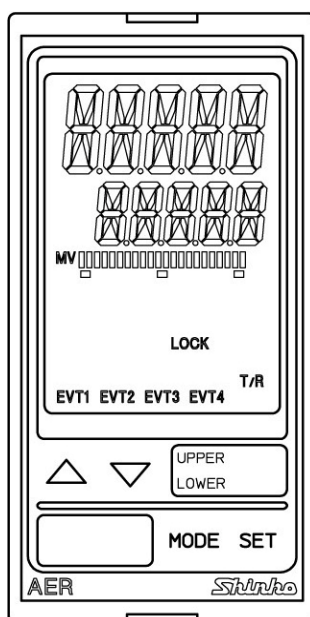


Digital Indicating pH Meter

AER-102-PH

Instruction Manual



Shinko

Preface

Thank you for purchasing our AER-102-PH, Digital Indicating pH Meter.

This manual contains instructions for the mounting, functions, operations and notes when operating the AER-102-PH. To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.

To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

Characters Used in This Manual

Indication	-	0	1	2	3	4	5	6	7	8	9	°C	°F
Number, °C/°F	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Indication	A	b	c	d	E	F	G	H	I	J	K	L	M
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Indication	N	o	P	Q	R	S	T	U	V	W	X	Y	Z
Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Caution

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow all of the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- The contents of this instruction manual are subject to change without notice.
- Care has been taken to assure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- This instrument is designed to be installed within a control panel. If it is not, measures must be taken to ensure that the operator cannot touch power terminals or other high voltage sections.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos Co., Ltd. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damage.

Safety Precautions (Be sure to read these precautions before using our products.)

The safety precautions are classified into 2 categories: “Warning” and “Caution”.

Depending on the circumstances, procedures indicated by ⚠ Caution may cause serious results, so be sure to follow the directions for usage.



Warning Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.



Caution Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.



Warning

- To prevent an electric shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to the instrument, parts replacement may only be undertaken by Shinko or other qualified service personnel.

SAFETY PRECAUTIONS

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protective equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Caution with respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument. In the case of resale, ensure that this instrument is not illegally exported.

1. Installation Precautions



Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current is flowing.
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
- If the AER-102-PH is mounted through the face of a control panel, the ambient temperature of the unit - not the ambient temperature of the control panel - must be kept to under 50°C. Otherwise the life of electronic parts (especially electrolytic capacitors) of the unit will be shortened.

Note: Do not install this instrument on or near flammable material even though the case of this instrument is made of flame-resistant resin.

2. Wiring Precautions



Caution

- Do not leave wire remnants in the instrument, because they could cause a fire or a malfunction.
- Use a solderless terminal with an insulation sleeve in which the M3 screw fits when wiring the AER-102-PH.
- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.
- Tighten the terminal screw using the specified torque. If excessive force is applied to the screw when tightening, the terminal screw may be damaged.
- This instrument does not have a built-in power switch, circuit breaker or fuse.
It is necessary to install them near the instrument.
(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- For a 24V AC/DC power source, do not confuse polarity when using direct current (DC).
- Be sure to terminate the ground terminal (D-class grounding) for safety.
Keep the grounding of this unit separate from other electrical devices such as motors.
- Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor.
- Use the pH combination electrode sensor in accordance with the sensor input specifications of the AER-102-PH.
- Keep the input wires and power line separate.

Note about the pH Combination Electrode Sensor Cable

The pH combination electrode sensor cable is a highly-insulated (electrical) cable. Please handle it with utmost care as follows.

- Do not allow terminals and socket of the pH combination electrode sensor cable to come in contact with moisture or oil of any kind. Likewise, ensure fingers are clean, otherwise the insulation will deteriorate, resulting in unstable indication.

Be sure to keep the cable dry and clean at all times.

If the cable is stained, clean it with alcohol, and dry it completely.

- For standard solution calibration or electrode checking/replacement, the pH combination electrode sensor cable should be wired with sufficient length.
- Keep the pH combination electrode sensor cable and junction cable away from devices such as motors or their power lines from which inductive interference emanates.

Connection

The pH combination electrode sensor cable has the following terminals.

Symbol	Terminal
G	Glass electrode terminal
R	Reference electrode terminal
T, T	Temperature compensation electrode terminal (Cu500)
A, B, B	Temperature compensation electrode terminal (Pt100)
E	Shielded wire terminal

For the pH combination electrode sensor with No Temperature Compensation, T, T or A, B, B cables are not available.

E cables are available depending on the sensor type.

3. Operation and Maintenance Precautions



Caution

- Do not touch live terminals. This may cause an electric shock or problems in operation.
- Turn the power supply to the instrument OFF when retightening the terminal or cleaning.

Working on or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.

- Use a soft, dry cloth when cleaning the instrument.
(Alcohol based substances may tarnish or deface the unit.)
- As the display section is vulnerable, do not strike or scratch it with a hard object or put pressure on it.

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1. Model

1.1 Model

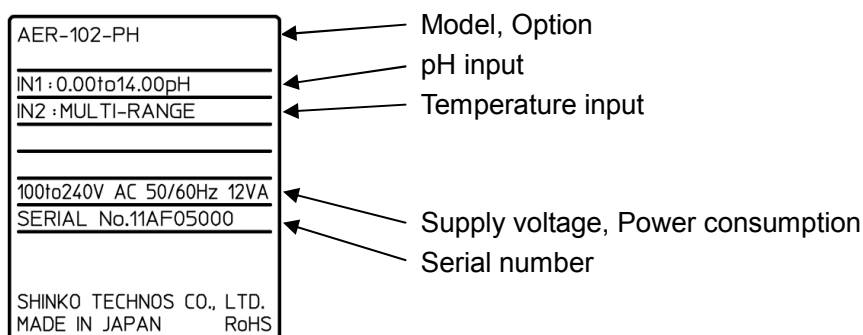
A E R - 1 0	2-	PH	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Input Points	2				2 points
Input		PH			pH combination electrode sensor (Cu500/25°C or Pt100)
Supply Voltage					100 to 240V AC (standard)
		1			24V AC/DC (*)
Option			C5		Serial communication RS-485
			EVT3		EVT3, EVT4 Output (contact output 3, 4)

(*) Supply voltage 100 to 240V AC is standard.

When ordering 24V AC/DC, enter “1” after the input code.

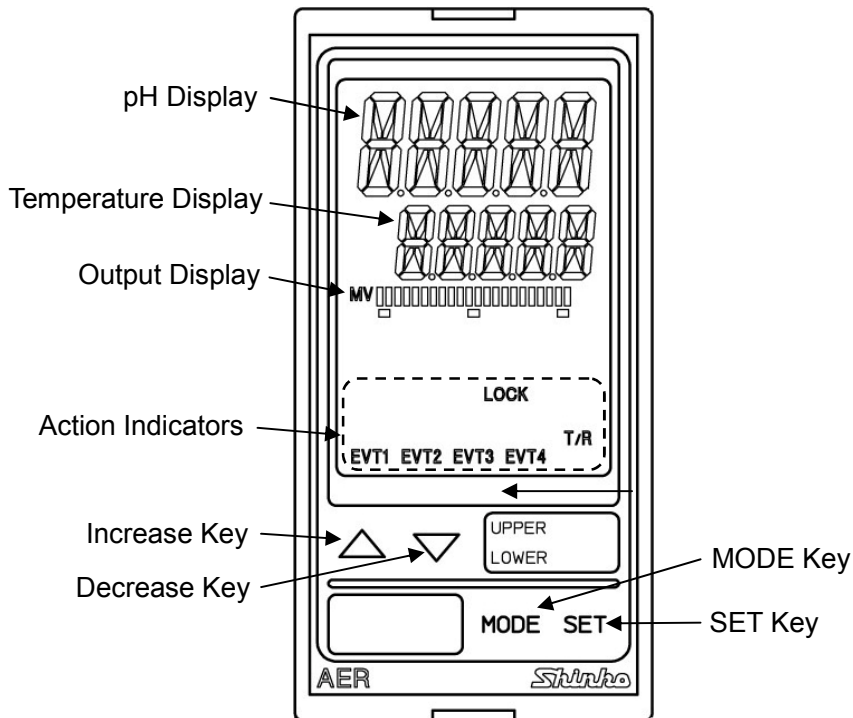
1.2 How to Read the Model Label

The model label is attached to the left side of the case.



(Fig. 1.2-1)

2. Name and Functions of Sections



(Fig. 2-1)

Displays

pH Display:

pH or setting characters in the setting mode are indicated with the red/green/orange LED.

Indications differ depending on the selections during [Backlight Selection (p.43)] and [pH color (p.43)].

Temperature Display:

Temperature or set values in the setting mode are indicated with the green LED.

Indications differ depending on the selections during [Backlight Selection (p.43)].

Output Display:

Backlight green

The bargraph is lit corresponding to the transmission output volume.

Action Indicators: Backlight orange

EVT1: Lit when EVT1 output (contact output 1) is ON.

EVT2: Lit when EVT2 output (contact output 2) is ON.

EVT3: Lit when EVT3 output (contact output 3) (EVT3 option) is ON.

EVT4: Lit when EVT4 output (contact output 4) (EVT3 option) is ON.

T/R: Lit during Serial communication (C5 option) TX output (transmitting).

LOCK: Lit when Lock 1, 2 or 3 is selected.

Keys

△ Increase Key: Increases the numeric value.

▽ Decrease Key: Decreases the numeric value.

MODE MODE Key: Selects a group.

SET SET Key: Switches the setting modes, and registers the set value.

3. Mounting to the Control Panel

3.1 Site Selection



Caution

Use within the following temperature and humidity ranges.

Temperature: 0 to 50°C (32 to 122°F) (No icing), Humidity: 35 to 85%RH (Non-condensing)

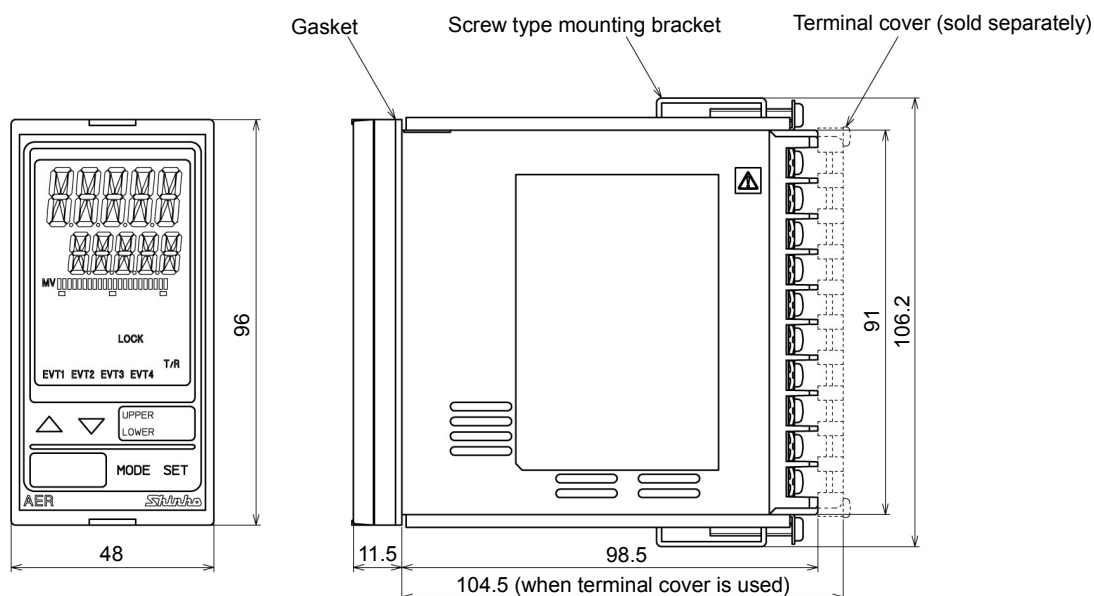
If AER-102-PH is mounted through the face of a control panel, the ambient temperature of the unit - not the ambient temperature of the control panel - must be kept to under 50°C, otherwise the life of electronic parts (especially electrolytic capacitors) of the unit will be shortened.

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit

3.2 External Dimensions (Scale: mm)



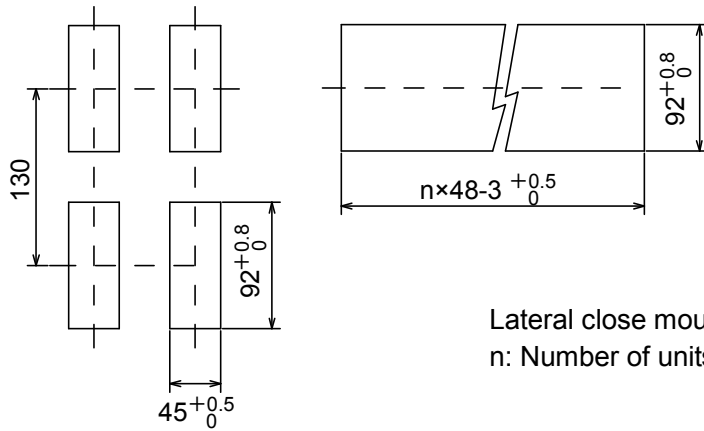
(Fig. 3.2-1)

3.3 Panel Cutout (Scale: mm)



Caution

If lateral close mounting is used for the unit, IP66 specification (Drip-proof/Dust-proof) may be compromised, and all warranties will be invalidated.



Lateral close mounting
n: Number of units mounted

(Fig. 3.3-1)

3.4 Mounting and Removal



Caution

As the case is made of resin, do not use excessive force while screwing in the mounting bracket, or the case or mounting brackets could be damaged. The torque should be 0.12N•m.

How to mount the unit

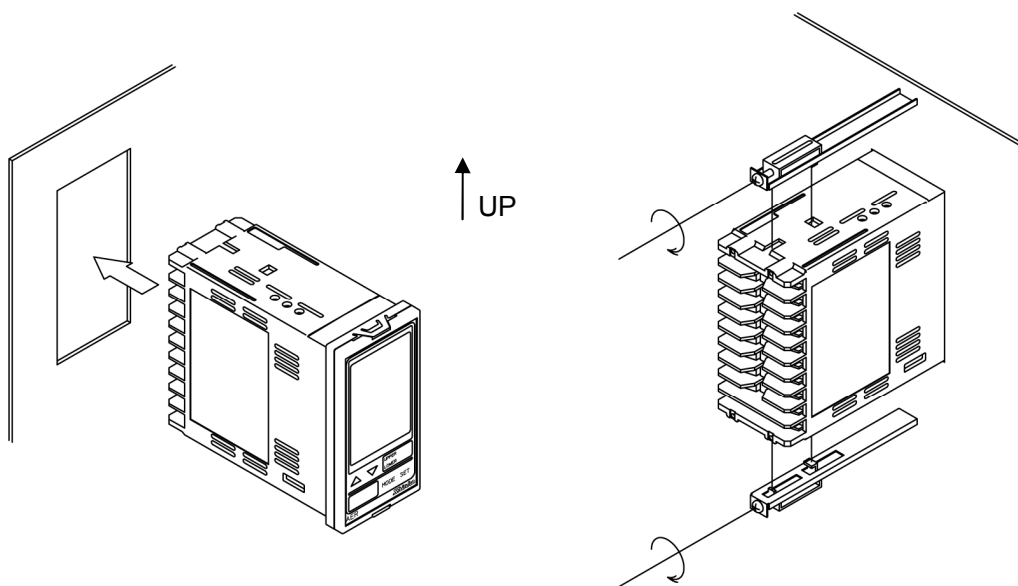
Mount the unit vertically to the flat, rigid panel to ensure it adheres to the Drip-proof/Dust-proof specification (IP66).

Mountable panel thickness: 1 to 8mm

- (1) Insert the unit from the front side of the panel.
- (2) Attach the mounting brackets by the holes at the top and bottom of the case, and secure the unit in place with the screws.

How to remove the unit

- (1) Turn the power to the unit OFF, and disconnect all wires before removing the unit.
- (2) Loosen the screws of the mounting brackets, and remove the mounting brackets.
- (3) Pull the unit out from the front of the panel.



(Fig. 3.4-1)

4. Wiring



Warning

Turn the power supply to the instrument off before wiring or checking.
Working on or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.



Caution

- Do not leave wire remnants in the instrument, because they could cause a fire or a malfunction.
- Use a solderless terminal with an insulation sleeve in which the M3 screw fits when wiring the AER-102-PH.
- Tighten the terminal screw using the specified torque. If excessive force is applied to the screw when tightening, the terminal screw may be damaged.
- This instrument does not have a built-in power switch, circuit breaker or fuse.
It is necessary to install them near the instrument.
(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- For a 24V AC/DC power source, do not confuse polarity when using direct current (DC).
- Be sure to terminate the ground terminal (D-class grounding) for safety.
Keep the grounding of this unit separate from other electrical devices such as motors.
- Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor.
- Use the pH combination electrode sensor in accordance with the sensor input specifications of this unit.
- Keep the input wires and power line separate.

Note about the pH Combination Electrode Sensor Cable

The pH combination electrode sensor cable is a highly-insulated (electrical) cable. Please handle it with utmost care as follows.

- Do not allow terminals and socket of the pH combination electrode sensor cable to come in contact with moisture or oil of any kind. Likewise, ensure fingers are clean, otherwise the insulation will deteriorate, resulting in unstable indication. Be sure to keep the cable dry and clean at all times. If the cable is stained, clean it with alcohol, and dry it completely.
- For standard solution calibration or electrode checking/replacement, the pH combination electrode sensor cable should be wired with sufficient length. Keep the pH combination electrode sensor cable and junction cable away from devices such as motors or their power lines from which inductive interference emanates.

Connection

The pH combination electrode sensor cable has the following terminals.

