SENSECUBE

pH, EC CONTROLLER

PE-300

Korea Digital Co., Ltd. www.sensecube.com
804, Ace Twin Tower 2, 273 Digital-ro, Guro-gu, Seoul, Korea Tel: +82-2-2109-8838 Fax: +82-2-2109-8884, sensor@koreadigital.com

SENSECUBE

- Easy Installation and Calibration
- Multi-function and high function with MCU MICRO PROCESS provides the high reliability of data processing
- Display various measurement and parameter value
  Current pH, EC, temperature
  Control setting pH, EC
  Set pH, EC contact operation time and minimum interval
- Various output signal
  Analog 4~20mA, RS-485, Relay contact
- Automatic temperature compensation
  Correction factor β=2%/℃
- Remarks
  Electrode is a consumable. It needs periodic cleaning, calibration and other management.

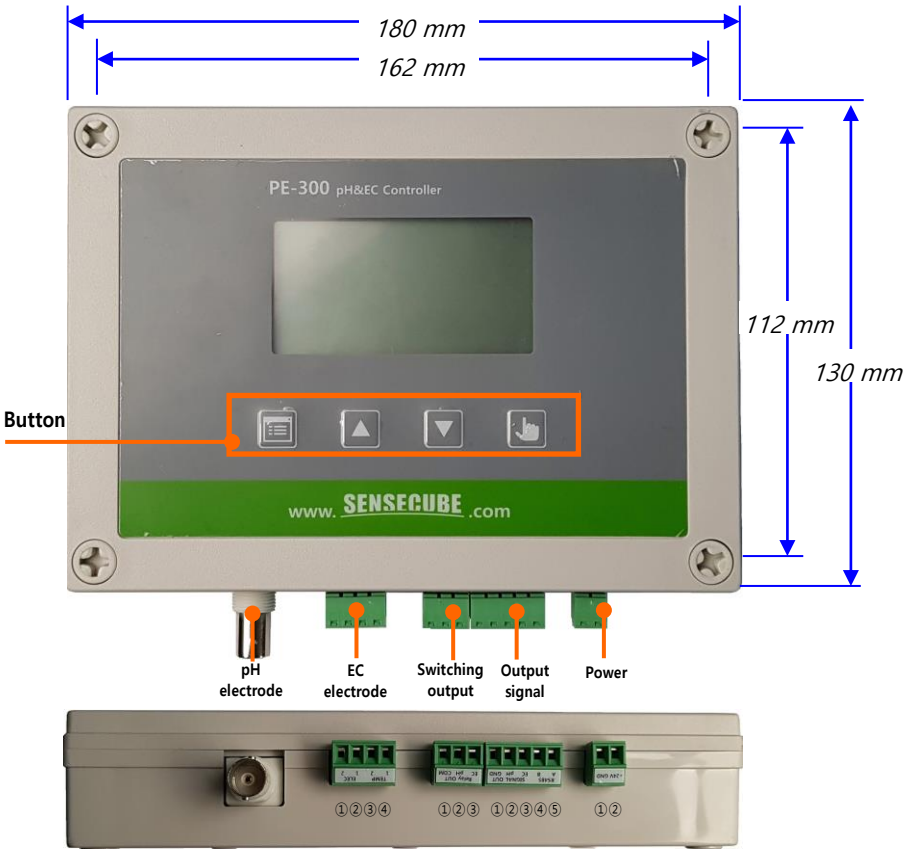
  Please refer to separate material for protocol of RS-485 communication

  The instrument is set up for pH electrode andelectric conductivity sold separately. Using other electrode may result in diffent output value.
- Design and specification are subject to change without prior notice.

