

Operation Manual

Energom-5001-pH-ORP-2

**Online double channel
PH&ORP controller**

User Instruction

- Please read the manual carefully before using the instrument.
- To make measure more accurate, the probe should be calibrated periodically. **(After receiving the products, if you can use at once, which don't need to calibrate, you may use directly, we have calibrated well in factory).**
One year after out of factory, no matter it is used or not, the probe performance will be effected and should be replaced.
- If the pH probe stay for long time not used, before using it should be dipped into 3mol/L muriate solution for 24 hours.
- During working, if find the instrument can't work properly or broken, please contact with the supplier, please do not repair it by yourself.
- This instrument is double channel PH and ORP controller, which have two probes input terminal.
- Before calibration, please power on the instrument and wait 20 minutes for warming up.

I Introduction:

Industrial online PH/ORP controller EnergoM-5001-pH-ORP-2 is double channel PH and ORP controller. It can measure and control PH and ORP value of water continuously, the PH/ORP controller is applicable for municipal waste water treatment, chemistry, printing and dyeing, paper, medicine, plating and environmental production etc.

In accordance with the environment and characteristics of water industry, as well as the international power supply standard, considering the electricity design in special environment, the PH/ORP controller could be supplied with power 220V AC, 110V AC and safe low voltage 24V AC, 24V DC for selection.

Main Characteristics:

- ✧ English language display
- ✧ Measure **pH and ORP**, high/low limit control, 4-20mA current output, Modbus RS485 digital communication output (Optional)
- ✧ It could be set automatic/manual temperature compensation
- ✧ pH high/low limit alarm light, four relays, alarm delay could be set
- ✧ Instrument mode isolated transmitting port, max circle resistance up to 750Ω
- ✧ **PID control** to actuate and control powered variable value through 4-20 mA output (optional)
- ✧ Back light of LCD could select power saving mode, timing automatic off, brightness adjust,
- ✧ High performance CPU, good electromagnetic compatibility
- ✧ **AC input be fused** and **self-recovery** function
- ✧ **ESD** over voltage protection is available
- ✧ Password management avoid non-professional person to operate

II Main Technical Index

Measure range: pH(0~14 pH) ; ORP(-1200~+1200 mV)

Accuracy: ± 0.02 pH; ± 1 mV

Resolution: 0.01pH; 1mV (0.1mV optional)

Stability: ≤ 0.02 pH/24hr ; ≤ 3 mV/24hr

pH standard solution: **4.00/6.86/9.18**

Display: 128 * 64 dot matrix LCD

Temp. compensation: 0–120 °C, manual / automatic (**NTC 10k**)

Communication output: Modbus RS485 output

Signal output: Isolated one 4-20mA signal output,
max circle resistance 750Ω

Alarm output: high and low limit alarm contact each group
(3A/250 V AC) ,normal open contact relay

Power supply: AC 220V/110V ±10%, 50Hz,
AC/DC 24V(optional)

Power consumption: ≤3W

Working environment: (1) temperature 0~60 °C
(2) humidity≤85%RH

Outline dimension: 96×96×127mm(high×width×depth)

Hole size: 92×92mm(height×width)

III Outline dimensions and fixed Installation

Insert the controller from the front panel, install the fix clamp
(left and right), tighten with the clamp.

