

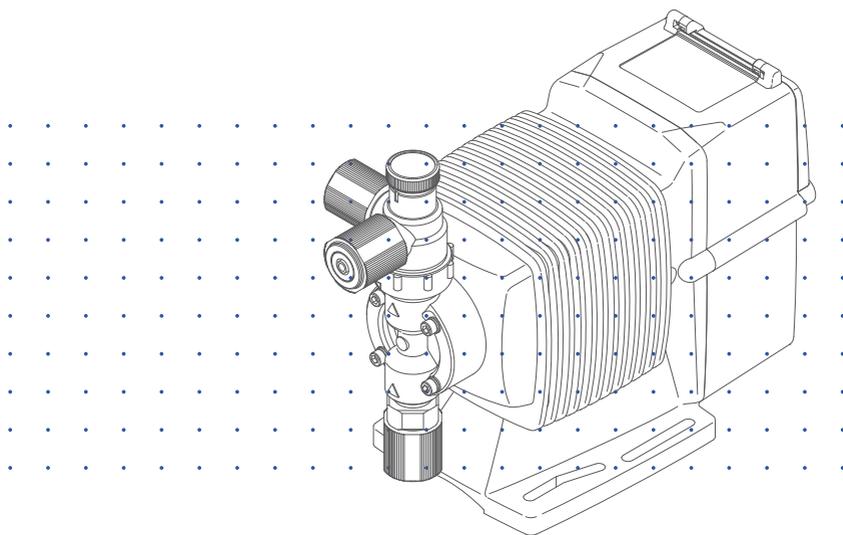
# Iwaki

## Electromagnetic Metering Pump

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### EWN-WCL (For FRC control)

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## Instruction manual

Thank you for choosing our product.



Please read through this instruction manual before use.

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

## Order confirmation

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

### a. Check if the delivery is as per order.

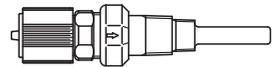
Check the nameplate to see if the information such as model codes, discharge capacity and discharge pressure are as per order.

Iwaki Metering Pump	
MODEL	
PRESSURE	MPa
CAPACITY	L/H
VOLTAGE	V
CURRENT	A
FREQUENCY	Hz
MFG.No.	
Year :	
<b>IWAKI CO.,LTD.</b>  <small>MADE IN JAPAN</small>	
1P425395	IP65 

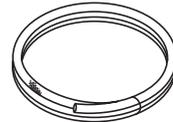
### b. Check if the required number of accessories is provided.

- A check valve

\*The attached check valve varies with pump models.  
See page 95 for accessories.



- A 3m PVC braided tube ( $\phi 4 \times \phi 9$  or  $\phi 8 \times \phi 13$ )



### c. Check if the delivery is damaged or deformed.

Check for transit damage and loose bolts.

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# Safety instructions

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

## ■ Symbols

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.



### **WARNING**

Indicates mishandling could lead to a fatal or serious accident.



### **CAUTION**

Indicates mishandling could lead to personal injury or property damage.

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

#### Caution marks



Caution



Electrical shock

#### Prohibited mark



Prohibited



Do not rework or alter

#### Requirement mark



Requirement



Wear protection



Grounding



## **Export Restrictions**

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control.

Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

**! WARNING****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.



Electrical shock

**Stop operation**

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



Requirement

**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.



Prohibition

**Do not modify the pump**

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



Do not remodel

**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.



Wear protectors

**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.



Prohibition

**Do not operate the pump in a flammable atmosphere**

Do not place explosive or flammable material near the pump.



Prohibition

## CAUTION

### 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.



Requirement

### 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.



Prohibition

### 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 cases may deform by friction heat and consequently leakage results.



Caution

### Keep electric parts and wiring dry

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



Prohibition

### Ventilation

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



Caution

### Do not install /store the pump:

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



Prohibition

### Spill precautions

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



Requirement

**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.



Prohibition

**Grounding**

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



Earthing

**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.



Electrical shock

**Preventative maintenance**

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



Requirement

**Do not use a damaged pump**

Use of a damaged pump could lead to an electric shock or death.



Prohibition

**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.



Requirement

**Check pump head bolts**

Liquid may leak if any of the pump head bolts become loose. Tighten the bolts diagonally and evenly by the rated torque below before initial operation and at regular intervals.



Caution

**Tightening torque**

EWN-B11/-B16/-B21/-C16/-C21 : 2.16 N•m

EWN-B31/-C31/-C36 : 2.55 N•m

**Install a relief valve**

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



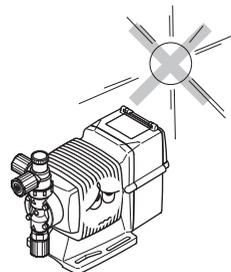
Requirement

## Precautions for use

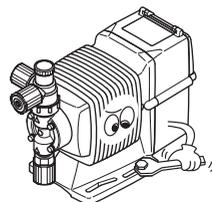
- Electrical work should be performed by a qualified electrician. Otherwise, personal injury or property damage could result.



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



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



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



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



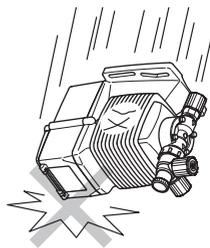
- Install the pump as close to the supply tank as possible.



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



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



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



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



- Do not use the control unit to a different drive unit of other pumps. An electrical circuit or the drive unit may fail.



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



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



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



# Overview

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

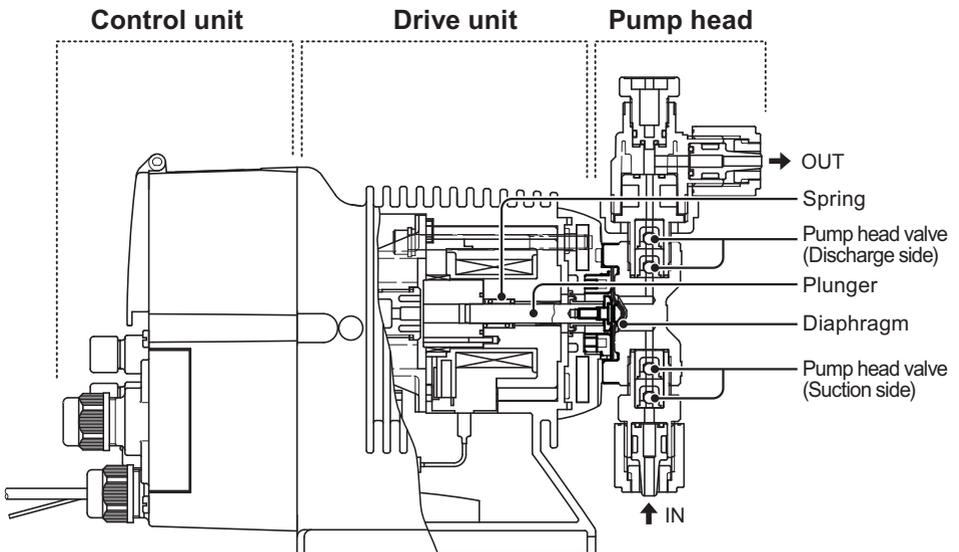
## Introduction

### Pump structure & Operating principle

The EWN-W is a diaphragm type electromagnetic metering pump which automatically monitors and controls water quality by means of a sensor.

#### Principle of operation

The pulse signal controls the electromagnetic force and spring force in order to make reciprocating motion. The reciprocating motion is transferred to a diaphragm through a plunger and then volumetric change occurs in the pump head. This action transfers liquid along with pump head valve action.



## Features

---

- **Automatic control**

The EWN-W automatically monitors and controls water quality by means of a sensor.

WCL type: Controls a flow rate in proportion to the concentration of free residual chlorine (FRC).

- **Multivoltage operation**

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

- **Waterproof and dustproof structure (IP65)**

The drive unit, control unit and pump head are hermetically sealed in order to ensure water-/dust-proof of IP65.

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

## Operational functions

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- **AUTO operation (see page 66)**

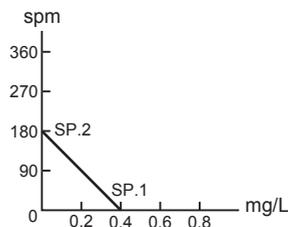
The external sensor signal controls the pump operation according to a concentration of FRC (free residual chlorine). AUTO operation acts as proportional control and PID control.

### Proportional control

In this mode the pump controls stroke rate in proportion to FRC. Program stroke rates at two different points before operation.

<Example of program parameters>

SP.1	FRC: 0.40mg/L
	spm: 0
SP.2	FRC: 0.00mg/L
	spm: 180



**PID control**

Programming integral and derivative values compensates deviation in the proportional control. See the following formula.

$$spm = Kp \times Deviation + Ki \times Accumulated\ deviation + Kd (Previous\ deviation - deviation)$$

Kp: Proportional gain (calculated by SP.1 and SP.2)

Ki: Integral gain ( $Kp/Ti$  Ti=Integral term)

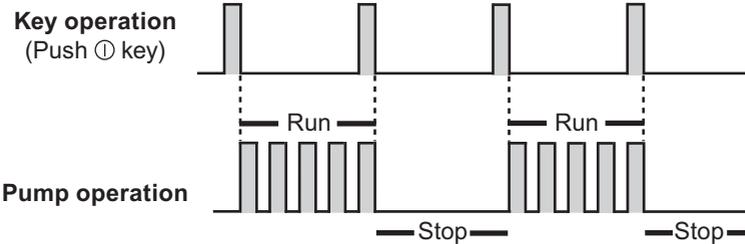
Kd: Derivative gain ( $Kp \times Td$  Td=Derivative term)

Deviation: Process value (PV) - Setpoint (SP)

Accumulated deviation: Summed instantaneous deviation

■ **MAN operation (see page 67)**

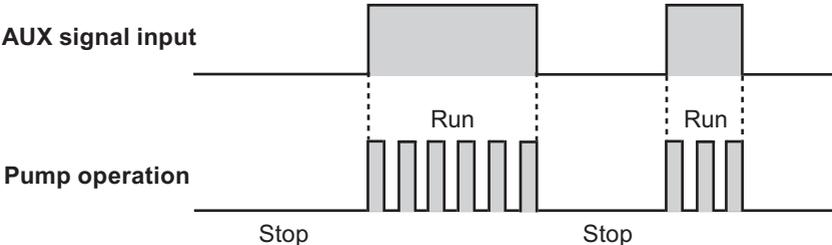
The start/stop of the pump by key operation



\*Operation can also be stopped or resumed by plugging in or off.

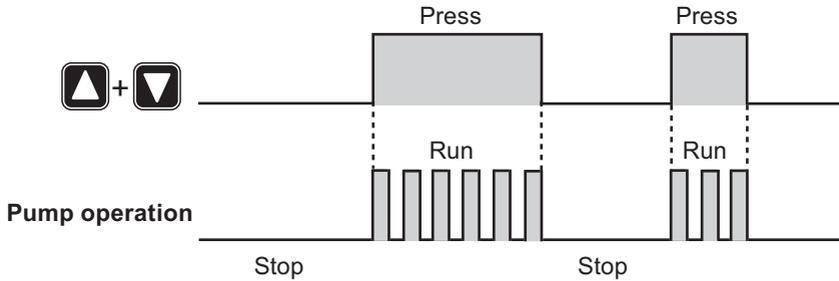
■ **AUX function**

The pump runs at the maximum stroke rate while receiving the external signal via the AUX terminal. Use this function for degassing.



■ **Priming function (See page 67)**

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



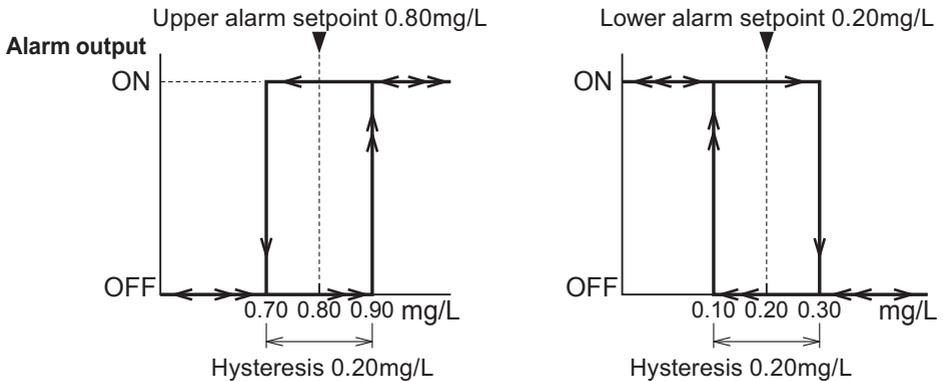
■ **OUTPUT function (See page 60)**

Signals can be sent via the output terminal in sync with programming.

**OUT1 (Mechanical relay)**

The upper alarm and lower alarm function.

<Example>



Interlock, STOP, Pre-STOP, AUX and Sensor failure alarms can be programmed to the OUT1.

**OUT2 (PhotoMOS relay)**

Signals can be outputted in sync with stroke rates as well as the above alarms.

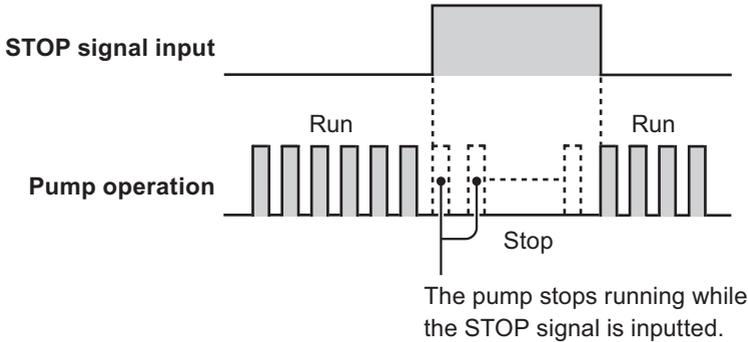
## ■ STOP function (See page 59)

The start/stop of the pump can be controlled by the external signal from a level sensor or other devices.

### When "NOR. OP" is selected:

The pump stops while receiving the external signal via the STOP terminal (closed contact).

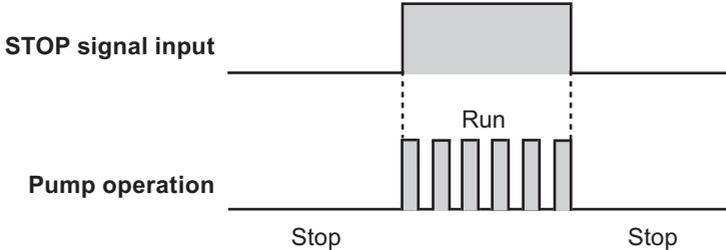
\*The pump resumes operation when the STOP signal is released.



### When "NOR. CL" is selected:

The pump runs while receiving the external signal via the STOP terminal (closed contact).

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



## ■ Pre-STOP function

### When "NOR. OP" is selected:

The STOP LED lights orange while the pump is receiving the external signal via the Pre-STOP terminal (closed contact).

### When "NOR. CL" is selected:

The STOP LED stops lightening while the pump is receiving the external signal via the Pre-STOP terminal (closed contact).

**■ Interlock function (See page 59)**

The start/stop of the pump can be controlled by the external signal. Use this function to stop the sensor as well as the pump in case a flow has stopped. Otherwise, sensor sensitivity may reduce.

**■ Electrolytic cleaning function**

Push both the CAL and ESC keys at once to start electrolytic cleaning. Electrolytic cleaning prevents sensitivity reduction.

## Part names

### Pump

#### Adjusting screw

Used for opening the air vent port.

#### Air vent port

Always connect a tube.  
Be sure to return the tube end to a supply tank or a container.  
The air vent port can rotate 90 degrees.

#### Control unit

Used for the start/stop of the pump and stroke rate adjustment/programming. See next page for detail.

Outlet

Air vent body

Inlet

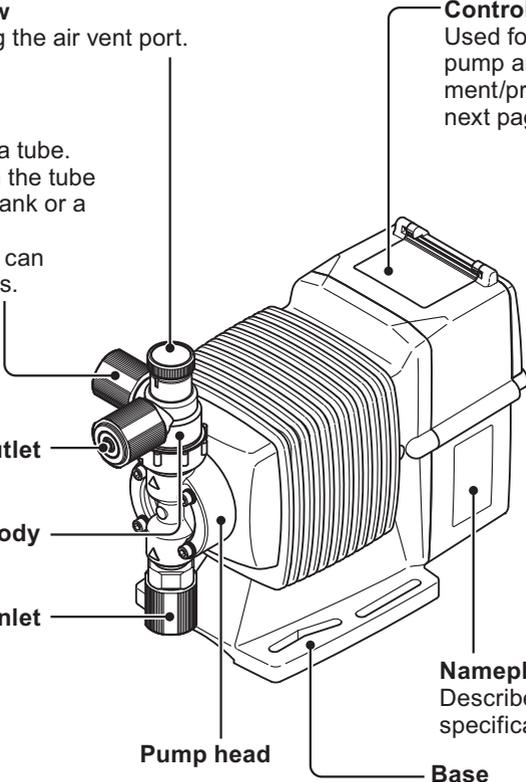
Pump head

#### Nameplate

Describes the pump specifications.

