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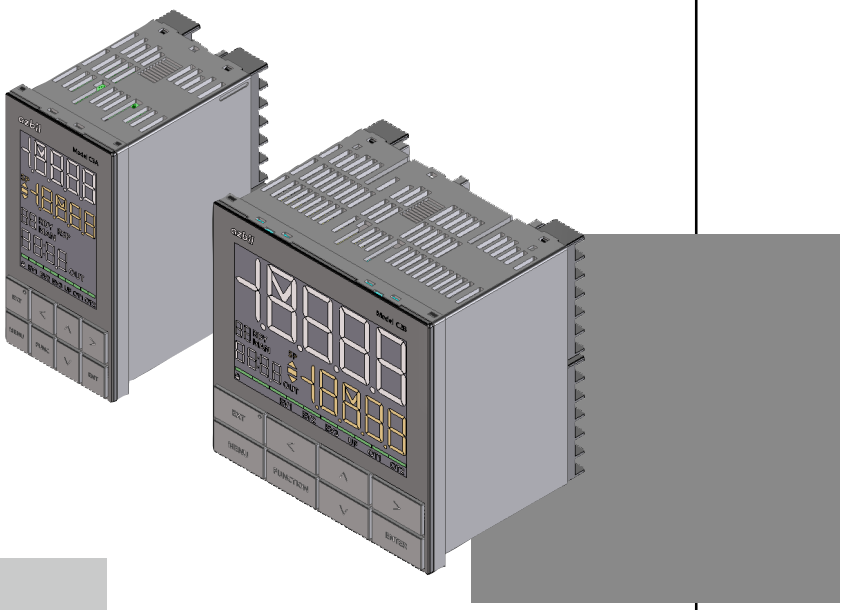
No. CP-SP-1478E

Single Loop Controller

Model C2/C3

User's Manual

for Installation and Configuration



Thank you for purchasing your Azbil Corporation product.

This manual contains information for ensuring the safe and correct use of the product.

Those designing or maintaining equipment that uses this product should first read and understand this manual. This manual contains information not only for installation, but also for maintenance, troubleshooting, etc. Be sure to keep it nearby for handy reference.

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Getting Up to Speed with model C2/C3

The quick reference guide on pages D-1 to D-8 summarizes key operations, parameters, and settings, and gives concrete operation examples using illustrations.

Try looking at these pages first, and then read the main text for details.

A separate color version of the quick guide printed on dirt-resistant paper is available for convenient use on site (document No. CP-SP-1479E).

Contact the azbil Group or a distributor for details.

NOTICE

Please make sure that this manual is available to the user of the product.

Unauthorized duplication of this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is complete and accurate, but if you should find an omission or error, please contact us.

In no event is Azbil Corporation liable to anyone for any indirect, special, or consequential damages as a result of using this product.

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Safety Requirements

To reduce the risk of an electric shock resulting in personal injury, follow all safety notices in this document.

This symbol warns the user of a potential shock hazard.

The use of this product in a manner not specified by the manufacturer may impair its built-in safety features. Do not replace any component except as specified by the manufacturer.

Wiring should be carried out by an experienced and qualified worker according to local regulations.

Be sure to mount a switch for shutting off the main power to this product within reach of the operator.

Be sure to use the rated fuse for the power wiring of this device. For an AC/DC power supply connected to a DC power (24 V DC / 24 V AC) model, use a power supply that has double insulation or reinforced insulation from the main power supply and complies with NEC Class 2 as per UL 1310.

● Device Ratings

● Device Ratings

AC power models

Voltage:	100–240 V AC, 50/60 Hz (operating voltage: 85–264 V AC)
Power consumption:	12 VA max.

● DC power models

Voltage:	24 V DC (operating voltage: 20.4–26.4 V DC) 24 V AC, 50/60 Hz (operating voltage: 20.4–26.4 V AC)
Power consumption:	6 W max. (24 V DC) 9 VA max. (24 V AC)

● Operating Environment

Do not operate this device in the presence of flammable liquids or vapors.

Operation in such environments is a safety hazard.

Operating temperature:	–10 to +55 °C
Operating humidity:	10–85 % RH (without condensation or freezing)
Vibration:	0–5 m/s^2 (10–60 Hz)
Overvoltage category:	II (IEC 60364-4-443, IEC 60664-1)
Pollution degree:	2
Installation location:	Indoors
Elevation:	2000 m max.

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● Device Installation

This product should be installed in a panel to protect the operator from accidental contact with the rear terminals.

Common mode voltage of all I/O except for supply power and relay contact outputs: voltage to ground of 30 Vrms max., 42.4 V peak max., and 60 V DC max.

● Standards Compliance

EN 61010-1, EN 61326-1 (for use in industrial locations)

During EMC testing, the indication or output may fluctuate by the equivalent of ±10 % FS.

● Fuse Rating

Fuse type:	Time-lag (T) (IEC 60127)
Rated voltage:	250 V AC
Rated current:	1 A (AC power model)
	1 A (DC power model)

If the power supply is grounded, install a fuse on the non-grounded side.

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Conventions Used in This Manual

■ The safety precautions explained below aim to prevent injury to you and others, and to prevent property damage.

⚠WARNING	**Warnings are indicated when mishandling this product may result in death or serious injury.**
⚠CAUTION	**Cautions are indicated when mishandling this product may result in minor injury or property damage only.**

■ In describing the product, this manual uses the icons and conventions listed below.

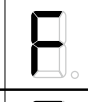
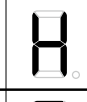
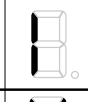
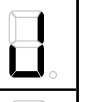
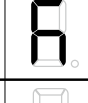
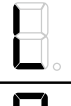
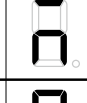
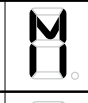
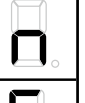
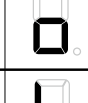
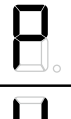
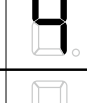
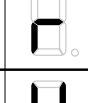
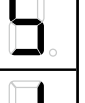
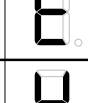
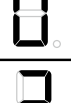
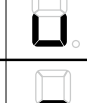
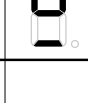
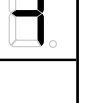
	Indicates that caution is required in handling.
	The indicated action is prohibited.
	Be sure to follow the indicated instructions.
Handling Precautions:	Information to be aware of when handling.
Note:	Indicates information that may be useful.
:	Indicates an item or page to which the user may refer.
(1) (2) (3):	Steps in a sequence or parts of a figure, etc.
[XXX], [XX]:	Square brackets indicate a window name, button, or menu shown on the screen of the PC, this device, etc.
>>:	Indicates the result of an operation, or the status after the operation.

● **Number and letter display on the LCD**

Numbers: The 7-segment LCD expresses numbers as follows:

0		1		2		3		4	
5		6		7		8		9	

Letters: The 7-segment LCD expresses the letters shown below. There are some alphabetical characters which are not displayed on the LCD.

A a		B b		C c		D d		E e	
F f		G g		H h		I i		J j	
K k		L l		M m		or		N n	
O o		P p		Q q		R r		S s	
T t		U u		V v		W w		X x	
Y y		Z z		–					

Handling Precautions

- As shown above, the following are shown in the same way: the number 2 and the letter Z, the number 5 and the letter S, and the number 9 and the letter Q.

Safety Precautions

■ Features

⚠WARNING

To prevent electrical shock, this device must be installed in a location that is only accessible to people with appropriate knowledge about electrical safety. Install this device inside a control panel that cannot be opened without the use of a key or tool.
Do not use this device in an environment with conductive contamination, or with dry non-conductive contamination which can become conductive due to condensation, etc. Problems such as tracking phenomena may damage parts, resulting in fire.
Be sure to use the fuse described in the specifications for the power wiring of this device. Otherwise, tracking phenomena or parts failure due to other factors may cause fire.
Be sure to check that the device has been correctly wired before turning on the power. Incorrect wiring of this device may cause device failure and also lead to a dangerous accident.
Before removing, mounting, or wiring this device, be sure to turn off the power to it and all connected devices. After wiring this device, attach the separately sold terminal cover (model 84525948-001 for the C2A/C3A, model 84525949-001 for the C2B/C3B). Otherwise, there is a danger of electric shock.
Do not touch live parts such as the power terminals. There is a danger of electric shock.
Do not disassemble this device. There is a danger of electric shock or device failure.

⚠CAUTION

Use this device within the operating ranges given in the specifications (for temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.). Otherwise, there is a danger of fire or device failure.
Do not block the ventilation holes. There is a danger of fire or device failure.
Wire this device correctly in compliance with applicable standards, and use the power source and installation methods specified in this user's manual. Otherwise, there is a danger of fire, electric shock, or device failure.
Do not allow wire clippings, metal shavings, water, etc., to enter the case of this device. There is a danger of fire or device failure.
Firmly tighten the terminal screws to the torque listed in the specifications. Insufficient tightening may result in fire or electric shock.
Do not use unused terminals as relay terminals. There is a danger of fire, electric shock, or device failure.
Use the relays within the recommended service life. Otherwise, there is a danger of fire or device failure.
Use an appropriate overcurrent protection device (fuse, circuit breaker, etc.) with a sufficient breaking capacity for the lines to which the relays of this device are connected to protect the circuits. Otherwise, there is a danger of fire or device failure.

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⚠CAUTION

If there is a risk of a power surge caused by lightning, use a surge absorber (surge protector). Otherwise, there is a danger of fire or device failure.
Do not operate the keys with a sharp object (such as a mechanical pencil tip, etc.). Doing so can cause device failure.
To remove dirt from this device, wipe it with a soft dry cloth. **Never use an organic solvent such as paint thinner or benzene, or a detergent.**
Do not use this device in wet places or with wet hands. **There is a danger of electric shock.**
Do not turn the controller on or off while the USB loader cable is connected. The controller could malfunction.
Do not connect any cables other than the USB loader cable (A-microB, model No. SLP-ULCJA0) and right angle conversion cable (model No. SLP-ULLJA0) to the loader connector. The controller could fail or display an incorrect temperature.
Do not use the PV, RSP, CT, and VT inputs for measurement in a place that falls into measurement category II, III, or IV. **There is a danger of fire, electric shock, or device failure.**

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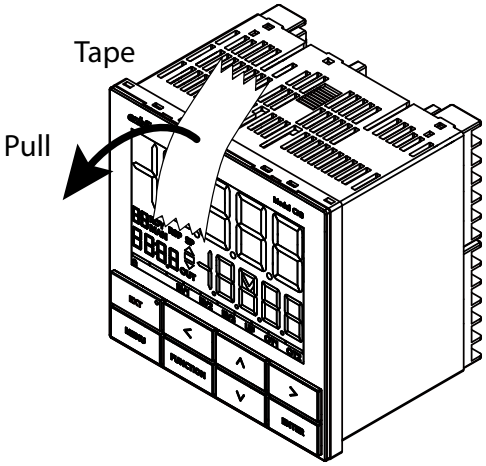
Before Using This Device

There is a film on the console on the front of this device to protect the surface.

