts
1	Pump head	1
3	Fitting	2
4	Fitting nut	2
7	Diaphragm	1
9	Retainer	1
10	Back up retainer	1 (EH-E 56)
11	Valve guide	4 (2)*1
12	Valve seat	4 (2)*1
13	Valve	4 (2)*1
14	Valve gasket	*3

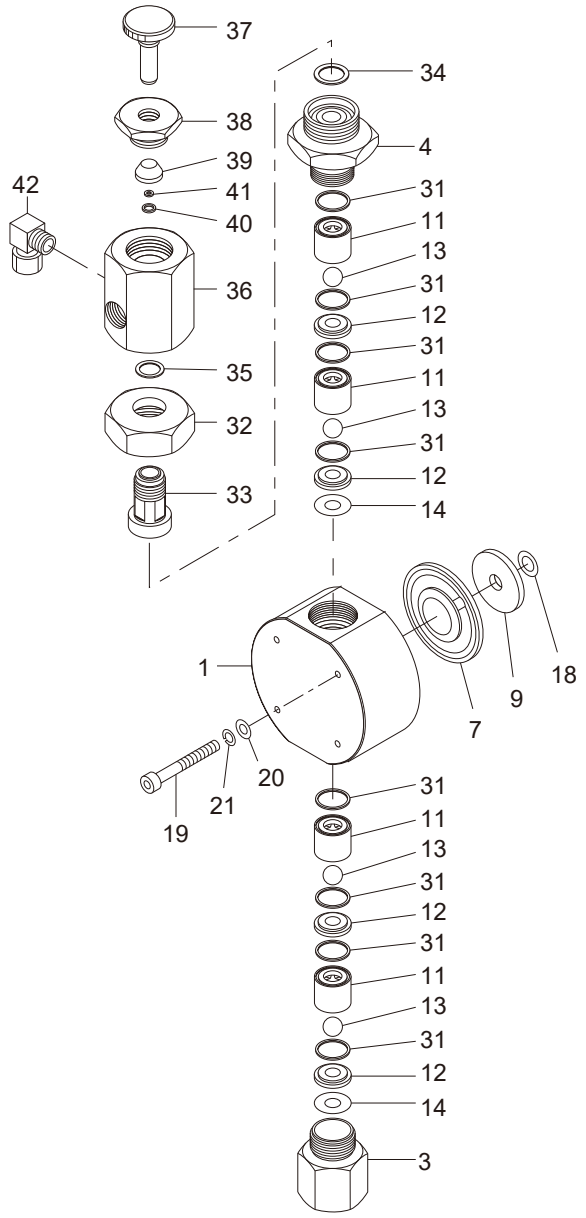
No.	Part names	# of parts
17	O ring (Gasket for FC type)	2
18	Diaphragm spacer	1*4
19	Hex socket cap bolt	4 (6)*1
20	Plain washer	4 (6)*1
21	Spring washer	4 (6)*1
28	Hose stopper	2
29	Fitting spacer	2
30	O ring (Gasket for FC type)	2
31	Spacer	2 (EH-E 46)

*1 The parenthetic figures are for EH-E 46/56.
*2 These valve gaskets (with an asterisk) are provided to the pumps with FC wet end code.
*3 The number of valve gaskets varies with pump model of:
- EH-E 31/36/56 VC/V6/VE/PC/PE and EH-E 56 VM that have two (2).
- EH-E 46 VC/V6/VE/PC/PE/FC that have four (4).
- EH-E 31/36/46 FC that have six (6).

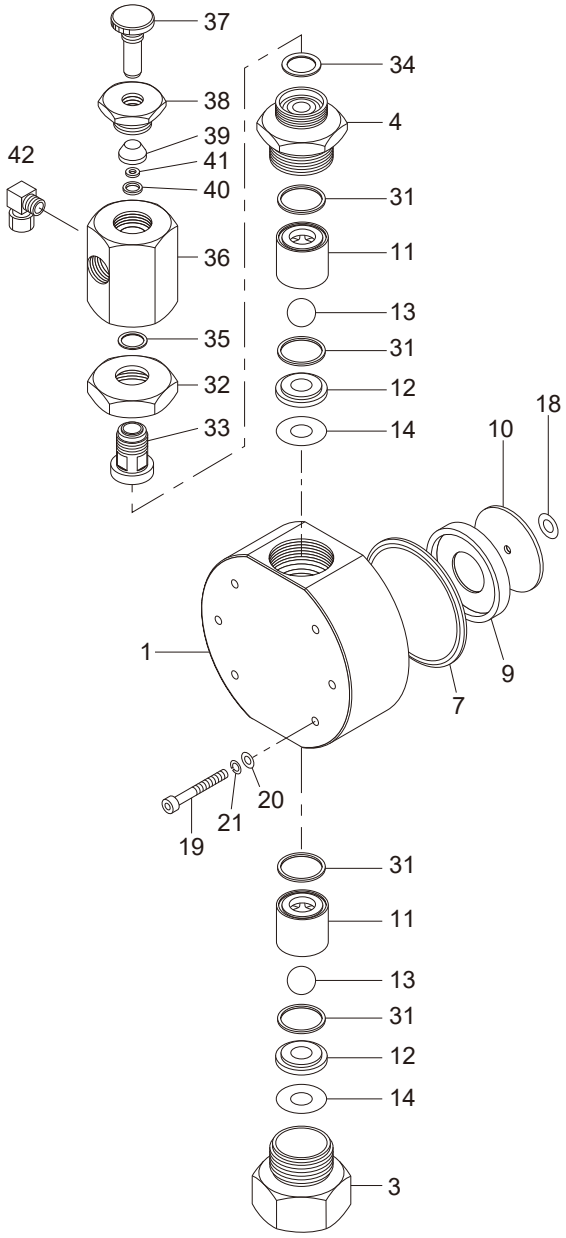
*4 The number of diaphragm spacers varies with pump model.

