Cheonsei

KEMPION DIGITAL CONTROLLER

MESTAR+

Digital RC Controller

Instruction Manual

www.cheonsei.co.kr

Thank you very much for purchasing Cheonsei digital RC controller.
Please read this instruction manual before beginning operation.
Handling and maintenance are explained in easy way. Read through this manual and use correctly the product. Correct handling, repair and maintenance are described easily.
※ The specification of products can be changed for improvement without prior notice.

Contents

1 Notice for Safety

1-1 Introduction

- To use the products safely, the signs are showed on the manual like below.
- As it is a matter of safety, please be sure to keep the directions in manual.
- he signs and indication are as follows.

⚠ Warning

Person death or serious injury will be occurred, if warning is not kept by wrong handling.

⚠ Caution

Person injury or property damage will be occurred, if caution is not kept by wrong handling.

1-2 Cautions for Operation Condition

⚠ Caution

- Do not use controller and its components for other purposes.
  Otherwise, it may cause trouble.
- Please keep the followings, otherwise it may cause trouble.
  Ambient temperature : -5 ~ 45°C
  Relative humidity : below 90%
  Install location : Indoor and inside of electrical panel
  Temperature of the handling liquid : below the working temperature described in the electrode specification
- Gas or moisture, which occur in jobsite, can lead to the internal corrosion of the controller and it may cause reduction of service life and trouble.

1-3 Warning for Handling Condition

⚠ Warning

- Install this controller beyond the reach of children and/or unauthorized person.
- Turn off the power and stop the controller & other equipments when repairing or disassembling the controller.
  If power is on during work, it may cause electric shock.
- Controller should be properly grounded and install ELCB(Earth Leakage Circuit Breaker) in order to prevent electric shock.
- In case of installation in the electric panel, install the controller after securing sufficient space in order not to contact with the components inside electric panel.
- Do not touch with wet hands. Electric shock may occur.
- Use only designated parts. If undesignated parts are used to the controller, it may cause accident & trouble.
- Do not arbitrarily reconstruct the controller. If the controller is arbitrarily reconstructed, it may cause accident & trouble.

⚠ Caution

- Do not use the controller of which case was damaged. If the controller is used, it may cause trouble to equipment connected with the controller.
- Do not install controller in the heavy moist or dusty place. Electric shock and trouble may occur.
- Do not use power other than that specified in controller. Otherwise, it may cause malfunction or fire.
- Refrain from voltage withstand test in order to prevent damage of internal parts.
- Dispose of waste controller in accordance with related national law.

2 Product Confirmation

2-1 Check Point When Unpacking

Please check following points immediately after receiving the product.
If the defect is found from the product, please request it to local agent or CHEONSEI.

1 Is specification correct as ordered?
2 Is there any missing parts ?
3 Is there any visible damage caused by vibration or shock during transport?
4 Is there any loosened bolt or nut?

2-2 Components

1 Controller
- Digital RC Controller : 1 Set
- Bracket(SPC-1 M4x52) : 2 EA
- Instruction Manual : 1 COPY

2 SET Components
- Refer to section 6.

3 General

This controller is a digital controller built-in micro processor. It can be used by composing circuit with the external devices through dry contact of analog Input & output and, as option, it can be composed according to wanted using condition by installing Communication card.
This controller is designed only for a high insulation shielded cable.
If you need to extend the electrode cable, refrain from using the general cable in market and use our high insulation shielded cable.

4 Model Code

MESTAR+ R □ □ – □

① ② ③ ④

① Type	② Controller Type	③ Output	④ Electrode Type
R : RC(Residual Chlorine)	B : Standard	0 : Standard	1 : CPR11(Amperometric)

5 Specifications

5-1 Controller

Specification		Performance
Display and Measuring Range		0.00 ~ 4.00ppm(mg/L)
Resolution/Accuracy		0.01ppm(mg/L) / 0.01ppm(mg/L)
Ambient temp. & Humidity		-10°C ~ 40°C, Lower than relative humidity 80%RH (Dew and dew condensation must not be formed)
Temp. & pH compensation		None
Calibration Method		2 Points Calibration(Zero, Span)
Display		3in LCD Segment Display (LED Back Light : White)
Alarm Output	Setting	HIGH, LOW
	Output	Dry Contact 1a 1b Contact Capacity : 0.5A, 125VAC / 1A, 24VDC
	Dead Band	0.00 ~ 0.30ppm
Analog Output		0.00 ~ 4.00ppm(mg/L) : 4~20mA Isolated Output(Load Resistance 500Ω)
Memory		EEPROM
Communication Method		RS-485 (Option)
Power		AC85~245V, 50/60Hz
Case Material		Anti-static ABS
Size		96mm * 96mm * 115mm
Weight		Approx. 400g
Installation Place		Indoor, Inside electric panel

5-2 Electrode

	Specification	Remark
Model	CPR11	
Type	Free Residual Chlorine Measurement	
Electrode Type	Amperometric	
Measurement Range	0.00 ~ 4.00 ppm(mg/L)	
pH condition which measurement is available	4.00 ~ 8.20 pH	Recommendation:6.5~7.5pH
Capacity condition which measurement is available	200 ~ 250mL/min	Over 500mL/min in case of recycling process
Workable Temp.	2 ~ 45°C	
Workable Pressure	Max. 1 bar	
Reply Time	95% in 2 minutes	Based on 25°C
Cable Length	5m	
Material	Glass	

6 Set Components

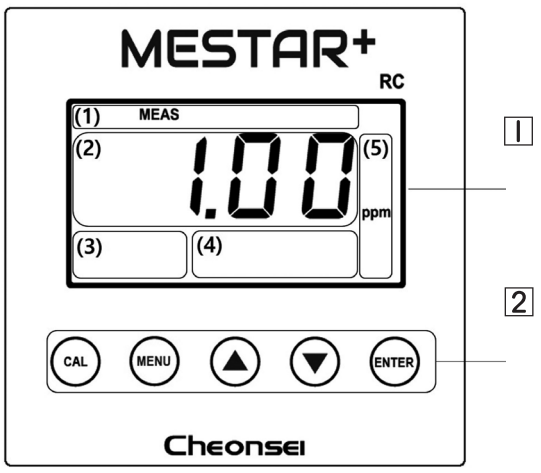
6-1 Standard components

SET Model	Components		Specification	Quantity
RBO-1	Controller		Digital RC Controller	1Set
	Panel Bracket		SPC-1 M4 x 52mm	2EA
	Instruction Manual		20Page	1Copy
	Electrode		CPR11	1Set
	Sampling Holder	Probe Housing	Material : PC	1Set
		Sampling Valve	Material : PVC	1Set
		Filter	Material : Nylon + PC	1Set
		Plate	Material : PP	1Set