#### Base

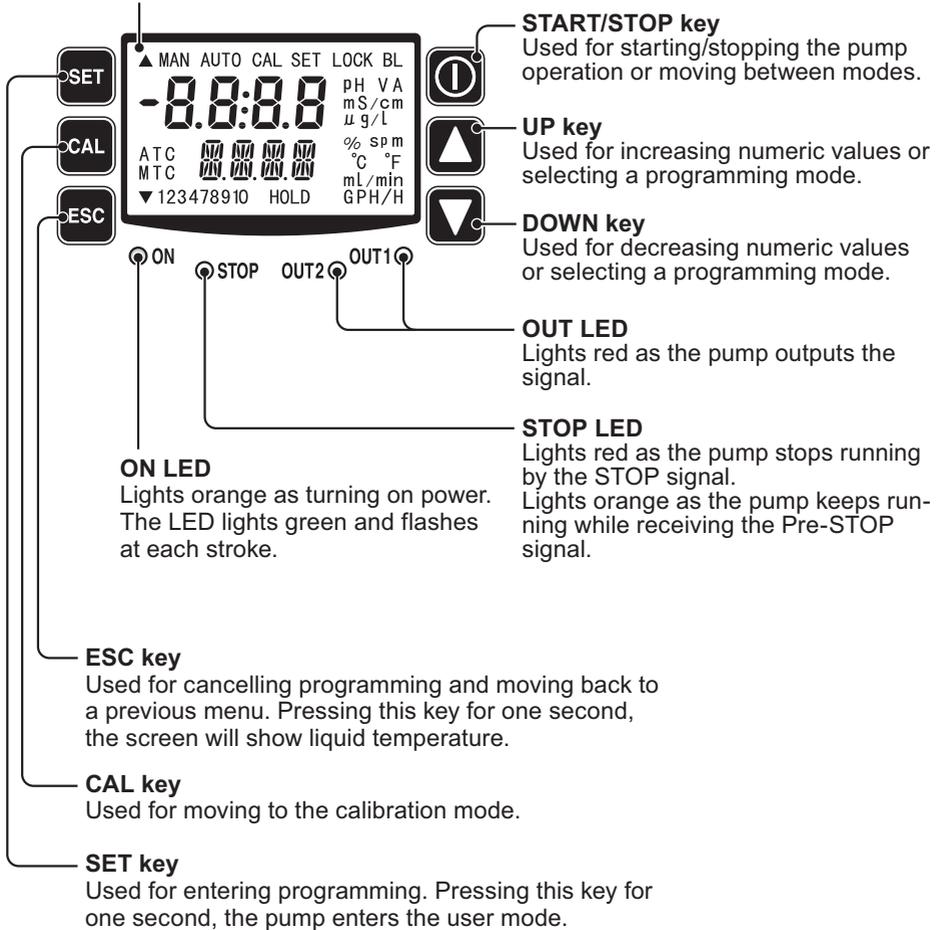
Always fix with bolts.



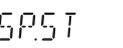
# Operational panel

## Display

An operational status, a selected mode and a programmed value are shown here.



## ■ Basic displays & Pump states

	STOP LED lights red	ON LED lights orange	ON LED blinks green	OUT LED lights red
MAN  ATC	—	Manual wait state. Display shows a FRC concentration.	—	OUT1 & 2 function as programmed.
MAN  ATC	—	—	Operation in manual mode. Display shows FRC and stroke rate in %. Full at 100.0%.	OUT1 & 2 function as programmed.
AUTO  ATC	—	Wait state in Auto mode. Display shows FRC and liquid temperature.	Operation in Auto mode. Display shows FRC and liquid temperature.	OUT1 & 2 function as programmed.
AUTO  ATC	Operation stop by the STOP signal	—	—	—
SET  1	—	Programming in the User mode	—	—
SET  2	—	Programming at SP.1	—	—
AUTO CAL 	Programming in the calibration mode	—	—	—
AUTO CAL 	Error occurred.	—	—	—
AUTO  ATC	—	—	PRIME mode. Operation at the maximum stroke rate	—
AUTO  ATC	—	—	AUX mode. Operation at the maximum stroke rate	—

## Identification codes

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

### Pump/Drive units

**EWN - B 11 VC**  **E WCL**  -

a      b   c   d   e   f   g      h      i

#### a. Series name

EWN: Multivoltage electromagnetic metering pump

#### b. Drive unit (Average power consumption)

B: 20W

C: 24W

#### c. Diaphragm effective diameter

11: 10mm      16: 15mm      21: 20mm

31: 30mm      36: 35mm

#### d. Wet end materials

Code	Pump head	Fitting	Valve	O ring	Valve seat	Gasket	Diaphragm
VC	PVC	PVC	Alumina ceramic	FKM	FKM	PTFE	PTFE + EPDM
VH			HC276	EPDM	EPDM		

#### Material code

PVC : Transparent polyvinyl chloride

EPDM : Ethylene-propylene rubber

FKM : Fluorine-contained rubber

PTFE : Polytetrafluoroethylene

HC276 : HASTELLOY C276

**e. Tube connection bore**

No.	Hose size (ID×OD)	Pump model
1	ø4×ø9	EWN-11/-16 & -21
2	ø4×ø6	
3	ø6×ø8	
4	ø8×ø13	EWN-31 & -36
5	ø9×ø12	

\*No code: ø4×ø9 or ø4×ø6 is equipped to the EWN-11, -16 & -21.  
ø8×ø13 or ø9×ø12 is equipped to the EWN-31 & -36.

**f. Power cable**

E: European type

**g. Control unit function**

WCL: Free residual chlorine

**h. Special version**

C: High compression type

**i. Special configuration**

01-99

## FRC sensor/Flow cell

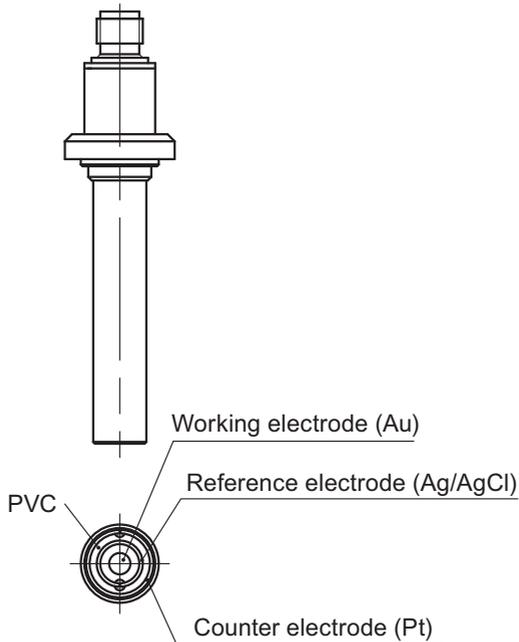
The EWN-WCL always needs a sensor and a flow cell during operation.

### ! Observe the following points for sensor.

- Do not cause mechanical damage to the sensor. Failure may result.
- Do not touch a measuring surface with bare hands. Sensitivity may reduce when the surface is contaminated by sebum.
- The sensor is a ware part. Replace it with new one periodically.

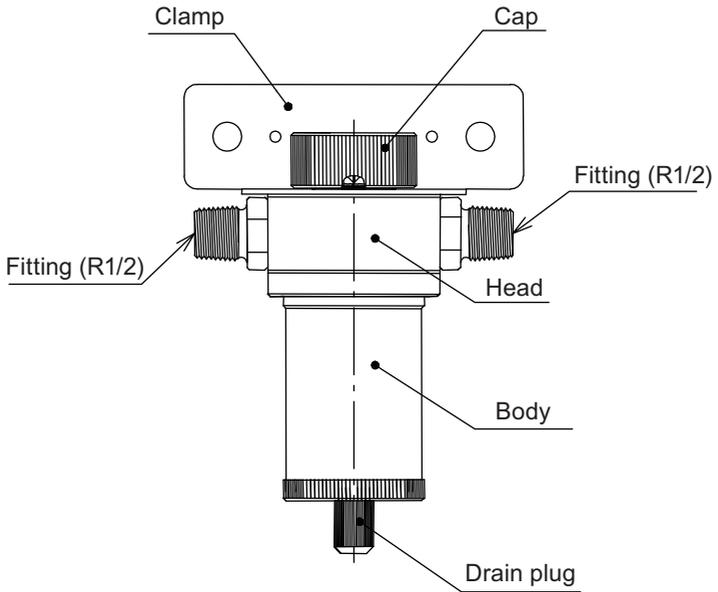
### ■ Free Residual Chlorine sensor (RS-20L-D)

Always use the RS-20L-D sensor. The sensor has three electrodes on its measuring surface. The sensor cable is detachable so remove it as necessary for easy maintenance.



- **Flow cell (RF-20)**

Always use the RF-20 flow cell. In the flow cell, ceramic beads clean up the measuring surface of the sensor.



# Installation

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

**!** Observe the following points when installing the pump.

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

## Pump mounting

*Select an installation location and mount the pump.*

### Necessary tools

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

### 1 Select a suitable place.

Always select a flat floor free of vibration. See page 10 for detail.

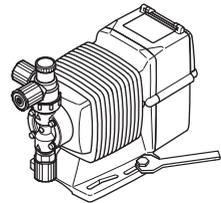
Flooded suction application is recommended when handling a gaseous liquid such as sodium hypochlorite.

### 2 Anchor the pump by the M5 bolts.

Be sure to fix the pump at four points.

#### NOTE

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



# Pipework

Connect tubes to the pump and install a check valve.

## Before operation

- Cut the tube ends flat.

Tube end (Side view)



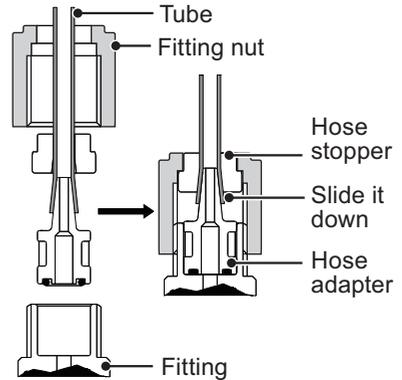
## Necessary tools

- Adjustable wrench or spanner

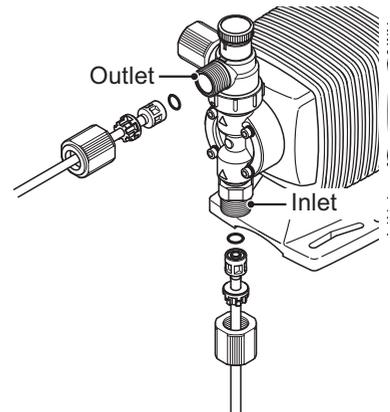
## Tube connection

- Pass a tube into the fitting nut and hose stopper and then slide it down to the hose adapter as far as it will go.
- Fit the tube end (hose adapter) to the fitting. Then hand tighten the fitting nut.
- Retighten the fitting nut by turning it 180 degrees with an adjustable wrench or spanner.

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

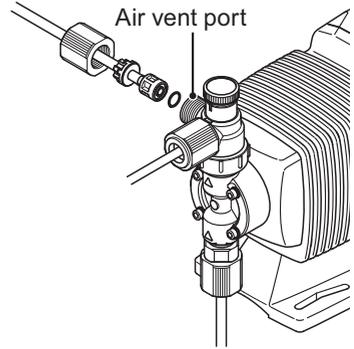


## 1 Connect tubes into the inlet and outlet.



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

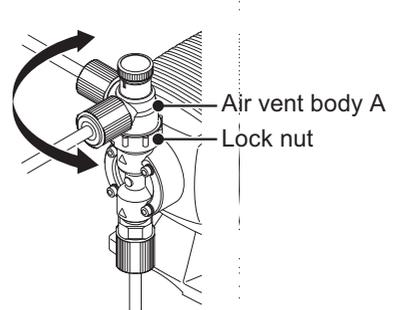
Route back the other tube end to a supply tank or a container.



## 3 Determine an air vent port direction.

The air vent port can rotate 90 degrees.

- Turn the lock nut anticlockwise.
- Adjust the direction of the air vent port.
- Hand-tighten the lock nut, holding the air vent body A.
- Turn the lock nut 90 degrees clockwise further with an adjustable wrench or spanner.

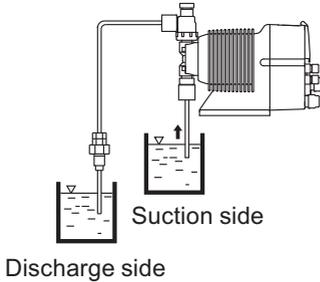


## Check valve mounting

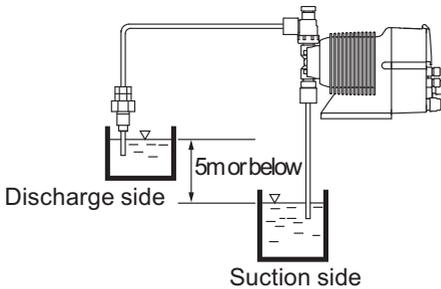
Install an optional check valve to the EWN for the prevention of a back flow, siphon and overfeeding.

In the following cases be sure to install the check valve.

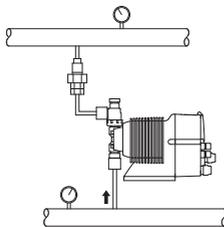
- A suction side liquid level is higher than a discharge side (See the diagram below). Or an injection point is below a suction side liquid level at atmospheric pressure.



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



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



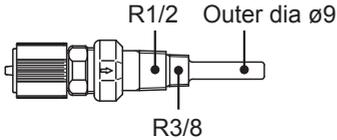
- A discharge pressure (including pipe resistance and discharge head) is below 0.13MPa. (0.049MPa for B31 and C36).

# 1

## Mount a check valve at the discharge tube end.

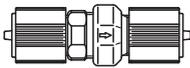
\*The CAN check valve has R1/2 and R3/8 thread connections as well as a tube connection. Cut off and adjust the connection length to fit the check valves into tubing.

### CAN check valve



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

### CBN check valve

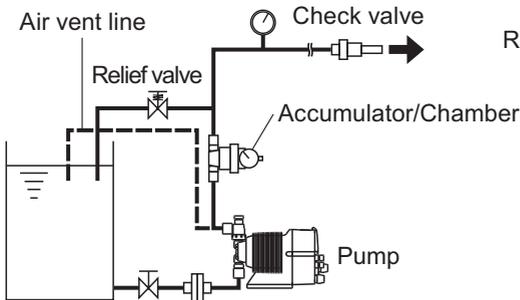


## NOTE

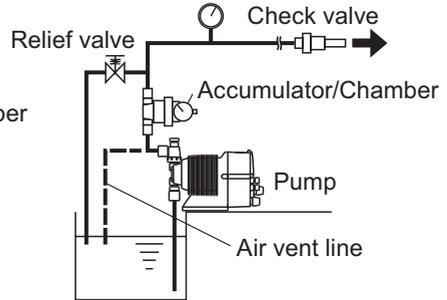
Periodically clean or replace a check valve with new one for the prevention of crystal clogging.

## Tubing layout

### Flooded suction application



### Suction lift application



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

## NOTE

Install a relief valve if a discharge line may clog.

## Sensor/Flow cell mounting

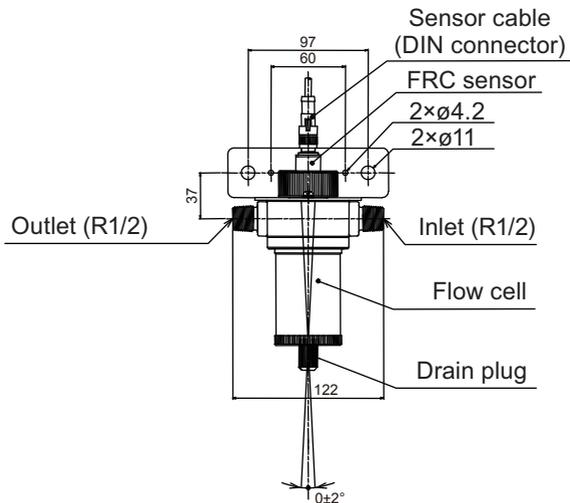
Always use the RS-20L-D sensor along with the RF-20 flow cell.

### ! Observe the following points for installation.

Do not use products in the following places :

- Where liquid temperature exceeds 45°C or falls below 0°C.
- Under direct sunlight or radiation heat.
- Under strong chemical liquid.
- Under strong impacts.
- In poorly-ventilated space.
- Liquid flow is not stable. Away from a drain system.
- \*Mount stop valves before and after the flow cell for easy maintenance.
- A sensor can not be removed for maintenance.
- The floating beads in the flow cell can not be checked at one view.
- Under rain water.
- Under corrosive atmosphere or in a dusty place.
- Where ambient temperature exceeds 40°C or falls below 0°C.

Mount the flow cell on the wall through the clamp ( $\varnothing 11$  and  $\varnothing 4.2$  holes). Use a saddle clamp when mounting it on the pipe. Always keep the flow cell vertical (within  $\pm 2^\circ$ ).



