

Iwaki Electromagnetic Metering Pump

EWN-W (For water quality control)



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 dealer 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.



b. Check if the delivery is damaged or deformed.

Check for transit damage and loose bolts.

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Safety instructions

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

Pictorial indication

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





For exportation

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

Turn off power before work

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

Stop operation

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

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

Do not modify the pump

Remodelling the pump carries a high degree of risk. We are not responsible for any failure or injury results from remodelling.

Wear protective clothing

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

Do not damage the power cable

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

Do not use the pump in a flammable atmosphere

Do not place dangerous or flammable goods near the pump for your safety.









Requirement



Do not remode

Prohibition





Prohibition

A qualified operator only

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

Use a specified power only

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

Do not run pump dry

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

Do not wet electric parts or wiring

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

Ventilation

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

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

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

Countermeasure against efflux

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







Prohibition







Do not use the pump in a water place

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

Earthing

Risk of electrical shock. Always earth the pump.

Install an earth leakage breaker

An electrical failure of the pump may adversely affect related devices. Purchase and install an earth leakage breaker separately.

Wear part replacement

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

Do no use a damaged pump

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

Disposal of the used pump

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

Tighten the pump head

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

Tightening torque

| EWN-B09•11•16•21, C16•21 | : 2.16 N•m |
|--------------------------|------------|
| EWN-B31, C31•36 | : 2.55 N•m |

Install a relief valve

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







Requirement

Earthing





Precautions for use

- Electrical work should be performed by a qualified operator. Otherwise, personal injury or property damage accident may result.
- Do not install the pump in the following places where...
 Under a flammable atmosphere or in a dusty/humid place.
 Under direct sunlight or wind & rain.

-Ambient temperature is beyond 0-40 degrees Celsius. Protect the pump with a cover when installing it out of doors.

- Select a level location where is free from vibration and liquid can't stay. Fix the pump with M5 bolts so as not to vibrate. If the pump is installed at a tilt, the flow may reduce.
- When two or more pumps are installed, the pump operation interacts each other and vibration becomes significant, resulting in poor performance or failure of internal electrical devices. Select an installation location where tolerates vibration to enough degree.
- Keep a wide maintenance space around the pump.
- Install the pump as close to a supply tank.
- Install the pump in a cool and dark place when handling liquids that readily generate gas bubbles such as sodium hypochlorite or hydrazine solution. Flooded suction application is strongly recommended when using the pump with a supply tank.













Safety instructions

- Be careful not to drop the pump onto the floor. A strong impact may reduce pump performance. Do not use a pump which has once damaged. Otherwise an electrical leak or shock may result.
- The pump is a light water-/dust-proof structure of IP65, but is not totally waterproof. Do not have the pump wet with the liquid handled or rainwater.
- Never wet the pump head, control unit and drive unit. Otherwise, Failure or an accident may result. Immediately wipe off liquid if the pump has got wet.
- Do not close the discharge line during operation. Otherwise, liquid may leak or tubing may break. Install a relief valve to be sure to prevent a leak or a tubing break
- Do not remove the control unit. Note that an applicable control unit differs with each drive unit. Do not attach a control unit to a different drive unit. Otherwise, an electrical circuit or the drive unit may fail.
- Release the pressure from the discharge line before dismantling the pump or removing tubing. Otherwise, chemical liquid gushes out.
- Be careful not to come in contact with residual liquid.
- Do not clean the pump or nameplate with a solvent such as benzene and thinner. This may discolour the pump or erase printing. Use a dry cloth or a wet cloth with water or neutral detergent.















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 electrodes and sensors.

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 electrodes and sensors.

WPO type: Controls a flow rate in proportion to the pH or ORP value measured by electrodes.

WEC type: Controls a flow rate in proportion to the conductivity measured by sensors.

WCT type: Controls a blowdown valve along with the conductivity measured by sensors.

Multi voltage

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

• Waterproof and dustproof structure (IP65)

This pump is hermetically sealed at the drive unit, control unit and the pump head separately in order to ensure a certain level of water-/dust-proof that is equal to IP65.

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

Operational function

• AUTO operation (see page 75)

The external sensor signal (pH/ORP or conductivity) controls the pump operation. The AUTO operation acts as the proportional control, PID control and blowdown control.

Proportional control (WPO/WEC)

In this mode the pump controls stroke rate in proportion to the measured pH/ORP value or conductivity. Program stroke rates at two different points before operation.

<Example of program parameters>

SP.1 pH: 7.00 spm: 0 SP.2 pH: 10.00 spm: 360



PID control (WPO/WEC)

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

spm=Kp×Deviation + Ki×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×Td Td=Derivative term)Deviation:Process value (PV) - Setpoint (SP)Accumulated deviation:Summed instantaneous deviation

Blowdown control (WCT)

The pump controls a blowdown valve along with the measured conductivity. In this control there are two operation.

*The multibox (relay type) is required to supply power in this control.

Interval operation

The pump runs separately from the blowdown operation.



Synchronized blowdown operation

The pump runs in sync with the blowdown operation. Lockout and a time limit can also be programmed.



• Manual operation (see page 76)

The start/stop of the pump by key operation



*Operation can 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 76)

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 69)

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

OUT1 (Mechanical relay)

The upper alarm and lower alarm function via OUT1.





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

OUT2 (PhotoMOS relay)

The synchronization signal in sync with stroke rates can be outputted as well as the above alarms.

• STOP function (See page 68)

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 receiving the external signal via the Pre-STOP terminal (closed contact).

When "NOR. CL" is selected...

