SRS0 Series
Instruction manual

https://www.shimaden.co.jp
SHIMADEN CO., LTD.

■ For questions, please contact
YOUR LOCAL AGENT or
exp-dept@shimaden.co.jp

MSRS0-E53-H
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■ Preface

Thank you for purchasing Shimaden product. Before using this product, make sure that you read thoroughly the precautions on safety, installation and wiring in order to use it safely and correctly.
This manual contains the requisite minimum information. For parameter value, initial value, and other details, please refer to the Digital Controller SRS1/3/4/5 Series Instruction Manual (Detailed Version).

■ Accessories check

The controller has undergone sufficient quality control inspections, but you should check the specification code/appearance and make sure you have all the accessories to ensure nothing is missing or damaged.
· SRS0 digital controller: 1 unit
· Instruction manual (A3 size paper × 2): 1 copy

■ Safety precautions

⚠ **Warning**

The SRS0 Series are control instruments designed for industrial use to control temperature, humidity and other physical values. You should either take appropriate safety measures or avoid using this product for control purposes where failure could have a serious effect on human life. The manufacturer shall not be liable for accidents that result from use without taking appropriate safety measures.

● The digital controller should be used so the terminal elements in the control box, etc., are not touched by humans.
● Do not remove the controller from its case or insert your fingers or electric conductors inside the case. Doing so could result in electric shock or accident involving death or serious injury.
● Be sure to turn off power before wiring. Failure to do so could result in electric shock.
● After wiring, do not touch terminal elements or other charged parts while conducting electricity. Failure to do so could result in electric shock.

■ Consent on use

The warranty period for SRS0 Series is one year after the purchase. In principle, avoid use of the product under the following places/conditions. Should you use the controller under the following places/situations, be sure to use it with the proper rating and level of performance and make sure to use the controller correctly while taking appropriate safety measures in order to avoid accidents.
● Outside
● Places exposed to chemical contamination, electrical disturbance, and/or mechanical stress
● Places which are not specified as an appropriate installation site in the instruction manual or catalog
● When used for nuclear facilities, air facilities, space facilities, railway facilities, vehicle facilities, medical equipment, and facilities which are controlled by separate regulations
● Facilities in which failure of the product would constitute a danger to human life or property
● When used in application or facilities which require a high level of safety

⚠ **Caution**

If there is danger of damage to any peripheral device or equipment due to failure of the controller, you should take appropriate safety measures such as mounting a fuse or overheating prevention device. The manufacturer shall not be liable for an accident that results from use without taking appropriate safety measures.

● Controller labels and alert mark ⚠
  Alert marks ⚠ are printed on the terminal label of the case. **You could receive an electrical shock if you touch charged parts. The alert mark is provided to call your attention to this danger.**
● Provide a switch or breaker as a means of cutting off power for external power circuit connected to the power terminal of the controller. Mount a switch or breaker near the controller where the operator can access it easily and label it as an electrical breaker for the controller. Use a switch or breaker that conforms to requirements of IEC60947.
● Fuses
  The controller does not have a built-in fuse. Be sure to mount a fuse on the power circuit connected to the power terminal. Provide a fuse between the switch or breaker and the controller. Mount on the L side of the power terminal.
  Fuse rating/characteristics: 250 V AC, 0.5 A/medium time-lagged type or time-lagged type
  Use a fuse that conforms to requirements of IEC60127.
● Voltage/current of load connected to the output terminal and EV terminal should be within the rating. Using voltage/current that exceeds the rating could shorten the life of the controller by raising the temperature and could result in equipment failure. For rating, see "11. Specifications."
● Do not apply voltage/current other than rated input to the input terminal. Doing so could shorten product life and lead to equipment failure. For rating, see "11. Specifications."
● Do not allow the ventilation holes to become clogged with dust, etc. Doing so could shorten the life of the product due to temperature rise or insulation deterioration and could result in equipment failure or fire.
● Repeating endurance tests such as dielectric strength, noise resistance and surge resistance could negatively affect the controller.
● The user should absolutely not modify or use the controller in any other way than it was intended.
● It takes 30 minutes to display the correct temperature after applying power to the digital controller. (Therefore, turn the power on more than 30 minutes prior to the operation.)
● To ensure safety and maintain the functions of this device, do not disassemble this device. If this device must be disassembled for replacement or repair, contact your dealer.