7 Name & Function of Each Part

7-1 Front

1 Display : 3” LCD Segment



① Status
- SETUP : Display in setup mode
- MEAS : Display in measurement mode
- CAL : Display in calibration mode
- ZERO : Display in ZERO calibration
- SPAN : Display in SPAN calibration

② Main display : Measureed valve or setting screen is displyed according to Mode

③ Alarm
- HOLD : Display in setting of measurement value fixed
- HIGH : Display in HIGH alarm
- LOW : Display in LOW alarm

④ Sub Display : Display temp. or display setting value when enter in setting mode or calibration mode

⑤ Unit : Display the unit which is set

2 Key

CAL : Enter Calibration Mode, if press the button for 5 seconds in Measuring Mode.
Exit the Calibration Mode, if press the button in Calibration Mode.
(Can not enter Calibration Mode when Setting Mode, displaying Error, & Setting to hold the measured value)

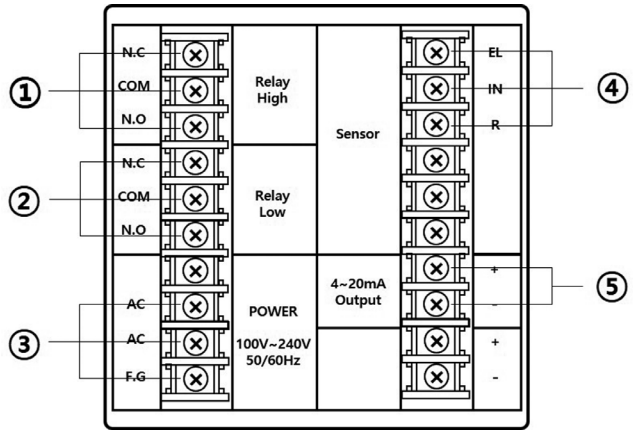
(MENU) : Enter the Setting Mode, if press the button in Measuring Mode.
Return to previous Mode, if press the button in Setting Mode.

(▲) : Menu is changed or Setting Value is increased, if press the button in Setting Mode or Calibration Mode.
Setting value is fast increased, if press the button continuously.
High Alarm Setting Value is displayed for 3 seconds, if press the button for 3 seconds in Measuring Mode.

(▼) : Menu is changed or Setting Value is decreased, if press the button in Setting Mode or Calibration Mode.
Setting value is fast decreased, if press the button continuously.
Low Alarm Setting Value is displayed for 3 seconds, if press the button for 3 seconds in Measuring Mode.

(ENTER) : Save the setting value in Setting Mode or Calibration Mode.
The buzzer will sound and all setting values will be initialized, if press the button for 5 seconds in Measuring Mode.
(Unable to initialize when Setting Mode, Calibration Mode, & displaying Error)
※ When initialization, all calibration values and setting values will be changed to the initial setting values before delivery from factory.

7-2 Rear



① Relay High : HIGH alarm Output Terminal
② Relay Low : LOW alarm Output Terminal
③ Power : Power Supply Terminal
④ Sensor : Electrode Connection Terminal
⑤ Process : Analog Output Terminal for 4~20mA of 0 ~ 4ppm

8 Callbration

8-1 Calibration

This controller is Two-Point Calibration type and supports Zero calibration and Span calibration.
Get a comparator ready for the conduct of calibrations (A DPD colorimeter is recommended).

8-2 Cautions for calibration

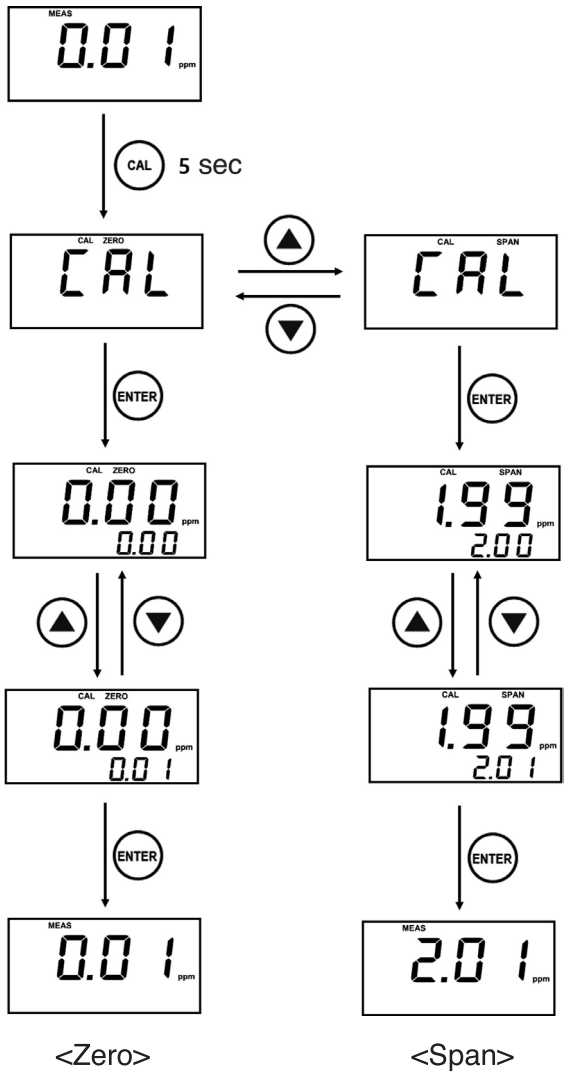
1. In calibration mode, do not be changed to Measuring Mode even after several minutes.
   To exit the Calibration Mode, should stop calibration by pressing the CAL Key or complete calibration by pressing the ENTER Key.
2. During calibration, if press CAL key to exit Calibration Mode or the Calibration Mode is exited in an unusual manner, such as power off, Calibration Values are not stored.