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

Pump



Display

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



key for one second, the pump enters the user mode.

ne

Outline

Basic displays & Pump states

| | STOP LED lights redly | ON LED lights orange | ON LED blinks greenly | OUT LED lights redly |
|--|---|--|---|--|
| MAN 4 0 0 ph atc 7 7 | _ | Manual wait state. Display shows pH value. | _ | OUT1 & 2 function as programmed. |
| MAN I 4.00 PH ATC I 000 % | _ | _ | Operation in manual mode. Display shows pH and stroke rate in %. 360spm is at 100%. | OUT1 & 2 function as programmed. |
| айто 14000 рн атс 250 с | _ | Wait state in Auto mode. Display shows pH value and temperature. | Operation in Auto mode. Display shows pH value and temperature. | OUT1 & 2 function as programmed. |
| | Operation stop by the STOP signal | _ | _ | _ |
| SET | _ | Programming in the User mode | _ | _ |
| 8.5 0 рн 2 5 Р. I | _ | Programming at SP.1 | _ | _ |
| аито сал 5.85 рн 25.0 °с | Programming in the calibra- tion mode | _ | _ | _ |
| AUTO-CAL | _ | Auto calibration is in process | _ | _ |
| | Error oc- curred. | _ | _ | _ |
| | | _ | PRIME mode. Operation at the maximum stroke rate | _ |
| алс ЫЛС МИТО Атс ПЦХ | _ | _ | AUX mode. Operation at the maximum stroke rate | _ |

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

Pump/Drive units

<u>EWN</u> - <u>B</u> <u>11</u> <u>VC</u> <u>J</u> <u>WPO</u> <u>-</u> - <u></u>

a bcdefghi

a. Series name

EWN: Multivoltage electromagnetic metering pump

b. Drive unit code (Average power consumption)

B: 20W

C: 24W

c. Diaphragm effective diameter

09: 8mm 11: 10mm 16: 15mm 21: 20mm 31: 30mm 36: 35mm

d. Wet end materials

| Code | Pump head | Valve | O ring | Valve seat | Gasket | Diaphragm |
|------|-----------|-----------------|--------|------------|--------|-----------|
| VC | | Alumina ceramic | FKM | FKM | | |
| VH | PVC | HC276 | EPDM | EPDM | DTEE | PTFE |
| PC | | Alumina ceramic | FKM | FKM | PIFE | + EPDM |
| PH | GFRPP | HC276 | EPDM | EPDM | | |

Material code

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

e. Tube connection bore code

| No. | Hose size (ID×OD) | Wet end materials | Pump model |
|-------------|------------------------------|-------------------|-----------------------------|
| No code* | ø4×ø6 | VC/VH/VC-C/VH-C | EWN-09/-11/-16 & -21 |
| | ø9×ø12 | VC/VH | EWN-31 & -36 |
| | ø6×ø12 | VC-C/VH-C | EWN-09/-11/-16 & -21 |
| | IN/AIR: ø4×ø6 OUT: Rc 1/4 | PC/PH-H | EWN-11 & -16 |
| 1 | ø4×ø9 | VC/VH/VC-C/VH-C | EWN-09/-11/-16 & -21 |
| 3 | ø6×ø8 | VC/VH/VC-C/VH-C | EWN-09/-11/-16 & -21 |
| 4 | ø8×ø13 | VC/VH | EWN-31 & -36 |
| 6 | ø10×ø12 | VC/VH | EWN-31 & -36 |
| 7 | ø1/4"×ø3/8" | VC/VH/VC-C/VH-C | EWN-09/-11/-16 & -21 |
| 8 | ø3/8"×ø1/2" | VC/VH | EWN-31 & -36 |
| 23 | ø6×ø12 | VC | EWN-11/-16/-21/-31 & -36 |
| 24 | ø5×ø8 | VC/VC-C | EWN-09/-11/-16 & -21 |

* No code. ø4×ø6 and ø6×ø12 are equipped to the EWN-09, -11, -16 & -21 (the VC or VH-C types).

f. Power code

E: European cord

g. Control unit function code

WPO: pH/ORP WEC: Conductivity WCT: Cooling tower

h. Special version code

C: High compression type

H: High pressure type

i. Special configuration code

Sensors

The EWN-W always needs sensors during operation.

Dbserve the following points for sensor.

- Do not cause mechanical damage to the pump. The sensor may fail.
- Do not touch a glass membrane with bare hands. Sensitivity may reduce when the membrane is contaminated by sebum.
- The sensor is a ware part. Replace it with new one periodically.

Conductivity sensor

Use the designated conductivity sensor.

Immersion mounted sensor: ESC-150P1-06YV

This type of sensor is placed in a tank. There are two vertical probes at the sensor end.



InLine mounted sensor: CS150TC-Y

This type of sensor is placed in a pipeline through a flow cell. There are two probes in a slot at the sensor end.



Installation

Installation

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

Observe the following points when installing the pump.

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

Pump mounting

Select an installation location and mount the pump.

Necessary tools

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

1 Select a suitable place.

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

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

2 Fix the pump by the M5 bolts.

Be sure to fix the pump at four points.

NOTE

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



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

- a. 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.
- b. Fit the tube end (hose adapter) to the fitting. Then hand tighten the fitting nut.
- c. Retighten the fitting nut by turning it180 degrees with an adjustable wrench or spanner.

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



Connect tubes into the inlet and outlet.



1



Installation

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

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

3 Direction of the air vent port.

The air vent port can rotate 90 degrees.

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





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.

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



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



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



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

Mount the check valve at the discharge tube end.

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

CAN check valve

R1/2 Outer dia Φ9

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

CBN check valve



NOTE -

1

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

Tubing layout

Flooded suction application

Suction lift application



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

NOTE

Install a relief valve if the discharge line may clog.

pH/ORP electrode

Observe the instruction manual of the pH/ORP electrode. Always select "MTC" in AUTO/MAN TC selection. See page 66 for detail.

Conductivity sensor

Immersion mounted sensor

Place the sensor into a tank. Insure that the sensor is surrounded by at least 30mm of liquid on all sides, including top and bottom. Otherwise, an accurate measurement can not be obtained.



Wiring

Wiring for the power source and external signal.

Dbserve 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. Otherwise the electrical circuit on the control unit may break.
- Do not perform wiring work while the power is on. Otherwise, an electrical shock and short circuit may result, and consequently the pump may fail. Be sure to turn off power before wiring work.
- Be careful for the power not to be turned on during work.
- Replacement of a power cable should be conducted by a manufacturer, his agency or a skilled person. Otherwise, an accident may result.

Necessary tools

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

Power supply/Earthing

Check that the main power is turned off.

For the WPO and WEC types, insert the plug all the way seated in a socket. For the WCT, connect power wires and earth wire to correct terminals. This product has two power wires and one earth wire, and is classified as class I. *Make sure the earth plug is

connected as well.