Specifications

Measurement	Range	pH 0.0 ~ 14.0, EC 0 ~ 5dS/m
	Accuracy (@25℃)	pH ±0.05 (@ pH3 ~ pH8) EC ±2% F.S. (@ 0 ~ 4dS/m)
	Temp compensation	EC correction factor 5~40℃, (β=2%/℃)
	Interval	Within 1 second
General	Initial stabilization	Within 2 minutes
	Storage temperature	-20 ~ 80℃
	Operating condition	0 ~ 50℃, Max 95%RH
User interface	Display	128x 64 graphic LCD
	Setting	4 button switch
Electrical	Power supply	24VDC±5V
	Power consumption	Below 1.5W
	Analog output	4 ~ 20mA
	Communication	RS-485 (Baud rate 38,400bps)
	Relay	SPST AC250V, 3A Max 2 contact
Calibration	Manual calibration	pH Offset (pH7), Span (pH4 or pH10)
		EC Offset, Span
Dimensions	Outer dimension	180mm x 130 mm x H36mm
	Weight	Approx. 300g (not include electrode)
	Fixture	Φ4.0 x 4 point 162x 112

How to connect wiring



Button (From left) : ①MENU, ②UP, ③DOWN, ④ENTER

EC electrode ①EC2②EC1, ③T2④T1 (No polarity in EC1,EC2 and T1,T2)
Relay switching output ①COM, ②pH, ③EC
Output signal ①M(pH/EC Signal GND) ②pH(4~20mA) ③EC(4~20mA) ④RS-485(B) ⑤RS-485(A)
Power ①DC Power (GND) ②DC Power (+24V)

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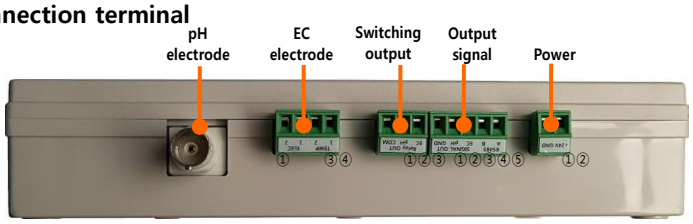
Precautions

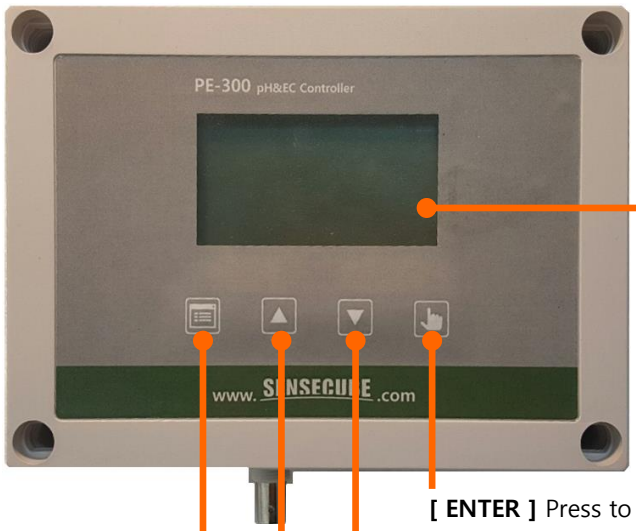
1. This product is shipped after our strict quality inspection and guaranteed for one year after shipment.
   However, in the event of damage or failure due to consumer error, it may be charged.
2. Take care not to apply external forces when handling or securing. External impact or external forces may cause failure, such as LCD damage.
3. Not to be used in areas where water or water are concerned. Please consult technical matters in advance.
4. pH electrode and EC electrode are optimized for our optional products.
   Connecting third-party electrodes may cause incorrect operation or malfunction.
5. In case of polarity sensors, be sure to check the polarity of the sensor before connecting it.
6. For stable operation, the common signal terminal '⑨M' 'and the' ⑩ DC Power (GND) 'terminal are electrically isolated.
   For stable function, please use the power of PE300 separately from the power of other devices
7. Relay contact capacity for pump or valve operation is 250VAC 3A. Be careful not to exceed the capacity range.
8. Be sure to check the other connection before connecting the power supply to the applied voltage and polarity.

