和文は裏面をご覧下さい。

INSTRUCTION MANUAL

Programmable Controller PCB1

No. PCB11JE3 2019.11

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For detailed usage and options, refer to the full Instruction Manual for the PCB1. Please download the full Instruction Manual from Shinko website.
http://www.shinko-technos.co.jp/e/ → Support & Downloads → Downloads → Manuals

Thank you for purchasing our PCB1, Programmable Controller. This manual contains instructions for the mounting, functions, operations and notes when operating the PCB1. 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.

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

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

⚠ **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 electrical shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.**
- **To prevent an electrical 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. Proper periodic maintenance is also 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.**

⚠ Installation Precautions

[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 -10 to 55℃ (14 to 131℉)**
- **An ambient non-condensing humidity of 35 to 85 %RH (Non-condensing)**
- **No large capacity electromagnetic switches or cables through which large current is flowing**
- **No water, oil or chemicals or the vapors of these substances can come into direct contact with the unit**
- **Please note that the ambient temperature of this unit – not the ambient temperature of the control panel – must not exceed 55℃ (131℉) if mounted through the face of a control panel, otherwise the life of electronic components (especially electrolytic capacitors) may be shortened.**

⚠ 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.

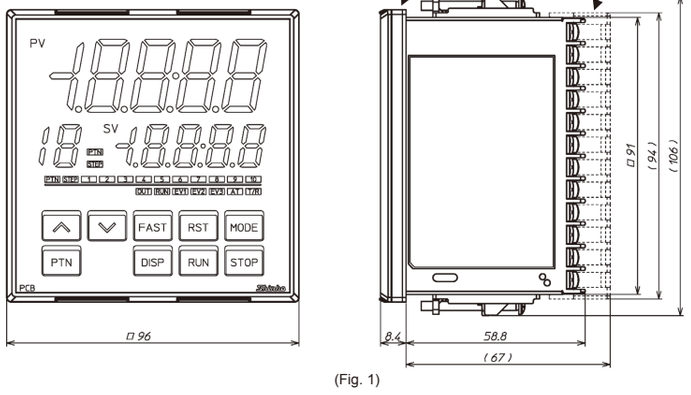
Specifications

Power supply voltage	100 to 240 V AC 50/60 Hz, Allowable fluctuation: 85 to 264 V AC 24 V AC/DC 50/60 Hz, Allowable fluctuation: 20 to 28 V AC/DC
Base accuracy (At ambient temperature 23℃, for a single unit mounting)	Thermocouple: Within ±0.2% of each input span ±1 digit However, R, S inputs, 0 to 200℃(32 to 392℉): Within ±6℃(12℉) B input, 0 to 300℃ (32 to 572℉): Accuracy is not guaranteed. K, J, E, T, N inputs, Less than 0℃ (32℉): Within ±0.4% of input span ±1 digit RTD: Within ±0.1% of each input span ±1 digit Direct current, DC voltage inputs: Within ±0.2% of each input span ±1 digit
Effect of ambient temperature	Within 50 ppm/℃ of each input span
Input sampling period	125 ms
Time accuracy	Within ±0.5% of setting time
Power consumption	100 to 240 V AC: Approx.8 VA max.(11 VA max. if max. options are added) 24 V AC: Approx. 5 VA max. (8 VA max. if max. options are added) 24 V DC: Approx. 5 W max. (8 W max. if max. options are added)
Ambient temperature	-10 to 55℃ (However, no icing, non-condensing)
Ambient humidity	35 to 85 %RH (However, non-condensing)
Weight	Approx. 220 g
Accessories	Mounting bracket: 1 set Instruction manual excerpt: 1 copy