3 Clean the electrodes with clean or distilled water before submerging it.
4 The residual chlorine is much influenced by the rate of liquid flow. Calibrate the rate with the same flow rate obtained at the time of measurement. The reliability of the measure value is reduced, if the flow rate at the time of calibration is different from that at the time of measurement.
5 Calibrate in the manner that the range to be measured falls within the Zero and Span range; otherwise, its accuracy drops.
(Ex. Meas: 2ppm ➡ Zero: 0ppm, Span: 3ppm)
6 In case of Zero calibration, calibrating with a Zero solution will be more accurate than exposing the electrodes to the air.
7 It is recommended that the Span calibration should be at least in excess of 2ppm.
8 There can be a considerable difference between analysis by an instrument and analysis by a reagent. Analysis by a reagent is advised to adopt to have precise measurements.

⚠ Warning

- Do not handle calibration powder or solution used for product calibration by children or the elderly & the infirm, since it may be harmful to the human body.
  Be sure to follow the doctor's prescription when drinking it.

8-3 How to calibrate



<Zero> <Span>

① Clean the electrodes with distilled water intended for cleaning.
② Immerse them in a calibration solution until the concentration of the controller remains stable.
③ In the Measuring Mode, press the CAL key for 5 seconds to enter the Calibration Mode.
④ Select the type of calibration (Zero, Span) by using the ▲ and ▼ keys.
⑤ And, the concentration of the residual chlorine measured will be indicated.
⑥ You can change the calibration concentration by using the ▲ and ▼ keys.
⑦ Align it with the concentration of the comparator and complete the calibration process by pressing the Enter key.

9 Setting & Operating

9-1 Menu setting

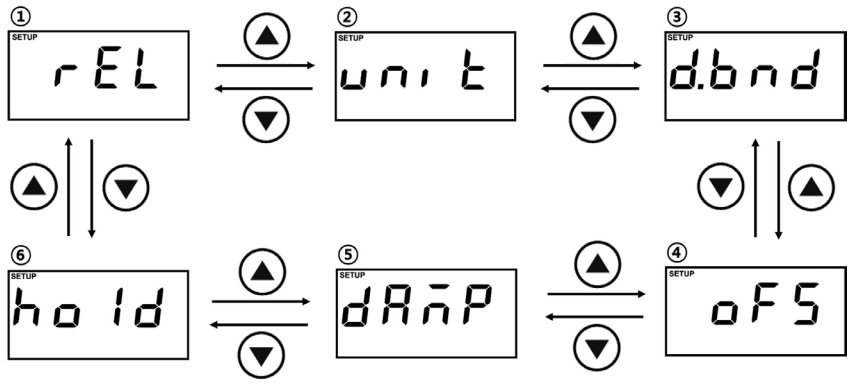
You can enter Menu mode by pressing the Menu key in Measuring mode, and can return to Measuring mode by pressing Menu key in Menu mode.
In Menu mode, if there is no any keystroke for 20 seconds, return to Measuring mode without any storage of the value that is being set.
Enter key must be pressed to save the setting value.

9-2 Standard setting value

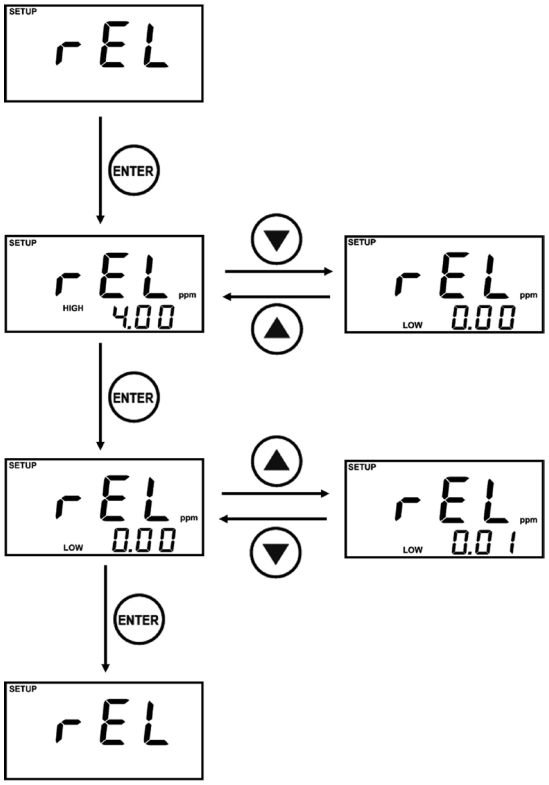
Menu		Standard setting value
Alarm setting(rEL)	High	2.00ppm
	Low	0.00ppm
Unit(unit)		ppm
Dead band(d.bnd)		0.00ppm
Offset(oFs)		0.00ppm
Damping(dAn̄p)		0.00ppm
Hold on measured value		OFF

9-3 Menu Configrations

Menu configurations support 6 setup menus as shown below. Can change the menu by ▲ & ▼ key after entering the Menu mode and can enter the setting display by ENTER key.
In case of each setting method, refer to the setting page(9-4 ~ 9-9) of the corresponding menu.