■ EH-E 31/36/46/56 SH

EH-E 31/36



EH-E 46/56

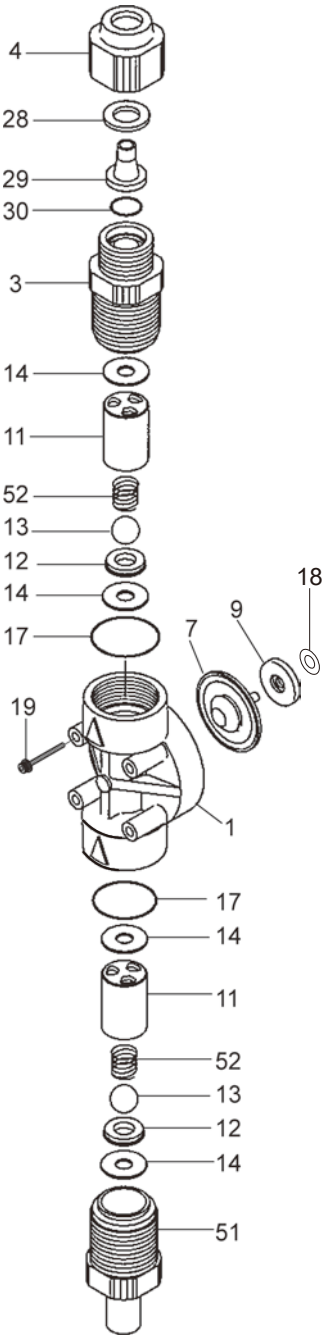


No.	Part names	# of parts
1	Pump head	1
3	Suction fitting	1
4	Discharge fitting	1
7	Diaphragm	1
9	Retainer	1
10	Back up retainer	1 (EH-E 56)
11	Valve guide	4 (2)*1
12	Valve seat	4 (2)*1
13	Valve	4 (2)*1
14	Valve gasket B	2
18	Diaphragm spacer	1*2
19	Hex socket cap bolt (M5)	4 (6)*1
20	Plain washer	4 (6)*1

No.	Part names	# of parts
21	Spring washer	4(6)*1
31	Valve gasket A	8(4)*1
32	Nut	1
33	Fitting	1
34	Fitting gasket	1
35	Air vent gasket	1
36	Air vent body	1
37	Adjusting screw	1
38	Seal nut	1
39	Seal ring	1
40	Air vent valve seat	1
41	Seat ring	1
42	Tube connector	1

*1 The parenthetic figures are for EH-E 46/56.
*2 The number of diaphragm spacers varies with pump model.

■ EH-E 36 HP6



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

*1 The number of diaphragm spacers varies with pump model.

Specifications/Outer dimensions

Specifications

Information in this section is subject to change without notice.

■ Pumps

Model code	Max. output capacity mL/min	Stroke volume mL/stroke	Discharge pressure MPa	Stroke rate spm	Stroke length % (mm)	Average power cons. W	Average current A	Weight kg
EH-E 31	340	0.19-0.94	1	1-360	20-100 (0.3-1.5mm)	48	11U: 1.8 20E: 0.8 23U: 0.8	8 (13)
EH-E 36	520	0.29-1.44	0.7 (0.6)					
EH-E 46	750	0.42-2.08	0.4					8 (16)
EH-E 56	1250	0.69-3.47	0.2					
EH-E 36 HP6	300	0.25-1.25	0.7	1-240			20E: 0.8	8

*Maximum output capacity is rated with clean water at ambient temperature at maximum discharge pressure (also, stroke length 100%, at stroke rate 100% and rated voltage). Output may increase as pressure decreases.
*Allowable room temperature: 0-40°C or 32-104°F
*Allowable ambient humidity: 30-85%RH (non-condensing in the controller)
*Allowable liquid temperature: 0-40°C or 32-104°F (VC/V6/VE/VM wet end codes)
0-60°C or 32-140°F (PC/PE/FC/SH/HP6 wet end codes)
*Allowable power voltage deviation: ±10% of the rated range
*Maximum altitude: 2000m
*Pollution degree: 2
*The maximum noise level: 80dB at 1m or 3.3feet (A scale)
*The parenthesised values are for the EH-E with SH wet end code.
*For the EH-E 46/56 SH, the stroke length is adjustable in the shorter range of 50-100% (0.75-1.5mm).

■ 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	Input signal	No-voltage contact or open collector*1
EXT mode	Digital control*4	n (1-999) strokes per signal (multiplier)*2 n (1-999) signals per stroke (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 2 0-20mA, 0-360spm
	Input signal	No-voltage contact or open collector*1
Sensor power	12VDC 10mA	
Indicator	Numeric indication	4-digit LCD
	Operation	Green LED (blinks at each stroke)
Power voltage*5	11U (USA)	115VAC (90-126VAC)
	23U (USA)	230VAC (207-253VAC)
	20E (Asia/Europe)	220/230/240VAC (198-264VAC)

*1 The maximum applied voltage from the EH-E to an external contact is 5V at 1.1mA. When using a mechanical relay, the minimum application load should be 1mA or below.

*2 In the digital control with a preset multiplier, the pump does not run over the MAN speed at any pulse rate. An unprocessed pulse sinal which exceeds the MAN speed pulse rate is stored for up to 64535 strokes if the multiplier buffer is turned on ("X-ON").

*3 In the digital control with a preset divisor, the pump does not run over 360 spm at any pulse rate. An unprocessed pulse signal which exceeds the max 360 spm is stored for up to 64535 strokes if the divisor buffer is turned on ("/-ON").

*4 The maximum frequency is 100Hz.

*5 Observe the specified power voltage range, or the pump may fail.