Control output OUT1	Relay contact: 1a, Control capacity, 3 A 250 V AC (resistive load) 1 A 250 V AC (inductive load cosϕ=0.4), Electric life: 100,000 cycles, Minimum applicable load: 10 mA 5 V DC Non-contact voltage (for SSR drive): 12 V DC±15%, Max. 40 mA (short circuit protected) Direct current: 4 to 20 mA DC (Resolution: 12000), Load resistance: Max. 550 Ω
Event output EV□	Relay contact: 1a, Control capacity: 3 A 250 V AC (resistive load) 1 A 250 V AC (inductive load cosϕ=0.4) Electric life: 100,000 cycles, Minimum applicable load: 10 mA 5 V DC
Control output OUT2 [EV2(DR), DS, DA, EV3D□ options]	Relay contact: 1a, Control capacity: 3 A 250 V AC (resistive load) 1 A 250 V AC (inductive load cosϕ=0.4) Electric life: 100,000 cycles, Minimum applicable load: 10 mA 5 V DC (If EV2 option is ordered, and 020 is selected in [Event Output EV2 allocation]) Non-contact voltage (for SSR drive): 12 V DC±15%, Max. 40 mA (short circuit protected) Direct current: 4 to 20 mA DC (Resolution: 12000) Load resistance: Max. 550 Ω
Transmission output (EIT option)	Output: 4 to 20 mA DC (Resolution: 12000), Load resistance: Max. 550 Ω Output accuracy: Within ±0.3% of transmission output span Response time: 400 ms + Input sampling period (0%→90%)
Insulated power output (P24 option)	Output voltage: 24±3 V DC (When load current is 30 mA DC) Ripple voltage: Within 200 mV DC (When load current is 30 mA DC) Max. load current: 30 mA DC

Dimensions (Scale: mm)

( ): Size when mounting brackets or terminal cover (sold separately) are mounted.

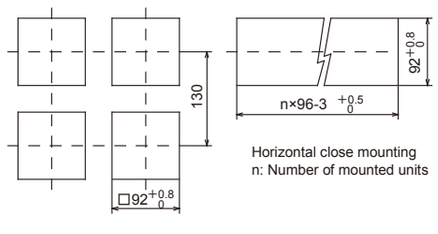


(Fig. 1)

Panel Cutout (Scale: mm)

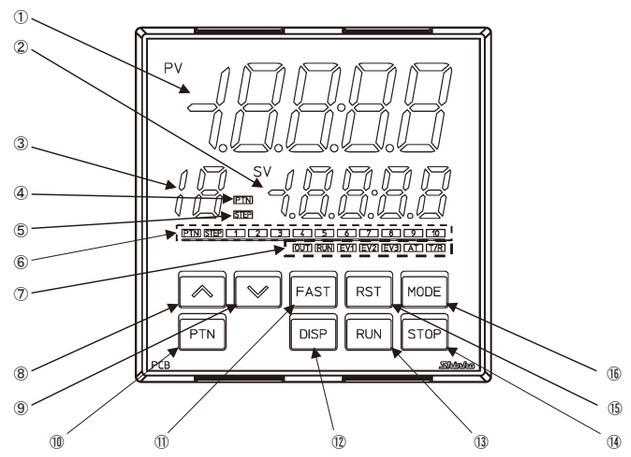
⚠ Caution

If horizontal close mounting is used for the unit, IP66 specification (Drip-proof/Dust-proof) may be compromised, and all warranties will be invalidated.
The torque for the mounting bracket screws should be 0.1 N•m.



(Fig. 2)

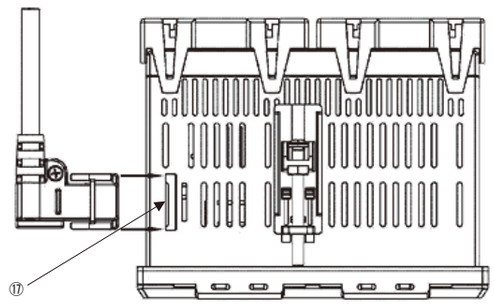
Names and Functions



(Fig. 3)

Tool cable
CMD-001

Top view of the case



(Fig. 4)