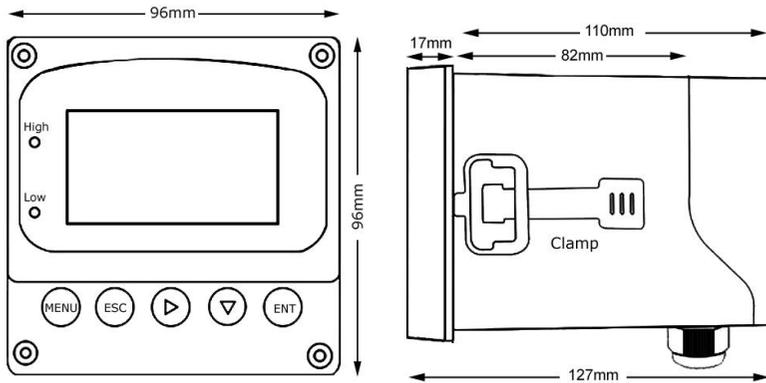


Chart 1 Outline dimensions and fixed installation

IV Wire Connection

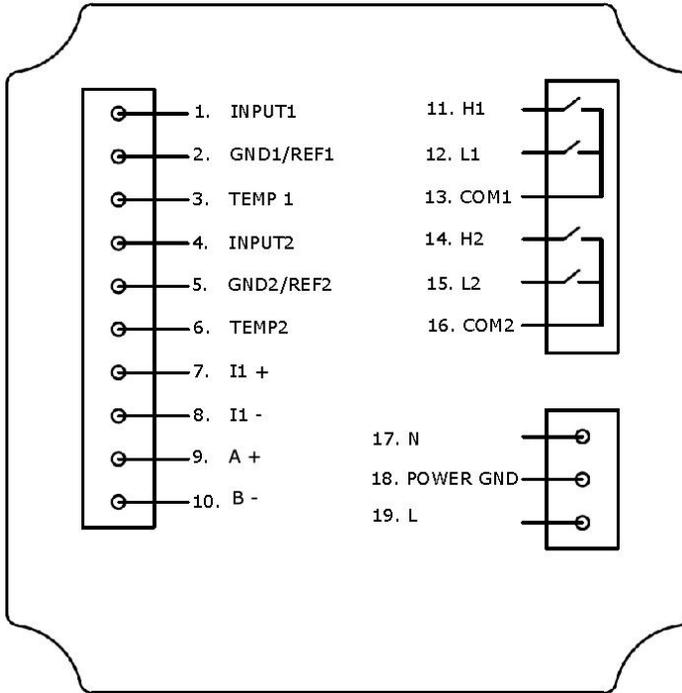


Chart 2 Rear terminals

V Connection Instruction

1. INPUT1 : PH probe signal input port (Transparent)
2. GND1/REF1: Reference probe & Temperature Compensation port (**Black&Red**)
3. TEMP1: Temperature compensation port (Yellow)
4. INPUT2 : ORP probe signal input port (Transparent)
5. GND1/REF2: Reference probe port (Black)
6. NC: undefined

7. I 1+: 4-20mA output + (PH)
8. I 1- : 4-20mA output - (PH)
9. A+: RS485 +
10. B- : RS485 -
11. H1: High limit relay normal open contact
12. L1: Low limit relay normal open contact
13. COM1: High/Low limit relay common port
14. H2: High limit relay normal open contact
15. L2: Low limit relay normal open contact
16. COM2:High/Low limit relay common port
17. N: **220V** Power connection
18. GND: Ground wire
19. L: **220V** Power connection

VI Probe Installation

1、 Installation method and Attention-matter

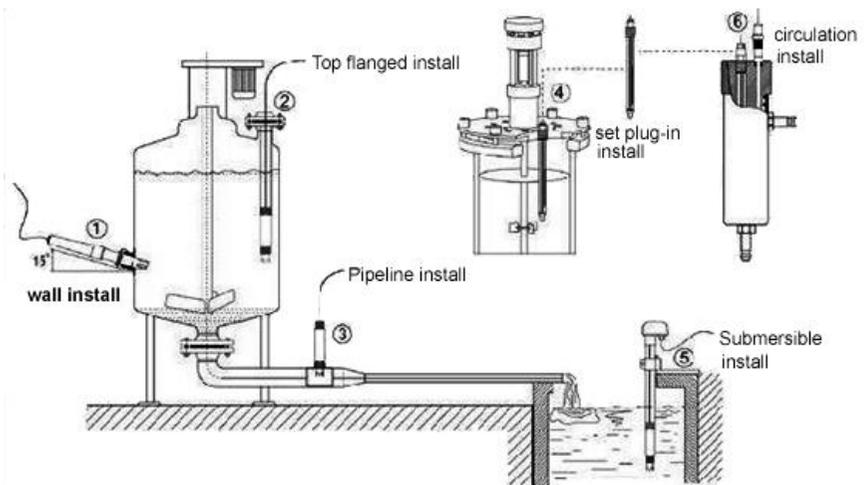


Chart 3 (Several common method of installation)