■ European power cable

Cross section area	0.75 [mm^2] / 3-conductor (L/N/PE)
Length	2000 [mm]
Standard	H03VV-F
Terminal end	European plug

■ American power cable

Cross section area	0.824 mm^2 (18AWG)
Length	78.74" (inch)
Standard	SJTW
Terminal end	American plug

■ Asian power cable

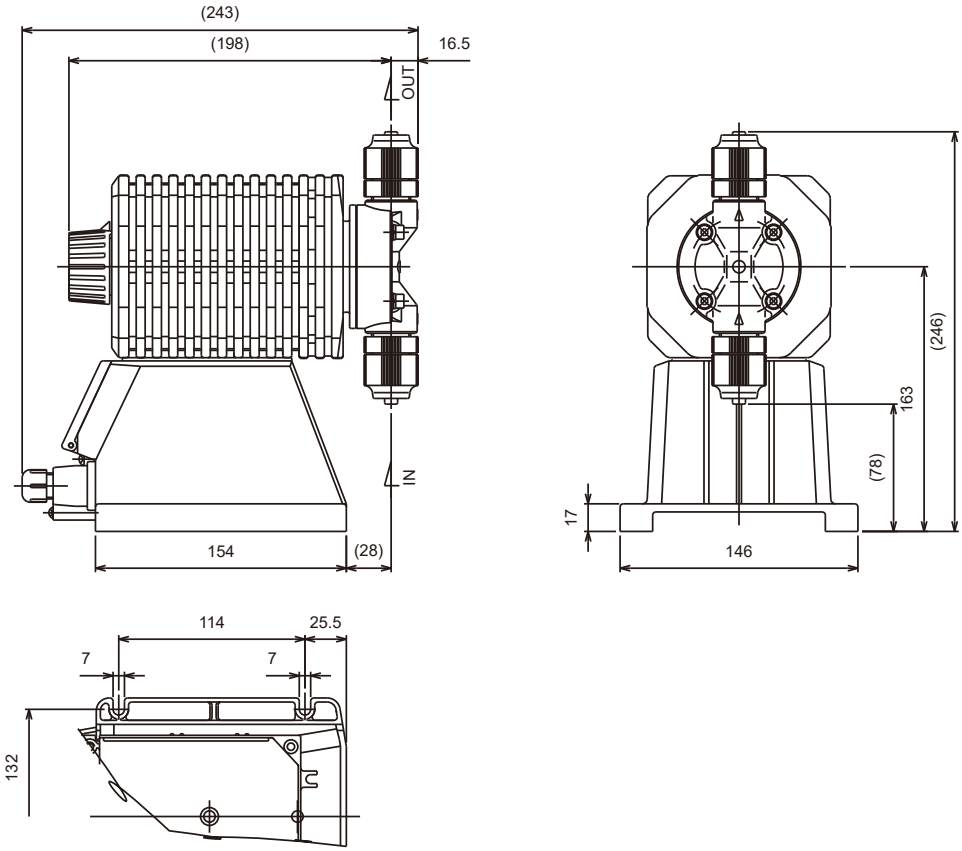
Cross section area	0.75 [mm^2] /3-conductor
Length	1500 [mm]
Standard	VCTFK
Terminal end	Spade terminal (V1.25-YS4A or equivalent)

■ Pump colour

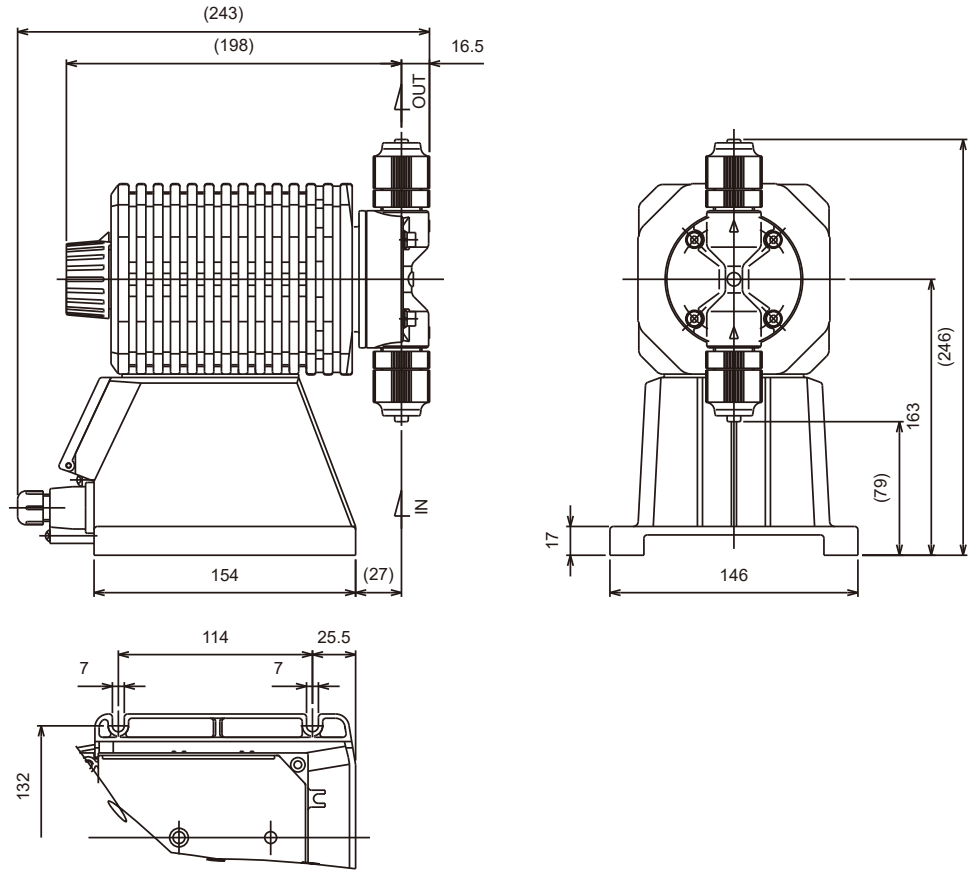
Blue	Munsell colour system 7.5PB 3/8
Red	Munsell colour system 5R 3/10