Displays, Indicators

①	**PV Display (Red)**	Indicates process variable (PV) in RUN mode. Indicates setting characters in Setting mode. Flashes during Wait action or Holding in program control.
②	**SV Display (Green)**	Indicates desired value (SV), Output manipulated variable (MV), or Remaining time (TIME) in RUN mode. Retains display indication at power OFF. Indicates the set values in setting mode.
③	**PTN/STEP Display (Orange)**	Indicates the pattern number or step number. Each time the DISP key is pressed, the PTN/STEP Display (③), and the PTN/STEP indicator (⑥) alternately indicate the pattern number and step number. Flashes during Wait action, or when the step number is indicated. If 'SV digital reception' is selected in [Communication protocol], ↱ is indicated.
④	**PTN Indicator (Orange)**	Lights up when the pattern number is indicated on the PTN/STEP Display.
⑤	**STEP Indicator (Orange)**	Lights up when the step number is indicated on the PTN/STEP Display.
⑥	**PTN/STEP Indicator (Green)**	LED for the pattern number or step number lights up. If the PTN/STEP Display (③) indicates the pattern number, the PTN/STEP indicator (⑥) lights up its step number. If the PTN/STEP Display indicates the step number, the PTN/STEP indicator lights up its pattern number. Each time the DISP key is pressed, the PTN/STEP indicator and the PTN/STEP Display alternately indicate the pattern number and step number.

Action Indicators

⑦	**OUT (Green)**	Lights up when control output OUT1 is ON. For direct current output type, flashes corresponding to the MV in 125 ms cycles.
	RUN (Orange)	Lights up during program control RUN. Flashes during Program control HOLD or Fixed value control.
	EV1 (Red)	Lights up when Event output EV1 is ON.
	EV2 (Red)	Lights up when Event output EV2 [(EV2, EV3(DR) options] is ON. Lights up when control output OUT2 [Cooling output (EV2, DS, DA or EV3D□ option)] is ON. For direct current output type (DA, EV3DA options), flashes corresponding to the MV in 125 ms cycles.
	EV3 (Red)	Lights up when Event output EV3 (EV3D□, EI options) is ON.
	AT (Orange)	Flashes while AT is performing.
	T/R (Orange)	Lights up during serial communication (C5W, C5 options) TX (transmitting) output.

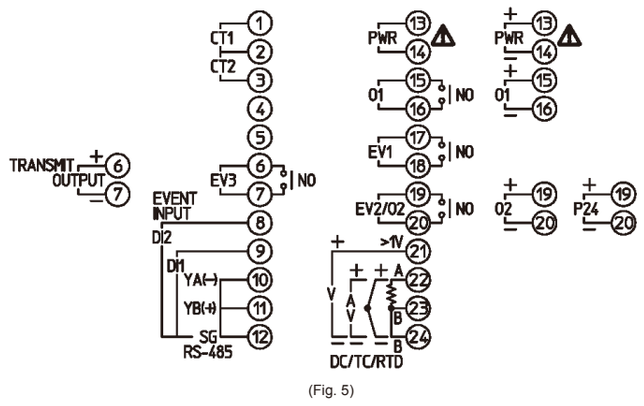
Keys, Connector

⑧	**UP key**	In setting mode, increases the numerical value. By pressing for approx. 1 second during program control, time progress pauses, and control continues with the SV at that time (Holding function).
⑨	**DOWN key**	In setting mode, decreases the numerical value.
⑩	**PTN key (Pattern key)**	During program control stop (in standby), selects program pattern number to perform or to set. By pressing during program control, moves to Monitor mode. In Monitor mode, switches the indication item.
⑪	**FAST key**	In setting mode, makes the numeric value change faster. During program control, makes step time progress 60 times faster.
⑫	**DISP key (Display key)**	During RUN mode, the PTN/STEP display and PTN/STEP indicator alternately indicates the pattern number and step number. In setting mode, registers the set value, and moves back to the previous mode.
⑬	**RUN key**	Performs program control, or cancels Holding while program control is held. By pressing for approx. 1 second during program control, stops performing step, and proceeds to the next step (Advance function).
⑭	**STOP key**	Stops program control by pressing for approx. 1 sec during program control, or cancels pattern end output.
⑮	**RST(Reset) key**	In setting mode, registers the set value, and moves to RUN mode.
⑯	**MODE key**	In setting mode, registers the set value, and moves to the next item.
⑰	**Tool cable connector**	By connecting the Tool cable (CMD-001, sold separately), the following operations can be conducted from an external computer, using the Console software SWM-PCB101M. • Reading and setting of step SV, step time, PID and various set values • Reading of PV and action status • Function change