End terminals

See the following diagram for detail.



NOTE

- Do not share a power source with a high power equipment which may generate surge voltage. Otherwise electronic circuit may fail. The noise caused by the inverter also affects the electronic circuit.
- Power voltage should be charged at a sitting via a switch or a relay. Otherwise CPU may malfunction. See page 34 for the precautions for ON-OFF control by the relay.



Surge voltage

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

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

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

Surge absorption element



Recommended varisters

| Panasonic | ERZV14D431 |
|-----------|-------------|
| KOA | NVD14UCD430 |

See manufacturer's catalogues for detail.

• Install a noise cut transformer via power cable.



Noise cut transformer

Precautions for ON-OFF control by the relay

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

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

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

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 install the EXT/STOP signal wires in parallel with a power cable or combine them in a concentric cable (ex. 5 wires cable). Otherwise noise is generated through the EXT/STOP signal wires due to induction effect and it results in malfunction or failure.
- When using the SSR (Solid State Relay) for the EXT/STOP signal input, see the recommended products below. Any SSR other than the recommended ones can cause malfunction. See manufacturer's information such as catalogues for detail.

-OMRON G3FD-102S or G3FD-102SN

- -OMRON G3TA-IDZR02S or G3TA-IDZR02SM
- When using a contact type relay for the EXT/STOP signal input, the minimum application load should be 1mA or below.

*Use either a no-voltage contact or an open collector for the external signal.

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 2 : Pre-STOP 3 : COM 4 : COM

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.



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.

*For the WCT type, OUT1 is an open collector and is specifically used for blowdown control.

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

*Batch alarm is selected at factory default setting.


Points to be checked

· Check that the main power is turned off.

NOTE -

- Do not wet wire terminals or the terminal box. Keep them free from contamination such as oil. Contamination impairs insulation and affects readings. Clean with alcohol and wait until they dry off when they are contaminated.
- 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.

For the WCT, remove the terminal case and pass the sensor cable into the cable path as below.



For the WPO, connect the sensor cable via the BNC connector. Always select "MTC (Manual Temperature Compensation)" in User mode after the connec-

tion.



NOTE

Tighten the terminal case and cable gland enough to keep sealing performance.

Terminal box

Connect sensor cable terminals to the terminal box.



*Use spade terminal with the following size.



WEC/WCT type

See the table below when wiring.

| Terminal # | Functions |
|------------|--------------------------------|
| 1-2 | T, T: Temperature compensation |
| 3-5 | Disused |
| 6-7 | E1, E2: Conductivity sensor |
| 8 | Disused |
| 9 | S: Shield |

NOTE '

- The pH/ORP electrode cable is a high-voltage insulated cable so extra care is required.
- Always use a specified junction cable when extending or relaying the sensor cable. The use of conduit pipe to the optional junction cable is recommended for the prevention of the static electricity caused by induction or vibration.
- Be careful not to damage the sensor cable. The sensor signal is a faint electrical signal.
- · Do not extend or modify sensor cable.

The WCT type needs a Multibox (relay type) when making blowdown control.

Outline

The multibox is designed to supply power supply voltage to both the pump and blowdown valve.

Specification

| Model code | | TK-PC99-6RY | |
|------------|-------------------|--|--|
| Input | Power supply | 100-240VAC 50/60Hz | |
| | Control | Blowdown control | |
| Output | Valtaga contact | Max. 250VAC, 3A (Resistance load) | |
| | | The same voltage as power supply voltage | |
| | Pump power supply | The same voltage as power supply voltage | |

Outer dimensions



Installation

Fix the Multibox.

Necessary tools

• Four M4 Phillips screws (Multibox mounting)



Wiring

See below for wiring outline.



Cable connection

Connect cables to the Multibox. Follow the instruction below.

Points to be checked

· Check that the main power is turned off.



• When using OUT2...

Punch out the cover on the CN2 and connect a output cable. Use cable glands to tighten the cable.

Connection for power supply and a blowdown valve



NOTE -

Tighten cable glands securely to maintain sealing performance.

Switch ON

Switch on the Multibox and close the cover after wiring work. The system is now ready for blowdown control.



NOTE

Close the cover tight to maintain sealing performance.

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

Before operation

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

Points to be checked

Before operation, check if ...

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

Retightening of pump head fixing bolts

Important

The pump head fixing bolts may loosen when plastic parts creep due to temperature change in storage or in transit.

This can lead to leakage. Retighten the pump head fixing bolts before starting operation.

Always tighten the bolts diagonally. See below for the tightening torque at each model.

Tightening torque

| Model identification code | Torque | Bolts |
|---------------------------|----------|--------------------------|
| EWN-B09•11•16•21 | 2.16 N•m | M4 Hex. socket head bolt |
| EWN-B31 | 2.55 N•m | M4 Hex. socket head bolt |
| EWN-C16•21 | 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 the flow rate is too low
- After liquid is replaced in the supply tank
- After a long period of stoppage
- After maintenance and inspection

NOTE

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



*Select manual operation in the user mode. The pump runs or stops as the start/stop key is pressed. See page 61 for detail.



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 manual operation.

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

Clean the insides of pump head and tubing.

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

Before unplugging the pump

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

When the pump does not transfer liquid at resuming operation.

- Clean the valve sets, removing foreign matters.
- If gas is in the pump head, expel gas and readjust the flow rate. See "Degassing" on page 44.