Connection terminal



EC electrode ①EC2②EC1, ③T2④T1 (No polarity in EC1,EC2 and T1,T2)
Relay switching output ①COM, ②pH, ③EC
Output signal ①M(pH/EC Signal GND) ②pH(4~20mA) ③EC(4~20mA) ④RS-485(B) ⑤RS-485(A)
Power ①DC Power (GND) ②DC Power (+24V)

Operation and display



LCD

[ENTER] Press to confirm the change of setting
[DOWN] Press to change(increase) the set value
[UP] Press to change(decrease) the set value
[MENU] Press to go to the page of the item you want to change, such as pH, EC, etc

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■ MENU configuration

- [Initial Screen]
  - [MENU 1] **1. EC CAL.**
    - **1.1. EC [ZERO]** : Set the EC electrode zero
    - **1.2. EC [SPAN]** : Span setting for EC electrode
  - [MENU 2] **2. pH CAL.**
    - **2.1. pH [7.0]** : Set pH 7.0
    - **2.2. pH [SPAN]** : Set pH SPAN (4.0 or 10.0)
  - [MENU 3] **3. EC CONTROL**
    - **3.1. SETTING** : Set the control value of EC RELAY
  - [MENU 4] **4. pH CONTROL**
    - **4.1. SETTING** : Wet the control value of pH RELAY
  - [MENU 5] **5. TIME CONTROL**
    - **5.1. INTERVAL** : Set the operation interval of the relay [0 : No operation]
    - **5.2. DURING** : Set relay operating time
  - [MENU 6] **6. DEVICE INFO.**
    - **6.1. ADDRESSS** : Set ADDRESS(communication ID, MODBUS RTU)
    - **6.2. INITIALIZE** : Reset all setting values to factory setting

■ Operation by MENU (example)

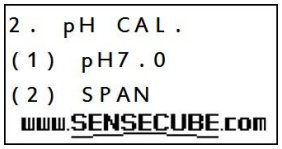
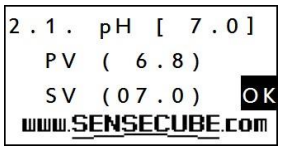
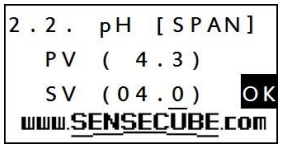
Initial screen

	Screen	Description
0. Initial screen	EC 0.0(0.0) pH 6.3(7.0) TE 20.3℃ www.SENSECUBE.com	Display the current conductivity(EC), pH and temperature(TE)values. The value within () is the setting value. Temperature has only display function without control function.

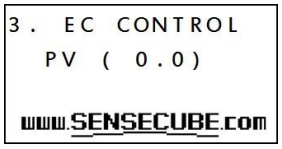
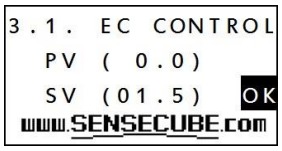
EC electrode calibration : Check after electrode replacement or periodically.

	Screen	Description	Key
1. EC calibration	1. EC CAL. (1) ZERO (2) SPAN www.SENSECUBE.com	EC calibration (1) 0 (zero) setting (2) SPAN setting	Enter the MENU button from the initial screen Select item (UP/DOWN button) Enter setting (ENTER button) Cancel (MENU button)
1.1. zero setting	1.1. EC [ZERO] PV (0.0) SV (00.0) OK www.SENSECUBE.com	When set to zero (0) PV: Process Value SV: Set Value ※Set SV to 0	Setting (OK/ENTER button) Cancel (MENU button)
1.2. SPAN setting	1.2. EC [SPAN] PV (12.3) SV (12.3) OK www.SENSECUBE.com	Set SV value after stabilization of PV value.	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)
※Modify	1.2. EC [SPAN] PV (12.3) SV (12.9) OK www.SENSECUBE.com	Modify mode : reverse Move mode : underline ※ Input button Move and modify: UP/DOWN Change mode : ENTER button	
※Complete	1.2 EC [SPAN] Complete. SV (12.9) OK www.SENSECUBE.com	Setup completed ※Other settings are displayed in the same way.	Return to top screen (Wait 5 seconds or press any button)

