

User Manual

Temperature Controllers
KPN Series

AUM-K-0301-AB

Thank you for purchasing an Autonics product.
This user manual contains information about the product and its proper use,
and should be kept in a place where it will be easy to access.

Preface

Thank you for purchasing Autonics product.

Please familiarize yourself with the information contained in the **Safety Precautions** section before using this product.

This user manual contains information about the product and its proper use, and should be kept in a place where it is easy to access.

User Manual Guide

- Please familiarize yourself with the information in this manual before using the product.
- This manual provides detailed information on the product's features. It does not offer any guarantee concerning matters beyond the scope of this manual.
- This manual may not be edited or reproduced in either part or whole without permission.
- A user manual is not provided as part of the product package.
Visit our web site (www.autonics.com) to download a copy.
- The manual's content may vary depending on changes to the product's software and other unforeseen developments within Autonics, and is subject to change without prior notice.
Upgrade notice is provided through our homepage.
- We contrived to describe this manual more easily and correctly. However, if there are any corrections or questions, please notify us on our homepage.

User Manual Symbols

| Symbol | Description |
|--|--|
|  Note | Supplementary information for a particular feature. |
|  Warning | Failure to follow instructions can result in serious injury or death. |
|  Caution | Failure to follow instructions can lead to a minor injury or product damage. |
|  Ex. | An example of the concerned feature's use. |
| ※1 | Annotation mark. |

Safety Precautions

- Following these safety precautions will ensure the safe and proper use of the product and help prevent accidents and minimize hazards.
- Safety precautions are categorized as Warnings and Cautions, as defined below:

| | | |
|--|----------------|---|
|  Warning | Warning | Cases that may cause serious injury or fatal accident if instructions are not followed. |
|--|----------------|---|

| | | |
|--|----------------|---|
|  Caution | Caution | Cases that may cause minor injury or product damage if instructions are not followed. |
|--|----------------|---|

Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, fire or economic loss.
- Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.
Failure to follow this instruction may result in explosion or fire.
- Install on a device panel to use.
Failure to follow this instruction may result in electric shock.
- Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.
- Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.

Caution

- When connecting the power input and relay output, use AWG 20 (0.50mm²) cable or over and tighten the terminal screw with a tightening torque of 0.74 to 0.90N·m. When connecting the sensor input and communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90N·m.
Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.
- Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.
- Keep metal chip, dust, and wire residue from flowing into the unit.
Failure to follow this instruction may result in fire or product damage.

Specifications and dimensions in this user manual are subject to change without notice.

Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions (catalog, homepage).

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1 Product Introduction

1.1 Features

KRN series – standard PID temperature controller – realizes more powerful control with super high-speed sampling cycles of 50 ms and $\pm 0.3\%$ display accuracy. It supports diverse control modes including heating/cooling simultaneous control, and automatic/manual control and communication functions. In addition, KRN series covers all necessary features for high performance temperature controllers – that is, diverse input sensor support, multi SV setting, SSRP + current output, high resolution display and compact size.

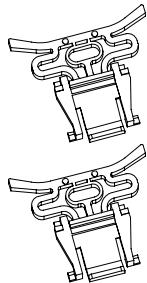
- High speed sampling of 50ms and $\pm 0.3\%$ display accuracy
- Enable to check control output operation amount by adopting bar graph
- Simultaneous heating/cooling control and automatic/manual control for high performance control
- Selection function of current output or SSR drive output
- Parameter setting available via PC (USB and RS485 communication)
 - Free device comprehensive management program (DAQMaster)
 - ※ Communication converter sold separately: SCM-WF48(Wi-Fi/RS485·USB wireless communication converter), SCM-US(USB/Serial converter), SCM-38I(RS232C/RS485 converter) SCM-US48I(USB/RS485 converter)
- Multi-SV (max. 4) function (select via digital input terminal)
- Heater break alarm (CT input)
 - ※ CT sold separately: CSTC-E80LN, CSTC-E200LN, CSTS-E80PP
- Small size (rear length: 60mm)
- Multi input/multi range

1.2 Components and accessories

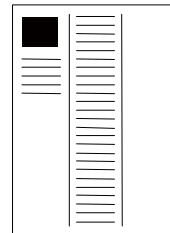
(1) Components



KPN Series



Brackets



Manual

**Note**

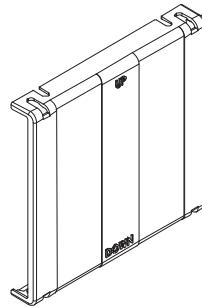
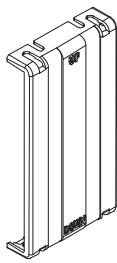
Make sure all of the above components are included with your product package before using it. If components are missing or damaged, please contact Autonics or your distributor.

(2) Accessories

- Terminal cover

- RHA-COVER
(48×96mm)

- RLA-COVER
(96×96mm)



- Communication converter

| | |
|--|--|
| SCM-WF48 (USB to RS485 converter) | SCM-US48I (USB to RS485 converter) |
|  |  |
| SCM-38I (RS232C to RS485 converter) | SCM-US (USB to Serial converter) |
|  |  |



Note

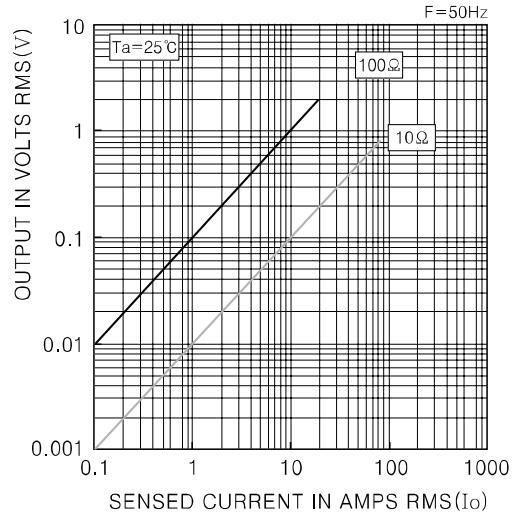
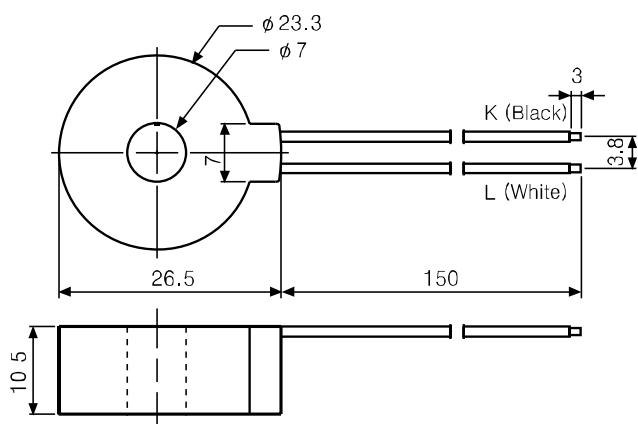
For more information 'Communication converters' sold separately, refer to the manual of each products.

Visit our website(www.autonics.com) to download the manuals.

- Current transformer (CT)

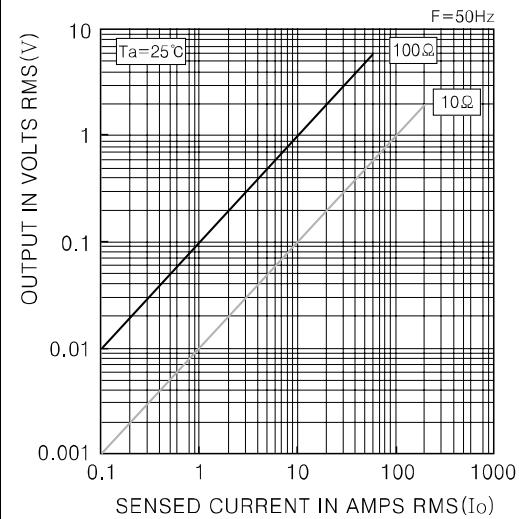
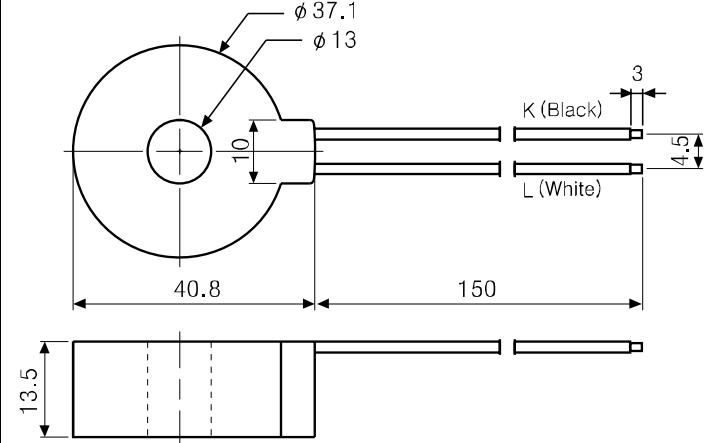
CSTC-E80LN

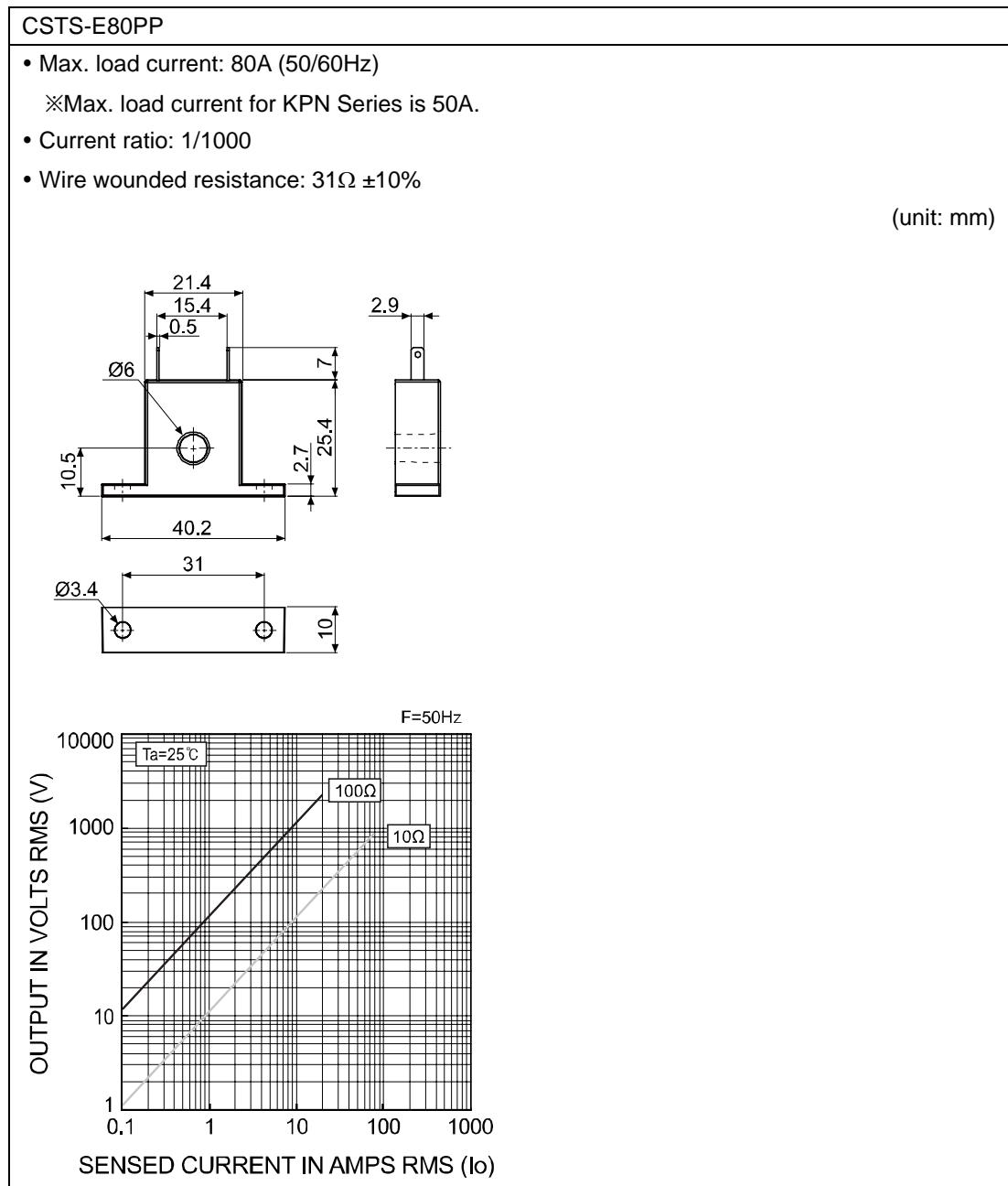
- Max. load current: 80A(50/60Hz)
※ Max. load current for KPN Series is 50A.
- Current ratio: 1/1000
- Wire wounded resistance: $31\Omega \pm 10\%$



CSTC-E200LN

- Max. load current: 200A(50/60Hz)
※ Max. load current for KPN Series is 50A.
- Current ratio: 1/1000
- Wire wound resistance: $20\Omega \pm 10\%$





Note

Images of components and accessories may differ from actual products.

For more information about CT, refer to the manual of this unit.

Visit our website (www.autonics.com) to download the manuals of this unit.

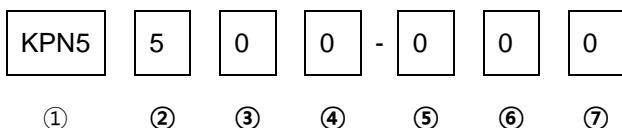


Caution

※Do not supply primary current in case that CT output is open. High voltage will be generated in CT output.

※The current for above CTs is 50A same but inner hole sizes are different. Please use this for your environment.

1.3 Ordering information



| Category | | Description | |
|-------------------------------|---------------|---|--|
| ①Item | KPN5 | Temperature / Process Controller | |
| ②Size | 2 | DIN W96 X H48mm | |
| | 3 | DIN W48 X H96mm | |
| | 5 | DIN W96 X H96mm | |
| ③Number of control outputs | 0 | 1 output type (Heating or Cooling type) | |
| | 1 | 2 output type (Heating&Cooling) | |
| ④Control output ^{*1} | 1 output type | 0 | Relay, current, SSR drive voltage selection output |
| | 2 output type | 1 | OUT1: Current, SSR drive voltage selection output OUT2: Current, SSR drive voltage selection output |
| | | 3 | OUT1: Current, SSR drive voltage selection output OUT2: Relay output |
| | | 7 | OUT1: Relay output OUT2: Current, SSR drive voltage selection output |
| | | 9 | OUT1: Relay output OUT2: Relay output |
| ⑤Option com. output | 0 | None | |
| | 2 | RS485 | |
| ⑥Option I/O | 0 | None | |
| | 3 | Transmission output+Remote SV | |
| ⑦Power supply | 0 | 100 - 240VAC 50/60Hz | |

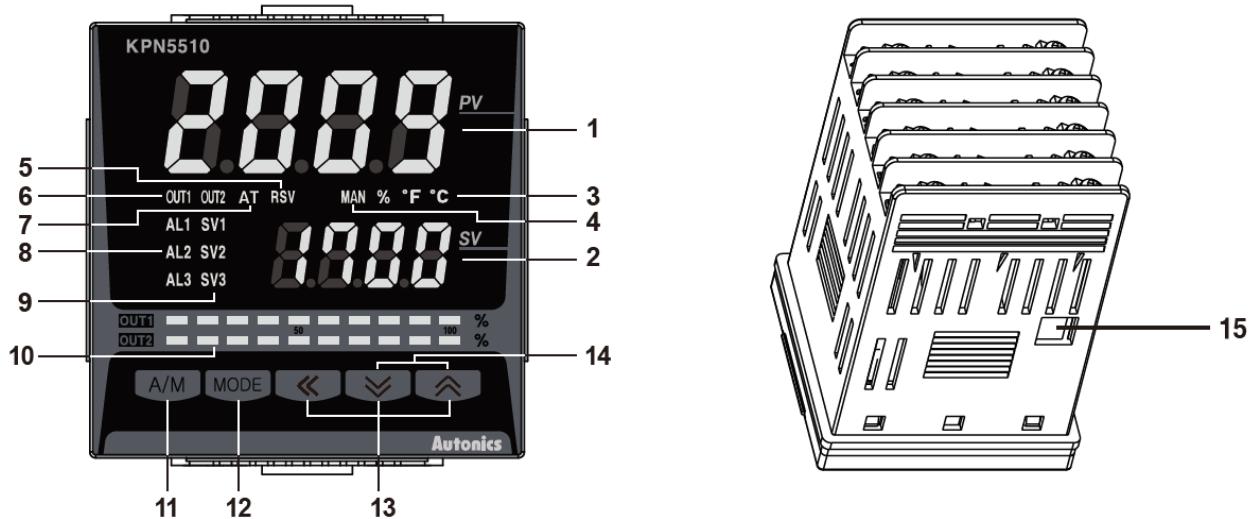
*1. The 1 output type is heating or cooling output type and the 2 output type is heating & cooling output type.

The 1 output type is able to use only one output among relay, current, SSR drive voltage outputs.

OUT1 of the 2 output type is fixed as heating output and OUT2 of the 2 output type is fixed as cooling output.

If you select the SSR drive voltage or current output model, you can select the appropriate control output.

1.4 Part descriptions



- ① Measured value (PV) display part
RUN mode: Displays currently measured value (PV).
Set mode: Displays the parameters.
- ② Set value (SV) display part
RUN mode: Displays the set value (SV).
Set mode: Displays the set value of the parameter.
- ③ Unit (°C/°F/%) indicator: Displays the unit set at display unit [d.u.t] in parameter 3 group.
- ④ Manual control indicator: Turns ON during manual controlling.
- ⑤ Remote SV control indicator: Turns ON during remote SV controlling
- ⑥ Control output (OUT1, OUT2) indicator: Turns ON when the control output is ON.
※ When using current output, in case that for manual control MV is 0.0%, the control output indicator turns OFF but the other cases it turns ON always. In case that for auto control MV is over 3.0%, it turns ON and the MV is below 2.0%, it turns OFF.
- ⑦ Auto tuning indicator: Flashes by 1 sec. when executing auto tuning.
- ⑧ Alarm output (AL1, AL2, AL3) indicator: Turns ON when the alarm output is ON.
- ⑨ Multi-SV indicator: The SV 1 to 3 indicator turns ON when using multi SV function.
- ⑩ Bar graph for control output: Displays control output MV as bar graph. The KRN5□00 as 1 output type has one bar graph (OUT1), and the KPN5□1□ as 2 output type has two bar graphs (OUT1, OUT2).
- ⑪ **A/M** key: Used when switching auto control to manual control.
- ⑫ **MODE** key: Used when entering parameter setting group, returning to RUN mode, moving parameter, saving the set value.
- ⑬ **◀ ▶ ▲ ▼** keys: Used when entering the set value changing mode and moving or changing up/down digit.
- ⑭ When pressing **▼ ▲** keys for 3 sec. at the same time, it operates the function (RUN/STOP, alarm clear, auto-tuning) set at digital input key [**d1 - 2**] in parameter 5 group.
- ⑮ PC loader port: It is the PC loader port for serial communication to set and monitor parameters by PC. Use this port for connection SCM-US (USB to serial convertor).
※ Display part is different by options.



Note

7-segment characters

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | b | C | d | E | F | G | H | I | J | K | L | M |
| N | o | P | q | r | s | t | u | v | w | x | y | z |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| n | o | P | q | r | s | t | u | v | w | x | y | z |
| N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|----|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | -1 | / |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | -1 | / |

2 Specifications

2.1 Ratings

| Series | KPN52□□ | KPN53□□ | KPN55□□ |
|-------------------------|--|---|------------|
| Power supply | 100 - 240VAC, 50/60Hz | | |
| Allowable voltage range | 90 to 110% of rated voltage | | |
| Power consumption | Max. 15VA | | |
| Display method | 7Segment: red/green, control output display bar graph: red/green | | |
| Character size | PV(W x H) | 8.5X17.0mm | 7.0X14.6mm |
| | SV(W x H) | 6.0X12.0mm | 6.0X12.0mm |
| Input type | RTD | JPt 100Ω, DPt 100Ω, DPt 50Ω, Cu 100Ω, Cu 50Ω, Nickel 120Ω (6 types) | |
| | Thermocouples | K, J, E, T, L, N, U, R, S, B, C, G, PLII(13 types) | |
| | Analog | Voltage: 0 to 100mV, 0 to 5V, 1 to 5V, 0 to 10V(4 type) Current: 0 to 20mA, 4 to 20mA(2 types) | |
| Display accuracy | RTD | At room temperature (23°C±5°C): (PV ±0.3% or ±1°C, select bigger one)±1Digit ^{※1} | |
| | Thermocouples | Out of room temperature range: (PV ±0.5% or ±2°C, select bigger one)±1Digit | |
| | Analog | At room temperature (23°C±5°C): ±0.3% F.S.±1Digit Out of room temperature range: ±0.5% F.S.±1Digit | |
| | CT input | ±5% F.S.±1Digit | |
| Control output | Relay | OUT1, OUT2: 250VAC 3A 1a | |
| | SSR | Max. 11VDC±2V 20mA | |
| | Current | DC4 - 20mA or DC0 - 20mA or selectable (max. load 500Ω) | |
| Alarm output | Relay | AL1, AL2, AL3 Relay: 250VAC 3A 1a | |
| Option output | Transmission | DC4 - 20mA (max. load 500Ω, output accuracy: ±0.3% F.S.±1Digit) | |
| | Communication | RS485 communication output (Modbus RTU method) | |
| Option input | CT | 0.0 - 50.0A(primary heater current value measuring range) ※CT ratio is 1/1000 | |
| | Remote SV | 1-5VDC or DC4-20mA (Current input: use external resistance 250Ω) | |
| | Digital input | Contact input: ON-max. 2kΩ, OFF-min. 90kΩ | |
| | | Non-contact input: ON- Residual voltage max.1.0V, OFF-leakage current max.0.1mA | |
| Control type | Heating, Cooling | ON/OFF, P, PI, PD, PID control | |
| | Heating&Cooling | | |
| Hysteresis | | Thermocouple/RTD: 1 to 100°C/F (0.1 to 100.0°C/F) variable, Analog: 1 to 100 Digit | |
| Proportional band (P) | | 0.1 to 999.9°C(0.1 to 999.9%) | |
| Integral time (I) | | 0 to 9999 sec. | |
| Derivative time (D) | | 0 to 9999 sec. | |
| Control period (T) | | 0.1 to 120.0 sec. (relay output, SSR drive voltage output only) | |
| Manual reset value | | 0.0 to 100.0% | |

| | | |
|-----------------------|---------------------|--|
| Sampling period | | 50ms |
| Dielectric strength | | 2000VAC 50/60Hz for 1 min. (between input terminal and power source terminal) |
| Vibration | | 0.75mm amplitude at frequency of 5 to 55 Hz (for 1 min.) in each X, Y, Z direction for 2 hours |
| Relay life cycle | Mechanical | Over 10,000,000 times |
| | Electrical | Over 100,000 times (250VAC 3A resistance load) |
| Insulation resistance | | Over 100MΩ (at 500VDC megger) |
| Noise resistance | | Square shaped noise by noise simulator (pulse width 1 μs) ±2KV R-phase, S-phase |
| Memory retention | | Approx. 10 years (when using non-volatile semiconductor memory type) |
| Environment | Ambient temperature | -10 to 50°C, storage: -20 to 60°C |
| | Ambient humidity | 35 to 85% RH, storage: 35 to 85% RH |
| Protection | | IP65(front part) |
| Insulation type | | Double insulation or reinforced insulation (mark: □, dielectric strength between the measuring input part and the power part: 1kV) |
| Weight ^{※2} | | Approx. 230g (approx. 160g) Approx. 316g (approx. 220g) |

※1. At room temperature (23°C ± 5°C)

- TC K, J, T, N, E type, below -100°C / L, U, PLII, RTD Cu50Ω, DPt50Ω: (PV ±0.3% or ±2°C, select the higher one)±1Digit
- TC C, G and R, S type, below 200°C: (PV ±0.3% or ±3°C, select the higher one)±1Digit
- TC B type, below 400°C, there is no accuracy standards.

Out of room temperature range

- RTD Cu50Ω, DPt50Ω: (PV ±0.5% or ±3°C, select the higher one) ± 1Digit
- RTD R, S, B, C, G: (PV 0.5% or ±10°C, select the higher one) ± 1Digit
- Other sensors: Below -100°C, within ±5°C

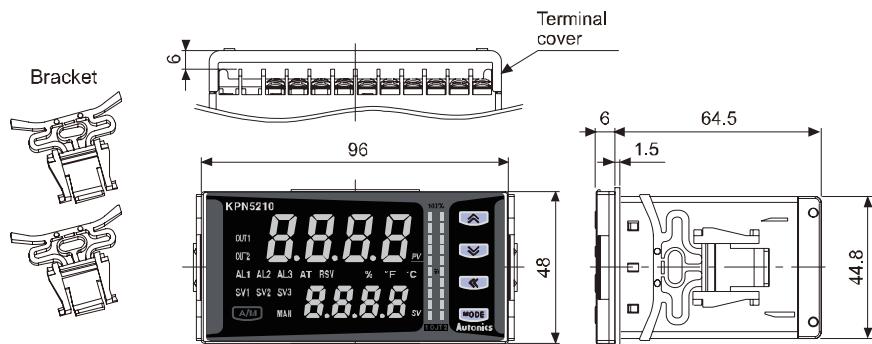
※2. The weight is with packaging and the weight in parentheses is only unit weight.

※ Environment resistance is rated at no freezing or condensation.

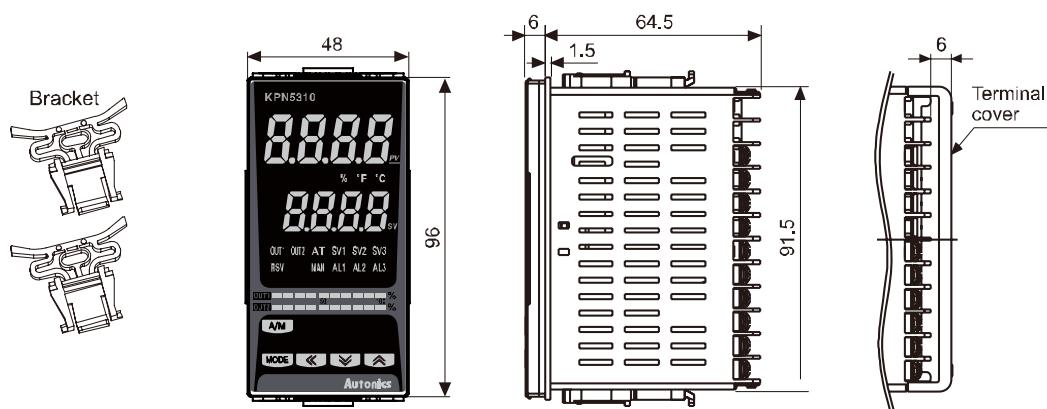
3 Dimensions

Unit: mm

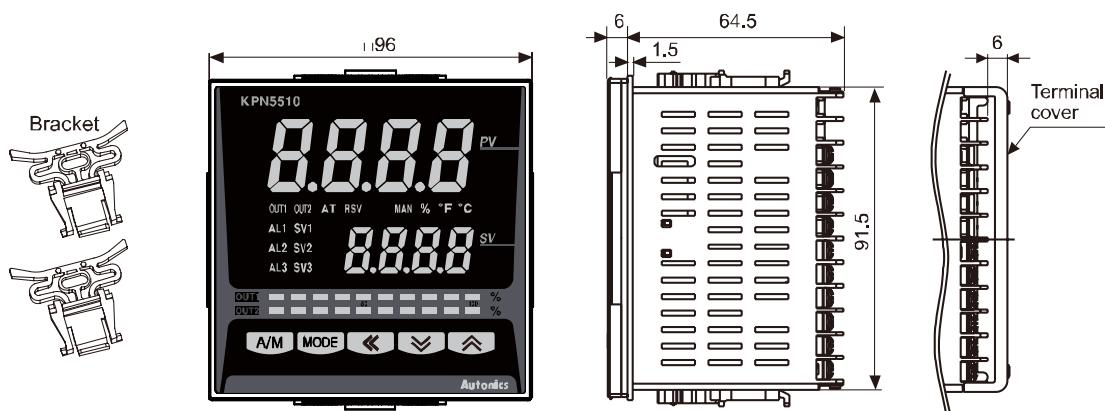
(1) KPN52□□



(2) KPN53□□

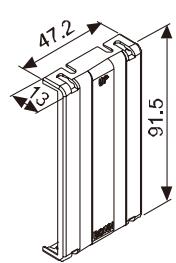


(3) KPN55□□

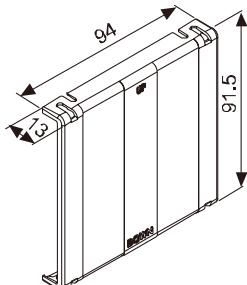
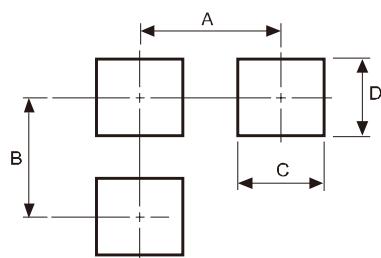


(4) Terminal cover (sold separately)

• RHA-COVER(48×96mm)

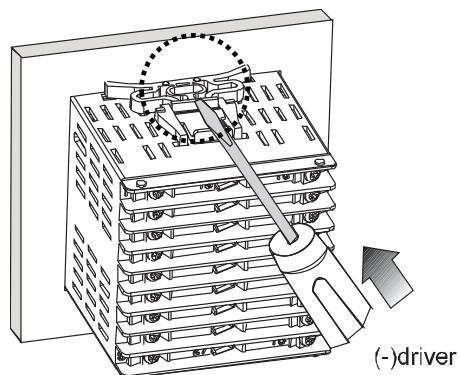


• RLA-COVER(96×96mm)

**(5) Panel cut-out**

| Model | Unit | A | B | C | D | (Unit:mm) |
|---------|------|----------|----------|---------------------------------|---------------------------------|-----------|
| | | Min. 115 | Min. 65 | 92 ^{+0.8} ₀ | 45 ^{+0.6} ₀ | |
| KPN52_□ | | Min. 115 | Min. 65 | 92 ^{+0.8} ₀ | 45 ^{+0.6} ₀ | |
| KPN53_□ | | Min. 65 | Min. 115 | 92 ^{+0.8} ₀ | 92 ^{+0.8} ₀ | |
| KPN55_□ | | Min. 115 | Min. 115 | 45 ^{+0.6} ₀ | 92 ^{+0.8} ₀ | |

■ Installations

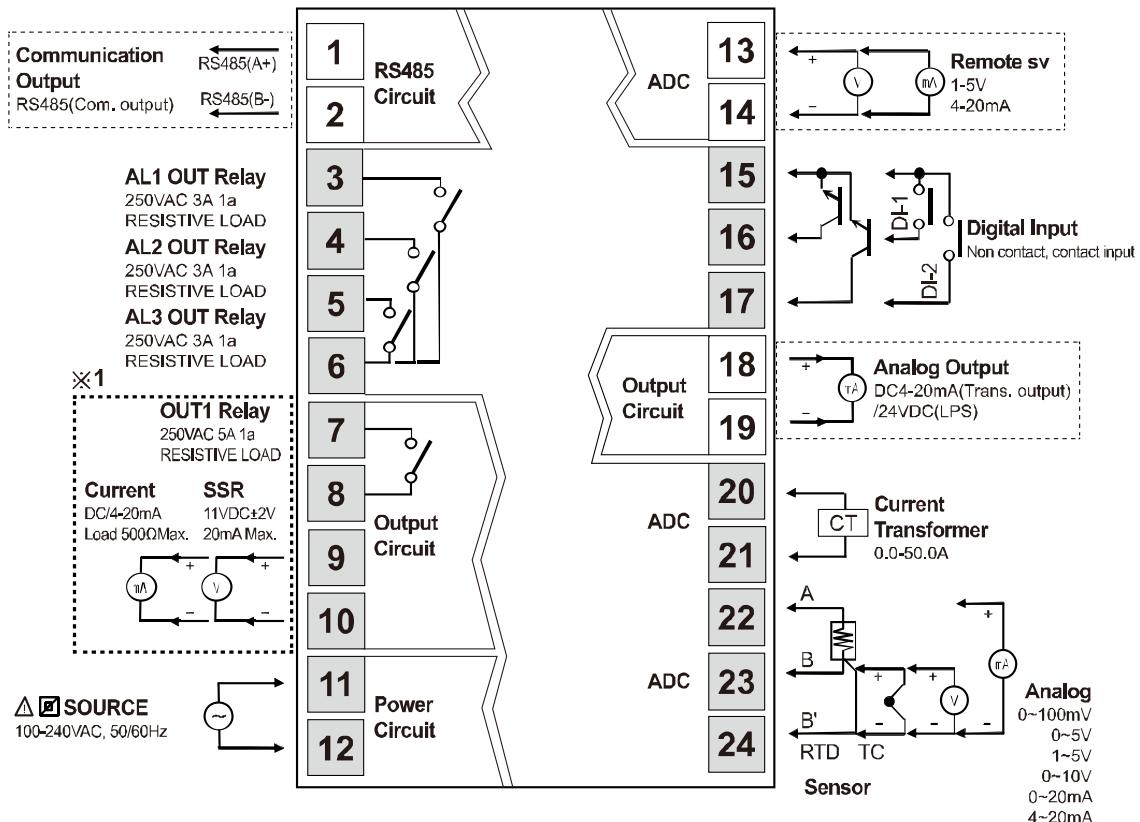


Mount this unit into a panel, fasten bracket by using with a flat-head driver as shown.