Symbol	Terminal
G	Glass electrode terminal
R	Reference electrode terminal
T, T	Temperature compensation electrode terminal (Cu500)
A, B, B	Temperature compensation electrode terminal (Pt100)
E	Shielded wire terminal

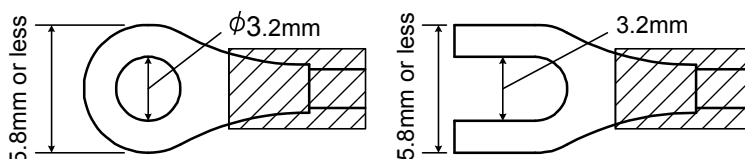
For the pH combination electrode sensor with No Temperature Compensation, T, T or A, B, B cables are not available.

E cables are available depending on the sensor type.

4.1 Lead Wire Solderless Terminal

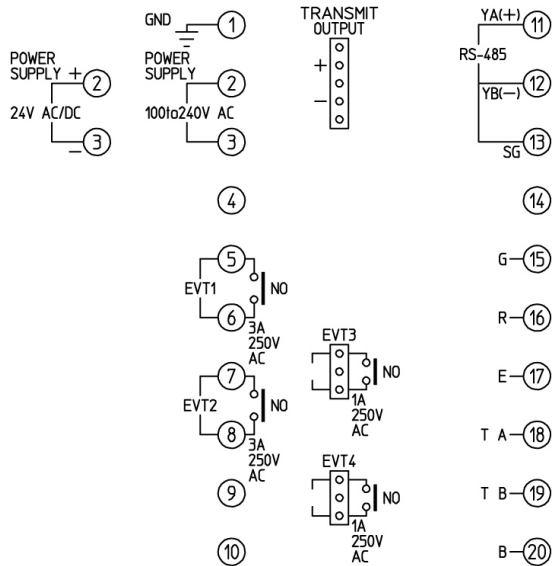
Use a solderless terminal with an insulation sleeve in which an M3 screw fits as follows. The tightening torque should be 0.63 N•m.

Solderless Terminal	Manufacturer	Model	Tightening Torque
Y type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25Y-3	0.63N•m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Ring type	Nichifu Terminal Industries CO.,LTD.	TMEV1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	



(Fig. 4.1-1)

4.2 Terminal Arrangement



(Fig. 4.2-1)

GND	Ground
POWER SUPPLY	100 to 240V AC or 24V AC/DC (when 1 is added after the model) For 24V DC, ensure polarity is correct.
EVT1	EVT1 output (contact output 1)
EVT2	EVT2 output (contact output 2)
TRANSMIT OUTPUT	Transmission output
G, R	Electrode sensor
E	Shielded wire terminal
T, T	Temperature compensation sensor (Cu500)
A, B, B	Temperature compensation sensor (Pt100) (For 2-wire type, use terminals 18 and 19.)
RS-485	Serial communication RS-485 (C5 option) 2 connectors are wired internally. Use the included wire harnesses C5J and C0J.
EVT3	EVT3 output (contact output 3) (EVT3 option) Use the included wire harness HBJ.
EVT4	EVT4 output (contact output 4) (EVT3 option) Use the included wire harness HBJ.

5. Outline of Key Operation and Setting Groups

5.1 Outline of Key Operation

There are 2 setting modes: Simple Setting mode, and Group Selection mode in which setting items are divided into groups.

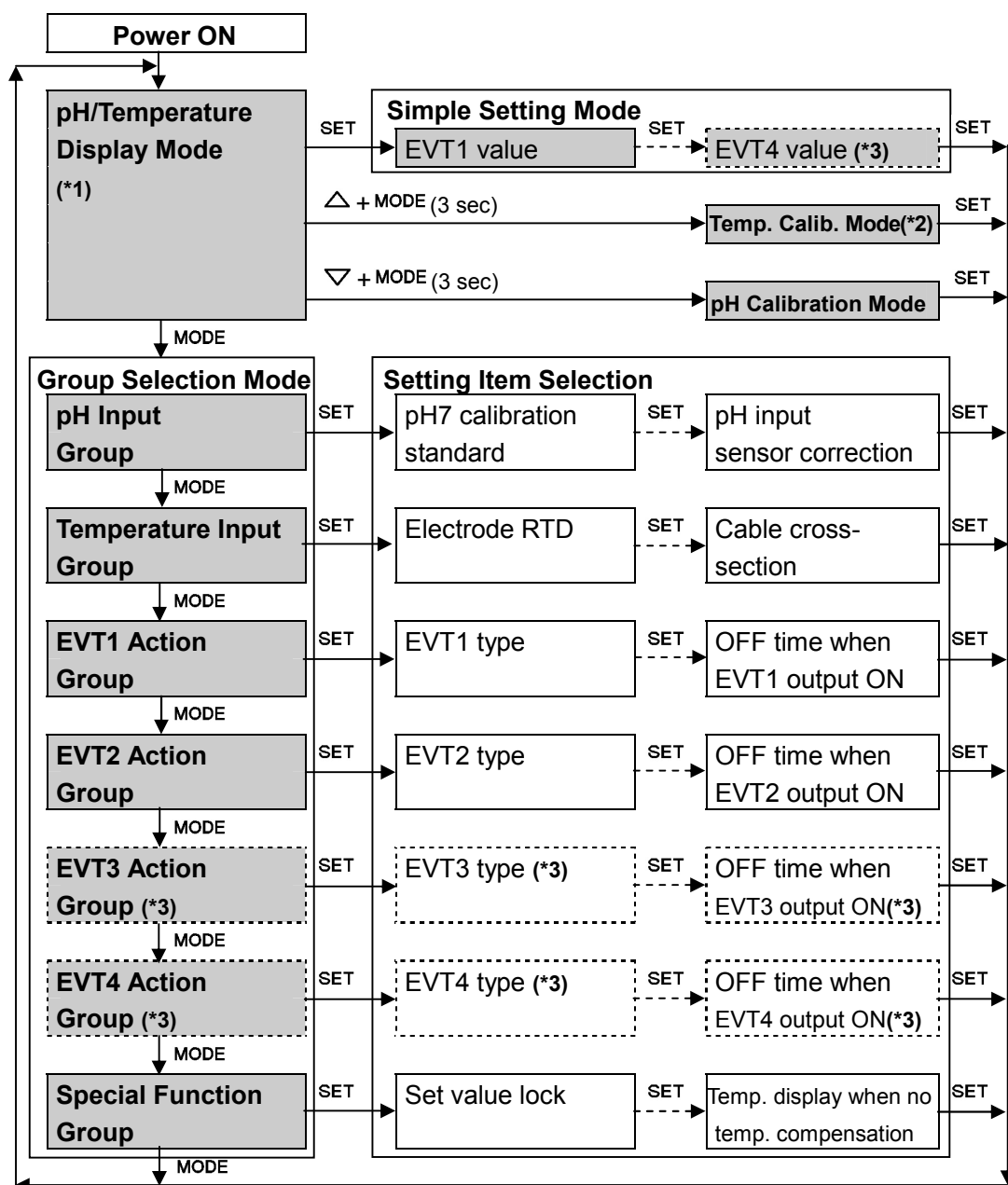
To enter the Simple setting mode, press the **SET** key in the pH/Temperature display mode.

To enter the Group Selection mode, press the **MODE** key in the pH/Temperature display mode.

Select a group with the **MODE**, and press the **SET** key. The unit enters each setting item.

To set each setting item, use the Δ or ∇ , and register the set value with the **SET** key.

5.2 Setting Groups



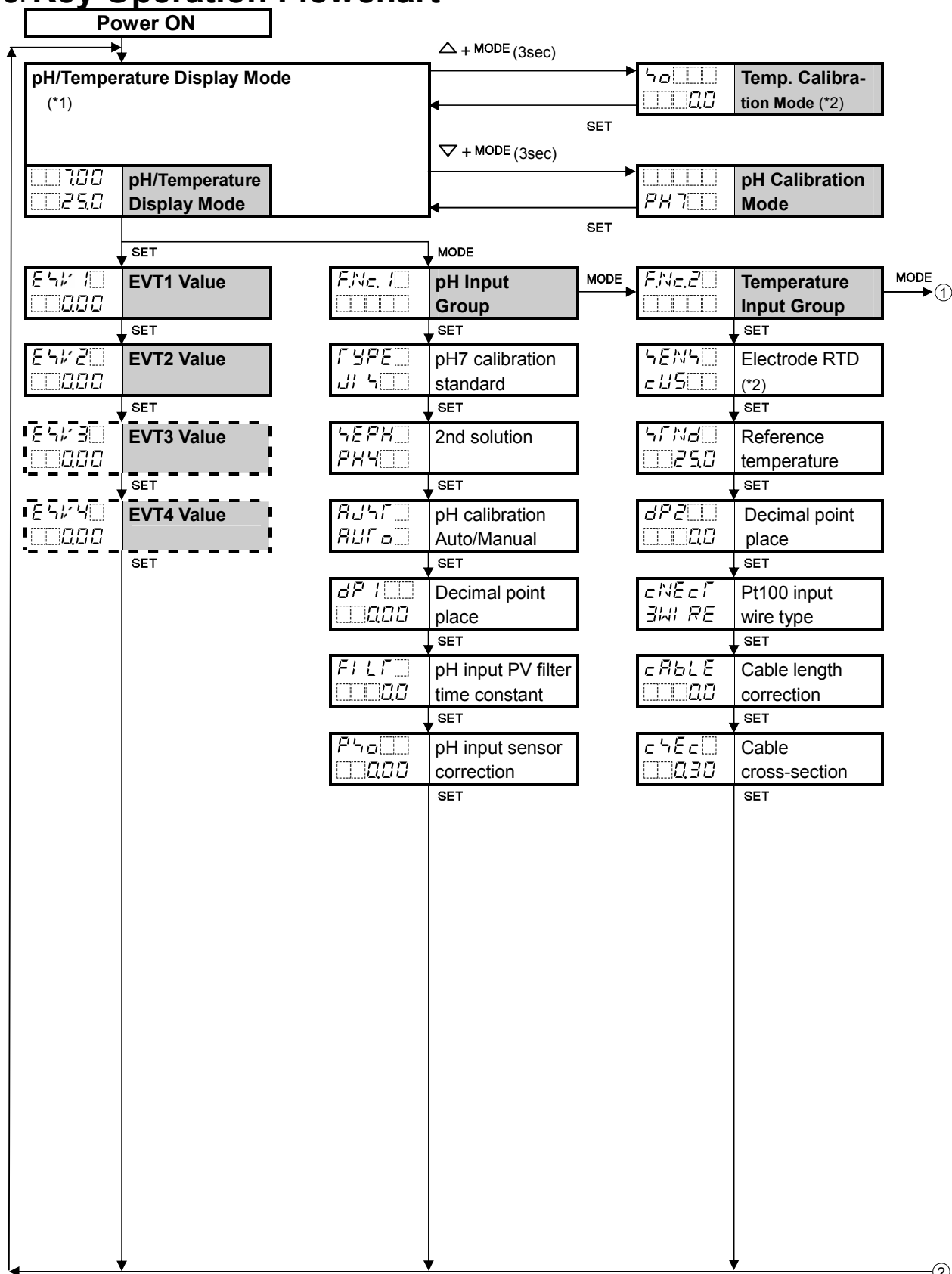
[pH/Temperature Display mode, Temperature Calibration mode]

- (*1) In the pH/Temperature Display mode, indicates the item selected during [Backlight selection (p.43)] in the Special function group, and measurement starts.
- (*2) If *NONE* (No temperature compensation) is selected during [Electrode RTD (p.24)] in the Temperature input group, the unit does not move to the Temperature calibration mode.
- (*3) Setting groups and items with dotted lines are indicated only when the EVT3 option is added.

[Key Operation]

- \triangle + MODE (3 sec): If the MODE key is held down for 3 seconds while the \triangle key is pressed, the unit will proceed to the Temperature Calibration Mode.
- ∇ + MODE (3 sec): If the MODE key is held down for 3 seconds while the ∇ key is pressed, the unit will proceed to the pH Calibration Mode.
- MODE, SET: If the MODE or SET key is pressed, the unit will proceed to the next setting item indicated by an arrow.
- $\xrightarrow{\text{SET}}$: This means "Press the SET key until the desired setting mode appears".
- If the MODE key is held down for 3 seconds at any setting item, the unit will revert to the pH/Temperature display mode.

6. Key Operation Flowchart



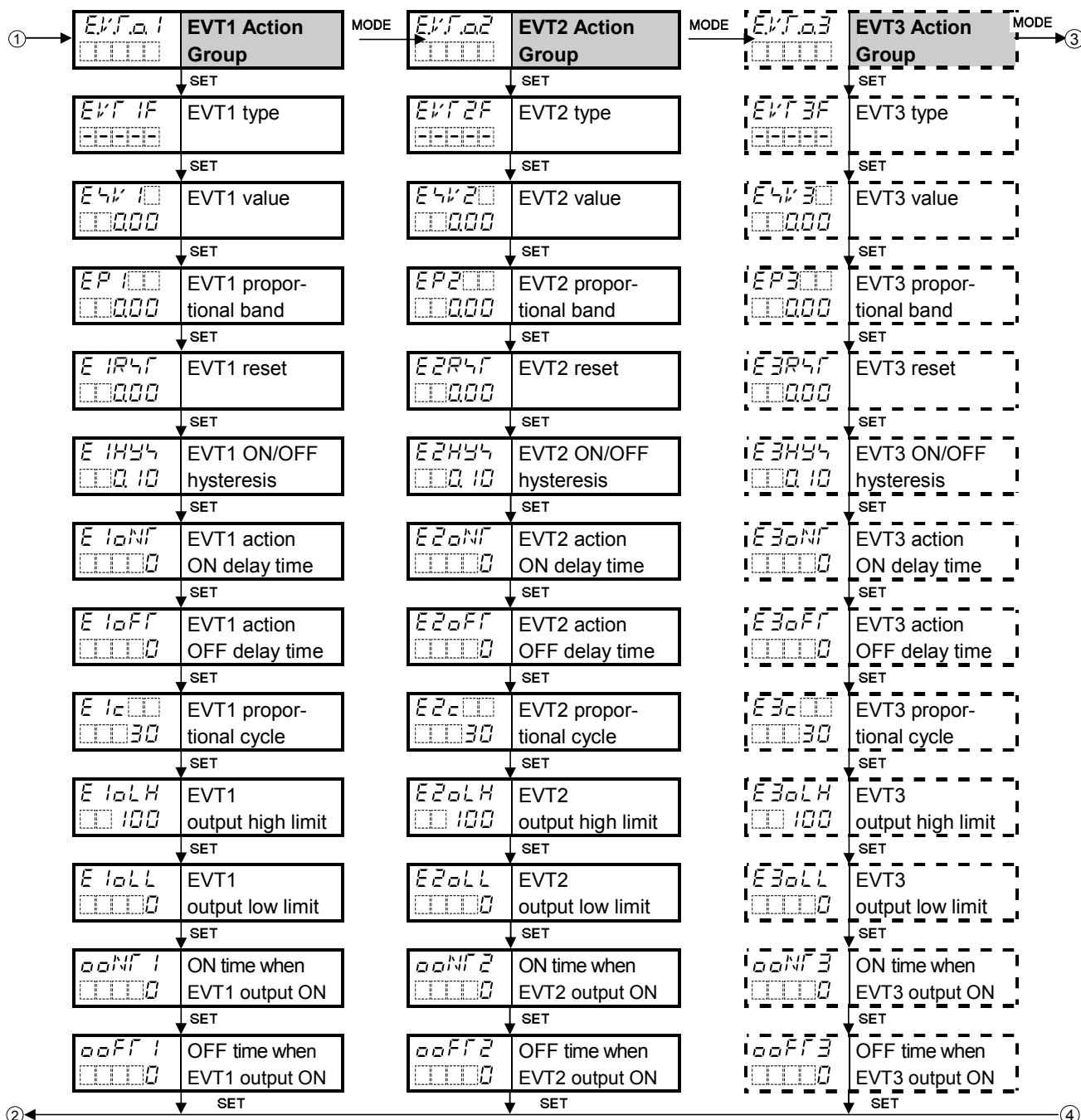
[pH/Temperature display mode, Temperature calibration mode]

(*1) Indicates the item selected during [Backlight selection (p.43)] in the Special function group, then measurement starts.

(*2) If *NONE* (No temperature compensation) is selected during [Electrode RTD (p.24)] in the Temperature input group, the unit does not move to the Temperature calibration mode.

[Setting groups and items with dotted lines]

Setting groups and items with dotted lines are indicated only when the options are added.