In order to make sure the probe measure the real value on the pipe, bubbles should be avoided, otherwise the value will be not accurate, please install according to the following chart:

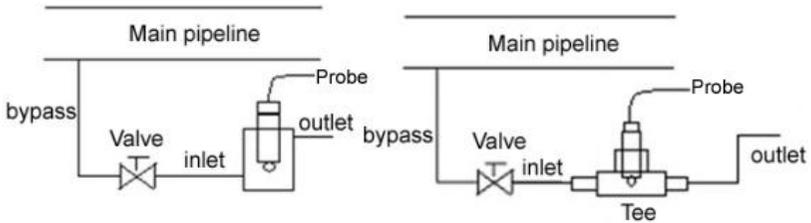


Chart 4 (attention matters of pipe installation)

Note: (1) The probe bypass pipe of the main pipe, valve should be installed in front of it to control the water flow speed, flow should be relatively slow, generally there are steady water flow out of the outlet port is ok. The probe should be installed vertically and should be insert into the active water flow, outlet port should be higher than inlet port which could make sure the probe is in the water solution absolutely.

- (2) The probe should be calibrated before installation.
- (3) The measure signal is weak electric signal, its cable should be contributed separately, it is not allowed to contribute together in same cable or terminal with other power line, control line etc, which is to avoid interrupt or break the measure unit.
- (4) If the measure cable should be lengthen, please contact with the supplier or indicated before place order (generally not

longer than 10m)

VII Correct setting

1. Soft key function

Soft key	Key function	Function description
	Menu Key	Enter main menu
	Return key	Exit or return to the upper interface
	Right shift key	Select the digit circularly, Select sub-menu, change the digit value
	Down shift key	Select sub-menu Change the digit value
	Confirm key	Confirm selected sub-menu Confirm selected value

2、 Main Interface Display:



Note: Under main interface through press “”, shift to **CH-1** browsing interface, press “” to shift to browsing **CH-2** browsing

interface , no need to enter 'Menu Option' interface, it could browse setting value.

3、 Browsing interface:

CH-1	CH-2
Temp Comp: Auto	Temp Comp: manual
Temp. : 120.0 C	Temp. : 025.0 C
I Out : 12.00 mA	I Out : 12.00mA
Hi Close : 13.00pH	Hi Close : +1200mV
Hi Open : 12.00pH	Hi Open : +1100mV
Lo Close : 02.00pH	Lo Close : -1200mV
Lo Open : 03.00pH	Lo Open : -1100mV

Note: Browsing interface through press “  ” could check parameter state in turn, through press “  ” return to main interface.

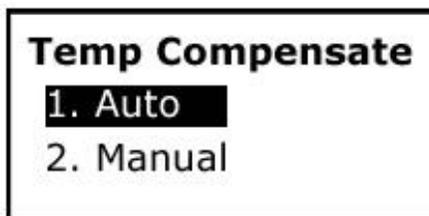
4、 Main Menu Interface:

Menu Option
1. Temp Comp
2. Relay & Alarm
3. 4-20mA output
4. PID control
5. Modbus RS485
6. Backlight option
7. Factory reset
8. Calibrate
9. Password change

Under main interface, press “**MENU**” key to enter user login interface, after input password “**0000**” to press “**ENT**” to enter “**Menu Option**” interface, this interface menu instruction as follow:

No.	Menu Name	Menu content instruction
1.	Temp Comp	Set Temperature compensation state
2.	Relay & Alarm	Set pH and ORP High/ Low set point and Relay delay
3.	4-20mA Output	Set pH and ORP transmission capacity start range transferring
4.	PID control	To actuate and control powered variable value through 4-20 mA output
5.	Backlight option	Set back light normal ON, delay off and dimming
6.	Factory reset	Recovery the instrument parameters to factory setting
7.	Calibrate	This menu only open for pH probe
8.	Password change	Reset login password

5、Parameter Interface :



Note: press “  ” or “  ” to select to “ Auto ” or “ Manual ” parameter setting, press “  ” to enter.

6、Relay & Alarm Interface:



Note: press “  ” or “  ” to select “ PH/ORP High Point ”, “ PH/ORP Low Point ” or “ Relay delay ” parameter interface, press “  ” to enter.