After the installation and wiring work is completed, stick a piece of tape on the corner of the console and pull it in the direction indicated by the arrow below to remove the protective film.

Handling Precautions

- Removing the protective film with your fingernail may cause scratches on the console.



To ensure safe use of this product, use the latest firmware.

Note

- ☞ ■ ROM version history (p. App.-12) (for changes in each ROM version)
- ☞ ■ Updating the firmware (p. 11-7) (for details on firmware updates)

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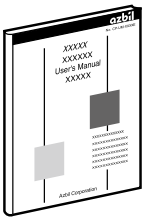
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The Role of This Manual

There are six different manuals related to the model C2/C3 Single Loop Controller (hereafter "this device"). Read them as necessary for your specific requirements.

If you do not have a manual you require, please contact us or one of our dealers.

Alternatively, you can download the necessary manuals from https://aa-industrial.azbil.com/jp/en/download.



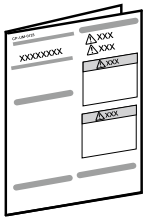
Single Loop Controller Model C2/C3 User's Manual for Installation and Configuration

Document No. CP-SP-1478E

This manual.

This manual describes the hardware and all functions of this device. Personnel in charge of the design, manufacture, operation, or maintenance of equipment that incorporates this device, or those in charge of communication software for equipment that uses this device's communication functions, should read this manual thoroughly.

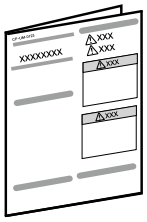
This manual also describes the installation, wiring, connections for communication, functions and settings of this device, operating procedures, communication with a master station (PC, etc.), communication addresses, troubleshooting, and detailed specifications.



Single Loop Controller Model C2A/C2B User's Manual

Document No. CP-UM-6003JEC

This manual is supplied with the product. It has descriptions in Japanese, English, and Chinese. Personnel in charge of the design or manufacture of equipment that incorporates this device should read this manual thoroughly. This manual covers safety precautions, installation, wiring, main specifications, and parameters of this device. For further information about operation, refer to the user's manual for installation and configuration.



Single Loop Controller Model C3A/C3B User's Manual

Document No. CP-UM-6004JEC

This manual is supplied with the product. It has descriptions in Japanese, English, and Chinese. Personnel in charge of the design or manufacture of equipment that incorporates this device should read this manual thoroughly. This manual covers safety precautions, installation, wiring, main specifications, and parameters of this device. For further information about operation, refer to the user's manual for installation and configuration.

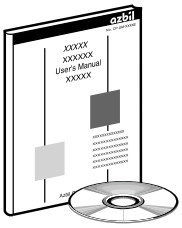


Quick Reference Guide for Model C2/C3 **Document No. CP-SP-1479E**

For those using this device for the first time or for operators on the work site, this guide serves as a reference when specifying parameters.

Key operations, menu flowcharts, and parameter settings are described with color illustrations.

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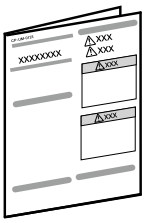


User's Manual for Detailed Functions of Smart Loader Package Model SLP-C1F for Single Loop Controller Model C1A/C1M/C2/C3

Document No. CP-SP-1463E

This manual is supplied with Smart Loader Package model SLP-C1F.

This manual describes the software used on a PC to configure model C2/C3. Those designing or setting up equipment that uses model C2/C3 should read this manual. The manual describes installation of the software into a PC, operation of the PC, various functions, and setup procedures.



Smart Loader Package Model SLP-C1F Installation Manual

Document No. CP-UM-5986JEC

This manual is supplied with the product. It has descriptions in Japanese, English, and Chinese. Personnel in charge of the design or manufacture of equipment that incorporates this device should read this manual thoroughly. This manual covers safety precautions, installation, wiring, main specifications, and parameters of this device. For further information about operation, refer to the user's manual on detailed functions.

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Organization of This User's Manual

This manual is organized as shown below.

Quick Reference Guide for Model C2/C3

Parameters, settings, and concrete operation examples with illustrations.

For a quick understanding of this device, read this section first.

Chapter 1. Overview

This product's applications, features, model selection, and part names and their functions. The terms introduced in this chapter are used in the subsequent descriptions, so make sure to understand them.

Chapter 2. Outline of Functions

Overview of functions and operations.

Chapter 3. Installation

Operating environment, installation dimensions, installation procedures, necessary tools.

Chapter 4. Wiring

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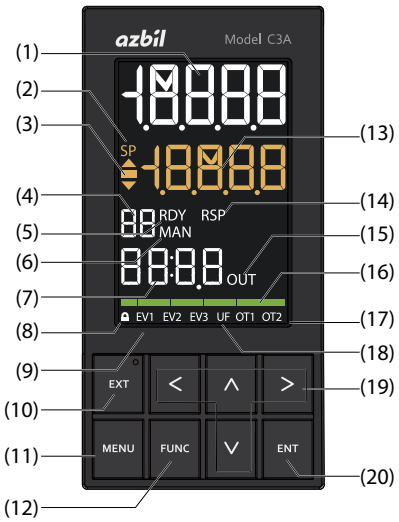
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Quick Reference Guide for Model C2/C3

This guide offers a summary of key operations, parameter flowcharts, and settings, for convenient reference at the operation site. This guide is made for repeated use. Dirt wipes off easily and even notes written with an oil-based felt-tip pen can be removed with an eraser.
If more detailed information on the C2/C3 is needed, refer to the user's manual for installation and configuration (CP-SP-1478E).
The most convenient way to configure the C2/C3 is with the Smart Loader Package (model No. SLP-C1FJA_). Please contact the azbil Group or a distributor for more information.