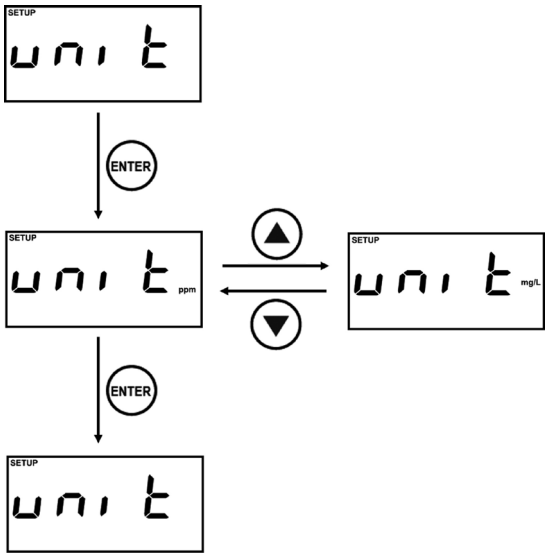
9-4 Alarm Setting



① rEL is Alarm setting menu.
② Present Alarm setting value is displayed, while you enter the Setting display.
③ Setting values can be changed by ▲,▼ Keys and finish the setting by pressing the Enter key.
(Unit : 0.01ppm, Max : 4.00ppm)
④ Set the HIGH Alarm setting and then the LOW Alarm setting.
⑤ The HIGH Alarm value cannot be set lower than the LOW Alarm value, and the LOW Alarm value cannot be set higher than the HIGH Alarm value.
⑥ Dead band setting value is reflected to Alarm setting value. (Refer to "9-6: Dead Band Setting")
Ex) When 0.30ppm of Dead band & 2.00ppm of HIGH Alarm are set, 1.70ppm or higher cannot be set as LOW Alarm
⑦ Generating condition of alarm
- HIGH Alarm : HIGH Alarm setting value – Measured value ≤ 0
- LOW Alarm : LOW Alarm setting value – Measured value ≥ 0

※ In case of Dead band setting and its corresponding operation, refer to “9-6 Dead Band Setting”.

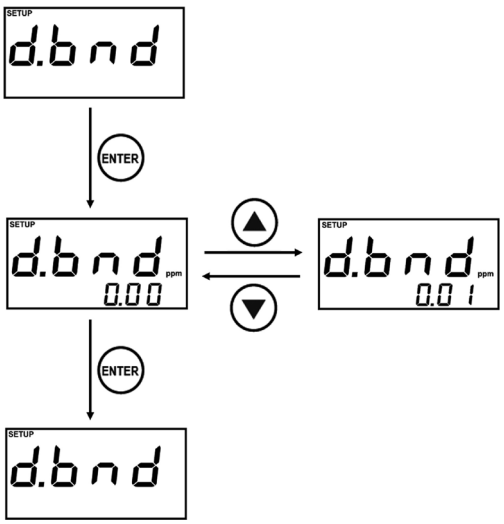
9-5 Unit Setting



① unit is Unit setting menu.
② Present set unit is displayed, while you enter the Setting display.
③ Set unit can be changed by ▲,▼ Keys and finish the setting by pressing the Enter key.
(Both units of ppm and mg/L are supported.)

9-6 Dead band setting

① d.bnd is Dead band setting menu.
② Present set value is displayed, while you enter the Setting display.
③ Change values by using the ▲ and ▼ keys and press the Enter key to complete the setting.
※ The band can be set up to a maximum of 0.30ppm.
The alarm will occur as shown below example.

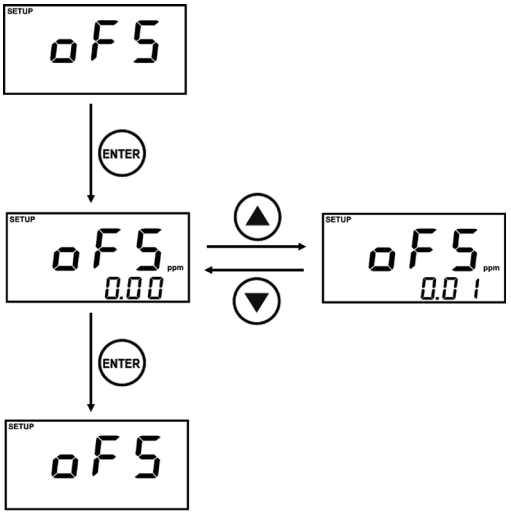


Ex) When setting of 0.10ppm
- When Setting value of HIGH Alarm is 3.00ppm.
  : If measured value is 3.10ppm or over, HIGH Alarm will occur, and, if measured value become less than 2.90ppm, HIGH Alarm will be off.
- When Setting value of LOW Alarm is 1.00ppm.
  : If measured value is less than 0.90ppm, LOW Alarm will occur, if measured value become 1.10ppm or over, LOW Alarm will be off.

※ Dead band setting value can not be set within the difference range of HIGH Alarm and LOW Alarm.
(Refer to " 9-4 Alarm Setting")

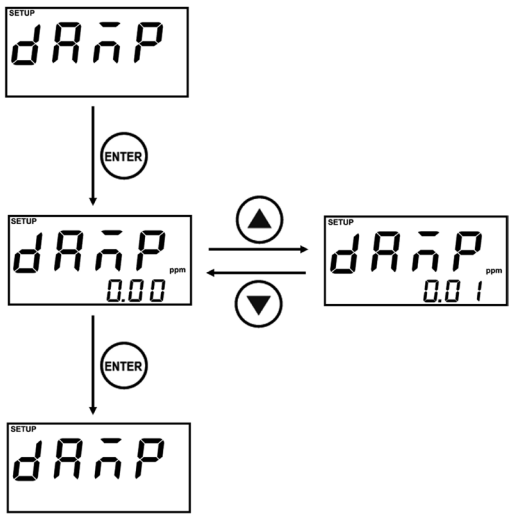
Ex) When 1.20ppm HIGH Alarm and 1.00ppm of LOW Alarm are set, 0.20ppm or higher can not be set as Dead band.

9-7 Offset setting



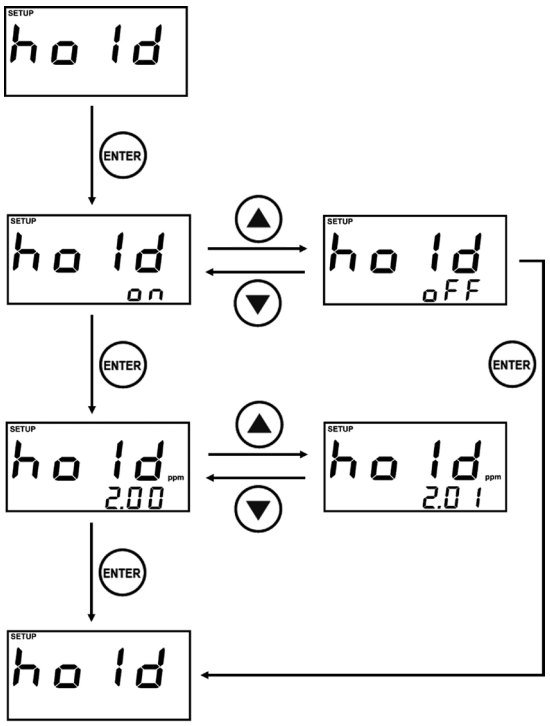
① oFS is Offset setting menu.
② Present set value is displayed, while you enter the Setting display.
③ Change values by using the ▲ and ▼ keys and press the Enter key to complete the setting.
※ The offset can be set within a range of -0.30 ~ 0.30ppm. The measured value is displayed after offsetting it as much as setting value.