4 Connections

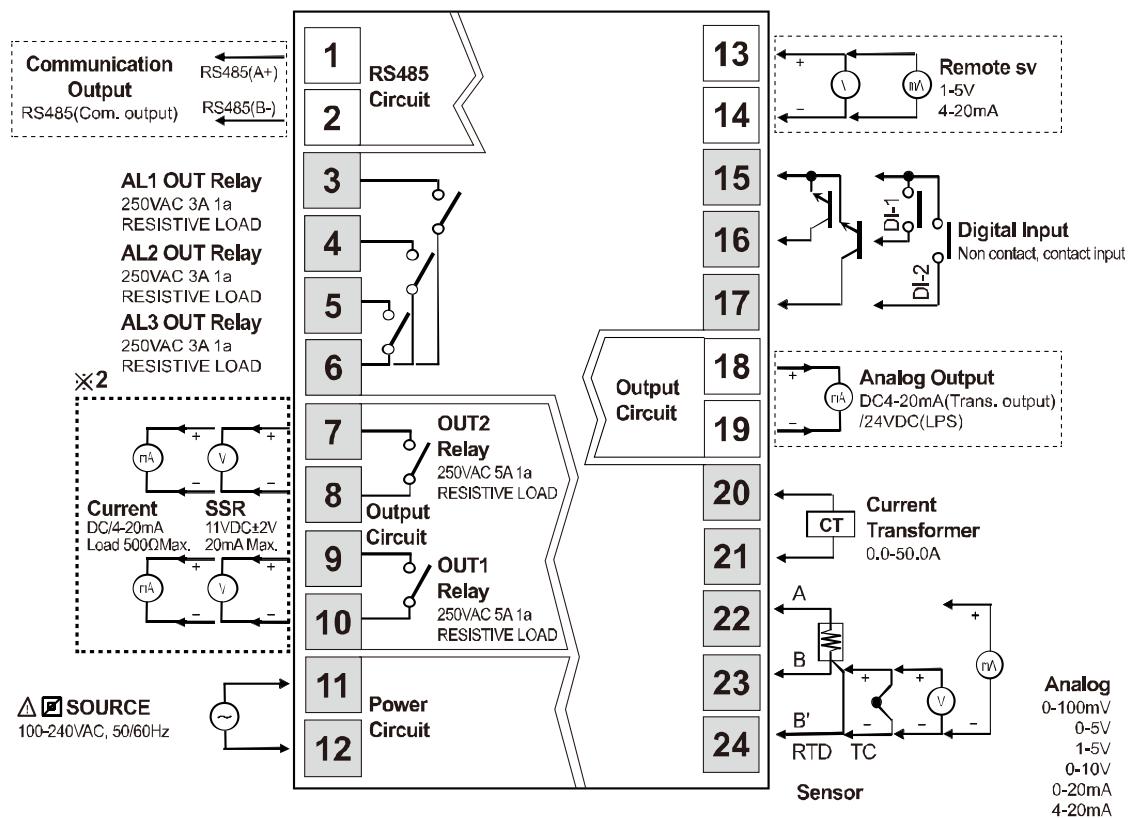
Standard model has shaded terminals only. [] is option specification.

(1) KPN5□00



- ※1. Set relay output [RELAY], current [CUR] or SSR drive voltage output [SSRV] at OUT1 control output [OUT1] in parameter 3 group.

(2) KPN5□1□



※2. OUT1, OUT2

| Model | OUT1 control output | OUT2 control output |
|---------|---|---|
| KPN5□11 | Current, SSR drive voltage selection output | Current, SSR drive voltage selection output |
| KPN5□13 | Current, SSR drive voltage selection output | Relay output |
| KPN5□17 | Relay output | Current, SSR drive voltage selection output |
| KPN5□19 | Relay output | Relay output |

4.1 Wiring precautions

- Mixing up the input terminals with output terminals and vice versa can lead to product damage.
- Use only sensors supported by the product.
- Make sure to connect rated SSRs or loads to the output terminals.
- Make sure to connect communication cable with correct communication terminals (A, B).
- Make sure to observe correct polarity of power source terminals. (+ and -).

4.1.1 Sensor connection

(1) Compensation wire connection

For thermocouple sensors, use compensation wire of the same specification as input sensors. Using an extension wire of different specifications and/or material increases inaccuracy of temperature sensing. It is recommended to choose high performance compensation wire for more reliable sensing.

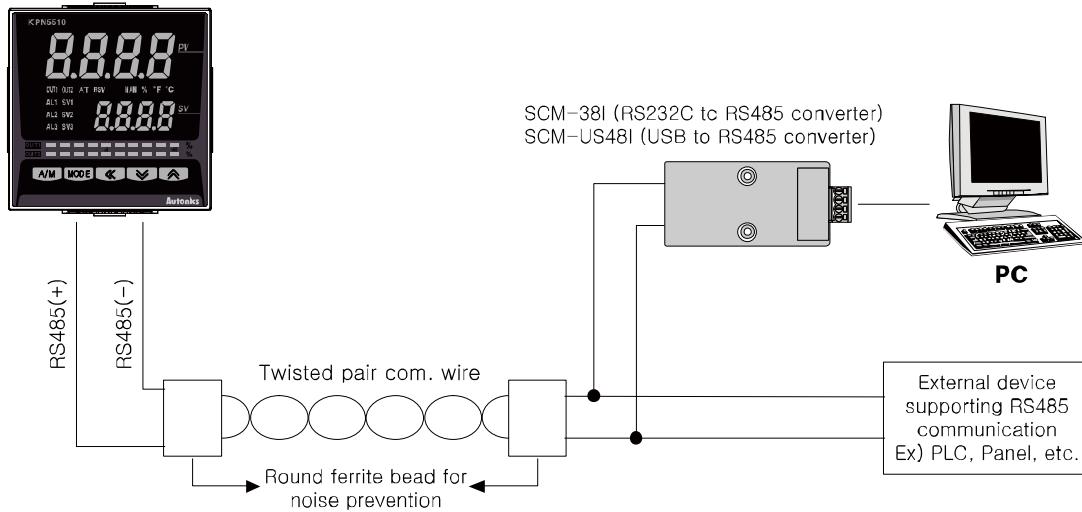
(2) Measurement error

Do not mix up the direction of the input sensor connector.
Carefully adjust both load and sensor positions.
Make sure the sensor is securely attached to the input connector.

(3) AC power cable and wiring

Do not put the sensor lines in close proximity of the AC power lines.

4.1.2 Communication line wiring



Note

Do not tie together with the AC power line.

Only use twisted pair wires for the communication lines. Do not allow the communication line to exceed 800m in length.

For further details, please refer to '6.6 Communication'.

5 Preparation and Startup

5.1 Powering ON and initial display

When supplying the power to the product, the display part flashes for 1 sec. It displays the model type (option, output, control output) and flashes the input type twice and it operates in RUN mode.

| ① Flashes whole display parts | ② Displays model type | ③ Flashes input type twice | ④ RUN mode |
|-------------------------------|-----------------------|----------------------------|------------|
| | | | |

5.2 Basic controls

5.2.1 Parameter setting sequence

Each parameter setting is related. Follow this sequence for initial setting.

Parameter 3 Group [P_R-3] → Parameter 4 Group [P_R-4] → Parameter 5 Group [P_R-5] → Parameter 2 Group [P_R-2] → Parameter 1 Group [P_R-1] → SV Setting Group [S_U]



Note

Changing Parameter 3 Setting Group's parameters can sometimes reset other associated parameters. Always make sure to check if such parameters have been affected.

5.2.2 SV setting

You can set the temperature to control with \llcorner , \lrcorner , \triangleup keys.
Set range is within SV low-limit value [$L - 5u$] to SV high-limit [$H + 5u$] value.

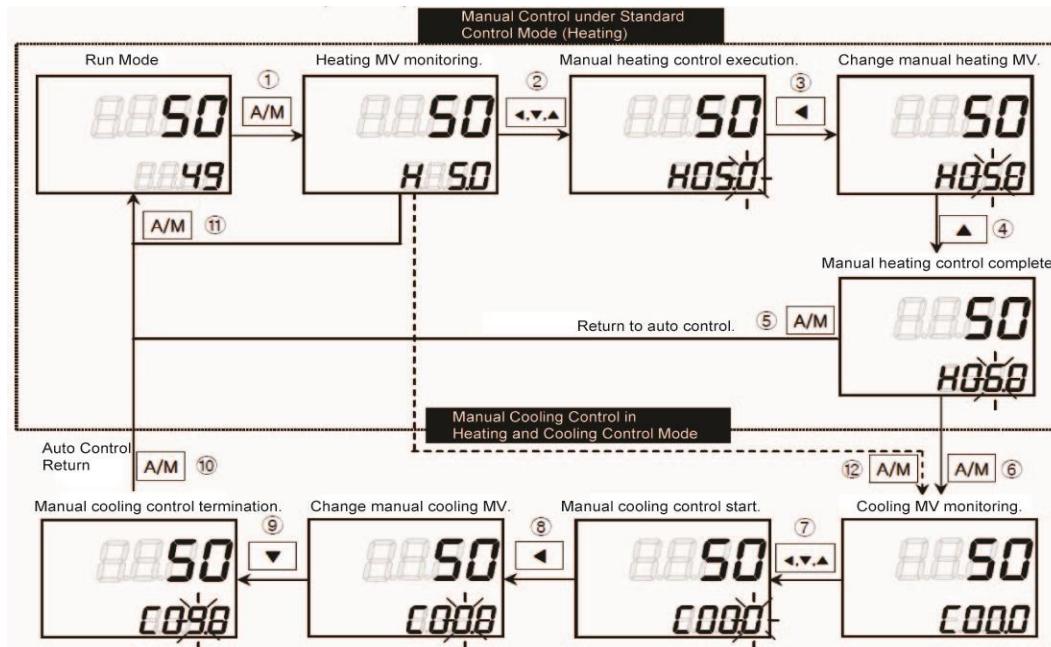


Ex.

In case of changing set temperature from 210°C to 250°C

| | |
|---|---|
|  | <p>Press any key among \llcorner, \lrcorner, \triangleup in RUN mode to enter into SV setting mode. Last digit (10^0 digit) on SV display part flashes.</p> |
|  | <p>Press the \llcorner key to move digit. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)</p> |
|  | <p>Press the \lrcorner, \triangleup keys to raise or lower the setting value.</p> |
|  | <p>Press the MODE key to save the setting value. If there is no additional key operation in 3 sec., the changed SV is automatically saved.</p> |

5.2.3 MV Monitoring and Manual Control Setting



- ① While in Run mode, press the **A/M** key to commence manual control. The SV display shows H (heating control) or C (cooling control) and simultaneously displays the MV to indicate commencement of MV monitoring.
- ② If any one of **◀**, **▼**, **▶** is pressed while MV monitoring is in progress, the MAN lamp turns on and the last digit flashes to indicate activation of manual control.
- ③ Press the **◀** key to change the flashing digits. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)
- ④ Select the digit and configure the desired MV value using the **▼**, **▶** keys.
- ⑤ To stop manual control, press the **A/M** key. The MAN lamp turns off, and the system returns to auto control mode.
- ⑥ While in heating and cooling control mode, set the manual heating MV and then press the **A/M** key to see C (cooling control) and the current cooling MV value on the SV display indicating commencement of cooling MV monitoring.
- ⑦ If any one of the **◀**, **▼**, **▶** keys is pressed while MV monitoring is in progress, the MAN lamp turns on and the last digit flashes to indicate activation of manual control.
- ⑧ Press the **◀** key to change the flashing digit. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)
- ⑨ Select the digit and configure desired cooling MV value using the **▼**, **▶** keys.
- ⑩ To stop manual control, press the **A/M** key. The MAN lamp turns off, and the system returns to auto control mode.
- ⑪ While in standard control mode (heating control or cooling control), press the **A/M** key once from the MV monitoring stage, or any other stage. It returns to auto control mode.
- ⑫ During heating and cooling control mode, press the **A/M** key once from the MV monitoring stage, or any other stage. It skips the system to the cooling MV monitoring stage.

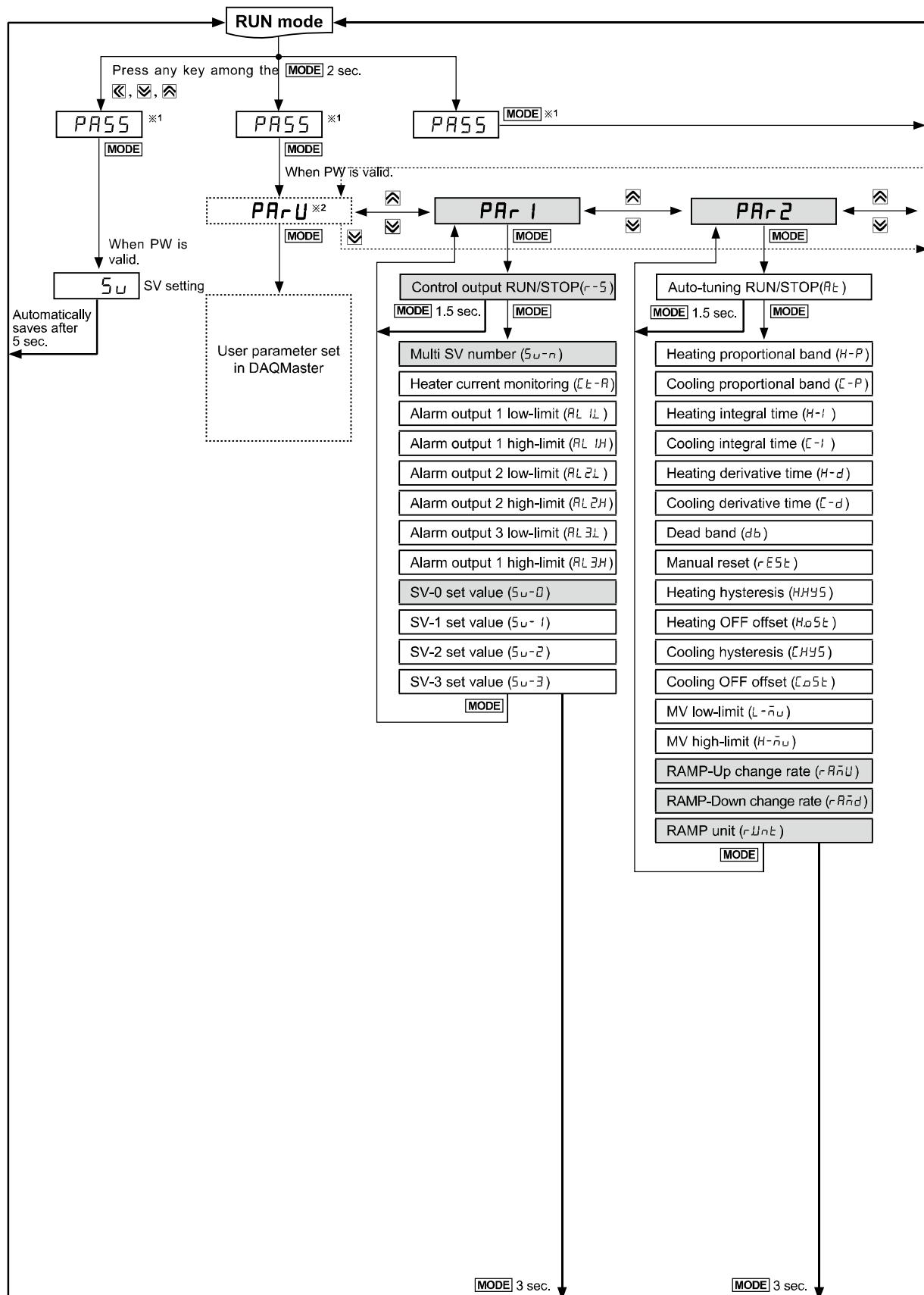


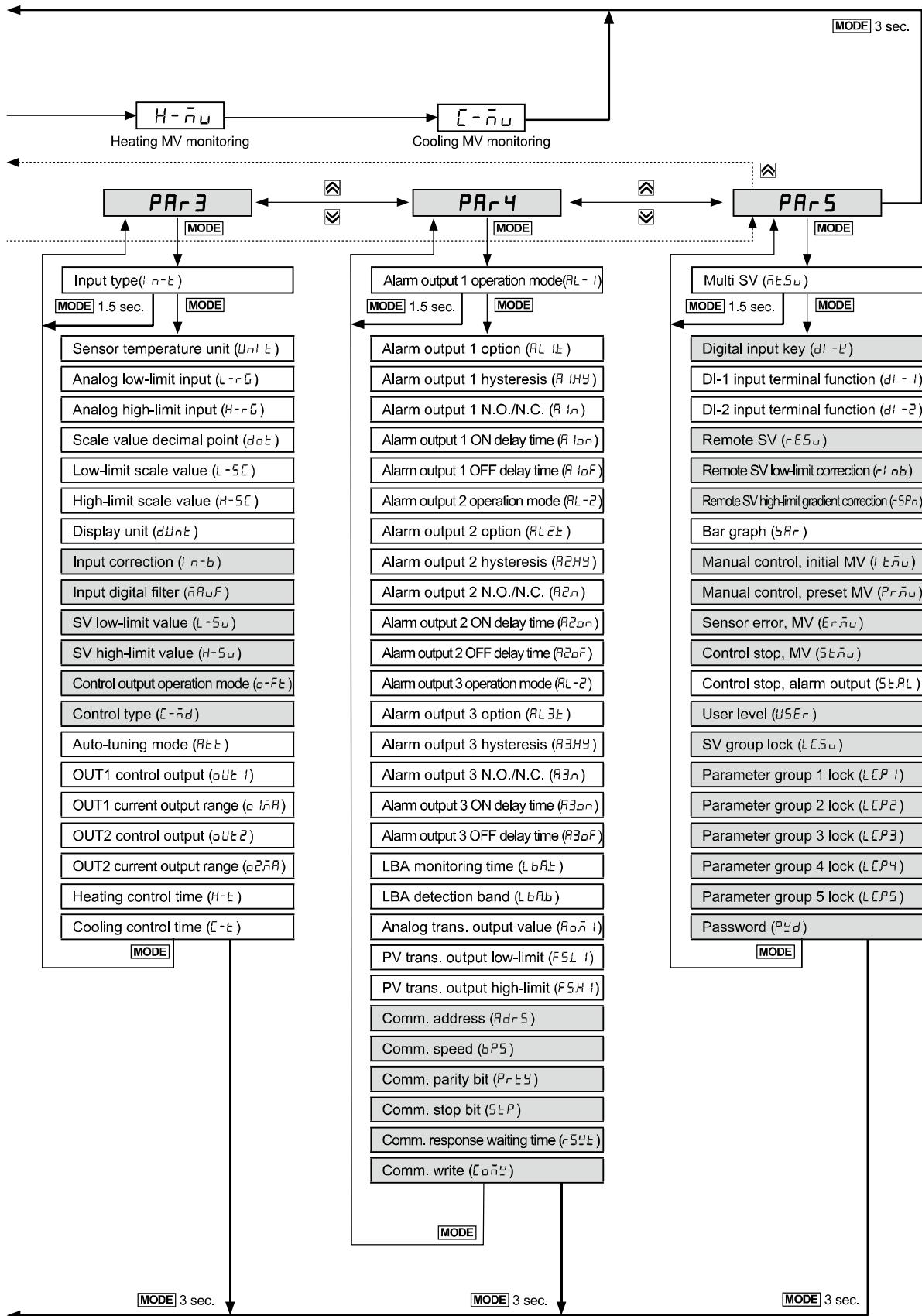
Note

For heating and cooling control, the system returns to auto control after going through heating monitoring, manual heating control, cooling monitoring, and manual cooling control stages in sequence.

Heating MV remains in effect during cooling monitoring and manual cooling control.

5.3 Parameter Reference Chart





※1. [PR55] parameter is displayed only when password is set. It is not displayed when purchasing the unit since the default password is set to [0000].

If the password is not valid, the screen is changed to the password code screen. Press any key among \leftarrow , \downarrow , \uparrow to return to password entering window. Press the MODE key to return to RUN mode.

If you forget the password, contact our service center after checking the password code.

※2. It is displayed when setting user parameter group in the integrated device management program (DAQMaster).

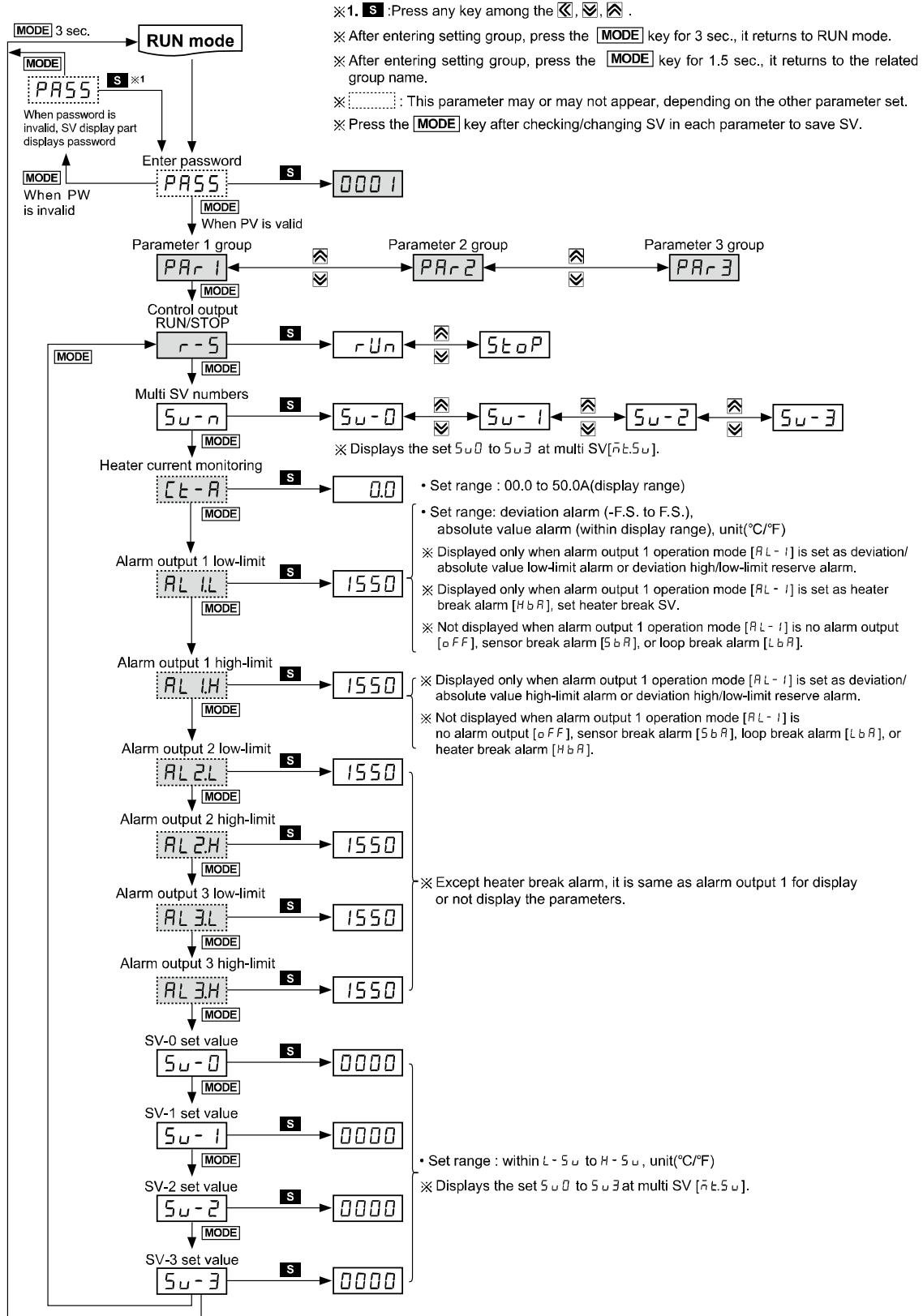


Note

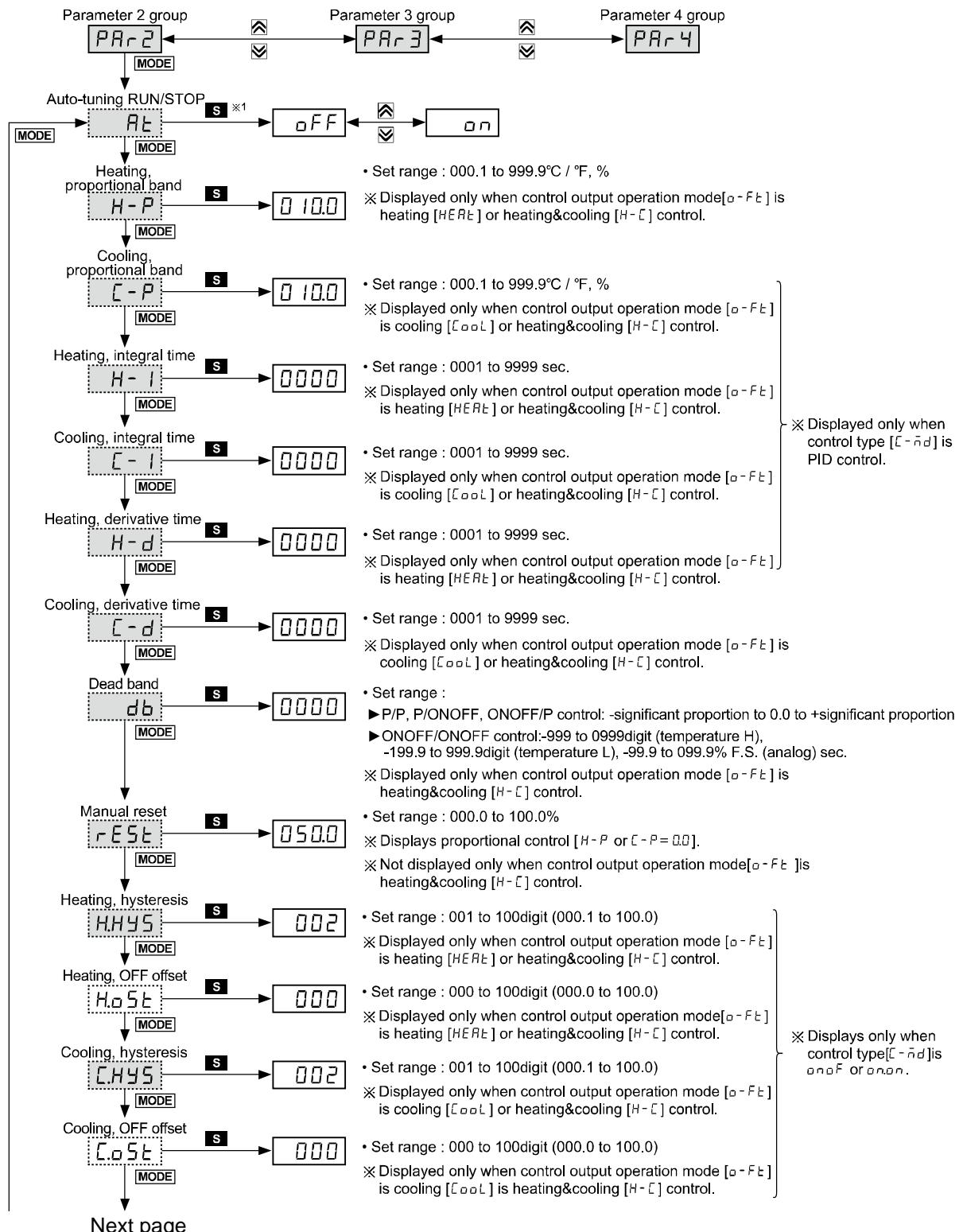
- Press the MODE key over 2 sec. in RUN mode to enter into setting mode.
- Press the MODE key for 1.5 sec. while in setting mode to move to other parameter group.
- Press the MODE key over 3 sec. while in setting mode to return to RUN mode.
- Press the MODE key at the lowest level of parameter to move parameter group screen. Press \leftarrow , \downarrow keys to move other parameter groups.
- If there is no additional key operation within 30 sec. after entering into setting mode, it is automatically returned to RUN mode and previous setting value remains.
- The shaded parameters are displayed in common. The others may not be displayed by the specifications of the product, other parameter's setting, or parameter mask setting.