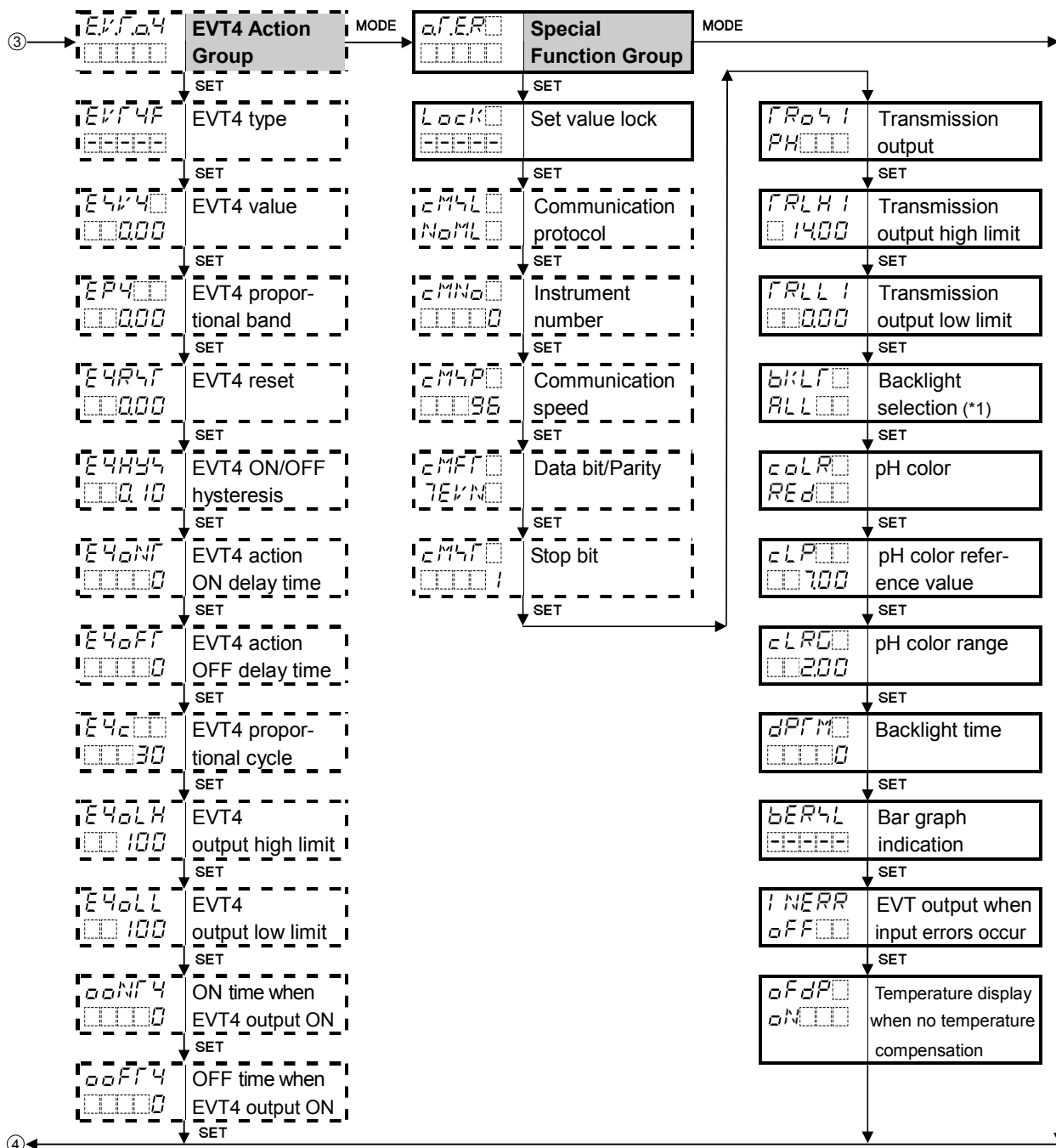
[About Setting Items]

EVT1	EVT1 value
0.00	

- Upper left: pH Display: Indicates the setting item characters.
- Lower left: Temperature Display: Indicates factory default value.
- Right side: Indicates the setting item.

[About Key Operation]

- Δ +MODE (3sec): If MODE is pressed for 3 sec while Δ is pressed, the unit will enter the next setting item.
- ∇ +MODE (3sec): If MODE is pressed for 3 sec while ∇ is pressed, the unit will enter the next setting item.
- MODE, SET: If MODE or SET is pressed, the unit will enter the next setting item.
- If MODE is held down for 3 sec at any setting item, the unit will return to the pH/Temperature display mode.



7. Setup

Setup should be done before using this instrument, to select pH input, Temperature input, EVT1, EVT2, EVT3 (EVT3 option) and EVT4 (EVT3 option) types, Communication (C5 option), Transmission output, and Indication settings (Backlight selection, pH color, etc.), according to the users' conditions.

Setup can be conducted in the pH Input Group, Temperature Input Group, EVT1, EVT2, EVT3, EVT4 Action Groups and Special Function Group.

If the users' specification is the same as the default value of the AER-102-PH, or if setup has already been complete, it is not necessary to set up the instrument. Proceed to Chapter "8. Calibration (p.45)".

7.1 Turn the Power Supply to the AER-102-PH ON.

For approx. 2 seconds after the power is switched ON, the following characters are indicated on the pH Display and Temperature Display.

pH Display	Temperature Display	Selection Item in [Electrode RTD (p.24)]
PH□□□	Unlit	NONE□ : No temperature compensation
	CUS□□	CUS□□ : Cu500
	PT□□□	PT□□□ : Pt100

During this time, all outputs are in OFF status, and LED indicators go off. After that, the item selected during [Backlight selection (p.43)] is indicated, and measurement starts. This status is called pH/Temperature display mode.

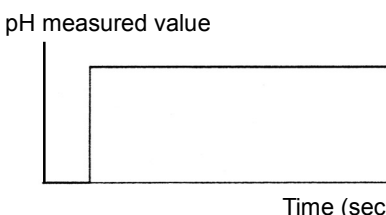
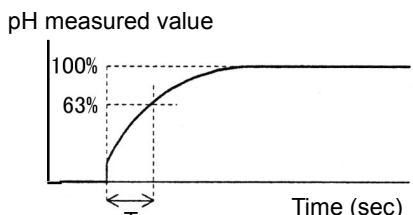
7.2 pH Input Group

To enter the pH input group, follow the procedures below.

- ① **FUNC** Press the **MODE** key once in the pH/Temperature display mode.
- ② **TYPE** Press the **SET** key once.

The unit proceeds to the pH input group, and “pH 7 calibration standard” item is indicated.

Character	Name, Function, Setting Range	Factory Default Value
TYPE <input type="text"/> J1 <input type="text"/>	pH 7 calibration standard <ul style="list-style-type: none"> • Selects pH7 calibration value standard. • J1 <input type="text"/> : JIS • U1 <input type="text"/> : US standard 	JIS
2EPH <input type="text"/> PH4 <input type="text"/>	2nd solution <ul style="list-style-type: none"> • Selects the 2nd solution for the automatic pH calibration out of pH 2, pH 4, pH 9 and pH 10 (JIS). [The 1st solution is fixed as pH 7 (JIS or US standard).] • Not available if MANU <input type="text"/> (Manual) is selected during [pH calibration Auto/Manual]. • PH2 <input type="text"/> : pH 2 • PH4 <input type="text"/> : pH 4 • PH9 <input type="text"/> : pH 9 • PH10 <input type="text"/> : pH 10 	pH 4
ADJ <input type="text"/> AUT <input type="text"/>	pH calibration Auto/Manual <ul style="list-style-type: none"> • Selects either automatic or manual pH calibration. • AUT <input type="text"/> : Automatic • MANU <input type="text"/> : Manual 	Automatic
dP <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Decimal point place <ul style="list-style-type: none"> • Selects the decimal point place. • <input type="text"/><input type="text"/><input type="text"/><input type="text"/> : No decimal point • <input type="text"/><input type="text"/><input type="text"/><input type="text"/> : 1 digit after decimal point • <input type="text"/><input type="text"/><input type="text"/><input type="text"/> : 2 digits after decimal point 	2 digits after decimal point

Character	Name, Function, Setting Range	Factory Default Value
F1 L F <input type="text"/> <input type="text"/> <input type="text"/> 00	pH input PV filter time constant <ul style="list-style-type: none"> Sets PV filter time constant for pH input. <p>Even when pH measured value before PV filter process changes as shown in (Fig. 7.2-1), if the PV filter time constant “T” is set, the pH measured value changes as shown in (Fig. 7.2-2) so that pH measured value after finishing PV filter process can reach 63% (of the desired PV) after T seconds have passed.</p> <p>If the PV filter time constant is set too large, it affects EVT action due to the delay of response.</p> <p>(e.g.) In case the LSD of the pH measured value prior to PV filter process is fluctuating, it can be suppressed by using the PV filter time constant.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>(Fig. 7.2-1)</p> </div> <div style="text-align: center;">  <p>(Fig. 7.2-2)</p> </div> </div> <ul style="list-style-type: none"> Setting range: 0.0 to 60.0 sec 	0.0 sec
P4 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> 000	pH input sensor correction <ul style="list-style-type: none"> Sets pH input sensor correction value. <p>This corrects the input value from the pH Combination Electrode Sensor. When a sensor cannot be set at the exact location where measurement is desired, pH measured by the sensor may deviate from the pH in the measured location. In this case, desired pH can be obtained by adding sensor correction values.</p> <p>pH after sensor correction= Current pH+ (Sensor correction value)</p> <ul style="list-style-type: none"> Setting range: -1.40 to 1.40 (The placement of the decimal point does not follow the selection, but is fixed.) 	0.00

7.3 Temperature Input Group

To enter the Temperature Input group, follow the procedures below.

- ① $FNc.2$ Press the **MODE** key twice in the pH/Temperature display mode.
- ② $4EN4$ Press the **SET** key.

The unit enters the Temperature input group, and “Electrode RTD” item will appear.

Character	Name, Function, Setting Range	Factory Default Value
$4EN4$ $cU5$	Electrode RTD <ul style="list-style-type: none"> • Selects RTD type of the electrode. • $NONE$: No temperature compensation $cU5$: Cu500 Pt : Pt100 	Cu500
$4FNd$ 25.0	Reference Temperature <ul style="list-style-type: none"> • Sets reference temperature of temperature compensation. • Not available if $cU5$ (Cu500) or Pt (Pt100) is selected during [Electrode RTD]. Setting range: 5.0 to 95.0°C 	25.0°C
$dP2$ 0.00	Decimal Point Place <ul style="list-style-type: none"> • Selects decimal point place. • 0.0000 : No decimal point 0.000 : 1 digit after decimal point 	1 digit after decimal point
$cNEcF$ $3WI RE$	Pt100 Input Wire Type <ul style="list-style-type: none"> • Selects the input wire type when Pt100 is selected during [Electrode RTD]. • If $NONE$ (No temperature compensation) or $cU5$ (Cu500) is selected during [Electrode RTD], this item and all following items will not appear. • $2WI RE$: 2-wire type $3WI RE$: 3-wire type 	3-wire type
$cABLE$ 0.00	Cable Length Correction <ul style="list-style-type: none"> • Sets the cable length correction value. • If $3WI RE$ (3-wire type) is selected during [Pt100 Input Wire Type], this item and the following item will not appear. • Setting range: 0.0 to 100.0m 	0.0m
$c4Ec$ 0.30	Cable Cross-section <ul style="list-style-type: none"> • Sets the cable cross-section area. • Setting range: 0.10 to 2.00mm² 	0.30mm ²

7.4 EVT1 Action Group



To enter the EVT1 action group, follow the procedures below.

- ① *EVT1* Press the **MODE** key 3 times in the pH/Temperature display mode.
- ② *EVT1 IF* Press the **SET** key.



The unit proceeds to the EVT1 action group, and “EVT1 type” is indicated.

Character	Name, Function, Setting Range	Factory Default Value									
<i>EVT1 IF</i> [---][---]	EVT1 type	No action									
	<ul style="list-style-type: none"> • Selects an EVT1 output (contact output 1) type. • Note: If EVT1 type is changed, EVT1 value defaults to 0.00 or 0.0. • If <i>NONE</i> [] (No temperature compensation) is selected during [Electrode RTD (p.24)], even if Temperature input low limit or Temperature input high limit is selected, EVT1 action will be disabled. • [] : No action • <i>PH_L</i> [] : pH input low limit • <i>PH_H</i> [] : pH input high limit • <i>TEMP_L</i> [] : Temperature input low limit • <i>TEMP_H</i> [] : Temperature input high limit • <i>ERROR</i> [] : Error output [When the error type is “Error” (Table 7.4-1) (p.26), the output is turned ON.] • <i>FAIL</i> [] : Fail output [When the error type is “Fail” (Table 7.4-1) (p.26), the output is turned ON.] 										
	<ul style="list-style-type: none"> • EVT1 Action 										
	<table border="1"> <thead> <tr> <th>EVT1 Type</th><th>P Action</th><th>ON/OFF Action</th></tr> </thead> <tbody> <tr> <td>pH input low limit, Temperature input low limit</td><td> <p>EVT1 proportional band</p> </td><td> <p>Hysteresis</p> </td></tr> <tr> <td>pH input high limit, Temperature input high limit</td><td> <p>EVT1 proportional band</p> </td><td> <p>Hysteresis</p> </td></tr> </tbody> </table>	EVT1 Type	P Action	ON/OFF Action	pH input low limit, Temperature input low limit	<p>EVT1 proportional band</p>	<p>Hysteresis</p>	pH input high limit, Temperature input high limit	<p>EVT1 proportional band</p>	<p>Hysteresis</p>	
EVT1 Type	P Action	ON/OFF Action									
pH input low limit, Temperature input low limit	<p>EVT1 proportional band</p>	<p>Hysteresis</p>									
pH input high limit, Temperature input high limit	<p>EVT1 proportional band</p>	<p>Hysteresis</p>									

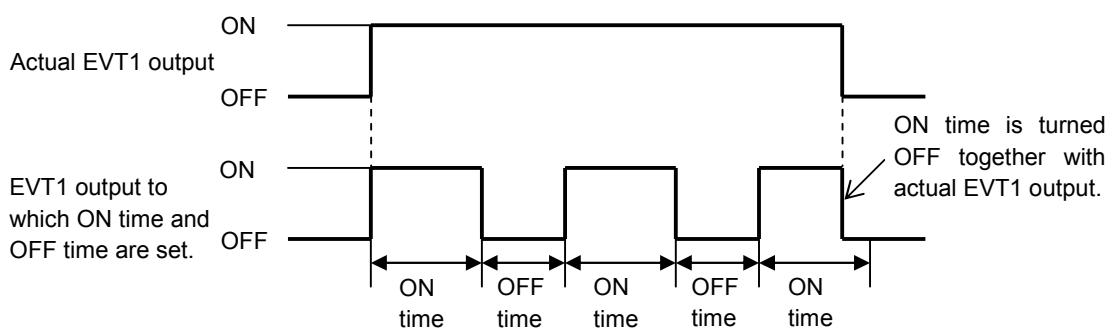
(Fig. 7.4-1)

Character	Name, Function, Setting Range	Factory Default Value	
	• Error output, Fail output (Table 7.4-1)		
	Error Type	Error Contents	Description
	Error	Response Speed Error	When calibrating the standard solution, the response of the pH Combination Electrode Sensor is slow. With the 1st and 2nd solutions, when ± 0.10 pH or more of input fluctuation within ± 1.50 pH continues for 5 minutes.
	Error	Electrode Sensitivity Error	When calibrating the standard solution, sensitivity of the pH Combination Electrode Sensor is deteriorating. The difference of calibration value between the 1st and the 2nd point is 2.00 pH or less.
	Error	Asymmetry Potential Error	When calibrating pH 7, the difference in electromotive force between the sensor measured value and standard value exceeds the equivalent of ± 1.50 pH.
	Error	Standard Solution Error	The specified standard solution has not been used. When ± 1.50 pH is exceeded for the 1st and 2nd solutions.
	Error	Solution Temperature Error	When temperature is 55°C or more at pH 10 solution.
	Error	Outside Temp. Compensation Range	Measured temperature has exceeded 110°C.
	Error	Outside Temp. Compensation Range	Measured temperature is less than 0°C.
	Fail	Temp. Sensor Disconnected	Temperature sensor lead wire is disconnected.
Fail	Temp. Sensor Short-circuited	Temperature sensor lead wire is short-circuited.	
	EVT1 value	pH input: 0.00 pH Temperature input: 0.0°C	
• Sets EVT1 value. If  (No action), <i>EROUT</i> (Error output) or <i>FAIL</i> (Fail output) is selected during [EVT1 type], this setting item and all following items will not appear. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C			

Character	Name, Function, Setting Range	Factory Default Value
<i>E P 1</i> <i>000</i>	EVT1 proportional band <ul style="list-style-type: none"> Sets EVT1 proportional band. ON/OFF action when set to 0.00 or 0.0. Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	pH input: 0.00 pH Temperature input: 0.0°C
<i>E 1R4</i> <i>000</i>	EVT1 reset <ul style="list-style-type: none"> Sets EVT1 reset value. Not available for the ON/OFF action. Setting range: pH input: ±4.00 pH Temperature input: ±10.0°C 	pH input: 0.00 pH Temperature input: 0.0°C
<i>E 1H4</i> <i>0.10</i>	EVT1 ON/OFF hysteresis <ul style="list-style-type: none"> Sets EVT1 ON/OFF hysteresis. Not available for the P action. Setting range: pH input: 0.01 to 4.00 pH Temperature input: 0.1 to 10.0°C 	pH input: 0.10 pH Temperature input: 1.0°C
<i>E 1aNF</i> <i>0000</i>	EVT1 action ON delay time <ul style="list-style-type: none"> Sets EVT1 action delay time. The EVT1 output does not turn ON after the input value exceeds the EVT1 value until the time set in the [EVT1 action ON delay time] elapses. Not available for the P action. Setting range: 0 to 10000 seconds 	0 sec
<i>E 1aFF</i> <i>0000</i>	EVT1 action OFF delay time <ul style="list-style-type: none"> Sets EVT1 action delay time. The EVT1 output does not turn OFF after the input value exceeds the EVT1 value until the time set in the [EVT1 action OFF delay time] elapses. Not available for the P action. Setting range: 0 to 10000 seconds 	0 sec
<i>E 1c</i> <i>0030</i>	EVT1 proportional cycle <ul style="list-style-type: none"> Sets EVT1 proportional cycle. Not available for the ON/OFF action. Setting range: 1 to 300 seconds 	30 sec
<i>E 1aLH</i> <i>100</i>	EVT1 output high limit <ul style="list-style-type: none"> Sets EVT1 output high limit value. Not available for the ON/OFF action. Setting range: EVT1 output low limit to 100% 	100%
<i>E 1aLL</i> <i>0000</i>	EVT1 output low limit <ul style="list-style-type: none"> Sets EVT1 output low limit value. Not available for the ON/OFF action. Setting range: 0% to EVT1 output high limit 	0%

Character	Name, Function, Setting Range	Factory Default Value
oOnT 1 	ON Time when EVT1 Output ON <ul style="list-style-type: none"> • Sets ON time when EVT1 output is ON. If ON time and OFF time are set, EVT1 output can be turned ON/OFF in a configured cycle. (Fig. 7.4-2) • Not available for P action • Setting range: 0 to 10000 seconds 	0 sec
oOff 1 	OFF Time when EVT1 Output ON <ul style="list-style-type: none"> • Sets OFF time when EVT1 output is ON. If ON time and OFF time are set, EVT1 output can be turned ON/OFF in a configured cycle. (Fig. 7.4-2) • Not available for P action • Setting range: 0 to 10000 seconds 	0 sec

Timing chart when EVT1 output ON time and OFF time are set.



