INSTRUCTION MANUAL

DIN Rail Mounted Indicating Controller DCL-33A

No. DCL31JE3 2019.01

For detailed usage, refer to the Instruction Manual for the DCL-33A. Please download the full Instruction Manual from Shinko website.
http://shinko-technos.co.jp/e/ → Support & Downloads → Downloads → Manuals

Thank you for purchasing our DCL-33A, DIN Rail Mounted Indicating Controller. This manual contains instructions for the mounting, functions, operations and notes when operating the DCL-33A. 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 electric shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.
- To prevent 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 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.
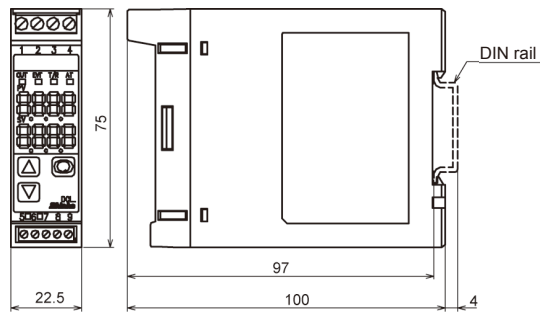
⚠ Caution for Installation

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℃ (32 to 122℉) 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
- Take note that the ambient temperature of this unit – not the ambient temperature of the control panel – must not exceed 50℃ (122℉) if mounted within a control panel, otherwise the life of the electronic components (especially electrolytic capacitors) may be shortened.
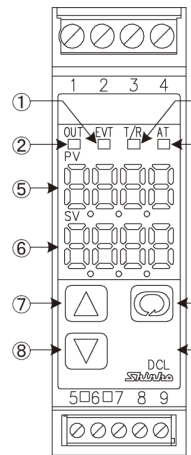
⚠ Caution with Respect to Export Trade Control Ordinance

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 voltage fluctuation: 85 to 264 V AC 24 V AC/DC 50/60 Hz, Allowable voltage fluctuation: 20 to 28 V AC/DC
Base accuracy (at ambient temperature 23℃, for a single unit mounting)	Thermocouple input: Within ±0.2% of each input span±1 digit, or ±2℃ (4℉), whichever is greater. However, R, S inputs, 0 to 200℃ (32 to 392℉): Within ±8℃ (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, or ±4℃ (8℉), whichever is greater RTD input: Within ±0.1% of each input span±1 digit, or ±1℃ (2℉), whichever is greater DC voltage input: Within ±0.2% of each input span±1 digit Direct current input: Within ±0.2% of each input span±1 digit
Input sampling period	125 ms
Power consumption	100 to 240 V AC: Approx. 5 VA max. 24 V AC: Approx. 4 VA max. 24 V DC: Approx. 4 W max.
Ambient Temperature, Humidity	0 to 50℃, 35 to 85 %RH (Non-condensing)
Weight	Approx. 100 g
Accessories	Instruction manual excerpt: 1 copy When W option is ordered: Connector harness W 3 m 1 length When W option (5A, 10A, 20A) is ordered: CT (CTL-6S) 1 piece When W option (50A) is ordered: CT (CTL-12-S36-10L1U) 1 piece When EI option is ordered: Connector harness AOJ 3 m 1 length When EA option is ordered: Connector harness AOJ 3 m 1 length
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) Electrical life: 100,000 cycles Non-contact voltage (for SSR drive): 12 V DC±15% Max 40 mA (short circuit protected) Direct current: 4 to 20 mA DC, Load resistance: Max 550 Ω Output accuracy: Within ±0.3% of output span Resolution: 12000

EVT output	**Alarm output:** (Alarm, Loop break alarm and optional Heater burnout alarm utilize common output terminals.) The alarm action point is set by ± deviation from the SV (excluding Process alarm), and if the input goes outside the range, alarm is turned ON or OFF (High/Low limit range alarm). When De-energized action is selected in [Alarm Energized/De-energized], alarm is activated conversely. Setting accuracy: Same as base accuracy Action: ON/OFF action Hysteresis: Thermocouple, RTD inputs: 0.1 to 100.0℃ (℉) DC voltage, current inputs: 1 to 1000 (The placement of the decimal point follows the selection.) Output: Open collector, Control capacity: 0.1 A 24 V DC Alarm type: High limit alarm, Low limit alarm, High/Low limits alarm, High/Low limits independent alarm, High/Low limit range alarm, High/Low limit range independent alarm, Process high alarm, Process low alarm, High limit with standby alarm, Low limit with standby alarm, High/Low limits with standby alarm, High/Low limits with standby independent alarm. Energized/De-energized action are applied to the above alarms, totaling 24 alarm types. No alarm action can also be selected. Alarm Energized/De-energized: Alarm output Energized/De-energized can be selected.