9-8 Damping setting



① dAnp is Damping setting menu.
② Present setting value is displayed, while you enter the Setting display.
③ Change values by using the ▲ and ▼ keys and press the Enter key to complete the setting.
※ The damping value can be set within a range of 0.00 ~ 0.30ppm.
The measured value is displayed after damping it as much as setting value.

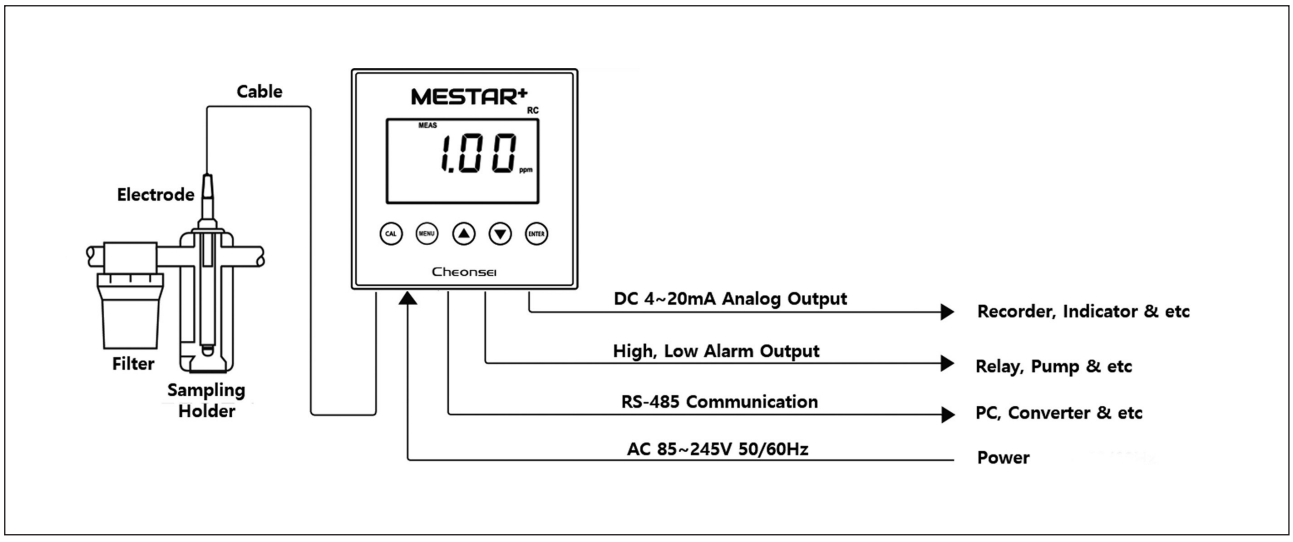
9-9 Hold Setting



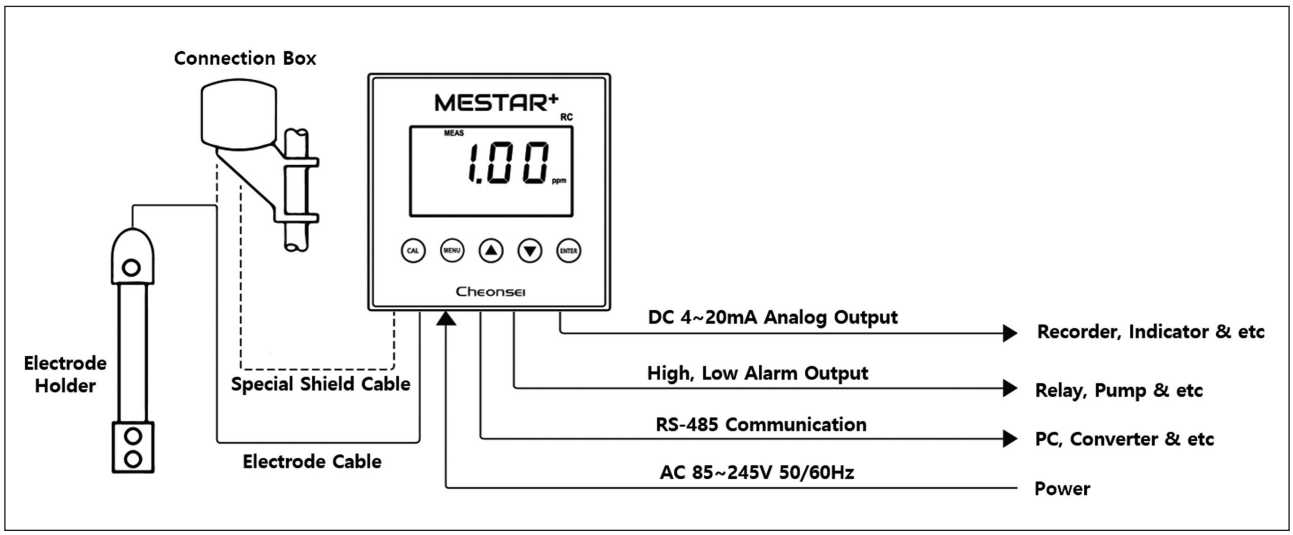
① hold is menu for fixing the measured value.
② You can select whether to hold the measured value or not, after entering the Setting display.
③ on or oFF can be changed by ▲,▼ key.
④ When selecting oFF, setting is immediately completed.
⑤ When selecting on, the value to set is displayed.
⑥ The setting value can be changed by ▲,▼ key.
(Unit : 0.01ppm, Range : 0.00~4.00ppm)
⑦ You can choose up to 4.00ppm, and the measured value will be displayed as the set value. In addition, the “Hold” status also appears.
※ If the held setting value is higher than the setting value of HIGH Alarm and lower than the setting value of LOW Alarm, alarm will occur(possible to use them to test alarms), but it will be not effected by Dead band.
⑧ Finish the setting by pressing ENTER Key.
⑨ The setting value is displayed as the measured value and HOLD status is displayed.
※ If the hold setting value is higher than the setting value of HIGH Alarm and lower than the setting value of LOW Alarm, alarm will occur but it will be not effected by Dead band.
※ It is impossible to enter the calibration mode, when the measured value is hold state.