5.4 Parameter Setting Groups

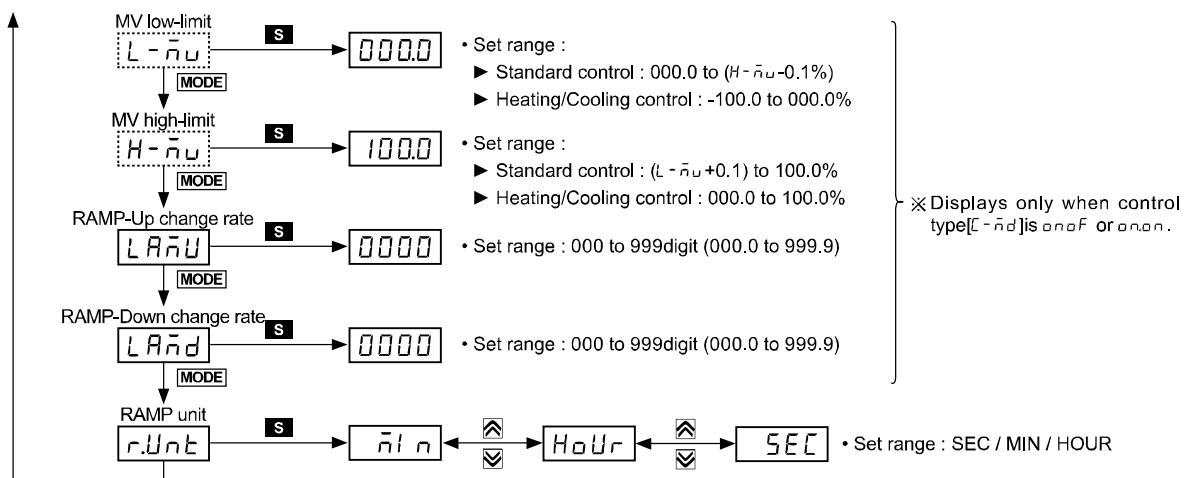
5.4.1 Parameter 1 Setting Group [PAr 1]



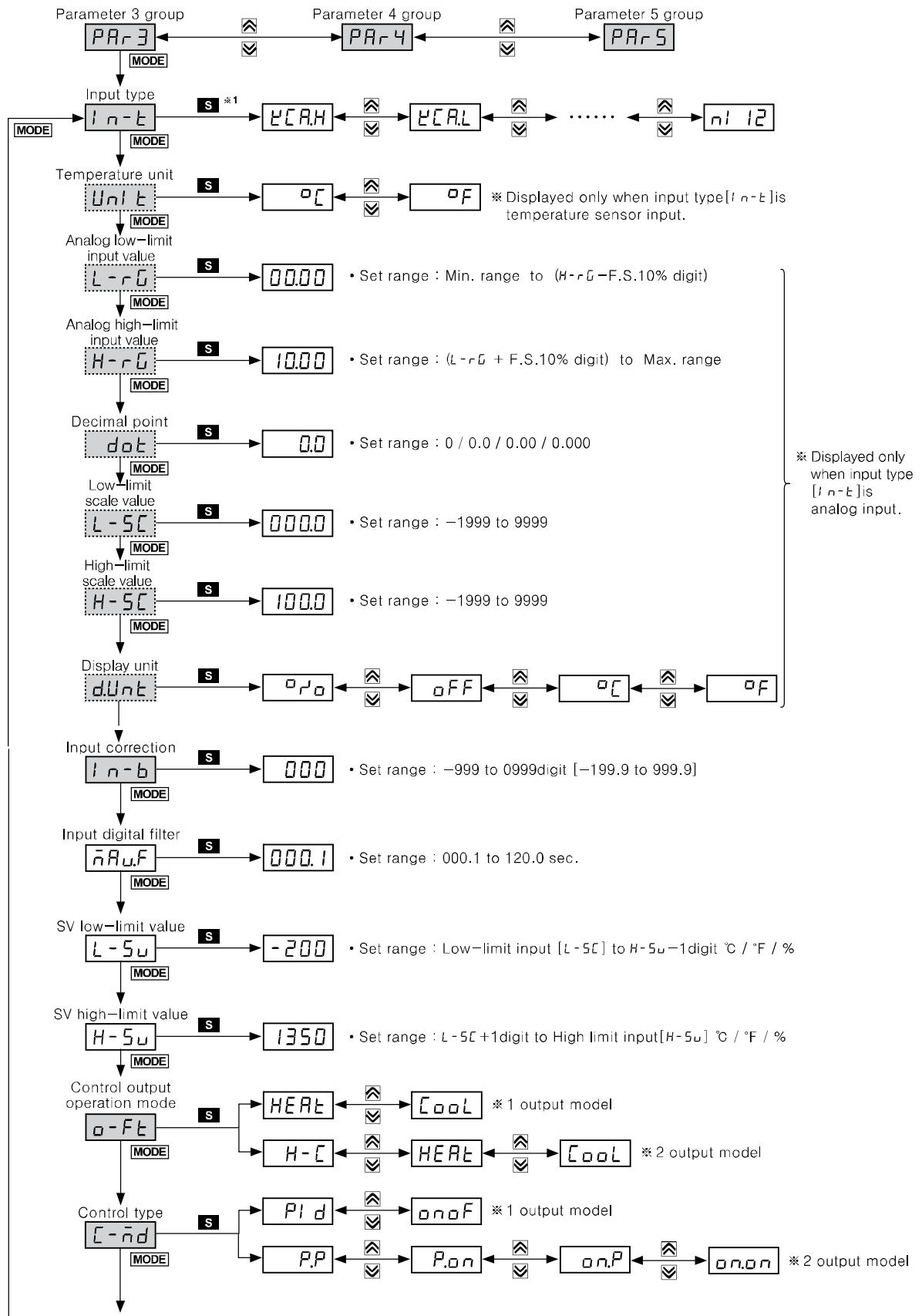
5.4.2 Parameter 2 Setting Group [PAr2]



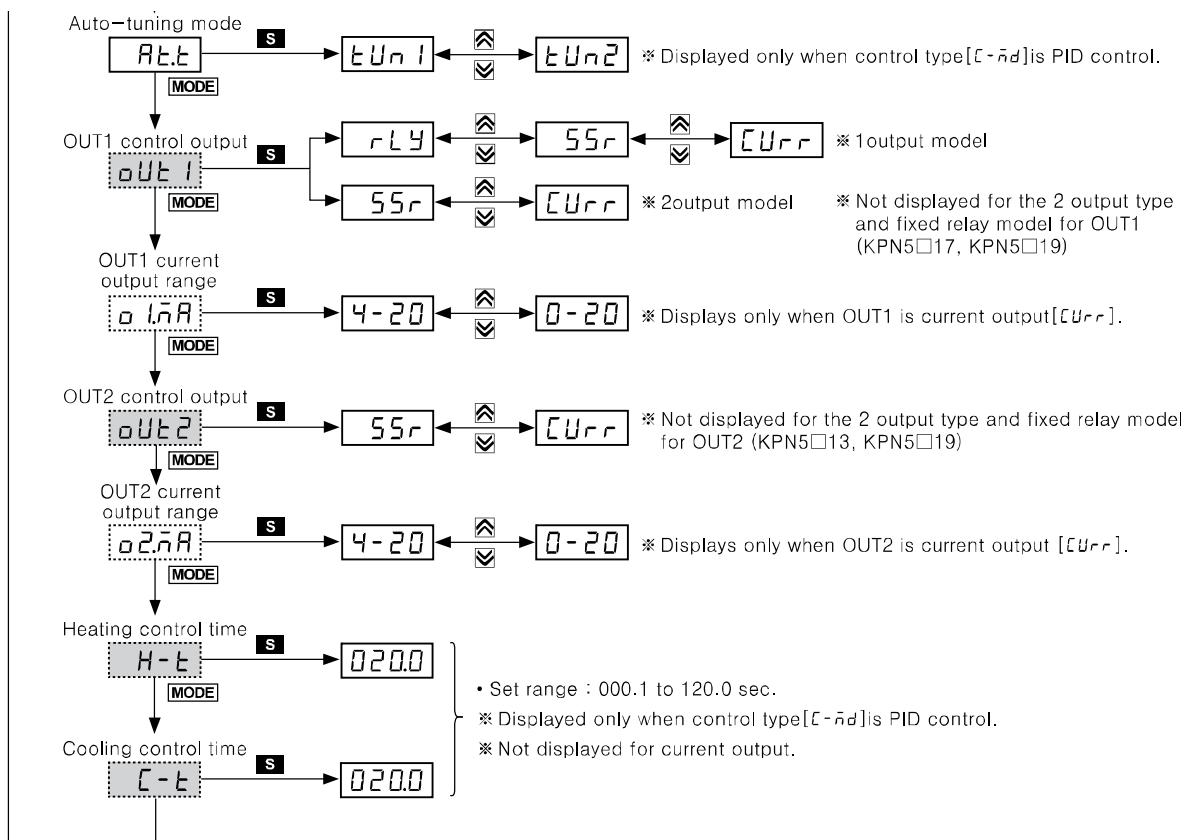
Next page



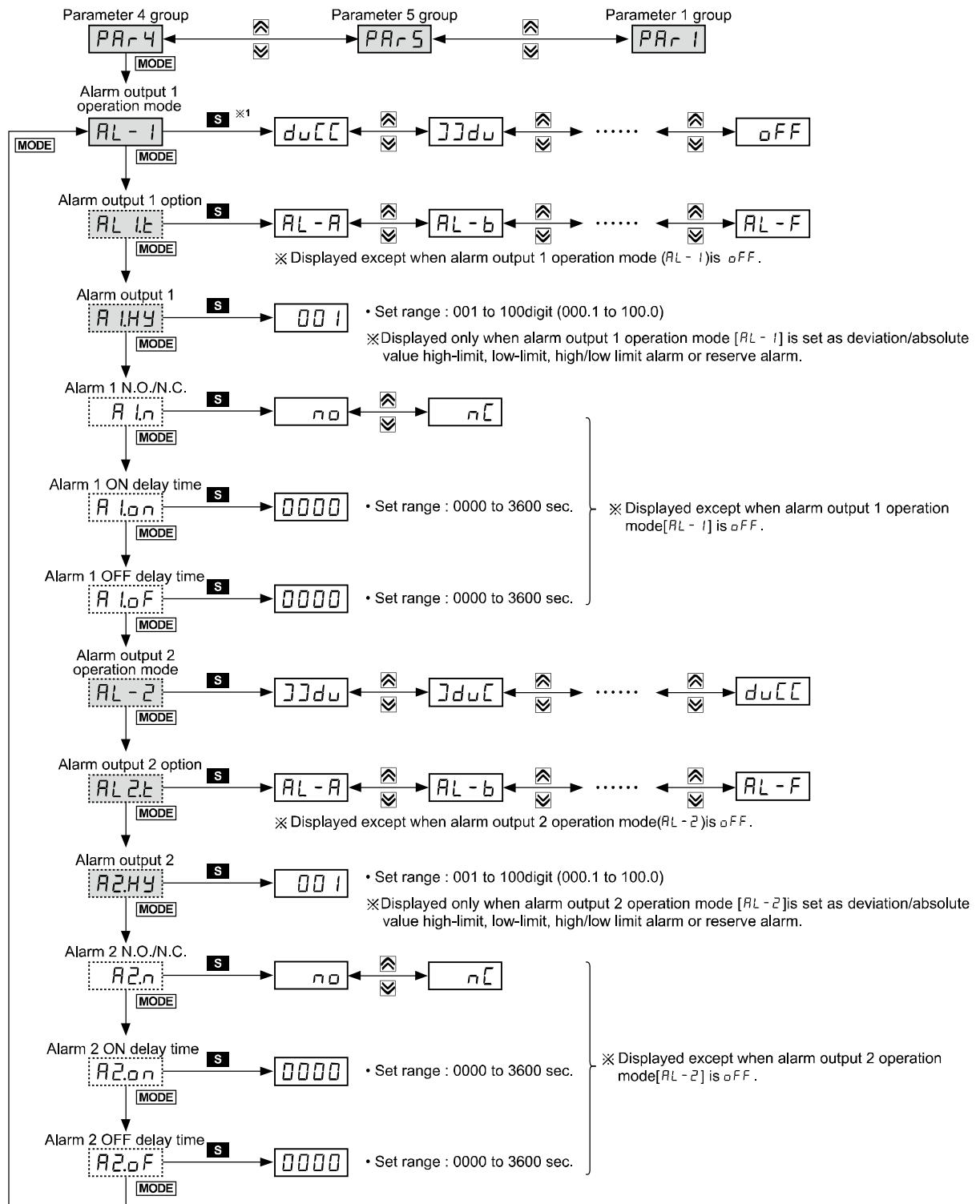
5.4.3 Parameter 3 Setting Group [PAr3]



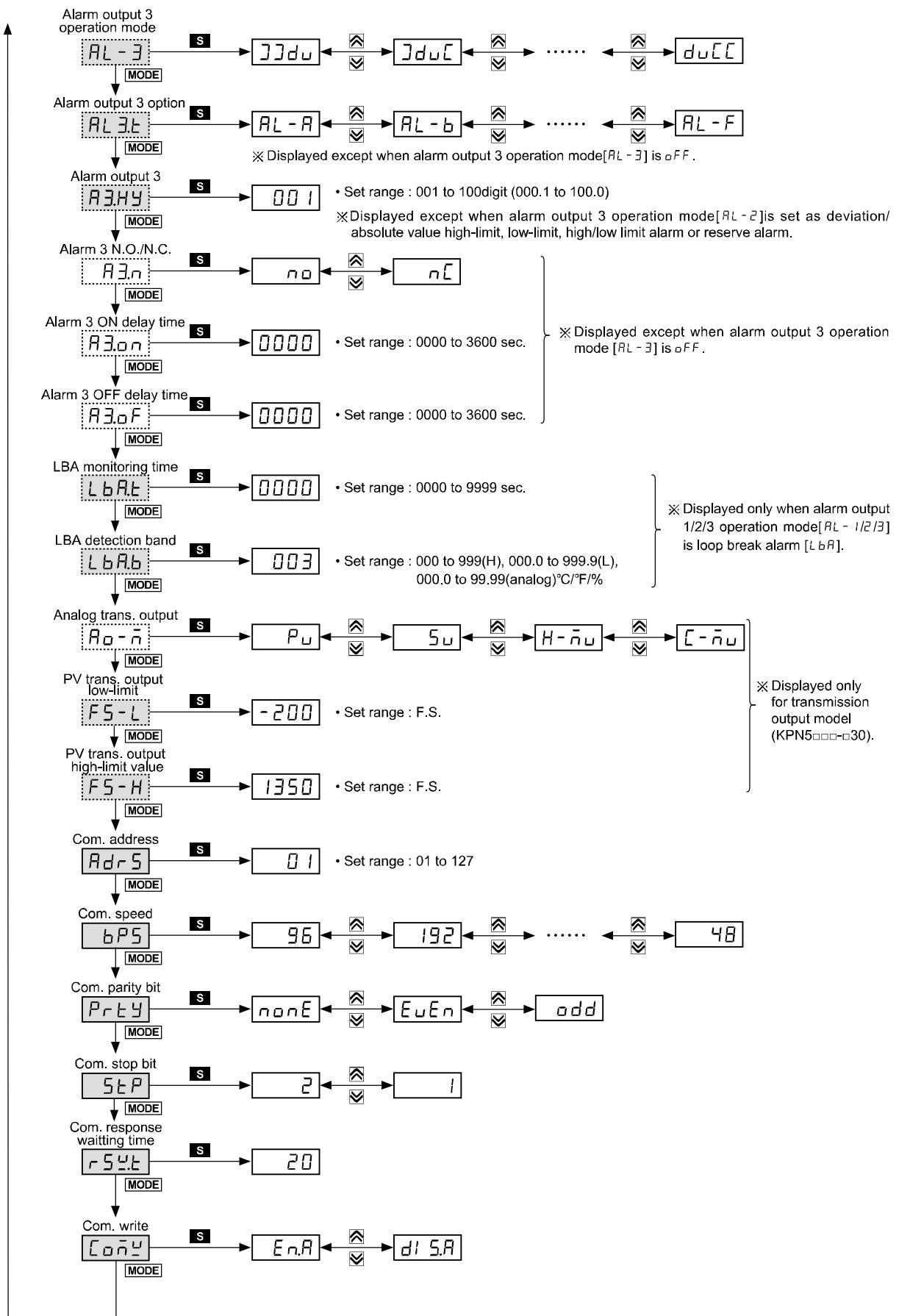
Next page



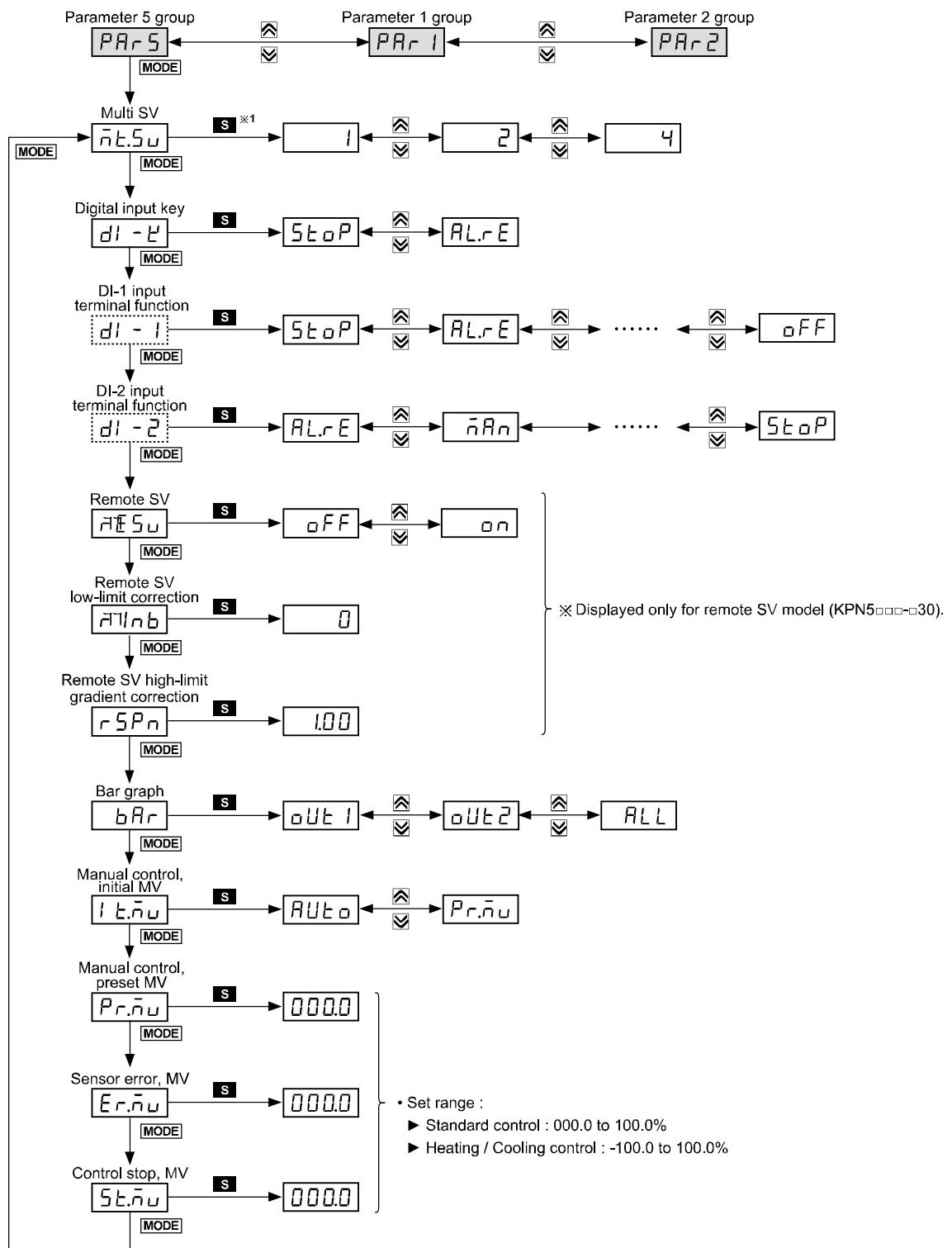
5.4.4 Parameter 4 Setting Group [PAr4]



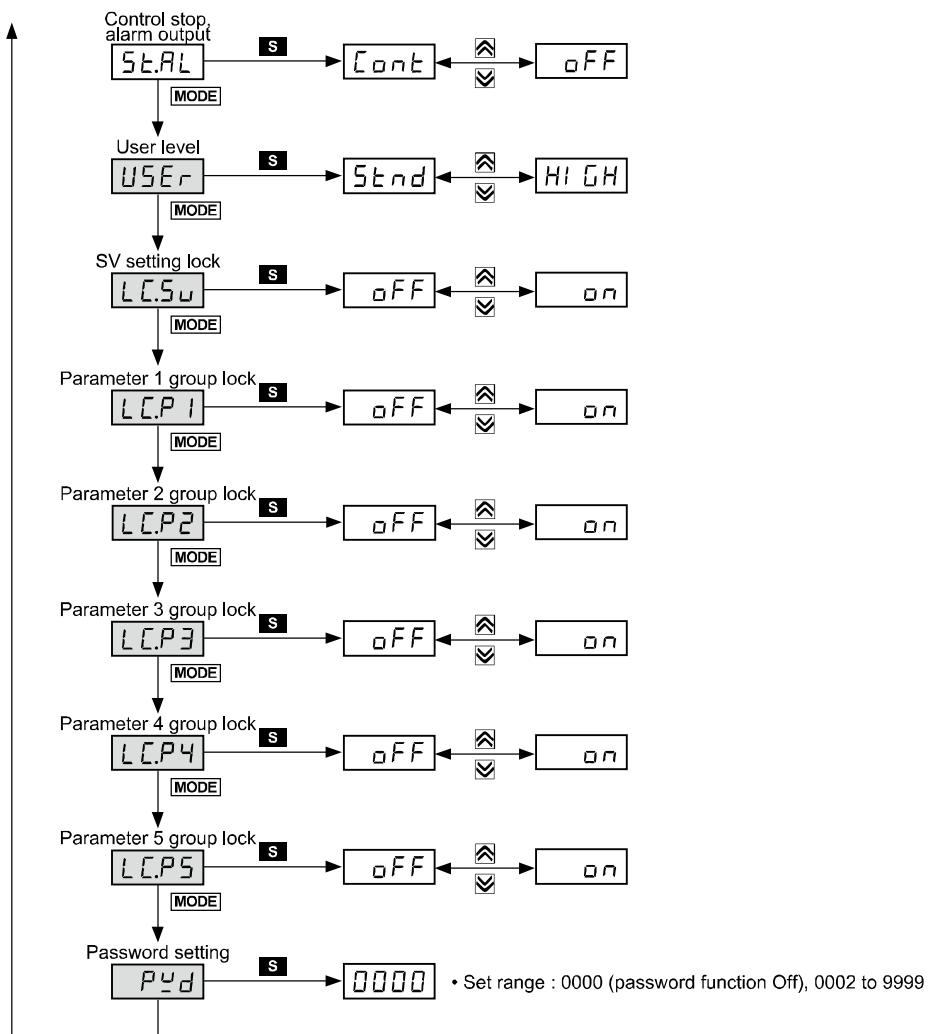
Next page



5.4.5 Parameter 5 Setting Group [PAr5]



Next page



6 Parameter Settings and Functions

6.1 Input

6.1.1 Input types and temperature ranges

| Input type | | | Display | Temp. range(°C) | Temp. range(°F) |
|----------------------|---------------------|------------|---------|---|------------------|
| Thermocouple (TC) | K(CA) | 1 | E.C.P 1 | -200 to 1350 | -328 to 2463 |
| | | 0.1 | E.C.P 2 | -199.9 to 999.9 | -199.9 to 999.9 |
| | J(IC) | 1 | E.C.J 1 | -200 to 800 | -328 to 1472 |
| | | 0.1 | E.C.J 2 | -199.9 to 800.0 | -199.9 to 999.9 |
| | E(CR) | 1 | E.C.E 1 | -200 to 800 | -328 to 1472 |
| | | 0.1 | E.C.E 2 | -199.9 to 800.0 | -199.9 to 999.9 |
| | T(CC) | 1 | E.C.t 1 | -200 to 400 | -328 to 752 |
| | | 0.1 | E.C.t 2 | -199.9 to 400.0 | -199.9 to 752.0 |
| | B(PR) | 1 | E.C.-b | 0 to 1800 | 32 to 3272 |
| | R(PR) | 1 | E.C.-r | 0 to 1750 | 32 to 3182 |
| | S(PR) | 1 | E.C.-s | 0 to 1750 | 32 to 3182 |
| | N(NN) | 1 | E.C.-n | -200 to 1300 | -328 to 2372 |
| | C(TT) ^{*1} | 1 | E.C.-c | 0 to 2300 | 32 to 4172 |
| | G(TT) ^{*2} | 1 | E.C.-g | 0 to 2300 | 32 to 4172 |
| | L(IC) | 1 | E.C.L 1 | -200 to 900 | -328 to 1652 |
| | | 0.1 | E.C.L 2 | -199.9 to 900.0 | -199.9 to 999.9 |
| | U(CC) | 1 | E.C.U 1 | -200 to 400 | -328 to 752 |
| | | 0.1 | E.C.U 2 | -199.9 to 400.0 | -199.9 to 752.0 |
| | Platinel II | 1 | E.C.-P | 0 to 1390 | 32 to 2534 |
| RTD | Cu 50Ω | 0.1 | C.U.50 | -199.9 to 200.0 | -199.9 to 392.0 |
| | Cu 100Ω | 0.1 | C.U.10 | -199.9 to 200.0 | -199.9 to 392.0 |
| | JPt 100Ω | 1 | J.Pt.1 | -200 to 650 | -328 to 1202 |
| | | 0.1 | J.Pt.2 | -199.9 to 650.0 | -199.9 to 999.9 |
| | DPt 50Ω | 0.1 | d.Pt.5 | -199.9 to 600.0 | -199.9 to 999.9 |
| | DPt 100Ω | 1 | d.Pt.1 | -200 to 650 | -328 to 1202 |
| | | 0.1 | d.Pt.2 | -199.9 to 650.0 | -199.9 to 999.9 |
| | Nickel 120Ω | 1 | n.l.12 | -80 to 200 | -112 to 392 |
| Analog | Voltage | 0 to 10V | A-u 1 | -1999 to 9999 (Display range is variable according to decimal point position.) | |
| | | 0 to 5V | A-u 2 | | |
| | | 1 to 5V | A-u 3 | | |
| | | 0 to 100mV | A.nu 1 | | |
| | Current | 0 to 20mA | A.nA 1 | | |
| | | 4 to 20mA | A.nA 2 | | |

※1: C(TT) : Same as existing W5(TT) type sensor

※2: G(TT) : Same as existing W(TT) type sensor



Note

Temperature sensors convert the subject temperature to electrical signals for the temperature controller allowing it to control output.

SV (Setting Value) can only be set within the input range.

6.1.2 Input type [PAr3 → In-t]

This product supports multiple input types, making it possible for the user to choose from thermocouples, RTDs, and analog voltage/current.

If you change the input specification, the SV's high/low limits are automatically set to the new specification's max/min values for temperature sensors. As for analog inputs, high/low input values are set to the max/min temperature range and the SV high/low limits set to high/low scale values.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|----------------|-----------------|------|
| PAr3 | In-t | Refer to 6.1.1 | ECAH | - |

6.1.3 Sensor temperature unit [PAr3 → Unit]

When selecting the input temperature sensor, you can set the desired units (°C, °F) of temperature value to be displayed.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|-----------|-----------------|------|
| PAr3 | Unit | °C / °F | °C | - |



Note

This parameter is not displayed for analog input.

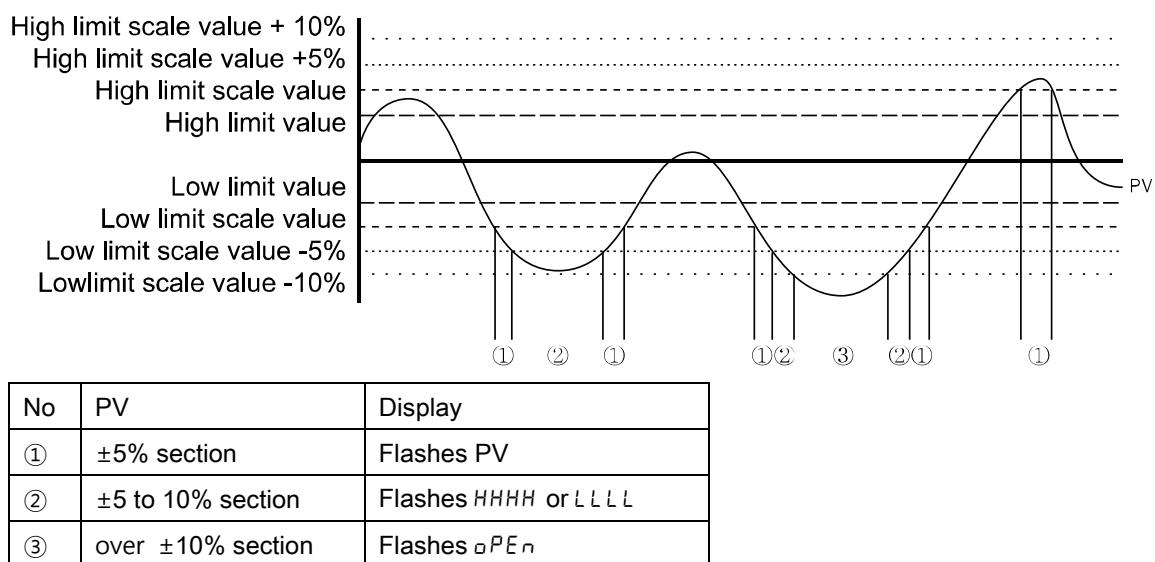
6.1.4 Analog input/scale value

With analog input selected, you can set the analog input range (high/low limit input values) and the display scale (high/low limit scale values) within the designated input range.