	Alarm Energized	Alarm De-energized
EVT indicator (Red)	Lit	Lit
EVT output	ON	OFF

Alarm HOLD function: Once an alarm is activated, the alarm output is maintained until the power is turned off.

Loop break alarm output:
(Loop break alarm, Alarm and optional Heater burnout alarm utilize common output terminals.)
Detects heater burnout, sensor burnout and actuator trouble.
Setting range:
Loop break alarm time: 0 to 200 minutes
Loop break alarm span:
Thermocouple, RTD inputs: 0 to 150℃ (℉) or 0.0 to 150.0℃ (℉)
DC voltage, current inputs: 0 to 1500 (The placement of the decimal point follows the selection.)
Output: Open collector, Control capacity: 0.1 A 24 V DC

Heating/Cooling control output (OUT2) (DC option)	Output: Open collector, Control capacity: 0.1 A 24 V DC

External Dimensions (Scale: mm)
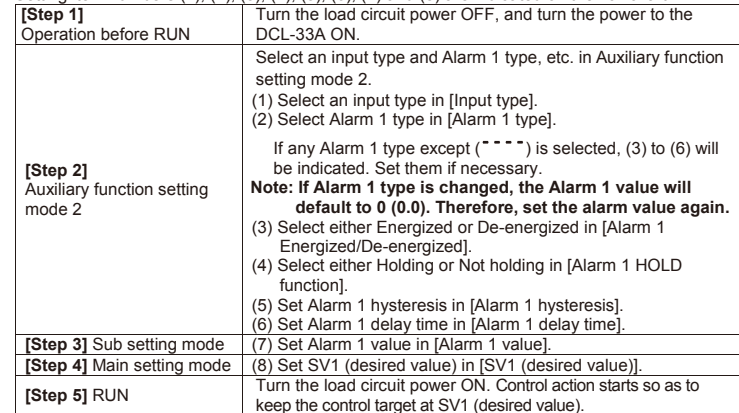

Name and Functions

No.	Name	Description
①	EVT indicator	The red LED lights when Event output (Alarm, Loop break alarm or optional Heater burnout alarm) is ON. The red LED also lights when Cooling output is ON if Heating/Cooling control option is ordered.
②	OUT indicator	The green LED lights when OUT (control output) is ON (when Heating output is ON if Heating/Cooling control option is ordered). For Direct current output, flashes in 125 ms cycles corresponding to the output MV.
③	T/R indicator	The yellow LED flashes during Serial communication TX output (transmitting).
④	AT indicator	The yellow LED flashes while auto-tuning (AT) is performing.
⑤	PV Display	Indicates the PV (process variable), or setting characters in setting mode with a red LED.
⑥	SV Display	Indicates the SV (desired value), output MV (manipulated variable) or each set value in each setting mode with a green LED.
⑦	UP key	Increases the numeric value.
⑧	DOWN key	Decreases the numeric value.
⑨	MODE key	Switches the setting mode or registers the set data. (Registers the set data by pressing the MODE key.)
⑩	SUB-MODE key	Enters Auxiliary function setting mode 2 in combination with the MODE key. If 'Control output OFF' is selected in [SUB-MODE key function]: Turns all outputs OFF as if the power were turned OFF. If 'Auto/Manual control' is selected in [SUB-MODE key function]: Switches the Auto/Manual control. If 'Alarm HOLD cancel' is selected in [SUB-MODE key function]: Cancels Alarm HOLD.

⚠ Caution

- When setting the specifications and functions of this unit, connect mains power cable to terminals 1 and 2 first, then set them referring to "Key Operation Flowchart", before "Mounting to the Control Panel" and "Wiring".
- Do not pull or bend the lead wire on the terminal side when wiring or after wiring, as it could cause malfunction.