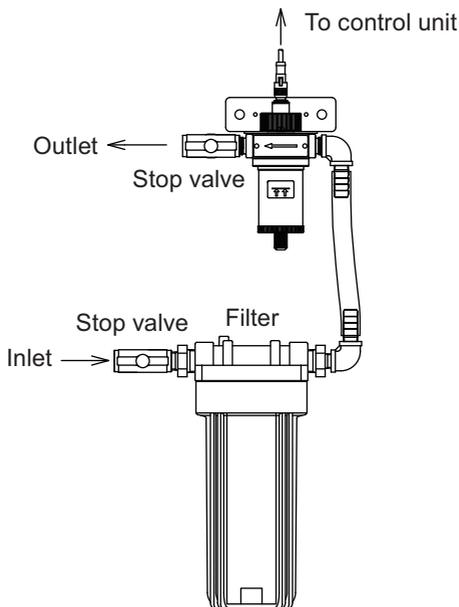
## Flow cell mounting

Install stop valves as shown below and keep the flow in the flow cell in between 1.1-1.5L/min. FRC concentration varies with the flow in the flow cell. Use a constant flow valve (RC-1300-15A) to keep a constant flow.

### NOTE

- FRC concentration will change significantly if the flow in the flow cell gets too low. Sensor sensitivity also will reduce as electrodes will not be cleaned enough.
- Sensor life will reduce if the flow in the flow cell gets too high and electrodes are polished roughly.
- Hold the hexagon part of the fitting when connecting a valve or pipe to the flow cell, or the fitting will break at 5.0N•m or more.

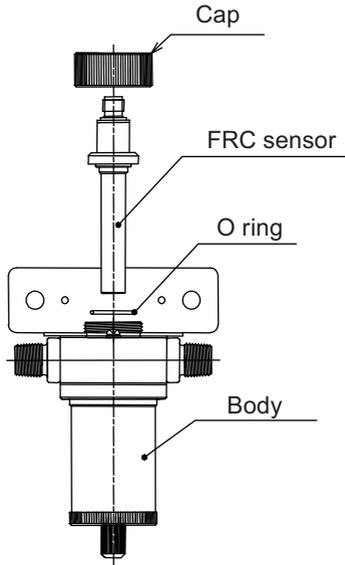
### Flow cell piping



## ***FRC sensor mounting***

---

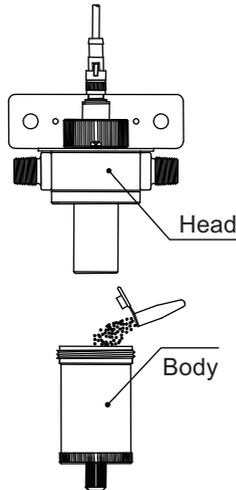
*Place the FRC sensor into the flow cell as shown below. Check that an O ring is in place and then fix it by the cap. Always tighten the cap enough to prevent a leak.*



## ***Beads loading***

---

*Remove the body from the head and load it with beads. Always remove all beads completely before loading the next quantity of beads. Check that an O ring is in place and then mount the body into the head.*



---

### NOTE

- Do not try to put beads into the body through the head. Seal performance will reduce when a bead gets stuck in between sealing surfaces. A FRC concentration will not stay constant when it is too many. Electrode cleaning effect will reduce when it is too few.
-

*Wiring for a power voltage and an external signal.*

**! Observe the following points during wiring work.**

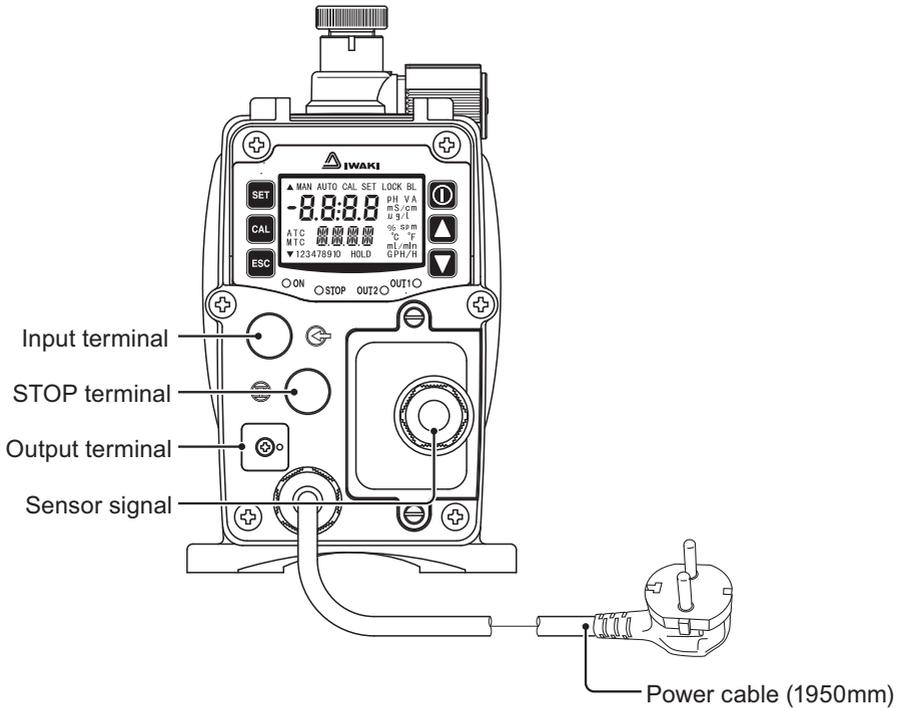
- Electrical work should be performed by a qualified operator. Always observe applicable codes or regulations.
- Observe the rated voltage range, or the electrical circuit in the control unit may fail.
- Do not perform wiring work while electric power is on. Otherwise, an electrical shock or a short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

**Necessary tools**

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

## End terminals

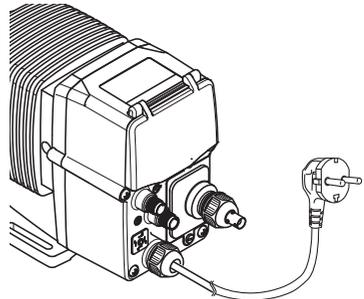
See the following diagram for detail.



## Power voltage/Earthing

Check that the main power is turned off.

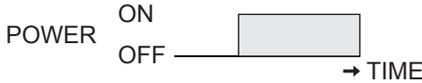
- 1 Insert the plug all the way seated in a socket.



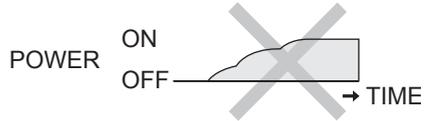
## NOTE

- Do not share a power source with a high power device which may generate surge voltage. Otherwise an electronic circuit may fail. The noise caused by an inverter also affects the circuit.
- Energize the pump with a power voltage via a mechanical relay or switch. Do not fluctuate the voltage, or CPU may malfunction. See page 37 for the precautions for ON-OFF control by a mechanical relay.

### Apply power at a sitting



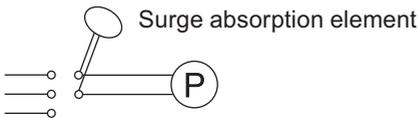
### Do not apply gradually



## Surge voltage

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

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



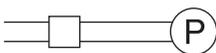
### Recommended varisters

Panasonic ERZV14D431

KOA NVD14UCD430

See manufacturer's catalogues for detail.

- Install a noise cut transformer via power cable.



Noise cut transformer

### Precautions for ON-OFF control by a mechanical relay

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

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

### Signal wire connection

Purchase the following DIN 4- and 5-pin female connector cables when using signal input and output.

#### Binder round connector cables

5-pin : 713 series 99-0436-10-05      *Input signal*

4-pin : 715 series 99-0430-15-04      *Stop signal*

#### Hirschmann square connector cables

4-pin : GDS307      *Output signal*

### Points to be checked

- Check that the main power is turned off.

---

## NOTE

- Do not lay on these signal cables in parallel with a power cable or combine them in a concentric cable (ex. 5 wires cable). Otherwise noise is generated through the cables due to induction effect and it results in malfunction or failure.
  - The following products are the recommended SSRs (Solid State Relays) for signal input. Any other SSRs may cause malfunction. See manufacturer's information for details on these SSRs.
    - OMRON G3FD-102S or G3FD-102SN
    - OMRON G3TA-IDZR02S or G3TA-IDZR02SM
  - When using a mechanical relay for signal input, its minimum application load should be 1mA or below.
  - Insert the DIN 4-pin connector as far as it will go and then rotate the outer ring to fix it.
- 

\*Use either a no-voltage contact or an open collector for the Input and STOP signals.

### ■ STOP signal

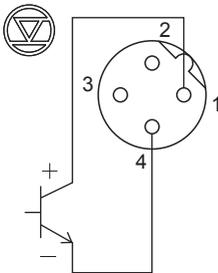
Connect signal wires to the STOP terminal via a DIN 4-pin connector.

- *When using an open collector:*

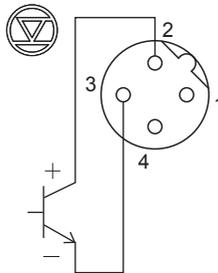
Pay attention to polarity. Pre-STOP and STOP are plus(+), and COM is minus(-).

- *When using a contact:*

The contact must be designed for an electronic circuit. The minimum application load should be 1mA or less.



Wiring for  
STOP function



Wiring for  
Pre-STOP function

- 1 : STOP (Brown)
- 2 : Pre-STOP (White)
- 3 : COM (Blue)
- 4 : COM (Black)

\*Each terminal is coloured as above for our optional cable.

---

## NOTE

- Our 5m cable is 5-wire. Cut off a green wire to use it with the DIN 4-pin connector.
-

## ■ Input signal

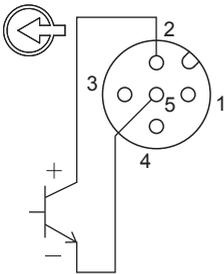
Connect signal wires to the Interlock and AUX terminals via a DIN 5-pin connector.

- *When using an open collector:*

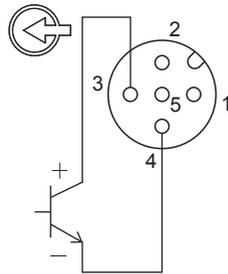
Pay attention to polarity. Interlock & AUX are plus(+), and COM is minus(-).

- *When using a contact:*

The contact should be designed for an electronic circuit. The minimum application load should be 1mA or less.



Wiring for Interlock function



Wiring for AUX function

- 1 : Free (Brown)
  - 2 : Interlock (White)
  - 3 : AUX (Blue)
  - 4 : COM (Black)
  - 5 : COM (Green)
- \*Each terminal is coloured as above for our optional cable.

## ■ Output signal

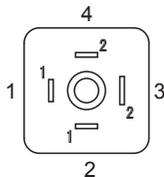
Connect signal wires to the OUT terminal via a DIN 4-pin connector.

- *OUT1<Mechanical relay>: Upper limit alarm, Lower limit alarm or Batch alarm*

\*Upper limit alarm is selected at factory default setting.

- *OUT2<PhotoMOS relay>: Upper limit alarm, Lower limit alarm, Batch alarm or Synchronous output.*

\*Batch alarm is selected at factory default setting.



- 1 : OUT1 (Brown)
- 2 : OUT1 (White)
- 3 : OUT2 (Blue)
- 4 : OUT2 (Black)

## Sensor cable connection

---

### Points to be checked

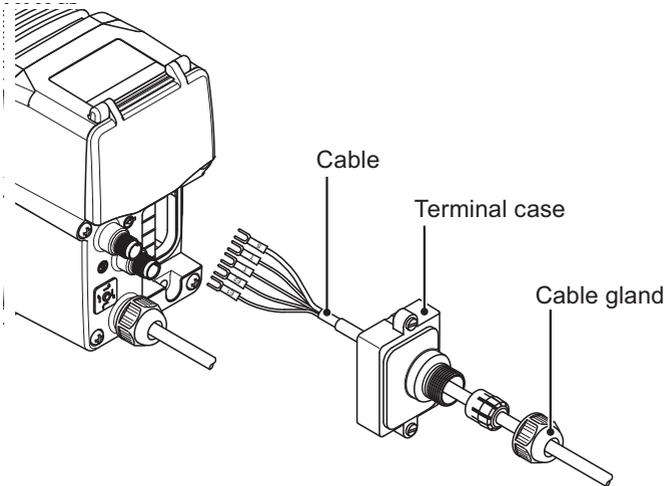
- Check that the main power is turned off.

### NOTE

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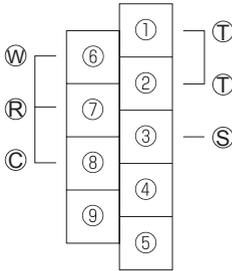
- Do not wet wire terminals or the terminal block. Keep them free from contamination such as oil. Contamination impairs insulation and affects readings. Clean with alcohol when they are contaminated and wait until they dry off.
  - Keep the sensor cable away from a motor and its power cable which generate noise.
  - Optimise the sensor cable wiring, taking account of calibration, inspection and replacement works.
  - Be careful not to damage the sensor cable. Sensor signal is a faint electrical signal.
  - Do not extend or modify a sensor cable.
  - Tighten the terminal case and cable gland enough to keep sealing performance.
- 

*Remove the terminal case and pass the sensor cable into the cable path as below.*

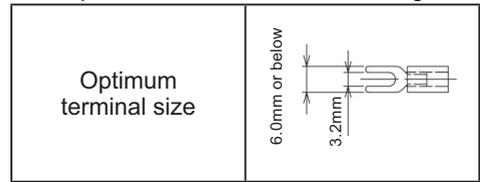


## ■ Terminal block

Connect sensor cable terminals to the terminal block.



\*Use spade terminals with the following size.



## WCL type

See the table below when wiring.

Terminal #	Functions
1-2	T, T: Temperature compensation
3	S: Shield
4-5	Disused
6	Working electrode
7	Reference electrode
8	Counter electrode
9	Disused

# Operation

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

## Before operation

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

### ***Points to be checked***

*Before operation, check if:*

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

### ***Retightening of pump head fixing bolts***

#### **Important**

The pump head fixing bolts may loosen when plastic parts creep due to temperature change in storage or in transit, and this can lead to leakage. Be sure to retighten the bolts evenly to the specified tightening torque below in diagonal order before starting operation.

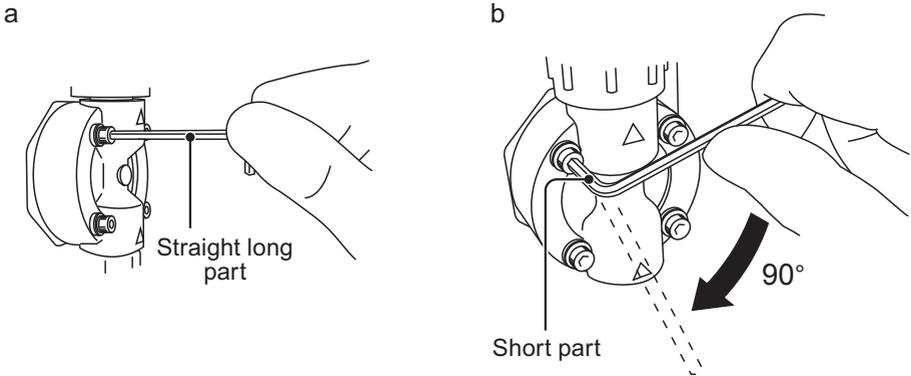
#### **Tightening torque**

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

\*Tighten fixing bolts once every three months.

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

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



## ***Degassing***

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

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

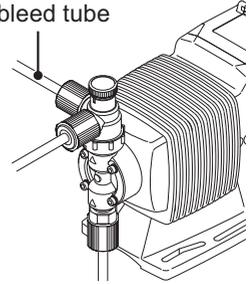
### NOTE

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

### Points to be checked

- An air bleed tube is connected to the pump.

Air bleed tube



## 1 Turn on power.

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

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



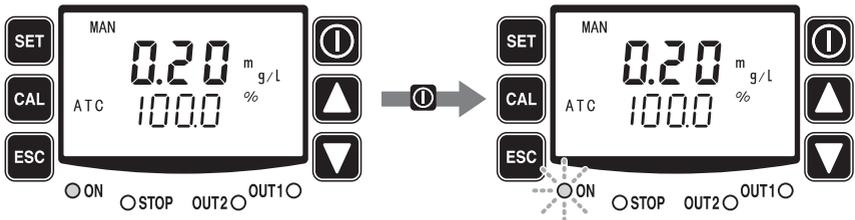
### NOTE

The screen shows "ERR7" when input signal wires are not connected. Complete connection and then turn on power.

## 2 Run the pump at the maximum stroke rate.

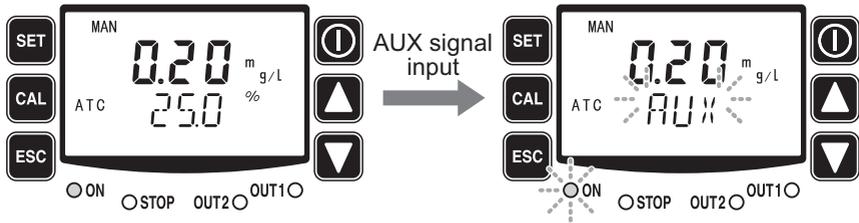
Select a convenient way from the following.

- Set a stroke rate to 100% and run the pump manually.