7、4-20mA output Interface:

4-20mA output
1. I1
2. I2

4mA Value
00.00 PH

20mA Value
14.00 PH

4mA Value
-1200mV

20mA Value
+1200mV

Note: press “  ” or “  ” input parameter value , press “  ” to save.

8、PID Control Interface:

PID Control
1. PID ON/OFF
2. Output Port
3. PID Parameter

PID OUT FROM:
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PID Parameter
1. Set Point
2. Control Cycle
3. P value set
4. I value set
5. D value set
6. PID Direction

Note: Press “  ” or “  ” to select and enter into “PID ON/OFF”, “Output Port” and “PID Parameter”, press “  ” to save.

9、Modbus RS485 Interface:

Modbus RS485
1. Baud speed
2. Address

Note: Press “  ” or “  ” to select, press “  ” to save.

10、Back light option Interface:



Note: Press “  ” or “  ” to select “Delay off”, “ Normal on” or “ Dimming ”, if select “Delay off”, then need to input “Set Time”, if select “ Dimming ”, then need to input “ Brightness ”, press “  ” to save..

11、 Factory Reset Interface:

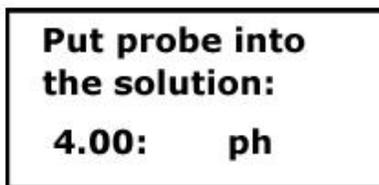


Note: Press “  ” or “  ” to select “ Yes ” or “ NO ”, press “  ” to save.

11、 Factory default parameter:

Menu name	Setting range	Factory parameter
Probe type	PH/ORP probe	PH probe
Temp. comp	Auto/manual	manual
Manual	0 ~ 120 °C	25 °C
High alarm close value	pH: 0.00 ~ 14.00	pH: 13.00 pH
	ORP: - 1200 ~ + 1200 mV	ORP: + 1200 mV
High alarm open value	pH: 0.00 ~ 14.00	pH: 12.00 pH
	ORP: - 1200 ~ + 1200 mV	ORP: + 1100 mV
Low alarm close value	pH: 0.00 ~ 14.00	pH: 2.00 pH
	ORP: - 1200 ~ + 1200 mV	ORP: - 1200 mV
Low alarm open value	pH: 0.00 ~ 14.00	pH: 3.00 pH
	ORP: - 1200 ~ + 1200 mV	ORP: - 1100 mV
Relay delay time	0-99S	0
4mA value	pH: 0.00 ~ 14.00	pH: 0.00 pH
	ORP: - 1200 ~ + 1200 mV	ORP: - 1200 mV
20mA value	pH: 0.00 ~ 14.00	pH: 14.00 pH
	ORP: - 1200 ~ + 1200 mV	ORP: +1200 mV
PID Control	ON/OFF	OFF
Set Point	0-14ph	7PH
PID Value	P: 0-500	P: 0.5
	I: 0-9999	I: 300 S
	D: 0-9999	D: 10 S
Control Cycle	1-9999	0005 S
PID Direction	Forward / Reverse	Forward
Baud Address	002	1-127
Baud speed	9600	2400,4800,9600,19200
User password	0 ~ 9999	0000
Backlight	Normal ON/Delay	Delay
Delay time	5 ~ 99 S	60 S

12、 Calibration Interface:



Note: When put probe into the solution, the controller display current measured solution PH value. This part operation refer to “ PH controller calibration“ part.

13、 Password Change Interface:



Note: Input new password , press “  ” to save.

VIII Maintenance

1. PH part

1) Maintenance of instrument

- The input terminal of instrument should be keep dry and clean, avoid dust and moisture invade.
- It is not allowed to put the probe in protein solution and acidic fluoride for long time, avoid touch with silicone oil.
- After long time use, if we found the slope is lower, it could be put the probe into 4% HF solution(hydro fluoride acid) 3-5 seconds, and then clean with distilled water, then dip into 0.1mol/L hydrochloric acid, that will renew the probe.

- To measure more accurate, the probe should be calibrated periodically and wash with distilled water.
- The instrument should be installed at a dry place or in a electric cabinet, to avoid water drop spatter or wet which will cause leakage of electricity or measure errors.