Outer dimensions

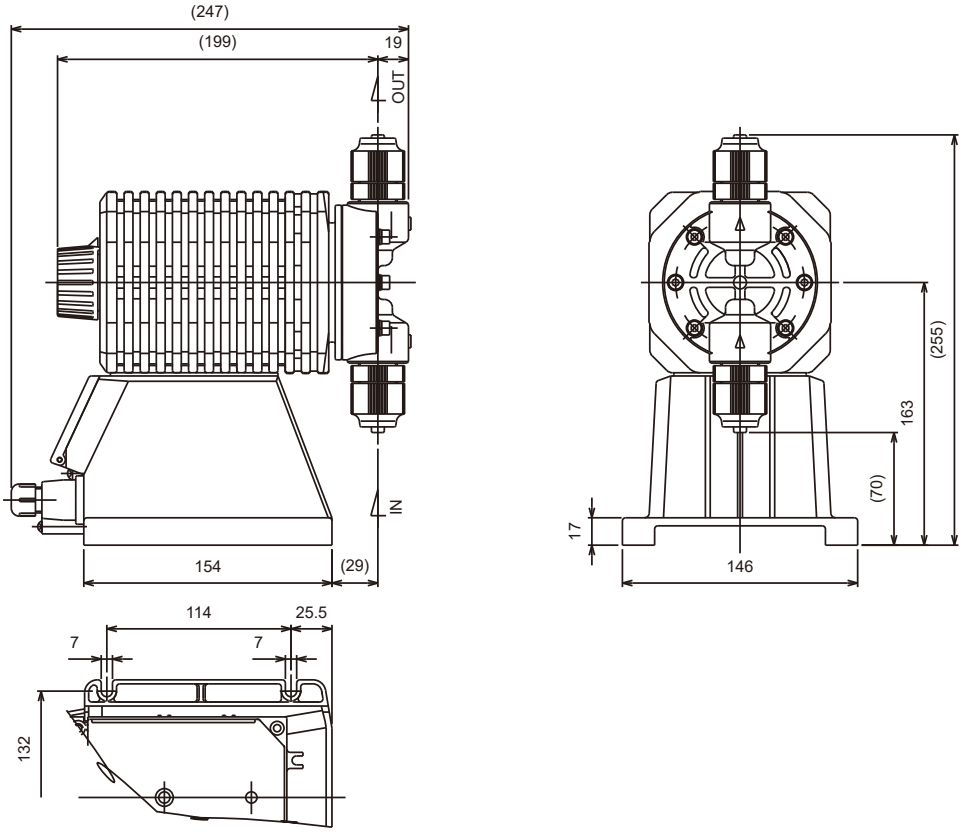
■ EH-E 31 VC/V6/VE/PC/PE/FC



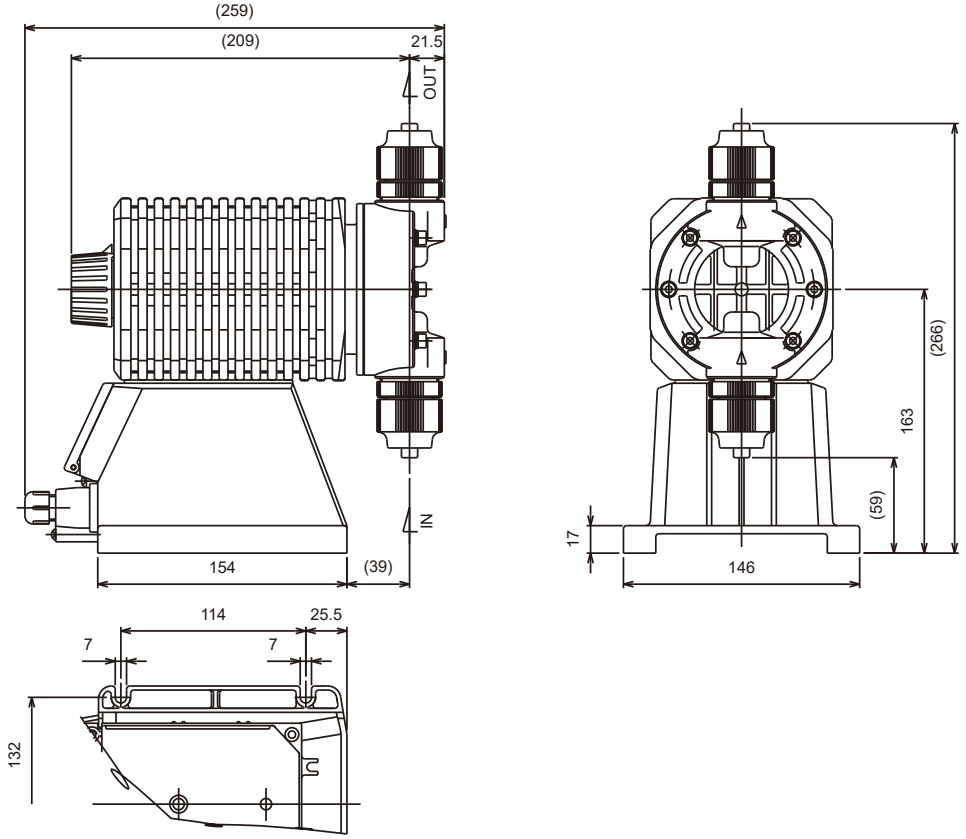
■ EH-E 36 VC/V6/VE/PC/PE/FC



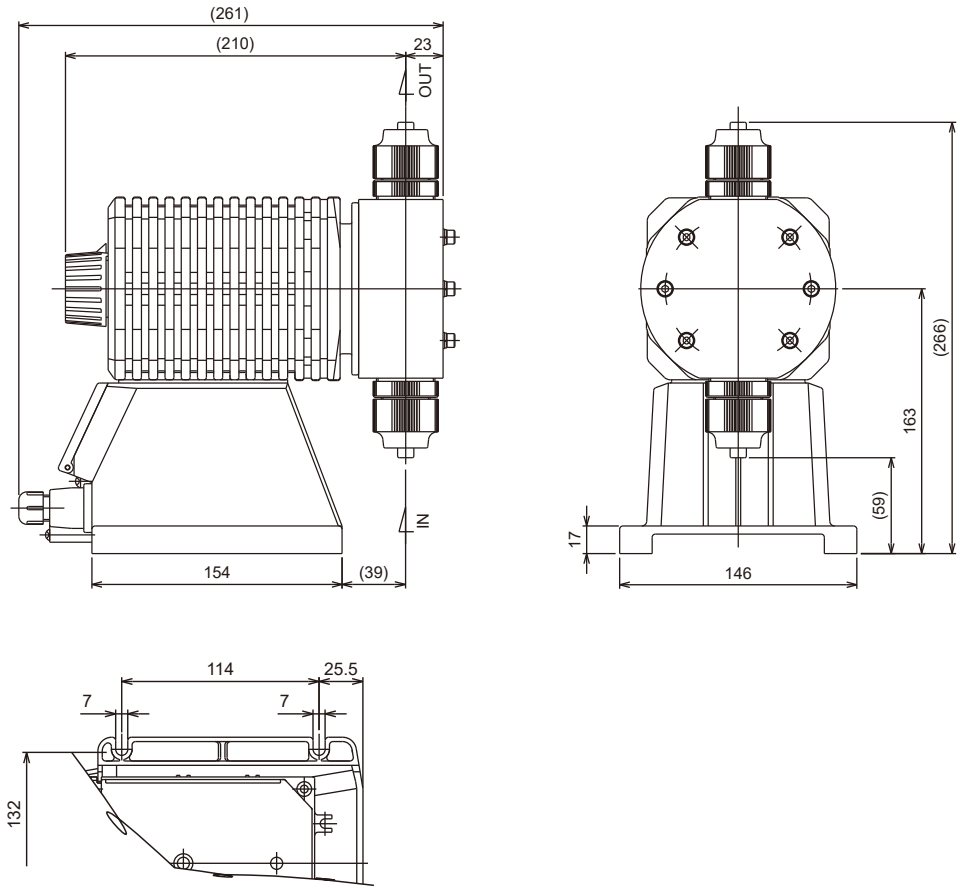
■ EH-E 46 VC/V6/VE/PC/PE/FC



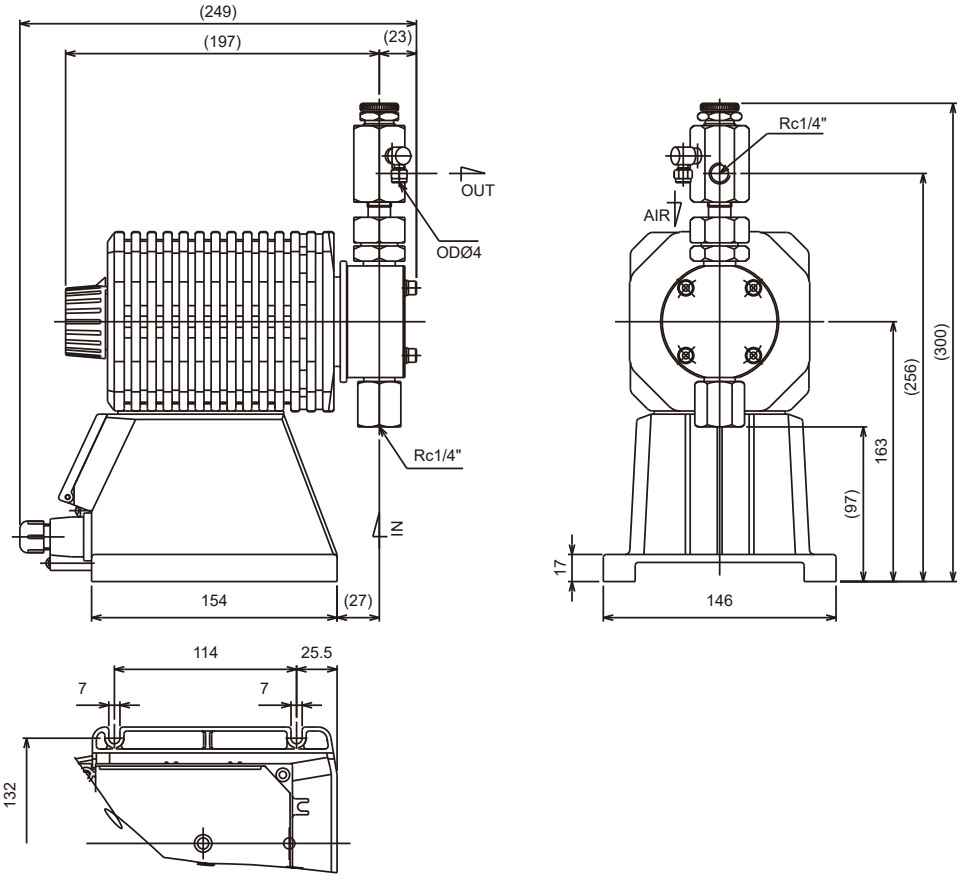
■ EH-E 56 VC/V6/VE/PC/PE/FC



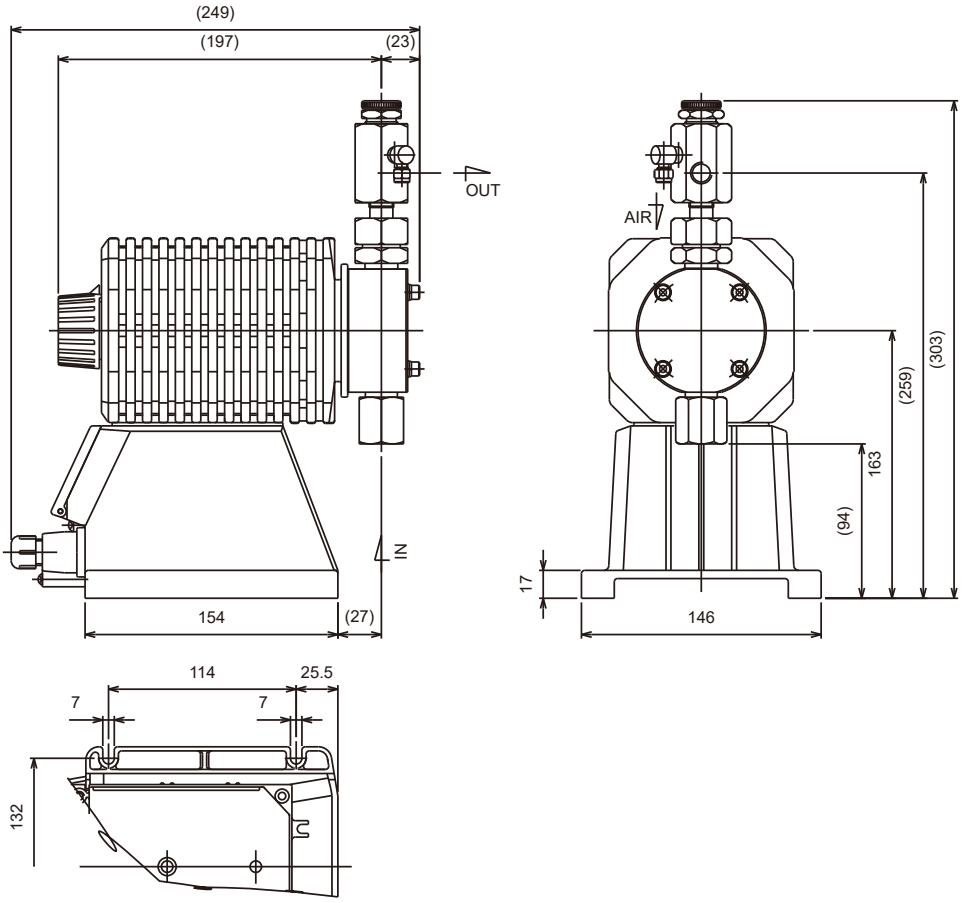
■ EH-E 56 VM