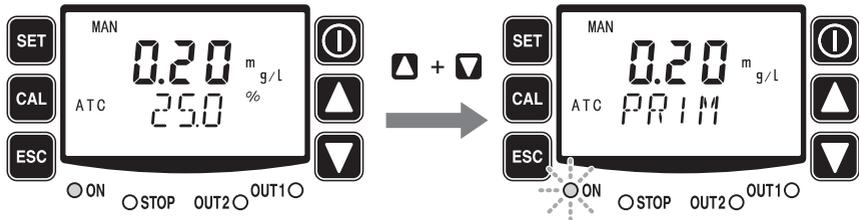


\*Select MAN operation in the user mode. See page 54 for detail. The pump runs or stops as the start/stop key is pressed.

- Enter the external signal via the AUX terminals.



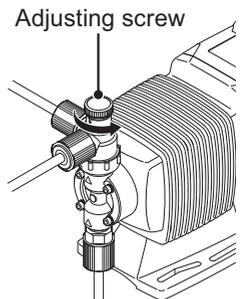
- Press and hold both the UP and DOWN keys.



\*The AUX function is not available while the pump is receiving the STOP signal. But then the priming function is always available at any signal input.

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

\*Do not rotate it three revolutions. Otherwise, liquid may come out from the adjusting screw.



### 4 Keep the pump running for more than ten minutes for degassing.

### 5 Stop the pump by:

- pushing the start/stop key once or
- stopping the AUX signal or
- releasing the UP and DOWN keys.

---

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

---

**7 Check liquid is discharged.**

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

---

**8 Check connections for leakage.**

Degassing has now been completed.

\*Do not forget to select auto operation in the user mode after making degassing in MAN operation.

---

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

---

#### **Clean wet ends and the inside of tubing.**

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

#### **Before unplugging the pump**

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

#### **When the pump does not transfer liquid at resuming operation.**

- Clean the valve sets and remove foreign matters.
- If gas is in the pump head, expel gas and readjust a flow rate. See "Degassing" on page 43.

#### **Before a long period of stoppage (one week or more)**

- Remove the FRC sensor from the flow cell and rinse electrodes with tap water. Dry out and cap the sensor and then store it. Drain the flow cell of liquid as well when leaving it under freezing temperature.

---

#### **NOTE**

- The flow cell may break when residual liquid freezes.
-

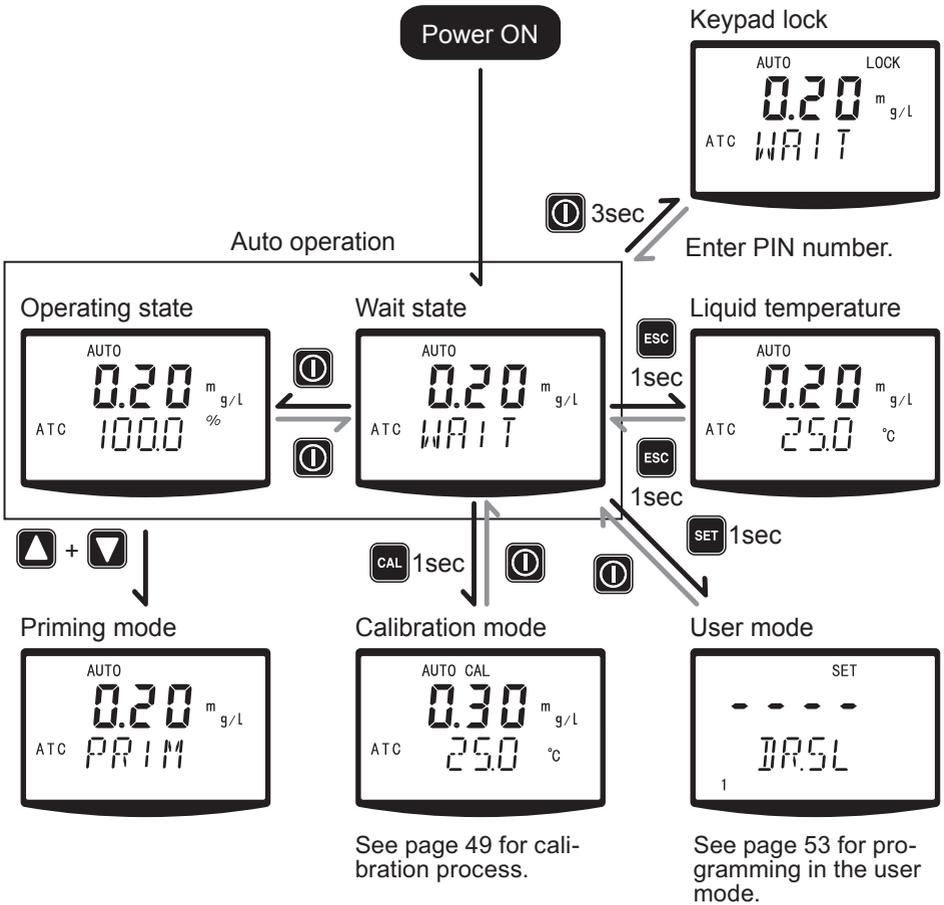
## Operation programming

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

### Default setting and setting range

	Parameters	Setting ranges	STEP <sup>*1</sup>	Default
Mode selection	-	AUTO or MAN	-	AUTO
Control	1Pt FRC	0.00 - 3.00 (mg/L)	0.01	0.40
	1Pt stroke rate	1 - MAX (spm)	1	0
	2Pt FRC	0.00 - 3.00 (mg/L)	0.01	0.00
	2Pt stroke rate	1 - MAX (spm)	1	180
	Integral	0 - 100.0(s)	0.1	0.0
	Derivative	0 - 100.0(s)	0.1	0.0
Measurement	Measured value adjustment	-1.00 - 1.00	0.01	0.00
	Auto/Man TC selection	AUTO or MAN	-	AUTO
	Temperature adjustment (Auto TC)	-10.0 - 10.0	0.1	0.0
	Temperature setting (Man TC)	0.0 - 50.0	0.1	25.0
Functions	STOP/PreSTOP selection	NO.OP/ NO.CL	-	NO.OP
	Interlock selection	NO.OP/ NO.CL	-	NO.OP
	Out 1	UP/ DOWN/ AL/ OFF	-	UP
	Out 2	UP/ DOWN/ AL/ SYNC/ OFF	-	ALM
	UP	0.00 - 3.00	0.01	0.80
	DOWN	0.00 - 3.00	0.01	0.00
	HYS	0.00 - 1.00	0.01	0.20
	DLT	0 - 99	1	10
	I.LOC	ON or OFF	-	OFF
	STOP	ON or OFF	-	ON
	P.STP	ON or OFF	-	OFF
	AUX	ON or OFF	-	OFF
	SENS	ON or OFF	-	OFF
Display	Flow rate unit	spm or %	-	%
	Measurement unit	mg/L or $\mu$ A	-	mg/L
Pin number	-	0000 - 9999	1	0000

\*1 The flow rate increases/decreases by 1spm as pushing the UP/DOWN keys. Press and hold either key for quick change.



## Perform a calibration

---

In calibration mode, adjust a reading of the control unit along with the actual concentration of free residual chlorine.

### **!** Observe the following points for FRC sensor.

- Adjust a reading of the control unit along with the FRC concentration.
- Do not have an impact on the sensor or it may fail.
- Be careful not to damage the sensor cable. Sensor signal is a faint electrical signal.
- Do not extend or modify sensor cable.
- Contact us for the following cases.
  - a. Air bubbles come up during operation.
  - b. Measured liquid is slurry.
  - c. Measured liquid is electrolysis solution.
  - d. The sensor is placed away from the control unit.

### ■ Calibration

Check if the flow in the flow cell is in the measurable range. See page 77. Loosen the drain plug to collect sample liquid.

Note that the sensor sensitivity will decrease with time. Periodic check and calibration are needed to keep the best performance. See page 80 for detail.

#### • *Adjustment*

Use a residual chlorine meter to determine an actual concentration of free residual chlorine in the sample liquid and then adjust a reading of the control unit accordingly. Do not change liquid and concentration after adjustment.

#### • *Zero adjustment*

Zero adjustment is not often used. Remove residual chlorine from the sample liquid completely or take out the sensor from the sample liquid. The control unit must show 0.00mg/L in this state. If not, correct reading accordingly.

Do not change liquid and concentration after zero adjustment.

---

## NOTE

This product measures free residual chlorine concentration in between 0.00-3.00mg/L. Measure an actual concentration of free residual chlorine by an amperometric titration or DPD colorimeter method.

A measurement error may increase when making a measurement in a DPD colorimeter method in the following conditions.

- a. Combined chlorine (monochloramine) is 1mg/L or more.
  - b. Aluminium ( $\text{Al}^{3+}$ ) is 4mg/L or more.
  - c. Nitrite-nitrogen ( $\text{NO}_2\text{-N}$ ) is 1mg/L or more.
  - d. Copper ( $\text{Cu}^{2+}$ ) is 2mg/L or more.
  - e. Iron ( $\text{Fe}^{2+}$ ) is 3mg/L or more.
  - f. Manganese ( $\text{Mn}^{2+}$ ) is 3mg/L or more.
  - g. Alkalinity is 250mg/L or more ( $\text{CaCO}_3$  convert).
  - h. Acidity is 150mg/L or more ( $\text{CaCO}_3$  convert).
  - i. Ozone is included.
  - j. Halogene substances other than chlorine is included.
-

## ■ Adjustment

- 1 Press and hold the CAL key for one second in wait state to call up the Cal mode.**

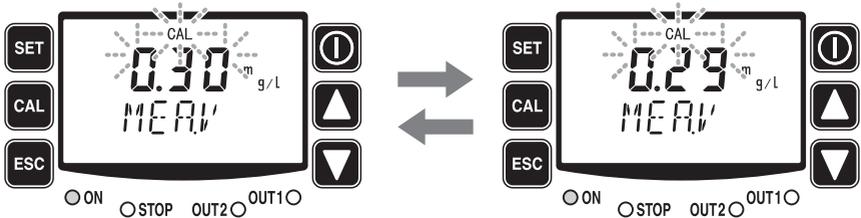


- 2 Push the CAL key once more.**



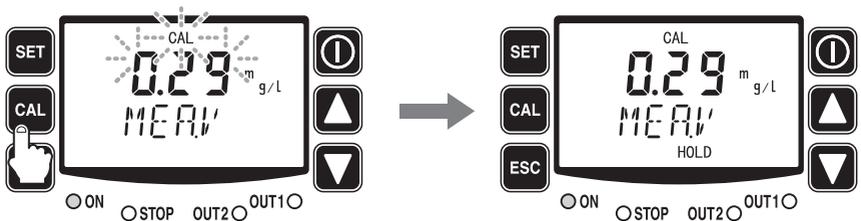
- 3 Use the UP or DOWN key to adjust a value.**

A measurement range is 0.00-3.00mg/L.



- 4 Push the CAL key to enter the value.**

The screen shows "Hold" after the CAL key is pushed. Push the start/stop key and return to wait mode.



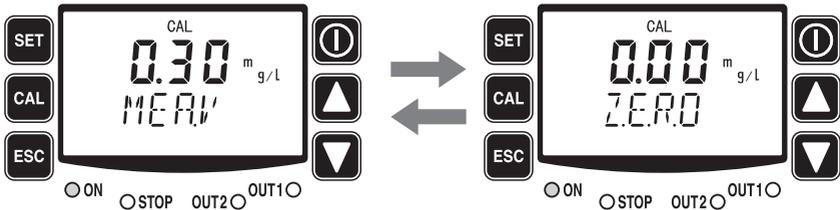
## ■ Zero adjustment

- 1 Press and hold the CAL key for one second to enter the Cal mode.**



- 2 Use the UP or DOWN key to select "ZERO".**

Measure dechlorinated water or disconnect the FRC sensor.

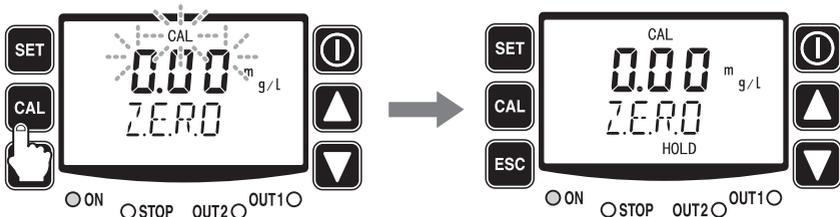


- 3 Push the CAL key to start calibration.**



- 4 Push the CAL key to enter the value.**

The screen shows "Hold" after the CAL key is pushed. Push the start/stop key and return to wait mode.



## User mode

Press and hold the SET key for one second in the wait state (the bottom line displays "WAIT"). The pump enters the User mode. Push the start/stop key when returning to the wait start.

### ■ User mode menu selection

Use the UP and DOWN keys to scroll through menus and select with the SET key.



#### AUTO/MAN selection

Select AUTO or MAN operation. See page 54 for detail.



#### Control parameter programming

Program control parameters. See page 55 for detail.



#### Measurement parameter programming

Program measurement parameters. See page 56 for detail.



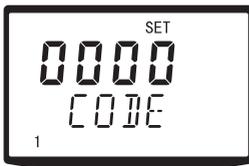
#### Function programming

Program input/output parameters. See page 58 for detail.



#### Display selection

Select spm indication or a measurement unit. See page 64 for detail.

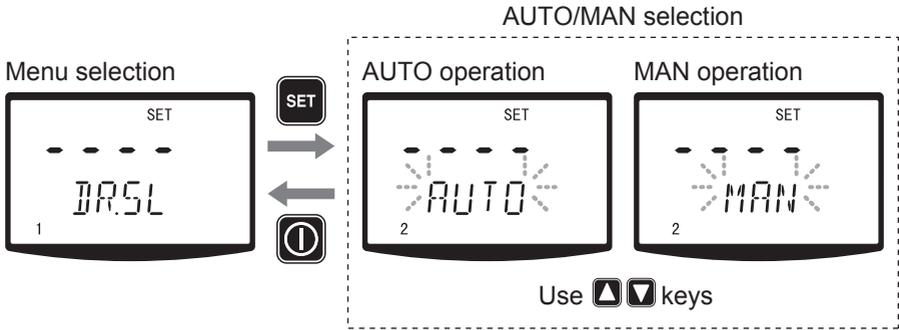


#### Pin number entry

Program pin number for release keypad lock function. See page 65 for detail.

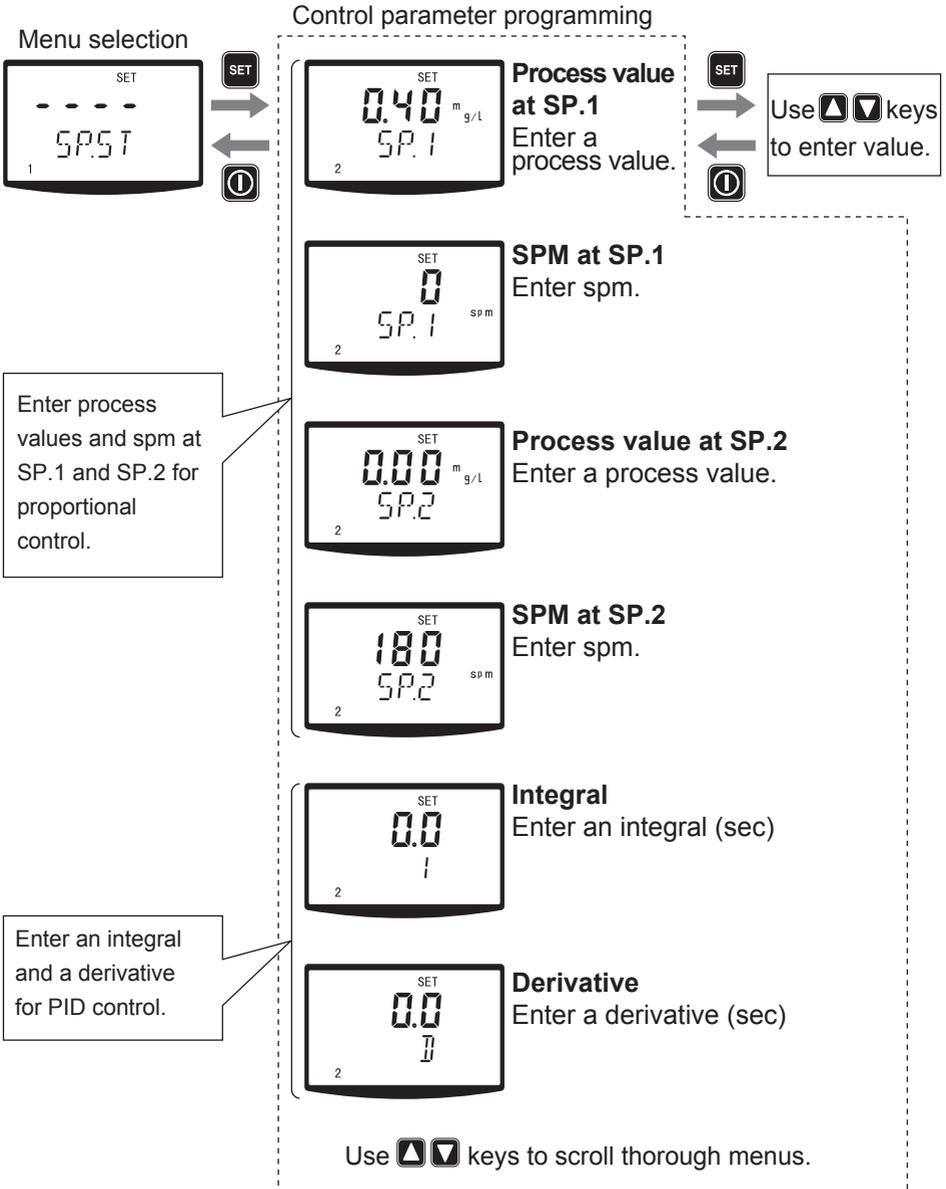
## ■ AUTO/MAN selection

Select AUTO or MAN operation.