Terminal Arrangement
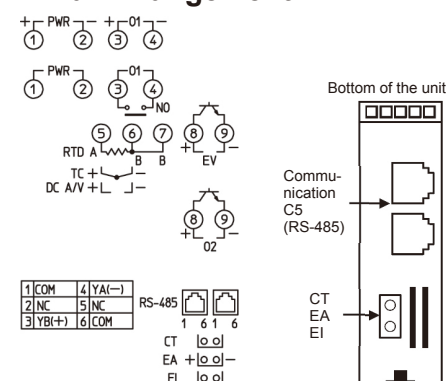
Name	Description
PWR (POWER SUPPLY)	100 to 240 V AC or 24 V AC/DC **For 24 V DC, ensure polarity is correct.**
O1	Control output (OUT1)
TC	Thermocouple
RTD	Resistance temperature detector
DC	Direct current or DC voltage **For Direct current input (when "Externally mounted 50 Ω shunt resister" is selected), connect a 50 Ω shunt resistor between input terminals.**
EV	Event output Outputs when Alarm, Loop break alarm or Heater burnout alarm (W option) is ON.
O2	Cooling output (DC option)
RS-485	Serial communication (C5 option)
CT	Current transformer input (W option)
EA	External setting input (EA option)
EI	DI1 input (EI option)

When using ferrules, use the following ferrules made by Phoenix Contact GMBH & CO.
Recommended Ferrules and Crimping Pliers

Terminal Number	Terminal Screw	Ferrules with Insulation Sleeve	Conductor Cross Sections	Tightening Torque	Crimping Pliers
1 to 4	M2.6	AI 0.25-8 YE	0.2 to 0.25 mm²	0.5 to 0.6 N·m	CRIMPFOX ZA 3 CRIMPFOX UD 6
		AI 0.34-8 TQ	0.25 to 0.34 mm²		
		AI 0.5-8 WH	0.34 to 0.5 mm²		
		AI 0.75-8 GY	0.5 to 0.75 mm²		
		AI 1.0-8 RD	0.75 to 1.0 mm²		
		AI 1.5-8 BK	1.0 to 1.5 mm²		
5 to 9	M2.0	AI 0.25-8 YE	0.2 to 0.25 mm²	0.22 to 0.25 N·m	
		AI 0.34-8 TQ	0.25 to 0.34 mm²		
		AI 0.5-8 WH	0.34 to 0.5 mm²		

Key Operation Flowchart

● Basic Operation Procedure

Set the input type, Alarm 1 type and SV1 (desired value), following the procedure below.
Setting item numbers (1), (2), (3), (4), (5), (6), (7) and (8) are indicated on the flowchart.

[Step 1] Operation before RUN	Turn the load circuit power OFF, and turn the power to the DCL-33A ON.
[Step 2] Auxiliary function setting mode 2	Select an input type and Alarm 1 type, etc. in Auxiliary function setting mode 2. (1) Select an input type in [Input type]. (2) Select Alarm 1 type in [Alarm 1 type]. If any Alarm 1 type except (‾ ‾ ‾) is selected, (3) to (6) will be indicated. Set them if necessary. Note: If Alarm 1 type is changed, the Alarm 1 value will default to 0 (0.0). Therefore, set the alarm value again. (3) Select either Energized or De-energized in [Alarm 1 Energized/De-energized]. (4) Select either Holding or Not holding in [Alarm 1 HOLD function]. (5) Set Alarm 1 hysteresis in [Alarm 1 hysteresis]. (6) Set Alarm 1 delay time in [Alarm 1 delay time].
[Step 3] Sub setting mode	(7) Set Alarm 1 value in [Alarm 1 value].
[Step 4] Main setting mode	(8) Set SV1 (desired value) in [SV1 (desired value)].
[Step 5] RUN	Turn the load circuit power ON. Control action starts so as to keep the control target at SV1 (desired value).