Terminal Arrangement

⚠ Caution

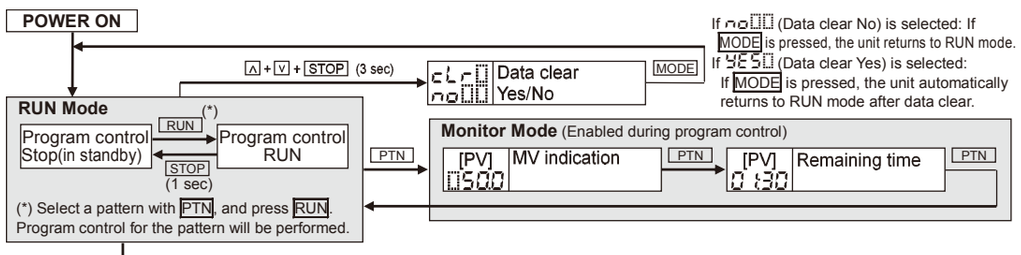
Do not pull or bend the lead wire on the terminal side when wiring or after wiring, as it could cause malfunction. Use a solderless terminal with an insulation sleeve in which an M3 screw fits. The torque for the terminal screws should be 0.63 N•m.



(Fig. 5)

PWR	Power supply voltage 100 to 240 V AC or 24V AC/DC **(For 24 V DC, ensure polarity is correct.)**
O1	Control output OUT1
EV1	Event output EV1
EV2	Event output EV2 [EV2, EV3(DR) options]
O2	Control output OUT2 (EV2, DS, DA, EV3D□ options)
P24	Insulated power output 24 V DC (P24 option)
TC	Thermocouple input
RTD	RTD input
DC	Direct current, DC voltage input
CT1	CT input 1 (C5W, EIW, W options)
CT2	CT input 2 (C5W, EIW, W options)
RS-485	Serial communication RS-485 (C5W, C5 options)
EVENT INPUT	Event input DI1 (C5W, EIW, EIT, C5, EI options) Event input DI2 (C5W, EIW, EIT, C5, EI options)
EV3	Event output EV3 (EV3D□, EI options)
TRANSMIT OUTPUT	Transmission output (EIT option)