## ■ Control parameter programming

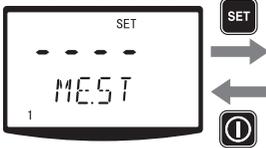
Programming for Proportional control and PID control



## ■ Measurement parameter programming

Program measurement parameters.

Menu selection

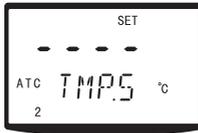


### Measured value adjustment

Adjust measured values.

See page 57 for detail.

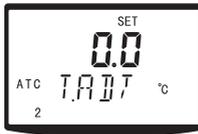
\*Adjustable range for deviation is between -1.00 - 1.00.



### AUTO/MAN TC selection

Select AUTO or MAN temperature compensation.

See page 57 for detail.



### Temperature reading adjustment /Temperature setting

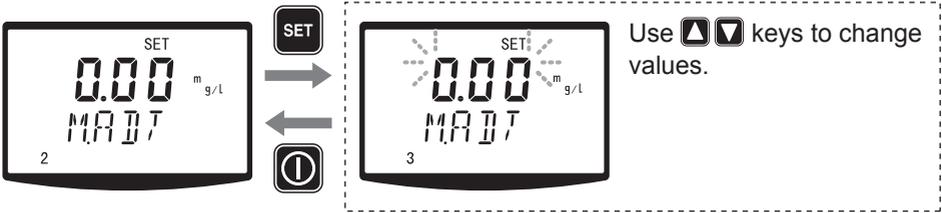
Adjust temperature in AUTO temperature compensation.

Program temperature in MAN temperature compensation.

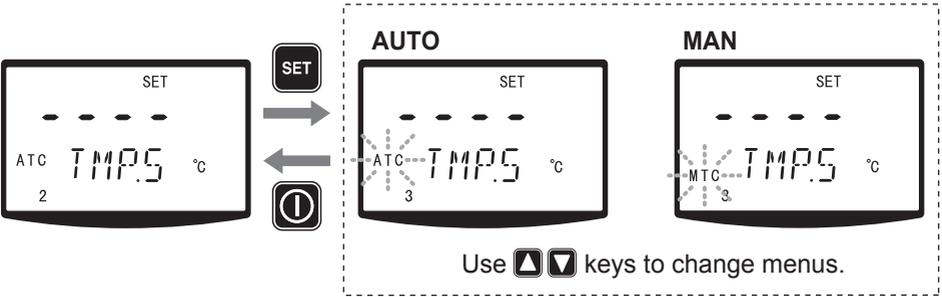
See page 57 for detail.

Use   keys to scroll through menus.

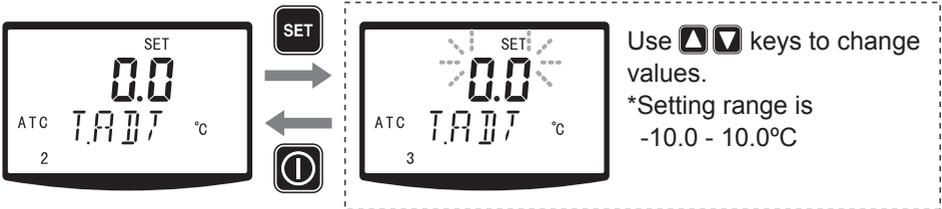
• Measured value adjustment



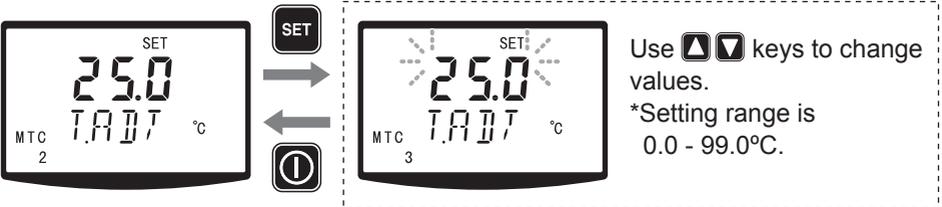
• AUTO/MAN TC selection



• Temperature reading adjustment in AUTO TC



• Temperature setting in MAN TC



## ■ Function programming

Program input/output parameters.

Menu selection



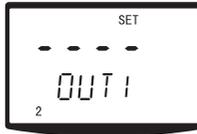
### STOP function

Program ON-OFF operation via the STOP signal. See page 59.



### Interlock function

Program ON-OFF operation via the interlock signal. See page 59.

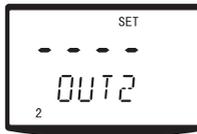


### OUT1

Program alarm output. See page 60.

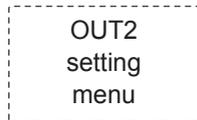


Programming menus will be added depending on OUT1 setting.



### OUT2

Program alarm and synchronous outputs. See page 60.



Programming menus will be added depending on OUT2 setting.

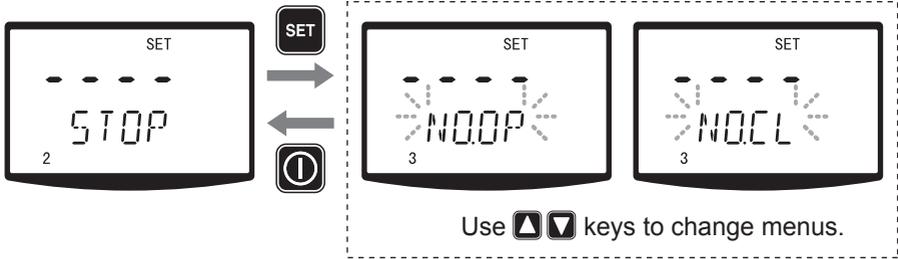
Use   keys to scroll through menus.

• *STOP function*

Program ON-OFF operation via the STOP signal.

Selecting "NO.OP", the pumps stops when receiving the signal.

Selecting "NO.CL", the pumps runs when receiving the signal.



\*\*"STOP" indication flashes when the STOP function is active.

**To release the STOP function:**

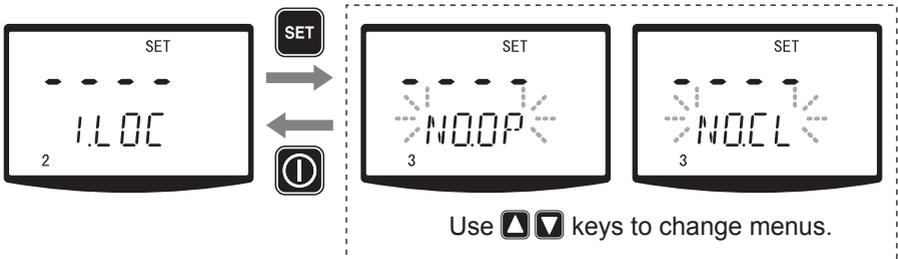
Just chose the opposite selection to the current one. For example, select "NO.CL" if "NO.OP" is selected.

• *Interlock function*

Program ON-OFF operation via the interlock signal.

Selecting "NO.OP", the pumps stops when receiving the signal.

Selecting "NO.CL", the pumps runs when receiving the signal.



**To release the interlock function:**

Just chose the opposite selection to the current one. For example, select "NO.CL" if "NO.OP" is selected.

• *OUT1 and 2 function*

Program the upper/lower alarms or a batch alarm.

OUT2 can be set for Synchronous output.

**Upper alarm (UP)**

An alarm is sent at the upper point. Hysteresis and delay time can be set.

**Lower alarm (DOWN)**

An alarm is sent at the lower point. Hysteresis and delay time can be set.

**Batch alarm (ALM)**

An alarm is programmed for the interlock (I.LOC), STOP, Pre-STOP, AUX, Sensor failure (SENS).

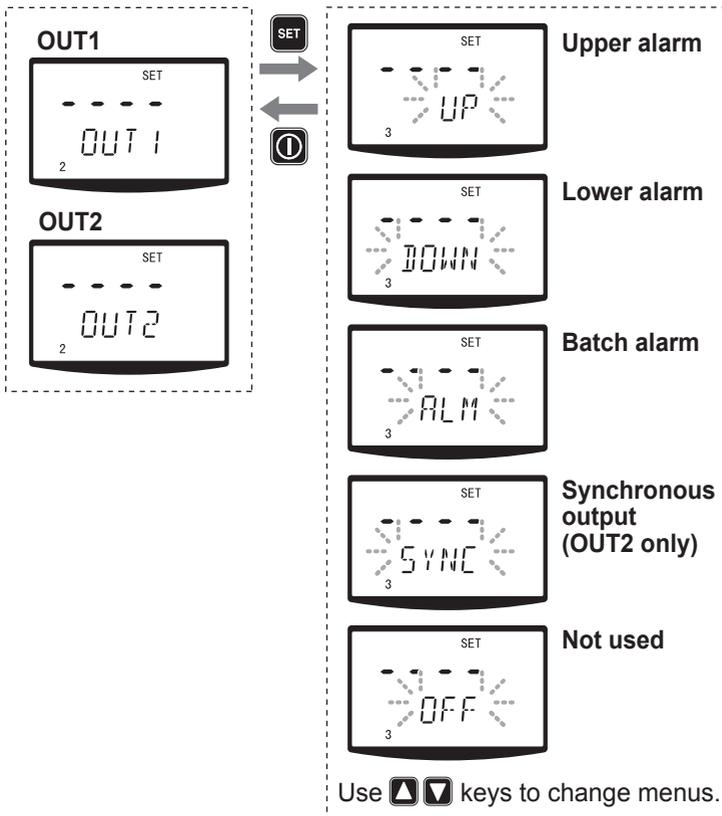
**Synchronous output (SYNC)**

The pulse signal is sent in sync with pumping action.

**Disused (OFF)**

Select "OFF" when not using this function

\*OUT1(or OUT2) LED lights when OUT1(or OUT2) is programmed.

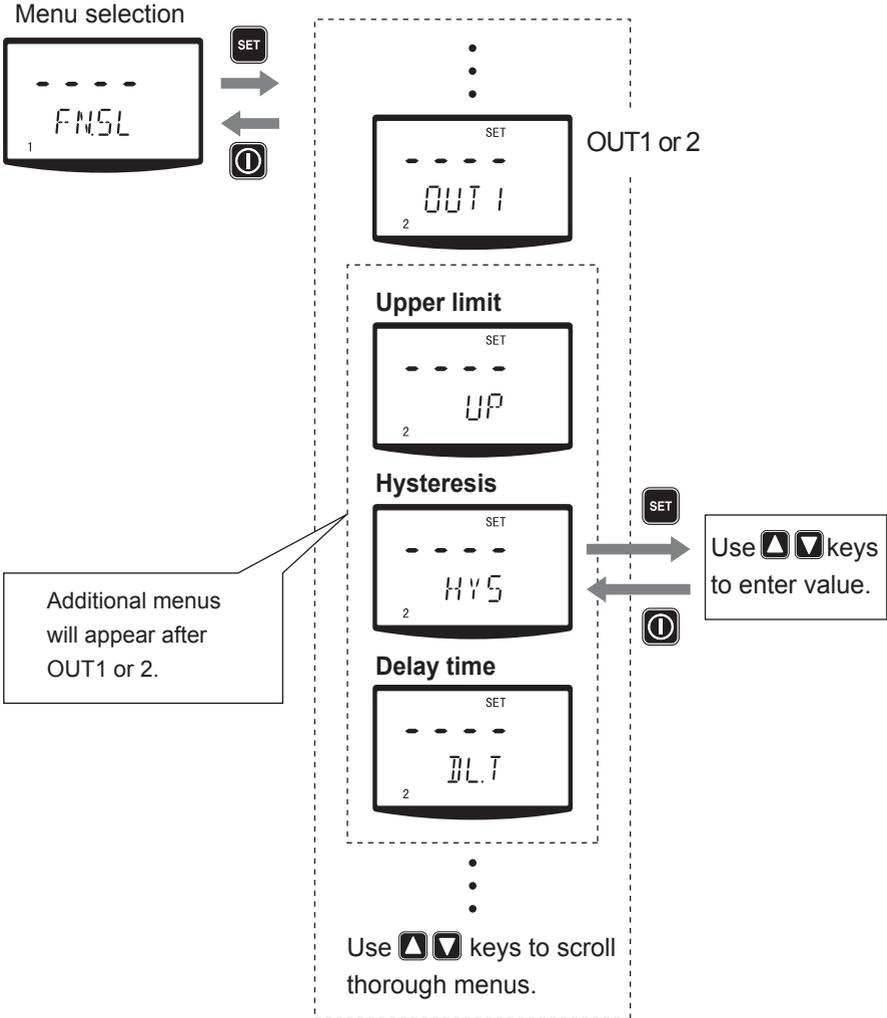


• *Upper alarm, lower alarm and batch alarm programming*

Program each alarm individually.

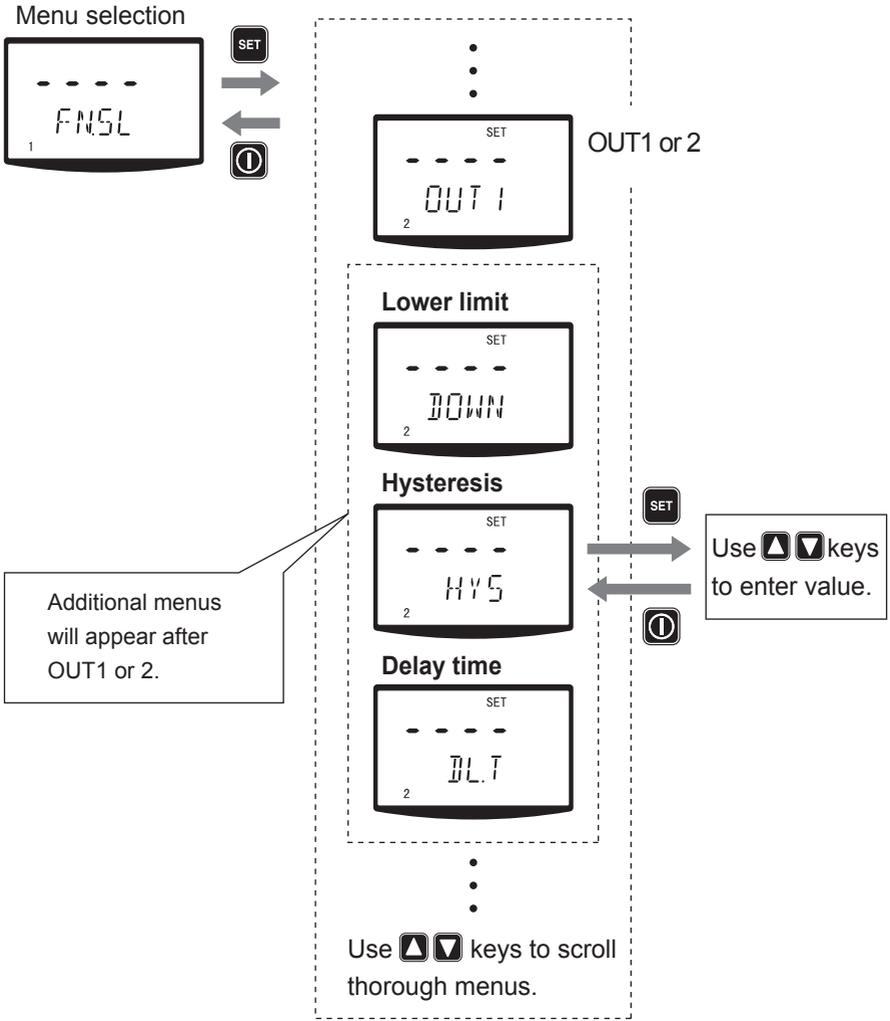
**Upper alarm**

Program the upper limit, hysteresis and delay time when selecting an upper alarm to OUT1 or 2.