Operation programming

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

| | | Parameters | Setting ranges | | STEP ^{*1} | Default |
|--|--------------------|---|------------------------------------|----------------------|--------------------|-------------|
| Mode selection | | - | AUTO or MAN | | - | AUTO |
| | | | WPO | PH : 0.00 - 14.00 | 0.01 | 8.60 |
| | | 1Pt | | ORP :-2000-2000 | 1 | 200 |
| | | | | WEC : 0 - 400 | | 200 |
| | WPO WEC | 1Pt stroke rate | 1 - MAX (spm) | | 1 | 0 |
| | | 2Pt | WPO | PH : 0.00 - 14.00 | 0.01 | 14.00 |
| | | | | ORP :-2000-2000 | 1 | 1200 |
| | | | | WEC:0-400 | 1 | 0 |
| | | 2Pt stroke rate | 1 - MAX (spm) | | 1 | MAX |
| Control | | Integral | 0 - 100.0 (s) | | 0.1 | 0.0 |
| | | Derivative | | 0 - 100.0 (s) | 0.1 | 0.0 |
| | | Starting point | | 0 - 399 | 1 | 200 |
| | | Stop point | 0 - 399 | | 1 | 100 |
| | WCT | Stroke rate range | 1 - MAX (spm) | | 1 | MAX |
| | | Pump control | INT or B.SYC | | - | INT |
| | | ON time | 00 : 01 - 23 : 59 (HH : MM) | | 00:01 | 01:00 |
| | | OFF time | 00 : 01 - 23 : 59 (HH : MM) | | 00:01 | 02:00 |
| | | Lock out time | 00 : 00 - 99 : 59 (MM : SS) | | 00:01 | 40:00 |
| | | Time limit | 00 : 00 - 99 : 59 (MM : SS) | | 00:01 | 20:00 |
| | WPO | PH/ORP selection | | PH or ORP | - | PH |
| Measurement WPO (PH) WPO WEC WCT WPO (PH) WEC | WPO | PH buffer selection | NIST (4.7.9) / NIST (2.7.9) / TECH | | - | NIST(4.7.9) |
| | (PH) | Auto/Man selection | AUTO or MAN | | - | AUTO |
| | WPO WEC WCT | | | PH mode :-2.00-2.00 | 0.01 | 0.00 |
| | | adjustment | WFO | ORP mode: -200 - 200 | 1 | 0 |
| | | | WEC/WCT : -100 - 100 | | 1 | 0 |
| | WPO (PH) WEC | Auto/Man TC selection | AUTO or MAN | | - | AUTO |
| | | Temperature adjustment (When Auto TC is selected) | -10.0 - 10.0 | | 0.1 | 0.0 |
| | WPO | Temperature setting | WPO: 0.0 - 99.0 | | 01 | 25.0 |
| | WEC | WEC (Man TC) | | WEC: 0.0 - 50.0 | | 20.0 |

| | Parameters | | Setting ranges | STEP*1 | Default |
|------------|---------------------------|----------------------------|------------------------|--------|---------|
| | STOP/PreSTOP selection | NO.OP/ NO.CL | | - | NO.OP |
| | Interlock selection | WPO/W | WPO/WEC : NO.OP/ NO.CL | | NO.OP |
| | Interiock Selection | WCT | : NO.OP/ NO.CL | - | NO.CL |
| | 0+1 | WPO/WEC : UP/ DOWN/ AL/OFF | | - | UP |
| | Out 1 | WCT : UP (No indication) | | - | UP |
| | Out 2 | UP/ DOWN/ ALM/ SYNC/ OFF | | - | ALM |
| | | WDO | PH : 0.00 - 14.00 | 0.01 | 12.00 |
| Functions | UP | WPO | ORP : -2000 - 2000 | 1 | 1000 |
| | | | WEC/WCT: 0-400 | | 300 |
| | DOWN | WPO | PH : 0.00 - 14.00 | 0.01 | 2.00 |
| FUNCTIONS | | | ORP : -2000 - 2000 | 1 | 400 |
| | | | WEC/WCT : 0 - 400 | | 50 |
| | HYS | WPO | PH : 0.00 - 4.00 | 0.01 | 2.00 |
| | | | ORP : 0 - 999 | 1 | 100 |
| | | WEC/WCT: 0-200 | | 1 | 10 |
| | DL.T | | 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 | WPO (PH) : pH or mV | | - | pН |
| | | WEC/\ | NCT : mS/m or mS/cm | - | mS/m |
| 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.



mode.

Perform a calibration

Before calibration, program measurement conditions in the user mode. See page 64 for detail. And then enter the calibration mode and calibrate this product at each measuring object.

NOTE

Electrodes or sensors to be used and calibration process vary with a measuring object.

- Calibration for pH measurement (WPO type)... Auto 1Pt or 2Pt calibration and Man 1Pt or 2Pt calibration are available.
- Calibration for ORP measurement (WPO type)... A sensitivity check and a Man calibration is available.
- Calibration for conductivity measurement (WEC/WCT types)... Cell constant programming and measured value calibration is available.

Use of a conductivity sensor

- See the wiring section for connection. Always program the cell constant value tags along each sensor.
- Do not extend or shorten the sensor cable. A cell constant may change and an error may occur.
- Unscrew the top cover and rinse with tap water when cleaning. Use a neutral detergent with a soft close as necessary.

Calibration for pH measurement (WPO type)

Always perform a calibration with a buffer solution to optimise the settings of a electrode and this product. The sensitivity of the electrode reduces with time. Calibrate it time to time.

NOTE -

Do not reuse a buffer solution.

• Keep a buffer solution temperature close to the process solution to obtain accuracy.

| Auto 2Pt calibration | |
|----------------------------------|---|
| Usable buffer solutions | JIS: pH2, 4, 7, and 9 |
| | US: pH4, 7, and 10 |
| Combination of buffer solutions | JIS: pH4&7, pH7&9, pH4&9, pH2&7, pH2&9 |
| | US: pH4&7, pH7&10, pH4&10 |
| Calibration order | Random |
| Auto buffer solution recognition | The controller determines a pH value of buffer solution automatically. |
| | *Program JIS or US in advance. The controller can not recognize JIS or US. |
| Auto potential check | The controller determines if the electrode poten- tial is stable or not. |
| | |
| Auto 1Pt calibration | |
| Usable buffer solutions | JIS: pH2, 4, 7, and 9 |
| | US: pH4, 7, and 10 |
| Combination of buffer solutions | Just one buffer is required. |
| Auto buffer solution recognition | The controller determines a pH value of buffer solution automatically. |
| | *Program JIS or US in advance. The controller can not recognize JIS or US. |
| Auto potential check | The controller determines if the electrode poten- |
| | |
| Man 1Pt or 2Pt calibration | |
| Usable buffer solutions | Any pH buffer solution |
| Combination of buffer solution | One or two-different pH buffer solution |
| Calibration order | Random |
| NOTE | |

Man IPt or 2Pt calibration is used for calibration with a certain pH solution.