(Fig. 7.4-2)

7.5 EVT2 Action Group

To enter the EVT2 action group, follow the procedures below.



- ① *EVT2.02* Press the **MODE** key 4 times in the pH/Temperature display mode.
- ② *EVT2F* Press the **SET** key.

The unit proceeds to the EVT2 action group, and “EVT2 type” is indicated.

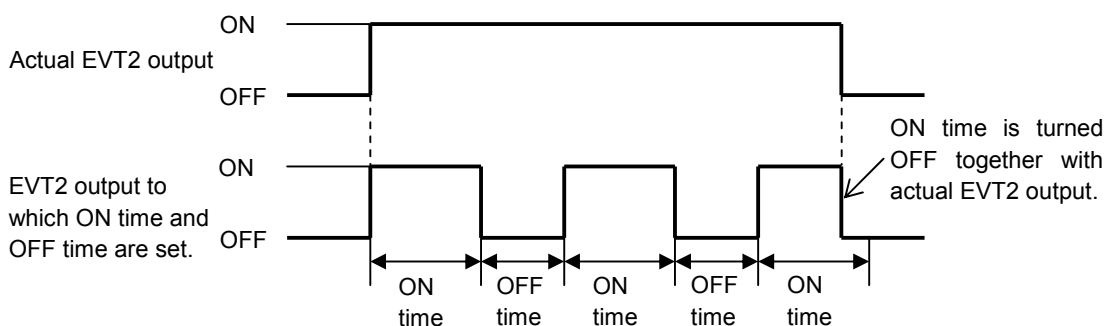
Character	Name, Function, Setting Range	Factory Default Value									
<i>EVT2F</i> - - - - -	EVT2 type	No action									
	<ul style="list-style-type: none"> • Selects an EVT2 output (contact type 2). <p>Note: If EVT2 type is changed, EVT2 value defaults to 0.00 or 0.0.</p> <ul style="list-style-type: none"> • If <i>NONE</i> (No temperature compensation) is selected during [Electrode RTD (p.24)], even if Temperature input low limit or Temperature input high limit is selected, EVT2 action will be disabled. • <i>----</i> : No action <i>PH_L</i> : pH input low limit <i>PH_H</i> : pH input high limit <i>TEMP_L</i> : Temperature input low limit <i>TEMP_H</i> : Temperature input high limit <i>EROUT</i> : Error output [When the error type is “Error” (Table 7.5-1) (p.30), the output is turned ON.] <i>FAIL</i> : Fail output [When the error type is “Fail” (Table 7.5-1) (p.30), the output is turned ON.] <p>• EVT2 Action</p> <table border="1"> <thead> <tr> <th>EVT2 Type</th><th>P Action</th><th>ON/OFF Action</th></tr> </thead> <tbody> <tr> <td>pH input low limit, Temperature input low limit</td><td> <p>EVT2 proportional band</p> </td><td> <p>Hysteresis</p> </td></tr> <tr> <td>pH input high limit, Temperature input high limit</td><td> <p>EVT2 proportional band</p> </td><td> <p>Hysteresis</p> </td></tr> </tbody> </table> <p>(Fig. 7.5-1)</p>		EVT2 Type	P Action	ON/OFF Action	pH input low limit, Temperature input low limit	<p>EVT2 proportional band</p>	<p>Hysteresis</p>	pH input high limit, Temperature input high limit	<p>EVT2 proportional band</p>	<p>Hysteresis</p>
EVT2 Type	P Action	ON/OFF Action									
pH input low limit, Temperature input low limit	<p>EVT2 proportional band</p>	<p>Hysteresis</p>									
pH input high limit, Temperature input high limit	<p>EVT2 proportional band</p>	<p>Hysteresis</p>									

Character	Name, Function, Setting Range	Factory Default Value	
	• Error output, Fail output (Table 7.5-1)		
	Error Type	Error Contents	Description
	Error	Response Speed Error	When calibrating the standard solution, the response of the pH Combination Electrode Sensor is slow. With the 1st and 2nd solutions, when ± 0.10 pH or more of input fluctuation within ± 1.50 pH continues for 5 minutes.
	Error	Electrode Sensitivity Error	When calibrating the standard solution, sensitivity of the pH Combination Electrode Sensor is deteriorating. The difference of calibration value between the 1st and the 2nd point is 2.00 pH or less.
	Error	Asymmetry Potential Error	When calibrating pH 7, the difference in electromotive force between the sensor measured value and standard value exceeds the equivalent of ± 1.50 pH.
	Error	Standard Solution Error	The specified standard solution has not been used. When ± 1.50 pH is exceeded for the 1st and 2nd solutions.
	Error	Solution Temperature Error	When temperature is 55°C or more at pH 10 solution.
	Error	Outside Temp. Compensation Range	Measured temperature has exceeded 110°C.
	Error	Outside Temp. Compensation Range	Measured temperature is less than 0°C.
	Fail	Temp. Sensor Disconnected	Temperature sensor lead wire is disconnected.
Fail	Temp. Sensor Short-circuited	Temperature sensor lead wire is short-circuited.	
E4V2 0000	EVT2 Value	pH input: 0.00 pH Temperature input: 0.0°C	
• Sets EVT2 value. If (No action), <i>ERROR</i> (Error output) or <i>FAIL</i> (Fail output) is selected during [EVT2 type], this setting item and all following items will not appear. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C			

Character	Name, Function, Setting Range	Factory Default Value
<i>E200</i> <i>000</i>	EVT2 proportional band	pH input: 0.00 pH Temperature input: 0.0°C
	<ul style="list-style-type: none"> • Sets EVT2 proportional band. ON/OFF action when set to 0.00 or 0.0. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	
<i>E2R4</i> <i>000</i>	EVT2 reset	pH input: 0.00 pH Temperature input: 0.0°C
	<ul style="list-style-type: none"> • Sets EVT2 reset value. Not available for the ON/OFF action. • Setting range: pH input: ±4.00 pH Temperature input: ±10.0°C 	
<i>E2H4</i> <i>0.10</i>	EVT2 ON/OFF hysteresis	pH input: 0.10 pH Temperature input: 1.0°C
	<ul style="list-style-type: none"> • Sets EVT2 ON/OFF hysteresis. Not available for the P action. • Setting range: pH input: 0.01 to 4.00 pH Temperature input: 0.1 to 10.0°C 	
<i>E2aNF</i> <i>0000</i>	EVT2 action ON delay time	0 sec
	<ul style="list-style-type: none"> • Sets EVT2 action delay time. The EVT2 output does not turn ON after the input value exceeds the EVT2 value until the time set in the [EVT2 action ON delay time] elapses. Not available for the P action. • Setting range: 0 to 10000 seconds 	
<i>E2aFF</i> <i>0000</i>	EVT2 action OFF delay time	0 sec
	<ul style="list-style-type: none"> • Sets EVT2 action delay time. The EVT2 output does not turn OFF after the input value exceeds the EVT2 value until the time set in the [EVT2 action OFF delay time] elapses. Not available for the P action. • Setting range: 0 to 10000 seconds 	
<i>E2c00</i> <i>0030</i>	EVT2 proportional cycle	30 sec
	<ul style="list-style-type: none"> • Sets EVT2 proportional cycle. Not available for the ON/OFF action. • Setting range: 1 to 300 seconds 	
<i>E2oLH</i> <i>00100</i>	EVT2 output high limit	100%
	<ul style="list-style-type: none"> • Sets EVT2 output high limit value. Not available for the ON/OFF action. • Setting range: EVT2 output low limit to 100% 	
<i>E2oLL</i> <i>0000</i>	EVT2 output low limit	0%
	<ul style="list-style-type: none"> • Sets EVT2 output low limit value. Not available for the ON/OFF action. • Setting range: 0% to EVT2 output high limit 	

Character	Name, Function, Setting Range	Factory Default Value
oOnT2 	ON Time when EVT2 Output ON <ul style="list-style-type: none"> • Sets ON time when EVT2 output is ON. If ON time and OFF time are set, EVT2 output can be turned ON/OFF in a configured cycle. (Fig. 7.5-2) • Not available for P action • Setting range: 0 to 10000 seconds 	0 sec
oOffT2 	OFF Time when EVT2 Output ON <ul style="list-style-type: none"> • Sets OFF time when EVT2 output is ON. If ON time and OFF time are set, EVT2 output can be turned ON/OFF in a configured cycle. (Fig. 7.5-2) • Not available for P action • Setting range: 0 to 10000 seconds 	0 sec

Timing chart when EVT2 output ON time and OFF time are set.



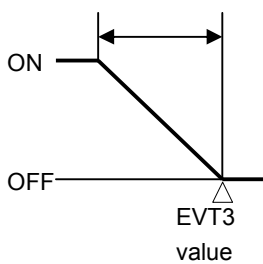
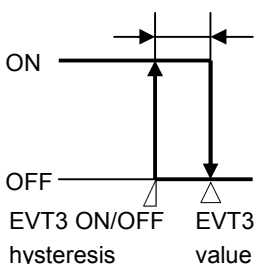
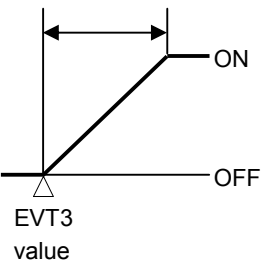
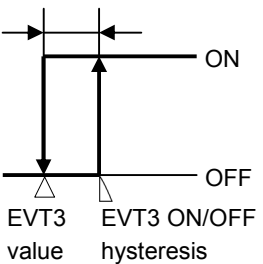
(Fig. 7.5-2)

7.6 EVT3 Action Group

EVT3 action group is available only when EVT3, EVT4 Output (EVT3 option) is added.
To enter the EVT3 action group, follow the procedures below.

- ① *EVT3.03* Press the **MODE** key 5 times in the pH/Temperature display mode.
- ② *EVT3F* Press the **SET** key.

The unit proceeds to the EVT3 action group, and “EVT3 type” is indicated.

Character	Name, Function, Setting Range	Factory Default Value
<i>EVT3F</i> - - - - -	EVT3 type	No action
<ul style="list-style-type: none"> Selects an EVT3 output (contact output 3) type. Note: If EVT3 type is changed, EVT3 value defaults to 0.00 or 0.0. If <i>NONE</i> (No temperature compensation) is selected during [Electrode RTD (p.24)], even if Temperature input low limit or Temperature input low limit is selected, EVT3 action will be disabled. - - - - - : No action <i>PH_L</i> : pH input low limit <i>PH_H</i> : pH input high limit <i>TEMP_L</i> : Temperature input low limit <i>TEMP_H</i> : Temperature input high limit <i>ERR_L</i> : Error output [When the error type is “Error” (Table 7.6-1) (p.34), the output is turned ON.] <i>FAIL</i> : Fail output [When the error type is “Fail” (Table 7.6-1) (p.34), the output is turned ON.] 		
<ul style="list-style-type: none"> EVT3 Action 		
EVT3 Type	P Action	ON/OFF Action
pH input low limit, Temperature input low limit	EVT3 proportional band 	Hysteresis 
pH input high limit, Temperature input high limit	EVT3 proportional band 	Hysteresis 

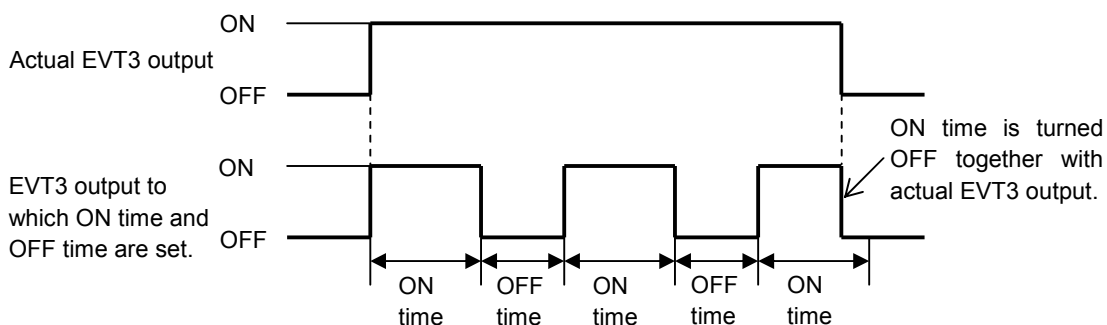
(Fig. 7.6-1)

Character	Name, Function, Setting Range	Factory Default Value	
	• Error output, Fail output (Table 7.6-1)		
	Error Type	Error Contents	Description
	Error	Response Speed Error	When calibrating the standard solution, the response of the pH Combination Electrode Sensor is slow. With the 1st and 2nd solutions, when ± 0.10 pH or more of input fluctuation within ± 1.50 pH continues for 5 minutes.
	Error	Electrode Sensitivity Error	When calibrating the standard solution, sensitivity of the pH Combination Electrode Sensor is deteriorating. The difference of calibration value between the 1st and the 2nd point is 2.00 pH or less.
	Error	Asymmetry Potential Error	When calibrating pH 7, the difference in electromotive force between the sensor measured value and standard value exceeds the equivalent of ± 1.50 pH.
	Error	Standard Solution Error	The specified standard solution has not been used. When ± 1.50 pH is exceeded for the 1st and 2nd solutions.
	Error	Solution Temperature Error	When temperature is 55°C or more at pH 10 solution.
	Error	Outside Temp. Compensation Range	Measured temperature has exceeded 110°C.
	Error	Outside Temp. Compensation Range	Measured temperature is less than 0°C.
	Fail	Temp. Sensor Disconnected	Temperature sensor lead wire is disconnected.
Fail	Temp. Sensor Short-circuited	Temperature sensor lead wire is short-circuited.	
E4V3	EVT3 value	pH input: 0.00 pH Temperature input: 0.0°C	
000	• Sets EVT3 value. If (No action), <i>EROUT</i> (Error output) or <i>FAIL</i> (Fail output) is selected during [EVT3 type], this setting item and all following items will not appear. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C		

Character	Name, Function, Setting Range	Factory Default Value
E300 000	EVT3 proportional band	pH input: 0.00 pH Temperature input: 0.0°C
	<ul style="list-style-type: none"> • Sets EVT3 proportional band. ON/OFF action when set to 0.00 or 0.0. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	
E3R4 000	EVT3 reset	pH input: 0.00 pH Temperature input: 0.0°C
	<ul style="list-style-type: none"> • Sets EVT3 reset value. Not available for the ON/OFF action. • Setting range: pH input: ±4.00 pH Temperature input: ±10.0°C 	
E344 0.10	EVT3 ON/OFF hysteresis	pH input: 0.10 pH Temperature input: 1.0°C
	<ul style="list-style-type: none"> • Sets EVT3 ON/OFF hysteresis. Not available for the P action. • Setting range: pH input: 0.01 to 4.00 pH Temperature input: 0.1 to 10.0°C 	
E3aNF 0000	EVT3 action ON delay time	0 sec
	<ul style="list-style-type: none"> • Sets EVT3 action delay time. The EVT3 output does not turn ON after the input value exceeds the EVT3 value until the time set in the [EVT3 action ON delay time] elapses. Not available for the P action. • Setting range: 0 to 10000 seconds 	
E3aFF 0000	EVT3 action OFF delay time	0 sec
	<ul style="list-style-type: none"> • Sets EVT3 action delay time. The EVT3 output does not turn OFF after the input value exceeds the EVT3 value until the time set in the [EVT3 action OFF delay time] elapses. Not available for the P action. • Setting range: 0 to 10000 seconds 	
E3c00 0030	EVT3 proportional cycle	30 sec
	<ul style="list-style-type: none"> • Sets EVT3 proportional cycle. Not available for the ON/OFF action. • Setting range: 1 to 300 seconds 	
E3oLH 0100	EVT3 output high limit	100%
	<ul style="list-style-type: none"> • Sets EVT3 output high limit value. Not available for the ON/OFF action. • Setting range: EVT3 output low limit to 100% 	
E3oLL 0000	EVT3 output low limit	0%
	<ul style="list-style-type: none"> • Sets EVT3 output low limit value. Not available for the ON/OFF action. • Setting range: 0% to EVT3 output high limit 	

Character	Name, Function, Setting Range	Factory Default Value
onNF3 00000	ON Time when EVT3 Output ON	0 sec
	<ul style="list-style-type: none"> • Sets ON time when EVT3 output is ON. If ON time and OFF time are set, EVT3 output can be turned ON/OFF in a configured cycle. (Fig. 7.6-2) • Not available for P action • Setting range: 0 to 10000 seconds 	
offF3 00000	OFF Time when EVT3 Output ON	0 sec
	<ul style="list-style-type: none"> • Sets OFF time when EVT3 output is ON. If ON time and OFF time are set, EVT3 output can be turned ON/OFF in a configured cycle. (Fig. 7.6-2) • Not available for P action • Setting range: 0 to 10000 seconds 	

Timing chart when EVT3 output ON time and OFF time are set.



(Fig. 7.6-2)

7.7 EVT4 Action Group

EVT4 action group is available only when EVT3, EVT4 Output (EVT3 option) is added.
To enter the EVT4 action group, follow the procedures below.