■ Wiring

Take the following precautions when wiring:

● Wire in accordance with the "Terminal layout." After wiring, check and make sure the wiring is correct.
● Crimp-type terminals fit M3 screws. Use crimp-type terminals that are no wider than 6 mm.
● For thermocouple input, use a compensating lead wire that matches the type of thermocouple.
● For RTD input, resistance for lead wires should be a maximum of 10Ω per wire. All 3 wires should have the same resistance.
● Input signal wires must not be accommodated with a strong electric circuit in the same conduit or duct.
● Using shielded wiring (single point grounding) is effective for static induction noise.
● Making input wiring short and twisting at regular intervals is effective for electromagnetic induction noise.
● For power supply, use wiring or cable with sectional area of at least 1 mm² that offers the same or higher performance as 600 V vinyl insulated wiring.
● Securely fasten the terminal element screw. Fastening torque: 0.5 N·m (5 kgf·cm)
● Counter measure against lightning surge will be required for signal line over 30m
● If the instrument appears to be easily affected by power supply noise, use a noise filter to prevent malfunctioning. Mount the noise filter on the grounded panel and make the wire connection between the noise filter output and power line terminals of the controller as short as possible.

■ Terminal layout

SRS1

SRS1-01

COM 1	7 L 100-240VAC~
EV1 1A240V AC 2	8 N 50/60Hz 10VA
EV2 1A240V AC 3	9 + OUTPUT
A 4	10 − 4-20mA DC / 20mA12V DC / 2.5A240V AC
DC 5	11 COM
B 6	12 DI 1

SRS3/SRS4/SRS5

13	100-240VAC~
14 N	50/60Hz 10VA
15 +	OUTPUT
16 −	4-20mA DC / 20mA12V DC / 2.5A240V AC
17	COM
18	DI 1
19	COM
20	EV1 1A240V AC
21	EV2 1A240V AC
22 A +	DC
23 B	
24 B	

■ Installation site (environmental conditions)

⚠ **Caution**

Do not use the controller in the following locations. Doing so could lead to equipment failure, damage or fire.
● Places exposed to flammable or corrosive gases, oil mist, or excessive dust that could cause insulation to deteriorate.
● Places subject to strong vibration or impact
● Places near strong electrical circuit or places subject to inductive interference
● Places exposed to water dripping or direct sunlight
● Places where the controller is struck directly by air from heater or air conditioner
The controller is designed to be used under the following conditions.
Observe the following environmental conditions:
● Indoor use
● Max. elevation: 2000 m
● Ambient temperature: -10–50°C
● Ambient humidity: Max. 90%RH, no dew condensation
● Transient over voltage category: II
● Pollution class: 2 (IEC 60664)

■ External dimensions and panel cutout

⚠ **Caution**

In order to maintain safety and function, do not remove the case from the controller.
If the case of the controller has to be removed for replacement/repair, contact your nearest Shimaden agent.

● Cut a hole for mounting the controller in the panel by referring to external dimensions and panel cutout.
● The panel thickness should be 1.0–3.5 mm.
● The controller is provided with tabs for mounting. Insert as is from the front surface of the panel.
● SRS0 Series controllers are designed for mounting on a panel: Be sure to mount the controller on a suitable panel.
● If mounted in series, provide ventilation so ambient temperature does not exceed 50°C due to temperature rise caused by heat generation.

SRS1

Panel cutout
Unit: mm
If mounted horizontally
N = Number of units

SRS3

Unit: mm

SRS4

Unit: mm
If mounted horizontally
N = Number of units

SRS5

Unit: mm

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■ Product specification code check

Compare the specification code on the case with the following to make sure it is the product you ordered.