10 System Diagram

10-1 Sampling holder type



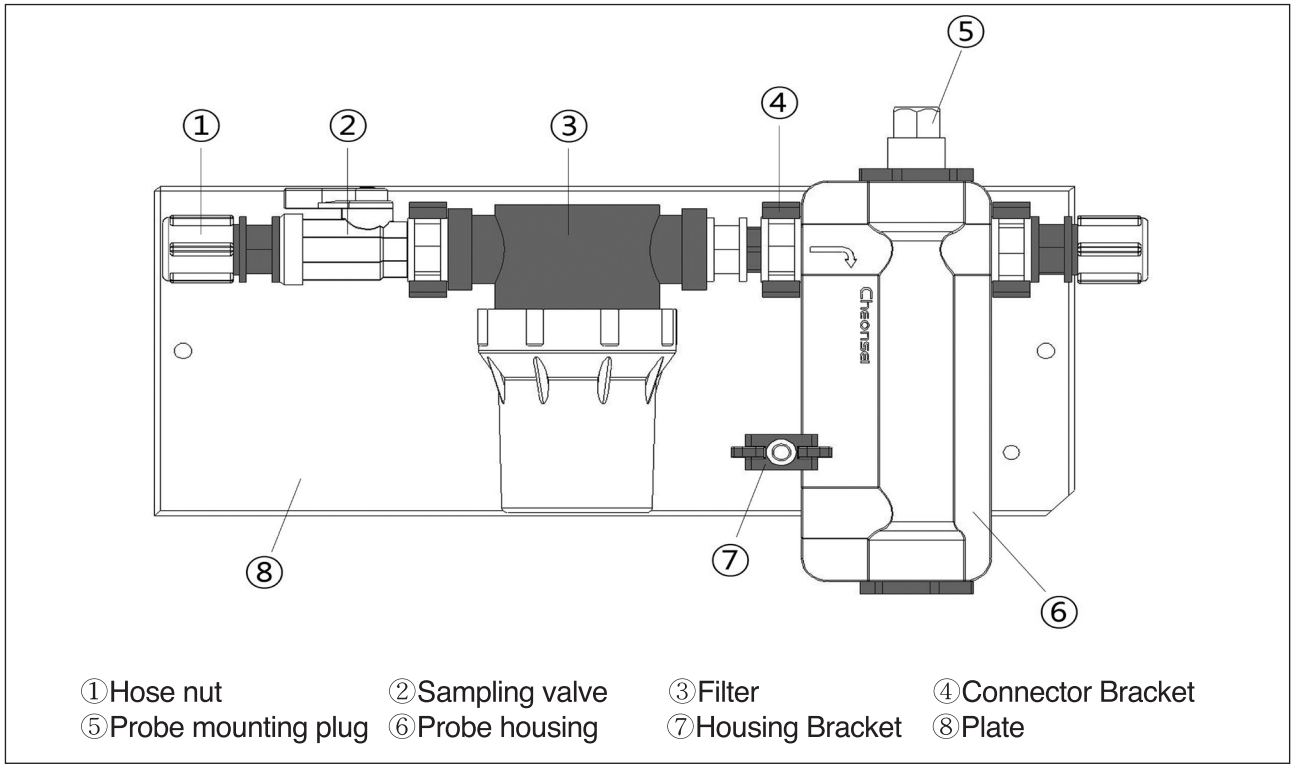
10-2 Electrode Holder type



11 Handling of Components

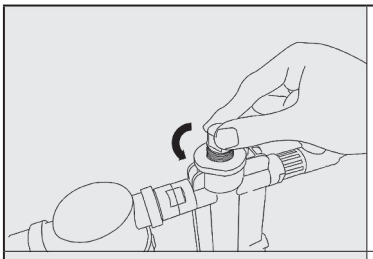
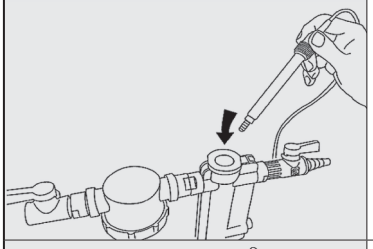
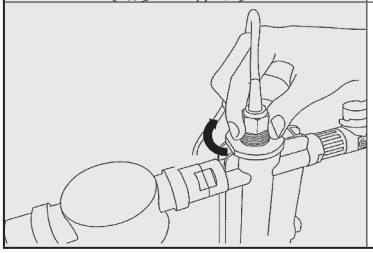
※ This includes only standard components.

11-1 Sampling holder set composition



※ Refer '11-3' structure and name of each part for details.