The decimal point positions remain fixed when configuring the high/low limit input values. You can change the input values at $R_u 1: 00.00, R_u 2/R_u 3: 0.000, R_h 1: 000.0, R_h 2/R_h 3: 00.00$ decimal points.

If the upper and lower limit scale settings are identical, **Err** flashes twice and setting mode is displayed.

For analog input, $\pm 5\%$ of the set high/low limit input value is extended. Analog output is also extended compairing input value. (For temperature sensor input, $\pm 5\%$ extension is applied within the temperature range.)



Note

This parameter is not displayed for temperature sensor input.

6.1.4.1 Analog low-limit input value [$PRr3 \rightarrow L-rG$]

You can set the low limit input values for actual use within the analog input range.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|------|
| $PRr3$ | $L-rG$ | Min. temperature range to high limit input value [$H-rG$] – F.S. 10% | 00.00 | - |

6.1.4.2 Analog high-limit input value [$PRr3 \rightarrow H-rG$]

You can set the high limit input values for actual use within the analog input range.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|---|-----------------|------|
| $PRr3$ | $H-rG$ | Low limit input value [$L-rG$] + F.S. 10% to Max. temperature range | 10.00 | - |

6.1.4.3 Decimal point [*PAr3* → *dot*]

You can set the decimal point positions for PV (Present Value) and SV (Setting Value) within high and low limit scale values.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|------------|------------------------|-----------------|------|
| <i>PAr3</i> | <i>dot</i> | 0 / 0.0 / 0.00 / 0.000 | 0.0 | - |

6.1.4.4 Scale low-limit value [*PAr3* → *L-SC*]

You can set the display scales of lower limit values for analog input [*L-rG*].
(Based on the decimal point position setting.)

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|---------------|-----------------|------|
| <i>PAr3</i> | <i>L-SC</i> | -9999 to 9999 | 000.0 | - |

6.1.4.5 Scale high-limit value [*PAr3* → *H-SC*]

You can set the display scales of high limit values for analog input [*H-rG*].
(Based on the decimal point position setting.)

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|---------------|-----------------|------|
| <i>PAr3</i> | <i>H-SC</i> | -9999 to 9999 | 100.0 | - |

6.1.4.6 Display unit [*PAr3* → *d.Unit*]

When you select analog input type, you can set the display units.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|---------------|-------------------|-----------------|------|
| <i>PAr3</i> | <i>d.Unit</i> | °C / °F / % / OFF | % | - |

| Setting | Parameter function |
|---------|--|
| °C | Sets the display unit to °C and turns on the °C indicator. |
| °F | Sets the display unit to °F and turns on the °F indicator. |
| % | Sets the display unit to % and turns on the % indicator. |
| OFF | Sets the display unit to an undefined unit. The LED unit indicator does not turn on. |

6.1.5 Input correction [$P_{Rr3} \rightarrow I_{n-b}$]

This feature is used to compensate for input error caused by thermocouples, RTDs, or analog input devices, not by the controller itself.

This input correction function is mainly used when the sensor cannot be attached directly to controlled objects. It is also used to compensate for temperature error between the sensor's installation point and the actual measuring point.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|---------|
| P_{Rr3} | I_{n-b} | -999 to 0999 (Temperature H, Analog), -199.9 to 999.9 (Temperature L) | 0000 | °C/°F/- |



Ex.

If the controller displays 78°C when the actual temperature is 80°C, set the input bias [I_{n-b}] to '002' in order to adjust the controller's display temperature to 80°C.

After input correction, the PV is out of the temperature range by each sensor, it displays 'HHHH' or 'LLLL'.



Note

Make sure that an accurate temperature error measurement is taken before setting values of input correction. An inaccurate initial measurement can lead to greater error.

Many of today's temperature sensors are graded by their sensitivity. Since higher accuracy usually comes at a higher cost, most people tend to choose sensors with medium sensitivity. Measuring each sensor's sensitivity correction for input correction function in order to ensure higher accuracy in temperature reading.

6.1.6 Input digital filter [$P_{Rr3} \rightarrow \bar{n}_{Ru.F}$]

It is not possible to perform high accuracy control if the PV (Present Value) fluctuates because of noise elements, disturbance, or instabilities in the input signal. Using the input digital filter function can stabilize PV to realize more reliable control.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|------------------|----------------|-----------------|------|
| P_{Rr3} | $\bar{n}_{Ru.F}$ | 000.1 to 120.0 | 000.1 | sec. |



Ex.

If the input digital filter is set to 0.4 seconds, digital filtering is applied to a sampling value collected over 0.4 seconds (400 ms).

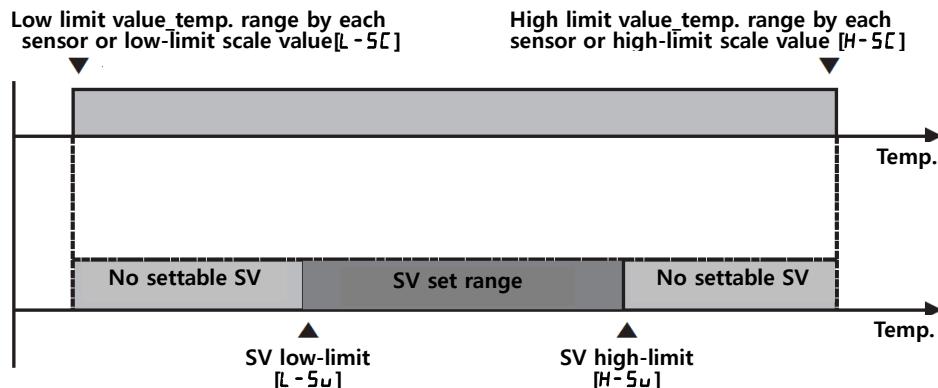


Note

When the input digital filter is used, PV (Present Value) can vary from the actual input value.

6.1.7 SV high/low limit value [$PAr3 \rightarrow H-5u/L-5u$]

You can limit the SV (Setting Value) range within the temperature range of the sensor or analog input type in order to prevent the system from controlling with improper SV.



| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------------------------|--|-----------------|-------|
| $PAr3$ | $H-5u$ SV high-limit value | SV low-limit [$L-5u$] + 1digit to high limit value by each sensor or high-limit scale value [$H-5u$] | 1350 (Temp.) | °C/°F |
| | $L-5u$ SV low-limit value | SV low-limit [$L-5u$] or low-limit scale value [$L-5u$] to SV high-limit [$H-5u$] or high-limit scale value [$H-5u$] | 000.0 (Analog) | |
| | $H-5u$ SV low-limit value | SV low-limit [$L-5u$] to high limit value by each sensor or high-limit scale value [$H-5u$] | -200 (Temp.) | °C/°F |
| | $L-5u$ SV high-limit value | SV high-limit [$H-5u$] or high-limit scale value [$H-5u$] | 100.0 (Analog) | |



Note

If setting over or below of high/low-limit input range of input temperature sensor type or high/low-limit scale value of analog, the SV is not saved and the previous settings are retained.

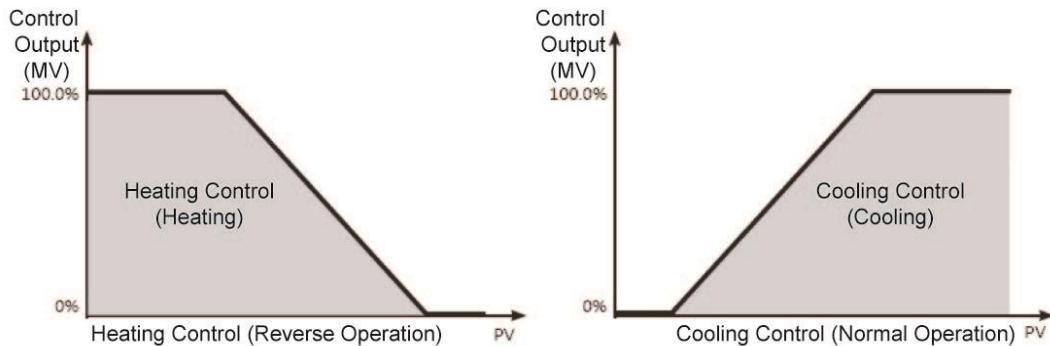
SV is available to set within the 'SV low-limit [$L-5u$] to SV high-limit [$H-5u$] range. You can not set SV as 'SV low-limit [$L-5u$] > SV high-limit [$H-5u$]'.

6.2 Control output

6.2.1 Control output mode [*PAr3* → *o-Ft*]

Control output modes for general temperature control include heating [*HEAT*], cooling [*Cool*], and heating and cooling [*H-C*].

Heating control and cooling control are mutually opposing operations with inverse outputs.



The PID time constant varies based on the controlled objects during PID control.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|---|-----------------|------|
| <i>PAr3</i> | <i>o-Ft</i> | Standard model: <i>HEAT</i> / <i>Cool</i> | <i>HEAT</i> | - |
| | | Heating & Cooling model: <i>HEAT</i> / <i>Cool</i> / <i>H-C</i> | <i>H-C</i> | - |

6.2.1.1 Heating control [*PAr3* → *o-Ft* → *HEAT*]

As reverse operation, if PV is lower than SV, it is set the output to supply power to the load(heater).

6.2.1.2 Cooling control [*PAr3* → *o-Ft* → *Cool*]

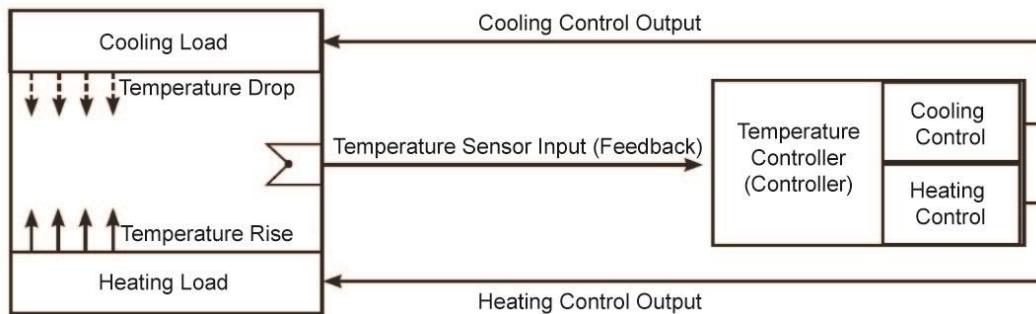
As normal operation, if PV is higher than SV, it is set the output to supply power to the load (cooler).

6.2.1.3 Heating & Cooling control [PRr3 → o-Ft → H-C]

Heating and cooling with a single temperature controller when it is difficult to control subject temperature with only heating or cooling.

Heating and cooling control mode controls the object using different PID time constants for each heating and cooling.

It is also possible to set heating and cooling control in both PID control or ON/OFF control mode. Heating/cooling output can be selected among Relay output, SSR output and current output depending on model types chosen according to your application environment. (Note that only standard SSR control is available for SSR output in OUT2.)



Note

For heating and cooling control, OUT1 control output is dedicated to heating control and OUT2 control output to cooling control.

6.2.1.3.1. Dead band/Overlap band [PRr2 → db]

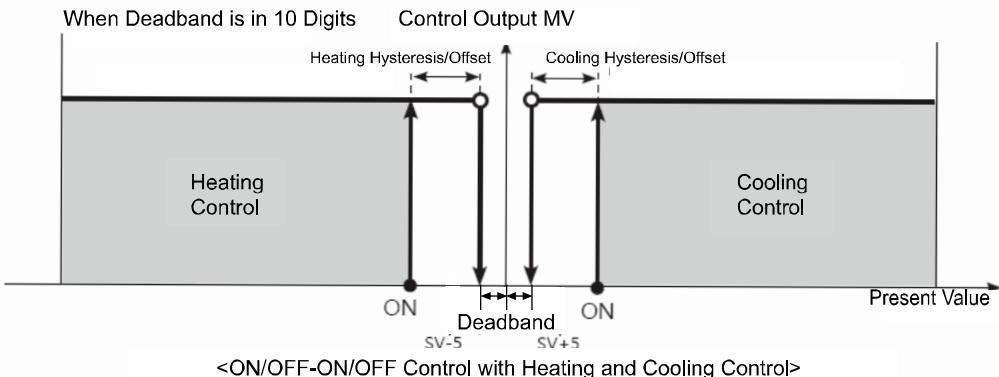
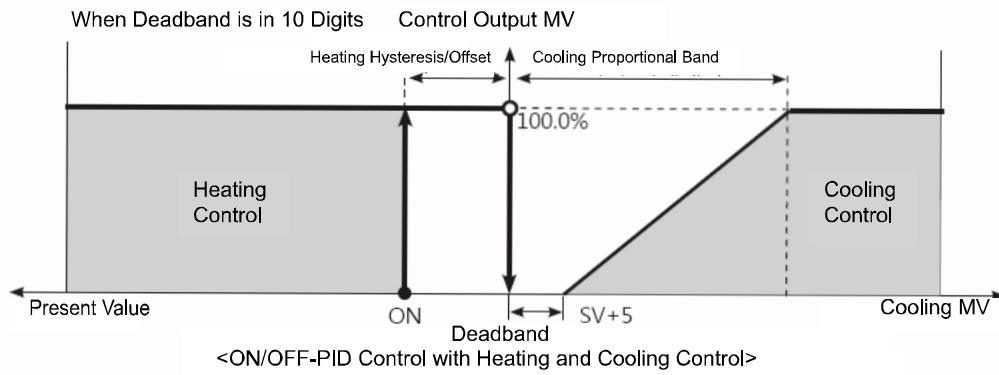
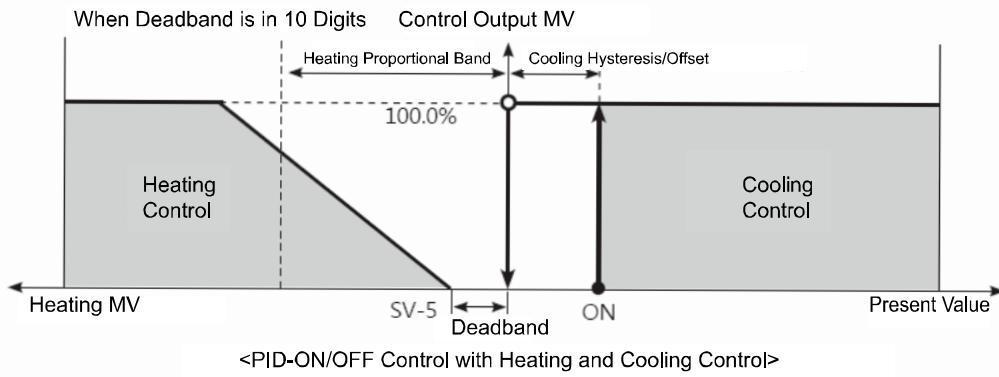
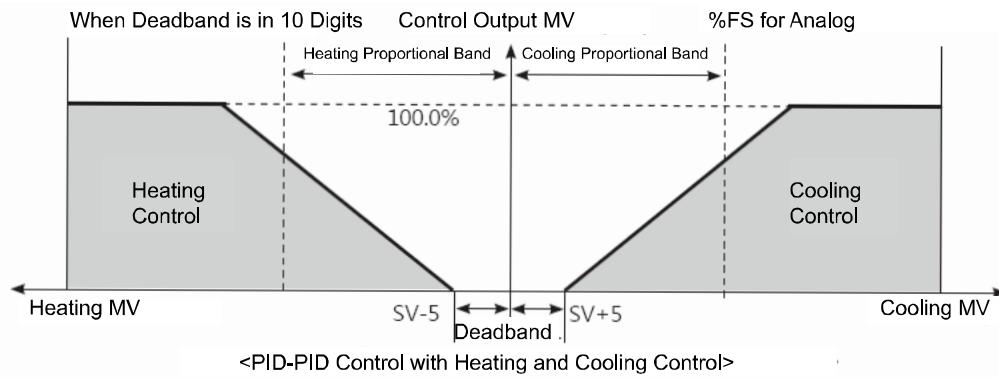
In heating and cooling control, it is possible to designate a dead band between heating and cooling control bands based on SV (Setting Value).

A dead band forms around the SV when db is set to a positive value (+). No control occurs in the dead band area. Therefore, heating and cooling MVs become 0.0% in the formed dead band. An overlap band (simultaneous application of heating and cooling MVs) forms around the SV when db is set to a negative value (-).

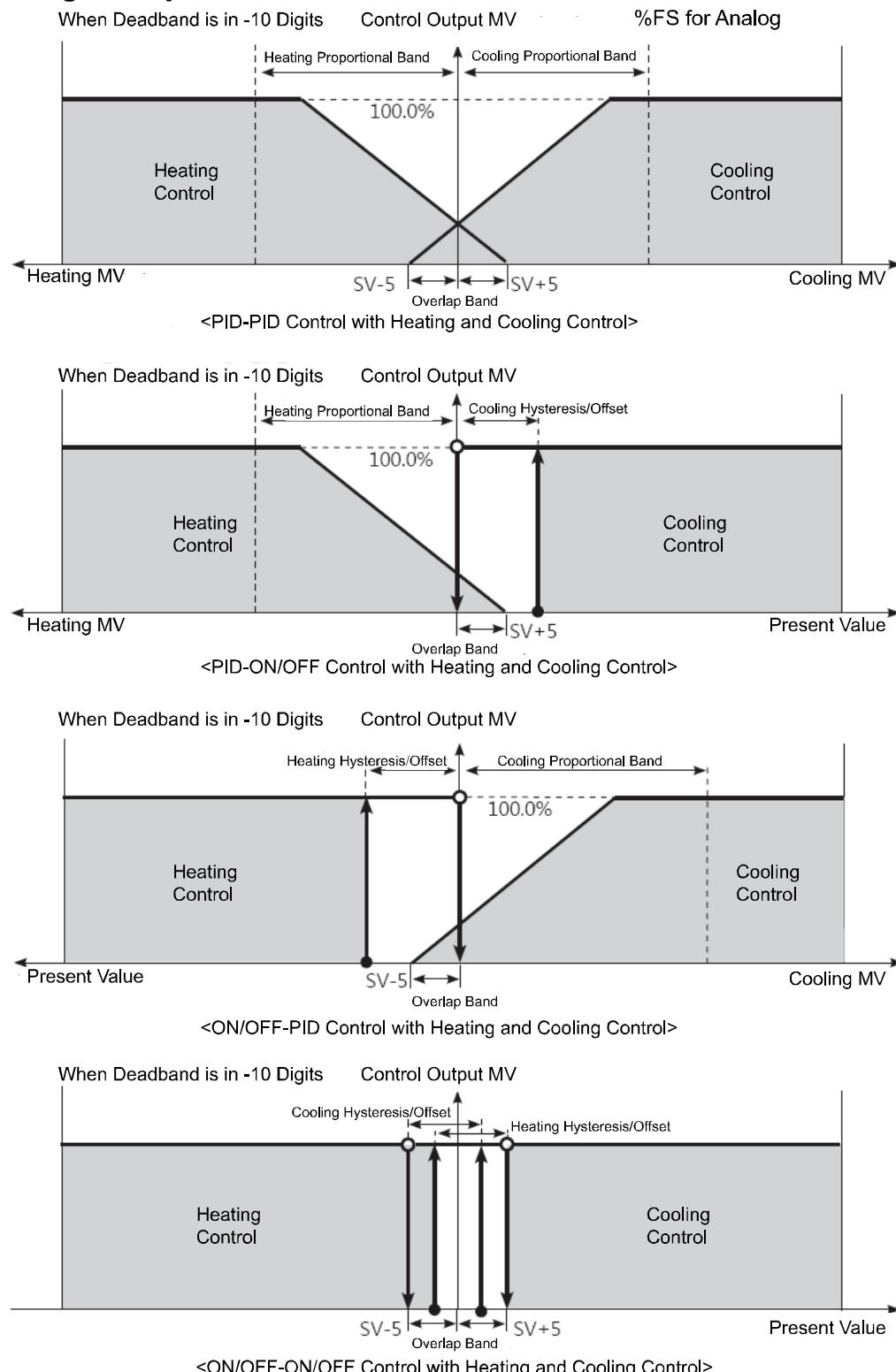
Set db to 0 when a dead band or an overlap band is not used.

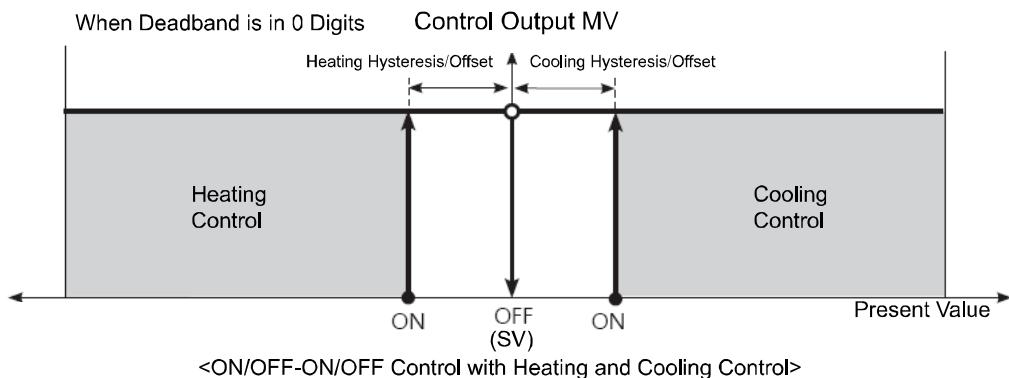
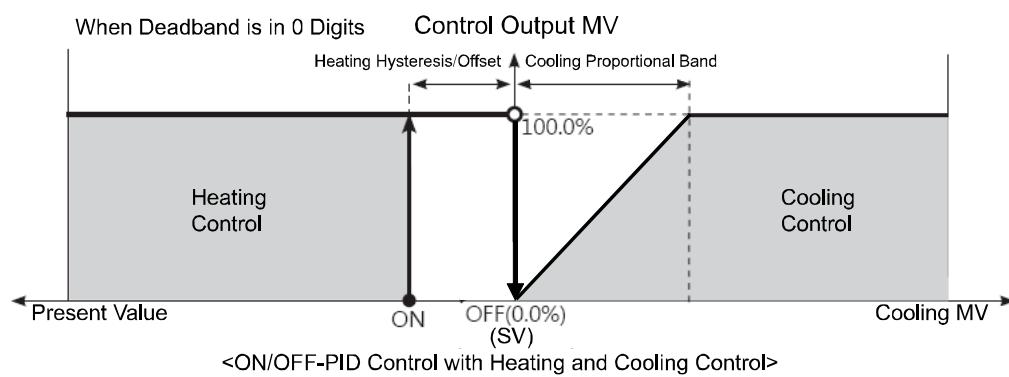
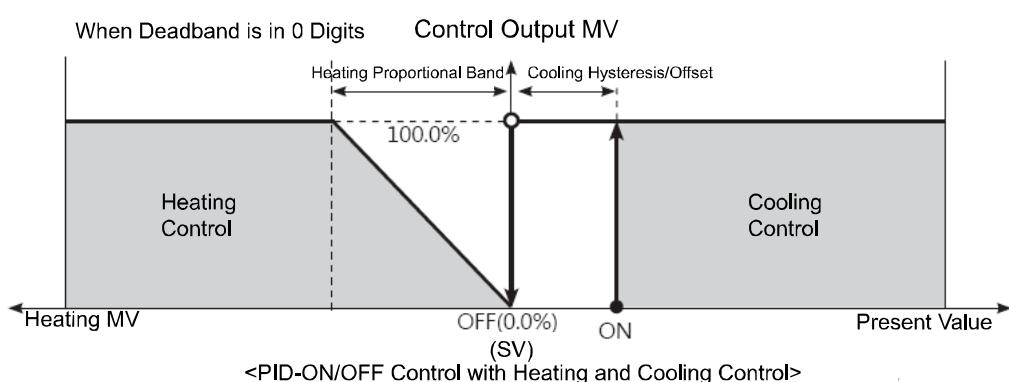
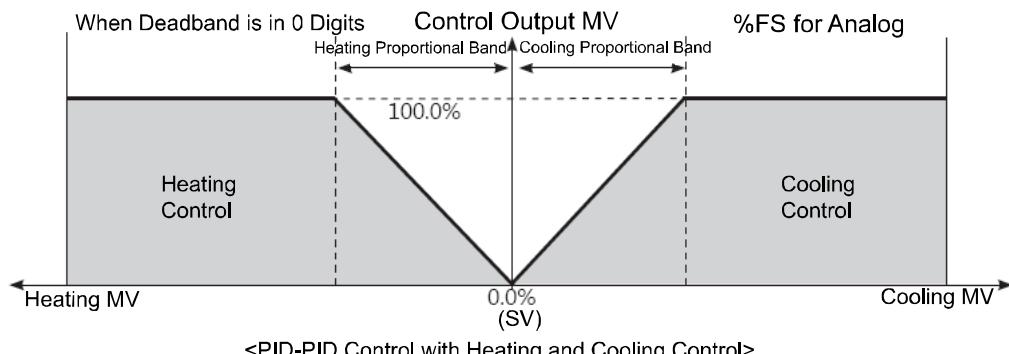
| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|---------------------|---------------------|------|
| PRr2 | db | Refer to the below. | Refer to the below. | |

- PID/PID, PID/ON-OFF, ON-OFF/PID control
 - Set range (temperature): -(proportional band) to +(proportional band) (based on the lower value when proportional bands are different)
 - Set range (analog): -99.9to 099.9
 - Factory default: 0000(temperature H), 000.0(temperature L, analog), (unit: temperature °C/°F, analog % F.S.)
- ON-OFF/ON-OFF control
 - Set range (temperature):
 - 999(overlap band) to 0000(not used) to 0999(dead band) (temperature H)
 - 199.9(overlap band) to 000.0(not used) to 999.9(dead band) (temperature L)
 - Set range (analog): -99.9(overlap band) to 000.0(not used) to 099.9(dead band)
 - Factory default: 0000(temperature H), 000.0(temperature L, analog), (Unit: temperature °C/°F, analog % F.S.)

(1) Using dead band

(2) Using overlap band

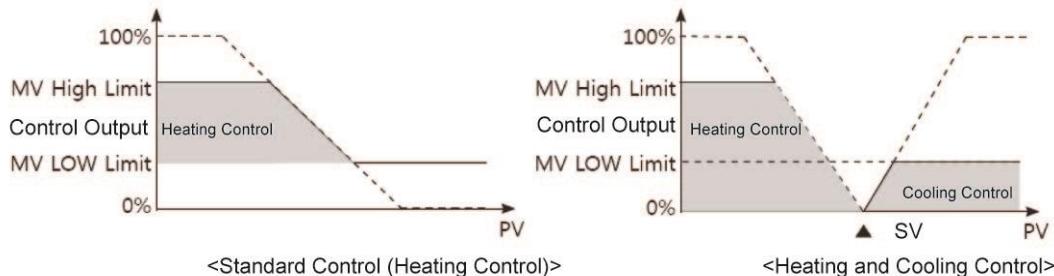


(3) Using neither dead band nor overlap band

6.2.2 MV high/low-limit [PAr2 → H-ℓn / L-ℓn]

MV high/low-limit values [H-ℓn / L-ℓn] for control output can be configured to the actual MV, provided the temperature controller's MV calculation exceeds the limits.

During heating and cooling control, cooling MV carries a "-" prefix. Therefore, the high-limit is expressed as a + value on the heating side and the lower limit as a - value on the cooling side.



| Parameter | Description |
|-----------|-------------------|
| L-ℓn | MV low-limit set |
| H-ℓn | MV high-limit set |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|------|
| PAr2 | H-ℓn | Standard control: MV low-limit value [L-ℓn] + 0.1 to 100.0 | 100.0 | % |
| | | Heating & Cooling control: 0.0 to 100.0 (PID control) 0.0(OFF)/100.0(ON) (ON/OFF control) | 100.0 | % |
| | L-ℓn | Standard control: 0.0 to MV high-limit value [H-ℓn] - 0.1 | 0.0 | % |
| | | Heating & Cooling control: -100.0 to 0.0 (PID control), -100.0(ON)/0.0(OFF) (ON/OFF control) | -100.0 | % |



Note

Same MV limits applied during auto-tuning.

MV limits are not applied to manual control, MV upon control stop, MV upon a sensor error, and initial manual control MV.

MV high/low-limit configuration is not available for ON/OFF control in standard control mode (heating or cooling control).

6.2.3 RAMP [*PAr2* → *rRnU*/*rRnd*/*rUnit*]

Ramp is a feature used to configure the slope toward SV (Setting Value). The feature limits change rate of SV and thereby restricts sudden temperature changes (increase and decrease) in the control subject.

Ramp is commonly used in applications where rapid temperature changes (increase and decrease) could impact negatively on the control subject.

| Parameter | Description |
|--------------|-----------------------|
| <i>rRnU</i> | RAMP-Up change rate |
| <i>rRnd</i> | RAMP-Down change rate |
| <i>rUnit</i> | RAMP time unit set |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|--------------|---|-----------------|------|
| <i>PAr2</i> | <i>rRnU</i> | 000 to 999 (temperature H, analog), 000.0 to 999.9 (temperature L) | 000 | |
| | <i>rRnd</i> | 000 to 999 (temperature H, analog), 000.0 to 999.9 (temperature L) | 000 | |
| | <i>rUnit</i> | SEC (sec.), m (min.), Hour (hour) | m | - |



Note

Activating the ramp feature when the ramp is not in operation limits the change rate of SV (Setting Value) based on PV (Present Value). Changing SV or ramp parameters while the ramp is in operation limits the change rate of SV based on SV at the point of the change.

Control operates based on changed SV (hereinafter referred to as RAMP SV) - changed by preset change rate (slope). Set RAMP-Up change rate and RAMP-Down change rate independently.

During RAMP operation, Alarm operates based on the last SV.