● Code selection table

Item	Code	Specification
1. Series	SRS1-	48 × 48 DIN size Digital Controller
	SRS3-	96 × 96 DIN size Digital Controller
	SRS4-	96 × 48 DIN size Digital Controller
	SRS5-	48 × 96 DIN size Digital Controller
2. Control output	Y-	Contact 240 V AC 2.5 A
	I-	Current 4–20 mA max. 600Ω
	P-	SSR drive voltage 12 V DC 20 mA
	V-	Voltage 0–10 V max. 2 mA
3. Program	N	None
	P	1 pattern 10 steps
4. Event	1	2 points 240 V AC 1.0 A Common
5. Remarks	0	Without
	6	Voltage input (V)
	9	With

■ Error message

Screen display	Problem	Cause	Remedy
HHHH (HHHH)	Higher limit scaleover	(1) Break in thermocouple input wiring (2) Break in RTD input A terminal wiring (3) Measured input value exceeded higher limit of measuring range by 10%.	(1) Check thermocouple input wiring for possible break. If there is nothing wrong with wiring, replace thermocouple. (2) Check RTD input A terminal wiring for possible break. If there is nothing wrong with wiring, replace RTD. (3) For voltage or current input, check the measurement signal transmission unit. Check if setting of measuring range code is correct for input signal. (4) Check if input scaling setting is adequate.
LLLL (LLLL)	Lower limit scaleover	Measured input value fell below the lower limit of the measuring range by 10%.	(1) Check for measurement input wiring for reverse polarity or possible break, etc. (2) Check if input scaling setting is adequate.
b - - - (b---)	Break in RTD input wiring	(1) Break in B wiring (2) Multiple break in ABB wiring	Check RTD input ABB terminal wiring for possible break. If thereis nothing wrong with wiring, replace RTD.
CJHH (CJHH)	Higher limit scaleover of cold junction (CJ) of thermocouple input	Ambient temperature has exceeded 80°C.	(1) Reduce ambient temperature to the level provided in the environment conditions for the product. (2) If ambient temperature has not exceeded 80°C, inspect the controller.
CJLL (CJLL)	Lower limit scaleover of cold junction (CJ) of thermocouple input	Ambient temperature has fallen below -20°C.	(1) Reduce ambient temperature to the level provided in the environment conditions for the product. (2) If ambient temperature has not fallen below -20°C, inspect the controller.

■ Measuring range codes

Input type			Code	Measuring range (°C)	Measuring range (°F)
Multi-input	Thermocouple	B	01 *1	0–1800°C	0–3300°F
		R	02 *6	-50–1700°C	0–3100°F
		S	03 *6	0–1700°C	0–3100°F
		K	04 *2	-199.9– 800.0°C	-300–1500°F
			05	0–1370°C	0–2500°F
		E	06	0–700°C	0–1300°F
		J	07 *2	-200–600°C	-320–1100°F
		T	08 *2	-270–400°C	-450–750°F
		N	09 *6	0–1300°C	0–2300°F
		PL II	10 *3	0–1300°C	0–2300°F
		C(WRe5–26)	11	0–2300°C	0–4200°F
		U	12 *2	-199.9–400.0°C	-300–750°F
		L	13	0.0–600.0°C	0–1100°F
	Kelvin	K	14 *4	10.0–350.0K	
		AuFe–Cr	15 *5	0.0–350.0K	
	R.T.D.	Pt100	33	-200–600°C	-300–1100°F
			34	-199.9–300.0°C	-300–600°F
	mV	-10–50 mV	72	Display Scaling range: -1999–9999 digits Span: 10-9999 digits	
Voltage	V	0 – 10 V	86		

Display accuracy   TC: ± (0.3%FS + 1digit + 2°C)
Pt: ± (0.3%FS +1 digit + 0.1°C)
mV, V: ± (0.3%FS + 1digit)

*1 Accuracy guarantee is not applicable to 400°C (752°F) or below.
Accuracy of indicated values is 400 – 800°C (752 – 1472°F) is ± (0.5%FS + 1digit + 2°C)
*2 Accuracy of indicated values below -100°C (-148°F) is ± (1.5%FS + 1digit + 2°C)
*3 Accuracy of indicated values ± (1.5%FS + 1digit + 2°C)
*4 Accuracy temperature range:
10 – 30K: ± (2.5%FS + 1digit + 2°C)
30 – 70K: ± (1.5%FS + 1digit + 2°C)
70 – 350K: ± (1.0%FS + 1digit + 2°C)
*5 Accuracy of indicated values is ± (1.0%FS + 1digit + 2°C)
*6 Accuracy of indicated values below 200°C (392°F) is ± (0.5%FS + 1digit+2°C)
Note: TC: Temperatures below -273 °C (-459 °F) or R.T.D.: Temperatures below
-240 °C (-400 °F) are subject to scaleover display.
Thermocouple: With or without a decimal point is selectable for TC and Pt.