● Alarm Type

| High limit alarm	The alarm action is ± deviation setting from the SV. The alarm is activated if the input value reaches the high limit set value.
Low limit alarm	The alarm action is ± deviation setting from the SV. The alarm is activated if the input value drops below the low limit set value.
High/Low limits alarm	Combines High limit and Low limit alarm actions. When input value reaches the high limit set value or drops below the low limit set value, the alarm is activated.
High/Low limit range alarm	When input value is between the low limit and high limit set values, the alarm is activated.
Process alarm	Sets the scale range of the controller, alarm action points can be set at random and if the input reaches the randomly set action point, the alarm is activated.
High/Low limits independent	High limit and low limit set values can be set respectively. The alarm is activated when the input value exceeds the high limit set value or drops below the low limit set value.
High/Low limit range independent	High limit and low limit set values can be set respectively. The alarm is activated when the input value is between the low limit and high limit set values.
High limit with standby, Low limit with standby, H/L limits with standby, H/L limits with standby independent	After the power supply to the instrument is turned on, even if the input enters the alarm action range, the alarm is not activated. If SV is changed while the controller is running, the alarm is not activated even if the input is in the alarm action range. (If the controller is allowed to keep running, the standby function will be released once the input exceeds the alarm action point.)

● About Setting Item

- **Upper left**: PV Display: Indicates setting characters. **Lower left**: SV Display: Indicates the factory default.
- **Right side**: Indicates the setting item.
- ▓ : This setting item is optional, and appears only when the option is ordered.

● Character Indication

AT Perform/Cancel		Input Type							
⊓⊓⊓⊓	AT Cancel	ɫ⊏⊏	K	-200 - 1370℃	⊓⊏⊏	C(W/Re5-26)	0 - 4200℉	⊦IL	H/L limits alarm

(Remaining character-indication tables comprise dense tabular code/symbol listings for Input Type, Set value lock, Communication protocol, Communication speed, Parity, Stop bit, A1–A4 type, Decimal point place, Direct/Reverse action, OUT2 cooling method, Alarm types 1–4 settings, Event input DI allocation, SV Rise/Fall rate, Control output, Heater burnout alarm, SUB-MODE key function, Auto/Manual control, Remote/Local, Controller/Converter, etc.)