The electrode sensitivity is checked in calibration. Inadequate pH solution can not be used.

Auto calibration

1Pt or 2Pt calibration can be performed as immersing an electrode in buffer solution and pushing the CAL key.



flashes. If "HOLD" is shown on the screen as blinking stops, the 2Pt calibration has finished.

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



Manual calibration

1Pt or 2Pt calibration can be performed as immersing an electrode in buffer solution.





Calibration for ORP measurement (WPO type)

The calibration for ORP measurement is effective on the following.

- Sensitivity check by ORP Electrode sensitivity is checked if correct or not.
- Man calibration

Readings are corrected to the actual process value.

Sensitivity check process by ORP

NOTE '

In this process, the electrode is checked for its sensitivity. This process is different from the pH electrode sensitivity check that correct reading errors on the controller.

a. Prepare a ORP buffer solution

*mV in the buffer solution starts to reduced two hours after preparation (dissolving of ORP powders). First use is recommended. Do not preserve the buffer solution.

- b. Dissolve ORP powders in 500ml of pure water.
- c. Immerse the electrode into the solution.
- d. Check the solution temperature is in between 10 and 30°C.
- e. Check if mV is in the allowable range below.When using a saturated calomel reference electrode:220±20mVWhen using a silver chloride reference electrode:260±20mV

If the mV is out of the allowable range, take the steps below.

- a. Remove contamination with a gauze.
- b. Polish a metal pole carefully with a sandpaper of about #1000.
- c. Immerse the electrode into dilute nitric acid (1:1) and then rinse with pure water.

Check if the mV is in the allowable range. If it is still out of range, replace the electrode.

- f. Replace the electrode from the solution.
- g. Rinse and wipe off the electrode.

MAN calibration

This process is different from the pH electrode sensitivity check that correct reading errors on the controller, and the actual conductivity and mV reading will not be the same.

In this process, a reading range only is adjusted and 0mV is fixed.



Conductivity calibration (WEC/WCT)

The following two are to be calibrated.

- Cell constant
- Reading

Cell constant



Reading



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.



Control parameter programming

Program control parameters.

WPO/WEC types

Programming for Proportional control and PID control



• WCT type

Programming for blowdown control



Measurement parameter programming

Program measurement parameters.



• pH/ORP selection



• pH buffer selection (WPO type)



• AUTO/MAN pH calibration (WPO type)



· Measured value adjustment



AUTO/MAN TC selection (WPO with pH/WCT types)



• Temperature reading adjustment (WPO with pH/WEC/WCT types) in AUTO TC



• Temperature setting (WPO with pH/WEC/WCT types) in MAN TC



Function programming

Program input/output parameters.



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.



*Note that "NO.OP" is selected for the WPO/WEC and "NO.CL" is for the WCT in factory default.

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. For the WCT type, OUT1 is designed for blowdown control only, so that it is not programmable.

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.


Display selection

Select spm indication or a measurement unit.



Pin number entry

Enter pin number to release the keypad lock state.

*Factory default value is "0000".



Operation

Read this section before operation.

AUTO operation

The pump monitors and controls process solution automatically.

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

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



2 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 61 for detail.



Operation

3 Push the start/stop key to stay ready The ON LED lights greenly and the pump starts control automatically.



MAN operation

Run or stop operation manually.



Priming function

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



A keypad lock state limits 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



Keypad lock release





Operation stop with a keypad lock state



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

Important

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

Before unplugging the pump

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

NOTE -

- We do not assure material suitability in a specified application and are not responsible for any failure due to corrosion or erosion.
- Contact us or your nearest dealer 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 measures do not help removing problems, contact us or your nearest dealer.

■ Pump

| States | Possible causes | Solutions |
|--|--|---|
| The pump does not run. (LED does not | Power voltage is too low. | Recover the power voltage to a nor- mal level. Allowable voltage range: 90-264VAC |
| appear. Blank screen.) | The pump is not powered. | Check the switch if it is installed. Correct wiring Replace a breaking wire to new one. |
| Liquid can not | Air lock in the pump | • Expel air. See page 44. |
| be sucked up. | Stroke length is too short. | Run the pump at 100% stroke length and adjust it to proper length. |
| | Air ingress through suction line. | Correct tubing. |
| | A valve set is installed upside down. | Reinstall the valve set. |
| | Valve gaskets are not installed. | Install valve gaskets. |
| | Foreign matters are stuck in the pump head valves. | Dismantle, inspect and clean the valve. Replace as necessary. |
| | A ball valve is stuck on a valve seat. | Dismantle, inspect and clean the valve. Replace as necessary. |
| The flow rate | Air stays in the pump head. | • Expel air. See page 44. |
| fluctuates. | Overfeeding occurs. | Mount a check valve. See page 28. |
| | Foreign matters are stuck in the pump head valves. | Dismantle, inspect and clean the valve. Replace as necessary. |
| | Diaphragm is broken. | • Replace the diaphragm. See page 92. |
| | Pressure fluctuates at an injection point. | Review tubing layout to maintain a pressure constant at an injection point or change an injection point in a constant pressure. |
| Liquid leaks. | Loose fit of the fitting or the air vent body. | Retighten them. |
| | Loose fit of the pump head. | Retighten the pump head. See page 43. |
| | O rings or valve gaskets are not in- stalled. | Install O rings and valve gaskets. |
| | Diaphragm is broken. | • Replace the diaphragm. See page 92. |
| | Excessive discharge pressure. | Check that a discharge line is not closed. Check if tubing is not clogged. |