Note: Unless otherwise designated, the factory default settings are as follows:

Input range	Code	Measuring range
Multi–input	05	K 0–1370°C
Voltage input	86	0-10V

■ Names and functions of parts on front panel
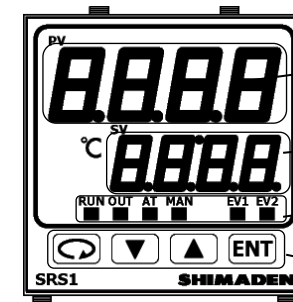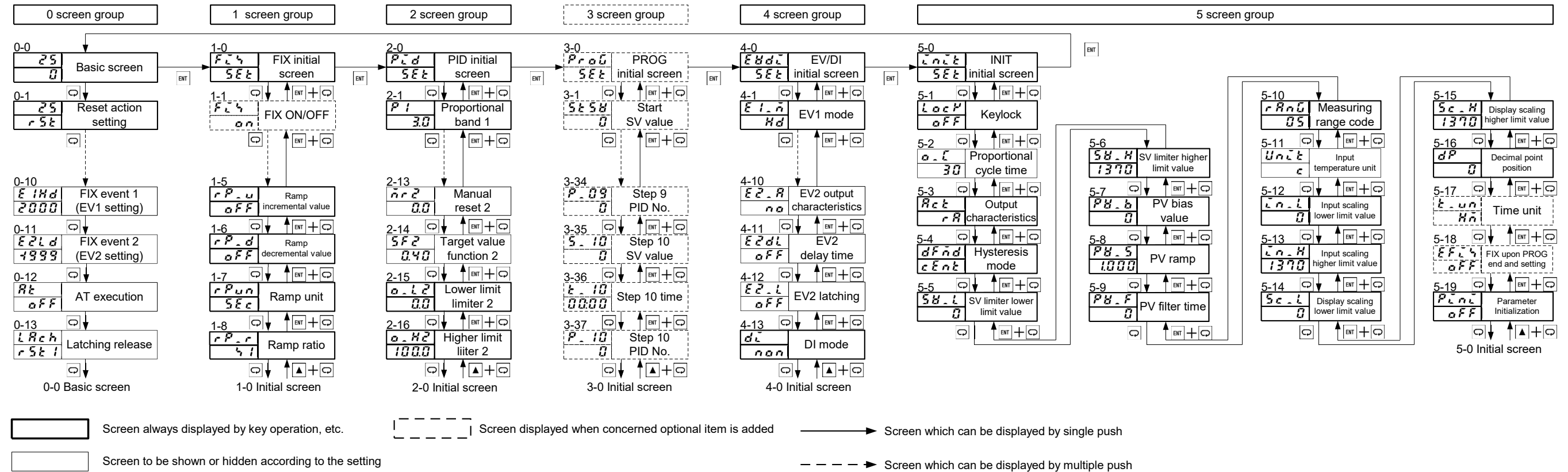

(1) Measured value (PV) display
(2) Target set value (SV) display
(3) Action display
(4) Operating keys