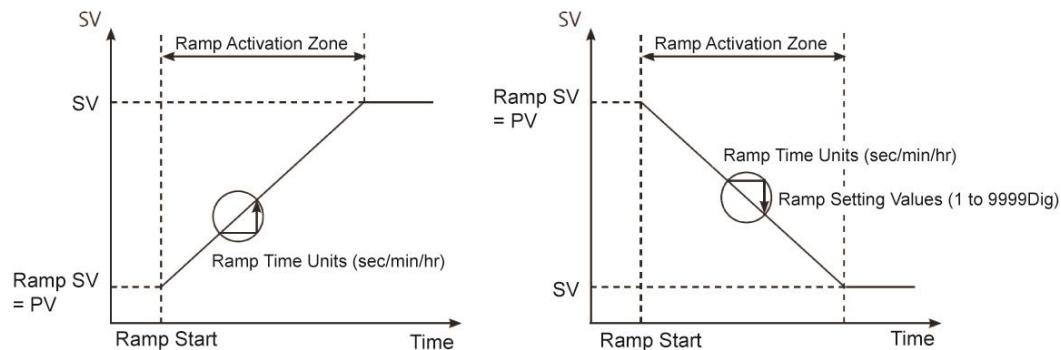
Setting the rate of ramp change to 0 deactivates the ramp feature.

If the ramp feature has been activated, RAMP SV is displayed on SV display part.

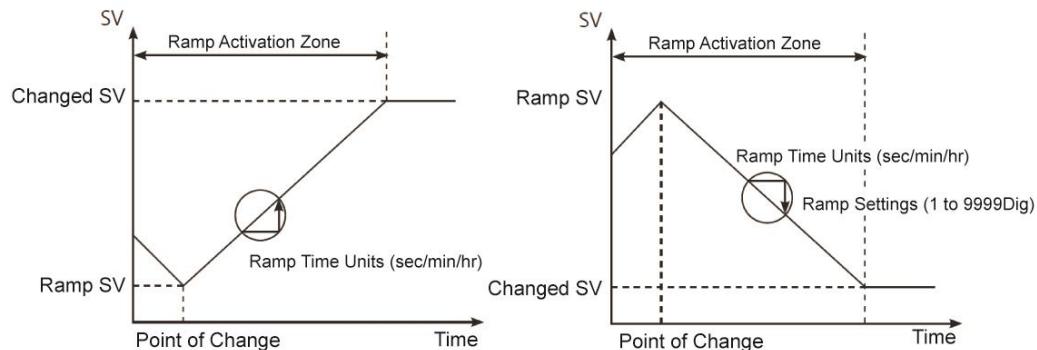
RAMP feature by operation status

| Operation status | Ramp Up/Down | RAMP feature |
|--|--------------------------|--------------|
| All operations | When it is 0 | Inactive |
| <i>oPEn</i> , <i>HHHH</i> , <i>LLLL</i> , Auto-Tuning, Auto → Manual, RUN → STOP | Regardless of conditions | Inactive |
| <i>oPEn</i> , <i>HHHH</i> , <i>LLLL</i> , after completing Auto-Tuning, PV = SV | Regardless of conditions | Inactive |
| Power ON, SV changing, STOP → RUN, Manual → Auto, Ramp Rate changing | When it is not 0 | Active |

RAMP feature operation graph



<Activating Ramp when Ramp is not in operation>



<Changing SV or Ramp Parameter when Ramp is in operation>

6.2.4 Auto/ Manual control

- Auto control: This mode is to make temperature reach SV with MV calculated by PID control.
- Manual control: This mode is to make temperature reach SV with user's defined MV.



Note

When in manual control mode, parameter settings can only be checked and cannot be modified (except for lock parameters).

When the unit is powered on following a power interruption or shutdown, the previous control mode (auto or manual) is maintained.

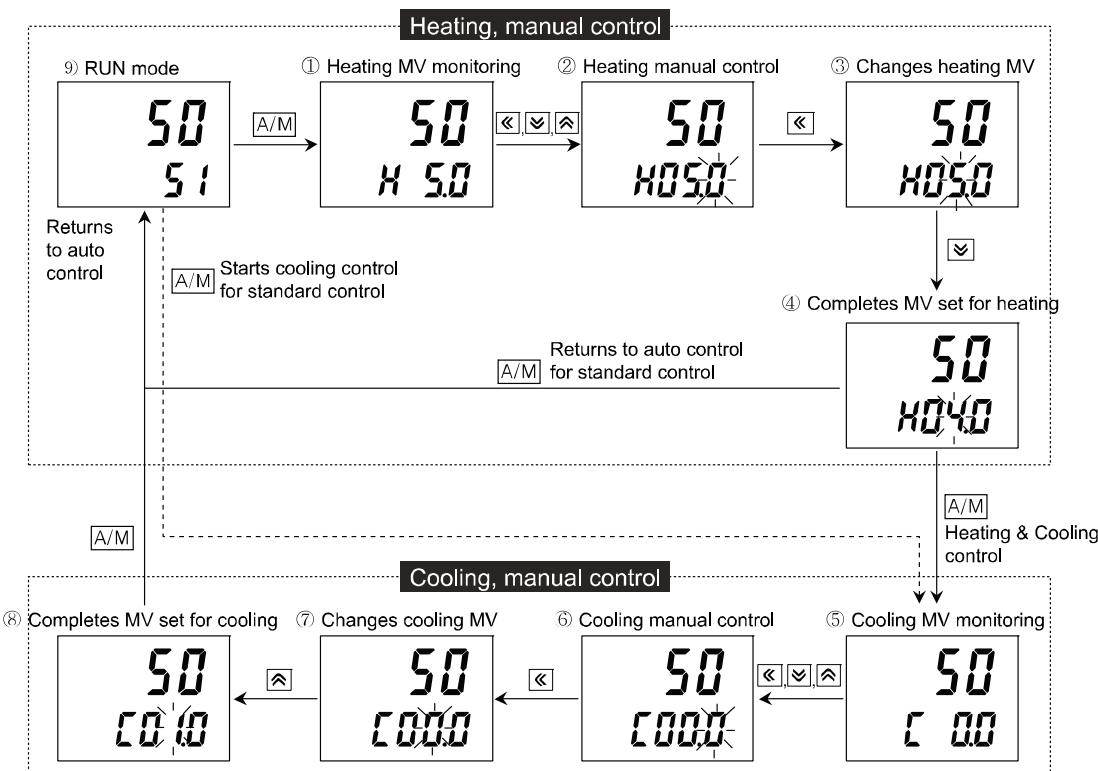
If switching to manual control during Auto-tuning, Auto-tuning is stopped.
It is possible to switch to manual control mode while in STOP.

When sensor break alarm [5bA] occurs in standard control mode, the sensor error MV (Errn) is applied. In this state, manual and auto control MV settings can be modified.

It is still possible to switch auto/manual control mode while in controlling operation.

Operation priority: Manual Control > Stop > Open (sensor disconnection)

6.2.4.1 Manual/Auto Control Switching



(1) In standard control(heating or cooling), manual control switching

- ①, ⑤: Press the **A/M** key once in RUN mode, it enters MV monitoring mode. The SV display part displays **H** (for heating control) or **C** (for cooling control) and the current MV.
- ②, ⑥: During monitoring MV, press any one of **◀ ▶ ▲ ▼** keys, the last digit (10⁰ Digit) flashes and it switches to manual control.
- ③, ⑦: Press the **◀** key to change the flashing digit. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)
- ④, ⑧: Press the **▼ ▲** key continuously, it moves as $0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 0$ and it is related with upper/lower digit.
By **◀ ▶ ▲ ▼** keys, set the desired MV.
- ⑨: Press the **A/M** in ① to ⑧ status, the MAN lamp turns OFF and the system returns to auto control mode.

(2) Heating & Cooling control, manual control switching

- ①: Press the **A/M** key once in RUN mode, it enters heating MV monitoring mode. The SV display part displays **H** and the current heating MV.
- ②: During monitoring heating MV, press any one of **◀ ▶ ▲ ▼** keys, the last digit (10⁰ Digit) flashes and it switches to manual control.
- ③: Press the **◀** key to change the flashing digit. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)
- ④: Press the **▼ ▲** key continuously, it moves as $0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 0$ and it is related with upper/lower digit.
By **◀ ▶ ▲ ▼** keys, set the desired MV.
- ⑤: Press the **A/M** in ① to ⑧ status, it enters cooling MV monitoring mode. The SV display part displays **C** and the current cooling MV.
- ⑥: During monitoring cooling MV, press any one of **◀ ▶ ▲ ▼** keys, the last digit (10⁰ Digit) flashes.

- ⑦: Press the  key to change the flashing digit. ($10^0 \rightarrow 10^1 \rightarrow 10^2 \rightarrow 10^3 \rightarrow 10^0$)
- ⑧: Press the   key continuously, it moves as 0→1→2→3→4→5→6→7→8→9→0 and it is related with upper/lower digit.
By    keys, set the desired MV.
- ⑨: Press the  in ⑤ to ⑧ status, the MAN lamp turns OFF and the system returns to auto control mode.



Note

For heating and cooling control, the system returns to auto control after going through heating monitoring, manual heating control, cooling monitoring, and manual cooling control stages in sequence.

Heating MV remains in effect during cooling monitoring and manual cooling control.

When digital input terminal (DI-1, DI-2) function is set as AUTO/MANUAL, auto/manual control function by the front  key and communication does not operate.

(3) By digital input terminal (DI), auto/manual switching

When digital input terminal (DI) is set as AUTO/MANUAL, it switches to manual control when digital input terminal (DI) is ON(Close) (MAN lamp turns ON). It returns to auto control when digital input terminal (DI) is OFF(Open).

For auto control stauts of digital input terminal, only monitoring is available. For manual control stauts, monitoring and changing MV are available.



Note

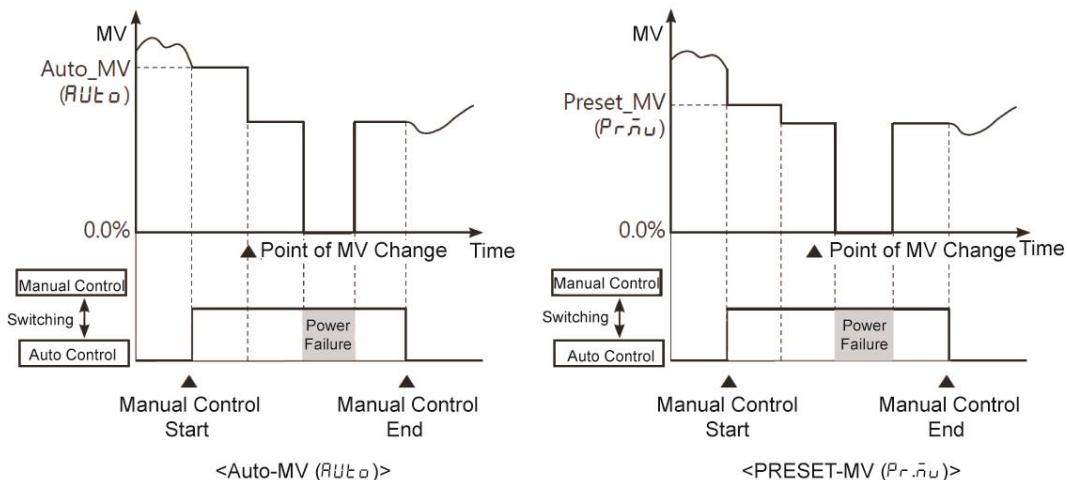
For more information of digital input terminal (DI), refer to '6.7.4.1 Digital input terminal function [ →  -  /  -2]".

6.2.4.2 Manual control, initial MV [PRr5 → I_E.nu]

When switching from auto control to manual control, you can select the initial MV at the switching point.

AUto: Controls with the auto control MV at the before-switching point as initial MV.

Pr.nu: Controls with the set **Pr.nu** (preset manual MV) value as initial MV.



6.2.4.3 Manual control, preset MV [PRr5 → Pr.nu]

For manual control, initial MV is set as **Pr.nu** (preset manual MV), you can set the desired preset manual MV.

| Setting group | Parameter | Set range | | | Factory default | Unit |
|---------------|-----------|--------------|------|---|-----------------|------|
| PRr5 | I_E.nu | AUto / Pr.nu | AUto | - | | |

| Setting group | Parameter | Set range | | | Factory default | Unit |
|---------------|-----------|--------------------------|----------------|--|-----------------|------|
| PRr5 | Pr.nu | Standard control | ON/OFF control | 000.0(OFF)/ 100.0(ON) | 000.0 | % |
| | | | PID control | 000.0 to 100.0 | | |
| | | Heating& Cooling control | ON/OFF control | - 100.0(cooling ON) / 000.0(OFF) / 100.0(heating ON) | | |
| | | | PID control | - 100.0(cooling) to 000.0(OFF) to 100.0(heating) | | |



Note

For heating & cooling control, when SV is within 0.1 to 100.0, it is applied to heating MV. When SV is within -100.0 to 0.1, it is applied to cooling MV.

6.2.5 Output type

6.2.5.1 Control output [PAr3 → OUT1]

(1) 1-output model

This model supports relay output, current output, and SSR drive voltage output. You can select the desired one output type.

OUT1: Select control output of OUT1

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|------------------|-----------------|------|
| PAr3 | OUT1 | rLY / 55r / Curr | rLY | - |

(2) 2-output model

| No | Model | Control output | Factory default |
|----|-------------|---|-----------------|
| 1 | KPN5□11-□□0 | OUT1: Current, SSR drive voltage selection output | 55r |
| | | OUT2: Current, SSR drive voltage selection output | 55r |
| 2 | KPN5□13-□□0 | OUT1: Current, SSR drive voltage selection output | 55r |
| | | OUT2: Relay output | rLY |
| 3 | KPN5□17-□□0 | OUT1: Relay output | rLY |
| | | OUT2: Current, SSR drive voltage selection output | 55r |
| 4 | KPN5□19-□□0 | OUT1: Relay output | rLY |
| | | OUT2: Relay output | rLY |

6.2.5.2 Current output range [PAr3 → OUT1/OUT2]

When control output is set as current output, high/low-limit of current output is selectable between 4-20mA or 0-20mA.

- **OUT1:** Current output range of OUT1
- **OUT2:** Current output range of OUT2



Note

When current output (OUT1, OUT2) is current output model, this parameter is displayed.

6.3 Temperature control

6.3.1 Temperature control type [*PAr3* → *C-nd*]

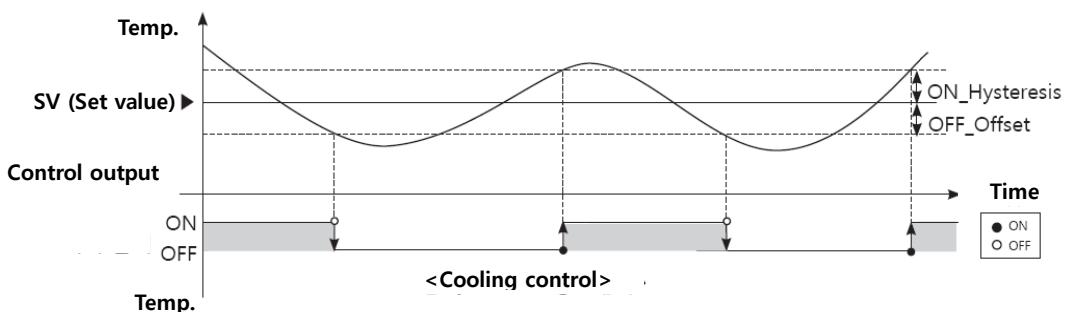
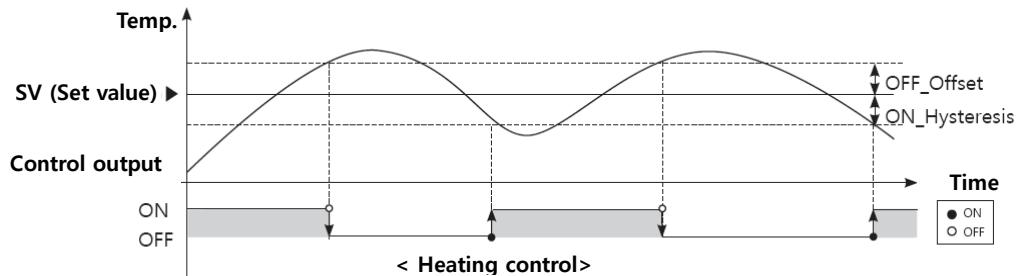
You can select the desired control type to control temperature.

| SV | Description | | |
|---------------------------|--------------|----------------|----------------|
| | Heating | Cooling | |
| Standard control | <i>Pi d</i> | PID control | |
| | <i>onoff</i> | ON/OFF control | |
| Heating & Cooling control | <i>P.P</i> | PID control | PID control |
| | <i>P.on</i> | PID control | ON/OFF control |
| | <i>on.P</i> | ON/OFF control | PID control |
| | <i>on.on</i> | ON/OFF control | ON/OFF control |

| Setting group | Parameter | Set range | | Factory default | Unit |
|---------------|-------------|-----------------|----------------------------------|-----------------|------|
| <i>PAr3</i> | <i>C-nd</i> | Standard | <i>Pi d / onoff</i> | <i>Pi d</i> | - |
| | | Heating&Cooling | <i>P.P / P.on / on.P / on.on</i> | <i>P.P</i> | - |

6.3.2 ON/OFF control [*PAr3* → *C-nd* → *onoff*]

Controls the temperature by comparing PV (Present Value) with SV (Setting Value) and turning power to the load on or off.



6.3.2.1 Hysteresis [PAr2 → H.HYS/H.oFT/L.HYS/L.oFT]

Hysteresis is to adjust control output ON/OFF point in ON/OFF control mode. ON_Hysteresis sets the output on point and OFF_Offset sets the off point.

Setting hysteresis too low can result in hunting induced by disturbance (noise, chattering, etc.). To minimize hunting, set ON_Hysteresis and OFF_Offset values with consideration to the heater or cooler's capacity and thermal characteristics, the control subject's response characteristics, the sensor's response characteristics and installation conditions, and other defining factors.

| Parameter | Description |
|-----------|---------------------------------------|
| H.HYS | ON Hysteresis set for heating control |
| H.oFT | OFF_Offset set for heating control |
| L.HYS | ON Hysteresis set for cooling control |
| L.oFT | OFF_Offset set for cooling control |

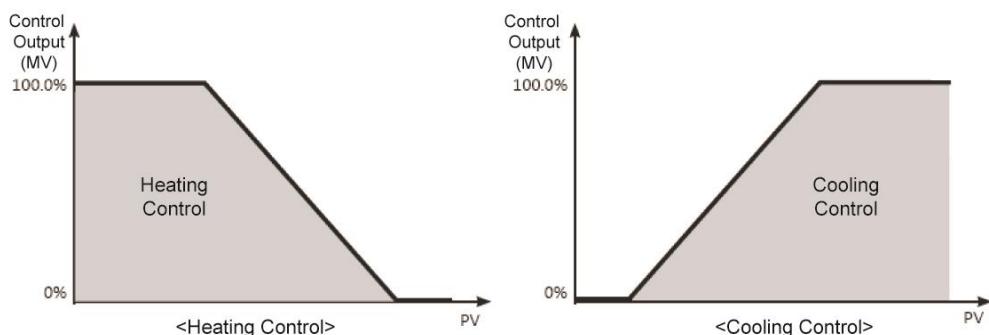
| Setting group | Parameter | Set range | Factory default | Unit | |
|---------------|-----------|---|-----------------|---------|--|
| PAr2 | H.HYS | Temperature H, analog: 00.1 to 100 Temperature L: 00.1 to 10.0 | 002 | °C/°F/- | |
| | L.HYS | | | | |
| | H.oFT | Temperature H, analog: 00.1 to 100 Temperature L: 00.1 to 10.0 | 000 | | |
| | L.oFT | | | | |

6.3.3 PID control [$PAr3 \rightarrow C-Pd \rightarrow PI\ d$]

PID control is a combination of proportional (P), integral (I), and derivative (D) controls and offers superb control over the control subjects, even with a delay time.

Proportional control (P) implements smooth, hunting-free control;
Integral control (I) automatically corrects offsets;
and Derivative control (D) speeds up the response to disturbance.

Through these actions, PID control realizes ideal temperature control.



Note

Application of PID control

- Proportional (P) control: Select PID control and set integral time and derivative time to 0000.
- Proportional Integral (PI) control: Select PID control and set derivative time to 0000.
- Proportional Derivative (PD) control: Select PID control and set integral time to 0000.

When using multi-SV function, PID time constants for 5u0 to 5u3 are applied same.

6.3.3.1 Proportional band [$PAr2 \rightarrow H-P/C-P$]

When PV (Present Value) is within the Proportional Band (P), the ON/OFF ratio needs to be adjusted during the proportional period (T). The defined proportional control (time proportional control) section is called as the proportional band.

| Parameter | Description |
|-----------|-------------------------------|
| H-P | Proportional band for heating |
| C-P | Proportional band for cooling |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|----------------|-----------------|---------------------------|
| PAr2 | H-P | 000.1 to 999.9 | 0 10.0 | Temp.: °C/°F Analog: % |
| | C-P | | | |

6.3.3.2 Integral time [PAr2 → H-I /C-I]

MVs from integral and proportional operation become the same when deviation is consistent. The time taken for the two MVs to match is called the integral time.

| Parameter | Description |
|-----------|---------------------------|
| H-I | Integral time for heating |
| C-I | Integral time for cooling |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--------------|-----------------|------|
| PAr2 | H-I | 0000 to 9999 | 0000 | sec. |
| | C-I | | | |



Note

Integral control is not conducted if the integral time is set to 0.

Setting the integral time too short can intensify Correction Movements and cause hunting.

6.3.3.3 Derivative time [PAr2 → H-d/C-d]

In accordance with the deviation of the ramp, the time taken for the MV gained from derivative operation to reach the MV gained from proportional control is called the derivative time.

| Parameter | Description |
|-----------|-----------------------------|
| H-d | Derivative time for heating |
| C-d | Derivative time for cooling |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--------------|-----------------|------|
| PAr2 | H-d | 0000 to 9999 | 0000 | sec. |
| | C-d | | | |



Note

Derivative control is not conducted if the derivative time is set to 0.

When using multi-SV function, PID time constants for 50 to 53 are applied same.

6.3.3.4 Control time [*PAr3* → *H-t/C-t*]

If relay or SSR is used to output MV under proportional control, the output is on for a fixed amount of time (within the control period, as a percentage of the MV) and then remains off for the rest of the time. The preset period when output ON/OFF takes place is called the proportional control period.

Control with SSR drive voltage output has a faster response than that of relay output. Therefore, by configuring a shorter control period, more responsive temperature control is achieved.

| Parameter | Description |
|------------|--------------------------|
| <i>H-t</i> | Control time for heating |
| <i>C-t</i> | Control time for cooling |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|------------|---------------|--|------|
| <i>PAr3</i> | <i>H-t</i> | 00.1 to 120.0 | Relay output: 020.0 SSR drive voltage output: 002.0 | sec. |
| | <i>C-t</i> | | | |



Note

For heating & cooling control, set the control time for heating and the control time for cooling individually.

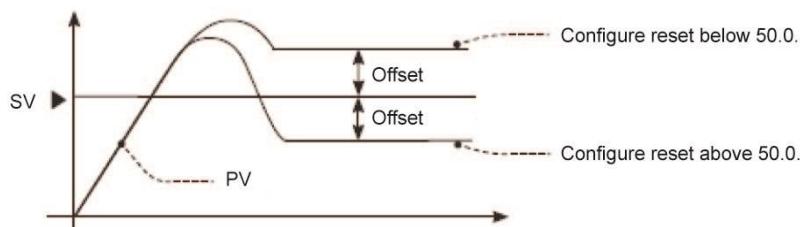
6.3.3.5 Offset correction/manual reset [*PAr2* → *rESt*]

When selecting P / PD control mode, there are certain temperature differences even after PV reaches stable status since heater's rising and falling time is inconsistent due to thermal characteristics of control objects, such as heat capacity and the heater capacity. This temperature difference is called OFFSET. Offset can be corrected using manual reset.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|----------------|-----------------|------|
| <i>PAr2</i> | <i>rESt</i> | 000.0 to 100.0 | 050.0 | % |

- Manual reset adjustment based on control result

Under stable control conditions, set the offset to 50% if PV and SV are identical, to over 50.0% if PV is lower than SV, and to below 50.0% if PV is higher than SV.



Note

The offset correction feature can only be used when proportional control is in effect. If setting the integral value to 0, the manual reset parameter is displayed.

The user cannot configure the manual reset setting during heating and cooling control. Instead, the setting is automatically set to 0% for both heating and cooling.

Applicable only when integral time is set to 0 (under P control or PD control only).

Switching from heating and cooling control to standard control (P, PD control) automatically configures the reset setting to 50%.

6.3.4 Auto-tuning

Auto-tuning measures the control subject's thermal characteristics and thermal response rate, and calculates and set the PID time constant for fast response characteristics and high stability. (Set control type [$\text{L}-\bar{n}d$] as PID)

It stops the progress automatically when error [oPEn] occurs during operating auto-tuning. To stop auto-tuning, set as [oFF].

(Maintains the before P, I, D value before executing auto-tuning)

6.3.4.1 Auto-tuning RUN/STOP [$\text{PAr2} \rightarrow \text{Rt}$]

Auto-tuning automatically stores PID time constants upon termination. These PID time constants can then be modified by the user to suit their usage environment.

When auto-tuning is in progress, the AT lamp located on the front of the controller flashes in 1-second intervals. When auto-tuning finishes, the AT lamp automatically goes off and the auto-tuning parameter will return to oFF .

When auto-tuning is in progress and digital input [$\text{dI-1}, \text{dI-2}$] feature is RUN/STOP or AUTO/MANUAL, auto-tuning will be automatically ended, if concerned digital input is inputted or a sensor disconnection error occurs. (Restored the PID used prior to the auto-tuning session)

| Set value | Description |
|--------------|-----------------|
| oFF | Auto-tuning OFF |
| on | Auto-tuning ON |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|--------------------------|-----------------|------|
| PAr2 | Rt | oFF / on | oFF | - |

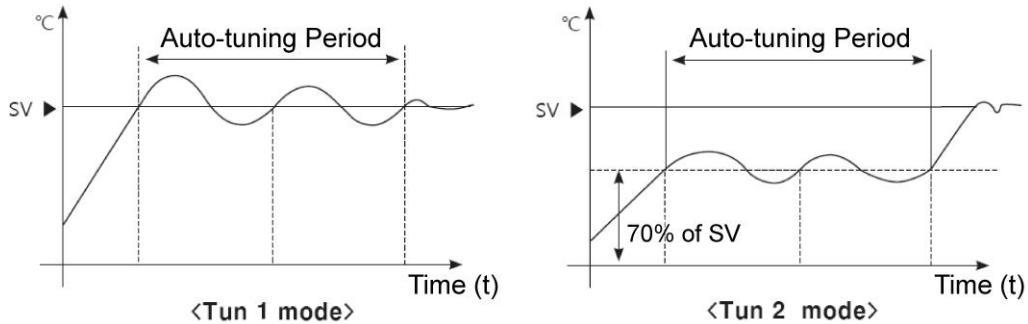


Note

- Auto-tuning continues to run even if the temperature reading exceeds or falls below the input range.
- When auto-tuning is in progress, parameters can only be referenced and not changed.
- Auto-tuning is not available in manual control.

6.3.4.2 Auto-tuning mode [PPr3 → Rr.t]

Auto-tuning is available in Tun1 MODE (SV) or Tun2 MODE (70% of SV), depending on the baseline value used.



| Set value | Description |
|-------------|---|
| TUn1 | Tun1 mode: Auto-tuning and calculates the PID time constant based on SV (set value). |
| TUn2 | Tun2 mode: Auto-tuning and calculates the PID time constant based on 70% of SV (set value). |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|-------------|-----------------|------|
| PPr3 | Rr.t | TUn1 / TUn2 | TUn1 | - |



Note

In cooling control mode, TUN2 Mode calculates 70% based at 0°C.

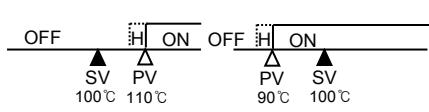
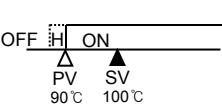
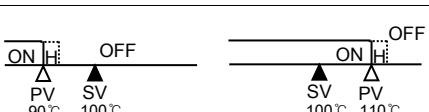
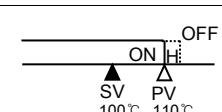
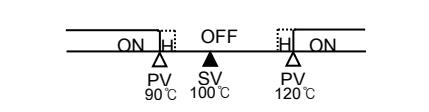
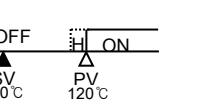
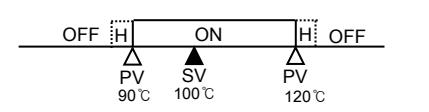
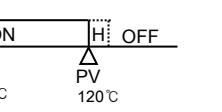
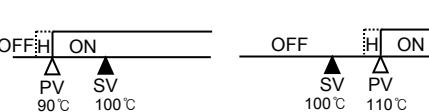
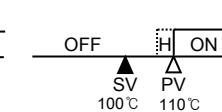
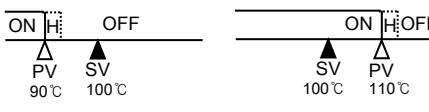
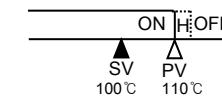
When SV=-100°C, TUN2 is performed at -70°C.

6.4 Alarm

This product has 3 alarms to operate individually when the value is too high or low. Alarm function is set by the combination of alarm mode and alarm option.
To clear alarm, use digital input function (setting as $RL.rE$) or turn the power OFF and ON.