- ① *EVT4* Press the **MODE** key 6 times in the pH/Temperature display mode.
- ② *EVT4F* Press the **SET** key.

The unit proceeds to the EVT4 action group, and “EVT4 type” is indicated.

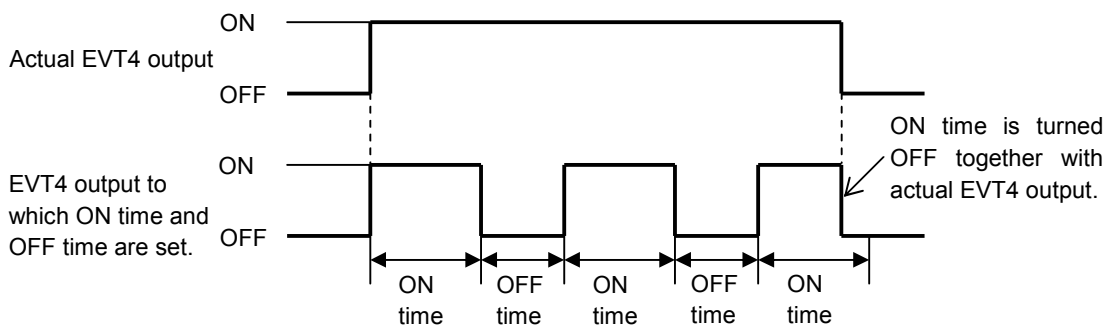
Character	Name, Function, Setting Range	Factory Default Value									
<i>EVT4F</i> ----	EVT4 type	No action									
	<ul style="list-style-type: none"> • Selects an EVT4 type. <p>Note: If EVT4 type is changed, EVT4 value defaults to 0.00 or 0.0.</p> <ul style="list-style-type: none"> • If <i>NONE</i> (No temperature compensation) is selected during [Electrode RTD (p.24)], even if Temperature input low limit or Temperature input high limit is selected, EVT4 action will be disabled. • <i>----</i>: No action • <i>PH_L</i> : pH input low limit • <i>PH_H</i> : pH input high limit • <i>TEMP_L</i> : Temperature input low limit • <i>TEMP_H</i> : Temperature input high limit • <i>EROUT</i> : Error output [When the error type is “Error” (Table 7.7-1) (p.38), the output is turned ON.] • <i>FAIL</i> : Fail output [When the error type is “Fail” (Table 7.7-1) (p.38), the output is turned ON.] <p>• EVT4 Action</p> <table> <tr> <th>EVT4 Type</th><th>P Action</th><th>ON/OFF Action</th></tr> <tr> <td>pH input low limit, Temperature input low limit</td><td> <p>EVT4 proportional band</p> </td><td> <p>Hysteresis</p> </td></tr> <tr> <td>pH input high limit, Temperature input high limit</td><td> <p>EVT4 proportional band</p> </td><td> <p>Hysteresis</p> </td></tr> </table> <p>(Fig. 7.7-1)</p>		EVT4 Type	P Action	ON/OFF Action	pH input low limit, Temperature input low limit	<p>EVT4 proportional band</p>	<p>Hysteresis</p>	pH input high limit, Temperature input high limit	<p>EVT4 proportional band</p>	<p>Hysteresis</p>
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E4.4 0.00	EVT4 value	pH input: 0.00 pH Temperature input: 0.0°C																														
	• Sets EVT4 value. If <input type="text"/> (No action), <i>ERROR</i> (Error output) or <i>FAIL</i> (Fail output) is selected during [EVT4 type], this setting item and all following items will not appear. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C																															

Character	Name, Function, Setting Range	Factory Default Value
E4P4 000	EVT4 proportional band	pH input: 0.00 pH Temperature input: 0.0°C
	<ul style="list-style-type: none"> • Sets EVT4 proportional band. ON/OFF action when set to 0.00 or 0.0. • Setting range: pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	
E4R4 000	EVT4 reset	pH input: 0.00 pH Temperature input: 0.0°C
	<ul style="list-style-type: none"> • Sets EVT4 reset value. Not available for the ON/OFF action. • Setting range: pH input: ±4.00 pH Temperature input: ±10.0°C 	
E4H4 0.10	EVT4 ON/OFF hysteresis	pH input: 0.10 pH Temperature input: 1.0°C
	<ul style="list-style-type: none"> • Sets EVT4 ON/OFF hysteresis. Not available for the P action. • Setting range: pH input: 0.01 to 4.00 pH Temperature input: 0.1 to 10.0°C 	
E4aNF 0000	EVT4 action ON delay time	0 sec
	<ul style="list-style-type: none"> • Sets EVT4 action delay time. The EVT4 output does not turn ON after the input value exceeds the EVT4 value until the time set in the [EVT4 action ON delay time] elapses. Not available for the P action. • Setting range: 0 to 10000 seconds 	
E4aFF 0000	EVT4 action OFF delay time	0 sec
	<ul style="list-style-type: none"> • Sets EVT4 action delay time. The EVT4 output does not turn OFF after the input value exceeds the EVT4 value until the time set in the [EVT4 action OFF delay time] elapses. Not available for the P action. • Setting range: 0 to 10000 seconds 	
E4c 0030	EVT4 proportional cycle	30 sec
	<ul style="list-style-type: none"> • Sets EVT4 proportional cycle. Not available for the ON/OFF action. • Setting range: 1 to 300 seconds 	
E4oLH 00100	EVT4 output high limit	100%
	<ul style="list-style-type: none"> • Sets EVT4 output high limit value. Not available for the ON/OFF action. • Setting range: EVT4 output low limit to 100% 	
E4oLL 0000	EVT4 output low limit	0%
	<ul style="list-style-type: none"> • Sets EVT4 output low limit value. Not available for the ON/OFF action. • Setting range: 0% to EVT4 output high limit 	

Character	Name, Function, Setting Range	Factory Default Value
oOnF4 <div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> </div>	ON Time when EVT4 Output ON <ul style="list-style-type: none"> • Sets ON time when EVT4 output is ON. • If ON time and OFF time are set, EVT4 output can be turned ON/OFF in a configured cycle. (Fig. 7.7-2) • Not available for P action • Setting range: 0 to 10000 seconds 	0 sec
oOffF4 <div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> </div>	OFF Time when EVT4 Output ON <ul style="list-style-type: none"> • Sets OFF time when EVT4 output is ON. • If ON time and OFF time are set, EVT4 output can be turned ON/OFF in a configured cycle. (Fig. 7.7-2) • Not available for P action • Setting range: 0 to 10000 seconds 	0 sec

Timing chart when EVT4 output ON time and OFF time are set.



(Fig. 7.7-2)

7.8 Special Function Group

To enter the Special Function group, follow the procedures below.

① **afERR** Press the **MODE** key 7 times in the pH/Temperature display mode.

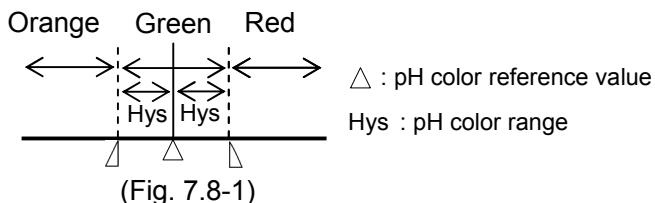
② **Lock** Press the **SET** key.


The unit enters the Special Function group, and the “Set Value Lock” item will appear.

Character	Name, Function, Setting Range	Factory Default Value
Lock - - - -	Set Value Lock	Unlock
	<ul style="list-style-type: none"> Locks the set values to prevent setting errors. Selects Unlock or Lock. - - - - (Unlock): All set values can be changed. Lock 1 (Lock 1) : None of the set values can be changed. Lock 2 (Lock 2) : Only EVT1, EVT2, EVT3, EVT4 values can be changed. Lock 3 (Lock 3) : All set values except Electrode RTD, Temperature calibration value, pH calibration value, pH calibration Auto/Manual can be temporarily changed. However, they revert to their previous value after the power is turned off because they are not saved in the non-volatile memory. Do not change setting items (EVT1, EVT2, EVT3, EVT4 types). If they are changed, they will affect other setting items. Be sure to select Lock 3 when changing the set value frequently via communication function. (If the value set by the communication function is the same as the value before the setting, the value will not be written in the non-volatile memory.) 	
cmML NmML	Communication Protocol	Shinko protocol
	<ul style="list-style-type: none"> Selects communication protocol. Available when the Serial communication (C5) option is added. NmML : Shinko protocol ModR : Modbus ASCII mode ModR : Modbus RTU mode 	
cmNo 0000	Instrument Number	0
	<ul style="list-style-type: none"> Sets the instrument number individually to each instrument when communicating by connecting plural instruments. Available when the Serial communication (C5) option is added. 0 to 95 	

CM4P 96	Communication Speed	9600bps
	<ul style="list-style-type: none"> • Selects a communication speed equal to that of the host computer. • Available when the Serial communication (C5) option is added. • 96 : 9600bps 192 : 19200bps 384 : 38400bps 	
CMFF 7EVEN	Data Bit/Parity	7 bits/Even parity
	<ul style="list-style-type: none"> • Selects data bit and parity. • Available when the Serial communication (C5) option is added. • NONE : 8 bits/No parity 7NONE : 7 bits/No parity 8EVEN : 8 bits/Even parity 7EVEN : 7 bits/Even parity 8ODD : 8 bits/Odd parity 7ODD : 7 bits/Odd parity 	
CM4F 1	Stop Bit	Stop bit 1
	<ul style="list-style-type: none"> • Selects the stop bit. • Available when the Serial communication (C5) option is added. • 1 : Stop bit 1 2 : Stop bit 2 	
FR41 PH	Transmission Output	pH transmission
	<ul style="list-style-type: none"> • Selects the transmission output type. • If NONE (No temperature compensation) is selected during [Electrode RTD (p.24)], and if TEMP (Temperature transmission) is selected, the transmission output value will become the value set during [Reference temperature (p.24)], regardless of selection in [Temperature Display when No Temperature Compensation (p.44)]. • PH : pH transmission TEMP : Temperature transmission 	
FRLH1 14.00	Transmission Output High limit	pH transmission: 14.00 pH Temp. transmission: 100.0°C
	<ul style="list-style-type: none"> • Sets the Transmission output high limit value. (This value corresponds to 20mA DC output.) If Transmission output high limit and low limit are set to the same value, 4mA DC will be fixed as a transmission output. • Setting Range: pH transmission: Transmission output low limit to 14.00 pH Temperature transmission: Transmission output low limit to 100.0°C 	

Character	Name, Function, Setting Range	Factory Default Value
TRLL <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Transmission Output Low limit <ul style="list-style-type: none"> Sets the Transmission output low limit value. (This value corresponds to 4mA DC output.) If Transmission output high limit and low limit are set to the same value, 4mA DC will be fixed as a transmission output. Setting Range: pH transmission: 0.00 pH to Transmission output high limit Temperature transmission: 0.0°C to Transmission output high limit 	pH transmission: 0.00 pH Temp. transmission: 0.0°C
BKLF <input type="text"/> <input type="text"/> ALL <input type="text"/> <input type="text"/>	Backlight Selection <ul style="list-style-type: none"> Selects the display to backlight. ALL <input type="text"/> <input type="text"/> : All are backlit. PH <input type="text"/> <input type="text"/> : pH display TEMP <input type="text"/> <input type="text"/> : Temperature display Ac <input type="text"/> <input type="text"/> : Action indicators PHTEMP <input type="text"/> <input type="text"/> : pH display + Temperature display PHAc <input type="text"/> <input type="text"/> : pH display + Action indicators TEMPAc <input type="text"/> <input type="text"/> : Temperature display + Action indicators 	All are backlit
COLR <input type="text"/> <input type="text"/> REd <input type="text"/> <input type="text"/>	pH Color <ul style="list-style-type: none"> Selects a color for the pH display. GRN <input type="text"/> <input type="text"/> : Green REd <input type="text"/> <input type="text"/> : Red ORC <input type="text"/> <input type="text"/> : Orange PHCR <input type="text"/> <input type="text"/> : pH color changes continuously. The pH display color changes according to [pH color reference value] and [pH color range] settings. <ul style="list-style-type: none"> When pH is lower than [pH color reference value] – [pH color range]: Orange When pH is within [pH color reference value] ± [pH color range]: Green When pH is higher than [pH color reference value] + [pH color range]: Red 	Red
CLP <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	pH Color Reference Value <ul style="list-style-type: none"> Sets a reference value for pH color to be green when PHCR <input type="text"/> <input type="text"/> (pH color changes continuously) is selected during [pH color]. Setting Range: 0.00 to 14.00 pH 	7.00 pH



Character	Name, Function, Setting Range	Factory Default Value
<i>cLRD</i> <i>200</i>	pH Color Range <ul style="list-style-type: none"> • Sets a range for pH color to be green when <i>PHCR</i> (pH color changes continuously) is selected during [pH color]. • Setting Range: 0.10 to 14.00 pH 	2.00 pH
<i>dPTM</i> <i>0</i>	Backlight Time <ul style="list-style-type: none"> • Sets time to backlight from no operation status until backlight is switched off. When set to 0, the backlight remains ON. Backlight relights by pressing any key while backlight is OFF. • Setting Range: 0 to 99 minutes 	0 minutes
<i>bER4L</i> <i>- - - -</i>	Bar Graph Indication <ul style="list-style-type: none"> • Selects bar graph indication. • <i>- - - -</i> : No indication <i>TRdF 1</i> : Transmission output Segments will light in accordance with the output manipulated variable (MV). Scale is -5 to 105%. Segments will light from left to right in accordance with the output manipulated variable (MV). <div style="text-align: center;"> <p>When output MV is 50%</p>  <p>-5% 50% 105%</p> <p>Lit increasingly to the right in accordance with the output MV.</p> <p>(Fig. 7.8-2)</p> </div>	No indication
<i>I NErr</i> <i>aFF</i>	EVT Output when Input Errors Occur <ul style="list-style-type: none"> • If input errors occur, such as pH combination electrode sensor is disconnected or short-circuited, EVT output Enabled/Disabled can be selected. If “Enabled” is selected, EVT output will be maintained when input errors occur. If “Disabled” is selected, EVT output will be turned OFF when input errors occur. • <i>aFF</i> : Disabled <i>aNE</i> : Enabled 	Disabled
<i>aFdP</i> <i>aFF</i>	Temperature Display when No Temperature Compensation <ul style="list-style-type: none"> • Selects an item to be indicated on the Temperature display when <i>NaNE</i> (No temperature compensation) is selected during [Electrode RTD (p.24)]. • Not available if <i>cU5</i> (Cu500) or <i>Pt</i> (Pt100) is selected during [Electrode RTD (p.24)]. • <i>aFF</i>: Unlit <i>4Td</i>: Reference temperature Temperature set during [Reference temperature (p.24)] will be indicated. 	Unlit

8. Calibration

The pH Calibration mode and Temperature Calibration mode are described below.

8.1 pH Calibration Mode

For pH measurement using the glass electrode method, pH in the sensor location, electrode performance and standard solution accuracy respectively play an important role for obtaining reliable data.

There are 2 methods in pH calibration: Automatic Calibration and Manual Calibration.

If **AUTO** (Automatic) is selected during [pH Calibration Auto/Manual (p.22)], pH will be automatically calibrated.

If **MANU** (Manual) is selected during [pH Calibration Auto/Manual (p.22)], pH will be calibrated manually.

8.1.1 Automatic Calibration

Automatic calibration of the 1st point standard solution [pH 7 (JIS or US standard)]

selected in the “pH7 calibration standard (p.22)” and the 2nd point solution [pH2, pH4, pH9 or pH10 (JIS)] selected in the “2nd solution” on p.22 is performed in sequence.

The pH value (based on JIS Z8802) at each temperature of pH standard solution will be automatically computerized.

If **NONE** (No temperature compensation) is selected during [Electrode RTD (p.24)], calibration will be automatically performed at 25°C basis.

The following shows the method for automatic calibration.

(1) 1st Point Calibration

- ① Soak the pH Combination Electrode Sensor in the 1st point standard solution (pH 7).
- ② Press the **MODE** key for 3 seconds while holding down the **▽** key in the pH/Temperature display mode.

The unit enters the pH Calibration mode, and indicates as follows.

- pH Display: Unlit
- Temperature Display: **PH 7**

- ③ Press the **MODE** key.

Automatic calibration of the 1st point starts.

During Automatic calibration, pH on the pH Display flashes.

Automatic calibration is carried out using the Automatic electrode quality evaluation function (*).

When flashing stops, automatic calibration of the 1st point is complete.

(*) pH7 calibration standard (p.22) and values calibrated by the Automatic electrode quality evaluation function are shown below.

pH7 Calibration Standard	Value Calibrated by Automatic Electrode Quality Evaluation Function
JIS	pH 6.86
US standard	pH 7.00

(2) 2nd Point Calibration

- ① Confirm that automatic calibration of the 1st point is complete, then press the **MODE** key.

The 2nd standard solution will be shown on the display as follows.

- pH Display: Unlit
- Temperature Display: Displays pH standard solution selected in [2nd solution] (p.22).

- ② Rinse the electrode, and soak the pH Combination Electrode Sensor in the 2nd Standard solution.

- ③ Press the **MODE** key.

Automatic calibration for the 2nd point starts.

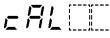
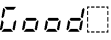
During Automatic calibration, pH on the pH Display flashes.

Automatic calibration is carried out using the Automatic electrode quality evaluation function.

When flashing stops, automatic calibration of the 2nd point will be complete.

- ④ Confirm that automatic calibration of the 2nd point is complete, then press the **MODE** key.

The newly calibrated values will be applied to the unit, indicating as follows.

- pH Display: 
- Temperature Display: 

pH automatic calibration is now complete.