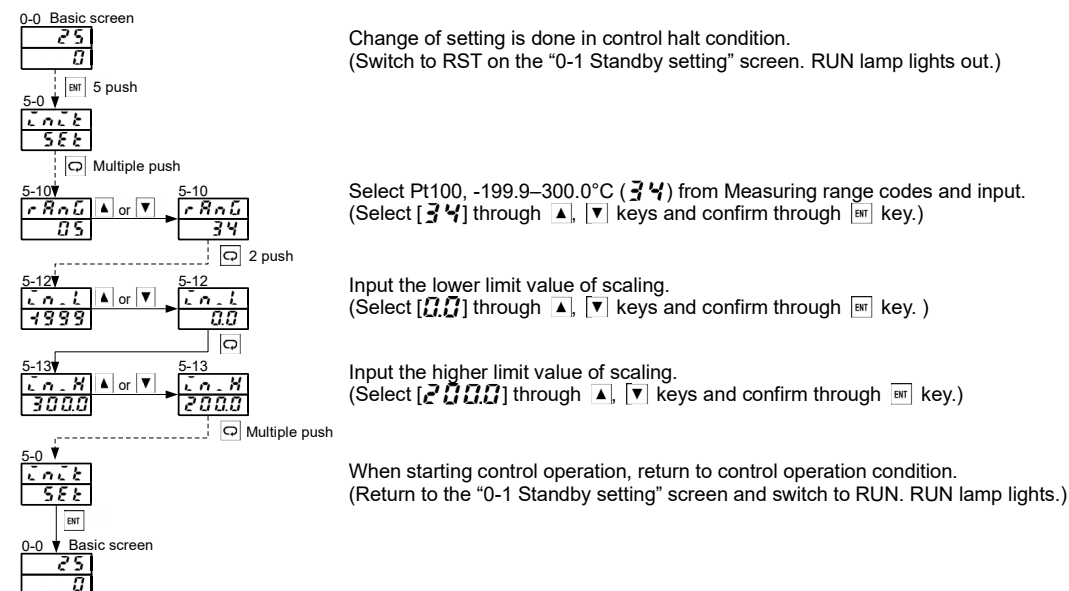| Name	Function
(1) Measured value (PV) display	1) Measured value display LED (red) • Displays current measured value (PV) on basic screen (screen 0-0). • Displays type of parameter on each respective parameter display screen.
(2) Target set value (SV) display	2) Target value display LED (green) • Displays current target value (SV) on basic screen (screen 0-0). • Displays set values on each respective parameter setting screen.
(3) Action display	Displays status of controller. • RUN: Action display LED (green) Off: Control halt status (STBY or RST) On: Running by fixed value control status (FIX) Flashing: Running by program control status (RUN) • OUT: Control output (green) For output by contact or SSR drive voltage: Off: Output is OFF. On: Output is ON. For voltage/current output: Off when output is 0% and On when output is 100%. In other cases, flashes at intervals of 0.5 seconds (multiples of 0.5 sec.). • AT: Auto tuning LED (green) Off: Auto tuning not executed On: Auto tuning standby Flashing: Auto tuning being executed • MAN: Manual control LED (green) Off: Automatic control operating status Flashing: Manual control operating status • EV1: Event output 1 (orange) • EV2: Event output 2 (orange) Off: Event output is OFF. On: Event output is ON.
(4) Operating keys	⟳ : Parameter key Displays the next screen in various screen groups. ▼ : Down key Decrements set values. ▲ : Up key Increments set values. ENT : Entry key Confirms set values. Displays various screen groups if no SV values are being modified on the basic screen.

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■ Parameter schematic diagram

Screen always displayed by key operation, etc.	Screen displayed when concerned optional item is added	Screen which can be displayed by single push
Screen to be shown or hidden according to the setting		Screen which can be displayed by multiple push

■ Setting of various parameters

Display the various parameters, select the desired value through ▲, ▼ keys and confirm through ᴇɴᴛ key.

● Input type and measuring range setting

Input type and scaling are set according to the sensor connected to this equipment.
By changing these parameters, registered data are initialized.

Example 1) When input range is Pt100, 0.0–200.0°C:

Change of setting is done in control halt condition.
(Switch to RST on the "0-1 Standby setting" screen. RUN lamp lights out.)

Select Pt100, -199.9–300.0°C (3 4) from Measuring range codes and input.
(Select [3 4] through ▲, ▼ keys and confirm through ᴇɴᴛ key.)

Input the lower limit value of scaling.
(Select [0.0] through ▲, ▼ keys and confirm through ᴇɴᴛ key.)