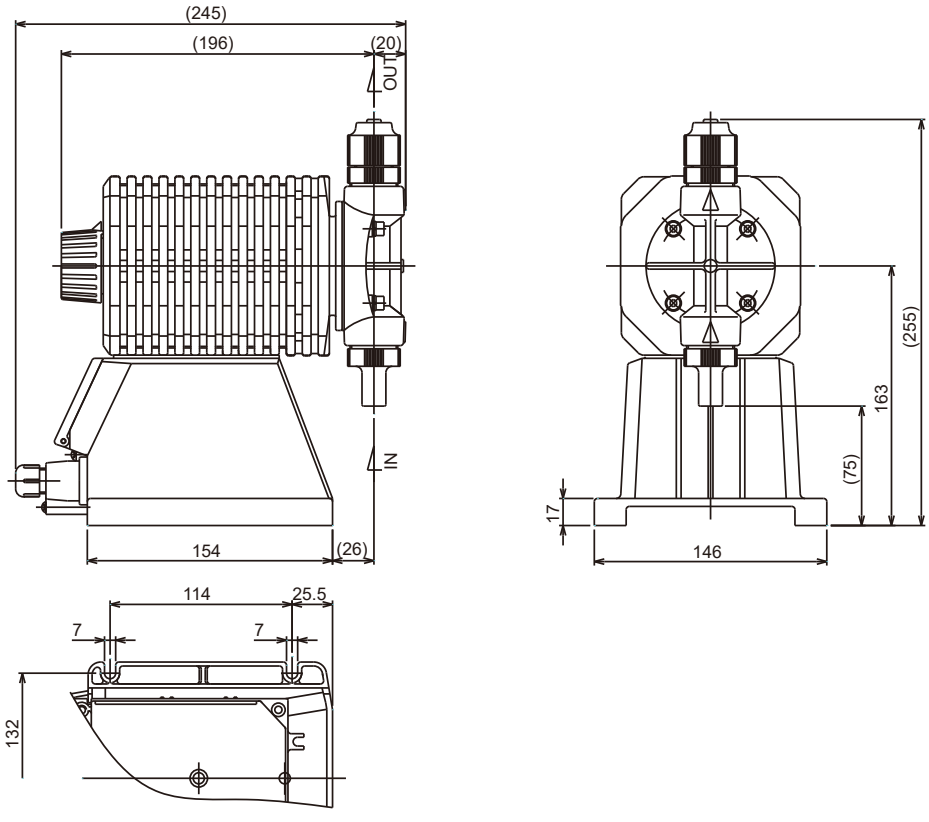
■ EH-E 31 SH



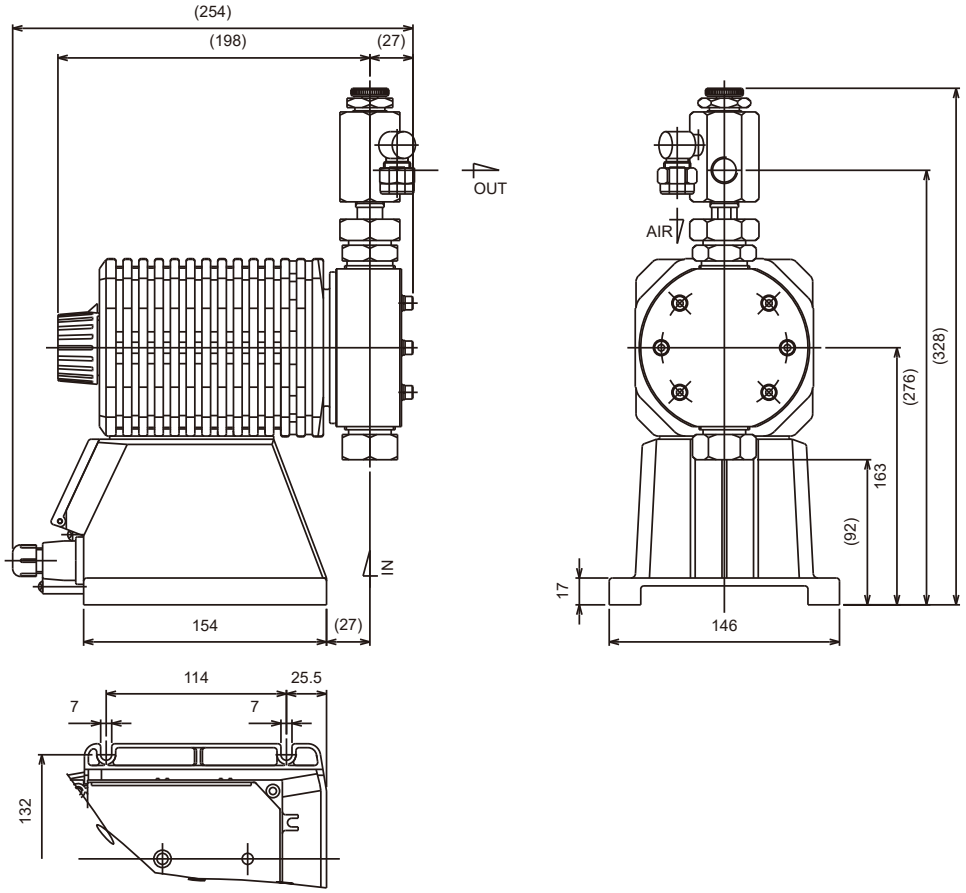
■ EH-E 36 SH



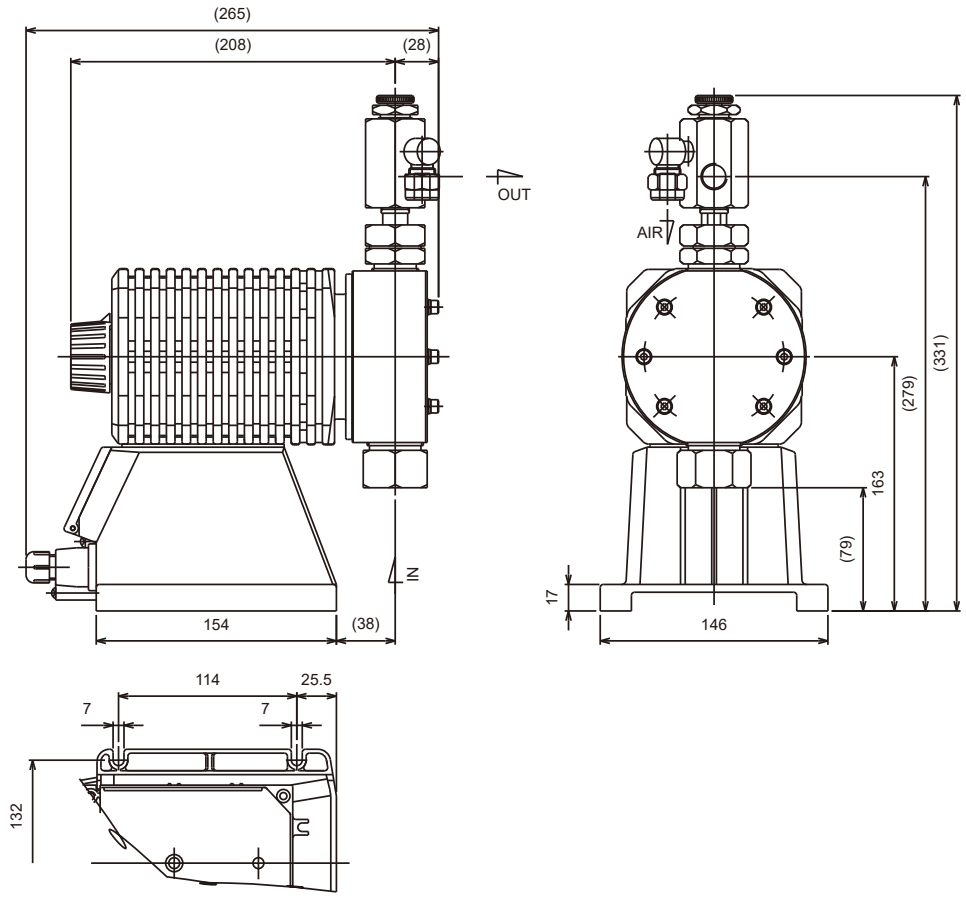
■ EH-E 36 HP6



■ EH-E 46 SH



■ EH-E 56 SH



EC DECLARATION OF CONFORMITY

A copy of the original Declaration of Conformity

(SUPPLIER'S NAME)

WE

IWAKI CO.,LTD.

(ADDRESS)

6-6 2-CHOME KANDA-SUDACHO CHIYODA-KU TOKYO JAPAN

(PRODUCT)

DECLARE UNDER OUR SOLE RESPONSIBILITY THAT THE PRODUCTS

ELECTROMAGNETIC METERING PUMP

(MODEL NAME)

EH-E SERIES

TO WHICH THIS DECLARATION RELATES ARE IN CONFORMITY

WITH THE FOLLOWING STANDARDS OR DIRECTIVES AS FAR AS APPLICABLE

(DIRECTIVES)

MACHINERY DIRECTIVE 2006/42/EC (ANNEX IIA)
EMC DIRECTIVE 2014/30/EU
RoHS DIRECTIVE 2011/65/EU

(STANDARDS)

EN ISO12100: 2010 EN61000-6-2: 2005 EN IEC63000: 2018
EN809: 1998 + A1: 2009 EN61000-6-4: 2007 + A1: 2011

(A PERSON WHO IS AUTHORISED TO COMPILE THE TECHNICAL FILE IN THE COMMUNITY)

IWAKI EUROPE GMBH
SIEMENSRING 115 D-47877 WILLICH GERMANY

NOTE: THIS DECLARATION BECOMES INVALID IF TECHNICAL OR OPERATIONAL MODIFICATIONS ARE INTRODUCED WITHOUT THE MANUFACTURER'S CONSENT.