2) Calibration of instrument:

- Before calibrate, check if the wire connection of instrument is correct or not, power on and wait 20mins.
- Prepare three kind of standard solution:4.00pH, 6.86pH 9.18pH
- Clean the probe with distilled water and dry with filter paper, put the probe into standard buffer solution 4.00PH, mix it slowly till the display value is steady.
- Through the menu to enter probe calibration interface, the screen display '4.00PH calibration', in the middle it display probe output pH value, till the pH value is steady and press ' ENT ' key to operate calibration, when calibration finished successfully it will indicate success.
- Repeat the upper two steps, calibrate the 6.86 and 9.18 PH. After finish each step calibrate, probe should be cleaned by distilled water and dry with filter paper, then it can be put into the next solution to calibrate.

2. ORP part

1) Preparation method of ORP standard solution

- 86mV: put a slight excess quinhydrone into standard 6.86 pH buffer solution
- 256 mV: put a slight excess quinhydrone into standard

4.00pH buffer solution

- The save time of standard solution is 3 days

2) ORP probe checking:

- Not like pH probe need be calibrated by standard solution, the ORP probe need to use standard solution to check, the most important is to check if the probe is workable or not.
- Clean the probe with clear water and dry it with soft towel.
- Put the ORP probe into the mV standard solution which is prepared. wait till the reading is steady.
- Watch the display value is close to mV standard solution or not, if the errors is within range $\pm 35\text{mV}$, the electrode could be used otherwise it need to be replaced.

IX 4-20mA current output formula

1.PH Current output formula:

- Factory setting define output current value is :0 pH is corresponding value of 4 mA; 14 pH is corresponding value of 20 mA.
- $I = (D - 4 \text{ mA corresponding value}) \times (16 / (20 \text{ mA corresponding value} - 4 \text{ mA corresponding value})) + 4.00$
- $I = (D - 0) \times (16 / 14) + 4.00$
- Note: I is output current value $4 \text{ mA} \leq I \leq 20 \text{ mA}$
- D is pH value displayed by the instrument $0.00\text{pH} \leq D \leq 14.00\text{pH}$

2. Formula of ORP current output:

Factory setting define the output current is :-2000mV is corresponding

value of 4 mA; +2000mV is corresponding value of 20 mA.

- $I = (D - 4 \text{ mA corresponding value}) \times (16 / (20 \text{ mA corresponding value} - 4 \text{ mA corresponding value})) + 4.00$
- $I = (D - (-2000)) \times (16 / (+2000 - (-2000))) + 4.00$
- $I = (D + 2000) \times (16 / 4000) + 4.00$
- Note: I is output current value $4 \text{ mA} \leq I \leq 20 \text{ mA}$
- D is ORP value displayed by the instrument $-2000\text{mV} \leq D \leq +2000\text{mV}$

X Fault Judgments and Trouble Clearing:

(1) No display of the controller?

Answer: the power is not well connected or blown fuse. Check the power supply line and fuse.

(2) Value can be displayed but not stable ?

Answer: Probe cable is wet or ceramic of probe is polluted. Check probe cable, clean ceramic core(0.1mHCL).

(3) Solution PH4.00 and PH6.86 can not be adjusted ?

Answer: Outside of probe is polluted, probe cable is wet, probe is broken or there is cracks, ceramic core of probe is blocked. Clear probe (0.1mHCL), check the probe cable, replace probe, clean ceramic core (0.1mHCL).

(4) Numbers response slow ?

Answer: thin film of probe or ceramic core is polluted. Clean the whole probe.

(5) The actual pH value change a lot but the instrument display pH value change very small?

Answer: ceramic core of probe is blocked, probe fall off/perish, slow response. Clean probe (0.1mHCL), use recovery solution.

(6)Display value of instrument not change ?

Answer: Probe broken, probe cable short circuit. replace probe, check probe cable.

(7)Relay not active or pH value not change after dosing chemicals ?

Answer: Relay broken; wrong setting of the instrument and chemical solution is not enough. Contact supplier to replace relay, change settings, add chemical solution.

XI Complete Instrument

PH/ORP Controller	1pc
PH probe	1pc
ORP probe	1pc
Fixed clamp	1pair
Operation manual	1pc
Calibration solution	1set