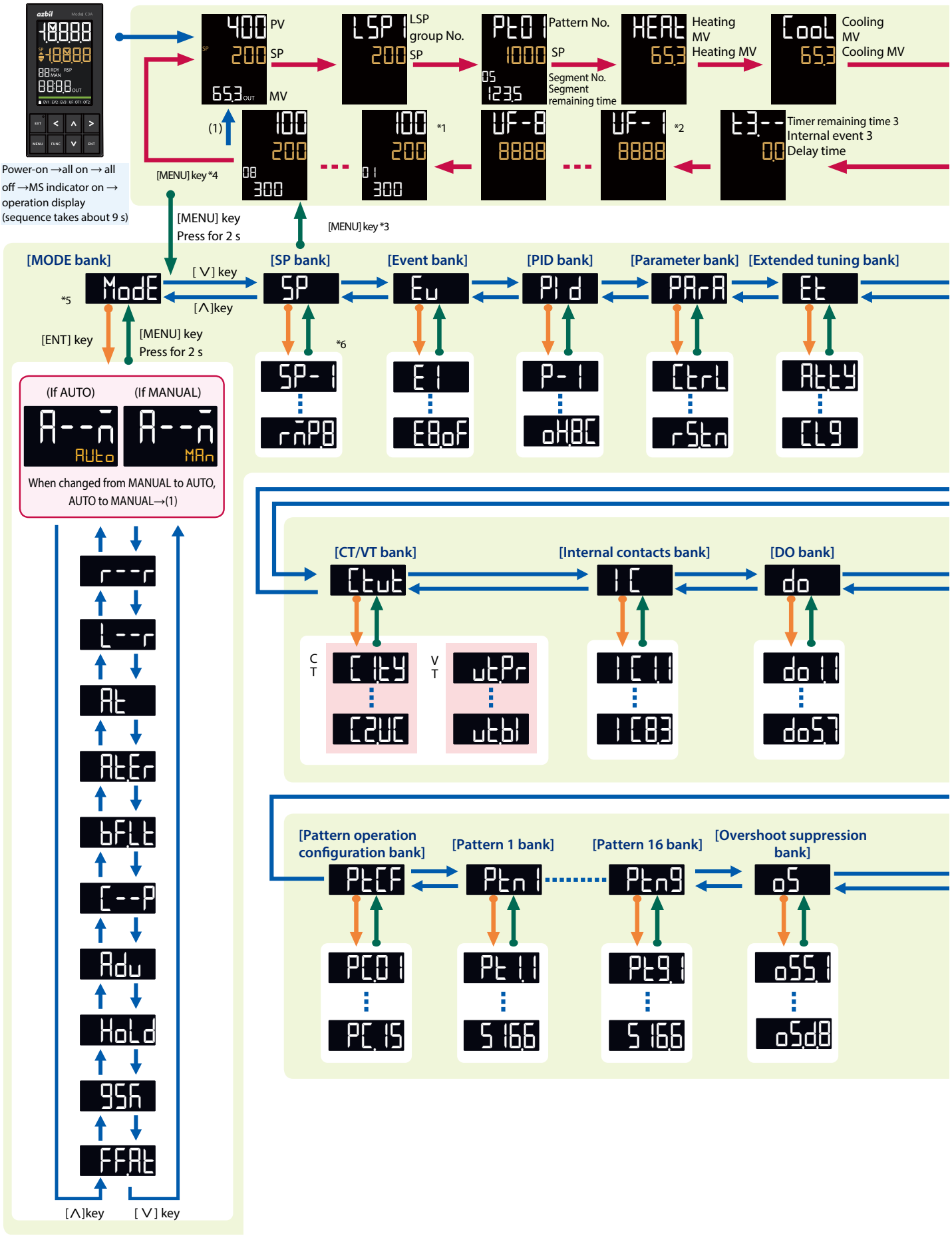




(1)	Display field 1	Shows PV (present temperature, etc.) or items that can be set. When an alarm occurs, the normal display and an alarm code are displayed alternately.
(2)	SP indicator	Lights up when the SP is displayed in display field 2.
(3)	Ramp indicator	Indicates the operating status of a pattern operation, SP ramp, and RSP ramp (model C3 only).
(4)	Display field 4	Shows the segment No. during a pattern operation or user operation screen No.
(5)	RDY mode indicator	Lights up in READY (control stop) mode.
(6)	MAN mode indicator	Lights up in MANUAL mode.
(7)	Display field 3	Shows the manipulated value (MV) or present values of monitored items.
(8)	Lock indicator	Lights up when any of the lock functions is enabled.
(9)	Event indicator	Lights up when the corresponding event output is ON.
(10)	Loader connector	Connect to a PC using the USB loader cable (A to micro-B) included with the Smart Loader Package.
(11)	[MENU] key	Switches between operation display, bank selection display, and settings display.
(12)	[FUNC] key	If it is held down for 2 seconds or longer when the operation display is shown, the preset operation (initial setting: AUTO/MANUAL selection) can be executed.
(13)	Display field 2	Shows the SP (set temperature, etc.) or other settings.
(14)	RSP indicator	Lights up in RSP mode (model C3 only).
(15)	MV indicator	Lights up when the MV is displayed in display field 3.
(16)	Multi-status (MS) indicator	Various ON/OFF states or analog values such as an MV graph can be displayed by specifying the light-up condition and design.
(17)	Control output indicator	Lights up when the corresponding control output is ON.
(18)	User-defined function indicator	Lights up according to the setting of the user-defined function indicator.
(19)	[∨], [∧], [<] and [>] keys	Used for shifting between the digits of a number and incrementing/decrementing numeric values.
(20)	[ENT] key	Used to start changing the setup and set the changed values.

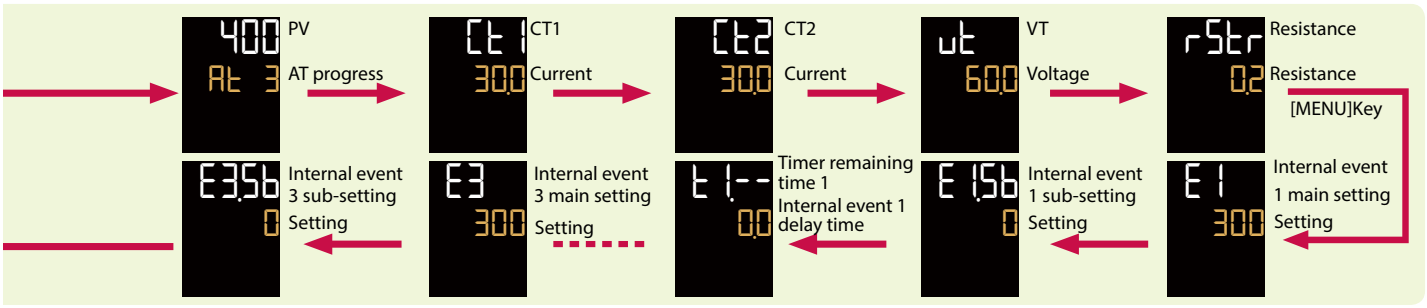
Note: The figures above show model C3.

Flowchart of Key Operations and Displays

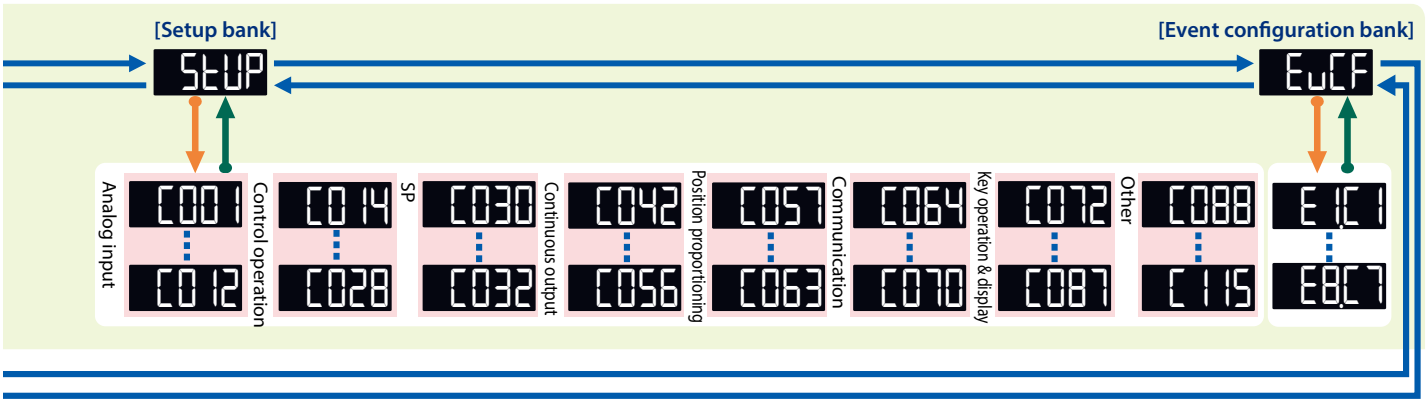


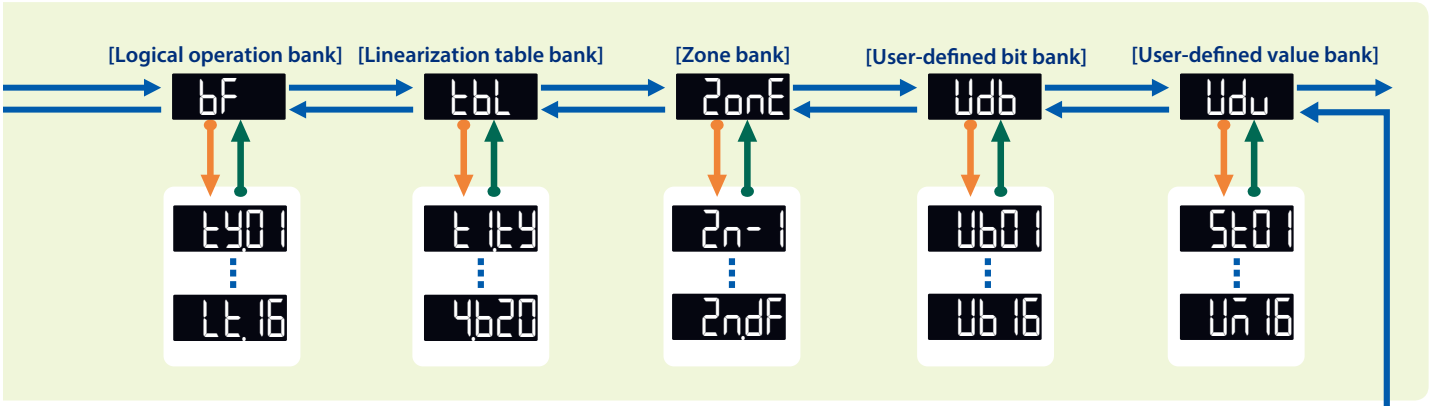
○ Some items are not displayed depending on the availability of optional functions, model number, display setup ([073] to [078]), and user level ([079]).
○ Pressing the [PARA] key while changing the setting of an item will cancel the change.

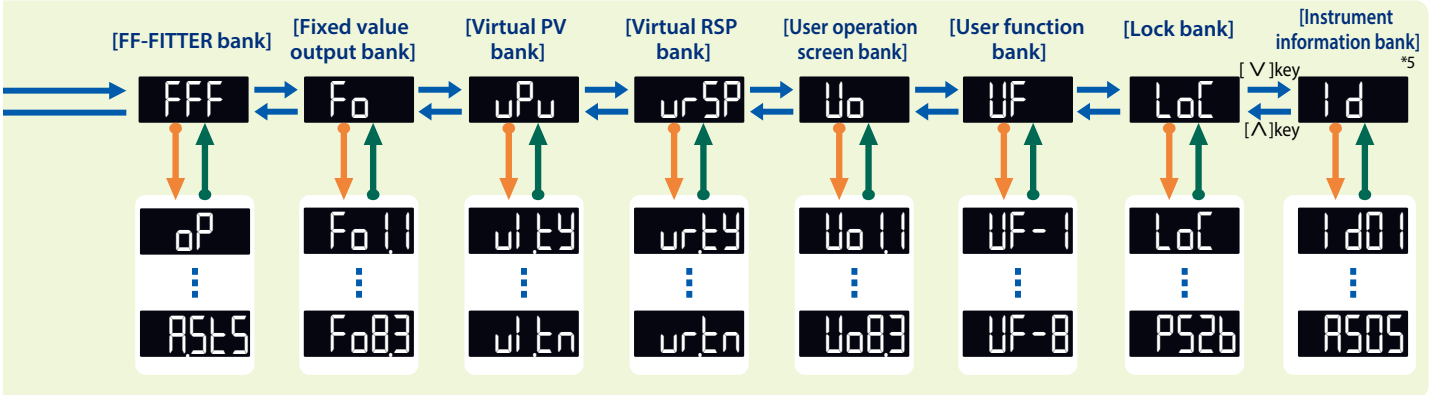
Operation display



Bank selection







*1. The user-defined values set in the user operation screen bank Uo are displayed.
*2.The parameters and numerical values set in the user function bank UF are displayed.
*3.If no key is pressed during the operation display restoration time (initial value: 3 minutes), the display automatically returns to (1) or (2).
*4.If the [<] key is pressed while holding down the [MENU] key, various displays/ settings can be navigated in reverse order.
*5.Pressing the [∧] key at the first bank moves to the last bank, and pressing the [v] key at the last bank moves to the first bank.
*6. In RSP mode, rSP and PI dr are displayed first.

■ **Explanation of arrows**

[MENU] key:
2-second press of **[MENU]** key:
[ENT] key:
[∨] or [∧] key:

■ **Item selection in a bank**

- [∨] key (move to next item)
- [∧] key (to previous item)
- [<] key (move to next channel)

Operation Examples

Red letters : Initial setup procedure

Blue letters : Procedure during operation

Setup of PV input range type

1



Press [MENU] once to show the operation display.

If the sensor has not been wired or is disconnected, an alarm for abnormal input (any one from RL0 1 to RL 1 1) may appear in display field 1.

2



Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.

3



Press [V] or [Λ] several times.

STUP flashes in display field 1.