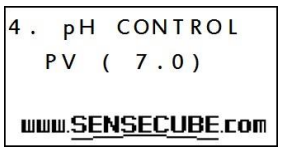
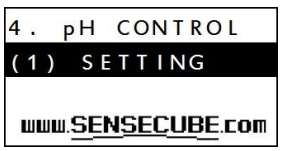
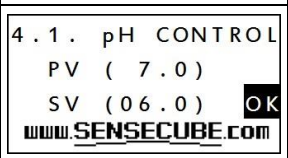
pH electrode calibration : Check after electrode replacement or periodically.

	Screen	Description	Key
2. pH calibration		pH calibration (1) Set pH7.0 (2) Set SPAN	Select item (UP/DOWN button) Enter setting (ENTER button) Cancel (MENU button)
2.1. Set pH7.0		Press ENTER when it's OK PV: process value SV: set value ※ Set SV to 0	Setting (OK/ENTER button) Cancel (MENU button)
2.2. Set SPAN		Set SV value after stabilization of PV value.	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)

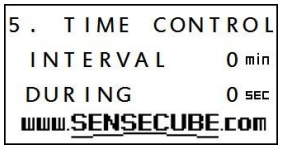
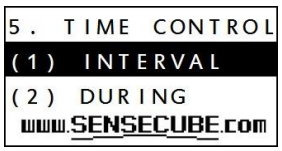
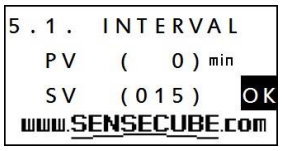
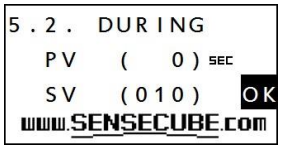
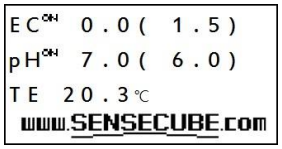
Set EC control value

	Screen	Description	Key
2. EC control value		Display of set value of EC control value	Select item (DOWN button)
		Display EC control value selection	Enter setting (ENTER button) Cancel (MENU button)
3.1 Input EC control value		When EC measurement less than SV, it operates according to TIME CONTROL setting. ※ TIME CONTROL set is mandatory	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)

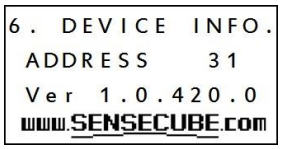
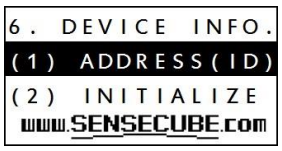
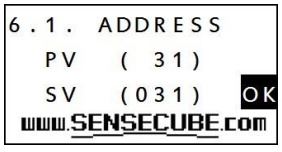
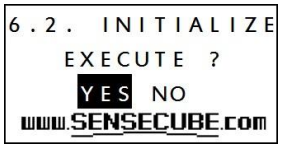
Set pH control value

	Screen	Description	Key
3. pH control value		Display the control value of the set pH	Select (DOWN button)
		Display pH control value selection	Enter setting (ENTER button) Cancel (MENU button)
4.1. Input pH control value		When pH reading is greater than SV, it operates according to pump control time ※ need to set pump control time	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)

Relay operation time control for pump control

	Screen	Description	Key
4. RELAY time control		Display relay operating interval and operating time	Select item (DOWN button)
		Select setting item (1) Interval (minute) (2) Operating time (second)	Select item (UP/DOWN button) Cancel (MENU button)
5.1. Set interval		Set relay operating interval (minute) ※If interval time is zero, disable relay.	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)
5.2. Set operating time		Set relay operating time (second)	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)
※ Relay control		※ During relay operation, EC and pH letter are displayed on upper right. ※ Stop relay operation when EC or pH control value are reached.	