Electrode/Sensor

WPO type

| States | Possible causes | Solutions | |
|---|--|--|--|
| Reading fluc- tuates | Air bubbles are trapped within the sens- ing area. | • Position the electrode such that air bubbles will not be trapped and a flow is sufficient. | |
| | A liquid level fluctuates. | Mount the sensor below the minimum liquid level. | |
| | A electrode signal wire is laid on close to other cables. | Keep it away from other cables or pass it into a conduit. | |
| | Power noise affects a reading. | Optimise power line or install a noise cut transformer. | |
| The elec- | Contamination on a probe | Clean the probe. | |
| trode is not responding to changes. | A scratched or damaged probe | Replace the electrode. | |
| Reading | Contamination on a probe | Clean the probe. | |
| failure | An electrode is in air. | Mount the sensor below the minimum solution level. | |
| | A scratched or damaged probe, or life end. | Replace the electrode as necessary. | |
| | Wiring failure | Check wiring of G(M) and R wires for the pH sensor. Replace as necessary. | |
| | Sensor cable connection is loose or disconnected. | Secure the connection. | |
| | Poor calibration | Perform calibration again. See page 51. | |
| | A prove is covered with a protective cap. | • Remove the cap. | |
| | A glass membrane stays dry in air. | • A dry glass membrane reduces re- sponsivity. Immerse it into pure water for 24 hours and then calibrate it with a buffer. | |
| | Sample liquid temperature and buffer solution temperature is much different. | Wait until TC on the electrode becomes stable. See page 51. | |
| | A glass membrane is broken. | Replace as necessary. | |
| | Internal liquid failure. | Check the internal liquid. | |

WEC/WCT type

| States | Possible causes | Solutions |
|---|--|--|
| Reading fluc- tuates | Air bubbles are trapped within the sens- ing area. | Position the sensor such that air bub- bles will not be trapped and a flow is sufficient. See page 30. |
| | A liquid level fluctuates. The distance of 30mm from the all sides is not maintained for the sensor. | Mount the sensor below the minimum liquid level.Keep the distance. See page 30. |
| | A sensor signal wire is laid on close to other cables. | Keep it away from other cables or pass it into a conduit. |
| | Power noise affects a reading. | Optimise power line or install a noise cut transformer. |
| The sen- | Contamination on a probe | Clean the probe. See page 86. |
| sor is not responding to changes. | A scratched or damaged probe | Replace the sensor. |
| Reading | Contamination on a probe | Clean the probe. See page 86. |
| failure | An sensor is in air. The distance of 30mm from the all sides is not maintained for the sensor. | Mount the sensor below the minimum solution level.Keep the distance. See page 30. |
| | A scratched or damaged probe, or life end. | Replace the sensor as necessary. |
| | Wiring failure | Check wiring of G(M) and R wires for the pH sensor. Replace as necessary. |
| | Sensor cable connection is loose or disconnected. | Secure the connection. |
| | Cell constant failure | • Check the cell constant of the sensor. See page 58. |
| Blowdown control is upset. | A starting or stop point is improper. | Correct each point. See page 63. |

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

WPO type

| Error code | Possible cause | Description | Error message is shown in |
|---|---|--|------------------------------|
| Hi* | Out of a measurement range | A reading is more than pH14.0 or 2000mV. | Measurement |
| Lo* | Out of a measurement range | A reading is lower than pH0.00 or -2000mV. | |
| ERR2 | Response speed anomaly | Slow response speed of the pH electrode | Calibration |
| ERR3 | ERR3 Asymmetry potential anomaly Asymmetry potential at pH7 buffer solution is not correct. | | |
| ERR4 | Electrode sensitivity anomaly | naly pH electrode sensitivity is reduced. | |
| ERR5 | Buffer solution anomaly | Unspecified buffer solution is used. | |
| ERR6 | Calibration failure | Calibration is done at the 3Pt. | |
| ERR7 Temperature sensor anomaly • Sensor wire is disconnected or short- circuited. Mea circuited. • Liquid temperature is 99.1°C or above or -0.1°C or below. • Output • Content • Content | | Measurement or calibration | |
| ERR8 | Setting error | The same value is set to setting points. | |

*In ORP mode only these error codes appear.

WEC/WCT type

| Error code | Possible cause | Description | Error message is shown in |
|------------|----------------------------|--|-------------------------------|
| Hi | Out of a measurement range | A reading is more than 401mS/m. | Measurement |
| Lo | Out of a measurement range | A reading is lower than 0mS/m. | |
| ERR7 | Temperature sensor anomaly | Sensor wire is disconnected or short- circuited. Liquid temperature is 99.1°C or above or -0.1°C or below. | Measurement or calibration |
| ERR8 | Setting error | When a stop point is at or above a starting point in upper limit control. When a stop point is at or below a starting point in lower limit control. When the total ON-OFF time exceeds 23:59.* When ON or OFF time is set to 0:00.* | Setting |
| ERR9 | Temperature error | Liquid temperature is beyond0.0-50.1°C | Measurement |

*These conditions are possible only for the WCT type.

Countermeasures

WPO type

| Error code | Possible cause | Counter measures |
|--|---|---|
| Hi* Out of a measure- ment range Lo* Out of a measure- ment range | Is the electrode is in a liquid? Is the protective cap removed from the measuring surface? Is electrode wire connection proper? Pay extra attention to check if the wire G(M) and R is not disconnected. Is junction cable is connected properly? | Study your system so that the electrode is always in the liquid at any liquid level. Remove the protective cap. Check the terminal box on the controller and multibox to see if connection is correct and secured by screws. |
| ERR2 Response speed anomaly | Is the electrode clean? Has the measuring surface been kept dry for a long period? Is the temperature difference between the measured liquid and buffer solution too wide? | Clean the electrode. The responsibility deteriorates once glass membrane becomes dry. In this case immerse the electrode into pure water for 24 hours and then calibrate it with buffer solution. Wait until the temperature sensor comes at liquid temperature and then perform calibration. |
| ERR3 Asymmetry po- tential anomaly | Is the electrode clean? Is the measuring surface broken? Does pH buffer solution not have problem? Is it fresh? Is pH7 se- lected? | Clean the electrode. Replace it if it is broken. If it is not fresh use new buffer solution. |
| ERR4 Electrode sensi- tivity anomaly | Is electrode clean?Is the measuring surface broken? | Clean the electrode.Replace if it is broken. |
| ERR5 Buffer solution anomaly | Is proper buffer solution (JIS: pH4, 7, 9) or (US: pH4, 7, 10) is selected? Check the pH difference between buffer solutions is 2pH. Check the electrode to see if The electrode is contaminated. The measuring surface is broken. Inner solution is deteriorated. | Use proper buffer solution. Clean or replace as necessary. |
| ERR6 Calibration failure | Calibration is done at the 3rd point. | Perform 1 or 2Pt calibration only. |
| ERR7 Temperature sen- sor anomaly | Is the resistance between T-T in proper range? 1097Ω at 25 °C 1000-1385Ω at 0-100 °C The sensor cable and junction cable is correct? | Disconnect electrode connection and measure resistance. If resist- ance is out of the proper range shown left, electrode failure is pos- sible. Replace electrode. Check the terminal box on the controller and multibox to see if connection is correct and secured by screws. |
| ERR8 Setting error | Erroneous setting. | Correct setting. |

*In ORP mode only these error codes appear.