4



Press [ENT].

The bank settings screen showing the setting for C00 1 (PV input range type) is displayed.

5



Press [ENT].

The rightmost digit in display field 2 flashes and its value can be changed.

Select the range of the sensor (see the PV input range table) by pressing [Λ], [V], [<], or [>].

Press [ENT]. The new value stops flashing and is now set.

Setup of event operation type

1



Press [MENU] once to show the operation display.

2



Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.

3



Press [V] or [Λ] several times.

EvCF is shown in display field 1.

4



Press [ENT].

E 1C 1 is shown in display field 1 and 0 in display field 2.

0 in display field 2 means that no event is set.

5



Press [ENT].

The rightmost digit in display field 2 flashes.

Press [Λ], [V], [<], or [>] until 4 is displayed.

6



Press [ENT].

The new value stops flashing and is now set.

4 in display field 2 means that the event operation type is "deviation high limit."

Use E2C 1 to set the operation type for event 2, and E3C 1 for event 3.

4 **For highlighted steps (e.g.,), if keys are locked, the setting does not flash and cannot be changed. To change the setting, cancel the key lock first.**

Execution of auto tuning (AT)

AT forces ON/OFF of the MV a number of times (a limit cycle) to calculate PID values.

Check that this operation does not create any problems for the associated equipment before executing AT.

1 Press [MENU] once to show the operation display.



2 Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.



3 Press [ENT].

A--n is shown in display field 1 and AUto in display field 2.

In ON/OFF control, r--r is shown display field 1.



4 Press [V] twice.

At is shown in display field 1, and AtoF in display field 2.



5 Press [ENT].

AtoF flashes in display field 2.

If the control method is ON/OFF control and if bit 3 (AT stop/start display) of C073 (mode display setup) is 0 (disabled), the parameter and setting are not displayed.



6 Press [Λ] once. Aton flashes in display field 2.

The display flashes only in RUN and AUTO modes, and only if there is no PV input error.



7 Press [ENT].

Aton stops flashing and AT begins.

If C0B0 (user-defined function indicator lighting conditions) is set to 1600 (AT stopped/started status), the UF indicator is lit during AT.
When AT and the calculation of PID constants are done, the UF indicator turns off.



During the AT process, if the mode is changed to READY or MANUAL, if PV input is faulty, or if a power failure occurs, AT stops automatically without changing the PID constants.

AT can also be stopped by changing the setting from Aton to AtoF (return to step 3 above).

Setup of the SP

1 Press [MENU] once to show the operation display.



2 Check that the operation display shows the SP, SP, and MV.

(If not, press [MENU] several times until they are displayed).



3 Press [ENT].
The rightmost digit in display field 2 flashes and its value can be changed. Change to the desired setting by pressing [Λ], [V], [<], or [>].

If the SP limit function is enabled, a value exceeding the limit cannot be set.
If you need to change the value, change the SP limit first.



4 Press [ENT].

The new value stops flashing and is now set.

If [MENU] is pressed while the setting is flashing, the status returns to that of step 1.



The SP can be changed in the operation display only in AUTO mode.

In MANUAL mode, the MV can always be changed. The specified value is immediately set as the MV.

RUN/READY mode selection

1



Press [MENU] once to show the operation display.

2



Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.

3



Press [ENT].

A--n is shown in display field 1 and AUto in display field 2.

In ON/OFF control, r--r is shown in display field 1.

4



Press [V] once.

r--r is shown in display field 1 and rdY (or rUn) in display field 2.

The current mode is indicated by rUn (RUN) or rdy (READY).

5



Press [ENT].

rdY(or rUn) flashes in display field 2.

Press [^] or [V] to select rUn (or rdY).

If "RUN/READY selection" is set for the internal contacts, the display does not flash and the mode cannot be changed using the keys.

6



Press [ENT].

The new value stops flashing and the mode is now set.

Setup of PID values

1



Press [MENU] once to show the operation display.

2



Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.

3



Press [V] or [^] several times.

PId is shown in display field 1.

4



Press [ENT].

P-I (proportional band) is shown in display field 2 and the present setting is shown in display field 2.

If the control method is ON/OFF control, the parameter and setting are not displayed.

5



Press [ENT].

The rightmost digit in display field 2 flashes.

Change to the desired P value by pressing [^], [V], [<], or [>].

6



Press [ENT].

The new value stops flashing and is now set.

The setting range of the proportional band is from 0.1 to 999.9 %.

Use I-I for specifying the integral time (0–19999 s) and d-I for the derivative time (0–19999 s).

Setup of event value

1 Press [MENU] once to show the operation display.



2 Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.



3 Press [V] or [Λ] several times.

Eu is shown in display field 1.



4 Press [ENT].
Press [V] several times.
E 1 is shown in display field 1 and 0 in display field 2.

0 in display field 2 means that the event main setting is 0.



5 Press [ENT].

The rightmost digit in display field 2 flashes.

Change to the desired setting by pressing [<] or [Λ] ("20" is selected in this example).



6 Press [ENT].

The new value stops flashing and is now set.



Use e2 to specify the setting for event 2, and e3 for event 3.

7 To proceed to hysteresis setup, press [V] twice or press [Λ] several times. E 1HY is shown in display field 1 and 5 in display field 2.

5 in display field 2 means that the hysteresis setting is 5.



8 In the same manner as changing the event setting, press [ENT] to make the setting flash, and press [V], [Λ], or [<] to change to the desired setting.

Then, press [ENT] to set the value.



Use E2HY to specify the hysteresis setting for event 2, and E3HY for event 3.

Automatic adjustment forposition proportional control

If "R1" (motor drive relay output) is selected for the control output option in the model number, and if C057 (setup bank) is set to 0 (initial value) or 1, be sure to execute automatic adjustment for position proportional control described below.

1 Press [MENU] once to show the operation display.



2 Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.



3 Press [V] or [Λ] several times. SEUP is shown in display field 1.



4 Press [ENT].

Press [Λ], [V], [<], or [>] several times.
C060 is shown in display field 1 and 0 in display field 2.



5 Press [ENT].
The rightmost digit in display field 2 flashes.
Press [Λ] or [V] to change the value to 1.
Press [ENT] to start automatic adjustment.



6 Display field 1 shows CACL and the relay to close turns ON.

Display field 2 shows the MFB count. When the count stabilizes, display field 1 shows CAOP and the relay for opening turns ON.

When the count stabilizes, automatic adjustment ends and the operation display is shown.



To stop automatic adjustment, press [MENU].

During automatic adjustment, no key operations are possible other than stopping the adjustment with [MENU].

Parameters

: Essential parameters for PV measurement and control
: Basic parameters
: Required when using optional functions

Operation settings

Display Left: display field 1 Right: display field 2		Item	Description	Initial value	Setting
Value (PV)	Value (SP)	SP (target value) MV	SP: SP low limit to high limit MV: −10.0 to +110.0 % (display field 3) SP can be changed in AUTO mode. MV can be changed in MANUAL mode (the value flashes).	0	
LSP1 *1	LSP	LSP No. (the last digit)*2	From 1 to the number set for LSP system group (max. = 8)	1	
PtO1 *1	Value (SP)	Pattern No., SP, segment remaining time, segment No.	The setting cannot be changed. Display field 1 shows the pattern No. (1 to the number of patterns). Display field 3 shows the segment remaining time. Display field 4 shows the segment No.	—	
HEAt	Value	Heat MV	The setting cannot be changed. −10.0 to +110.0 %	—	
CooL	Value	Cool MV		—	
Value (PV)	At1 *1	AT progress (the last digit)*2	The setting cannot be changed.	—	
Ct1	Value	CT1 current when output ON	The setting cannot be changed.	—	
Ct2	Value	CT2 current when output ON	The setting cannot be changed.	—	
ut	Value	VT voltage	The setting cannot be changed.	—	
rStr	Value	Resistance	The setting cannot be changed.	—	
E1	Value	Internal event 1 main setting	−19999 to +19999 U or 0 to 19999 U*1	0	
E1Sb	Value	Internal event 1 sub-setting		0	
t1-- *1	Value	Internal event 1 timer remaining time	The setting cannot be changed. Display field 1: ON delay / OFF delay distinction is displayed.	—	
E2	Value	Internal event 2 main setting	Same as for Internal event 1 main setting	0	
E2Sb	Value	Internal event 2 sub-setting	Same as for Internal event 1 sub-setting	0	
t2-- *1	Value	Internal event 2 timer remaining time	Same as for Internal event 1 timer remaining time	—	
E3	Value	Internal event 3 main setting	Same as for Internal event 1 main setting	0	
E3Sb	Value	Internal event 3 sub-setting	Same as for Internal event 1 sub-setting	0	
t3-- *1	Value	Internal event 3 timer remaining time	Same as for Internal event 1 timer remaining time	—	

*1. Display example. *2. The rightmost digit

Parameter settings

ModE [Mode bank]

Display		Item	Description	Initial value	Setting
A--M		AUTO/MANUAL mode selection	AUto: AUTO mode MAn: MANUAL mode	AUTO	
r--r		RUN/READY mode selection	rUn: RUN mode rdy: READY mode	RUN	
L--r		LSP/RSP mode selection	LSP: LSP rSP: RSP	LSP	
At		AT start/stop selection	AtoF: AT stop Aton: AT start	AT stop	
AtEr		Auto tuning error	EroF: Normal Eron: Abnormal	Normal	
bFLt		Release all latches	LtoF: Continue latches Lton: Release latches	Continue latches	
C--P	●	Constant value operation / pattern operation selection	CSt: Constant value operation Ptn: Pattern operation	Constant value operation	
Adv	●	Pattern operation ADVANCE	AdoF: No ADVANCE Adon: ADVANCE	No ADVANCE	
HoLd	●	Pattern operation HOLD	HdoF: No HOLD Hdon: HOLD	No HOLD	
9SM	●	Pattern operation G.SOAK clear	9Son: G.SOAK continues 9SoF: G.SOAK ends	G.SOAK continues	
FFAt	●	FF-FITTER automatic tuning selection	FFoF: No auto-tuning FFon: Use auto-tuning	No auto-tuning	

SP [SP bank]

Display		Item	Description	Initial value	Setting
rSP		RSP	The setting cannot be changed.	–	
PI dr	●	PID.R	1–8	1	
SP-1 to SP-8	●	LSP1–8 SP	SP low limit toSP high limit	0	
PId1 to PId8		LSP1–8 PID group No.	1–8	1	
rnP1 to rnP8	●	LSP1-8 ramp	0–19999 U	0	

Eu [Event bank]

Display		Item	Description	Initial value	Setting
E1 to E8		Internal events 1–8 Main setting	−19999 to +19999 U or 0 to 19999 U*1	0	
E1Sb to E8Sb		Internal events 1–8 Sub-setting	−19999 to +19999 U or 0 to 19999 U*1	0	
E1HY to E8HY		Internal events 1–8 Hysteresis	0 to 19999 U*1	5	
E1on to E8on	●	Internal events 1–8 ON-delay time	0 to 19999 U*2	0	
E1oF to E8oF	●	Internal events 1–8 OFF-delay time	0 to 19999 U*2	0	

*1. The number of decimal places changes according to the operation type of the internal event.
2. The number of decimal places changes according to the delay time decimal point position of the internal event.