T. Sawada.

TSUTOMU SAWADA

DEPUTY SENIOR GENERAL MANAGER,

QUALITY ASSURANCE HEAD OFFICE

Tokyo, Sep. 2, 2021

(PLACE AND DATE OF ISSUE) **(NAME AND SIGNATURE OR EQUIVALENT MARKING OF AUTHORIZED PERSON)**

DOCUMENT NO. IS-51K-519-3

UK DECLARATION OF CONFORMITY

A copy of the original Declaration of Conformity

(SUPPLIER'S NAME)

WE

IWAKI CO.,LTD.

(ADDRESS)

6-6 2-CHOME KANDA-SUDACHO CHIYODA-KU TOKYO JAPAN

(PRODUCT)

DECLARE UNDER OUR SOLE RESPONSIBILITY THAT THE PRODUCTS

ELECTROMAGNETIC METERING PUMP

(MODEL NAME)

EH-E SERIES

TO WHICH THIS DECLARATION RELATES ARE IN CONFORMITY WITH THE FOLLOWING REGULATIONS OR STANDARDS AS FAR AS APPLICABLE

(REGULATIONS)

S.I. 2008/1597 SUPPLY OF MACHINERY (SAFETY)
S.I. 2016/1091 ELECTROMAGNETIC COMPATIBILITY
S.I. 2012/3032 RESTRICTION OF HAZARDOUS SUBSTANCES

(STANDARDS)

EN ISO12100: 2010 EN61000-6-2: 2005 EN IEC63000: 2018
EN809: 1998 + A1: 2009 EN61000-6-4: 2007 + A1: 2011

(A PERSON WHO IS AUTHORISED TO COMPILE THE TECHNICAL FILE IN THE GB MARKET)

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STEVENAGE HERTS SG1 3QP UK

NOTE: THIS DECLARATION BECOMES INVALID IF TECHNICAL OR OPERATIONAL MODIFICATIONS ARE INTRODUCED WITHOUT THE MANUFACTURER'S CONSENT.

T. Sawada.

TSUTOMU SAWADA

DEPUTY SENIOR GENERAL MANAGER,

QUALITY ASSURANCE HEAD OFFICE

Tokyo, Sep. 6, 2021

(PLACE AND DATE OF ISSUE) **(NAME AND SIGNATURE OR EQUIVALENT MARKING OF AUTHORIZED PERSON)**

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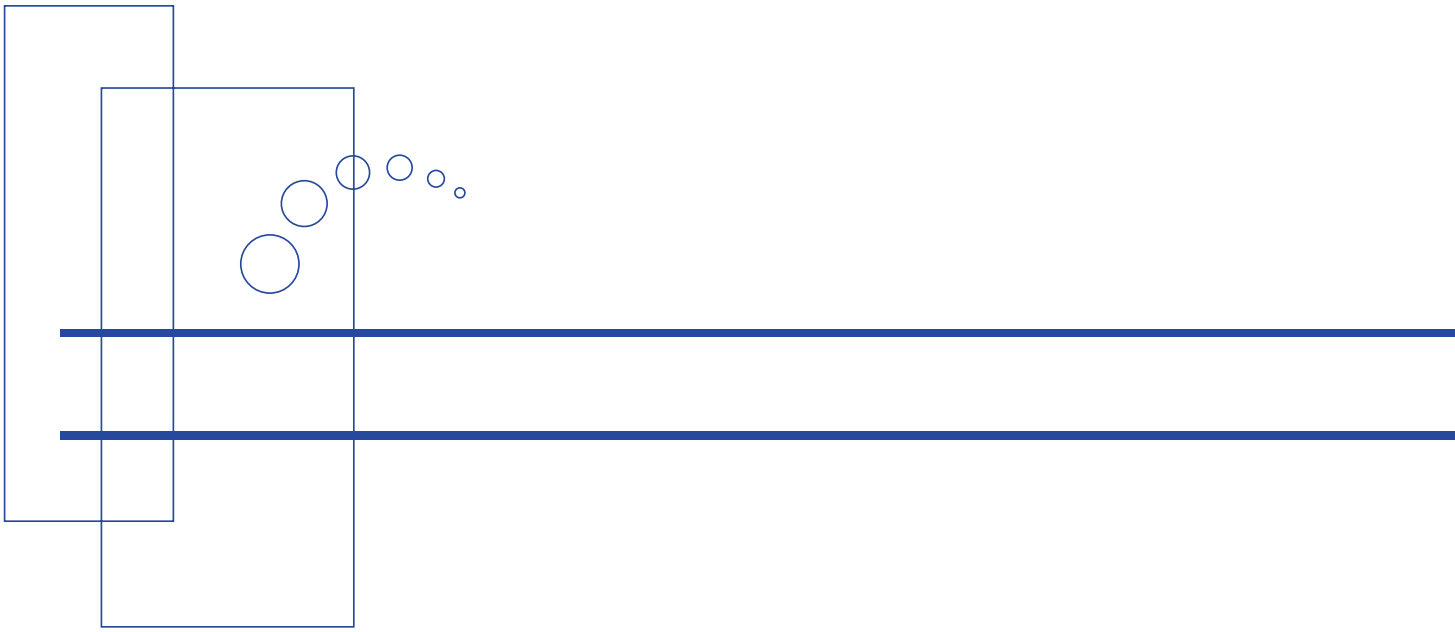

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T656-10 '25/07