- ⑤ Press the **SET** key.

The unit reverts to the pH/Temperature display mode.

8.1.2 Manual Calibration

Manual calibration can be carried out using 2 types of solution with a difference of 2 pH or more.

The following shows the method for manual calibration.

(1) 1st Point Calibration

- ① Soak the pH Calibration Electrode Sensor in the 1st standard solution.
- ② Press the **MODE** key for 3 seconds while holding down the ∇ key in the pH/Temperature display mode.

The unit enters the pH Calibration mode, and indicates as follows.

- pH Display: Unlit
- Temperature Display: $\square\square\square\square / \square\square\square\square$

- ③ Press the **MODE** key.

The unit enters the 1st point manual calibration mode, and indicates as follows.

- pH Display: $\square\square\square\square / \square\square\square\square$ and pH are displayed alternately.
- Temperature Display: Displays the calibrated value.

- ④ Set a calibration value with the Δ or ∇ key while checking the pH.
pH calibration value: -7.00 to 7.00

- ⑤ Press the **MODE** key.

The 1st point calibration is completed, and indicates as follows.

- pH Display: Unlit
- Temperature Display: $\square\square\square\square / \square\square\square\square$

(2) 2nd Point Calibration

- ① Rinse the electrode, and soak the pH Combination Electrode Sensor in the 2nd Standard solution.

- ② Press the **MODE** key.

The 2nd point can be calibrated manually, and indicates as follows.

- pH Display: $\square\square\square\square / \square\square\square\square$ and pH are displayed alternately.
- Temperature Display: Displays the calibration value.

- ③ Set a calibration value with the Δ or ∇ key while checking the pH.
pH calibration value: -7.00 to 7.00

- ④ Press the **MODE** key.

The 2nd point calibration is completed. The newly calibrated values will be applied to the unit, indicated as follows.

- pH Display: $\square\square\square\square / \square\square\square\square$
- Temperature Display: $\square\square\square\square / \square\square\square\square$

Manual pH calibration is complete.

- ⑤ Press the **SET** key.

The unit reverts to the pH/Temperature display mode.

8.1.3 Error Code during pH Calibration

During pH calibration, if pH calibration cannot be performed due to unstable pH input or temperature compensation error, etc., the error code (Table 8.1.3-1) will flash on the Temperature Display.

To cancel the error code, press the **MODE** key.

Check the standard solution and pH combination electrode sensor, and calibrate again.

If **Err** (Error output) is selected during [EVT1 type (p.25)], and when the error type is "Error" in (Table 8.1.3-1), the EVT1 output will be turned ON.

The same applies to EVT2, EVT3 and EVT4.

If **FAIL** (Fail output) is selected during [EVT1 type (p.25)], and when the error type is "Fail" in (Table 8.1.3-1), the EVT1 output will be turned ON.

The same applies to EVT2, EVT3 and EVT4.

(Table 8.1.3-1)

Error Code	Error Type	Error Contents	Description	Occurance
Err 11	Error	Response Speed Error	When calibrating the standard solution, the response of the pH Combination Electrode Sensor is slow. With the 1st and 2nd solutions, when ± 0.10 pH or more of input fluctuation within ± 1.50 pH continues for 5 minutes.	When calibrating
Err 12	Error	Electrode Sensitivity Error	When calibrating the standard solution, sensitivity of the pH Combination Electrode Sensor is deteriorating. The difference of calibration value between the 1st and the 2nd point is 2.00 pH or less.	
Err 13	Error	Asymmetry Potential Error	When calibrating pH 7, the difference in electromotive force between the sensor measured value and standard value exceeds the equivalent of ± 1.50 pH.	
Err 14	Error	Standard Solution Error	The specified standard solution has not been used. When ± 1.50 pH is exceeded for the 1st and 2nd solutions.	
Err 15	Error	Solution Temperature Error	When temperature is 55°C or more at pH 10 solution.	
Err 21	Fail	Temp. Sensor Disconnected	Temperature sensor lead wire is disconnected.	When measuring or calibrating
Err 22	Fail	Temp. Sensor Short-circuited	Temperature sensor lead wire is short-circuited.	
Err 23	Error	Outside Temp. Compensation Range	Measured temperature has exceeded 110°C.	
Err 24	Error	Outside Temp. Compensation Range	Measured temperature is less than 0°C.	

8.2 Temperature Calibration Mode

To calibrate a temperature, set a temperature calibration value.

If **NONE** (No temperature compensation) is selected during [Electrode RTD (p.24)], Temperature Calibration mode is not available.

When a sensor cannot be set at the exact location where measurement is desired, the resulting measured temperature may deviate from the temperature in the desired location. In such a case, the desired temperature can be set for the desired location by setting a temperature calibration value. However, it is effective within the input rated range regardless of the temperature calibration value.

Temperature after calibration = Current temperature + (Temperature calibration value)

(e.g.) When current temperature is 23.5°C,

If temperature calibration value is set to 1.5°C: $23.5 + (1.5) = 25.0^{\circ}\text{C}$

If temperature calibration value is set to -1.5°C: $23.5 + (-1.5) = 22.0^{\circ}\text{C}$

Temperature calibration procedures are shown below.

- ① Press the **MODE** key for 3 sec while holding down the **△** key in the pH/Temperature display mode.

The unit will proceed to the Temperature Calibration mode, and indicates as follows.

- pH Display: **7.00** and temperature are displayed alternately.
- Temperature Display: Displays temperature calibration value.

- ② Set a temperature calibration value with the **△** or **▽** key while checking temperature.

Setting range: -10.0 to 10.0°C

- ③ Press the **SET** key.

Temperature calibration is complete, and the unit reverts to the pH/Temperature display mode.

9. Measurement

9.1 Starting Measurement

After mounting to the control panel, and wiring, setup and calibration are complete, turn the power to the instrument ON. For approx. 2 seconds after the power is switched ON, the following characters are indicated on the pH Display and Temperature Display.

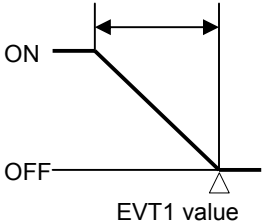
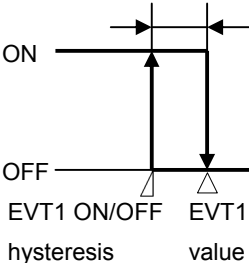
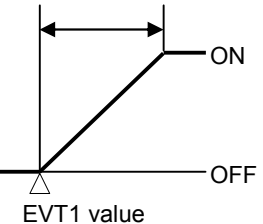
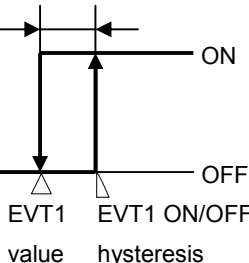
pH Display	Temperature Display	Selection Item in [Electrode RTD (p.24)]
<i>PH</i> □□□	Unlit	<i>NONE</i> □ : No temperature compensation
<i>PH</i> □□□	<i>CUS</i> □□	<i>CUS</i> □□ : Cu500
<i>PH</i> □□□	<i>PT</i> □□	<i>PT</i> □□ : Pt100

During this time, all outputs are in OFF status, and action indicators go off. After that, measurement starts, indicating the item selected during [Backlight Selection (p.43)].

9.2 EVT1 to EVT4 Outputs

If *PH_L*□ (pH input low limit), *PH_H*□ (pH input high limit), *TEMP_L* (Temperature input low limit) or *TEMP_H* (Temperature input high limit) is selected during [EVT1 type (p.25)], the following action is activated. The same applies to EVT2, EVT3 and EVT4.

• EVT1 Action

EVT1 Action	P Action	ON/OFF Action
pH input low limit, Temperature input low limit	EVT1 proportional band 	Hysteresis 
pH input high limit, Temperature input high limit	EVT1 proportional band 	Hysteresis 

(Fig. 9.2-1)

• **P Action**

Within the proportional band, the manipulated variable is outputted in proportion to the deviation between the EVT1 value and measured value.

EVT1 Action	Description
pH input low limit, Temperature input low limit	If measured value is lower than [EVT1 value – EVT1 proportional band], EVT1 output is turned ON. If measured value enters within the proportional band, EVT1 output is turned ON/OFF in EVT1 proportional cycles. If measured value exceeds the EVT1 value, EVT1 output is turned OFF.
pH input high limit, Temperature input high limit	If measured value is higher than [EVT1 value + EVT1 proportional band], EVT1 output is turned ON. If measured value enters within the proportional band, EVT1 output is turned ON/OFF in EVT1 proportional cycles. If measured value drops below the EVT1 value, EVT1 output is turned OFF.

• **ON/OFF Action**

EVT1 Action	Description
pH input low limit, Temperature input low limit	If measured value is lower than EVT1 value, EVT1 output is turned ON. If measured value exceeds the EVT1 value, EVT1 output is turned OFF.
pH input high limit, Temperature input high limit	If measured value is higher than EVT1 value, EVT1 output is turned ON. If measured value drops below the EVT1 value, EVT1 output is turned OFF.

EVT output status can be read by the status flag (EVT1, EVT2, EVT3, EVT4 output bit) in Serial communication (C5 option).

EVT output status when errors occur differs depending on the selection during [EVT output when input errors occur (p.44)].

- If **OFF** (Disabled) is selected, EVT output is turned OFF when input errors occur.
- If **ON** (Enabled) is selected, EVT output is maintained when input errors occur.

9.3 Error Output

If **Error** (Error output) is selected during [EVT1 type (p.25)], and when the error type is “Error” in (Table 9.5-1), the EVT1 output is turned ON.

The same applies to EVT2, EVT3 and EVT4.

9.4 Fail Output

If **Fail** (Fail output) is selected during [EVT1 type (p.25)], and when the error type is “Fail” in (Table 9.5-1), the EVT1 output is turned ON.

The same applies to EVT2, EVT3 and EVT4.

9.5 Error Code during Measurement

For temperature sensor error or outside temperature compensation range during measurement, their corresponding error codes flash on the Temperature Display as shown below in (Table 9.5-1).

(Table 9.5-1)

Error Code	Error Type	Error Contents	Description
E821	Fail	Temp. Sensor Disconnected	Temperature sensor lead wire is disconnected.
E822	Fail	Temp. Sensor Short-circuited	Temperature sensor lead wire is short-circuited.
E823	Error	Outside Temperature Compensation Range	Measured temperature has exceeded 110°C.
E824	Error	Outside temperature Compensation Range	Measured temperature is less than 0°C.

9.6 Setting EVT1 to EVT4

EVT1 to EVT4 settings are conducted in the Simple setting mode.

These setting items are the same as those in EVT1 to EVT4 action groups.

To enter the Simple setting mode, follow the procedures below.

- ① **EVT1** Press the **SET** key in the pH/Temperature display mode.
EVT1 value will be indicated.
- ② Sets each setting item using the Δ or ∇ key, and register the value with the **SET** key.

Character	Name, Function, Setting Range	Factory Default Value
EVT1 0000	EVT1 value <ul style="list-style-type: none"> Sets EVT1 value. If ---- (No action), ERR (Error output) or FAIL (Fail output) is selected during [EVT1 type (p.25)], this item and the following item will not appear. pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	pH input: 0.00 pH Temp. input: 0.0°C
EVT2 0000	EVT2 value <ul style="list-style-type: none"> Sets EVT2 value. If ---- (No action), ERR (Error output) or FAIL (Fail output) is selected during [EVT2 type (p.29)], this item and the following item will not appear. pH input: 0.00 to 14.00pH Temperature input: 0.0 to 100.0°C 	pH input: 0.00 pH Temp. input: 0.0°C
EVT3 0000	EVT3 value <ul style="list-style-type: none"> Sets EVT3 value. If ---- (No action), ERR (Error output) or FAIL (Fail output) is selected during [EVT3 type (p.33)], this item and the following item will not appear. pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	pH input: 0.00pH Temp. input: 0.0°C
EVT4 0000	EVT4 value <ul style="list-style-type: none"> Sets EVT4 value. If ---- (No action), ERR (Error output) or FAIL (Fail output) is selected during [EVT4 type (p.37)], this item and the following item will not appear. pH input: 0.00 to 14.00 pH Temperature input: 0.0 to 100.0°C 	pH input: 0.00 pH Temp. input: 0.0°C

- ③ Press the **SET** key. The unit reverts to the pH/Temperature display mode.

10. Specifications

10.1 Standard specifications

Rating

Rated Scale			
	Input	Input Range	Resolution
	pH combination electrode sensor	0.00 to 14.00pH 0.0 to 100.0°C	0.01pH 0.1°C
Input	pH combination electrode sensor: pH sensor: Based on JIS Z8802 Temperature element: Cu500/25°C or Pt100		
Supply Voltage	Model	AER-102-PH	AER-102-PH 1
	Supply voltage	100 to 240V AC 50/60Hz	24V AC/DC 50/60Hz
	Allowable voltage fluctuation range	85 to 264V AC	20 to 28V AC/DC

General Structure

External Dimensions	48 x 96 x 98.5mm (W x H x D)		
Mounting	Flush (Applicable panel thickness: 1 to 8mm)		
Case	Material: Flame-resistant resin, Color: Black		
Front Panel	Membrane sheet		
Indication Structure	Display		
	pH display	11-segment LCD display 5-digit Backlight: Red/Green/Orange Character size: 14.0 x 5.4mm (H x W)	
	Temperature display	11-segment LCD display 5-digit Backlight: Green Character size: 10.0 x 4.6mm (H x W)	
	Output display	22-segment LCD display Bar graph Backlight: Green	
	Action indicators: Backlight: Orange color		
	EVT1	EVT1 output (contact output 1) ON: Lit	
	EVT2	EVT2 output (contact output 2) ON: Lit	
	EVT3	EVT3 output (contact output 3) ON: Lit	
	EVT4	EVT4 output (contact output 4) ON: Lit	
	T/R	Serial comm. TX output (transmitting): Lit	
	LOCK	Lock 1, 2, 3 selected: Lit	
Setting Structure	Input system using membrane sheet key		

Indication Performance

Repeatability (at equivalent input)	pH: ± 0.05 pH
Linearity (at equivalent input)	pH: ± 0.05 pH
Indication Accuracy	Temperature: $\pm 1^{\circ}\text{C}$
Input Sampling Period	125ms

Standard Functions

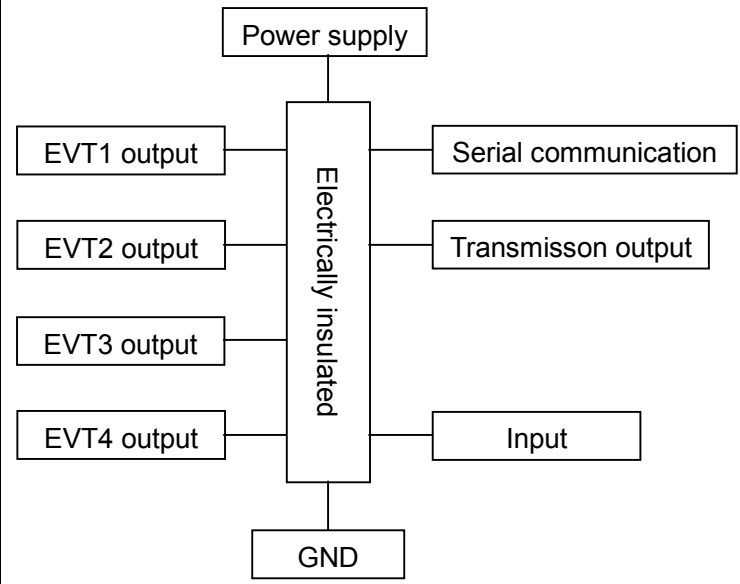
pH Calibration	<p>For pH measurement using the glass electrode method, pH in the sensor location, electrode performance and standard solution accuracy respectively play an important role for obtaining reliable data.</p> <p>Input value is shifted via 2-points calibration using the standard solutions.</p> <p>However, It is effective within the input rated range regardless of the calibration value.</p> <p>There are 2 calibration methods: Automatic Calibration, Manual Calibration.</p>																		
Temperature Calibration	<p>When a sensor cannot be set at the exact location where measurement is desired, the resulting measured temperature may deviate from the temperature in the desired location. In such a case, the desired temperature can be set for the desired location by setting a temperature calibration value. However, it is effective within the input rated range regardless of the temperature calibration value.</p>																		
EVT Output																			
Setting Accuracy	The same as indication accuracy																		
Output Action	<p>P control: When setting proportional band any value other than 0.00 or 0.0.</p> <p>ON/OFF control: When setting proportional band to 0.00 or 0.0.</p> <table><tr><td rowspan="2">Proportional band</td><td>pH input</td><td>0.00 to 14.00 pH</td></tr><tr><td>Temp. input</td><td>0.0 to 100.0 °C</td></tr><tr><td>Proportional cycle</td><td colspan="2">1 to 300 sec</td></tr><tr><td rowspan="2">ON/OFF hysteresis</td><td>pH input</td><td>0.01 to 4.00 pH</td></tr><tr><td>Temp. input</td><td>0.1 to 10.0 °C</td></tr><tr><td>Output high, low limit</td><td colspan="2">0 to 100 %</td></tr></table>			Proportional band	pH input	0.00 to 14.00 pH	Temp. input	0.0 to 100.0 °C	Proportional cycle	1 to 300 sec		ON/OFF hysteresis	pH input	0.01 to 4.00 pH	Temp. input	0.1 to 10.0 °C	Output high, low limit	0 to 100 %	
Proportional band	pH input	0.00 to 14.00 pH																	
	Temp. input	0.0 to 100.0 °C																	
Proportional cycle	1 to 300 sec																		
ON/OFF hysteresis	pH input	0.01 to 4.00 pH																	
	Temp. input	0.1 to 10.0 °C																	
Output high, low limit	0 to 100 %																		

Type	Selectable by the keypad from the following. <ul style="list-style-type: none">• No alarm• pH input low limit• pH input high limit• Temperature input low limit• Temperature input high limit• Error output• Fail output	
Output	Relay contact 1a	
	Control capacity	3A 250V AC (resistive load) 1A 250V AC (inductive load, $\cos\phi=0.4$)
	Electrical life	100,000 cycles
Action ON Delay Time	0 to 10000 sec	
Action OFF Delay Time	0 to 10000 sec	
ON Time/OFF Time when Output ON	If ON time and OFF time are set, the output can be turned ON/OFF when EVT output is ON.	