PId [PID bank]

Display		Item	Description	Initial value	Setting
P-1 to P-8		PID1–8 proportional band	0.1–1999.9 %	5.0	
I-1 to I-8		PID1–8 integral time	0–19999 s (0 = no operation)*	120	
d-1 to d-8		PID1–8 derivative time	0–19999 s (0 = no operation)*	30	
rE-1 to rE-8		PID1–8 manual reset	−10.0to +110.0 %	50.0	
oL-1 to oL-8	●	PID1–8 output low limit	−10.0to +110.0 %	0.0	
oH-1 to oH-8	●	PID1–8 output high limit	−10.0to +110.0 %	100.0	
P-1C to P-8C		PID1–8 proportional band (cool)	0.1–1999.9 %	5.0	
I-1C to I-8C		PID1–8 integral time (cool)	0–19999 s (0 = no operation)*	120	
d-1C to d-8C		PID1–8 derivative time (cool)	0–19999 s (0 = no operation)*	30	
oL1C to oL8C	●	PID1–8 output low limit (cool)	−10.0 to+110.0 %	0.0	
oH1C to oH8C	●	PID1–8 output high limit (cool)	−10.0 to+110.0 %	100.0	

*The number of decimal places changes according to the [PID decimal point position].

PArA [Parameter bank]

	Display		Item	Description	Initial value	Setting
Control	CtrL		Control method	0: ON/OFF control 1: PID control	0 or 1	
	AtoL		MV low limit at AT	−10.0 to +110.0 %	0.0	
	AtoH		MV high limit at AT	−10.0 to +110.0 %	100.0	
	dIFF		ON/OFF control differential	0–19999 U	5	
	oFFS	●	ON/OFF control operating point offset	−19999 to +19999 U	0	
PV	FL		PV filter	0.0–120.0 s	0.0	
	rA	●	PV ratio	0.001–19.999	1.000	
	bI		PV bias	−19999 to +19999 U	0	
	FL2		RSP filter	0.0–120.0 s	0.0	
	rA2		RSP ratio	0.001–19.999	1.000	
	bI2		RSP bias	−19999 to +19999 U	0	
	PuAS		PV assignment	0: PV 1: Virtual PV	0	
	Putn		PV linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	
Continuous output	o1tn		OUT 1 continuous output linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	
	o2tn		OUT 2 continuous output linearization table group definition	Same as for OUT 1 continuous output linearization table group definition	0	
	AUtn		AUX output: continuous output linearization table group definition	Same as for OUT 1 continuous output linearization table group definition	0	
Control	oUtL		Output variation limit	0.0–1999.9 %/s (0.0 = no operation)	0.0	
SP	SPU	●	SP up ramp	0–19999U (0U = no slope)	0	
	SPd	●	SP down ramp	0–19999U (0U = no slope)	0	
	SPPS	●	SP ramp PV start	0: PV start allowed 1: PV start prohibited	0	
	rSPU	●	RSP up ramp	0–19999 U (0 U = no slope)	0	
	rSPd	●	RSP down ramp	0–19999 U (0 U = no slope)	0	
	rSPS	●	RSP ramp PV start	0: PV start allowed 1: PV start prohibited	0	
	rSAS	●	RSP assignment	0: RSP 1: Virtual RSP	0	
	rStn	●	RSP linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	

Items marked with ● in the tables are displayed if standard configuration or advanced configuration is selected for the user level.
To change the user level, see **Changing the user level** on page 10.

Et [Extended tuning bank]

Display		Item	Description	Initial value	Setting
AtEy		AT type	0: Normal 1: Immediate response 2: Stable	0	
SPLg	●	SP lag time	0.0–1999.9	0.0	
At-P	●	AT proportional band adjust	0.00–199.99	1.00	
At-I	●	AT integral time adjust	0.00–199.99	1.00	
At-d	●	AT derivative time adjust	0.00–199.99	1.00	
AtPt	●	MV switching point type for AT	0: Default (⅔of the deviation of the initial PV from the initial SP) 1: SP 2: PV	0	
AtPu	●	MV switching point PV for AT	−19999 to +19999 U	0	
CtrA	●	Control algorithm	0: PID-A (deviation-derivative type) 1: Ra-PID (high-performance PID) 2: PID-B (PV derivative type)	0	
CLg	●	Cooling gain	−10.0 to+110.0 %	30.0	

SEUP [Setup bank]

Display			Item	Description	Initial value	Setting
Analog input	C001		PV input range type	See the PV input range table.	88	
	C003	●	Reference junction compensation (cold junction compensation)	0: Internal compensation (by this device) 1: External compensation (by another device)	0	
	C004		PV decimal point position	0: No decimal point 1–3: 1–3 digits after the decimal point	0	
	C005		PV range low limit	If the PV input range type is DC voltage/current: −19999 to +19999U	0	
	C006		PV range high limit	If the PV input range type is DC voltage/current: −19999 to +19999U	1000	
	C007	●	SP low limit	PV range low limit to PV range high limit	0	
	C008	●	SP high limit	PV range low limit to PV range high limit	1000	
	C009	●	PV square root extraction dropout	0.0–100.0 % (0.0 = no square root extraction)	0.0	
	C010		RSP input range type	84: 0–1 V, 86: 1–5 V, 87: 0–5 V, 88: 0–10 V, 89: 0–20 mA, 90: 4–20 mA, 91: 2–10 V, 92: −10 to +10 V	88	
	C011		RSP input range low limit	−19999 to +19999 U	0	
	C012		RSP input range high limit	−19999 to +19999 U	1000	
Control action	C014		Control action (direct/reverse)	0: Heating control (reverse action) 1: Cooling control (direct action)	0	
	C015	●	Output operation at PV alarm	0: Continue control calculations 1: Output the value set for [Output at PV alarm]	0	
	C016	●	Output at PV alarm	−10.0 to+110.0 %	0.0	
	C017	●	Output at READY	−10.0 to+110.0 %	0.0	
	C018	●	Output at READY (cool)	−10.0 to+110.0 %	0.0	
	C019	●	Output operation at changing AUTO/MANUAL	0: Bumpless transfer 1: Preset	0	
	C020	●	Preset MANUAL value	−10.0 to +110.0 %	0.0 or 50.0	
	C021	●	Initial output type of PID control	0: Automatic 1: Do not initialize 2: Initialize	0	
	C022	●	Initial output of PID control	−10.0 to+110.0 %	0.0 or 50.0	
	C023		Integral time and derivative time decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	
	C024		Zone PID operation	0: Do not use 1: Used with SP change 2: Used with PV change	0	
	C026		Heat/cool control	0: Do not use 1: Individual PID 2: Shared PID	0	
	C028		Heat/cool control dead zone	−100.0 to+100.0 %	0.0	
SP	C030		LSP system group	1–8	1	
	C031	●	SP ramp type	0: Standard 1: Multi-ramp	0	
	C032	●	SP ramp unit	0: 1 s 1: 1 min 2: 1 h	1	

Display			Item	Description	Initial value	Setting
Continuous output	C042		OUT 1 continuous output range	For current output 1: 4–20 mA 2: 0–20 mA For voltage output 1: 1–5 V 2: 0–5 V 3: 0–10 V	1	
	C043		OUT 1 continuous output type	0: MV 1: Heating MV 2: Cooling MV 3: Loop PV 4: Loop PV before compensation 5: Loop SP 6: Deviation 7: CT1 current when output ON 8: CT2 current when output ON 9: MFB opening (including estimate) 10: Loop SP + MV 11: Loop PV + MV 12–2047: Invalid 2048–3071: Standard numerical codes	0	
	C044		OUT 1 continuous output scaling low limit	−19999 to +19999 U	0.0	
	C045		OUT 1 continuous output scaling high limit	−19999 to +19999 U	100.0	
	C046		OUT 1 continuous output MV scaling width	0–19999 U (valid when Output 1 continuous output type = 10 or 11)	200	
	C047		OUT 2 continuous output range	Same as for OUT 1 continuous output range	1	
	C048		OUT 2 continuous output type	Same as for OUT 1 continuous output type	3	
	C049		OUT 2 continuous output scaling low limit	Same as for Output 1 continuous output scaling low limit	0	
	C050		OUT 2 continuous output scaling high limit	Same as for Output 1 continuous output scaling high limit	1000	
	C051		OUT 2 continuous output MV scaling width	Same as for Output 1 continuous output MV scaling width	200	
	C052		AUX output: continuous output range	Same as for OUT 1 continuous output range	1	
	C053		AUX output: continuous output type	Same as for OUT 1 continuous output type	3	
	C054		AUX output: continuous output scaling low limit	Same as for Output 1 continuous output scaling low limit	0	
	C055		AUX output: continuous output scaling high limit	Same as for Output 1 continuous output scaling high limit	1000	
	C056		AUX output: continuous output MV scaling width	Same as for Output 1 continuous output MV scaling width	200	
Position proportioning	C057		Position proportional control: method selection	0: MFB control + control with estimated position 1: MFB control + close upon error 2: Control with estimated position 3: Control with estimated position + position adjustment at power-on	0	
	C058		Position proportional control: dead zone	0.5–2.5 %	10.0	
	C059		Position proportional control: long service life	0: Priority on controllability 1: Priority on service life	1	
	C060		Position proportioning: automatic adjustment	0: Stop 1: Start	0	
	C061		Position proportioning: adjustment value when fully closed	0–9999	1000	
	C062		Position proportioning: adjustment value when fully open	0–9999	3000	
	C063		Position proportioning: adjustment value for time until fully open	1.0–300.0 s	30.0	
Communication	C064		Communication type	0: CPL 1: Modbus™/ASCII 2: Modbus™/RTU 3: PLC Link Communication	0	
	C065		Station address	1–127 (0: no communication)	0	
	C066		Transmission speed	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4: 57600 bps	2	
	C067		Data format (data length)	0: 7 bits 1: 8 bits	1	
	C068		Data format (parity)	0: Even 1: Odd 2: None	0	
	C069		Data format (stop bits)	0: 1 bit 1: 2 bits	0	
	C070	●	Response time-out	1–250 ms	3	