Key Operation

- △ + ◯ : Press and hold the △ key and ◯ key (in that order).
- ▽ + ◯ (For 3 sec.): Press and hold the ▽ key and ◯ key (in that order) together for approx. 3 seconds.
- △ + ◯ (For 3 sec.): Press and hold the △ key and ◯ key (in that order) together for approx. 3 seconds.
- ▽ + ◯ (For 3 sec.): Press and hold the ▽ key and ◯ key (in that order) together for approx. 3 seconds.
- Set or select each item with the △ or ▽ key, and register the value with the ◯ key.
- ◯ : If the ◯ key is pressed, the unit proceeds to the next item, illustrated by an arrow.
- To revert to the PV/SV Display, press the ◯ key for approx. 3 seconds in any mode.
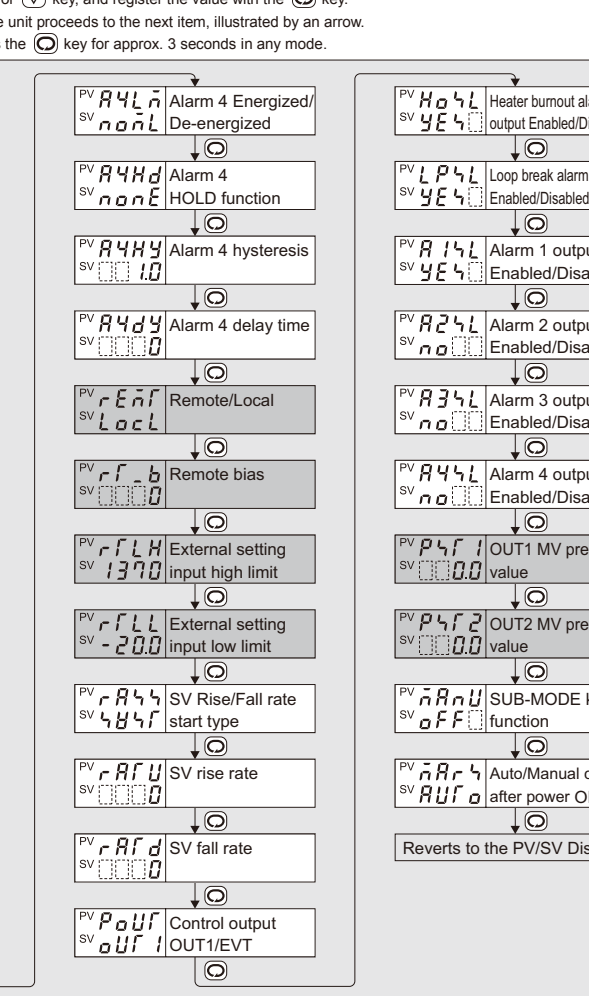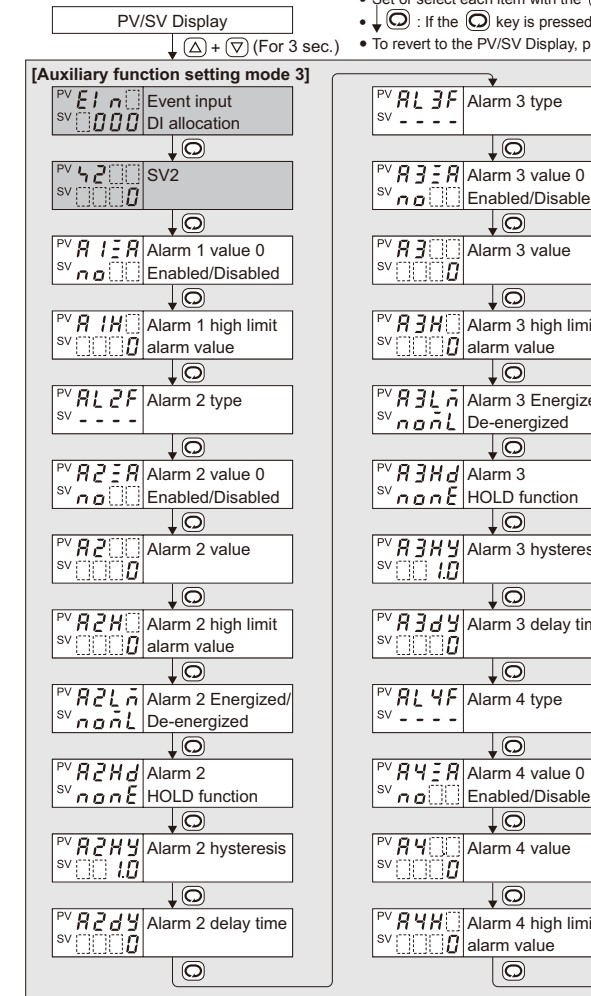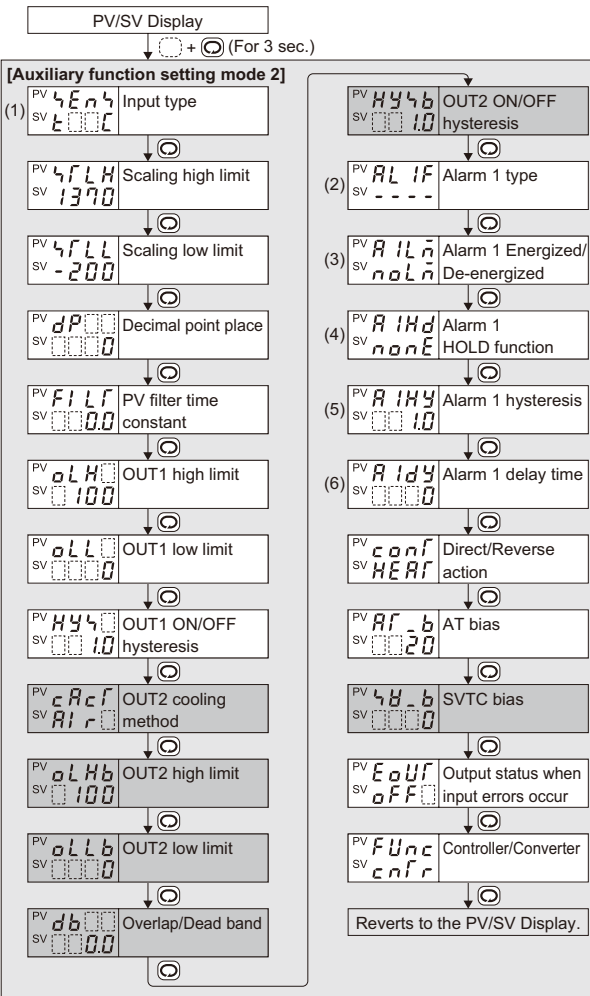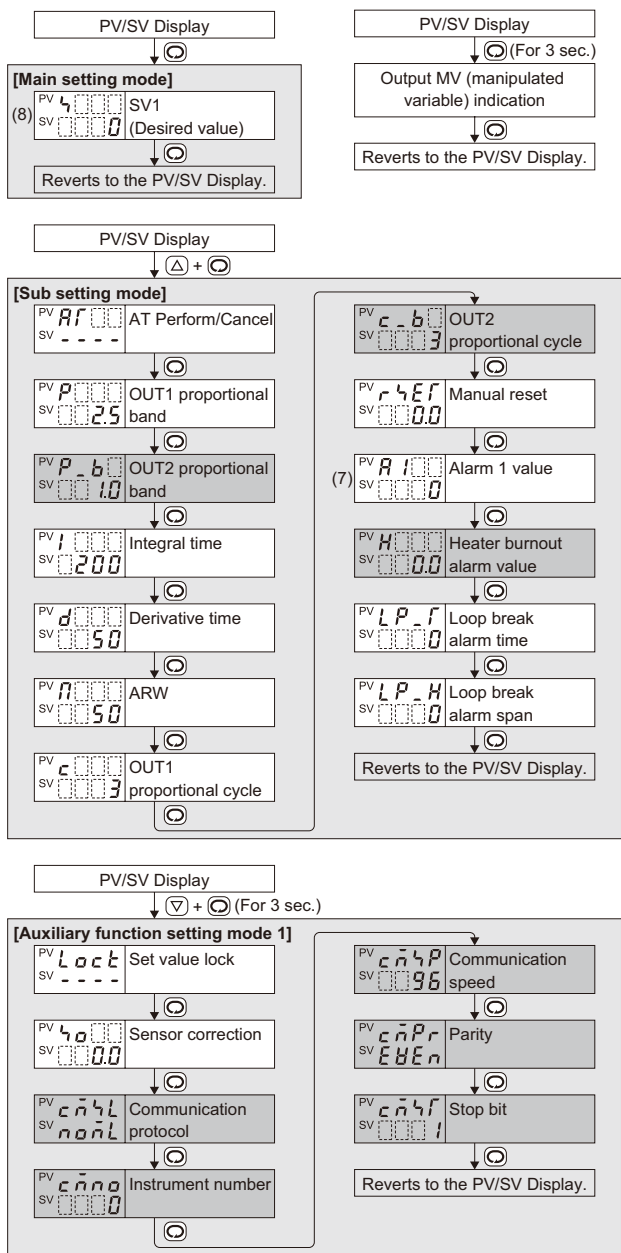
(*1) Externally mounted 50Ω shunt resistor (*2) Built-in 50Ω shunt resistor
(*3) 001 to 007: Works when contacts are closed (Input ON). 008 to 014: Works when contacts are open (Input OFF).