WEC/WCT type

| Error code | Possible cause | Counter measures | |
|---|--|--|--|
| Hi Out of a measure- ment range | A reading is more than 401mS/m. Is sensor cable connection proper? | Check if a specified sensor is used. Check the terminal box on the controller to see if connection is correct and secured by screws. | |
| Lo Out of a measure- ment range | Is sensor cable connection proper? | • Check the terminal box on the con- troller to see if connection is correct and secured by screws. | |
| ERR7 Temperature sen- sor anomaly | Is the resistance between T-T in proper range? 1097Ω at 25 °C 1000-1193Ω at 0-50 °C The sensor cable wiring is correct? | Disconnect sensor connection and measure resistance. If resistance is out of the proper range shown left, electrode failure is possible. Replace electrode. Check the terminal box on the con- troller to see if connection is correct and secured by screws. | |
| ERR8 Setting error | Erroneous setting. | Correct setting. | |
| ERR9 Temperature error | Liquid temperature is out of meas- urement range. | Observe the measurement tempera- ture range. | |

Daily inspection

Conductivity sensor cleaning

Contamination on a probe reduces sensitivity. Clean a probe periodically to keep a good sensing condition.

- Cleaning process
 - a. Remove a cover from the probe and flush the sensor with tap water.
 - b. Use neutral detergent to a soft cloth and wipe off contamination. Be careful not to damage the probe.
 - c. Repeat this process until contamination is removed.

NOTE

A conductivity sensor is wear parts. If there is heavy contamination or damage on a probe, replace it with new one. Otherwise, reading failure or malfunction may result.

Precautions

Clean the conductivity sensor periodically. A best cleaning time is depending on operating conditions. Note that the maximum cleaning frequency is once a month.

Always remove the sensor and clean a probe when it is not used. Do not leave it in system.

Inspection

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

Daily inspection

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

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

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

Periodic inspection

Retighten the pump head mounting bolts diagonally according to the following torque. *Mounting bolts may loosen in operation. How fast the bolts start to loosen is depending on operating conditions.

Tightening torque

| Model identification code | Torque | Bolts |
|---------------------------|----------|--------------------------|
| EWN-B09•11•16•21 | 2.16 N•m | M4 Hex. socket head bolt |
| EWN-B31 | 2.55 N•m | M4 Hex. socket head bolt |
| EWN-C16•21 | 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 44.

Wear parts replacement

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

Precautions

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

| | Parts | | # of parts | Estimated life |
|------|-----------|--|------------|----------------|
| Pump | Valve set | VC•VH•(PC/PH)-H•TC 14-0 11-0 13-0 12-0 11-0 13-0 12-0 12-0 17-0 | 2 sets | 8000 hours |
| | Diaphragm | 7-05 | 1 | |

Wear parts list

*The high compression types have a rear diaphragm sheet on the back side of the diaphragm. *Wear part duration varies with the pressure, temperature and characteristics of the liquid.

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

Before replacement

First release the pressure from the pump.



NOTE -----

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

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

NOTE

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

Valve set replacement

Discharge valve set dismantlement/assembly

Necessary tools

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

*Unfix the pump base before work.





6 Remount the air vent body A and connect tubes.

Suction valve set dismantlement/assembly

NOTE -

Be careful not to drop the valve set.



Maintenance



Diaphragm replacement

Necessary tools

- · Adjustable wrench or spanner
- Hexagon wrench
- Torque wrench

NOTE

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



| | Fit the retainer to the diaph to the diaphragm. Check that the bracket spa bracket spacer into the bra parts as necessary. The B/C-31 & -36 types do spacer. | nragm with its round on the second of the se | edge Mating parts Bracket the ing Bracket spacer |
|--------|--|--|---|
| | | | |
| 5 | Screw the diaphragm all | the way seated ir | n the plunger. |
| 5 6 | Screw the diaphragm all Mount the pump head. Tighten the pump head fi Tightening torque | the way seated in | n the plunger. Iy and evenly. |
| 5 6 | Screw the diaphragm all Mount the pump head. Tighten the pump head fin Tightening torque | the way seated in xing bolts diagonal | n the plunger. |
| 5 6 | Screw the diaphragm all Mount the pump head. Tighten the pump head fi Tightening torque Model identification code EWN-B09•11•16•21 | the way seated in xing bolts diagonal Torque 2.16 N•m | h the plunger. Iy and evenly. Bolts M4 Hex. socket head bolt |
| 5 6 | Screw the diaphragm all Mount the pump head. Tighten the pump head fit Tightening torque Model identification code EWN-B09•11•16•21 EWN-B31 | the way seated in xing bolts diagonal Torque 2.16 N•m 2.55 N•m | h the plunger. ly and evenly. Bolts M4 Hex. socket head bolt M4 Hex. socket head bolt |
| 5 6 | Screw the diaphragm all Mount the pump head. Tighten the pump head fi Tightening torque Model identification code EWN-B09•11•16•21 EWN-B31 EWN-C16•21 | the way seated in xing bolts diagonal Torque 2.16 N•m 2.55 N•m 2.16 N•m | h the plunger. |
| 5 6 | Screw the diaphragm all Mount the pump head. Tighten the pump head fi Tightening torque Model identification code EWN-B09•11•16•21 EWN-B31 EWN-C16•21 EWN-C31 | the way seated in xing bolts diagonal Torque 2.16 N•m 2.55 N•m 2.16 N•m 2.55 N•m | h the plunger. |

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.

■ 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.

■ EWN- [B11•C16] [PC•PH]-H



| 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 | 2 |
| 30 | Hose adaptor | 2 |
| 31 | O ring | 3 |
| 32 | Rear diaphragm seat | 1 |
| 53 | Fitting adapter | 1 |
| | | |

*The number of diaphragm spacers varies with pump model.