Display		Item	Description	Initial value	Setting
Key operation & display					
C072		[FN] key function	0: Disable 1: AUTO/MANUAL selection 2: RUN/READY selection 3: AT stop/start instruction 4: LSP group selection 5: Release all latches 6: LSP/RSP selection 7: Invalid 8: Constant value operation / pattern operation selection 9: Pattern operation ADVANCE 10: Pattern operation HOLD 11: Pattern operation G.SOAK clear 12: FF-FITTER automatic tuning selection 13–20: Invalid 21–36:User-defined bits 1–16 selection	1	
C073	●	Mode display setup (the sum of the weights)	Bit 0: AUTO/MANUAL display (Yes: +1) Bit 1: RUN/READY display (Yes: +2) Bit 2: LSP/RSP display (Yes: +4) Bit 3: AT stop/start display (Yes: +8) Bit 4: Release all latches display (Yes: +16) Bit 5: Invalid Bit 6: Pattern operation function display (Yes: +64) Bit 7: FF-FITTER automatic tuning (Yes: +128)	255	
C074	●	PV/SP display setup (the sum of the weights)	Bit 0: PV display (Yes: +1) Bit 1: SP display (Yes: +2) Bit 2: LSP group No. display (Yes: +4) Bit 3: Pattern operation display (Yes: +8) Bits 4–7: Invalid	15	
C075	●	MV display setup (the sum of the weights)	Bit 0: MV display (Yes: +1) Bit 1: Heating MV / cooling MV (Yes: +2) Bit 2: MFB display (Yes: +4) Bit 3: AT display (Yes: +8) Bits 4–7: Invalid	15	
C076	●	Event settings display setup	0: Do not show 1: Show for internal event 1 2: Show for internal events 1–2 3: Show for internal events 1–3	0	
C077	●	Event remaining time display setup	0: Do not show 1: Show for internal event 1 2: Show for internal events 1–2 3: Show for internal events 1–3	0	
C078	●	CT/VT display setup (the sum of the weights)	Bit 0: CT1 display (Yes: +1) Bit 1: CT2 display (Yes: +2) Bit 2: VT display (Yes: +4) Bit 3: Resistance display (Yes: +8) Bits 4–7: Invalid	0	
C079		User level	0: Simple 1: Standard 2: Advanced	1	
C080	●	User-defined function indicator lighting conditions	1024–2047: Standard bit numbers	1024	
C081	●	Multi-status (MS) display, condition (top priority)	1024–2047: Standard bit numbers	1568	
C082	●	Multi-status (MS) display, status (top priority)	0: On 1: Slow blink 2: 2 times blink 3: Fast blink 4: Left to right 5: Right to left 6: Left ↔ right 7: Dev OK 8: Dev graph 9: MV graph 10: Heating MV graph (for heat/cool control) 11: Cooling MV graph (for heat/cool control) 12: MFB graph (including currently estimated MFB) 13: DI monitor 14: Internal contact monitor 15: Internal event monitor 16: Polarity MV graph 17: Progress time in pattern 18: Pattern remaining time 19: Progress time in segment 20: Segment remaining time	1	
C083	●	Multi-status (MS) display, condition (second priority)	Same as for Multi-status (MS) display, condition (top priority)	1792	
C084	●	Multi-status (MS) display, status (second priority)	Same as for Multi-status (MS) display, status (top priority)	6	
C085	●	Multi-status (MS) display, condition (third priority)	Same as for Multi-status (MS) display, condition (top priority)	1025	
C086	●	Multi-status (MS) display, status (third priority)	Same as for Multi-status (MS) display, status (top priority)	9	
C087	●	Multi-status (MS) display, deviation range	0–19999 U	5	

Display		Item	Description	Initial value	Setting
Other					
C088	●	Zener barrier adjustment function	0–15Set 5 to enable adjustment.	0	
C089	●	Zener barrier adjustment value	−20.00 to +20.00	0.00	
C097		PV input failure (under range) type	0: −10 % FS 1: −5 mV (valid only when C001 (PV input range type) is set to 17 or 23.)	0	
C098	●	Sampling cycle	0: 25 ms 1: 50 ms 2: 100 ms 3: 300 ms 4: 500 ms	1, 2	
C099	●	Power frequency	0: 50 Hz 1: 60 Hz	0	
C100	●	Operation display restoration time	0–60 min (Display does not switch automatically to the operation display if set to 0.)	3	
C101	●	MANUAL operation at power-on	0: Normal 1: Restoring MV before power outage	0	
C102	●	SP ramp decimal point position	0: None 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	
C103	●	Pattern operation prohibited/allowed	0: Prohibited 1: Allowed	0	
C104	●	OS prohibited/allowed	0: Prohibited 1: Allowed	0	
C105	●	FF-FITTER prohibited/allowed	0: Prohibited 1: Allowed	0	
C106	●	Position proportional control: target type	2048–3071: Standard numerical codes	2416	
C107	●	Position proportional control: linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	
C108	●	Position proportioning: automatic adjustment result	0: Not executed 1: Succeeded 2: Failed	0	
C109	●	RSP tracking	0: Tracking OFF 1: Tracking ON	0	
C110	●	Fixed value output group definition	0: Do not use 1–8: Groups 1–8	0	
C111	●	Fixed value output slope time unit	0: 1 s 1: 1 min 2: 1 h 3: 1 day	0	
C112	●	Fixed value output slope decimal point position	0: No decimal point 1: 1 digits after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	
C113	●	Available user operation screens	0: Do not use 1–8: Available user operation screens	0	
C114	●	Operation display settings	0: Displays all operation screens 1: Displays basic + UO + UF screens	0	
C115	●	Mode at startup: Run/Ready*	0: Value saved in the nonvolatile memory 1: RUN 2: READY	0	

* This function was added in ROM version 1.03.

[Event configuration bank]

Display		Item	Description	Initial value	Setting
E1C1 to E8C1		Internal event 1–8 operation type	See "Event types."	0	
E1C2 to E8C2	●	Internal event 1–8 direct/reverse	0: Direct 1: Reverse	0	
E1C3 to E8C3	●	Internal event 1–8 standby	0: None 1: Standby 2: Standby + standby when the SP is changed	0	
E1C4 to E8C4	●	Internal event 1–8 event state at READY	0: Remain ON 1: Forced OFF	0	
E1C5 to E8C5	●	Internal event 1–8 delay unit	0: 1 s 1: 1 min 2: 1 h	0	
E1C6 to E8C6	●	Internal event 1–8 delay time decimal point position	0: None 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	
E1C7 to E8C7		Internal event 1–8 operation No. definition	2048–3071: Standard numerical codes	2048	

CtUt [CT/VT bank]

Display		Item	Description	Initial value	Setting
C1Y1 to C2Y1		CT1–2 operation type	0: Continuous current measurement 1: Heater burnout detection	0	
C1o1 to C2o1		CT1–2 output	0: Control output 1 1: Control output 2 2: Event output 1 3: Event output 2 4: Event output 3	0	
C1t1 to C2t1		CT1–2 measurement wait time	30–300 s	30	
C1tn to C2tn	●	CT1–2 CT sensor turn num	100–6000 turns	800	

Display		Item	Description	Initial value	Setting
C1LP to C2LP	●	CT1–2 number of power wire passes	1–6 times	1	
C1FL to C2FL	●	CT1–2 filter	0.0–120.0 s	0.1	
C1rA to C2rA	●	CT1–2 ratio	0.001–19.999	1.000	
C1bI to C2bI	●	CT1–2 bias	–1999.9 to +1999.9*1 or –199.99 to +199.99*2	0	
C1bo to C2bo	●	CT1–2 heater burnout detection threshold	0.0 to 1999.9*1 or 0.00 to 199.99*2	0	
C1oC to C2oC	●	CT1–2 overcurrent detection threshold	0.0 to 1999.9*1 or 0.00 to 199.99*2	0	
C1SC to C2SC	●	CT1–2 short-circuit detection threshold	0.0 to 1999.9*1 or 0.00 to 199.99*2	0	
C1HY to C2HY	●	CT1–2 hysteresis	0.0 to 1999.9*1 or 0.00 to 199.99*2	0.5 or 0.05	
C1dt to C2dt	●	CT1–2 delay time	0.0–1999.9 s	2.0	
C1UC to C2UC	●	CT1–2 condition for restoring not-measured status	1024–2047: Standard bit numbers	1024	
utPr to utPr	●	VT primary voltage	1.0–500.0	200.0	
utSE to utSE	●	VT secondary voltage	1.0–11.0	10.0	
utFL	●	VT filter	0.1–120.0 s	0.1	
utrA	●	VT ratio	0.001–19.999	1.000	
utbI	●	VT bias	–1999.9 to +1999.9	0.0	

*1. For a model with two CT inputs or a model with CT/VT input
*2. For a model with micro CT input

iC [Internal contacts bank]