6.4.1 Alarm operation [$PRr4 \rightarrow RL-1/RL-2/RL-3$]

You can set the alarm operation.

| Mode | Name | Operation | Description |
|-------------|--|--|--|
| OFF | - | - | No alarm output |
| duCC | Deviation high-limit alarm |   | If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON. Set deviation high-limit at $RL.1.H/RL.2.H/RL.3.H$. |
| JJdu | Deviation low-limit alarm |   | If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON. Set deviation low-temperature at $RL.1.L/RL.2.L/RL.3.L$. |
| JduC | Deviation high/low-limit alarm |   | If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON. Set deviation high-limit at $RL.1.H/RL.2.H/RL.3.H$. Set deviation low-temperature at $RL.1.L/RL.2.L/RL.3.L$. |
| CduC | Deviation high/low-limit reverse alarm |   | If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be OFF. Set deviation high-limit at $RL.1.H/RL.2.H/RL.3.H$. Set deviation low-temperature at $RL.1.L/RL.2.L/RL.3.L$. |
| PuCC | Absolute value high-limit alarm |   | If PV is equal as or higher than the absolute value, the output will be ON. Set absolute high-limit at $RL.1.H/RL.2.H/RL.3.H$. |
| JJPu | Absolute value low-limit alarm |   | If PV is equal as or lower than the absolute value, the output will be ON. Set absoulte low-limit at $RL.1.L/RL.2.L/RL.3.L$. |

| Mode | Name | Operation | Description |
|------|--------------------|-----------|--|
| LbR | Loop break alarm | - | It will be ON when it detects loop break. |
| SbR | Sensor break alarm | - | It will be ON when it detect sensor disconnection. |
| HbR | Heater break alarm | - | It will be ON when CT detects heater break. |

※H: Alarm output □ hysteresis [R□.HY]

| Parameter | Description |
|-----------|---------------------|
| RL - 1 | Select alarm 1 mode |
| RL - 2 | Select alarm 2 mode |
| RL - 3 | Select alarm 3 mode |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|------|
| PAr4 | RL - 1 | OFF / dUCC / JJDu / JDUU / Cdu / Pucc / JJPu / SbR / LbR / HbR | dUCC | - |
| | RL - 2 | | JJDu | - |
| | RL - 3 | | LbR | |

6.4.2 Alarm option [PAr4 → RL 1E / RL 2E / RL 3E]

Users can select the desired alarm output options.

| Set value | Option | Description |
|-----------|-----------------------------------|---|
| RL - A | Standard Alarm | If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF. |
| RL - b | Alarm latch ^{※1} | If it is an alarm condition, alarm output is ON and maintains ON status. (alarm output HOLD) |
| RL - c | Standby sequence1 ^{※2} | First alarm condition is ignored and from second alarm condition, standard alarm operates. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, standard alarm operates. |
| RL - d | Alarm latch and standby sequence1 | If it is an alarm condition, it operates both alarm latch and standby sequence. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, alarm latch operates. |
| RL - E | Standby sequence2 | First alarm condition is ignored and from second alarm condition, standard alarm operates. When re-supplied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, standard alarm operates. |
| RL - F | Alarm latch and standby sequence2 | Basic operation is same as alarm latch and standby sequence 1. It operates not only by power ON/OFF, but also alarm setting value, or alarm option changing. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, alarm latch operates. |

- Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Powr ON

- Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature (AL1, AL2, AL3) or alarm operation (AL-1, AL-2, AL-3), switching STOP mode to RUN mode

| Parameter | Description |
|-----------|-----------------------|
| AL 1.E | Select alarm 1 option |
| AL 2.E | Select alarm 2 option |
| AL 3.E | Select alarm 3 option |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|---|-----------------|------|
| PAr4 | AL 1.E | AL -R / AL -B / AL -C / AL -D / AL -E / AL -F | AL -R | - |
| | AL 2.E | | | - |
| | AL 3.E | | | |



Note

When selecting alarm output mode as LbR, SbR, HbR~ RL -C, RL -D options are not displayed.

6.4.3 Alarm output set value [PAr 1 → AL 1.L / AL 1.H / AL 2.L / AL 2.H / AL 3.L / AL 3.H]

You can set alarm output activation values. According to the selected alarm output mode, configuration parameters [AL □.H / AL □.L] will be activated for each setting.

| Parameter | Description |
|-----------|--|
| AL 1.L | Low limit value of alarm output 1. Reference value for determining heater break |
| AL 1.H | High-limit value of alarm output 1. |
| AL 2.L | Low limit value of alarm output 2. Reference value for determining heater break. |
| AL 2.H | High-limit value of alarm output 2. |
| AL 3.L | Low limit value of alarm output 3. Reference value for determining heater break. |
| AL 3.H | High-limit value of alarm output 3. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|---|-----------------------------------|------|
| PAr 1 | AL 1.H | - (temperature) high/low deviation: -F.S. to F.S. by each input type | Temperature : 1550 Analog : 100.0 | - |
| | AL 2.H | - (temperature) alarm absolute value: within display range of each input type | | |
| | AL 3.H | - (analog) high/low deviation value: - 1999 to 9999 within -F.S. to F.S. | | |
| | AL 1.L | - (analog) alarm absolute value: within display range of each input type | | |
| | AL 2.L | | | |
| | AL 3.L | | | |



Note

Changing the alarm output mode or options resets the settings to the highest or lowest values that will not trigger output in the new mode.

6.4.4 Alarm output hysteresis [$PAr4 \rightarrow A1.HY/A2.HY/A3.HY$]

- 'H' of operation group of '6.4.1 Alarm operation [$PAr4 \rightarrow AL-1/AL-2/AL-3$]' is alarm output hysteresis. You can set the interval between ON and OFF of alarm output.
- You can select it (Alarm1 Hysteresis/ Alarm2 Hysteresis/ Alarm3 Hysteresis) by each alarm.

| Parameter | Description |
|-----------|---|
| $A1.HY$ | Set interval between ON and OFF of alarm output 1 |
| $A2.HY$ | Set interval between ON and OFF of alarm output 2 |
| $A3.HY$ | Set interval between ON and OFF of alarm output 3 |

| Setting group | Parameter | Set range | Factory default | Unit | | |
|---------------|-----------|------------------------------------|-----------------|---|--|--|
| $PAr4$ | $A1.HY$ | Temperature H, analog: 00.1 to 100 | 00.1 | Temperature: °C/°F, Analog: Digit | | |
| | $A2.HY$ | Temperature L: 000.1 to 100.0 | | | | |
| | $A3.HY$ | | | | | |



Alarm output hysteresis is also applied as same during heater break alarm [HbR].

When alarm mode is loop break alarm [LbR] or sensor break alarm [SbR], this parameter is not displayed.

6.4.5 Alarm output contact type [$PAr4 \rightarrow A1.n/A2.n/A3.n$]

You can set realy contact type for alarm output.

| Set value | Description |
|-----------|---|
| no | Normally Open: Stays open when normal and closes in the event of an alarm. |
| nC | Normally Closed: Stays closed when normal and opens in the event of an alarm. |

| Parameter | Description |
|-----------|--|
| $A1.n$ | Select contact type for alarm output 1 |
| $A2.n$ | Select contact type for alarm output 2 |
| $A3.n$ | Select contact type for alarm output 3 |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|-----------|-----------------|------|
| $PAr4$ | $A1.n$ | no / nC | no | - |
| | $A2.n$ | | | |
| | $A3.n$ | | | |

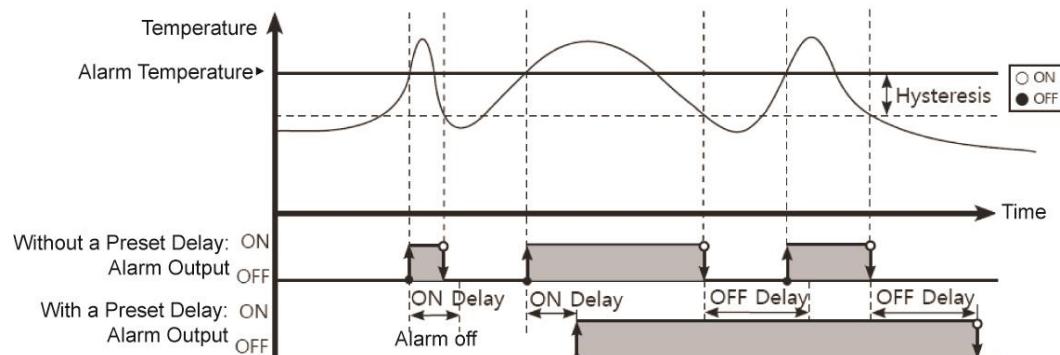
Front indicator operations

| Set value | Alarm | Alarm output | Front indicators |
|------------------------|-------|--------------|--|
| no (Normally Open) | OFF | Open | <input type="checkbox"/> OFF |
| | ON | Close | <input checked="" type="checkbox"/> ON |
| nC (Normally Closed) | OFF | Close | <input type="checkbox"/> OFF |
| | ON | Open | <input checked="" type="checkbox"/> ON |

6.4.6 Alarm output delay time [PRr4 → A1.on/A1.of/A2.on/A2.of/A3.on/A3.of]

Alarm output delay can be set to prevent false alarms caused by erroneous input signals resulting from disturbances or noise.

With a preset delay time, alarm output does not turn on for the preset duration. Instead, the concerned alarm indicator on the front flashes in 0.5-second intervals.



| Parameter | Description |
|-----------|--|
| A1.on | Alarm Output 1 On Delay: Stands by for the preset duration upon an alarm event, checks the alarm trigger conditions, and turns on the alarm output if the conditions are still present. |
| A1.of | Alarm Output 1 Off Delay. Stands by for the preset duration following alarm output off, checks the alarm trigger conditions, and turns off the alarm output if the clear conditions are still present. |
| A2.on | Alarm Output 2 On Delay. Stands by for the preset duration upon an alarm event, checks the alarm trigger conditions, and turns on the alarm output if the conditions are still present. |
| A2.of | Alarm Output 2 Off Delay. Stands by for the preset duration following alarm output off, checks the alarm trigger conditions, and turns off the alarm output if the clear conditions are still present. |
| A3.on | Alarm Output 3 On Delay. Stands by for the preset duration upon an alarm event, checks the alarm trigger conditions, and turns on the alarm output if the conditions are still present. |
| A3.of | Alarm Output 3 Off Delay. Stands by for the preset duration following alarm output off, checks the alarm trigger conditions, and turns off the alarm output if the clear conditions are still present. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--------------|-----------------|------|
| PRr4 | A1.on | 0000 to 3600 | 0000 | sec. |
| | A1.of | | 0000 | sec. |
| | A2.on | | 0000 | sec. |
| | A2.of | | 0000 | sec. |
| | A3.on | | 0000 | sec. |
| | A3.of | | 0000 | sec. |

6.4.7 Loop break alarm (LBA) [*PAr4* → *RL-1/RL-2/RL-3* → *LbA*]

Diagnoses the control loop by monitoring the control subject's temperature changes and sends out alarms if necessary.

- Heating control: When control output MV is 100% or high limit [*H-ñu*] and PV is not increased over than LBA detection band [*LbA.b*] during LBA monitoring time [*LbA.t*], or when control output MV is 0% or low limit [*L-ñu*] and PV is not decreased below than LBA detection band [*LbA.b*] during LBA monitoring time [*LbA.t*], alarm output turns ON.
- Cooling control: When control output MV is 0% or low limit [*L-ñu*] and PV is not increased over than LBA detection band [*LbA.b*] during LBA monitoring time [*LbA.t*], or when control output MV is 100% or high limit [*H-ñu*] and PV is not decreased below than LBA detection band [*LbA.b*] during LBA monitoring time [*LbA.t*], alarm output turns ON.

Main causes of LBA output ON

- Sensor error (disconnection, short)
- External controller error (magnet, auxiliary relay, etc)
- External load error (heater, cooler, etc)
- Wrong connection and disconnection of external devices



Note

Set alarm output mode [*RL-□*] as loop break alarm [*LbA*] and you can use loop break alarm.

When executing auto-tuning, LBA detection band [*LbA.b*] and LBA monitoring time [*LbA.t*] are automatically set by auto-tuning value.

In case of AT (auto-tuning)/manual control/stop control, loop break alarm [*LbA*] does not operates. When alarm reset is input, it initializes LBA monitoring start time.

6.4.7.1 LBA monitoring time [*PAr4* → *LbA.t*]

You can set the LBA monitoring time to check changes in the control subject's temperature. It is set automatically when executing Auto-tuning.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|--------------|--------------|-----------------|------|
| <i>PAr4</i> | <i>LbA.t</i> | 0000 to 9999 | 0000 | sec. |

6.4.7.2 LBA detection band [PAr4 → LBAb]

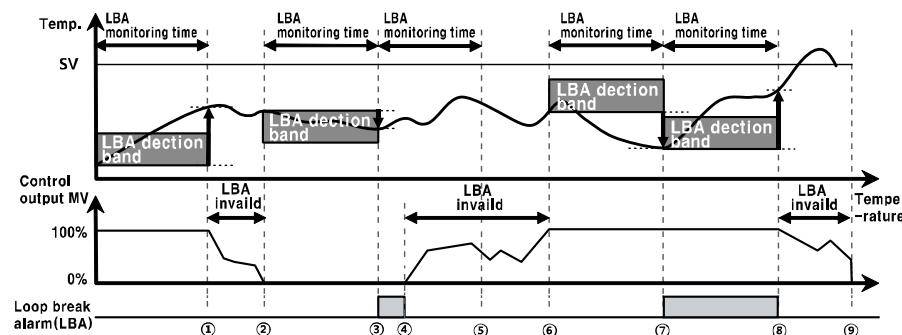
You can set the minimum value of deviation change to decrease during LBA monitoring time. It is set automatically when executing Auto-tuning.

| Setting group | Parameter | Set range | | Factory default | Unit |
|---------------|-----------|---------------|----------------|-----------------|-------|
| PAr4 | LBAb | Temperature H | 000 to 999 | 003 | °C/°F |
| | | Temperature L | 000.0 to 999.9 | 003.0 | °C/°F |
| | | Analog | 00.00 to 99.99 | 00.20 | %FS |



Ex.

For heating control(cooling control), when control output MV is 100%(0% for cooling control) and PV is not increased over than LBA detection band [LBAb] during LBA monitoring time [LBAt], or when control output MV is 0%(100% for cooling control) and PV is not decreased below than LBA detection band [LBAb] during LBA monitoring time [LBAt], alarm output turns ON.



| | |
|-----------------------|--|
| Start to control to ① | When control output MV is 100%, PV is increased over than LBA detection band [LBAb] during LBA monitoring time [LBAt]. |
| ① to ② | The status of changing control output MV (LBA monitoring time is reset.) |
| ② to ③ | When control output MV is 0% and PV is not decreased below than LBA detection band [LBAb] during LBA monitoring time [LBAt], loop break alarm (LBA) turns ON after LBA monitoring time. |
| ③ to ④ | Control output MV is 0% and loop break alarm (LBA) turns and maintains ON. |
| ④ to ⑥ | The status of changing control output MV (LBA monitoring time is reset.) |
| ⑥ to ⑦ | When control output MV is 100% and PV is not increased over than LBA detection band [LBAb] during LBA monitoring time [LBAt], loop break alarm (LBA) turns ON after LBA monitoring time. |
| ⑦ to ⑧ | When control output MV is 100% and PV is increased over than LBA detection band [LBAb] during LBA monitoring time [LBAt], loop break alarm (LBA) turns OFF after LBA monitoring time. |
| ⑧ to ⑨ | The status of changing control output MV (LBA monitoring time is reset.) |

6.4.8 Sensor break alarm [$PAr\ 4 \rightarrow RL - 1/RL - 2/RL - 3 \rightarrow SbR$]

You can set the controller to send out an alarm when a sensor is not connected or disconnected during temperature control. Sensor break can be confirmed through an external alarm output contact, such as a buzzer or similar devices.

Set alarm output mode [$RL - \square$] as SbR , sensor break alarm operates.



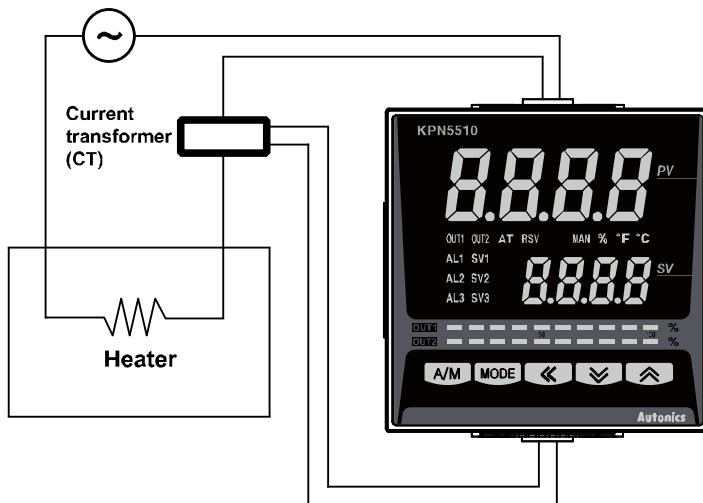
Note

Alarm output option can be set to standard alarm [$RL - R$] or alarm latch [$RL - b$].

6.4.9 Heater break alarm [$PAr\ 4 \rightarrow RL - 1/RL - 2/RL - 3 \rightarrow HbR$]

When using a heater to raise the temperature of the control subject, the temperature controller can be set to detect heater disconnection and send out an alarm by monitoring power supply to the heater.

Heater disconnection is detected by the controller using a current transformer (CT), which converts the current to the heater to a specific ratio (CT ratio) for monitoring. If the heater current value [$CT - R$] measured by the C.T. is less than the heater detection setting value [$RL \square.L$], the heater break alarm operates.



Note

- Heater break detection only takes place when the temperature controller's output is turned on. Otherwise, heater burnout will not be detected by the controller.
- Detection is only available in models with switching output (Relay contact output, SSR standard drive output). Models with linear output (current, SSR cycle/phase output) cannot detect.
- Current detection is not performed if OUT1's control output time is less than 250 ms.
- It is recommended to use the current transformer (CSTC-E80LN, CSTC-E200LN, sold separately).
- You can select the alarm option between standard alarm [$RL - R$] or alarm latch [$RL - b$].

6.4.9.1 Heater break detection value [PAr I → RL 1.L / RL 2.L / RL 2.L]

Set the alarm output value [RL □.L] as the reference value for heater burnout detection.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--------------|-----------------|------|
| PAr I | RL 1.L | 00.0 to 50.0 | 00.0 | A |
| | RL 2.L | | | |
| | RL 3.L | | | |



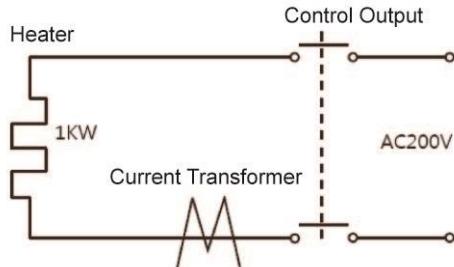
Note

Set to 00.0 for OFF. Set to 50.0 for ON.

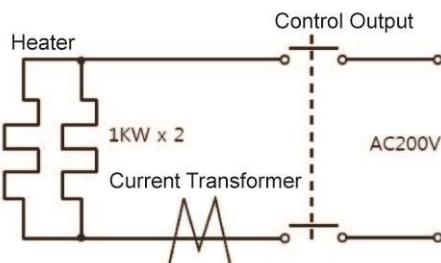


Ex.

Heater break set value = {(Normal heater current) + (Heater break current)}/2



If using a single output heater (capacity: 200 VAC, 1 KW, 5 A), normal heater current is 5 A, and burnout heater current is 0 A, the setting value is calculated as $(5 \text{ A} + 0 \text{ A})/2 = 2.5 \text{ A}$. Therefore, heater current values less than 2.5 A will be deemed heater burnout and the alarm will activate.



When two output heaters (capacity: 200 VAC, 1 KW, 5 A) are used, normal heater current is 10 A ($5 \text{ A} \times 2 \text{ EA}$). If a single heater burns out, the heater current becomes 5 A. The setting value is calculated as $(10 \text{ A} + 5 \text{ A})/2 = 7.5 \text{ A}$. Heater current values of less than 7.5 A are deemed heater burnout and the alarm activates.

6.4.10 Alarm output clear [$PAr5 \rightarrow dI - E \rightarrow AL.rE$]

Available only if alarm output option is set to alarm latch or alarm latch and standby sequence1, alarm latch and standby sequence2. It can be set to turn off alarm output when alarm output is on, alarm output conditions have been removed, or an alarm output clear signal that is greater than the minimal signal band is received. (However, alarm output clear is unavailable when alarm conditions remain in effect.)

You can assign the front panel's digital input key or the digital input terminals (DI-1, DI-2) for the alarm output deactivation feature.

(1) Clear alarm output by digital input key

If the digital input key has been assigned for alarm output deactivation and the alarm output option is set to alarm latch or alarm latch and standby sequence, press and hold the front ▼ and ▲ keys when alarm output is on.

(2) Clear alarm output by digital input terminal (DI)

When the digital input (DI) terminal is assigned to forced alarm (output) off, the alarm output clears when digital input (DI) terminal goes into the on state (close). (MAN lamp on).



Note

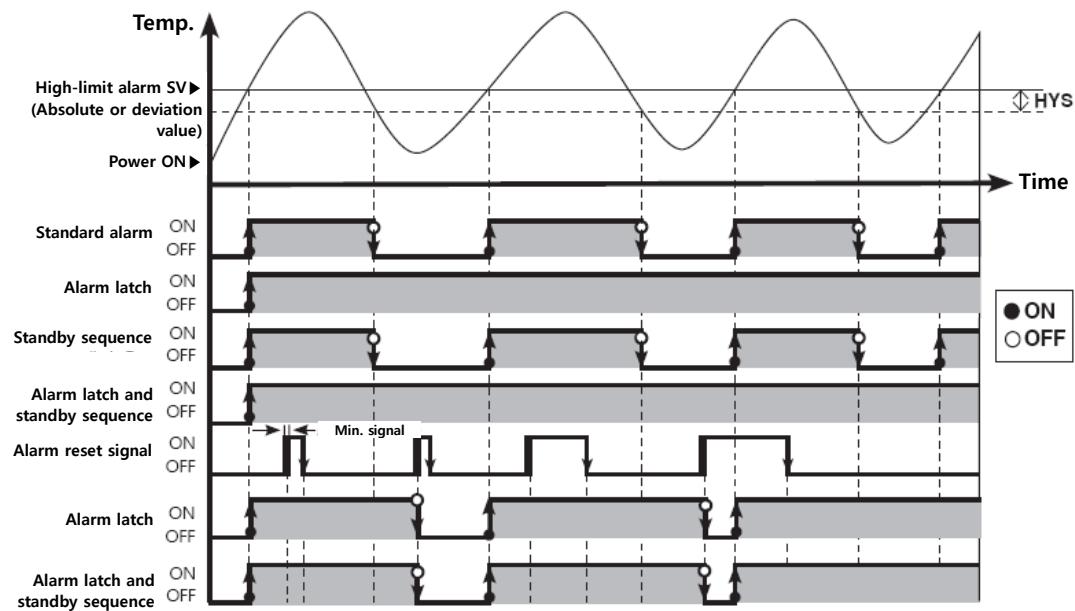
For more information of digital input key, refer to '6.7.4.2 Digital input key'.

For more information of digital input terminal(DI), refer to '6.7.4.1 Digital input terminal function [$PAr5 \rightarrow dI - 1/dI - 2$]'.

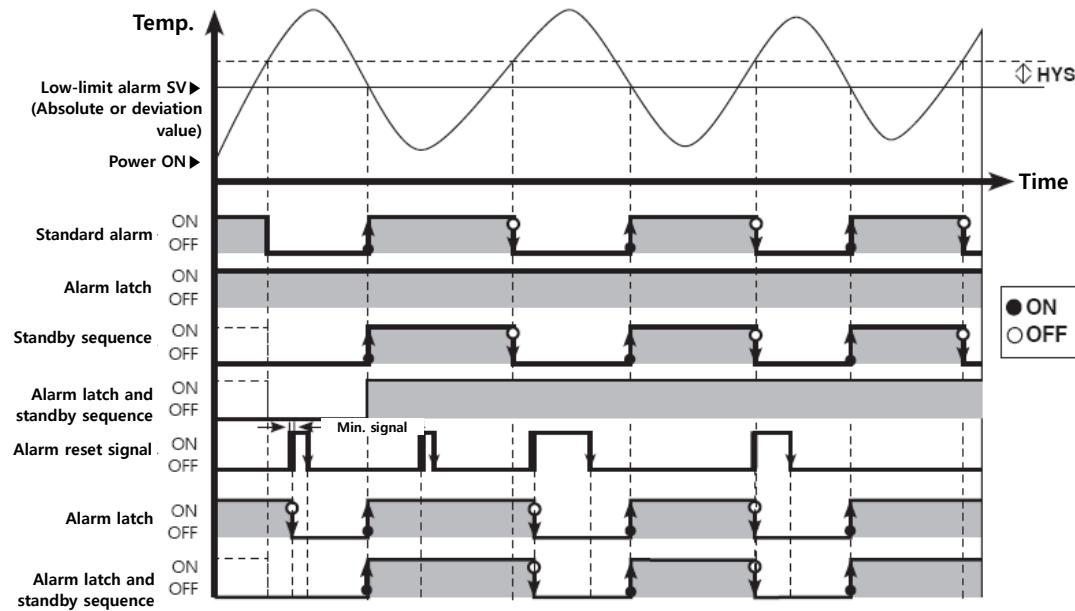
After clearing alarm output, alarm output operates normally at the next alarm output ON.

6.4.11 Alarm output operation

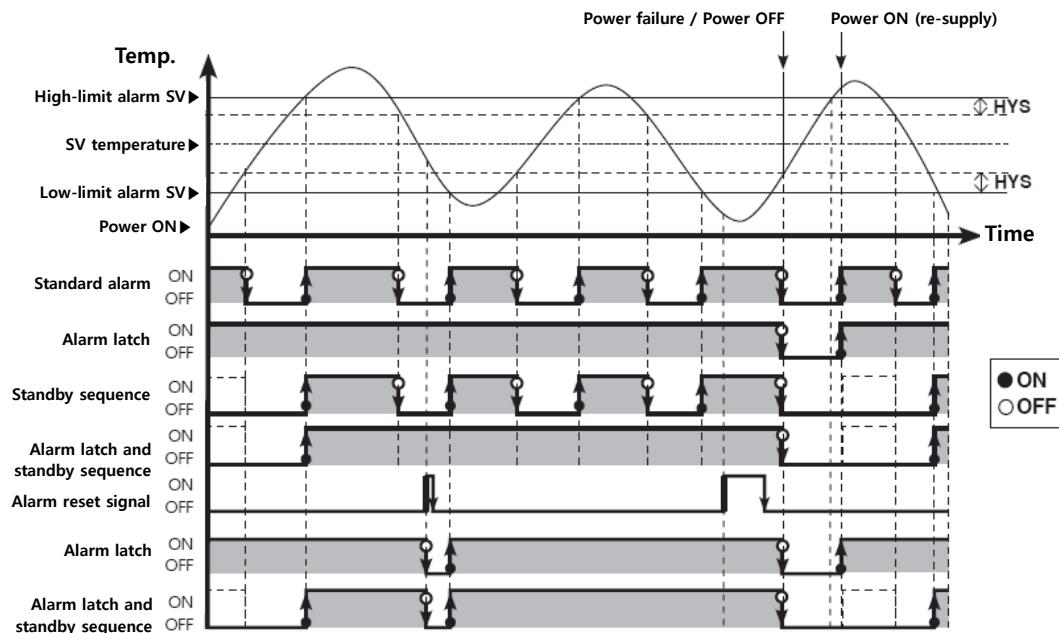
6.4.11.1 Absolute value high-limit alarm and deviation high-limit alarm



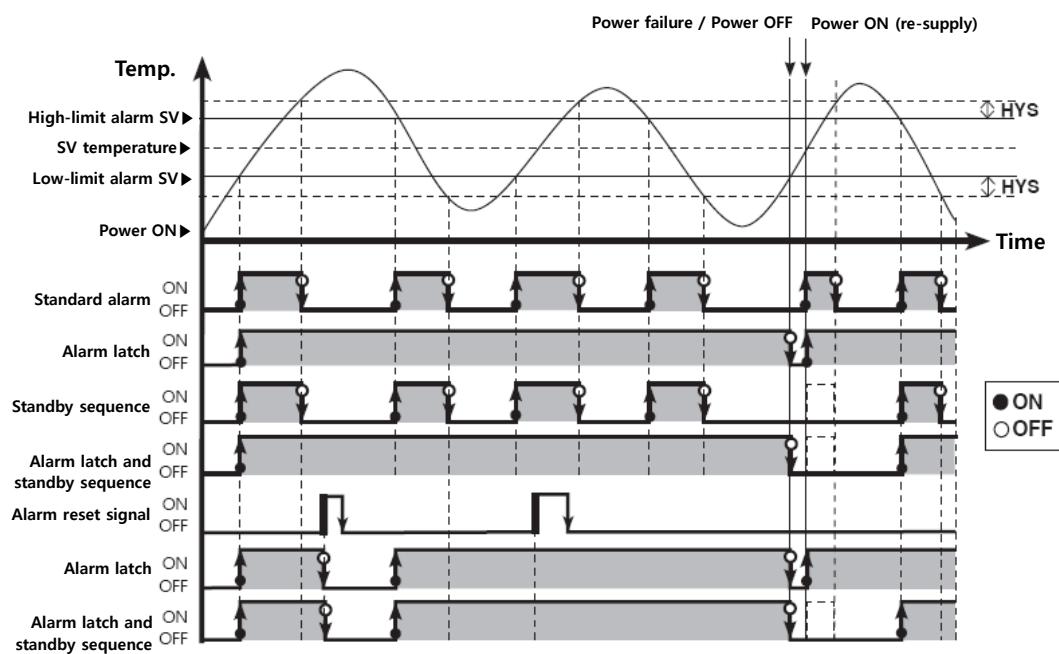
6.4.11.2 Absolute value low-limit alarm and deviation low-limit alarm



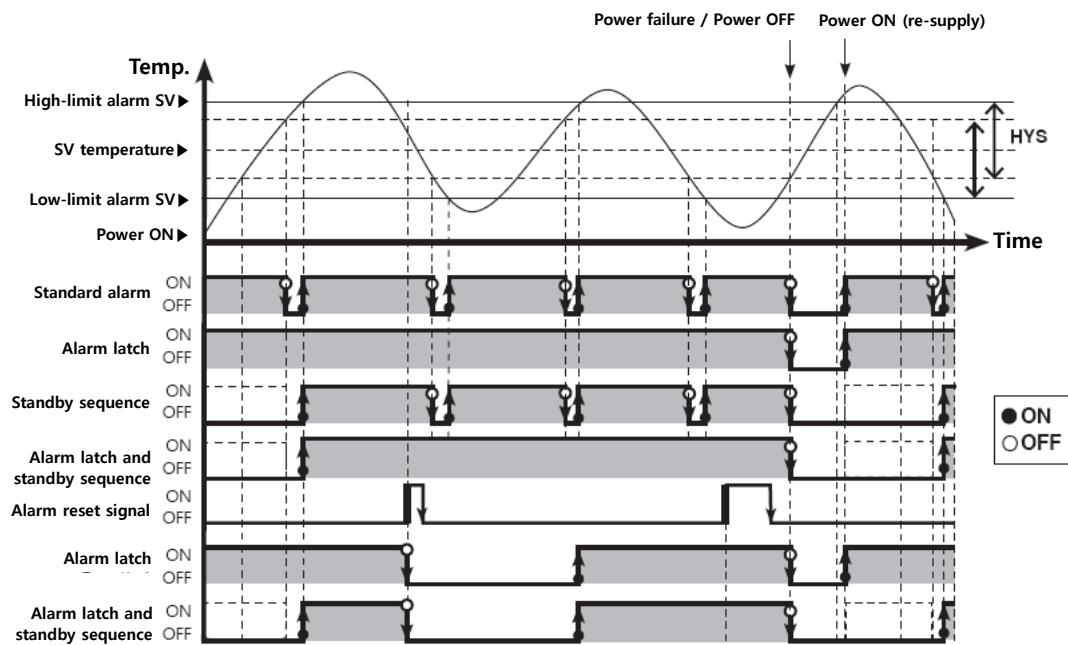
6.4.11.3 Deviation high/low-limit alarm



6.4.11.4 Deviation high/low-limit reverse alarm



6.4.11.5 Deviation high/low-limit alarm (hysteresis overlap)



6.5 Analog transmission

6.5.1 Analog transmission output value [$P_{Ar4} \rightarrow A_o-\bar{n}$]

Transmission output is a type of auxiliary output that converts the controller's PV, SV, H-MV, and C-MV to analog current (DC 4 to 20 mA) for external transmission.

| Set value | Description | | |
|---------------|--------------------------------|--|--|
| P_u | PV transmission output | | |
| S_u | SV transmission output | | |
| $H-\bar{n}_u$ | Heating MV transmission output | | |
| $C-\bar{n}_u$ | Cooling MV transmission output | | |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|---------------|---|-----------------|------|
| P_{Ar4} | $A_o-\bar{n}$ | $P_u / S_u / H-\bar{n}_u / C-\bar{n}_u$ | P_u | - |



Note

This parameter is displayed in transmission output models only..