### Lower alarm

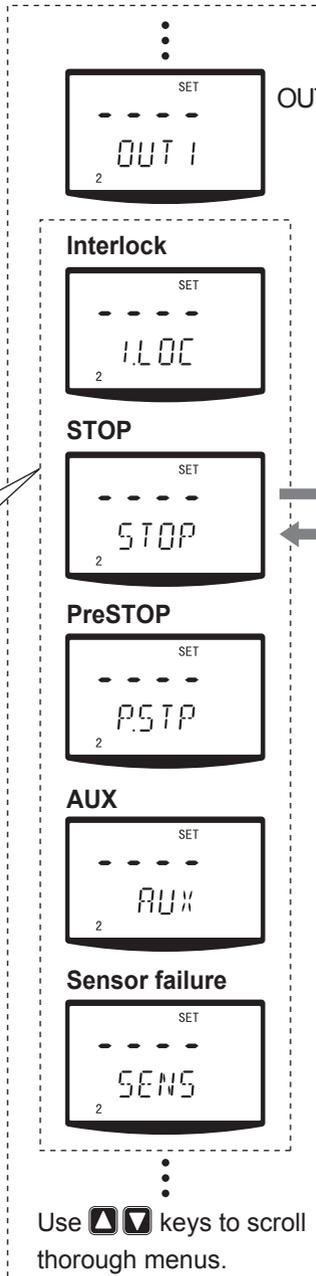
Program the lower limit, hysteresis and delay time when selecting an upper alarm to OUT1 or 2.



## Batch alarm

An alarm is programmed for the interlock (I.LOC), STOP, Pre-STOP, AUX, Sensor failure (SENS) when selecting a batch alarm to OUT1 or 2.

### Menu selection



OUT1 or 2

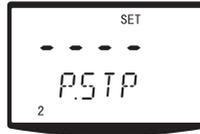
### Interlock



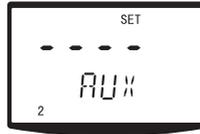
### STOP



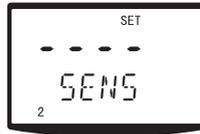
### PreSTOP



### AUX



### Sensor failure



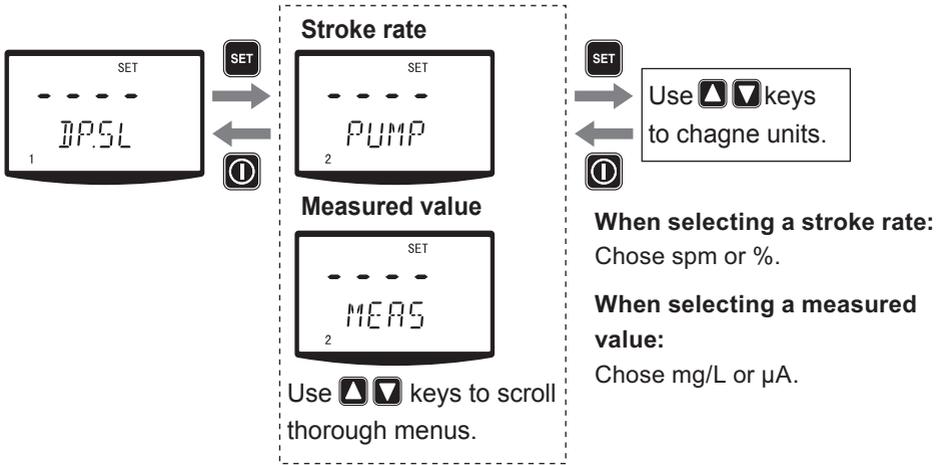
Use ▲▼ keys to select ON/OFF.

Additional menus will appear after OUT1 or 2.

Use ▲▼ keys to scroll through menus.

## ■ Display selection

Select spm indication or a measurement unit.



---

## NOTE

Select  $\mu\text{A}$  and check a current to a concentration so as to check sensor sensitivity. See page 80 for detail.

---

## ■ Pin number entry

Enter pin number to release the keypad lock state.

\*Factory default value is "0000".

**Entry screen**

**Pine number entry**

Push key to move to next digit.

Push key to change values.

# Operation

Read this section before operation.

## AUTO operation

The pump monitors and controls process solution automatically.

### 1 Turn on power.

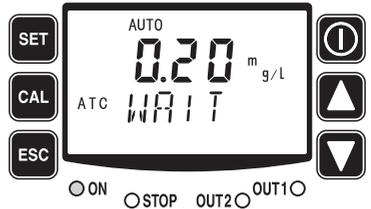
The ON LED lights and a display related to the current mode appears on the screen.

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



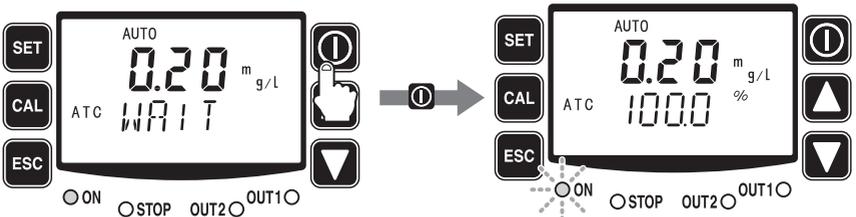
### 2 Check that the pump is in AUTO mode.

\*If the screen displays "MAN", it means the pump is in manual mode. In this case select "AUTO" in the user mode. See page 54 for detail.



### 3 Push the start/stop key to stay ready

The ON LED lights green and the pump starts control automatically.



## MAN operation

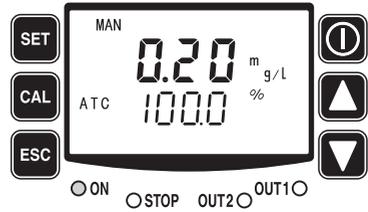
Run or stop operation manually.

### 1 Select MAN mode in the user mode.

\*See page 54 for detail.

### 2 Push the start/stop key to ON or OFF operation.

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

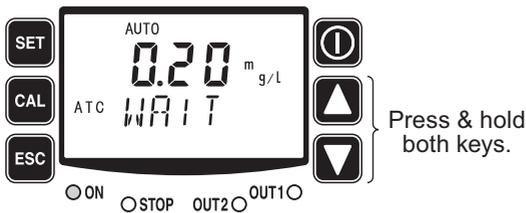


## Priming function

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

### 1 Press and hold both the UP and DOWN keys.

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



## Keypad lock

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

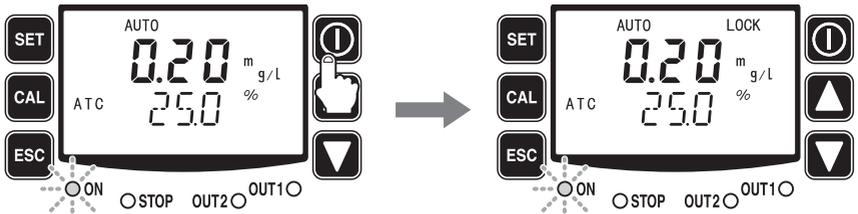
### NOTE

Any key operation is not acceptable when the keypad lock is active. In an emergency, pressing the start/stop key for three seconds, the pump enters a wait state and stops running. Pressing the same key once again will resume operation.

### ■ Keypad lock activation

#### 1 Press and hold the start/stop key for more than three seconds.

"LOCK" indication appears on the screen.



### ■ Keypad lock release

#### 1 Push any key other than the start/stop.



#### 2 Enter pin number.

Push the down key to move to the next digit.

Push the UP key to change values.

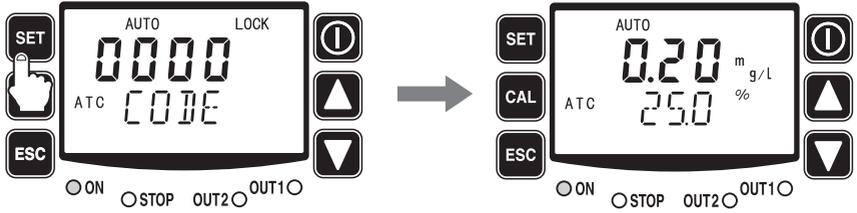
Always enter the pin number which is programmed in the user mode.



### 3 Push the SET key

The keypad lock state then will be released.

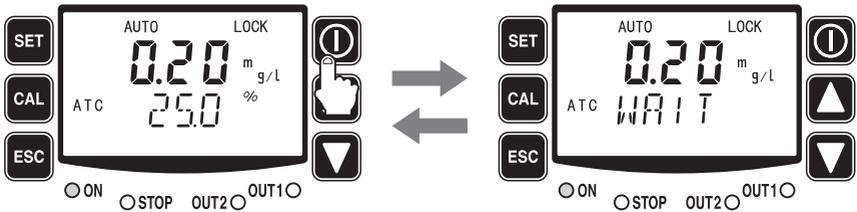
\*If the pin number is not correct, "FAIL" will be shown and the lock state will continue.



### ■ Emergency stop with a keypad lock state

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

The pump enters a wait state and stops running in the keypad lock state. Pressing the same key once again will resume operation with keypad lock active.



# Maintenance

***This section describes troubleshooting, sensor maintenance, wear part replacement, exploded views and specifications.***

## **!** Important

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

---

## NOTE

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

## Troubleshooting

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

### ■ Pump

States	Possible causes	Solutions
The pump does not run. (LED does not light. Blank screen.)	Power voltage is too low.	<ul style="list-style-type: none"> <li>• Observe the allowable voltage range of 90-264VAC</li> </ul>
	The pump is not powered.	<ul style="list-style-type: none"> <li>• Check the switch if it is installed.</li> <li>• Correct wiring.</li> <li>• Replace a breaking wire to new one.</li> </ul>
Liquid can not be pumped up.	Air lock in the pump	<ul style="list-style-type: none"> <li>• Expel air. See page 43.</li> </ul>
	Stroke length is too short.	<ul style="list-style-type: none"> <li>• Run the pump at 100% stroke length and adjust it to proper length.</li> </ul>
	Air ingress through suction line.	<ul style="list-style-type: none"> <li>• Correct tubing.</li> </ul>
	A valve set is installed upside down.	<ul style="list-style-type: none"> <li>• Reinstall the valve set.</li> </ul>
	Valve gaskets are not installed.	<ul style="list-style-type: none"> <li>• Install valve gaskets.</li> </ul>
	Foreign matters are stuck in the pump head valves.	<ul style="list-style-type: none"> <li>• Dismantle, inspect and clean the valves. Replace as necessary.</li> </ul>
	A ball valve is stuck on a valve seat.	<ul style="list-style-type: none"> <li>• Dismantle, inspect and clean the valve. Replace as necessary.</li> </ul>
The flow rate fluctuates.	Air stays in the pump head.	<ul style="list-style-type: none"> <li>• Expel air. See page 43.</li> </ul>
	Overfeeding occurs.	<ul style="list-style-type: none"> <li>• Mount a check valve. See page 28.</li> </ul>
	Foreign matters are stuck in the pump head valves.	<ul style="list-style-type: none"> <li>• Dismantle, inspect and clean the valves. Replace as necessary.</li> </ul>
	Diaphragm is broken.	<ul style="list-style-type: none"> <li>• Replace the diaphragm. See page 85.</li> </ul>
	Pressure fluctuates at an injection point.	<ul style="list-style-type: none"> <li>• Maintain a pressure constant at an injection point by optimizing piping or by relocating the point.</li> </ul>
Liquid leaks.	Loose fit of the fitting or the air vent body	<ul style="list-style-type: none"> <li>• Retighten them.</li> </ul>
	Loose fit of the pump head	<ul style="list-style-type: none"> <li>• Retighten the pump head. See page 42.</li> </ul>
	O rings or valve gaskets are not installed.	<ul style="list-style-type: none"> <li>• Install O rings and valve gaskets.</li> </ul>
	Diaphragm is broken.	<ul style="list-style-type: none"> <li>• Replace the diaphragm. See page 85.</li> </ul>
	Excessive discharge pressure	<ul style="list-style-type: none"> <li>• Check that a discharge line is not closed.</li> <li>• Check if tubing is not clogged.</li> </ul>

## ■ Sensor

States	Possible causes	Solutions
Reading fluctuates	A sensor cable is laid on close to other cables.	<ul style="list-style-type: none"> <li>• Keep it away from other cables or pass it into a conduit.</li> </ul>
	Power noise affects a reading.	<ul style="list-style-type: none"> <li>• Optimise power line or install a noise cut transformer.</li> </ul>
	Poor calibration	<ul style="list-style-type: none"> <li>• Measure an actual concentration by a FRC meter and adjust the control unit accordingly.</li> </ul>
	Concentration change	<ul style="list-style-type: none"> <li>• Repeat an actual concentration until it become stable.</li> </ul>
	Clogging	<ul style="list-style-type: none"> <li>• Clean a flow cell or filter.</li> </ul>
	Flow change in the flow cell	<ul style="list-style-type: none"> <li>• Check and clean a pipeline.</li> </ul>
	A FRC sensor is contaminated or deteriorated.	<ul style="list-style-type: none"> <li>• Clean or replace the sensor as necessary.</li> </ul>
	Poor connection of the sensor signal input terminal.	<ul style="list-style-type: none"> <li>• Tighten the terminal as necessary.</li> </ul>
	Sensor cable failure	<ul style="list-style-type: none"> <li>• Check and replace it as necessary.</li> </ul>
The sensor is not responding to changes.	Contamination on electrodes	<ul style="list-style-type: none"> <li>• Clean the electrodes. See page 75.</li> </ul>
	A scratched or damaged electrodes, or life end	<ul style="list-style-type: none"> <li>• Replace the sensor as necessary.</li> </ul>
Reading failure	Contamination on electrodes	<ul style="list-style-type: none"> <li>• Clean the electrodes. See page 75.</li> </ul>
	Poor electrode cleaning effect	<ul style="list-style-type: none"> <li>• Check the flow in the flow cell.</li> <li>• Check the filter for clogging. Clean or replace it as necessary.</li> </ul>
	A scratched or damaged electrodes, or life end	<ul style="list-style-type: none"> <li>• Replace the sensor as necessary.</li> </ul>
	Wiring failure	<ul style="list-style-type: none"> <li>• Check wiring. Replace as necessary.</li> </ul>
	Sensor cable connection is loose or disconnected.	<ul style="list-style-type: none"> <li>• Secure the connection.</li> </ul>
	Poor calibration	<ul style="list-style-type: none"> <li>• Measure an actual concentration by a FRC meter and adjust the control unit accordingly.</li> </ul>
A wide difference between an actual FRC concentration and reading.	The reading is not adjusted to the actual concentration.	<ul style="list-style-type: none"> <li>• Measure an actual concentration by a FRC meter and adjust the control unit accordingly.</li> </ul>

States	Possible causes	Solutions
A FRC concentration is too high.	Control parameter programming failure	• Check or correct programming as necessary. See page 55 for detail.
	Measured value adjustment failure	• Check or correct programming as necessary. Normal setting is 0.00. See page 57 for detail.
	Check valve failure	• Repair or replace as necessary.
	Poor flow in the flow cell.	• Check beads in the flow cell and adjust flow in between 1.1 and 1.5L/min.
	A FRC sensor is contaminated or deteriorated.	• Clean or replace the sensor as necessary.
	Sensor cable failure	• Check and replace it as necessary.
	Circuit failure	• Contact us.
A FRC concentration is too low.	Poor flow in the flow cell.	• Check beads in the flow cell and adjust flow in between 1.1 and 1.5L/min.
	Clogging	• Clean a flow cell or filter.
	Measured value adjustment failure	• Check or correct programming as necessary. Normal setting is 0.00. See page 57 for detail.
	Control parameter programming failure	• Check or correct programming as necessary. See page 55 for detail.
	Property change	• Check FRC consumption and set spm accordingly.
	Poor pumping rate	• Conduct degassing. • Repair or replace pump as necessary.
	Too much combined chlorine	• Replace liquid.
	Check valve failure	• Repair or replace as necessary.
	Concentration of sodium hypochlorite is too low.	• Use fresh sodium hypochlorite.
	A supply tank is empty.	• Refill the tank with sodium hypochlorite.
	A FRC sensor is contaminated or deteriorated.	• Clean or replace the sensor as necessary.
	Sensor cable failure	• Check and replace it as necessary.
	Circuit failure	• Contact us.

## Error codes

Error codes will be shown when this product is in a faulty condition. See below for the meanings of error codes and countermeasures.

### ■ Error code information

Error codes	Possible causes	Descriptions	Error message is shown in:
Hi	Out of a measurement range	A reading is more than 3.00mg/L.	Measurement
Lo	Out of a measurement range	A reading is lower than 0.00mg/L.	
ERR7	Temperature sensor anomaly	<ul style="list-style-type: none"> <li>• Sensor wire is disconnected or short-circuited.</li> <li>• Liquid temperature is 99.1°C or above or -0.1°C or below.</li> </ul>	Measurement or calibration
ERR8	Setting error	The same value is set to setting points.	Setting
ERR9	Temperature error	Liquid temperature is beyond 0.0-50.0°C	Measurement

### ■ Countermeasures

Error codes	Possible causes	Solutions
Hi Out of a measurement range	<ul style="list-style-type: none"> <li>• A FRC concentration is more than 3.00mg/L.</li> <li>• Sensor wire connection is not correct.</li> </ul>	<ul style="list-style-type: none"> <li>• Keep FRC in between 0.00 - 30.0mg/L.</li> <li>• Check the terminal block on the control unit to see if connection is correct and secured by screws.</li> </ul>
Lo Out of a measurement range	<ul style="list-style-type: none"> <li>• Sensor wire connection is not correct.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the terminal block on the control unit to see if connection is correct and secured by screws.</li> </ul>
ERR7 Temperature sensor anomaly	<ul style="list-style-type: none"> <li>• Is the resistance between T-T in proper range? 1097Ω at 25°C 1000-1193Ω at 0-50°C</li> <li>• The sensor cable connection is correct?</li> </ul>	<ul style="list-style-type: none"> <li>• Disconnect the sensor and measure resistance. If resistance is out of the proper range shown left, sensor failure is possible. Replace sensor.</li> <li>• Check the terminal block on the control unit to see if connection is correct and secured by screws.</li> </ul>
ERR8 Setting error	<ul style="list-style-type: none"> <li>• Erroneous setting</li> </ul>	<ul style="list-style-type: none"> <li>• Correct setting.</li> </ul>
ERR9 Temperature error	<ul style="list-style-type: none"> <li>• Liquid temperature is out of measurement range.</li> </ul>	<ul style="list-style-type: none"> <li>• Observe the measurement range.</li> </ul>

## Sensor/Flow cell maintenance

Conduct maintenance work periodically to keep the best performance.