[Main setting mode]

PV/SV Display → (8) ᔕᐁ 4 SV1 (Desired value) → Reverts to the PV/SV Display.

PV/SV Display → ◯ (For 3 sec.) → Output MV (manipulated variable) indication → Reverts to the PV/SV Display.

[Sub setting mode]

PV/SV Display → △ + ◯

Item	Description
A̅ʴ (- - - -)	AT Perform/Cancel
P (200)	OUT1 proportional band
P.b (2.5)	OUT2 proportional band
I (200)	Integral time
d (50)	Derivative time
⊓ (50)	ARW
c (3)	OUT1 proportional cycle
c.b (3)	OUT2 proportional cycle
ʳᔕᵉᵗ (0.0)	Manual reset
A1	Alarm 1 value
H (▓)	Heater burnout alarm value
LP⌐ (▓)	Loop break alarm time
LP.H (▓)	Loop break alarm span

Reverts to the PV/SV Display.

[Auxiliary function setting mode 1]

PV/SV Display → ▽ + ◯ (For 3 sec.)

Item	Description
Loc⊦	Set value lock
ᔕc (0.0)	Sensor correction
⊓o⊓L	Communication protocol
c⊓⊓o	Instrument number
c⊓ᔕP (96)	Communication speed
c⊓Pʳ (EⱯEn)	Parity
c⊓ᔕ⊦	Stop bit

Reverts to the PV/SV Display.

[Auxiliary function setting mode 2]

PV/SV Display → ⑩ + ◯ (For 3 sec.)