Transmission output is constant current output. Too great a resistance from the load can cause the output value to change. There is no optional output below 4 mA or above 20 mA.

6.5.2 Transmission output high/low-limit value [$P_{Ar4} \rightarrow F5-L/F5-H$]

If the transmission output value ($A_o-\bar{n}$) is below the transmission output lower limit ($F5-L$), 4 mA output will be provided. If the transmission output is between the lower limit ($F5-L$) and upper limit ($F5-H$), a certain proportional output within the range 4 mA and 20 mA will be provided. If it is above the upper limit ($F5-H$), 20 mA output will be provided.

| Set value | Description | | |
|-----------|---|--|--|
| $F5-L$ | Transmission output (4mA) low-limit value setting | | |
| $F5-H$ | Transmission output (20mA) high-limit value setting | | |

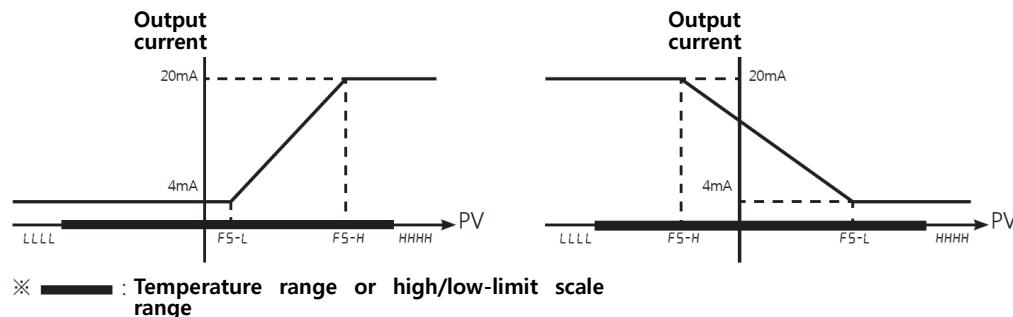
| Setting group | Parameter | Set range | | Factory default | Unit | |
|---------------|-----------|---------------------------|--|-----------------|-------|--|
| P_{Ar4} | $F5-L$ | P_u | Temperature: temperature range Analog: High/Low scale range | -200 | Digit | |
| | | S_u | SV low-limit value [$L-S_u$] to SV high-limit value [$H-S_u$] | | | |
| | | $H-\bar{n}_u/C-\bar{n}_u$ | 000.0 to 100.0 | | | |
| | $F5-H$ | P_u | Temperature: temperature range Analog: High/Low scale range | 1350 | | |
| | | S_u | SV low-limit value [$L-S_u$] to SV high-limit value [$H-S_u$] | | | |
| | | $H-\bar{n}_u/C-\bar{n}_u$ | 000.0 to 100.0 | | | |

**Note**

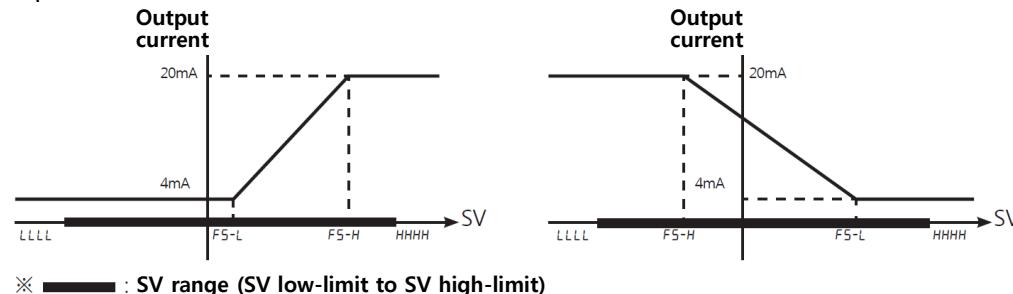
If transmission output high limit ($F5-H$) is transmission output low limit ($F5-L$), the transmission output is 4 mA.

(1) Present value (PV) transmission output

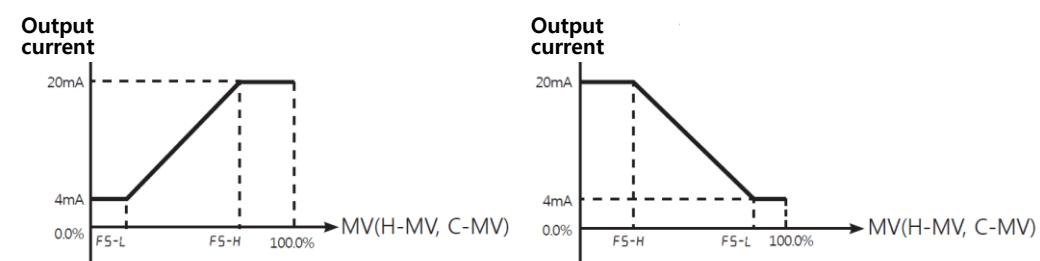
PV within sensor range or high/low limit scale can be converted and transmitted as current within the range of 4 mA and 20 mA.

**(2) Set value(SV) transmission output**

SV within sensor range or high/low limit scale can be converted and transmitted as current within the range of 4 mA and 20 mA. When ramp is in effect, ramp SV is transmitted step by step.

**(3) Heating MV/Cooling MV transmission output**

You can convert 0 to 100% of heating [$H - \bar{n}_u$] /cooling MV [$C - \bar{n}_u$] into 4 to 20 mA current.



6.6 Communication

This feature is used for external higher systems (PC, GP, etc.) to set the controller's parameters and to monitor the controller. It can also be used to transmit data to external devices.

No redundant unit addresses may exist along the same communication line. The communication cable must be twisted pair that supports RS485.

- Interface

| Item | Description |
|------------------------|---|
| Standard | Compliance with EIA RS485 |
| Max. connections | 31 units (address: 01 to 127) |
| Communication method | 2-wire half duplex |
| Synchronization method | Asynchronous |
| Communication distance | Within max. 800m |
| Communication speed | 2400, 4800, 9600, 19200, 38400 bps |
| Response wait time | 5 to 99ms |
| Start bit | 1bit (fixed) |
| Data bit | 8bit (fixed) |
| Parity bit | None, Even, Odd |
| Stop bit | 1, 2bit |
| Protocol | Modbus RTU (Character = 11Bit as fixed) |



Note

You could modify the parameter (first in, first out) using keys during communication connection, but this may lead to errors and malfunctions.

6.6.1 Communication address [PR4 → Adr5]

Set the address for data communication.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|-----------|-----------------|------|
| PR4 | Adr5 | 01 to 127 | 01 | - |

6.6.2 Communication speed [PR4 → bPS]

Set the transmission speed (bps) for data communication.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|------|
| PR4 | bPS | 24(2400bps) / 48(4800bps) / 96(9600bps) / 192(19200bps) / 384(38400bps) | 96 | bps |

6.6.3 Communication parity bit [PAr4 → PrtY]

Parity bit is a data communication method that adds one additional bit to each character in transmitted data as an indicator used to verify data loss and corruption. This parameter is used to enable or disable the parity bit option.

| Set value | Description |
|-------------|--|
| <i>nonE</i> | Not set parity bit |
| <i>EuEn</i> | Set total bit with signal value of “1” as even numbers |
| <i>odd</i> | Set total bit with signal value of “1” as odd numbers |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--------------------------|-----------------|------|
| PAr4 | PrtY | <i>nonE / EuEn / odd</i> | <i>nonE</i> | - |

6.6.4 Communication stop bit [PAr4 → StP]

You can set the number of bits to mark the end of a transmitted data string.

| Set value | Description |
|-----------|-----------------------------------|
| <i>1</i> | Set end of data string to 1 bit. |
| <i>2</i> | Set end of data string to 2 bits. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--------------|-----------------|------|
| PAr4 | StP | <i>1 / 2</i> | <i>2</i> | bit |

6.6.5 Communication response waiting time [PAr4 → rSv.E]

Set a standby time to mitigate communication errors when communicating with a slow master device (PC, PLC, etc.). Once a standby time is set, the controller will respond after the defined standby time.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|-----------------|-----------------|------|
| PAr4 | rSv.E | <i>05 to 99</i> | <i>20</i> | ms |



Note

Shorter standby times can cause communication errors in the master device.

6.6.6 Enable/Disable communication write [*PAr4*→*Coñy*]

This feature can change parameter settings stored in memory through communication with PC, GP, PLC, etc., in order to permit or prohibit writing.

| Set value | Description |
|---------------|--|
| <i>En.R</i> | Parameter set/change enable by communication. |
| <i>dl S.R</i> | Prohibit parameter setting or modification by communication. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|----------------------|-----------------|------|
| <i>PAr4</i> | <i>Coñy</i> | <i>En.R / dl S.R</i> | <i>En.R</i> | - |

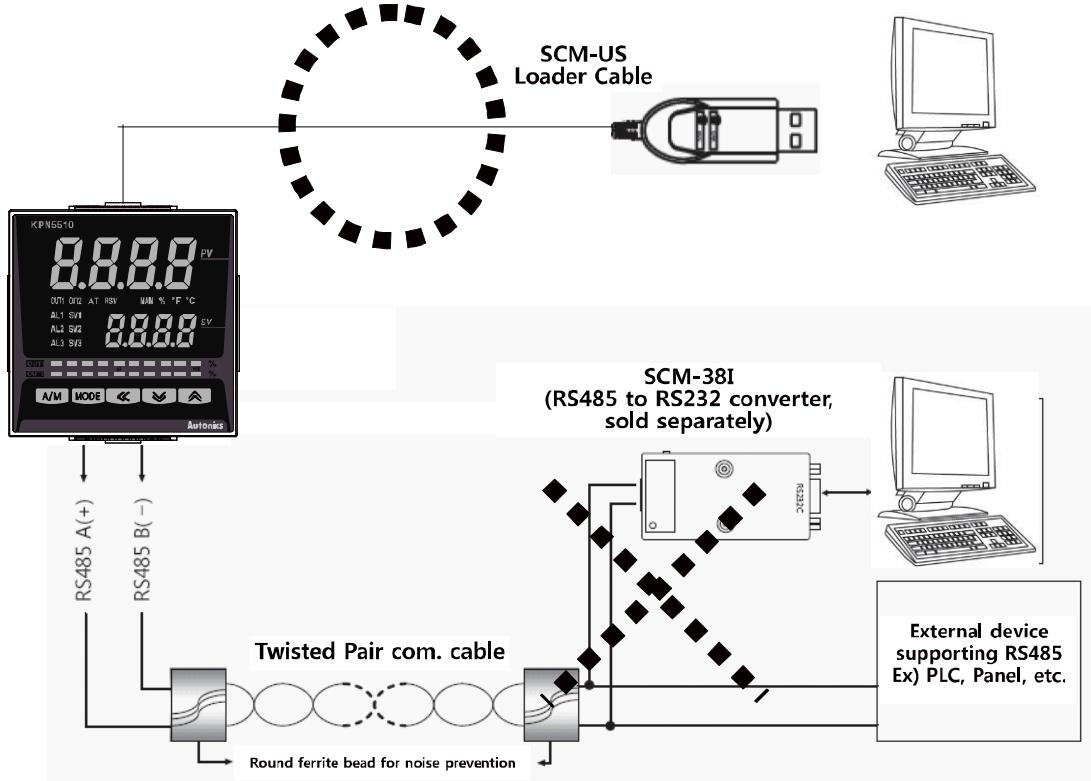


Note

Reading parameter settings is always available even in disable communication write.

6.6.7 USB to Serial connection

Data can be transmitted by SCM-US(USB to Serial converter, sold separately). However, RS485 communication through a USB-to-serial connection is blocked by hardware.



6.7 Additional Features

6.7.1 Monitoring

Refer to the '5.2.3 MV Monitoring and Manual Control Setting'.

6.7.1.1 Control output MV monitoring

Monitors and displays the current control output MV.

6.7.1.1.1 Heating MV monitoring

Displays the current heating MV during heating control or heating and cooling control. Users may manually adjust the MV to control the temperature.

- Measurement range: H 0.0 to H 100 (Unit%)



Note

It can display MV with a moving decimal point [H99.9 → H 100].

6.7.1.1.2 Cooling MV monitoring

Displays the current cooling MV during cooling control or heating and cooling control. Users may manually adjust the MV to control the temperature.

- Measurement range: C 0.0 to C 100 (Unit%)



Note

It can display MV with a moving decimal point [C99.9 → C 100].

6.7.1.2 Heater current value monitoring [PAr I → Ct-R]

A feature that monitors and displays the current of a heater (load) being controlled by control output.

| Setting group | Parameter | Measurement range | Unit |
|---------------|-----------|-------------------|------|
| PAr I | Ct-R | 0.0 to 50.0 | A |



Note

Heater (load) current value is measured by a current transformer (CT) and is displayed.

6.7.2 RUN/STOP [*PAr 1 → r - 5*]

Users can run or stop control output by force while in Run mode

The stop command stops control output. Auxiliary output, however, is not affected by the command.

This feature can be enabled by configuring parameters. In addition, the front panel's digital input keys () and digital input terminals (DI-1 and DI-2) can be assigned to the run/stop feature.

| Set value | Description |
|-------------|---|
| <i>rUn</i> | Forced control output run in Stop mode. |
| <i>StoP</i> | Forced control output stop in Run mode. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|--------------|-------------------|-----------------|------|
| <i>PAr 1</i> | <i>r - 5</i> | <i>rUn / StoP</i> | <i>rUn</i> | - |



Note

With stop enabled, the front panel's SV display indicates *StoP*.

The stop status will remain in effect after turning OFF the power and re-supplying the power. When stop is in effect, STOP MV [*St.ñu*] is output. In case of a sensor break occurring while in STOP, STOP MV [*St.ñu*] is output.

The run/stop setting remains in effect after re-supplying power. If the Digital Input [*dI - 1, dI - 2*] feature has been set for RUN/STOP, RUN/STOP feature by modifying front keys or parameter is unable.

6.7.2.1 STOP, control output [*PAr 5 → St.ñu*]

This parameter sets the control output value when in the stop state. With ON/OFF control, select between **100.0** (ON) and **000.0** (OFF). With PID control, the user can adjust the MV between **000.0** and **100.0**.

| Setting group | Parameter | Set range | | | Factory default | Unit |
|---------------|--------------|---------------------------|----------------|---|-----------------|------|
| <i>PAr 5</i> | <i>St.ñu</i> | Standard control | ON/OFF control | 000.0 (OFF)/ 100.0 (ON) | 000.0 | % |
| | | | PID control | 000.0 to 100.0 | 000.0 | |
| | | Heating & Cooling control | ON/OFF control | -100.0 (cooling ON) 000.0 (OFF) 100.0 (heating ON) | 000.0 | |
| | | | PID control | -100.0 (cooling) to 100.0 (heating) | 000.0 | |



Note

Ignores MV from ON/OFF control or PID control and sends out a control value based on the defined MV.

6.7.2.2 STOP, alarm output [*PAr5* → *St.RL*]

You can set alarm output for STOP.

| Set value | Description |
|-------------|--|
| oFF | Alarm output ceases along with a stop under all conditions. (However, reverting to Run mode after a stop in alarm latch or alarm latch and standby sequence restores the alarm output to the previous state.) |
| Cont | Alarm output continues regardless of control operation. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|------------|--------------------------|-----------------|------|
| <i>PAr1</i> | <i>r-5</i> | <i>Cont</i> / <i>oFF</i> | <i>Cont</i> | - |

6.7.3 Multi SV

Multi SV function allows users to set multiple SVs [*ñt.5u*] and save each setting in *Su0* to *Su3*. Users can change *Su-n* or select desired SV using external DI (Digital Input, DI-1, DI-2) terminals.

This feature supports up to four SVs which can be independently configurable.

6.7.3.1 Number of multi SV [*PAr5* → *ñt.5u*]

This parameter sets the number of Multi SVs. Select the number of Multi SVs required by the control subject.

| Number of SVs | SV set |
|---------------|-------------------------|
| 1 EA | SV-0 |
| 2 EA | SV-0, SV-1 |
| 4 EA | SV-0, SV-1, SV-2, SV-3, |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|--------------|--------------------------------|-----------------|------|
| <i>PAr5</i> | <i>ñt.5u</i> | <i>1</i> / <i>2</i> / <i>4</i> | <i>1</i> | EA |



Note

If the Digital Input [*dl* - *1*, *dl* - *2*] feature has been set for multi SV [*ñt.5u*], the number of Multi SV [*ñt.5u*] is not modified by pressing a key or communication.

6.7.3.2 Multi SV number selection [PRr 1 → Su-n]

You can set the SV(set value) number to be controlled.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|---------------------------|-----------------|------|
| PRr 1 | Su-n | Su-0 / Su-1 / Su-2 / Su-3 | Su-0 | - |

**Note**

The range of figures assigned to each SV (SV No.) varies depending on the number of Multi SVs [\bar{n} to $\bar{5}$] setting.

6.7.3.3 Multi SV set value [PRr 1 → Su-0/Su-1/Su-2/Su-3]

Set the desired set value of multi SV individually.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|-----------|
| PRr 1 | Su-0 | SV low-limit [$L-Su$] to SV high-limit [$H-Su$] | 0 | °C, °F, - |
| | Su-1 | | 0 | |
| | Su-2 | | 0 | |
| | Su-3 | | 0 | |

6.7.4 Digital input

6.7.4.1 Digital input terminal function [PRr5 → DI - 1/DI - 2]

By connecting an external input to a digital input terminal, you can perform preset digital input terminal functions.

| Set value | Description |
|-----------|--------------------------------|
| OFF | No function. |
| Stop | Run/Stop |
| AL.rE | Forced alarm output clear |
| MRn | Auto/Manual control selection. |
| MT.SV | Multi SV selection. |

In the case one of DI-1 or DI-2 being set for Multi SV[MT.SV], SV-0 is selected as the SV if the terminal's external contact signal is off and SV-1 is selected if the signal is on.

If both DI-1 and DI-2 are configured for Multi SV[MT.SV], you can select the SV using combinational logic of the terminals. If multi SV [MT.SV] are changed from 4 to 2, DI-2 will be turned OFF automatically, changed from 4 to 1, both DI-1 and DI-2 will be turned OFF or changed from 2 to 1, concerned DI will be OFF.

| DI-1 | DI-2 | Multi SV NO |
|------|------|-------------|
| OFF | OFF | SV-0 |
| ON | OFF | SV-1 |
| OFF | ON | SV-2 |
| ON | ON | SV-3 |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|----------------------------------|-----------------|------|
| PRr5 | DI - 1 | OFF / Stop / AL.rE / MRn / MT.SV | Stop | - |
| | DI - 2 | | AL.rE | |



Note

When powered on, digital input feature checks always the settings of terminal input.

Multi SV parameter will be activated only if Multi SV is more than 2.

This digital input terminal function operates regardless with lock and password set.

6.7.4.2 Digital input key

With digital input key enabled in Run mode, press and hold  keys at the same time for three seconds to activate the preset function.

6.7.4.2.1. Digital input key function [PAr5 → dI - E]

In order to use the digital input key feature, each function has to be first assigned to the keys.

| Set value | Description |
|--------------|---------------------------|
| StoP | Run/Stop |
| AL.rE | Forced alarm output clear |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|---------------|---------------------|-----------------|------|
| PAr5 | dI - E | StoP / AL.rE | StoP | - |



Note

If digital input key and digital input terminal set same, digital input key does not act.

6.7.4.2.2. Digital input key usage

Press the digital input keys on the front panel to execute the function assigned to the keys.

When in Run mode, press and hold  keys to execute the assigned function (run/stop or alarm output deactivation).



Note

If the same function is assigned to a digital input key and the digital input terminal, activation takes place as an "or" function and deactivation as an "and" function. (except Multi SV feature of digital input terminals)

Digital input key functions operate irrespective of password set.

6.7.5 Error

The controller diagnoses input signals for errors and displays messages accordingly. These messages inform the user of device problems.

| Message | Input | Description | Output |
|---------|--------------------|--|--|
| HHHH | Temperature sensor | Flashes at 0.5-second intervals if the input value is above the input range. | Standard type: Heating: 0%, Cooling: 100% Heating&Cooling: Heating: 0%, Cooling: 100% |
| | Analog | Flashes at 0.5-second intervals if the input value is over 5 to 10% of high limit or low limit value. | Normal output |
| LLLL | Temperature sensor | Flashes at 0.5-second intervals if the input value is below the input range. | Standard type: Heating: 100%, Cooling: 0% Heating&Cooling: Heating: 100%, Cooling: 0% |
| | Analog | Flashes at 0.5-second intervals if the input value is over 5 to 10% of low limit or high limit value. | Normal output |
| OPEN | Temperature sensor | Flashes at 0.5-second intervals in the event of an input disconnection. | Outputs the set MV at ErMV |
| | Analog | Flashes at 0.5-second intervals if F.S. is over $\pm 10\%$. | |
| ERR | Temperature sensor | Flashes at 0.5-second intervals if there is error for setting and it returns to the error-before screen. | - |
| | Analog | | |

When input value returns to the input range, alarm is deactivated and it operates normally.



Note

When supplying power or in standard control state, for heating control, if HHHH is displayed, it outputs 0%. If LLLL is displayed, it outputs 100%. For cooling control, if HHHH is displayed, it outputs 100%. If LLLL is displayed, it outputs 0%.

When supplying power or in standard control state, for heating & cooling control, if HHHH is displayed, it outputs 0% for heating, 100% for cooling. If LLLL is displayed, it outputs 100% for heating, 0% for cooling.

6.7.5.1 MV for sensor break error [oPEn] [PAr5 → Er.nu]

In the event of a sensor open error you can set control output value to predefined MV instead of ON/OFF control or PID control.

Ignores MV by ON/OFF control or PID control, and sends out a control value based on the defined MV.

| Setting group | Parameter | Set range | | | Factory default | Unit |
|---------------|--------------|---------------------------|----------------|--|-----------------|------|
| PAr5 | Er.nu | Standard control | ON/OFF control | 000.0(OFF)/100.0(ON) | 000.0 | % |
| | | | PID control | 000.0 to 100.0 | 000.0 | |
| | | Heating & Cooling control | ON/OFF control | -100.0(coolingON) /000.0(OFF) /100.0(heating ON) | 000.0 | |
| | | | PID control | -100.0 (cooling) to 100.0(heating) | 000.0 | |

6.7.6 User level [PAr5 → USEr]

You can limit parameter display by setting user level (standard level or high level).

When you set as a standard level user, the main function parameters shaded on the entire parameter list(refer to the '5.4 Parameter Setting Groups') are only displayed.

| Parameter | Description |
|--------------|---|
| Stnd | Displays main function parameters only. |
| HI GH | Displays main function parameters and all advanced function parameters. |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-------------|---------------------|-----------------|------|
| PAr5 | USEr | Stnd / HI GH | Stnd | - |

6.7.7 Lock

6.7.7.1 SV group lock [*PAr5* → *LC.5u*]

You can restrict SV parameter modification by locking SV group parameters, which include SV selection, digital input key (*DI - E*), *[A/M]* key for monitoring and manual control, parameter reset (*I nI t*), etc.

| Set value | Function |
|------------|-------------------------|
| on | Lock SV setting group |
| off | Unlock SV setting group |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|--------------|-----------------|-----------------|------|
| <i>PAr5</i> | <i>LC.5u</i> | on / off | off | - |

6.7.7.2 Parameter group lock [*PAr5* → *LC.P1/LC.P2/LC.P3/LC.P4/LC.P5*]

Lock or unlock individual parameter groups from *PAr1* (Parameter 1 group) to *PAr5* (Parameter 5 group). Even if parameter group is locked, you can read parameter settings.

However, SV setting lock and parameter group lock [*LC.5u/LC.P□*] of Parameter 5 group [*PAr5*] are available to change SV.

| Parameter | Description |
|------------|------------------------|
| on | Parameter group lock |
| off | Parameter group unlock |

| Parameter | Description |
|--------------|------------------------|
| <i>LC.P1</i> | Parameter 1 group lock |
| <i>LC.P2</i> | Parameter 2 group lock |
| <i>LC.P3</i> | Parameter 3 group lock |
| <i>LC.P4</i> | Parameter 4 group lock |
| <i>LC.P5</i> | Parameter 5 group lock |

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|------------------------------|-----------------|-----------------|------|
| <i>PAr5</i> | <i>LC.P1</i> to <i>LC.P5</i> | on / off | off | - |

6.7.8 Parameter initialization [*I nI t*]

This function is to initialize all parameters in memory to factory defaults.

Press the front keys for 5 sec. in RUN mode, *I nI t* parameter is displayed. Select **YES** and all parameters are initialized.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|---------------|-----------------|-----------------|------|
| - | <i>I nI t</i> | YES / no | no | - |



Note

If the password feature is activated, it is required to enter the password to activate this function. Initializing the parameters also resets the password.

6.7.9 Password [*PAr5* → *Pwd*]

Only the user who enters password can change and set SV setting group features (except by digital input key) and parameter 1 to 5 groups features. Password setting applies to SV setting group features (except by digital input key), and parameter 1 to 5 groups features comprehensively.

Changing the password setting automatically activates password function. Setting the password to **0000**, however, it cannot use password. **0001** is a read-only password. Under this password, any users can check parameter settings without knowing the password. The user, however, cannot change parameter settings.

Accessing the **Pwd** parameter with the read-only password displays a coded form of the setting.

- Set method
 - 1st Press the **[MODE]** key in RUN mode.
 - 2nd Press the **[VK]** key, select **PAr5** group and press the **[MODE]** key.
 - 3rd Press the **[MODE]** key and search **Pwd**.
 - 4th Press the **[<]** key and select the desired digit.
 - 5th Press the **[VK]** key to set password (0000, 0002 to 9999) and press the **[MODE]** key.
 - 6th Repeat step 4 and 5 and enter the set password.
 - 7th Press the **[MODE]** key or do not enter any keys for 3 sec. to save the password.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|------------|---|-----------------|------|
| PAr5 | Pwd | 0000 (Password OFF), 0002 to 9999 (Password ON) | 0000 | - |



Note

Digital input terminal feature and digital input key function are not related with password.

6.7.9.1 Enter password [PASS]

When the password is set and entering SV setting group or parameter set groups in RUN mode, [PASS] parameter to check the set password appears. Enter the set password and you can enter the set parameters.

- Set method

1st Enter SV setting group or parameter set groups.

2nd PASS parameter appears. Press the \square key to select desired digit.

3rd Press the $\downarrow\uparrow$ key and enter the password (0001 to 9999) and press the MODE key.

| Setting group | Parameter | Set range | Factory default | Unit |
|---------------|-----------|--|-----------------|------|
| PAr5 | PASS | 0001 (read-only password), 0002 to 9999 | 0001 | - |



Note

This parameter appears except 0000 password. If you do not know the password, 0001 password only can read parameters.

When entering wrong password, coded form of the set password SV and error message [Err] flash by 1 sec. in turns at the SV display part.

6.7.9.2 Password recovery

Entering wrong password displays a coded form of the password on the SV display part.

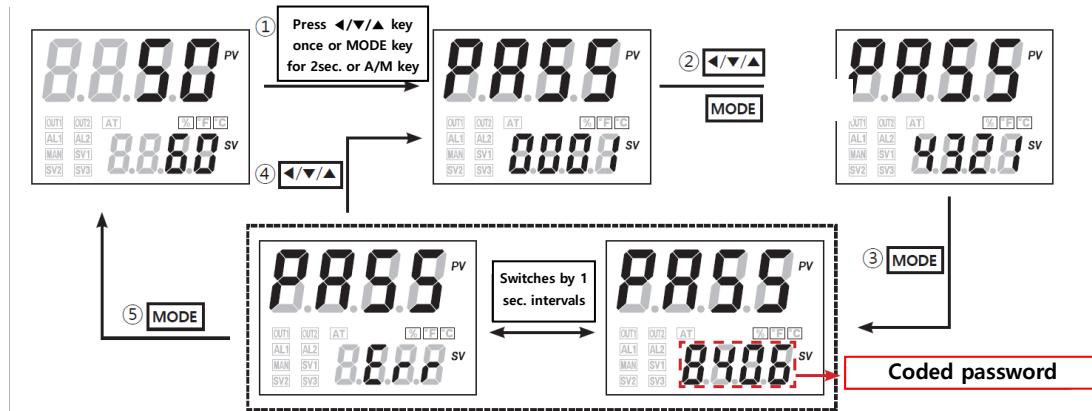
Submit this code to Autonics to recover your lost password.

When entering wrong password (the set password is 1234)

1st Enter SV setting group or parameter set groups.

2nd PASS parameter appears. Press the \blacktriangleleft key and select the desired digit.

3rd Press the $\downarrow\uparrow$ key and enter the password and press the MODE key. When entering wrong password 4321.



When entering wrong password, a coded form of the password and Err flash by 1 sec. in turns at the SV display part.