### ■ Maintenance frequency

The following table shows maintenance frequency at each check item in sodium hypochlorite dosing application for drinking water preservation.

Check item	Descriptions	Maintenance frequency
Flow cell	Check contamination.	1 day
	Check the flow by beads.	1 day
	Check for a leak.	1 day
	Replace beads with new ones.	3 months
	Check and clean the filter.	1 to 4 weeks
	Check and clean the flow path.	1 day
	Replace O rings with new ones.	1 year or as necessary
FRC sensor	Electrolytic cleaning/ Acid cleaning/ Cleanser cleaning	1 to 4 weeks
	Replace the sensor with new one.	12 months
Terminal block	Check for corrosion and poor connection.	12 months
Sensor cable	Check a connector for poor connection.	6 months
FRC reading	Check a deviation from an actual concentration.	1 day to 1 week
Calibration	Zero adjustment/ Adjustment	1 to 3 months or as necessary
Filter (Option)	Disinfection/ Cleaning	1 day to 1 month
	Replace a cartridge with new one.	1 to 3 months
Flow switch (Option)	Check operation for a leak.	1 month
	Cleaning	6 to 12 months

### ■ FRC sensor cleaning

Contamination on a working electrode reduces sensitivity. Clean the electrode periodically to keep a good sensing condition. The optimum cleaning frequency changes with liquid property. Push the CAL and ESC keys at once to start electrolytic cleaning. If it is persistent, remove the sensor from the flow cell and scrub the electrode with cleanser and a sponge or dilute hydrochloric acid 10 to 20 times with tap water and place the electrode in it for 1 to 5 minutes.

#### NOTE

- Be careful not to wet a sensor cable connector.
- Rinse the electrode well after taking it out of diluted hydrochloric acid.

## Inspection

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

### **Daily inspection (Pump)**

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

When wear parts come to the life limit, replace them with new ones. Contact us or your nearest distributor for detail.

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

### **Periodic inspection (Pump)**

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

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

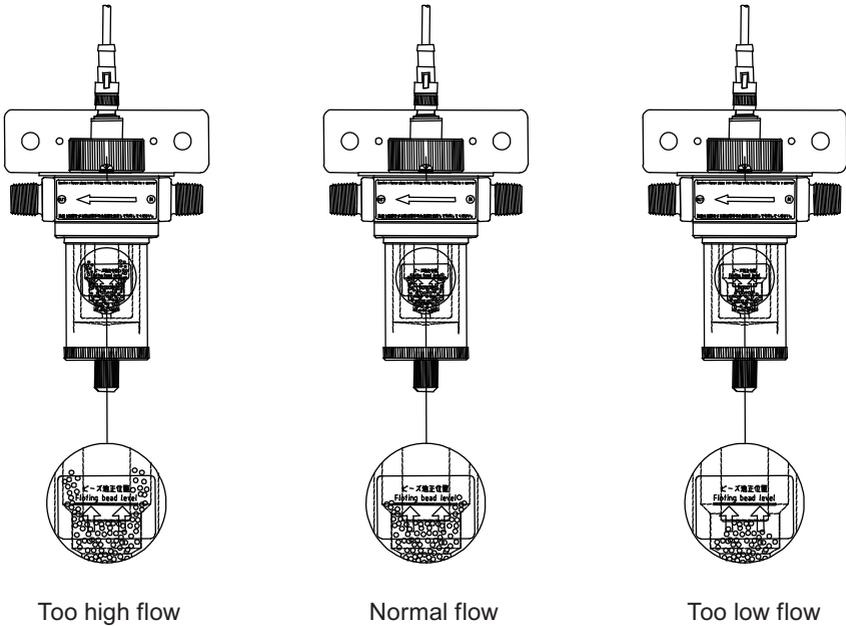
#### **Tightening torque**

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

\*A hexagon wrench can be used for a torque wrench. See page 43.

## Daily inspection (Flow cell)

Check the flow in the flow cell by floating beads. The beads come up to the floating bead level in a normal flow. If the flow falls and floating beads do not reach the level, it may be the sign of clogging or jamming. In this case FRC measurement will not be accurate as a deviation gets large. If the flow rises and the beads are far beyond the level, a FRC reading will be higher than an actual concentration and the life of sensor may shorten.



### ■ Flow cell cleaning

Follow the steps below for cleaning the flow cell. See page 92 for an exploded view.

- Turn off power.
- Detach the sensor cable from the FRC sensor.
- Close both the stop valves before and after the flow cell to isolate it.
- Remove the cap and the FRC sensor.
- Drain liquid of the flow cell via the drain plug.
- Detach the body from the head.
- Take out all beads and discard them. Clean the body with tap water.

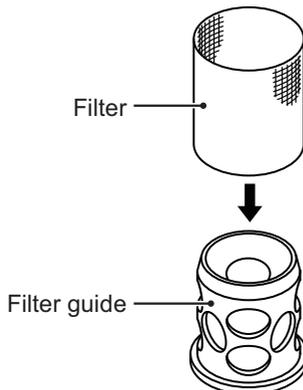
- h. Detach the filter from the head and clean it with tap water. Conduct acid cleaning as necessary.
- i. Detach the flushing cell from the head and clean it with tap water. Wipe it off with a soft cloth.
- j. Load the body with a specified quantity of beads (a capsule).
- k. Check the O ring (P48) is in place and then mount the body into the head.
- l. Attach the filter and FRC sensor.
- m. Connect a sensor cable to the FRC sensor.
- n. Open both the stop valves and check for a leak and a floating bead level.

## NOTE

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- Install the filter from the top of the head.
  - For acid cleaning, dilute hydrochloric acid 10 to 20 times with tap water and place the reference electrode in it for 1 to 5 minutes. Then wipe off contamination with a soft cloth. Rinse the electrode well after taking it out of diluted hydrochloric acid.
  - Be careful not to wet a sensor cable connector.
  - Always use a specified quantity of beads (a capsule).
  - Risk of chlorine gas poisoning. Do not mix chlorine bleach and acid such as hydrochloric acid.
  - Risk of blindness or chemical burn. Always wear protective clothing such as an eye protection and chemical resistant gloves. Rinse off hydrochloric acid with tap water for 15 minutes and consult a doctor if hydrochloric acid gets in your eye. If a skin or cloth gets wet, immediately rinse it off with tap water as well.
- 

## Filter set assembly



## ■ External filter cleaning

Clogging or jamming in the external filter (option) may reduce a FRC concentration in the flow cell and may cause excessive chloric acid injection. Be sure to conduct periodic inspection (1 to 4 weeks).

Place the filter in chlorine water (0.5mg/L or more) for at least five minutes for disinfection. Conduct acid cleaning to remove contaminations by iron, magnesium and calcium carbonate. Always wash out chlorine water or hydrochloric acid well after cleaning.

---

### NOTE

- Conduct filter disinfection to prevent Legionella proliferation.
  - For acid cleaning, dilute hydrochloric acid 10 to 20 times with tap water and place the reference electrode in it for 1 to 5 minutes. Then wipe off contamination with a soft cloth. Rinse the electrode well after taking it out of diluted hydrochloric acid.
  - Risk of chlorine gas poisoning. Do not mix chlorine bleach and acid such as hydrochloric acid.
  - Risk of blindness or chemical burn. Always wear protective clothing such as an eye protection and chemical resistant gloves. Rinse off hydrochloric acid with tap water for 15 minutes and consult a doctor if hydrochloric acid gets in your eye. If a skin or cloth gets wet, immediately rinse it off with tap water as well.
-

### ■ FRC reading check

A FRC reading carries a degree of deviation by a contamination on the sensor. Periodically check an actual FRC concentration and a control unit reading. If the difference is large, push the CAL and ESC keys at once to start electrolytic cleaning. If it is persistent, remove the sensor from the flow cell and scrub the electrode with cleanser and a sponge or dilute hydrochloric acid 10 to 20 times with tap water and place the electrode in it for 1 to 5 minutes.

A measurement error may increase when making a measurement in a DPD colorimeter method. See page 50 for detail. In this case try an amperometric titration method. Observe the measurable range of 0.00-3.00mg/L or correct calibration will not be obtained.

### ■ Sensor sensitivity check

Periodically check the sensor sensitivity. Select  $\mu\text{A}$  via the display selection programming in the user mode. Check an actual FRC concentration and corresponding  $\mu\text{A}$  along with the table and formula below. Change the FRC sensor with new one if sensor sensitivity does not reach the minimum level.

Actual FRC concentration	Sensor sensitivity (minimum level)
0.2mg/L	0.4 $\mu\text{A}$
0.4mg/L	0.8 $\mu\text{A}$
0.5mg/L	1.0 $\mu\text{A}$
0.8mg/L	1.6 $\mu\text{A}$

A current level at 1mg/L =  $1.00\text{mg/L} \div \text{Actual FRC concentration} \times \text{Reading} (\mu\text{A})$

### ■ Before a long period of stoppage

Remove the FRC sensor from the flow cell and rinse electrodes with tap water. Wipe off and cap the sensor.

Empty the flow cell if it is a freezing temperature.

#### NOTE

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Do not allow liquid to freeze in the flow cell or it may break.

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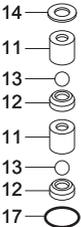
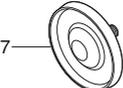
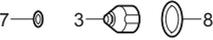
## Wear part replacement

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 us or your nearest distributor for detail.

### ! Precautions

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

### Wear part list (Pump)

	Parts	# of parts	Estimated life
Pump	VC•VH•PC•PH 	2 sets	8000 hours
	Diaphragm 	1	
	O ring 	See page 90	
Check valve	Poppet valve 	1	
	Spring 	1	

\*The lives of wear parts change with operating conditions.

\*Wear part duration varies with the pressure, temperature and characteristics of liquid.

\*The estimated life is calculated based on the continuous operation with clean water at ambient temperature.

## ***Before replacement***

---

*First release pressure from the pump head.*

**1** Stop the pump operation.

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

NOTE

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

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

NOTE

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

## ***Valve set replacement***

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### ■ Discharge valve set dismantlement/assembly

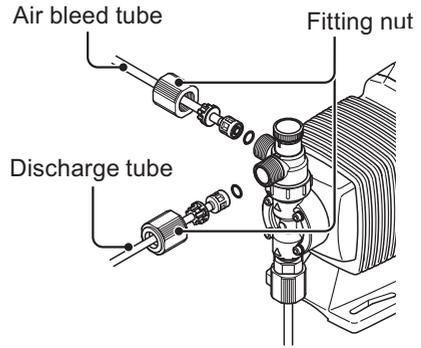
#### **Necessary tools**

- Adjustable wrench or spanner
- 21mm box wrench
- A pair of tweezers

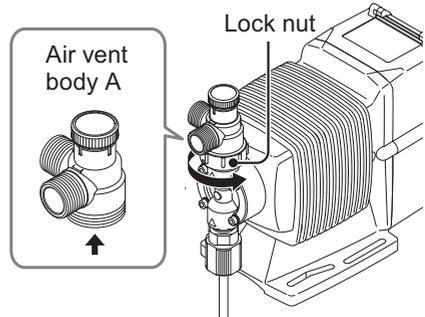
\*Unfix the pump base before disassembly.

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

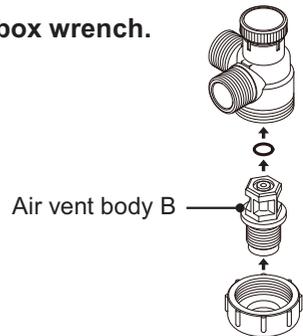
\*Wash out residual liquid or substances.



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



- 3** Remove the air vent body B by the 21mm box wrench.



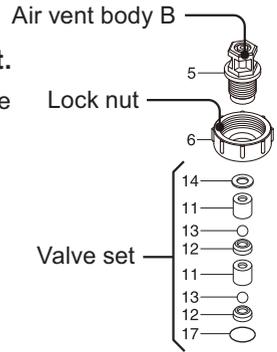
- 4** Pull out the valve set by a pair of tweezers.

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

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

\*Do not forget to fit O rings and gaskets.

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



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

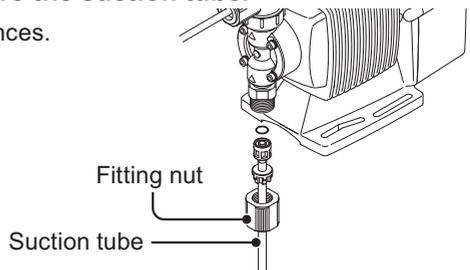
### ■ Suction valve set dismantlement/assembly

#### NOTE

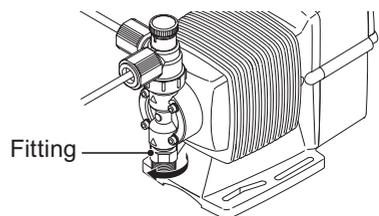
Be careful not to drop the valve set.

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

\*Wash out residual liquid or substances.



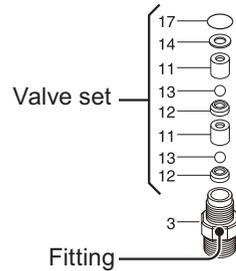
## 2 Remove the fitting by an adjustable wrench or a spanner.



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

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

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



**5** Reconnect the suction tube.

## ***Diaphragm replacement***

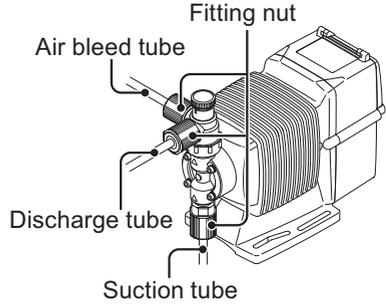
### **Necessary tools**

- Adjustable wrench or spanner
- Hexagon wrench
- Torque wrench

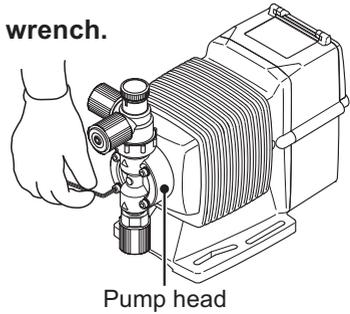
### **NOTE**

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

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

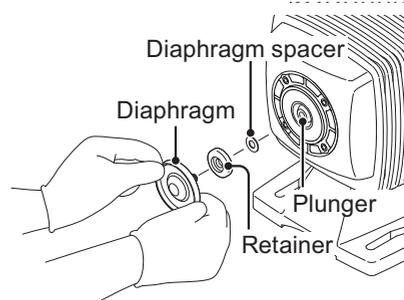


- 2** Remove the pump head with a hexagon wrench.



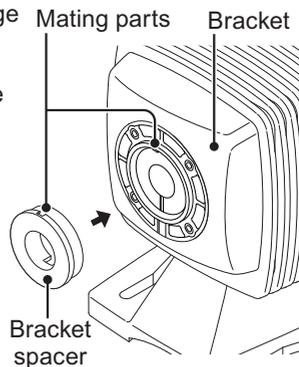
- 3** Rotate and remove the diaphragm from the plunger (pump shaft).

- 4** Slide a retainer and diaphragm spacer(s) onto the screw of a new diaphragm.



## NOTE

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



## 5 Screw the new diaphragm into the plunger as far as it will go.

\*Be careful not to loose the retainer and diaphragm spacer.

## 6 Mount the pump head.

Tighten the pump head fixing bolts evenly to the following torque in diagonal order.

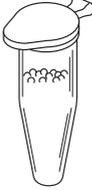
### Tightening torque

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

\*A hexagon wrench can be used for a torque wrench. See page 43.