11-2 How to assemble sampling holder and probe

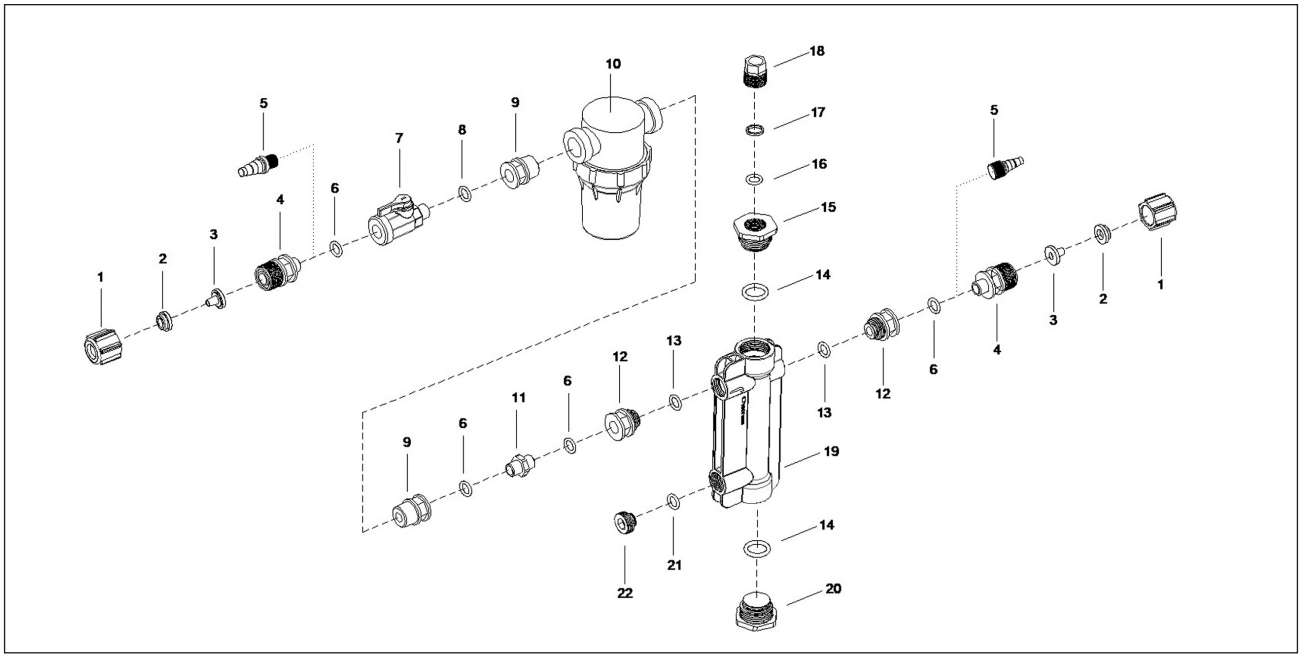
	• Remove the electrode mounting plug which is assembled to probe housing. ※ Other probe assembly is different to CPR11, so refer the manual for the electrodes.
	• Insert the probe in probe housing.
	• Complete the assembling by fixing the probe mounting plug.

⚠ Caution

- Be careful not to apply excessive force when handling the probe. If the glass probe is broken by excessive force, it may cause injury.

11-3 Structure and Name of each part

Ⅰ Housing set

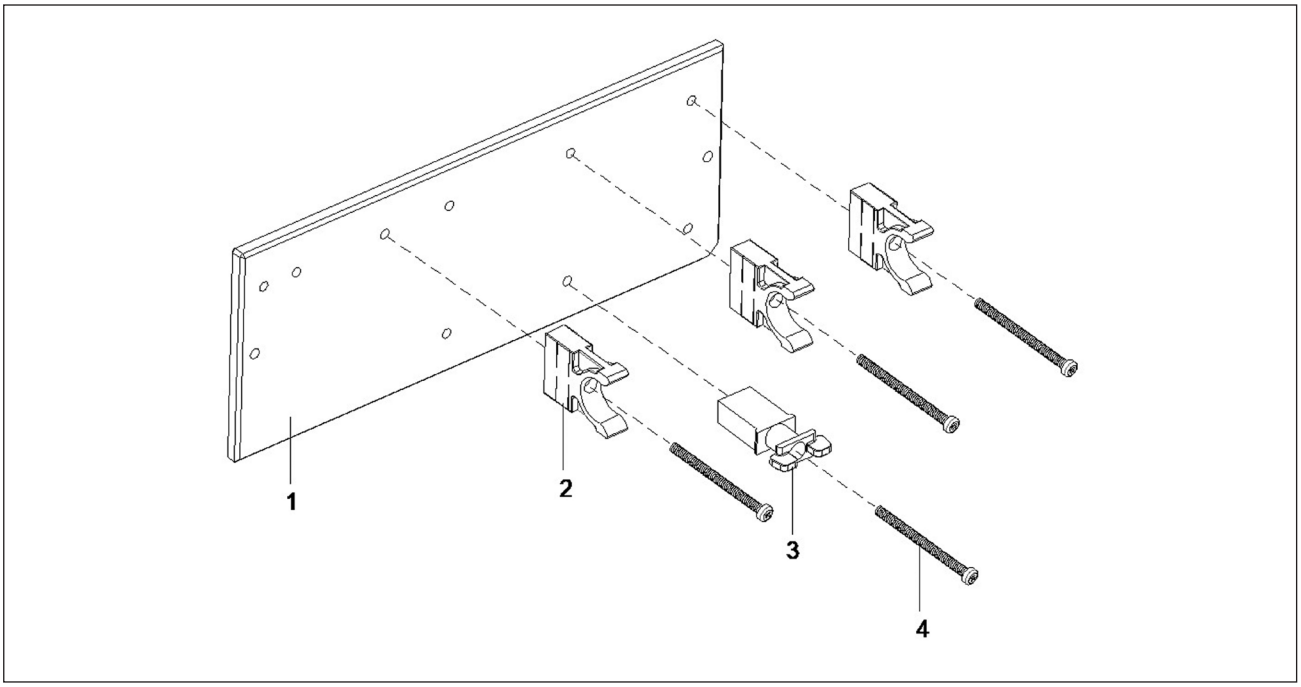


No.	Name	Q'ty
1	Hose nut	2
2	Clamp ring	2
3	Hose adaptor	2
4	Hose connector	2
5	Nozzle	1
6	O-ring	4
7	Sampling valve	1
8	O-ring	1
9	Filter connector	2
10	Filter	1
11	Nipple	1

No.	Name	Q'ty
12	Housing connector	2
13	O-ring	2
14	O-ring	2
15	probe plug	1
16	O-ring	1
17	Clamp ring	1
18	probe mounting plug	1
19	Probe housing	1
20	Drain plug	1
21	O-ring	1
22	Housing plug	1

※ The suction and discharge of housing set can use both hose joint type and nozzle type.
Standard is hose joint type, and 1pc of nozzle is supplied as an additional part.