7 Parameter Description by Setting group

7.1 SV Setting group [5u]

| Parameter | | Description | Set range | Unit | Factory default |
|-----------|--------------------------------|--|---------------------------------|---------|-----------------|
| 5u | Set Value | SVSet value | Within L-5u to H-5u | °C/°F/- | 0 |
| ▲+▼ key | Digital Input Key Execute | Digital input key | Press ☒☒ keys for 3sec. | - | - |
| (A/M) key | Auto_Manual Monitoring/Control | MV monitoring /Manual control key | Press (A/M) key for over 1 sec. | - | - |
| I n i t | Parameter Initialize | Parameter factory default initialization | no / YES | - | no |

7.2 MV monitoring/Manual control setting group [̄u]

| Parameter | | Description | Set range | Unit | Factory default |
|-----------|------------|-------------|----------------|------|-----------------|
| H-̄u | Heating_MV | Heating MV | H 0.0 to H 100 | % | - |
| C-̄u | Cooling_MV | Cooling MV | C 0.0 to C 100 | % | - |

※ It monitors heating and cooling MV and controls manually.

7.3 Parameter 1 setting group [PAr 1]

| Parameter | | Description | Set range | Unit | Factory default |
|-----------|---------------------------|------------------------------------|--|-------------|-----------------|
| r-5 | RUN_STOP | Control output RUN/STOP | rUn / Stop | - | rUn |
| 5u-n | Multi SV No | Multi SV number | 5u-0 / 5u-1 / 5u-2 / 5u-3 | - | 5u-0 |
| Ct-A | Heater Current Monitoring | Heater current value monitoring | 0.0 to 50.0 (display range) | A | 0.0 |
| AL 1.L | Alarm1_Low | Alarm output1 low-limit set value | Deviation alarm: -F.S. to F.S. Absoulte value alarm: within display range | °C/°F/ - | 1550 |
| AL 1.H | Alarm1_High | Alarm output1 high-limit set value | | | 1550 |
| AL 2.L | Alarm2_Low | Alarm output2 low-limit set value | | | 1550 |
| AL 2.H | Alarm2_High | Alarm output2 high-limit set value | | | 1550 |
| AL 3.L | Alarm3_Low | Alarm output3 low-limit set value | | °C/°F/ - | 0000 |
| AL 3.H | Alarm3_High | Alarm output3 high-limit set value | | | 0000 |
| 5u-0 | SV-0 Setting Value | SV-0 Set value | Within L-5u to H-5u | °C/°F/ - | 0000 |
| 5u-1 | SV-1 Setting Value | SV-1 Set value | Within L-5u to H-5u | °C/°F/ - | 0000 |
| 5u-2 | SV-2 Setting Value | SV-2 Set value | Within L-5u to H-5u | °C/°F/ - | 0000 |
| 5u-3 | SV-3 Setting Value | SV-3 Set value | Within L-5u to H-5u | °C/°F/ - | 0000 |

7.4 Parameter 2 Setting group [PAr2]

| Parameter | | Description | Set range | Unit | Factory default |
|--------------|--------------------------|------------------------------------|--|-------------|------------------------|
| Rt | Auto-Tuning Execute | Auto-tuning RUN/STOP | OFF / on | - | OFF |
| H-P | Heating_Proportinal Band | Heating, proportional band | 000.1 to 999.9 | °C/°F, % | 0 10.0 |
| C-P | Cooling_Proportinal Band | Cooling, proportional band | | | |
| H-I | Heating_Integral Time | Heating, integral time | 0000 to 9999 | sec. | 0000 |
| C-I | Cooling_Integral Time | Cooling, integral time | | | |
| H-d | Heating_Derivative Time | Heating, derivative time | 0000 to 9999 | sec. | 0000 |
| C-d | Cooling_Derivative Time | Cooling, derivative time | | | |
| db | Dead_Overlap band | Heating&Cooling, control deadband | P/P, P/ONOFF, ONOFF/P control : -proportional band to 0.0 to +proportional band (when proportional bands are different, it is based on the small value) ONOFF/ONOFF control : -999 to 0999 (temperature H) +99.9 to 999.9 (temperature L) | Digit | 0000 |
| | | | -99.9 to 099.9 (analog) | | |
| rEST | Manual Reset | Proportional control, manual reset | 0000 to 1000 | % | 050.0 |
| H.HYS | Heating_ON Hysteresis | Heating, hysteresis | 001 to 100 (000.1 to 1000) | Digit | 002 (002.0) |
| H.o5t | Heating_OFF Offset | Heating, OFF point offset | 000 to 100 (0000 to 1000) | Digit | 000 |
| C.HYS | Cooling_ON | Cooling, hysteresis | 001 to 100 | Digit | 002 |

| Parameter | | Description | Set range | Unit | Factory default |
|----------------|--------------------|---------------------------|---|-------|-----------------|
| | Hysteresis | | (000.1 to 1000) | | (002.0) |
| Cooling_Offset | Cooling_OFF Offset | Cooling, OFF point offset | 000 to 100 (000.0 to 100.0) | Digit | 000 |
| L_low | MV Low Limit | MV low limit | 000.0 to H_low-0.1 (Standard control) -100.0 to 000.0 (Heating&Cooling) | % | -1000 |
| H_high | MV High Limit | MV high limit | L_low+0.1 to 100.0 (Standard control) 000.0 to 100.0 (Heating&Cooling) | % | 1000 |
| ramp_U | Ramp_Up Rate | Ramp-Up change rate | 000 to 999 (000.0 to 999.9) | Digit | 000 |
| ramp_D | Ramp_Down Rate | Ramp-Down change rate | 000 to 999 (000.0 to 999.9) | Digit | 000 |
| r_Unit | Ramp Time Unit | Ramp time unit | SEC / min / Hour | - | min |

7.5 Parameter 3 Setting group [PAr3]

| Parameter | | Description | Set range | | Unit | Factory default |
|--------------|------------------------|------------------------------------|--|--------------------------------------|-----------------|-----------------|
| <i>I-n-t</i> | Input Type | Input type | Refer to input range chart | | - | ECR.H |
| <i>Unit</i> | Unit | Sensor temperature unit | °C / °F | | - | °C |
| <i>L-rG</i> | Low Input Range | Analog low-limit input value | Min. range to <i>H-rG</i> - F.S.10% | | Digit | 00.00 |
| <i>H-rG</i> | High Input Range | Analog high-limit input value | <i>L-rG</i> +F.S.10% to Max. range | | Digit | 10.00 |
| <i>dot</i> | Scaling Decimal Point | Scale value decimal point position | 0 / 0.0 / 0.00 / 0.000 | | - | 0.0 |
| <i>L-SC</i> | Low Scaling | Scale low-limit display value | -9999 to 9999 | | - | 000.0 |
| <i>H-SC</i> | High Scaling | Scale high-limit display value | -9999 to 9999 | | - | 100.0 |
| <i>dUnit</i> | Display Unit Lamp | Display unit | °C / °F / °Rd / OFF | | - | °Rd |
| <i>I-n-b</i> | Input Bias | Input correction | -999 to 0999 (-99.9 to 999.9) | | Digit | 0000 |
| <i>IRDIF</i> | Input Digital Filter | Input digital filter | 000.1 to 120.0 | | sec. | 000.1 |
| <i>L-Su</i> | SV Low Limit | SV low-limit | Input low-limit [<i>L-SC</i>] to <i>H-Su</i> -1Digit | | °C/F/% | -200 |
| <i>H-Su</i> | SV High Limit | SV high-limit | <i>L-Su</i> +1digit to input high-limit [<i>H-SC</i>] | | °C/F/% | 1350 |
| <i>o-Ft</i> | Control Operating Type | Control output operation mode | Standard | HEAT / COOL | HEAT H-C | HEAT |
| | | | Heating& Cooling | HEAT / COOL / H-C | | H-C |
| <i>C-nd</i> | Control Method | Temperature control type | Standard | PID / onOF | PID P,P | PID |
| | | | Heating& Cooling | P,P/P,o n/on.P /on.on | | P,P |
| <i>AtE</i> | Auto-Tuning Type | Auto-tuning mode | Eun1 / Eun2 | | - | Eun1 |
| <i>out1</i> | Output1(SSR_C) | OUT1 control output | Standar | rLY/ | rLY | rLY |

| Parameter | Description | Set range | | Unit | Factory default |
|-----------|------------------------|---------------------------|-------------------------|--------------|-----------------------|
| o1.rr | urr) Type | type | d | 55r/ curr | |
| | | | Heating & Cooling | 55r/ curr | 55r |
| o1.rr | OUT1 Current Range | OUT1 current output range | 4-20 / 0-20 | | - 4-20 |
| o2.rr | Output2(SSR_Curr) Type | OUT2 control output type | 55r / curr | | - 55r |
| o2.rr | OUT2 Current Range | OUT2 current output range | 4-20 / 0-20 | | - 4-20 |
| H-t | Heating_Conrol Time | Heating, control time | 000.1 to 120.0 | | sec. 020.0 (Relay) |
| C-t | Cooling_Conrol Time | Cooling, control time | 000.1 to 120.0 | | sec. 000.0 (SSR) |

7.6 Parameter 4 Setting group [PAr4]

| Parameter | | Description | Set range | Unit | Factory default |
|-----------|-----------------------|------------------------------|--|-------|-----------------|
| RL - 1 | Alarm1 Mode | Alarm output1 operation mode | OFF / duCC / JJdu / JduC / Cdu / PuCC / JJPu / LbR / SbR / HbR | - | duCC |
| RL 1.E | Alarm1 Type | Alarm output1 option/type | RL-R / RL-b / RL-C / RL-d / RL-E / RL-F | - | RL-R |
| R1.HY | Alarm1 Hysteresis | Alarm output1 hysteresis | 00 I to 100 (000.I to 100.0) | Digit | 00 I |
| R1.n | Alarm1 NO/NC | Alarm output1 contact type | no / nC | - | no |
| R1.on | Alarm1 ON Delay Time | Alarm output1 ON delay time | 0000 to 3600 | sec. | 0000 |
| R1.of | Alarm1 OFF Delay Time | Alarm output1 OFF delay time | 0000 to 3600 | sec. | 0000 |
| RL - 2 | Alarm2 Mode | Alarm output2 operation mode | OFF / duCC / JJdu / JduC / Cdu / PuCC / JJPu / LbR / SbR / HbR | - | JJdu |
| RL 2.E | Alarm2 Type | Alarm output2 option/type | RL-R / RL-b / RL-C / RL-d / RL-E / RL-F | - | RL-R |
| R2.HY | Alarm2 Hysteresis | Alarm output2 hysteresis | 00 I to 100 (000.I to 100.0) | Digit | 00 I |
| R2.n | Alarm2 NO/NC | Alarm output2 contact type | no / nC | - | no |
| R2.on | Alarm2 ON Delay Time | Alarm output2 ON delay time | 0000 to 3600 | sec. | 0000 |
| R2.of | Alarm2 OFF Delay Time | Alarm output2 OFF delay time | 0000 to 3600 | sec. | 0000 |
| RL - 3 | Alarm3 Mode | Alarm output3 operation mode | OFF / duCC / JJdu / JduC / Cdu / PuCC / JJPu / LbR / SbR / HbR | - | LbR |
| RL 3.E | Alarm3 Type | Alarm output3 option/type | RL-R / RL-b / RL-C / RL-d / RL-E / RL-F | - | RL-R |

| Parameter | Description | Set range | Unit | Factory default | |
|---------------|---------------------------|--------------------------------------|--|-----------------|------|
| A3.HY | Alarm3 Hysteresis | 001 to 100 (000.1 to 100.0) | Digit | 001 | |
| A3.n | Alarm3 NO/NC contact type | no / nC | - | no | |
| A3.on | Alarm3 ON Delay Time | Alarm output3 ON delay time | 0000 to 3600 | sec. | 0000 |
| A3.oF | Alarm3 OFF Delay Time | Alarm output3 OFF delay time | 0000 to 3600 | sec. | 0000 |
| LbRt | LBA Time | LBA monitoring time | 0000 to 9999 | sec. | 0000 |
| LbRb | LBA Band | LBA detection band | 0000 to 999(H) 000.0 to 99.99(L) 000.0 to 99.99 (analog) | °C/°F % | 002 |
| Ao.n I | Analog Output Mode | Analog transmission output value | Pu / Su / H-nu / L-nu | - | Pu |
| F5.L | Low Out Scale | Transmission output low-limit value | F.S. | - | -200 |
| F5.H | High Out Scale | Transmission output high-limit value | F.S. | - | 1350 |
| Adr5 | Unit Address | Communication address | 01 to 127 | - | 01 |
| bPS | Bit Per Second | Communication speed | 24 / 48 / 96 / 192 / 384 | - | 96 |
| Prty | Parity Bit | Communication parity bit | none / EuEn / odd | - | none |
| StP | Stop Bit | Communication stop bit | 1 / 2 | - | 2 |
| rStT | Respons Waiting Time | Communication response waiting time | 5 to 99 | ms | 20 |
| CoNy | Communication Write | Communication write enable/disable | En.R / dI 5.R | - | En.R |

7.7 Parameter 5 Setting group [PAr5]

| Parameter | | Description | Set range | | Unit | Factory default |
|---------------|----------------------------|---------------------------------------|---|----------------------------------|--------------|-----------------|
| <i>nE.Su</i> | Multi SV | Number of multi-SV | <i>I / 2 / 4</i> | | EA | <i>I</i> |
| <i>dl - E</i> | Digital Input Key Function | Front DI input key function | <i>0 : OFF 1 : At 2 : Stop 3 : AL.RE</i> | | - | <i>Stop</i> |
| <i>dl - 1</i> | Digital Input 1 Func | DI-1 input terminal function | <i>OFF / Stop / AL.RE / nRun / nE.Su / RE.Su</i> | | - | <i>OFF</i> |
| <i>dl - 2</i> | Digital Input 2 Func | DI-2 input terminal function | <i>nE.Su / RE.Su</i> | | - | <i>OFF</i> |
| <i>rE.Su</i> | | Remote SV | <i>OFF/on</i> | | - | <i>OFF</i> |
| <i>rl_nb</i> | | Remote SV low-limit value correction | <i>-999 to 999 (-99.9 to 999.9)</i> | | - | <i>0000</i> |
| <i>rSPn</i> | | Remote SV high-limit value correction | <i>0.100 to 5.000</i> | | - | <i>1.000</i> |
| <i>bAr</i> | | Bar graph | Standard control | <i>OFF / Out 1</i> | <i>Out 1</i> | <i>Out 1</i> |
| | | | Heating& Cooling | <i>OFF / Out 1 / Out 2 / ALL</i> | <i>ALL</i> | <i>ALL</i> |
| <i>lEnu</i> | Initial Manual MV | Manual control, initial manual | <i>AUTO / Pr.nu</i> | | - | <i>AUTO</i> |
| <i>Pr.nu</i> | Preset Manual MV | Manual control, reset manual | <i>000.0 to 100.0 (Standard control) 400.0 to 100.0 (Heating&Cooling)</i> | | % | <i>000.0</i> |
| <i>Er.nu</i> | Error MV | Sensor error, MV | <i>000.0 to 100.0 (Standard control) 400.0 to 100.0 (Heating&Cooling)</i> | | % | <i>000.0</i> |
| <i>St.nu</i> | Stop MV | Control stop, MV | <i>000.0 to 100.0 (Standard control) 400.0 to 100.0 (Heating&Cooling)</i> | | % | <i>000.0</i> |
| <i>St.AL</i> | Stop AlarmOut | Control stop, Alarm output | <i>Cont / OFF</i> | | - | <i>Cont</i> |
| <i>USER</i> | User Level | User level | <i>Stand / HIGH</i> | | - | <i>Stand</i> |
| <i>LC.Su</i> | Lock SV | SV lock setting | <i>on / OFF</i> | | - | <i>OFF</i> |
| <i>LC.P 1</i> | Lock Parameter 1 | Parameter1 group lock | <i>on / OFF</i> | | - | <i>OFF</i> |

| Parameter | | Description | Set range | Unit | Factory default |
|-----------|------------------|-----------------------|--|------|-----------------|
| LC.P2 | Lock Parameter 2 | Parameter2 group lock | on / off | - | off |
| LC.P3 | Lock Parameter 3 | Parameter3 group lock | on / off | - | off |
| LC.P4 | Lock Parameter 4 | Parameter4 group lock | on / off | - | off |
| LC.P5 | Lock Parameter 5 | Parameter5 group lock | on / off | - | off |
| Pwd | Password Setting | Password set | 0000 : Password function Off 0002 to 9999 | - | 0000 |

7.8 Password input parameter

| Parameter | | Description | Set range | Unit | Factory default |
|-----------|----------|----------------|------------------------------------|------|-----------------|
| PASS | Password | Password input | 0001 to 9999 (0001 for reading) | - | 0001 |

7.9 Initialized parameters by changing the related parameters

| Changed parameter | Description | Initialized parameters |
|-------------------|-------------------------------|--|
| In-t | Input type | Su-n, RL1.L, RL1.H, RL2.L, RL2.H, RL3.L, RL3.H, Su~Su3, db, H-HYS, H-05t, C-HYS, C-05t, rRnU, rRnd, r.Un, L-rG, H-rG, dot, L-SC, H-SC, d.Un, In-b, L-Su, H-Su, LbR.t, LbR.b, Ro-n, FS-L, FS-H. |
| Unit | Temperature unit | Except L-rG, H-rG, dot, L-SC, H-SC, d.Un, these are same as the initialized parameters of when changing input type. |
| H-Su | SV high-limit value | SV > H-Su, SV is initialized as H-Su |
| L-Su | SV low-limit value | SV < L-Su, SV is initialized as L-Su |
| o-Ft | Control output operation mode | L-nu, H-nu, C-nd, Er.nu, Pr.nu, St.nu |
| C-nd | Temperature control type | L-nu, H-nu, Er.nu, Pr.nu, St.nu |
| RL-1, RL-2, RL-3 | Alarm mode/option | RL1.L, RL1.H, RL2.L, RL2.H, RL3.L, RL3.H |

8 DAQMaster

8.1 Overview

DAQMaster is a comprehensive device management program that can be used with Autonics thermometers, panel meters, pulse meters, counters, recorders, and indicators, etc.

DAQMaster provides GUI control for easy and convenient management of parameters and multiple device data monitoring.



Note

For more descriptions, visit our web site (www.autonics.com) and download 'DAQMaster user manual'.

8.2 Features

DAQMaster has the following features.

(1) Supports multi-device

- Simultaneously monitor multiple devices and set parameters.
- Simultaneously connect units with different addresses in a single device.
- Use Modbus Remote Terminal Unit (RTU) to enable the use of multiple RS232 ports.

(2) Device scan

In cases of multiple units (with different addresses) connected together, use unit scan to automatically search for units.

(3) Convenient user interface

Freely arrange the windows for data monitoring, attributes, and projects.
Saving a project also saves the screen layout.

(4) Project management

You can save added device information, data monitoring screen layouts, and I/O source selection as project files. Open project files to load the saved settings.
Provides a project list for simple and easy project file management.

(5) Monitoring data log

When monitoring, save data log files as either DAQMaster data files (.ddf) or CSV (.csv) files. Open files saved in the .csv format directly from Microsoft Excel.
Define log data file naming/saving rules and destination folders to make file management convenient.

(6) Data analysis

Perform spreadsheet and graph analyses of .ddf data files using DAQMaster's data analysis feature. Save spreadsheet data as .rtf, .txt, .html, or .csv files.

(7) Modbus map table reporting

Print address map reports of registered Modbus devices. Modbus map table reports can be saved in .html and .pdf formats.

(8) Supports multi-language

Supports Korean, English, Japanese and Simplified Chinese.
To add a different language, modify the files in the Lang folder, rename, and save.

(9) Supports script

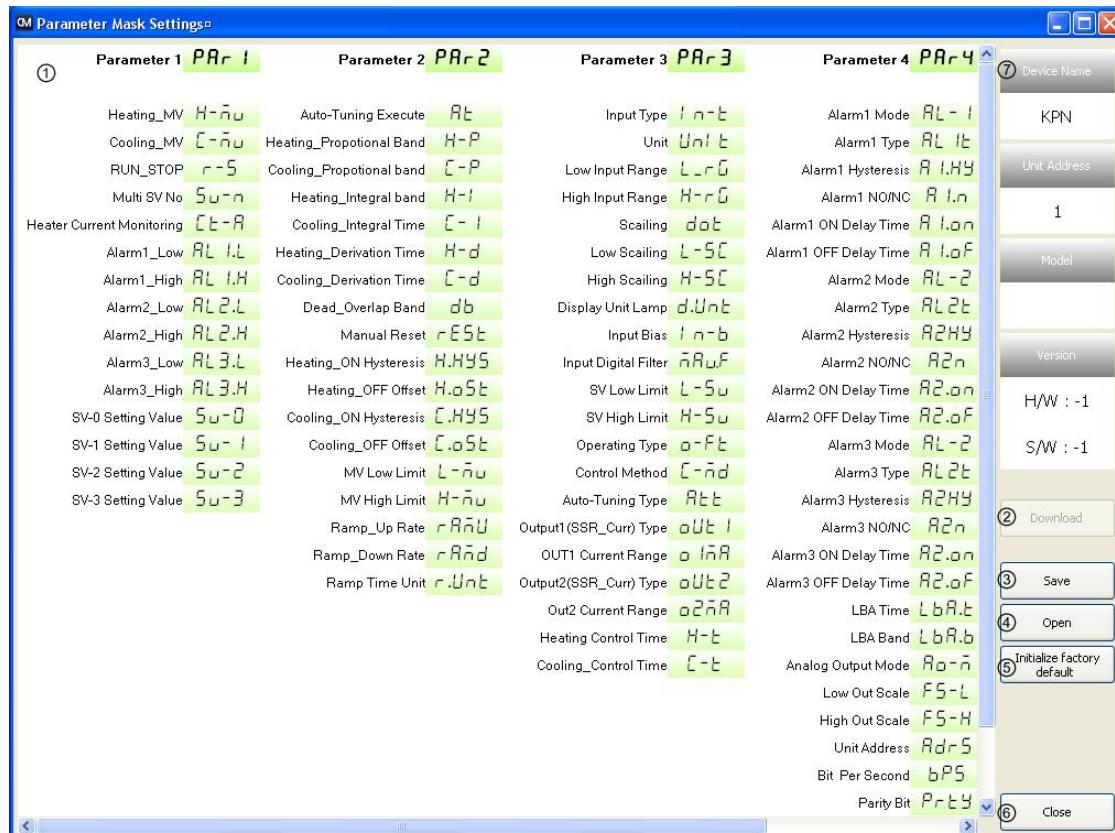
Uses the Lua Script language and deals with different I/O processes for individual devices.

8.3 KPN series special features

Parameter mask and user parameter group is available by DAQMaster.
Visit our website (www.autonics.com) to download DAQMaster program and the user manual.

8.3.1 Parameter mask

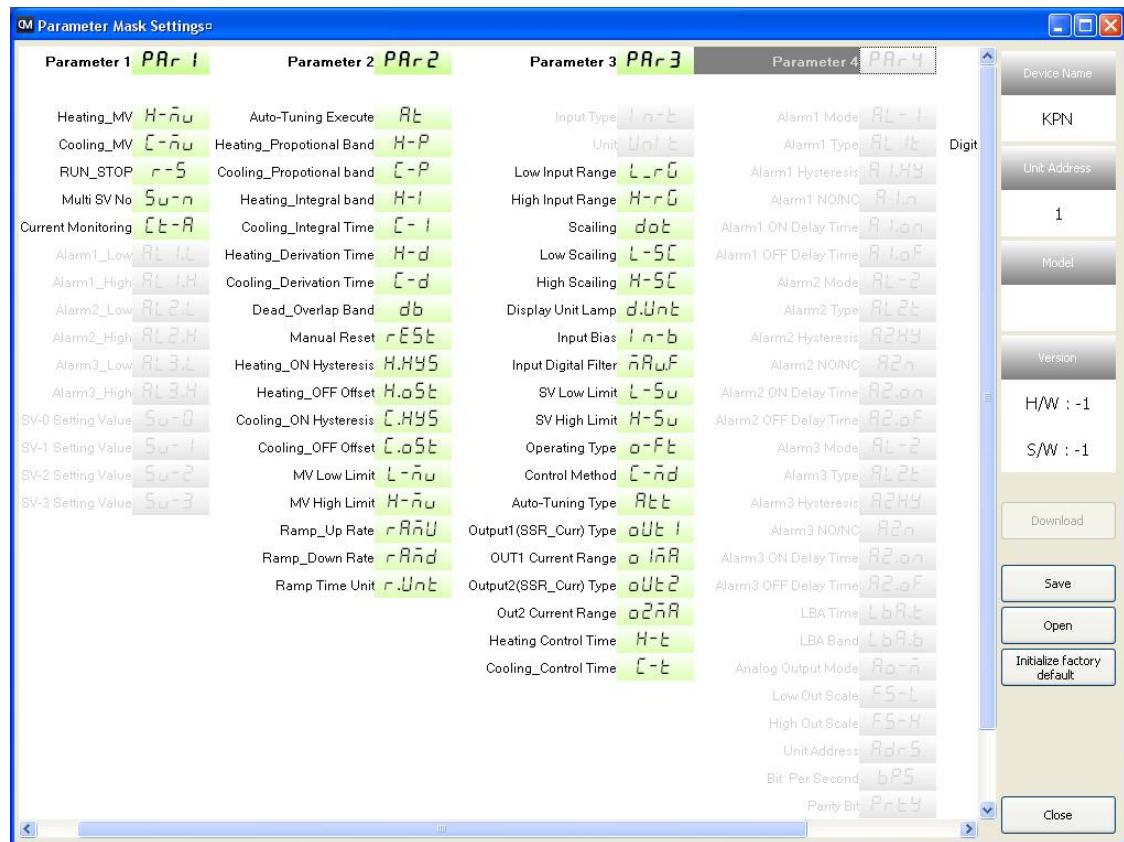
This feature is able to hide unnecessary parameters to user environment or less frequently used parameters in parameter group. Masked parameters are not only displayed. The set value of masked parameters are applied.



| No | Item | Description |
|----|----------------------------|--|
| ① | Parameter mask selection | Select the to-be masked parameters. Right-click the to-be masked parameters and they turn gray. |
| ② | Download | Applies the set masked parameters to the device. |
| ③ | Save | Saves the set masked parameters as a mask information file. |
| ④ | Open | Opens the saved mask information file. |
| ⑤ | Initialize factory default | Clears the set for the masked parameters. Download this setting to apply it to the device. |
| ⑥ | Close | Closes the Parameter Mask Settings dialog. |
| ⑦ | Device information | Displays device name, unit address, model name, and version. |



Ex.



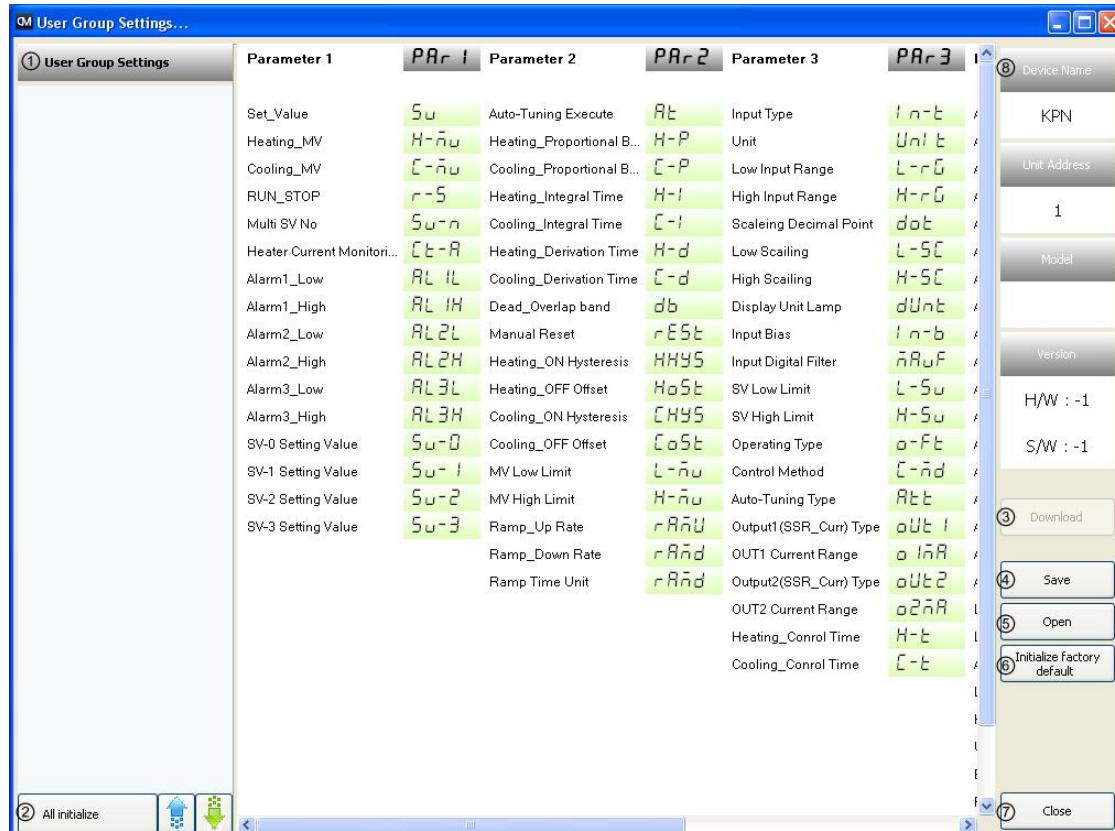
Example of masking alarm, SV setting parameters of parameter 1 group, input type, unit of parameter 3 group, and all of parameter 4 group.

8.3.2 User parameter group [PArU]

This feature is able to set the frequently used parameters to the user parameter group. You can quickly and easily set parameter settings.

User parameter group can have up to 30 parameters. You can set this by the integrated device management program, DAQMaster. For more information, refer to the DAQMaster user manual.

Visit our webpage (www.autonics.com) to download DAQMaster program and the user manual.



| No | Item | Description |
|----|----------------------------|---|
| ① | User group parameters | Displays the selected parameters as user group parameter Double-click the parameters for the user group, and these parameters turn gray. To delete the parameters at the user group, double-click the parameters. |
| ② | User group selection | - All initialize: Initializes the set user group. - ↑, ↓: Changes the selected parameter order up/down. |
| ③ | Download | Applies the set user group to the device. |
| ④ | Save | Saves the set user group as a user group information file. |
| ⑤ | Open | Opens the saved user group file. |
| ⑥ | Initialize factory default | Clears the set for the user group. Download this setting to apply it to the device. |
| ⑦ | Close | Closes the User Group Settings dialog. |
| ⑧ | Device information | Displays device name, unit address, model name, and version. |



Ex.

Example of the set user group with SV setting, control output RUN/STOP, alarm output 1 low/high-limit, SV-0/1/2/3 set value, manual reset, input correction, alarm output 1 mode-option/hysteresis/contact type/ON delay time/OFF delay time parameters.

Make Life Easy : **Autonics**