Display		Item	Description	Initial value	Setting
iC11 to iCB1		Internal contact 1–8 operation type	0: No function 1: LSP group selection (0/+1) 2: LSP group selection (0/+2) 3: LSP group selection (0/+4) 4: PID group selection (0/+1) 5: PID group selection (0/+2) 6: PID group selection (0/+4) 7: Reserved 8: PV hold 9: PV max. hold 10: PV min. hold 11: Fixed value output group selection (0/+1) 12: Fixed value output group selection (0/+2) 13: Fixed value output group selection (0/+4) 14: Reserved 15: Output linearization table group selection (0/+1) 16: Output linearization table group selection (0/+2) 17–20: Reserved 21: RUN/READY selection 22: AUTO/MANUAL selection 23: LSP/RSP selection 24: AT stop/start selection 25–30: Reserved 31: RUN/READY selection (reverse) 32: AUTO/MANUAL selection (reverse) 33: LSP/RSP selection (reverse) 34–40: Reserved 41: Control operation direct/reverse selection 42: SP ramp enabled/disabled 43–45: Reserved 46: Timer stop/start selection 47: Release/continue all latches 48: Motor drive output: opening operation 49: Motor drive output: closing operation 50: Reserved 51: RUN/READY selection (edge) 52: AUTO/MANUAL selection (edge) 53: LSP/RSP mode selection (edge) 54: RUN selection (edge) 55: READY selection (edge) 56: AUTO selection (edge) 57: MANUAL selection (edge) 58: LSP selection (edge) 59: RSP selection (edge) 60: Constant value operation / pattern operation selection 61: ADVANCE 62: HOLD 63: G.SOAK clear 64–65: Reserved 66: Constant value operation / pattern operation selection (edge) 67: HOLD (edge) 68: G.SOAK clear (edge) 69: Reserved 70: Pattern selection (0/+1) 71: Pattern selection (0/+2) 72: Pattern selection (0/+4) 73: Pattern selection (0/+8) 74: Reserved	0	
iC12 to iCB2	●	Internal contact 1–8 input type	1024–2047: Standard bit numbers	1152–1155, 1024	
iC13 to iCB3		Internal contact 1–8 operation No. definition	When [Operation type] is "Timer start/stop selection": 0: All internal events 1–8: Internal event No. Other: Invalid (does not operate) When [Operation type] is "Output linearization table group selection": 1: Control output 1 continuous output 2: Control output 2 continuous output 3: AUX output: continuous output 11: Control output 1 time proportional output 12: Control output 2 time proportional output 13: Event output 1 time proportional output 14: Event output 2 time proportional output 15: Event output 3 time proportional output Other: Invalid (does not operate)	0	

do [DO bank]

Display		Item	Description	Initial value	Setting
do11 to do51	●	OUT1–2, EV1–3 DO operation type	0: ON/OFF output 1: Time proportional output	0, 1	
do12 to do52	●	OUT1–2, EV1–3 ON/OFF output type	1024–2047: Standard bit numbers	1024, 1088–1090	
do13 to do53	●	OUT1–2, EV1–3 time proportional output type	2048–3071: Standard numerical codes	2416, 2418	
do14 to do54	●	OUT1–2, EV1–3 time proportional operation type	0: Priority on controllability 1: Priority on actuator service life	0, 1	
do15 to do55		OUT1–2, EV1–3 time proportional cycle	0.1–120.0 s	10.0, 2.0	
do16 to do56	●	OUT1–2, EV1–3 minimum ON/OFF time	1–250 ms *At least 50 ms operation for relay output	50, 1	
do17 to do57	●	OUT1–2, EV1–3 time proportional linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	

bF [Logical operation bank]

Display		Item	Description	Initial value	Setting
bY01 to bY16	●	Logical operation 1–16 calculation type	1: Function 1 (A and B) or (C and D) 2: Function 2 (A or B) and (C or D) 3: Function 3 (A or B or C or D) 4: Function 4 (A and B and C and D) 5: Function 5 (((A and B) or C) and D)	1	
A-01 to A-16	●	Logical operation 1–16 input assign A	1024–2047: Standard bit numbers	1024	
b-01 to b-16	●	Logical operation 1–16 input assign B		1024	
C-01 to C-16	●	Logical operation 1–16 input assign C		1024	
d-01 to d-16	●	Logical operation 1–16 input assign D		1024	
PA01 to PA16	●	Logical operation 1–16 input bit polarity A	0: Direct 1: Invert 2: Rising 3: Falling	0	
Pb01 to Pb16	●	Logical operation 1–16 input bit polarity B		0	
PC01 to PC16	●	Logical operation 1–16 input bit polarity C		0	
Pd01 to Pd16	●	Logical operation 1–16 input bit polarity D		0	
aF01 to aF16	●	Logical operation 1–16 delay unit	0: 1 s 1: 1 min 2: 1 h	0	
dU01 to dU16	●	Logical operation 1–16 delay time decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	
on01 to on16	●	Logical operation 1–16 ON-delay time	0–19999 U*	0	
oF01 to oF16	●	Logical operation 1–16 OFF-delay time	0–19999 U*	0	
rE01 to rE16	●	Logical operation 1–16 polarity	0: Direct 1: Invert	0	
LE01 to LE16	●	Logical operation 1–16 latch	0: No 1: Yes (ON latch) 2: Yes (OFF latch) (except OFF at power-on)	0	

* The number of decimal places changes according to the [Delay time decimal point position].

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tbL [Linearization table bank]

Display		Item	Description	Initial value	Setting
t 1tY to t4tY	●	Linearization table 1–4 operation type	0: Breakpoint 1: Bias	0	
t 1dP to t4dP	●	Linearization table 1–4 decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	1	
tA01 to t4A01	●	Linearization table 1–4 breakpoint A1	–19999 to +19999 U*	–1999.9	
tA02 to t4A02	●	Linearization table 1–4 breakpoint A2	–19999 to +19999 U*	1999.9	
tA03 to t4A03	●	Linearization table 1–4 breakpoint A3	–19999 to +19999 U*	0.0	
tA04 to t4A04	●	Linearization table 1–4 breakpoint A4	–19999 to +19999 U*	0.0	
tA05 to t4A05	●	Linearization table 1–4 breakpoint A5	–19999 to +19999 U*	0.0	
tA06 to t4A06	●	Linearization table 1–4 breakpoint A6	–19999 to +19999 U*	0.0	
tA07 to t4A07	●	Linearization table 1–4 breakpoint A7	–19999 to +19999 U*	0.0	
tA08 to t4A08	●	Linearization table 1–4 breakpoint A8	–19999 to +19999 U*	0.0	
tA09 to t4A09	●	Linearization table 1–4 breakpoint A9	–19999 to +19999 U*	0.0	
tA10 to t4A10	●	Linearization table 1–4 breakpoint A10	–19999 to +19999 U*	0.0	
tA11 to t4A11	●	Linearization table 1–4 breakpoint A11	–19999 to +19999 U*	0.0	
tA12 to t4A12	●	Linearization table 1–4 breakpoint A12	–19999 to +19999 U*	0.0	
tA13 to t4A13	●	Linearization table 1–4 breakpoint A13	–19999 to +19999 U*	0.0	
tA14 to t4A14	●	Linearization table 1–4 breakpoint A14	–19999 to +19999 U*	0.0	
tA15 to t4A15	●	Linearization table 1–4 breakpoint A15	–19999 to +19999 U*	0.0	
tA16 to t4A16	●	Linearization table 1–4 breakpoint A16	–19999 to +19999 U*	0.0	
tA17 to t4A17	●	Linearization table 1–4 breakpoint A17	–19999 to +19999 U*	0.0	
tA18 to t4A18	●	Linearization table 1–4 breakpoint A18	–19999 to +19999 U*	0.0	
tA19 to t4A19	●	Linearization table 1–4 breakpoint A19	–19999 to +19999 U*	0.0	
tA20 to t4A20	●	Linearization table 1–4 breakpoint A20	–19999 to +19999 U*	0.0	
tb01 to t4b01	●	Linearization table 1–4 breakpoint B1	–19999 to +19999 U*	–1999.9	
tb02 to t4b02	●	Linearization table 1–4 breakpoint B2	–19999 to +19999 U*	1999.9	
tb03 to t4b03	●	Linearization table 1–4 breakpoint B3	–19999 to +19999 U*	0.0	
tb04 to t4b04	●	Linearization table 1–4 breakpoint B4	–19999 to +19999 U*	0.0	
tb05 to t4b05	●	Linearization table 1–4 breakpoint B5	–19999 to +19999 U*	0.0	
tb06 to t4b06	●	Linearization table 1–4 breakpoint B6	–19999 to +19999 U*	0.0	
tb07 to t4b07	●	Linearization table 1–4 breakpoint B7	–19999 to +19999 U*	0.0	
tb08 to t4b08	●	Linearization table 1–4 breakpoint B8	–19999 to +19999 U*	0.0	
tb09 to t4b09	●	Linearization table 1–4 breakpoint B9	–19999 to +19999 U*	0.0	
tb10 to t4b10	●	Linearization table 1–4 breakpoint B10	–19999 to +19999 U*	0.0	
tb11 to t4b11	●	Linearization table 1–4 breakpoint B11	–19999 to +19999 U*	0.0	
tb12 to t4b12	●	Linearization table 1–4 breakpoint B12	–19999 to +19999 U*	0.0	
tb13 to t4b13	●	Linearization table 1–4 breakpoint B13	–19999 to +19999 U*	0.0	
tb14 to t4b14	●	Linearization table 1–4 breakpoint B14	–19999 to +19999 U*	0.0	
tb15 to t4b15	●	Linearization table 1–4 breakpoint B15	–19999 to +19999 U*	0.0	
tb16 to t4b16	●	Linearization table 1–4 breakpoint B16	–19999 to +19999 U*	0.0	
tb17 to t4b17	●	Linearization table 1–4 breakpoint B17	–19999 to +19999 U*	0.0	
tb18 to t4b18	●	Linearization table 1–4 breakpoint B18	–19999 to +19999 U*	0.0	
tb19 to t4b19	●	Linearization table 1–4 breakpoint B19	–19999 to +19999 U*	0.0	
tb20 to t4b20	●	Linearization table 1–4 breakpoint B20	–19999 to +19999 U*	0.0	

* The number of decimal places changes according to the [Linearization table 1–4 decimal point position].

Zone [Zone bank]

Display		Item	Description	Initial value	Setting
Zn-1 to Zn-7		Zone 1–7	–19999 to +19999 U	19999	
ZndF		Zone hysteresis	0–19999 U	5	

Udb [User-defined bit bank]

Display		Item	Description	Initial value	Setting
Ub01 to Ub16	●	User-defined bit 1–16	0–1	0	

Udu [User-defined value bank]

Display		Item	Description	Initial value	Setting
St01 to St16	●	User-defined values 1–16 Sign type	0: Signed 1: Unsigned	0	
PS01 to PS16	●	User-defined values 1–16 Settings decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	0	
Uu01 to Uu16	●	User-defined values 1–16 Settings user-defined value	–32768 to +32767U (signed)*1 0 to 65535U (unsigned)*1 If keys are used: –19999 to +19999 U	0	
Pn01 to Pn16	●	User-defined values 1–16 Monitor decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	0	
Un01 to Un16	●	User-defined values 1–16 User-defined monitor value	–19999 to +19999U (signed)*2 0–19999 U (unsigned)*2	The setting cannot be changed.	