Transmission Output Function

Transmission Output	<p>Converting pH or temperature to analog signal every input sampling period, outputs the value in current.</p> <p>If <i>NONE</i> (No temperature compensation) is selected during [Electrode RTD (p.24)], and if <i>TEMP</i> (Temperature transmission) is selected during [Transmission output (p.42)], the transmission output value will become the value set during [Reference temperature (p.24)].</p> <p>If Transmission output high limit and low limit are set to the same value, transmission output low limit value (4mA DC fixed) will be outputted.</p> <table><tr><td>Resolution</td><td>1/12000</td></tr><tr><td>Current</td><td>4 to 20mA DC (Load resistance: Max. 500 Ω)</td></tr><tr><td>Output accuracy</td><td>Within ±0.3% of Transmission output span</td></tr></table>	Resolution	1/12000	Current	4 to 20mA DC (Load resistance: Max. 500 Ω)	Output accuracy	Within ±0.3% of Transmission output span
Resolution	1/12000						
Current	4 to 20mA DC (Load resistance: Max. 500 Ω)						
Output accuracy	Within ±0.3% of Transmission output span						

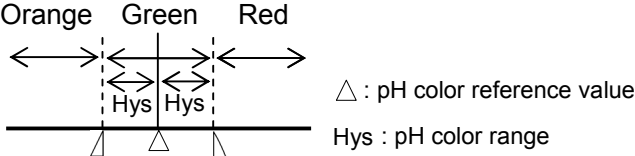
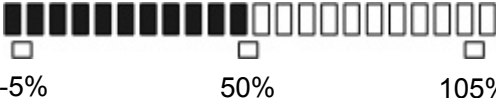
Insulation, Dielectric Strength

Circuit Insulation Configuration	 <pre> graph TD PS[Power supply] --- EI[Electrically insulated] EI --- GND[GND] EI --- EVT1[EVT1 output] EI --- EVT2[EVT2 output] EI --- EVT3[EVT3 output] EI --- EVT4[EVT4 output] EI --- SC[Serial communication] EI --- TO[Transmisson output] EI --- IN[Input] </pre> <p>The diagram shows a central vertical box labeled "Electrically insulated". At the top, it is connected to a "Power supply" box. At the bottom, it is connected to a "GND" box. To the left of the central box, there are four boxes labeled "EVT1 output", "EVT2 output", "EVT3 output", and "EVT4 output", each connected to the central box. To the right of the central box, there are three boxes labeled "Serial communication", "Transmisson output", and "Input", each connected to the central box.</p>
Insulation Resistance	10MΩ or more, at 500V DC
Dielectric Strength	Power terminal - ground (GND): 1.5kV AC for 1 minute Input terminal - ground (GND): 1.5kV AC for 1 minute Input terminal - power terminal: 1.5kV AC for 1 minute

Attached Functions

Set Value Lock	Lock 1: None of the set values can be changed. Lock 2: Only EVT1, EVT2, EVT3, EVT4 values can be changed. Lock 3: All set values, except Electrode RTD, Temperature calibration value, pH calibration value, pH calibration Auto/Manual, can be temporarily changed. However, they revert to their previous value after the power is turned off because they are not saved in the non-volatile memory.
pH Input Sensor Correction	This corrects the input value from the pH Combination Electrode Sensor. When pH measured by the sensor may deviate from the pH in the measured location, desired pH can be obtained by adding sensor correction value. However, it is effective within the measurement range regardless of the sensor correction value.
Temperature Display when No Temperature Compensation	If <i>NONE</i> (No temperature compensation) is selected during [Electrode RTD (p.24)], the item to be indicated on the Temperature display can be selected.
Cable Length Correction	If <i>2WIRE</i> (2-wire type) is selected during [Pt100 input wire type (p.24)], and if sensor cable is too long, temperature measurement error will occur due to cable resistance. This can be corrected by setting the cable length correction value and cable cross-section area.

Outside Measurement Range	<p>pH measured value is outside the measurement range: If the value is less than pH 0.00 or exceeds pH 14.00, the following will be indicated.</p> <p>However, when pH measurement value is outside the measurement range, and if the unit proceeds to the pH Calibration mode, the pH display will be unlit, and the Temperature display will flash $\square F \square \square$.</p> <p>When temperature errors occur, and if the unit proceeds to the pH Calibration mode, the pH display will be unlit, and the Temperature display will flash an error code.</p> <p>When $None \square$ (No temperature compensation) is selected during [Electrode RTD (p.24)]:</p> <table><tr><th>pH Display</th><th>Temperature Display</th></tr><tr><td>Less than 0.00 pH: 0.00</td><td>$\square F \square \square$ is flashing.</td></tr><tr><td>Exceeding 14.00 pH: 14.00</td><td>$\square F \square \square$ is flashing.</td></tr></table> <p>When $cUS \square \square$ (Cu500) or $Pt \square \square \square$ (Pt100) is selected during [Electrode RTD (p.24)]:</p> <table><tr><th>pH Display</th><th>Temperature Display</th></tr><tr><td>Less than 0.00 pH: 0.00 is flashing.</td><td>Temperature measurement value</td></tr><tr><td>Exceeding 14.00 pH: 14.00 is flashing.</td><td>Temperature measurement value</td></tr></table> <p>When temperature measurement value is outside the measurement range (less than 0.0°C or exceeding 110°C), the following will be indicated.</p> <table><tr><th>pH Display</th><th>Temperature Display</th></tr><tr><td>pH measurement value</td><td>Less than 0.0°C: $E \square 24 \square$</td></tr><tr><td>pH measurement value</td><td>Exceeding 110°C: $E \square 23 \square$</td></tr></table>	pH Display	Temperature Display	Less than 0.00 pH: 0.00	$\square F \square \square$ is flashing.	Exceeding 14.00 pH: 14.00	$\square F \square \square$ is flashing.	pH Display	Temperature Display	Less than 0.00 pH: 0.00 is flashing.	Temperature measurement value	Exceeding 14.00 pH: 14.00 is flashing.	Temperature measurement value	pH Display	Temperature Display	pH measurement value	Less than 0.0°C: $E \square 24 \square$	pH measurement value	Exceeding 110°C: $E \square 23 \square$
pH Display	Temperature Display																		
Less than 0.00 pH: 0.00	$\square F \square \square$ is flashing.																		
Exceeding 14.00 pH: 14.00	$\square F \square \square$ is flashing.																		
pH Display	Temperature Display																		
Less than 0.00 pH: 0.00 is flashing.	Temperature measurement value																		
Exceeding 14.00 pH: 14.00 is flashing.	Temperature measurement value																		
pH Display	Temperature Display																		
pH measurement value	Less than 0.0°C: $E \square 24 \square$																		
pH measurement value	Exceeding 110°C: $E \square 23 \square$																		
Power Failure Countermeasure	The setting data is backed up in the non-volatile IC memory.																		
Self-diagnosis	The CPU is monitored by a watchdog timer, and if an abnormal status is found on the CPU, the AER-102-PH is switched to warm-up status.																		
Warm-up Indication	<p>For approx. 2 seconds after the power is switched ON, the characters below are indicated on the pH Display and Temperature Display.</p> <table><tr><th>pH Display</th><th>Temperature Display</th><th>Selection Item in [Electrode RTD (p.24)]</th></tr><tr><td rowspan="3">$PH \square \square \square$</td><td>Unlit</td><td>$None \square$: No temperature compensation</td></tr><tr><td>$cUS \square \square$</td><td>$cUS \square \square$: Cu500</td></tr><tr><td>$Pt \square \square \square$</td><td>$Pt \square \square \square$: Pt100</td></tr></table>	pH Display	Temperature Display	Selection Item in [Electrode RTD (p.24)]	$PH \square \square \square$	Unlit	$None \square$: No temperature compensation	$cUS \square \square$	$cUS \square \square$: Cu500	$Pt \square \square \square$	$Pt \square \square \square$: Pt100								
pH Display	Temperature Display	Selection Item in [Electrode RTD (p.24)]																	
$PH \square \square \square$	Unlit	$None \square$: No temperature compensation																	
	$cUS \square \square$	$cUS \square \square$: Cu500																	
	$Pt \square \square \square$	$Pt \square \square \square$: Pt100																	

pH Color Selection	<p>Selects pH display color.</p> <table border="1" data-bbox="518 150 1232 367"> <thead> <tr> <th>Selection Item in [pH Color (p.43)]</th><th>pH Display Color</th></tr> </thead> <tbody> <tr> <td>GRN</td><td>Green</td></tr> <tr> <td>RED</td><td>Red</td></tr> <tr> <td>ORD</td><td>Orange</td></tr> <tr> <td>PHCR</td><td>pH color changes continuously.</td></tr> </tbody> </table> <p>pH color changes continuously: pH display color changes according to [pH color reference value (p.43)] and [pH color range (p.44)] settings.</p> <ul style="list-style-type: none"> • When pH is lower than [pH color reference value] – [pH color range]: Orange • When pH is within [pH color reference value] ± [pH color range]: Green • When pH is higher than [pH color reference value] + [pH color range]: Red  <p>Orange Green Red</p> <p>Δ : pH color reference value Hys : pH color range</p>	Selection Item in [pH Color (p.43)]	pH Display Color	GRN	Green	RED	Red	ORD	Orange	PHCR	pH color changes continuously.
Selection Item in [pH Color (p.43)]	pH Display Color										
GRN	Green										
RED	Red										
ORD	Orange										
PHCR	pH color changes continuously.										
Bar Graph Indication	<p>When TRAIL (Transmission output) is selected during [Bar graph indication (p.44)], segments light in accordance with the output MV.</p> <p>Scale is -5 to 105%. Segments light increasingly to the right in accordance with the output MV.</p> <p>(e.g.) Output MV 50%</p>  <p>-5% 50% 105%</p> <p>Light increasingly to the right in accordance with the output MV.</p>										

Other

Power Consumption	Approx. 12VA
Ambient Temperature	0 to 50 °C
Ambient Humidity	35 to 85%RH (Non-condensing)
Weight	Approx. 280g
Accessories	<p>Instruction manual: 1 copy Unit label: 1 sheet</p> <p>When Serial communication (C5 option) is added: Wire harness C5J (0.2m) 1 length Wire harness C0J (3m) 1 length</p> <p>When EVT3, EVT4 Output (contact output 3, 4)(EVT3 option) is added: Wire harness HBJ (3m) 2 lengths</p>

10.2 Optional Specifications

Serial Communication (Option code: C5)

Serial Communication	The following operations can be carried out from an external computer. (1) Reading and setting of various set values (2) Reading of the pH and temperature status (3) Function change																						
Cable Length	1.2km (Max), Cable resistance value: Within 50Ω (Terminators are not necessary, but if used, use 120Ω or more on one side.)																						
Communication Line	EIA RS-485																						
Communication Method	Half-duplex communication																						
Communication Speed	9600, 19200, 38400bps (Selectable by keypad)																						
Synchronization Method	Start-stop synchronization																						
Code Form	ASCII, Binary																						
Communication Protocol	Shinko protocol, Modbus ASCII, Modbus RTU (Selectable by keypad)																						
Data Bit/Parity	8-bits/No parity, 7-bits/No parity, 8-bits/Even, 7-bits/Even, 8-bits/Odd, 7-bits/Odd (Selectable by keypad)																						
Stop Bit	1, 2 (Selectable by keypad)																						
Error Correction	Command request repeat system																						
Error Detection	Parity check, Checksum (Shinko protocol), LRC (Modbus protocol ASCII), CRC-16 (Modbus protocol RTU)																						
Data Format	<table border="1"> <thead> <tr> <th>Communication Protocol</th><th>Shinko Protocol</th><th>Modbus ASCII</th><th>Modbus RTU</th></tr> </thead> <tbody> <tr> <td>Start bit</td><td>1</td><td>1</td><td>1</td></tr> <tr> <td>Data bit</td><td>7</td><td>7 or 8</td><td>8</td></tr> <tr> <td>Parity</td><td>Yes (Even)</td><td>Yes (Even, Odd) No parity</td><td>Yes (Even, Odd) No parity</td></tr> <tr> <td>Stop bit</td><td>1</td><td>1 or 2</td><td>1 or 2</td></tr> </tbody> </table>			Communication Protocol	Shinko Protocol	Modbus ASCII	Modbus RTU	Start bit	1	1	1	Data bit	7	7 or 8	8	Parity	Yes (Even)	Yes (Even, Odd) No parity	Yes (Even, Odd) No parity	Stop bit	1	1 or 2	1 or 2
Communication Protocol	Shinko Protocol	Modbus ASCII	Modbus RTU																				
Start bit	1	1	1																				
Data bit	7	7 or 8	8																				
Parity	Yes (Even)	Yes (Even, Odd) No parity	Yes (Even, Odd) No parity																				
Stop bit	1	1 or 2	1 or 2																				

EVT3, EVT4 Output (Contact output 3, 4) (Option code: EVT3)

EVT3, EVT4 Output (Contact output 3, 4)	The same as EVT output (pp.54, 55)
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11. Troubleshooting


If any malfunction occurs, refer to the following items after checking that power is being supplied to the AER-102-PH.

11.1 Indication

Problem	Presumed Cause and Solution
The pH/Temperature displays are unlit.	<ul style="list-style-type: none"> The time set during [Backlight time (p.44)] has passed. If any key is pressed while displays are unlit, it will re-light. Set the backlight time to a suitable time-frame.
Indication of the pH/Temperature display is unstable or irregular.	<ul style="list-style-type: none"> pH calibration and temperature calibration may not be completed. Perform pH calibration and temperature calibration. Electrode RTD selection might not be correct. Select a correct electrode RTD. Specification of pH combination electrode sensor may not be suitable. Replace the sensor to a suitable one. There may be equipment that interferes with or makes noise near the AER-102-PH. Keep equipment that interferes with or makes noise away from the AER-102-PH.
The Temperature display is unlit.	<ul style="list-style-type: none"> OFF (Unlit) is selected during [Temperature display when no temperature compensation (p.44)]. Select REF (Reference temperature).
[pH 1.0] is flashing on the Temperature display.	<ul style="list-style-type: none"> This shows that the response of the pH combination electrode sensor is slow when calibrating using standard solutions. Rinse the pH combination electrode sensor. If [pH 1.0] is still flashing, check if the standard solution and pH combination electrode sensor are normal. If they are not normal, replace the solution or the sensor.
[pH 12.0] is flashing on the Temperature display.	<ul style="list-style-type: none"> This shows that pH electrode sensitivity is deteriorating when calibrating using standard solutions. Rinse the pH combination electrode sensor, and refill the internal solution. If [pH 12.0] is still flashing, replace the pH combination electrode sensor.
[pH 13.0] is flashing on the Temperature display	<ul style="list-style-type: none"> When calibrating using standard solutions, this occurs when electromotive power (asymmetry potential) of pH 7 is large. Rinse the pH combination electrode sensor, and refill the internal solution. If [pH 13.0] is still flashing, replace the pH combination electrode sensor.
[pH 14.0] is flashing on the Temperature display.	<ul style="list-style-type: none"> When calibrating, this will occur if the specified standard solution is not used. Rinse the pH combination electrode sensor, and refill the internal solution. If [pH 14.0] is still flashing, use the specified standard solution.

Problem	Presumed Cause and Solution
[E 15] is flashing on the Temperature display.	<ul style="list-style-type: none"> When calibrating, this will occur if temperature of pH 10 is 55°C or more. Check the liquid temperature of pH 10.
[E 2 1] is flashing on the Temperature display.	<ul style="list-style-type: none"> This occurs when the temperature sensor lead wire is disconnected. Replace the pH combination electrode sensor.
[E 2 2] is flashing on the Temperature display.	<ul style="list-style-type: none"> This occurs when the temperature sensor lead wire is short-circuited. Replace the pH combination electrode sensor.
[E 2 3] is flashing on the Temperature display.	<ul style="list-style-type: none"> This occurs when measured temperature value exceeds 110°C. Check the environment of measurement location.
[E 2 4] is flashing on the Temperature display.	<ul style="list-style-type: none"> This occurs when measured temperature value is less than 0°C. Check the environment of measurement location.
[ERR 1] is indicating on the pH display.	<ul style="list-style-type: none"> Internal memory is defective. Contact our agency or us.

11.2 Key Operation

Problem	Presumed Cause and Solution
<ul style="list-style-type: none"> Unable to set values. The values do not change by \triangle, ∇ keys 	<ul style="list-style-type: none"> <i>Lock 1</i> (Lock 1) or <i>Lock 2</i> (Lock 2) is selected during [Set value lock (p.41)]. Select  (Unlock).

12. Character Tables

The following shows our character tables. Use data column for your reference.

12.1 Setting Group List

Character	Setting Group	Reference Section
<i>FNC.1</i>	pH input group	Section 12.5 (p.64)
<i>FNC.2</i>	Temperature input group	Section 12.6 (p.64)
<i>EVT.a.1</i>	EVT1 action group	Section 12.7 (p.65)
<i>EVT.a.2</i>	EVT2 action group	Section 12.8 (p.66)
<i>EVT.a.3</i>	EVT3 action group	Section 12.9 (p.67)
<i>EVT.a.4</i>	EVT4 action group	Section 12.10 (p.68)
<i>a.F.EP</i>	Special function group	Section 12.11 (pp. 69, 70)

12.2 Temperature Calibration Mode

Character	Name	Setting Range	Factory Default Value	Data
<i>Lo</i> (*)	Temperature calibration	-10.0 to 10.0°C	0.0°C	

(*) *Lo* and measured value are lit alternately.