## Wear part list (Flow cell/ FRC sensor)

### ■ Flow cell

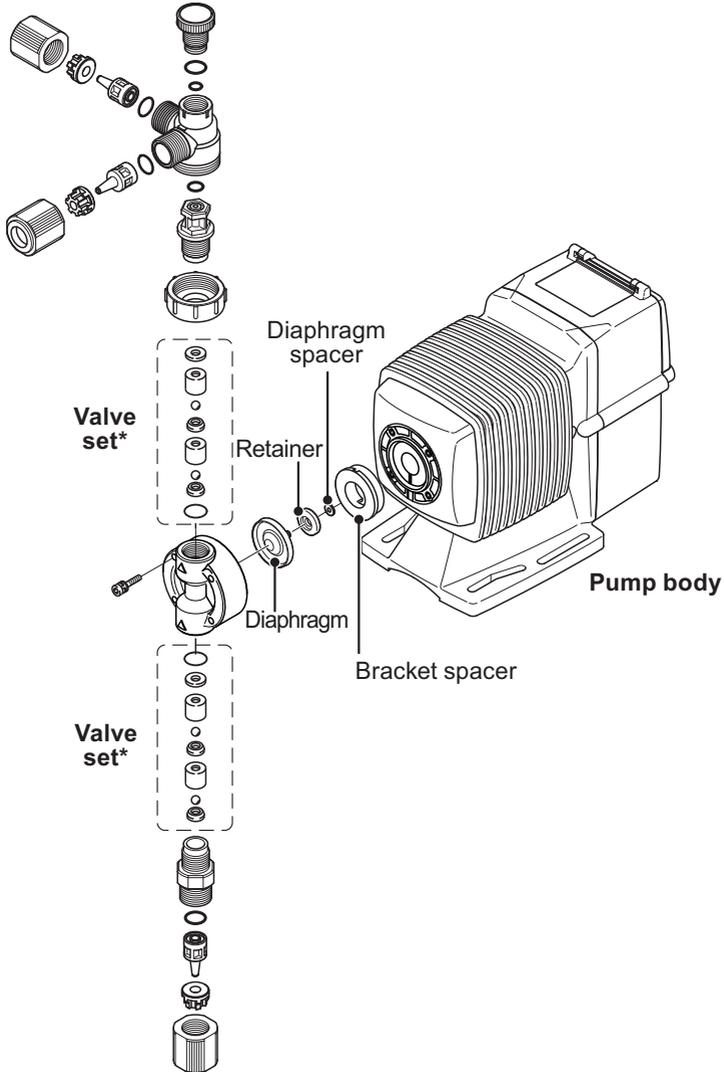
	Parts		# of parts	Estimated life
Pump	O ring (P3)		1	8000 hours or 1 year
	Filter		1	700 hours or 30 days
	Beads		1	2100 hours or 90 days
	O ring set		1 sets	8000 hours or 1 year

Always use a specified quantity of beads (a capsule). If it is low, cleaning effect and sensor sensitivity will reduce and a measurement error will be large. It also may get stuck in the filter. If it is large, beads will disturb correct measurement. Also, they will be contaminated and cleaning effect will reduce. To keep a specified quantity of beads, replace beads with new ones every three months or every time the flow cell is cleaned.

## Exploded view

### ***Pump head, Drive unit & Control unit***

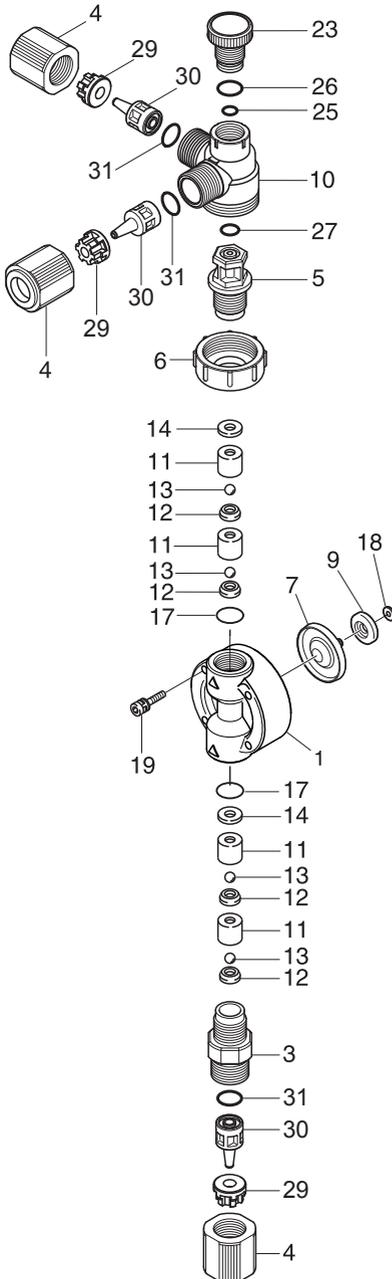
The pump in the diagram below is completely dismantled. Do not dismantle the pump beyond the extent shown in this instruction manual.



\*Wet end materials and their sizes differ with models.

# Pump head

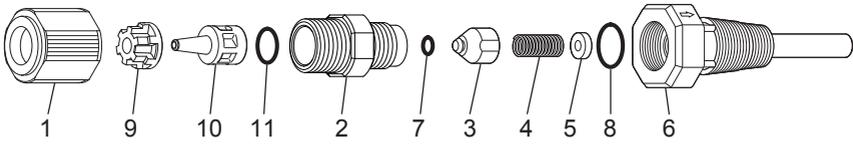
## ■ EWN- □ [VC•VH]



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

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

## Check valve

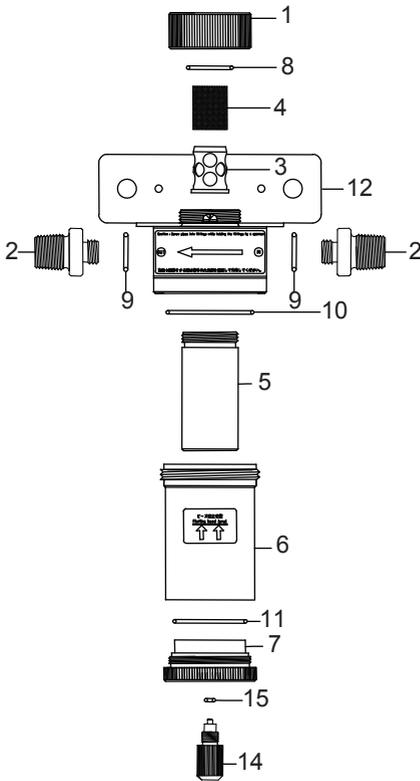


No.	Part names	# of parts
1	Fitting nut	1
2	Valve case	1
3	Poppet	1
4	Spring	1
5	Spacer	1(0)
6	Valve fitting A	1
7	O ring	1
8	O ring	1
9	Hose stopper	1
10	Hose adapter	1
11	O ring	1

\*For the CAN-2-L type, no spacer is provided.

# Flow cell

## ■ RF-20



No.	Part names	# of parts
1	Cap	1
2	Fitting	2
3	Filter guide	1
4	Filter	1
5	Flushing cell	1
6	Body	1
7	Bottom cap	1
8	O ring	1
9	O ring	1
10	O ring	1
11	O ring	1
12	Clamp	1
14	Drain plug	1
15	O ring	1

## Specifications/Outer dimensions

### Specifications

Information in this section is subject to change without notice.

#### ■ Pump unit

#### VC•VH

Model code	Flow rate L/H ml/min	Discharge pressure MPa	Stroke rate % (spm)	Tube size mm	Power consumption W	Current value A	Weight kg
EWN-B11	2.28 (38)	1.0	0.1-100 (1-360)	ø4×ø9	20	0.8	2.5
EWN-B16	3.9 (65)	0.7					
EWN-B21	6.0 (100)	0.4					
EWN-B31	12.0 (200)	0.2		ø8×ø13	24	1.2	3.5
EWN-C16	4.8 (80)	1.0		ø4×ø9			
EWN-C21	7.8 (130)	0.7		ø8×ø13			
EWN-C31	16.2 (270)	0.35					
EWN-C36	25.2 (420)	0.2					

#### VC•VH-C (High compression type)

Model code	Flow rate L/H ml/min	Discharge pressure MPa	Stroke rate % (spm)	Tube size mm	Power consumption W	Current value A	Weight kg
EWN-B11	1.38 (23)	1.0	0.1-100 (1-180)	ø4×ø9	20	0.8	2.5
EWN-B16	2.40 (40)	0.7					
EWN-B21	3.78 (63)	0.4					
EWN-C16	3.24 (54)	1.0			24	1.2	3.5
EWN-C21	4.68 (78)	0.7					

\*The above information is based on pumping clean water at rated voltage and ambient temperature.

\*Flow rates were collected at the maximum discharge pressure and 360spm (VC/VH-C type: 180spm). A flow rate increases as a discharge pressure decreases.

\*Allowable room temperature: 0 - 40°C

\*Allowable liquid temperature: 0 - 40°C

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

## ■ Control unit

Functions	Operation mode	Operation at a manual spm AUTO proportional or PID control								
	Mode change	Key operation								
Measurement	Measuring object	Free residual chlorine concentration								
	Measurement range	0.00 - 3.00mg/L								
	Calibration	Reading correction								
	Temp. compensation	AUTO Pt1000 (0 - 50°C) MAN (fixed)								
Keypad		SET, CAL, ESC, START/STOP, UP, DOWN								
Control functions	STOP	Operation stop at contact input <sup>*1</sup>								
	Interlock	Operation stop at contact input <sup>*1</sup>								
	Priming	Max spm operation by pressing the UP and DOWN keys								
	Keypad lock	Keypad lock and release								
Monitors	LCD	7×4, 14×4 backlit LCD indicates information such as measured values, operating conditions and units								
	LED	<table border="0"> <tr> <td>ON</td> <td>Green/Orange ×1</td> <td>Lights orange as powered on. Lights green while ready for operation Flashes green during operation</td> </tr> <tr> <td>STOP</td> <td>Red/Orange ×1</td> <td>Lights red at STOP signal input Lights orange at PreSTOP signal input</td> </tr> <tr> <td>OUT</td> <td>Red ×2</td> <td>Flashes at each output</td> </tr> </table>	ON	Green/Orange ×1	Lights orange as powered on. Lights green while ready for operation Flashes green during operation	STOP	Red/Orange ×1	Lights red at STOP signal input Lights orange at PreSTOP signal input	OUT	Red ×2
ON	Green/Orange ×1	Lights orange as powered on. Lights green while ready for operation Flashes green during operation								
STOP	Red/Orange ×1	Lights red at STOP signal input Lights orange at PreSTOP signal input								
OUT	Red ×2	Flashes at each output								
Input	STOP/PreSTOP	No voltage contact or Open collector <sup>*2</sup>								
	AUX	No voltage contact or Open collector <sup>*2</sup>								
	Interlock	No voltage contact or Open collector <sup>*2</sup>								
	Sensor	See the above measurement field.								
Output	OUT1	No voltage contact (mechanical relay) 250VAC, 3A(resistance load) Upper/Lower/Batch <sup>*3</sup> alarm are settable. (Factory default is: Upper alarm)								
	OUT2	No voltage contact (photoMOS) 24VAC/DC 0.1A Upper/Lower/Batch <sup>*3</sup> /Synchronous alarm are settable. (Factory default: Batch alarm turns on at STOP signal input)								
Buffer		Nonvolatile memory								
Power voltage <sup>*4</sup>		100-240VAC 50/60Hz								

- \*1 Operation resumption at contact input is also programmable.
- \*2 The maximum applied voltage is 12V at 2.3mA. The minimum application load should be 2.3mA or below when using a relay.
- \*3 Interlock, STOP, PreSTOP, AUX and Sensor failure can be set to the batch alarm at once.
- \*4 Observe the allowable voltage range of 90-264VAC. Otherwise failure may result.

### ■ Power cable

Conduction section area	0.75 [mm <sup>2</sup> ] Triplex cable(L/N/PE)	Standard	H03VV-F
Length	1950 [mm]	Terminal treatment	European plug

### ■ Pump colour

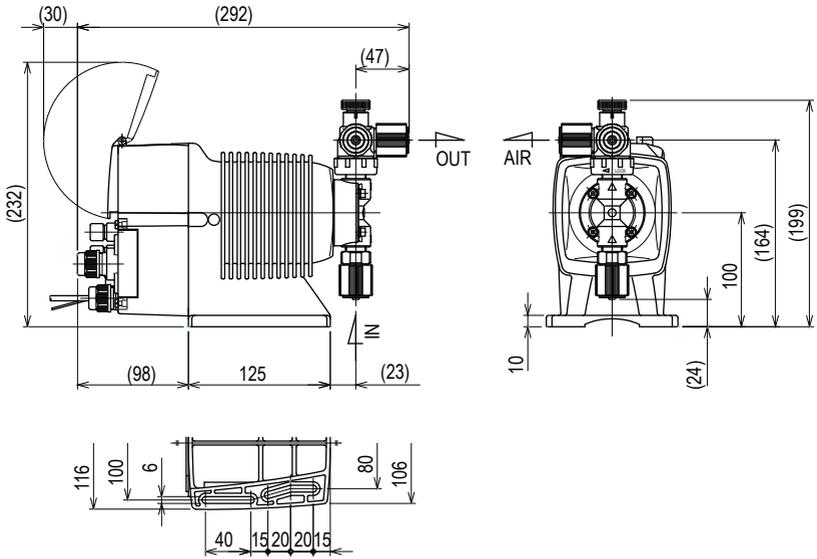
Blue	Munsell colour system 7.5PB 3/8
Red	Munsell colour system 5R 3/10

### ■ Accessory

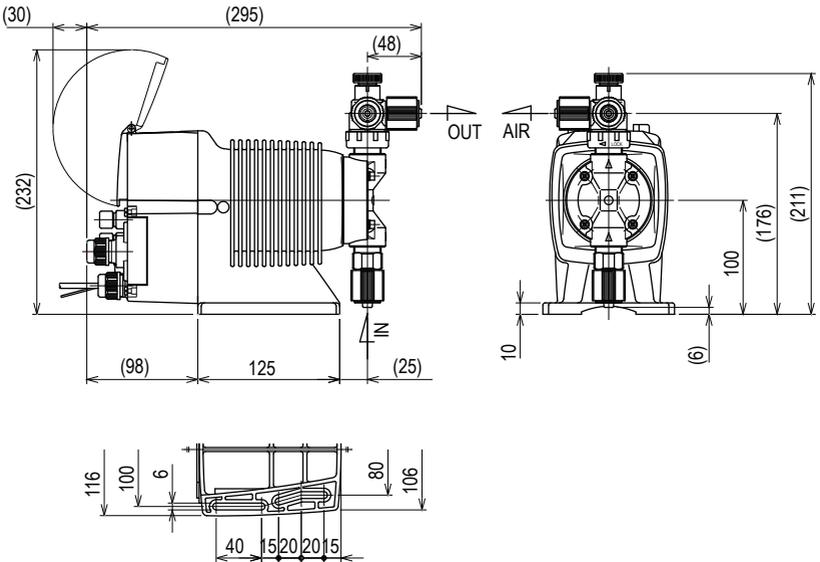
Model		Set pressure MPa	Hose size mm	Wet ends	Applicable pump	Pump wet end code
Chck valve	CAN-1VC-1	0.17	ø4×ø9	PVC	EWN-B11•16•21 EWN-C16•21	VC
	CAN-1VE-1					VH
	CAN-2VC-4		ø8×ø13		EWN-C31	VC
	CAN-2VE-4					VH
	CAN-2VCL-4	0.05	EWN-B31 EWN-C36		VC	
	CAN-2VEL-4				VH	

# Outer dimensions

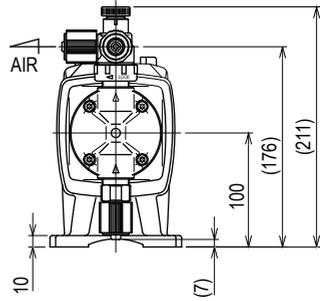
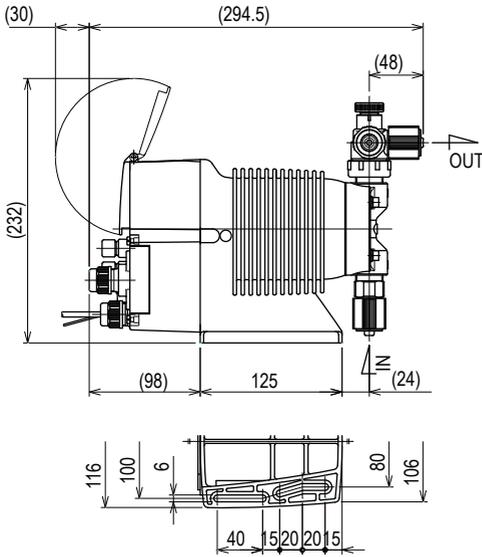
## ■ EWN-[B11•B16•B21•C16•C21] [VC•VH] (-C)



## ■ EWN-[B31•C31] [VC•VH]

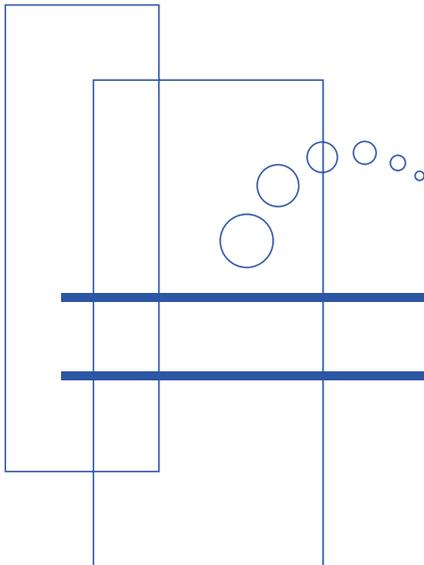


■ EWN-C36 [VC-VH]









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