PCB1 Key Operation Flowchart



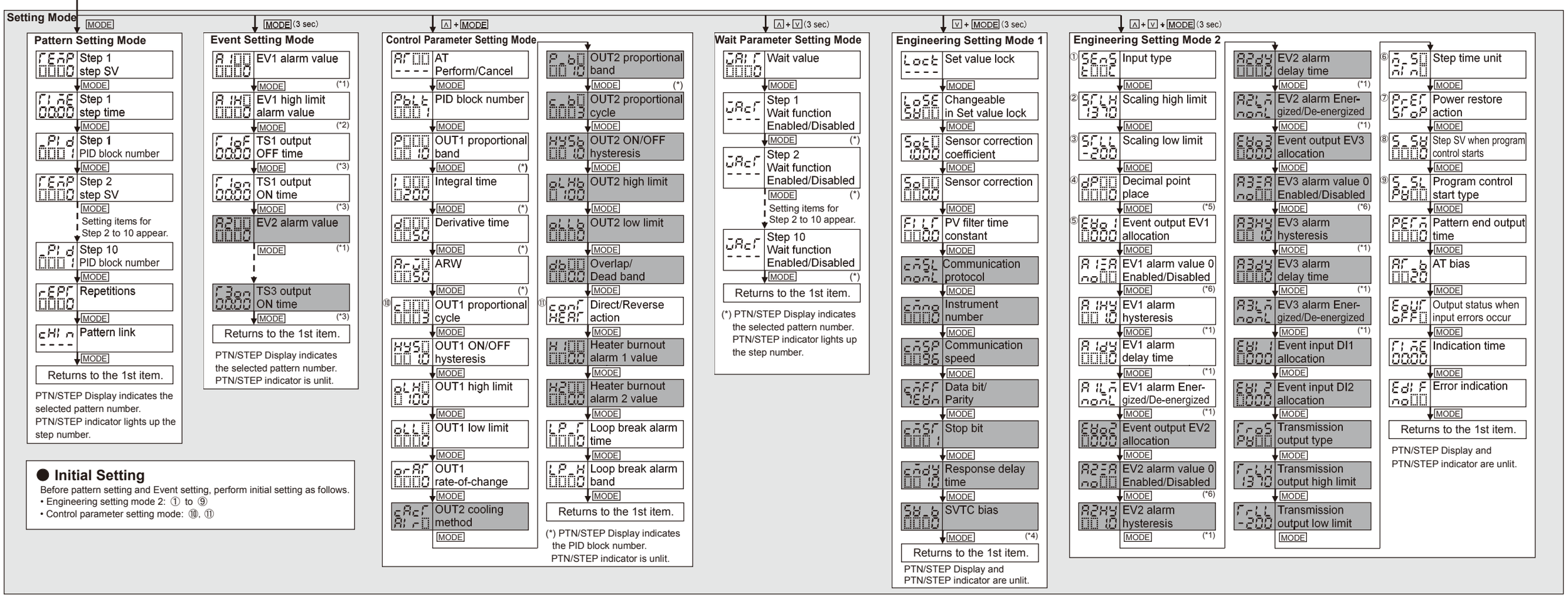
● About Setting Item

- Step 1 SV — Upper left: PV Display: Indicates setting characters. Lower left: SV Display: Indicates factory default. Right side: Indicates setting items.
- EV2 alarm value — Shaded setting items are optional, and appear only when the options are ordered.

- (*1) Available when 001 (High limit) to 012 (H/L limits with standby independent) are selected in [Event output EV□ allocation].
- (*2) Available when 004 (H/L limits independent), 006 (H/L limit range independent) or 012 (H/L limits with standby independent) is selected in [Event output EV□ allocation].
- (*3) Available when 015 (Time signal output) is selected in [Event output EV□ allocation].
- (*4) Available when SV digital reception (Shinko protocol) is selected in [Communication protocol].
- (*5) Available when direct current or DC voltage input is selected in [Input type].
- (*6) Available when 001(High limit) to 012 (H/L limits with standby independent) – except [007 (Process high) and 008 (Process low)] – are selected in [Event output EV□ allocation].

● Key Operation

- Use ∧ and ∨ for settings, and register the settings with MODE or DISP.
- MODE: Moves to the next item, illustrated by an arrow.
- DISP: Moves back to the previous item (Opposite to MODE).
- MODE (3 sec): Press MODE for approx. 3 seconds.
- ∧+MODE: Press ∧ and MODE (in that order) together.
- ∧+∨ (3 sec): Press ∧ and ∨ (in that order) together for 3 seconds.
- ∨+MODE (3 sec): Press ∨ and MODE (in that order) together for 3 seconds.
- ∧+∨+MODE (3 sec): Press ∧, ∨ and MODE (in that order) together for 3 seconds.
- ∧+∨+STOP (3 sec): Press ∧, ∨ and STOP (in that order) together for 3 seconds.
- RST: Returns to RUN mode from any setting items.



● Initial Setting

Before pattern setting and Event setting, perform initial setting as follows.
- Engineering setting mode 2: ① to ⑨
- Control parameter setting mode: ⑩, ⑪