12.3 pH Calibration Mode (for Manual pH calibration)

Character	Name	Setting Range	Factory Default Value	Data
<i>00 / 00</i> (*)	pH calibration value	-7.00 to 7.00	0.00	

(*) *00 / 00* and measured value are lit alternately.

12.4 Simple Setting Mode

Character	Name	Setting Range	Factory Default Value	Data
E4V1□	EVT1 value (*1)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
E4V2□	EVT2 value (*2)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
E4V3□	EVT3 value (*3)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
E4V4□	EVT4 value (*4)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	

(*1) Not available if □□□□□ (No action), *ERRUF* (Error output) or *FAIL*□ (Fail output) is selected during [EVT1 type].

(*2) Not available if □□□□□ (No action), *ERRUF* (Error output) or *FAIL*□ (Fail output) is selected during [EVT2 type].

(*3) Not available if □□□□□ (No action), *ERRUF* (Error output) or *FAIL*□ (Fail output) is selected during [EVT3 type].

Available only when EVT3, EVT4 Output (EVT3 option) is added.

(*4) Not available if □□□□□ (No action), *ERRUF* (Error output) or *FAIL*□ (Fail output) is selected during [EVT4 type].

Available only when EVT3, EVT4 Output (EVT3 option) is added.

12.5 pH Input Group

Character	Name	Setting Range	Factory Default Value	Data
<i>TYP</i> <input type="text"/>	pH7 calibration standard	<i>JIS</i> <input type="text"/> : JIS <i>US</i> <input type="text"/> : US standard	JIS	
<i>2EPH</i> <input type="text"/>	2nd solution (*)	<i>PH2</i> <input type="text"/> : pH 2 <i>PH4</i> <input type="text"/> : pH 4 <i>PH9</i> <input type="text"/> : pH 9 <i>PH10</i> <input type="text"/> : pH 10	pH 4	
<i>AUT</i> <input type="text"/>	pH calibration Auto/Manual	<i>AUT</i> <input type="text"/> : Automatic <i>MANU</i> <input type="text"/> : Manual	Automatic	
<i>DP1</i> <input type="text"/>	Decimal point place	<input type="text"/> : No decimal point <input type="text"/> : 1-digit after decimal point <input type="text"/> : 2-digits after decimal point	2-digits after decimal point	
<i>FILT</i> <input type="text"/>	pH input PV filter time constant	0.0 to 60.0 sec	0.0 sec	
<i>PHO</i> <input type="text"/>	pH input sensor correction	-1.40 to 1.40	0.00	

(*) Not available if *MANU* (Manual) is selected during [pH calibration Auto/Manual].

12.6 Temperature Input Group

Character	Name	Setting Range	Factory Default Value	Data
<i>TEMP</i> <input type="text"/>	Electrode RTD	<i>NONE</i> <input type="text"/> : No temperature compensation <i>CUS</i> <input type="text"/> : Cu500 <i>PT</i> <input type="text"/> : Pt100	Cu500	
<i>REFND</i> <input type="text"/>	Reference temperature(*1)	5 to 95°C	25°C	
<i>DP2</i> <input type="text"/>	Decimal point place	<input type="text"/> : No decimal point <input type="text"/> : 1 digit after decimal point	1 digit after decimal point	
<i>WIRE</i> <input type="text"/>	Pt100 input wire type (*2)	<i>2W RE</i> <input type="text"/> : 2-wire type <i>3W RE</i> <input type="text"/> : 3-wire type	3-wire type	
<i>CABLE</i> <input type="text"/>	Cable length correction (*3)	0.0 to 100.0m	0.0m	
<i>CSEC</i> <input type="text"/>	Cable cross-section (*3)	0.10 to 2.00mm ²	0.30mm ²	

(*1) Not available if *CUS* (Cu500) or *PT* (Pt100) is selected during [Electrode RTD].

(*2) Not available if *NONE* (No temperature compensation) or *CUS* (Cu500) is selected during [Electrode RTD].

(*3) Not available if *3W RE* (3-wire type) is selected during [Pt100 input wire type].

12.7 EVT1 Action Group

Character	Name	Setting Range	Factory Default Value	Data
<i>EVT IF</i>	EVT1 type	<i>----</i> : No action <i>PH_L</i> : pH input low limit <i>PH_H</i> : pH input high limit <i>TEMP_L</i> : Temp. input low limit <i>TEMP_H</i> : Temp. input high limit <i>EROUT</i> : Error output <i>FAIL</i> : Fail output	No action	
<i>EVL</i>	EVT1 value (*1)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>EP</i>	EVT1 proportional band (*2)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>ERST</i>	EVT1 reset (*3)	pH input: ± 4.00 pH Temp. input: $\pm 10.0^\circ\text{C}$	pH input: 0.00 pH Temp. input: 0.0°C	
<i>EHYS</i>	EVT1 ON/OFF hysteresis (*4)	pH input: 0.01 to 4.00 pH Temp. input: 0.1 to 10.0°C	pH input: 0.10 pH Temp. input: 1.0°C	
<i>EONF</i>	EVT1 action ON delay time (*4)	0 to 10000 sec	0 sec	
<i>EOFF</i>	EVT1 action OFF delay time (*4)	0 to 10000 sec	0 sec	
<i>EC</i>	EVT1 proportional cycle (*3)	1 to 300 sec	30 sec	
<i>EOLH</i>	EVT1 output high limit (*3)	EVT1 output low limit to 100%	100%	
<i>EOLL</i>	EVT1 output low limit (*3)	0% to EVT1 output high limit	0%	
<i>ONFI</i>	ON time when EVT1 output ON(*4)	0 to 10000 sec	0 sec	
<i>OFFI</i>	OFF time when EVT1 output ON(*4)	0 to 10000 sec	0 sec	

(*1) If *----* (No action), *EROUT* (Error output) or *FAIL* (Fail output) is selected during [EVT1 type], this item and all following items will not appear.

(*2) ON/OFF action when set to 0.00 or 0.0.

(*3) Not available for ON/OFF action.

(*4) Not available for P action.

12.8 EVT2 Action Group

Character	Name	Setting Range	Factory Default Value	Data
<i>EVT2F</i>	EVT2 type	<i>-----</i> : No action <i>PH_L</i> : pH input low limit <i>PH_H</i> : pH input high limit <i>TEMP_L</i> : Temp. input low limit <i>TEMP_H</i> : Temp. input high limit <i>EROUT</i> : Error output <i>FAIL</i> : Fail output	No action	
<i>E4V2</i>	EVT2 value (*1)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>EP2</i>	EVT2 proportional band (*2)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>E2R4F</i>	EVT2 reset (*3)	pH input: ±4.00 pH Temp. input: ±10.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>E2HY4</i>	EVT2 ON/OFF hysteresis (*4)	pH input: 0.01 to 4.00 pH Temp. input: 0.1 to 10.0°C	pH input: 0.10 pH Temp. input: 1.0°C	
<i>E2ONF</i>	EVT2 action ON delay time (*4)	0 to 10000 sec	0 sec	
<i>E2OFF</i>	EVT2 action OFF delay time (*4)	0 to 10000 sec	0 sec	
<i>E2c</i>	EVT2 proportional cycle (*3)	1 to 300 sec	30 sec	
<i>E2oLH</i>	EVT2 output high limit (*3)	EVT2 output low limit to 100%	100%	
<i>E2oLL</i>	EVT2 output low limit (*3)	0% to EVT2 output high limit	0%	
<i>oONF2</i>	ON time when EVT2 output ON(*4)	0 to 10000 sec	0 sec	
<i>oOFF2</i>	OFF time when EVT2 output ON(*4)	0 to 10000 sec	0 sec	

(*1) If *-----* (No action), *EROUT* (Error output) or *FAIL* (Fail output) is selected during [EVT2 type], this item and all following items will not appear.

(*2) ON/OFF action when set to 0.00 or 0.0.

(*3) Not available for ON/OFF action.

(*4) Not available for P action.

12.9 EVT3 Action Group

Character	Name	Setting Range	Factory Default Value	Data
<i>EVT3F</i>	EVT3 type	<i>-----</i> : No action <i>PH_L</i> : pH input low limit <i>PH_H</i> : pH input high limit <i>TEMP_L</i> : Temp. input low limit <i>TEMP_H</i> : Temp. input high limit <i>ERROR</i> : Error output <i>FAIL</i> : Fail output	No action	
<i>E4V3</i>	EVT3 value (*1)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>EP3</i>	EVT3 proportional band (*2)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>E3R4F</i>	EVT3 reset (*3)	pH input: ±4.00 pH Temp. input: ±10.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>E3H44</i>	EVT3 ON/OFF hysteresis (*4)	pH input: 0.01 to 4.00 pH Temp. input: 0.1 to 10.0°C	pH input: 0.10 pH Temp. input: 1.0°C	
<i>E3oNF</i>	EVT3 action ON delay time (*4)	0 to 10000 sec	0 sec	
<i>E3oFF</i>	EVT3 action OFF delay time (*4)	0 to 10000 sec	0 sec	
<i>E3c</i>	EVT3 proportional cycle (*3)	1 to 300 sec	30 sec	
<i>E3oLH</i>	EVT3 output high limit (*3)	EVT3 output low limit to 100%	100%	
<i>E3oLL</i>	EVT3 output low limit (*3)	0% to EVT3 output high limit	0%	
<i>oONF3</i>	ON time when EVT3 output ON(*4)	0 to 10000 sec	0 sec	
<i>oOFF3</i>	OFF time when EVT3 output ON(*4)	0 to 10000 sec	0 sec	

This setting group is available only when EVT3, EVT4 Output (EVT3 option) is added.

(*1) If *-----* (No action), *ERROR* (Error output) or *FAIL* (Fail output) is selected during [EVT3 type], this item and all following items will not appear.

(*2) ON/OFF action when set to 0.00 or 0.0.

(*3) Not available for ON/OFF action.

(*4) Not available for P action.

12.10 EVT4 Action Group

Character	Name	Setting Range	Factory Default Value	Data
<i>EVT4F</i>	EVT4 type	<i>-----</i> : No action <i>PH_L</i> : pH input low limit <i>PH_H</i> : pH input high limit <i>TEMP_L</i> : Temp. input low limit <i>TEMP_H</i> : Temp. input high limit <i>ERROR</i> : Error output <i>FAIL</i> : Fail output	No action	
<i>E4V4</i>	EVT4 value (*1)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>EP4</i>	EVT4 proportional band (*2)	pH input: 0.00 to 14.00 pH Temp. input: 0.0 to 100.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>E4R4</i>	EVT4 reset (*3)	pH input: ±4.00 pH Temp. input: ±10.0°C	pH input: 0.00 pH Temp. input: 0.0°C	
<i>E4HY4</i>	EVT4 ON/OFF hysteresis (*4)	pH input: 0.01 to 4.00 pH Temp. input: 0.1 to 10.0°C	pH input: 0.10 pH Temp. input: 1.0°C	
<i>E4ONF</i>	EVT4 action ON delay time (*4)	0 to 10000 sec	0 sec	
<i>E4OFF</i>	EVT4 action OFF delay time (*4)	0 to 10000 sec	0 sec	
<i>E4c</i>	EVT4 proportional cycle (*3)	1 to 300 sec	30 sec	
<i>E4oLH</i>	EVT4 output high limit (*3)	EVT4 output low limit to 100%	100%	
<i>E4oLL</i>	EVT4 output low limit (*3)	0% to EVT4 output high limit	0%	
<i>oONF4</i>	ON time when EVT4 output ON(*4)	0 to 10000 sec	0 sec	
<i>oOFF4</i>	OFF time when EVT4 output ON(*4)	0 to 10000 sec	0 sec	

This setting group is available only when EVT3, EVT4 Output (EVT3 option) is added.

(*1) If *-----* (No action), *ERROR* (Error output) or *FAIL* (Fail output) is selected during [EVT4 type], this item and all following items will not appear.

(*2) ON/OFF action when set to 0.00 or 0.0.

(*3) Not available for ON/OFF action.

(*4) Not available for P action.

12.11 Special Function Group

Character	Name	Setting Range	Factory Default Value	Data
<i>Lock</i> <input type="checkbox"/>	Set value lock	<i>-----</i> : Unlock <i>Lock 1</i> : Lock 1 <i>Lock 2</i> : Lock 2 <i>Lock 3</i> : Lock 3	Unlock	
<i>CM4L</i> <input type="checkbox"/>	Communication protocol (*)	<i>NaML</i> <input type="checkbox"/> : Shinko protocol <i>ModA</i> <input type="checkbox"/> : Modbus ASCII mode <i>ModR</i> <input type="checkbox"/> : Modbus RTU mode	Shinko protocol	
<i>CMNo</i> <input type="checkbox"/>	Instrument number(*)	0 to 95	0	
<i>CM4P</i> <input type="checkbox"/>	Communication speed (*)	<i>96</i> : 9600bps <i>192</i> : 19200bps <i>384</i> : 38400bps	9600bps	
<i>CMFF</i> <input type="checkbox"/>	Data bit/Parity (*)	<i>8NoN</i> <input type="checkbox"/> : 8 bits/No parity <i>7NoN</i> <input type="checkbox"/> : 7 bits/No parity <i>8EVN</i> <input type="checkbox"/> : 8 bits/Even <i>7EVN</i> <input type="checkbox"/> : 7 bits/Even <i>8odd</i> <input type="checkbox"/> : 8 bits/Odd <i>7odd</i> <input type="checkbox"/> : 7 bits/Odd	7 bits/Even	
<i>CM4F</i> <input type="checkbox"/>	Stop bit (*)	<i>1</i> : Stop bit 1 <i>2</i> : Stop bit 2	1	
<i>TRo41</i>	Transmission output	<i>PH</i> <input type="checkbox"/> : pH transmission <i>TEMP</i> <input type="checkbox"/> : Temperature transmission	pH trans- mission	
<i>TRLH1</i>	Transmission output high limit	Transmission output low limit to input range high limit	14.00 pH 100.0°C	
		If pH transmission is selected during [Transmission output]:		
		If Temperature transmission is selected during [Transmission output]:		
<i>TRL11</i>	Transmission output low limit	Input range low limit to Transmission output high limit	0.00 pH 0.0°C	
		If pH transmission is selected during [Transmission output]:		
		If Temperature transmission is selected during [Transmission output]:		

(*) Available only when Serial communication (C5 option) is added.

Character	Name	Setting Range	Factory Default Value	Data
<i>bKLF</i>	Backlight selection	<i>ALL</i> : All are backlit. <i>PH</i> : pH display <i>TEMP</i> : Temp. display <i>Ac</i> : Action indicators <i>PHTEMP</i> : pH display + Temp. display <i>PHRAc</i> : pH display + Action indicators <i>TEMPRAc</i> : Temp. display + Action indicators	All are backlit.	
<i>colR</i>	pH color	<i>GRN</i> : Green <i>RED</i> : RED <i>ORG</i> : Orange <i>PHCR</i> : pH color changes continuously.	Red	
<i>CLP</i>	pH color reference value	0.00 to 14.00 pH	7.00 pH	
<i>CLR</i>	pH color range	0.10 to 14.00 pH	2.00 pH	
<i>dPTM</i>	Backlight time	0 to 99 minutes	0 min.	
<i>BER4L</i>	Bar graph selection	<i>----</i> : No indication <i>TRof 1</i> : Transmission output	No indication	
<i>INERR</i>	EVT output when input errors occur	<i>OFF</i> : Disabled <i>ON</i> : Enabled	Disabled	
<i>oFdP</i>	Temperature display when No temperature compensation (*)	<i>OFF</i> : Unlit <i>4Td</i> : Reference temp.	Unlit	

(*): Not available if *cU5* (Cu500) or *Pt* (Pt100) is selected during [Electrode RTD].

12.12 Error Code List

If any error occurs, its error code will flash on the Temperature display.

Error Code	Error Type	Error Contents	Description	Occurance
E-11	Error	Response Speed Error	When calibrating the standard solution, the response of the pH Combination Electrode Sensor is slow. With the 1st and 2nd solutions, when ± 0.10 pH or more of input fluctuation within ± 1.50 pH continues for 5 minutes.	When calibrating
E-12	Error	Electrode Sensitivity Error	When calibrating the standard solution, sensitivity of the pH Combination Electrode Sensor is deteriorating. The difference of calibration value between the 1st and the 2nd point is 2.00 pH or less.	
E-13	Error	Asymmetry Potential Error	When calibrating pH 7, the difference in electromotive force between the sensor measured value and standard value exceeds the equivalent of ± 1.50 pH.	
E-14	Error	Standard Solution Error	The specified standard solution has not been used. When ± 1.50 pH is exceeded for the 1st and 2nd solutions.	
E-15	Error	Solution Temperature Error	When temperature is 55°C or more at pH 10 solution.	
E-21	Fail	Temp. Sensor Disconnected	Temperature sensor lead wire is disconnected.	When measuring or calibrating
E-22	Fail	Temp. Sensor Short-circuited	Temperature sensor lead wire is short-circuited.	
E-23	Error	Outside Temp. Compensation Range	Measured temperature has exceeded 110°C.	
E-24	Error	Outside Temp. Compensation Range	Measured temperature is less than 0°C.	

***** Inquiry *****

For any inquiries about this unit, please contact our agency or the vendor where you purchased the unit after checking the following.

[Example]

- Model ----- AER-102-PH
- Serial number ----- No.11AF05000

In addition to the above, please let us know the details of the malfunction, or discrepancy, and the operating conditions.

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