	Item	Description
(1)	ᔕᵉ⊓ (ɫ⊏⊏)	Input type
	ᔕℓLH (1370)	Scaling high limit
	ᔕℓLL (-200)	Scaling low limit
	dP (▓)	Decimal point place
	FILⱭ (0.0)	PV filter time constant
	oLH (▓)	OUT1 high limit
	oLL (▓)	OUT1 low limit
	HⱯᔕ (1.0)	OUT1 ON/OFF hysteresis
	cⱯcᵗ (▓)	OUT2 cooling method
	oLHb (100)	OUT2 high limit
	oLLb (▓)	OUT2 low limit
	db (0.0)	Overlap/Dead band
	HⱯᔕb (▓)	OUT2 ON/OFF hysteresis
(2)	A1 1F (▓)	Alarm 1 type
(3)	A1⊓ (⊓o⊓L)	Alarm 1 Energized/De-energized
(4)	A1Hd (⊓o⊓E)	Alarm 1 HOLD function
(5)	A1HⱯ (1.0)	Alarm 1 hysteresis
(6)	A1dⱯ (▓)	Alarm 1 delay time
	co⊓ʳ (HⱯAʳ)	Direct/Reverse action
	Aʳ_b (▓)	AT bias
	ᔕⱯᵗ_b (▓)	SVTC bias
	EoⱯ⌐ (oFF)	Output status when input errors occur
	FⱭ⊓c	Controller/Converter

Reverts to the PV/SV Display.

[Auxiliary function setting mode 3]

PV/SV Display → △ + ▽ (For 3 sec.)

Item	Description
EIn (000)	Event input DI allocation
ᔕⱯ2 (▓)	SV2
A1⊓ (⊓o)	Alarm 1 value 0 Enabled/Disabled
A1H (▓)	Alarm 1 high limit alarm value
A1HⱯ (1.0)	Alarm 1 hysteresis
A1dⱯ (▓)	Alarm 1 delay time
A23 (⊓o⊓L)	Alarm 2 type
A23⊓ (⊓o)	Alarm 2 Enabled/Disabled
A2 (▓)	Alarm 2 value
A2H (▓)	Alarm 2 high limit alarm value
A2Lⱼ (⊓o⊓L)	Alarm 2 Energized/De-energized
A2Hd (⊓o⊓E)	Alarm 2 HOLD function
A2HⱯ (1.0)	Alarm 2 hysteresis
A2dⱯ (▓)	Alarm 2 delay time
AL3F	Alarm 3 type
A3EA (⊓o)	Alarm 3 value 0 Enabled/Disabled
A3	Alarm 3 value
A3H	Alarm 3 high limit alarm value
A3Lⱼ	Alarm 3 Energized/De-energized
A3Hd	Alarm 3 HOLD function
A3HⱯ (1.0)	Alarm 3 hysteresis
A3dⱯ	Alarm 3 delay time
A4LA (⊓o⊓L)	Alarm 4 type
A4Hd (⊓o⊓E)	Alarm 4 HOLD function
A4HⱯ (1.0)	Alarm 4 hysteresis
A4dⱯ	Alarm 4 delay time
ʳᵉⱭᵗ (LocL)	Remote/Local
ʳ_b	Remote bias
ʳLⱢH (1370)	External setting input high limit
ʳLⱢL (-200)	External setting input low limit
ʳAᔕᔕ	SV Rise/Fall rate start type
ʳʳⱭᵖ	SV rise rate
ʳᵈⱭᵖ	SV fall rate
PoⱭᵗ	Control output OUT1/EVT
HoⱯL	Heater burnout alarm output Enabled/Disabled
LPᔕL	Loop break alarm output Enabled/Disabled
A1Ɫ	Alarm 1 output Enabled/Disabled
A2ᔕL	Alarm 2 output Enabled/Disabled
A3ᔕL	Alarm 3 output Enabled/Disabled
A4ᔕL	Alarm 4 output Enabled/Disabled
Pᔕ⊦1 (0.0)	OUT1 MV preset value
Pᔕ⊦2 (0.0)	OUT2 MV preset value
⊓A⊓F (oFF)	SUB-MODE key function
AⱭʳo	Auto/Manual control after power ON

Reverts to the PV/SV Display.