Input the higher limit value of scaling.
(Select [200.0] through ▲, ▼ keys and confirm through ᴇɴᴛ key.)

When starting control operation, return to control operation condition.
(Return to the "0-1 Standby setting" screen and switch to RUN. RUN lamp lights.)

Example 2) When input is -10–50 mV DC, and scaling is -5.00–5.00:

Change of setting is done in control halt condition.
(Switch to RST on the "0-1 Standby setting" screen. RUN lamp lights out.)

Select -10–50 mV (7 2) from Measuring range codes and input.
(Select [7 2] through ▲, ▼ keys and confirm through ᴇɴᴛ key.)

Display the lower limit value of scaling.
(Select [- 5.00] through ▲, ▼ keys and confirm through ᴇɴᴛ key.
If thermocouple or RTD, this screen will not be displayed.)

Display the higher limit value of scaling.
(Select [5.00] through ▲, ▼ keys and confirm through ᴇɴᴛ key.
If thermocouple or RTD, this screen will not be displayed.)

Change the position of decimal point.
(Select the position of decimal point through ▲, ▼ keys and confirm through ᴇɴᴛ key.)

When starting control operation, return to control operation condition.
(Return to the "0-1 Standby setting" screen and switch to RUN. RUN lamp lights.)

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■ Operation mode setting

This shows the setting method of operation mode, the PID control and ON/OFF (2-position) control.

● PID control mode

When shipped from our factory, PID control mode is set.
Execute auto-tuning (automatic PID calculation) according to the following procedures.
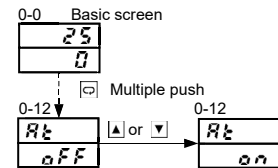
While in AT execution, AT lamp lights and system operation is actually executed. Execute under the condition that all systems are operable.
When AT lamp lights out, it is a sign that AT has ended. After AT ends, P/I/D/MR parameter is overwritten with the appropriate value.

● ON/OFF (2-position) control mode

In switching to ON/OFF control mode, please set proportional band (P) to OFF.
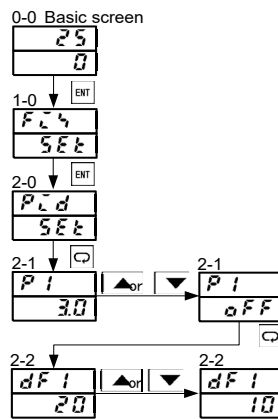
Set to OFF proportional band that corresponds to SV No.
(Select OFF through ▼ key and confirm through ENT key.)

Set "hysteresis" while on ON-OFF operation.
(Select "hysteresis" through ▲, ▼ keys and confirm through ENT key.)

● Output characteristics switching

This shows the switching setting method of control output characteristics.

Example) In switching control output from heating to cooling characteristics.
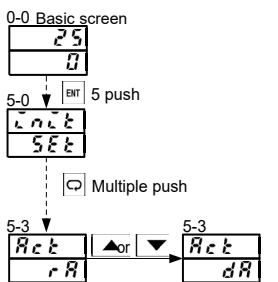
◆ Characteristics Code
Heating (humidification) characteristics: *rA*
Cooling (dehumidification) characteristics: *dA*

Changing control output characteristics from heating to cooling.
(Select *dA* through ▲, ▼ keys and confirm through ENT key.)

● Measured value (PV) correction

This shows the correction method of measured value (PV).

Example) When making a subtraction correction by +1.0°C
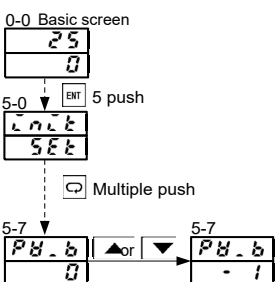
On the PV bias value setting screen, subtraction correction is made by +1.0°C.
(Select -1 by ▲, ▼ keys and confirm by ENT key.)

■ Event output setting

This shows event action mode setting and action position setting method.
Before setting event action position, first set event action mode.
By changing event action mode, registered data related to the event are initialized.