Device information: During initialization, all settings are changed to the settings from the manufacturer's factory. Please use it with care..

	Screen	Description	Key
6.Device information		Display device information	Select item (DOWN button)
		Display communication equipment address (ID) (DEFAULT 31) Display firmware version	Select item (UP/DOWN button) Cancel (MENU button)
6.1. Set communication ADDRESS (ID)		Set MODBUS rtu ADDRESS ※ Max. 31ea	Move (UP/DOWN button) Move ↔ Value (ENTER button) Value (UP/DOWN button) Setting (OK/ENTER button) Cancel (MENU button)
6.2. Initialization		Initialize and save all setting ※Used when a wrong setting value is entered and a malfunction occurs.	Move (UP/DOWN button) Initialization (ENTER button) Cancel (MENU button)

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■ Preparation for calibration

① **Calibration time and electrode life**

Calibration is performed once a month or when it is out of the error range compared with other measuring instruments, it is recalibrated.
The electrode can be used for about a year, but its service life can be shortened depending on the environment.
Replace the electrode if the detection reaction of the electrode is delayed or does not indicate the value.
Please immerse pH electrode in the protection container provided at the time of purchase if it is not used for a long time.
pH electrode container should be rotated and removed in reverse order. (Pulling out the container may cause damage due to pressure.)

② **Precautions for Calibration**

The calibration standard solution must be reagent grade 1 or higher or equivalent.
Clean the electrodes with pure water. If there is no pure water, use fresh water.
The output value can be checked by connecting an ammeter or other instrument to the output terminals.
When calibrating, immerse the electrodes in the solution and wait for sufficient time to set the stable value.

③ **Cleaning the sensor**

Fingerprint marks or oil components attached to the electrodes contaminate the solution and prevent accurate calibration.
For accuracy and repeatability of the instrument, check the cleanliness of the electrodes all the time.

■ pH calibration

① Prepare a standard solution of pH 7, pH 4 (or pH 10) and wash the electrodes with a cleaning water before removing water from the electrodes.
② Dip the electrodes into the prepared pH 7 standard solution and then set the value of output as pH 7.0.
③ When the pH 7.0 adjustment is completed, clean the electrodes with a cleaning water and remove water from the electrodes.
Dip the electrodes into the prepared pH 4 (or pH 10) standard solution and adjust the pH SPAN so that the values of the standard solution are output.
④ When the SPAN adjustment is completed, remove the electrodes, clean them with water, and remove water from the electrodes.
Measuring a pH 7 standard solution to verify that the output is reproduced within the error range.

■ EC calibration

① Prepare an EC standard solution and cleaning water, clean electrodes and remove water from electrodes.
② Adjust the EC 0 point in dry air so that the EC output is close to zero.
③ After dipping the electrodes into the prepared standard solution, adjust the EC SPAN to output values of the standard solution.
④ When the SPAN adjustment is complete, remove the electrodes, clean them with water, and remove water from the electrodes.

■ Reference chart

[T1] Output signal according to pH detection value

pH	mA	DC V
0.0	4.00	1.00
0.5	4.57	1.14
1.0	5.14	1.29
1.5	5.71	1.43
2.0	6.29	1.57
2.5	6.86	1.71
3.0	7.43	1.86
3.5	8.00	2.00
4.0	8.57	2.14
4.5	9.14	2.29
5.0	9.71	2.43
5.5	10.29	2.57
6.0	10.86	2.71
6.5	11.43	2.86
7.0	12.00	3.00
7.5	12.57	3.14
8.0	13.14	3.29
8.5	13.71	3.43
9.0	14.29	3.57
9.5	14.86	3.71
10.0	15.43	3.86
10.5	16.00	4.00
11.0	16.57	4.14
11.5	17.14	4.29
12.0	17.71	4.43
12.5	18.29	4.57
13.0	18.86	4.71
13.5	19.43	4.86
14.0	20.00	5.00