Specification

Specifications and apparent condition are subject to change without notice.

■ Pump unit

VC•VH

| Model code | Flow rate L/H mℓ/min | Discharge pressure MPa | Stroke rate % (spm) | Power con- sumption W | Current value A | Weight kg |
|------------|----------------------------|------------------------------|---------------------------|-----------------------------|--------------------|--------------|
| EWN-B11 | 2.28 (38) | 1.0 | | | 0.8 | |
| EWN-B16 | 3.9 (65) | 0.7 | | 20 | | 2.5 |
| EWN-B21 | 6.0 (100) | 0.4 | | 20 | | 2.5 |
| EWN-B31 | 12.0 (200) | 0.2 | 0.1-100 | | | |
| EWN-C16 | 4.8 (80) | 1.0 | (1-360) | | 4 1.2 | |
| EWN-C21 | 7.8 (130) | 0.7 | | 24 | | |
| EWN-C31 | 16.2 (270) | 0.35 | | | | 3.5 |
| EWN-C36 | 25.2 (420) | 0.2 | | | | |

VC•VH (High compression type)

| Model code | Flow rate L/H m{/min | Discharge pressure MPa | Stroke rate % (spm) | Power con- sumption W | Current value A | Weight kg |
|------------|----------------------------|------------------------------|---------------------------|-----------------------------|--------------------|--------------|
| EWN-B09 | 0.72 (12) | 1.0 | | | | |
| EWN-B11 | 1.38 (23) | 1.0 | | 20 | 0.8 | 2.5 |
| EWN-B16 | 2.40 (40) | 0.7 | 0.1-100 | 20 | | |
| EWN-B21 | 3.78 (63) | 0.4 | (1-180) | | | |
| EWN-C16 | 3.24 (54) | 1.0 | | 24 | 1.0 | 2.5 |
| EWN-C21 | 4.68 (78) | 0.7 | | 24 | 1.2 | 3.5 |

PC•PH (High pressure type)

| Model code | Flow rate L/H mℓ/min | Discharge pressure MPa | Stroke rate % (spm) | Power con- sumption W | Current value A | Weight kg |
|------------|----------------------------|------------------------------|---------------------------|-----------------------------|--------------------|--------------|
| EWN-B11 | 1.50 (25) | 1.7 | 0.1-100 | 20 | 0.8 | 2.5 |
| EWN-C16 | 2.4 (40) | 1.7 | (1-240) | 24 | 1.2 | 3.5 |

*These specifications are based on pumping ambient clean water at rated voltage.

*Flow rate is collected at the maximum discharge pressure and at 360spm (VC/VH-C type: 180spm, PC/PH-H type: 240spm). The flow rate increases as a discharge pressure decreases.

*Allowable room temperature: -10 - 40°C

*Allowable liquid temperature: -10 - 40°C (-10 - 60°C for the PC•PH)

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

Control unit

| Types | | WPO | WEC | WCT | | | |
|-----------------------------|-----------------------|---|--|--|--|--|--|
| | | Operation at a manual spm | | | | | |
| Functions | Operation mode | AUTO proportional | AUTO blowdown control | | | | |
| | Mode change | Key operation | Key operation | | | | |
| | Measuring object | pH/ORP | Conductivity | | | | |
| | Measurement range | 0.00 - 14.00pH -2000 - 2000mV | H NV 0 - 400mS/m | | | | |
| Measurement | Calibration | AUTO (1 or 2Pt calibration) MAN (1 or 2Pt calibration) | AUTO (1 or 2Pt calibration) Cell constant setting MAN Reading correction (1 or 2Pt calibration) | | | | |
| | Temp. compensation | AUTO Pt1000 (0 - 5 Man (fixed) | 0°C) | | | | |
| Keypad | | SET, CAL, ESC, ST | ART/STOP, UP, DOV | VN | | | |
| | STOP | Operation stop at co | ontact input ^{*1} | | | | |
| Control function | Interlock | Operation stop at contact input ^{*1} | | | | | |
| | Priming | Max spm operation by pressing the UP and DOWN keys | | | | | |
| | Keypad lock | Keypad lock and release | | | | | |
| | LCD | 7×4, 14×4 backlit LCD indicates information such as measured values, operating conditions and units | | | | | |
| Monitors | LED | ON Green/Orange ×1 Lights greenly Lights greenly Flash greenly STOP Red/Orange ×1 Lights redly at Lights orange OUT Red ×2 Lights at each | | y as powered on. y while ready for operation y during operation at STOP signal input e at PreSTOP signal input h output | | | |
| | STOP/PreSTOP | No voltage contact | or Open collector ^{*2} | | | | |
| Input | AUX | No voltage contact | or Open collector ^{*2} | | | | |
| | Interlock | No voltage contact | or Open collector ^{*2} | | | | |
| Output | OUT1 | No voltage contact (mechanical relay) 250VAC, 3A(resistance load) Upper/Lower/Batch ^{*3} alarm are settable. (Factory default is: Upper alarm) | | | | | |
| | OUT2 | No voltage contact (photoMOS) 24VAC/DC 0.1A Upper/Lower/Batch ⁻³ /Synchronous alarm are settable. (Factory default: Batch alarm turns on at STOP signal input) | | | | | |
| Storage fui | nction | Nonvolatile memory | / | | | | |
| Power voltage ^{*4} | | 100-240VAC 50/60Hz | | | | | |

- *1 Operation 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.
- *5 The contact capacity of the multibox (relay type) is 250VAC 3A(resistive load)

Power cable

WPO/WEC type

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

WCT type

| Conduction section area | 0.75 [mm ²] Triplex cable(L/N/PE) | Standard | H03VV-F |
|----------------------------|--|-----------------------|--|
| Length | 1950 [mm] | Terminal treatment | Power: Spade terminal (V1.25-YS4A or equivalent) Earth: Bare wire |

Pump colour

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

■ EWN-[B09•B11•B16•B21•C16•C21] [VC•VH] (-C)



■ EWN-[B31•C31] [VC•VH]



■ EWN-C36 [VC•VH]



■ EWN-[B11•C16] [PC•PH] -H



Specification





http://www.iwakipumps.jp

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