Example) When measured value (PV) is target value (SV) + 10.0°C, event output 1 (EV1) is engaged.
When measured value (PV) is target value (SV) - 5.0°C, event output 2 (EV2) is engaged. Both EVs are engaged at the hysteresis of 1.0°C.
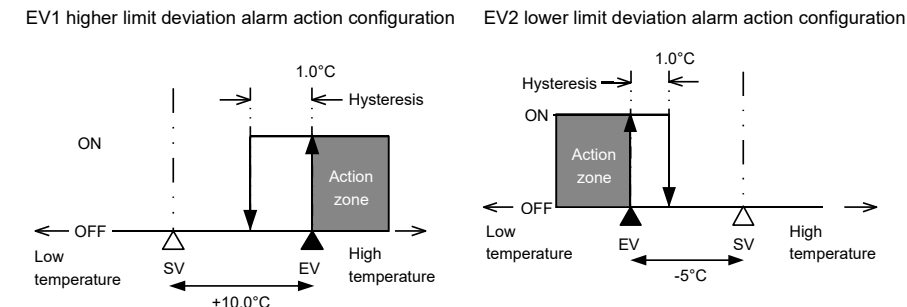
EV1 higher limit deviation alarm action configuration

EV2 lower limit deviation alarm action configuration

◆ Event action mode
Refer to "Alarm action configuration" and "Event type codes."

Set action mode of Event Output 1 (EV1) to higher limit deviation alarm (*Hd*).
(Select *Hd* through ▲, ▼ keys and confirm through ENT key.)

Set hysteresis of Event Output 1 ON position and OFF position.
(Select *1* through ▲, ▼ keys and confirm through ENT key.)

Set Event 2 (EV2) action mode to lower deviation alarm (*Ld*).
(Select *Ld* through ▲, ▼ keys and confirm through ENT key.)

Set hysteresis of Event Output 2 ON position and OFF position.
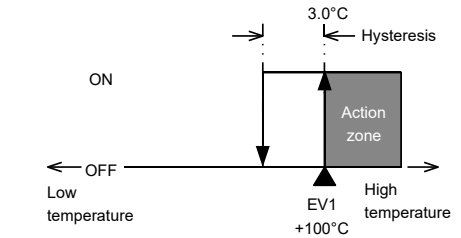(Select *1* through ▲, ▼ keys and confirm through ENT key.)

Set Event Output 1 action point at target value (SV) +10.0°C.
(Select *10* through ▲, ▼ keys and confirm through ENT key.)

Set Event Output 2 action point at target value (SV) -5.0°C.
(Select *-5* through ▲, ▼ keys and confirm through ENT key.)

Example) When measured value (PV) exceeds 100.0°C, event output 1 (EV1) is operated at the hysteresis of 3.0°C.

EV1 higher limit deviation alarm action configuration

Set action mode of event output 1 (EV1) to higher limit absolute value (*HA*).
(Select *HA* through ▲, ▼ keys and confirm through ENT key.)

Set hysteresis of ON position and OFF position of event output 1.
(Select *3* through ▲, ▼ keys and confirm through ENT key.)

Set action point of event output 1 at 100.0°C.
(Select *100* through ▲, ▼ keys and confirm through ENT key.)

● Event type codes (use in 4-1 screen and 4-7 screen)

Code	Types of event	Remarks
non (non)	No selection	
Hd (Hd)	Higher limit deviation alarm	EV1 initial value
Ld (Ld)	Lower limit deviation alarm	EV2 initial value
od (od)	Outside higher/lower limit deviation alarm	
id (id)	Inside higher/lower limit deviation alarm	
HA (HA)	Higher limit absolute value alarm	
LA (LA)	Lower limit absolute value alarm	
So (So)	Scale over	
run (run)	RUN signal (program being executed)	
rot1 (rot1)	Control output inverted output	For control output Y only (contact only)
StPS (StPS)	Step signal	For program control only
PtnS (PtnS)	Pattern signal	For program control only
EndS (EndS)	Program end signal	For program control only
HoLd (HoLd)	Hold signal	For program control only
ProG (ProG)	Program signal	For program control only
u_SL (u_SL)	Upslope signal	For program control only
d_SL (d_SL)	Downslope signal	For program control only
GUA (GUA)	Guarantee soak	For program control only