2 Plate set



No.	Name	Q'ty
1	Fixing plate	1
2	Connector bracket	3
3	Housing bracket	1
4	Bolt	4

12 Cause & Solution of Problem

	Problem	Number of Cause & Solution
A	E.01 on screen (Circuit board is not connected)	1, 2
B	E.02 on screen (Electrode is not calibrated)	3, 4, 9
C	Reading on screen is not changed	3, 4, 5, 6, 7, 9
D	Measuring is difficult because reading is not steady	3, 5, 6, 7, 9
E	The displayed temp. is far different from the actual temperature. (over ±5°C)	8

NO.	Cause	Solution
1	Faulty circuit board connection	Repair the controller
2	Damaged circuit board	Repair the controller
3	Damaged electrodes & Electrode's aging	Exchange electrode
4	Shortage of Electrode solution	Supplement of internal liquid
5	Faulty connection of controller's terminal	Connecting terminal after removing obstacle
6	Fault of liquid to be measured	Exchange the measuring liquid
7	The fluid velocity of liquid to be measured is not steady	Makes the fluid velocity steady
8	Fault of temp. compensation circuit	Exchange temp. compensation PCB
9	Damaged electrode membrane & electrode membrane aging	Exchange electrode membrane

13 Warranty

⚠ Caution

- If the product is reconstructed arbitrarily or the undesignated parts are used into the product, CHEONSEI will not warrant and CHEONSEI is not responsible for any expense caused by accident or trouble.

1 Warranty period is one year from purchase date.
2 During warranty period, repair or change of pump is free of charge, if trouble or damage of pump due to design or manufacturing of CHEONSEI.(Consumable parts are excluded)

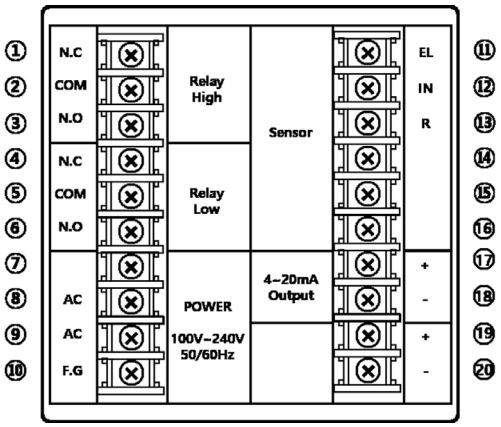
3 Repair or change product due to following reasons will be charged regardless the warranty period.
① Trouble or damage of pump expired warranty period.
② Trouble of using by careless handling.
③ Trouble or damage due to using non-designated part & reconstructing the products arbitrarily.
④ Trouble or damage due to reconstructing the products by other than CHEONSEI and our authorized company.
⑤ Trouble by fire or natural disaster

14 Repair Service

> ⚠ Caution
> • When the product is sent to factory for repair service, do not damage during transport.
> Also, please make sure that bolts and other components are securely fastened in order not to loss it.

1 Contact to CHEONSEI or local agent as shown on back of the manual, if you have any problem or questions.
2 If you want to repair, please inform the following.
① Model Name & manufacture number written in name plate
② Used period, using condition, & state
3 If warranty period is over, it may charge according to repair part. Please contact with sales agent for more information.
4 Minimum retention period of parts for repair is 5 years from the date of production.

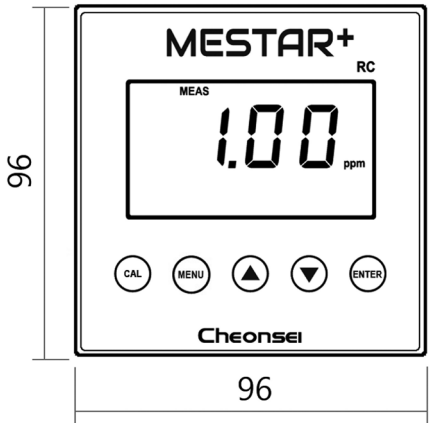
15 Controller Wiring



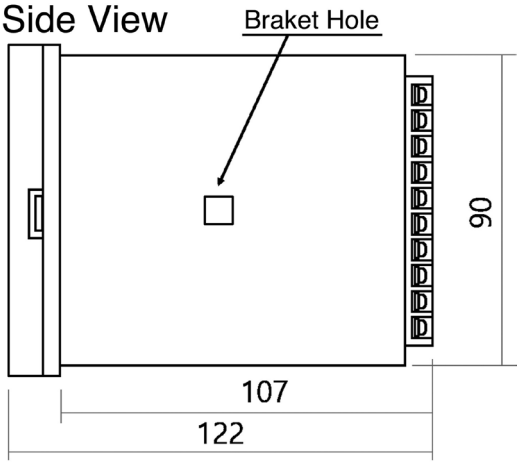
①HIGH Alarm N.C(Normal Close)
②HIGH Alarm COM(Common)
③HIGH Alarm N.O(Normal Open)
④LOW Alarm N.C(Normal Close)
⑤LOW Alarm COM(Common)
⑥LOW Alarm N.O(Normal Open)
⑦None
⑧AC input power
⑨AC input power
⑩F.G(Frame Ground)
⑪Electrode EL
⑫Electrode IN
⑬Electrode R
⑭None
⑮None
⑯None
⑰RC analog output +
⑱RC analog output -
⑲None
⑳None

16 Controller Dimension

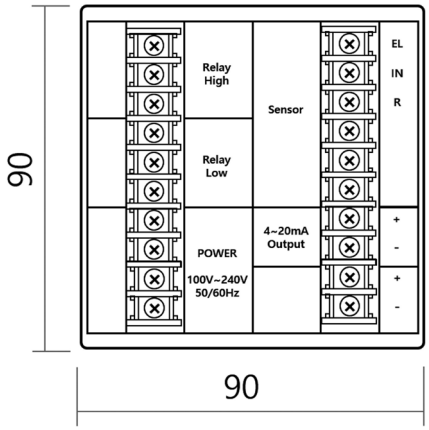
Front view



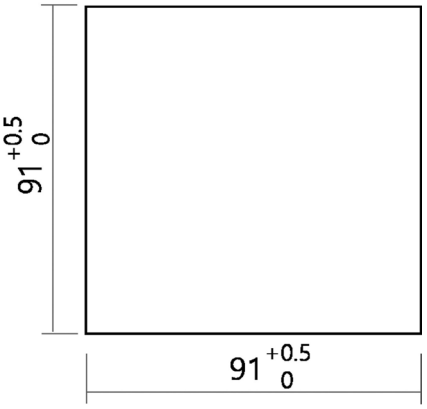
Side View



Rear View



Section View



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