Pattern link		Lock 5	Stop bit			R	32 to 3200 °F	0.000	3 digits after decimal point	Heating/Cooling control output •		Power restore action	
----	Pattern link Disabled	Changeable in Set value lock	1 bit			S	32 to 3200 °F	Event output EV1 to EV3 allocation		• Available only for Event output EV2 allocation		SToP	Stops after power is restored
cHIn	Pattern link Enabled	SV Step SV + Step time	2 bits			B	32 to 3308 °F	000	No event	EV1 to EV3 alarm value 0 Enabled / Disabled		cont	Continues after power is restored
AT Perform / Cancel		SvEv Step SV + Step time + EV□ alarm value	Input type			E	-328 to 1472 °F	001	High limit alarm	no	Disabled	HoLd	Suspends after power is restored
----	AT Cancel	Communication protocol	tc K	K	-200 to 1370 °C	T	-328 to 752.0 °F	002	Low limit alarm	YES	Enabled	Program control start type	
AT	AT Perform	nonL Shinko protocol	tc K	K	-200.0 to 400.0 °C	N	-328 to 2372 °F	003	H/L limits alarm	EV1 to EV3 alarm Energized / De-energized		PV	PV start
OUT2 cooling method		SVTr SV digital transmission (Shinko protocol)	J	J	-200 to 1000 °C	PLII	PL-II 32 to 2534 °F	004	H/L limits independent alarm	nonL	Energized	PVr	PVR start
Air	Air cooling	SVrr SV digital reception (Shinko protocol)	r	R	0 to 1760 °C	c	C(W/Re5-26) 32 to 4199 °F	005	H/L limit range alarm	rEVS	De-energized	SV	SV start
oil	Oil cooling	Modbus ASCII mode	S	S	0 to 1760 °C	Pt	Pt100 -328.0 to 1562.0 °F	006	H/L limit range independent alarm	Event input DI1, DI2 allocation		Output status when input errors occur	
wAtr	Water cooling	rtuA Modbus RTU mode	b	B	0 to 1820 °C	JPt	JPt100 -328.0 to 932.0 °F	007	Process high alarm	000	No event	oFF	Output OFF
Direct / Reverse action		rtur Modbus RTU mode	E	E	-200 to 800 °C	Pt	Pt100 -328 to 1562 °F	008	Process low alarm	001	Pattern number selection	on	Output ON
rEAr	Reverse control action	Communication speed	t	T	-200.0 to 400.0 °C	JPtF	JPt100 -328 to 932 °F	009	High limit with standby alarm	002	Direct / Reverse action	Error indication	
cool	Direct control action	96 9600 bps	n	N	-200 to 1300 °C	420A	4 - 20 mA -2000 to 10000	010	Low limit with standby alarm	003	Program control RUN / STOP	no	Disabled
Step 1 to 10 Wait function Enabled / Disabled		192 19200 bps	PLrc	PL-II	0 to 1390 °C	020A	0 - 20 mA -2000 to 10000	011	H/L limits with standby alarm	004	Program control Holding / Not holding	YES	Enabled
----	Disabled	384 38400 bps	c	C(W/Re5-26)	0 to 2315 °C	01 1V	0 - 1 V -2000 to 10000	012	H/L limits with standby independent	005	Program control Advance function		
USE	Enabled	Data bit / Parity	Pr	Pt100	-200.0 to 850.0 °C	01 5V	0 - 5 V -2000 to 10000	013	Heater burnout alarm output	Transmission output type			
Set value lock		8non 8 bits / No parity	JPrc	JPt100	-200.0 to 500.0 °C	1 5V	1 - 5 V -2000 to 10000	014	Loop break alarm output	PV	PV transmission		
----	Unlock	7non 7 bits / No parity	Prc	Pt100	-200 to 850 °C	0 10V	0 - 10 V -2000 to 10000	015	Time signal output	SV	SV transmission		
Loc1	Lock 1	8Evn 8 bits / Even	JPrc	JPt100	-200 to 500 °C	Decimal point place		016	Output during AT	MV	MV transmission		
Loc2	Lock 2	7Evn 7 bits / Even	tF	K	-328 to 2498 °F	no	No decimal point	017	Pattern end output	Step time unit			
Loc3	Lock 3	8odd 8 bits / Odd	tF	K	-328.0 to 752.0 °F	0.0	1 digit after decimal point	018	Output by communication command	Hour : Minutes			
Loc4	Lock 4	7odd 7 bits / Odd	JF	J	-328 to 1832 °F	0.00	2 digits after decimal point	019	RUN output	SEc	Minutes : Seconds		