[T2] Output signal according to EC detection value

EC(mS/cm)	mA	DC V
0.0	4.00	1.00
0.5	4.80	1.20
1.0	5.60	1.40
1.5	6.40	1.60
2.0	7.20	1.80
2.5	8.00	2.00
3.0	8.80	2.20
3.5	9.60	2.40
4.0	10.40	2.60
4.5	11.20	2.80
5.0	12.00	3.00
5.5	12.80	3.20
6.0	13.60	3.40
6.5	14.40	3.60
7.0	15.20	3.80
7.5	16.00	4.00
8.0	16.80	4.20
8.5	17.60	4.40
9.0	18.40	4.60
9.5	19.20	4.80
10.0	20.00	5.00

[T3] pH, EC detection value relative to output signal

mA	DC V	pH	EC (mS/cm)
4.00	1.00	0.00	0.00
4.50	1.13	0.44	0.31
5.00	1.25	0.88	0.63
5.50	1.38	1.31	0.94
6.00	1.50	1.75	1.25
6.50	1.63	2.19	1.56
7.00	1.75	2.63	1.88
7.50	1.88	3.06	2.19
8.00	2.00	3.50	2.50
8.50	2.13	3.94	2.81
9.00	2.25	4.38	3.13
9.50	2.38	4.81	3.44
10.00	2.50	5.25	3.75
10.50	2.63	5.69	4.06
11.00	2.75	6.13	4.38
11.50	2.88	6.56	4.69
12.00	3.00	7.00	5.00
12.50	3.13	7.44	5.31
13.00	3.25	7.88	5.63
13.50	3.38	8.31	5.94
14.00	3.50	8.75	6.25
14.50	3.63	9.19	6.56
15.00	3.75	9.63	6.88
15.50	3.88	10.06	7.19
16.00	4.00	10.50	7.50
16.50	4.13	10.94	7.81
17.00	4.25	11.38	8.13
17.50	4.38	11.81	8.44
18.00	4.50	12.25	8.75
18.50	4.63	12.69	9.06
19.00	4.75	13.13	9.38
19.50	4.88	13.56	9.69
20.00	5.00	14.00	10.00

※

The DC voltage is obtained by converting the current output by load resistance 250 Ω.
The above table is for reference by calculation that does not reflect realistic error.

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Warranty certificate

Thank you for purchasing the Sense Cube. This product has passed rigorous inspection of our company's thorough quality control system. If a manufacturing defect or natural failure occurs within the warranty period, please contact your place of purchase or our customer support center.

Product name		**pH, EC Controller**	Model name	**PE 300**
Date of purchase			Warranty	2 years
Place of purchase	Company		Tel	
	Address			
Customer	Name		Tel	
	Address			

Warranty regulations

1. If the product fails due to a defect in use within the warranty period, it will be repaired free of charge.
   (Except for consumable electrodes and accessories)
2. Compensation for repairs and exchanges shall be in accordance with the Regulations for Consumer Damage Compensation of the Economic Planning Board.
3. The policy under warranty is not applicable in each of the following cases
   - For poor performance and failures after the warranty period has expired
   - Performance degradation or failure after the warranty expires
   - Failure due to arbitrary improvement or modulation of the structure, performance and function of the product
   - In case of product failure or defect caused by natural disasters
4. Even if your product is out of warranty, you can still receive an warranty at cost.

Korea Digital Co., Ltd.

SENSECUBE is a registered trade mark for industrial sensor business of Korea Digital Co., Ltd. which was established in 1997 in Korea With 20 years of sensor-related expertise and manufacturing experience, we offer solutions in sensing and measuring fields optimized for your needs.

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