*1. The number of decimal places changes according to the [User-defined value 1 Settings decimal point position].
*2. The number of decimal places changes according to the [User-defined value 1 Monitor decimal point position].

PtCF [Pattern operation configuration bank]

Display		Item	Description	Initial value	Setting
PC01	●	Pattern time unit	0: 1 s 1: 1 min 2: 1 h	0	
PC02	●	Pattern time decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	
PC03	●	Pattern SP change limit decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	
PC04	●	Pattern SP increase change limit	0–19999 U (0 = no change limit)*1	0	
PC05	●	Pattern SP decrease change limit	0–19999 U (0 = no change limit)*1	0	
PC06	●	Power outage recovery operation type	0: Stop pattern operation at power-on (READY) 1: Resume pattern operation at power-on	0	
PC07	●	Pattern start number	Model without extended data memory: Fixed at 1 Model with extended data memory: 1 to number of patterns	1	
PC08	●	Power outage recovery occurrence	0: None 1: Power restored after an outage	0	
PC09	●	Number of executed cycles	0–19999	The setting cannot be changed.	
PC10	●	Number of remaining cycles	0–19999	The setting cannot be changed.	
PC11	●	Progress time in pattern	0–19999 U*2	The setting cannot be changed.	
PC12	●	Pattern remaining time	0–19999 U*2	The setting cannot be changed.	
PC13	●	Progress time in segment	0–19999 U*2	The setting cannot be changed.	
PC14	●	Segment remaining time	0–19999 U*2	The setting cannot be changed.	
PC15	●	Segment event status	0: No segment event 1–16: Current segment event	The setting cannot be changed.	

*1. The number of decimal places changes according to the [Pattern SP change limit decimal point position].
*2. The number of decimal places changes according to the [Pattern time decimal point position].

Ptn1 to Ptn8 [Pattern 1–16 bank]

Ptn_, Pt_1 to Pt_G: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as G.

Display		Item	Description	Initial value	Setting
Pt11 to PtG1	●	Pattern 1–16 segment count	1–16	16	
Pt12 to PtG2	●	Pattern 1–16 PV start	0: Disable PV start 1: Enable PV start	0	
Pt13 to PtG3	●	Pattern 1–16 operation end status	0: READY 1: END 2: Constant value operation	0	
Pt14 to PtG4	●	Pattern 1–16 cycle	0–19999	0	
Pt15 to PtG5	●	Pattern 1–16 pattern link	Model with extended data memory: 0–16 Model without extended data memory: 0–1 0 means no link.	0	

Display		Item	Description	Initial value	Setting
PŁ 16 to PŁ96	●	Pattern 1–16 G.SOAK time	0–19999 U*	0	
SO ł ł to S 1681	●	Pattern 1–16 segment 1–16 SP	SP low limit toSP high limit The number of decimal places changes according to the [PV decimal point position].	0	
SO ł2 to S 1682	●	Pattern 1–16 segment 1–16 time	0–19999 U*	0	
SO ł3 to S 1683	●	Pattern 1–16 segment 1–16 PID group No.	1–8 (segment 1) 0–8 (segment 2–16)	0, 1	
SO ł4 to S 1684	●	Pattern 1–16 segment 1–16 segment event	0: No segment event 1–16: Segment No.	0	
SO ł5 to S 1685	●	Pattern 1–16 segment 1–16 G.SOAK type	0: No G.SOAK 1: G.SOAK at the segment end point 2: G.SOAK at the start of a segment	0	
SO ł6 to S 1686	●	Pattern 1–16 segment 1–16 G.SOAK width	0–19999 U*	0	

*The number of decimal places changes according to the [Pattern time decimal point position].

oS [Overshoot suppression bank]

Display		Item	Description	Initial value	Setting
oSS ł	●	SPOS prohibited/ allowed	0: Prohibited 1: Allowed	0	
oSS2	●	OS SP change detection threshold	0–19999 U (0 = SPOS operation stopped)	0	
oSS3	●	SPOS operation type	0: Peak reference 1: Deviation reference	0	
oSS4	●	SPOS starting threshold	0–19999 U (The peak reference operation of SPOS is stopped when 0 is set or when the sum of the SPOS starting threshold and the OS disturbance detection threshold is greater than or equal to the peak deviation.)	0	
oSS5	●	SPOS starting deviation	0–19999 U (The deviation reference operation of SPOS is stopped when 0 or a value less than the OS disturbance detection threshold is set.)	0	
oSS6	●	SPOS PV start	0: PV start prohibited 1: PV start allowed	0	
oSS7	●	SPOS correction strength	–1999.9 to +1999.9 % (0.0 = SPOS operation stopped)	0.0	
oSS8	●	SPOS correction constant	0–1999.9 (0.0 = SPOS operation stopped)	0.0	
oSd ł	●	DROS prohibited/ allowed	0: Prohibited 1: Allowed	0	
oSd2	●	OS disturbance detection threshold	0–19999 U (DROS operation is stopped if 0 is set. The peak reference operation of SPOS is stopped when the sum of the SPOS starting threshold and the OS disturbance detection threshold is greater than or equal to the peak deviation.)	0	
oSd3	●	DROS operation type	0: Peak reference 1: Deviation reference	0	
oSd4	●	DROS correction before start	0: No correction 1: Use correction	0	
oSd5	●	DROS starting threshold	0–19999 U (0 = Peak reference operation of DROS stopped)	0	
oSd6	●	DROS starting deviation	–19999 to +19999 U (0 = Deviation reference operation of DROS stopped)	0	
oSd7	●	DROS correction strength	–1999.9 to +1999.9 % (0.0 = DROS operation stopped)	0.0	
oSd8	●	DROS correction constant	0–1999.9 (0.0 = DROS operation stopped)	0.0	

FFF [FF-FITTER bank]

Display		Item	Description	Initial value	Setting
oP	●	FF-FITTER operation type	1024–2047: Standard bit numbers	1024	
Ł ł	●	T1 period	0.0–1999.9 s	0.0	
Ł łŁY	●	T1 period MV type	0: Feedback MV 1: Fixed MV (bumpless) 2: Fixed MV (preset)	0	
FF ł	●	FF1 preset MV	–10.0 to +110.0 %	0.0	
Ł łA	●	T1A period	0.0–1999.9 s	0.0	
FF łA	●	FF1A MV	–10.0 to +110.0 %	0.0	
Ł2ŁY	●	T2 period initial output type of PID control	0: Feedback MV 1: Fixed MV	0	
Ł2ñu	●	T2 period initial output of PID control	–10.0 to +110.0 %	0.0	
Ł2	●	T2 period	0.0–1999.9 s	0.0	
FF2	●	FF2 MV	–120.0 to +120.0 %	0.0	
FF3	●	FF3 MV	–120.0 to +120.0 %	0.0	
AC ł	●	T1 period automatic tuning coefficient	0.00–199.99	1.00	
AŁ ł	●	T1 period automatic tuning threshold	0.00–199.99 %	1.00	
AŁ3	●	FF3 MV automatic tuning type	0: (Maximum – Minimum) ÷ 2 1: Maximum 2: Minimum 3: Average	0	
ASŁS	●	FF-FITTER automatic tuning status	0: Not run / normal termination 1: Automatic tuning in progress 2: Abnormal termination	0	
AC2	●	T2 period automatic tuning coefficient	0.00–199.99	1.00	

Fo [Fixed value output bank]

Display		Item	Description	Initial value	Setting
Fo ł ł to Fo8 ł	●	Fixed value output 1–8 MV	–10.0 to +110 %	0.0	
Fo ł2 to Fo82	●	Fixed value output 1–8 up ramp	0–19999 U (0 U = no slope)*	0	
Fo ł3 to Fo83	●	Fixed value output 1–8 down ramp	0–19999 U (0 U = no slope)*	0	

* The unit changes according to the [Fixed value output slope time unit] and the number of decimal places changes according to the [Fixed value output slope decimal point position].

uPu [Virtual PV bank]

Display		Item	Description	Initial value	Setting
uł ŁY	●	Virtual PV input type	2048–3071: Standard numerical codes	2048	
uł FL	●	Virtual PV filter	0.0–120.0	0.0	
uł rR	●	Virtual PV ratio	0.001–19.999	1.000	
uł bł	●	Virtual PV bias	–19999 to +19999 U	0	
uł ł L	●	Virtual PV input scaling low limit	–19999 to +19999 U*	0	
uł ł H	●	Virtual PV input scaling high limit	–19999 to +19999 U*	1000	
uł oL	●	Virtual PV output scaling low limit	–19999 to +19999 U	0	
uł oH	●	Virtual PV output scaling high limit	–19999 to +19999 U	1000	
uł Sd	●	Virtual PV square root extraction dropout	0.0–100.0	0.0	
uł Łn	●	Virtual PV linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	

* The number of decimal places changes according to the standard numerical code selected by [Virtual PV input type].

urSP [Virtual RSP bank]

Display		Item	Description	Initial value	Setting
urŁY	●	Virtual RSP input type	2048–3071: Standard numerical codes	2048	
urFL	●	Virtual RSP filter	0.0–120.0 s	0.0	
urrR	●	Virtual RSP ratio	0.001–19.999	1.000	
urbł	●	Virtual RSP bias	–19999 to +19999 U	0	
urł L	●	Virtual RSP input scaling low limit	–19999 to +19999 U*	0	
urł H	●	Virtual RSP input scaling high limit	–19999 to +19999 U*	1000	
uroL	●	Virtual RSP output scaling low limit	–19999 to +19999 U	0	
uroH	●	Virtual RSP output scaling high limit	–19999 to +19999 U	1000	
urŁn	●	Virtual RSP linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	

* The number of decimal places changes according to the standard numerical code selected by [Virtual RSP input type].

Uo [User operation screen bank]

Display		Item	Description	Initial value	Setting
Uo ł ł to Uo8 ł	●	User operation screen 1–8 Data shown in display field 1	2048–3071: Standard numerical codes	2048	
Uo ł2 to Uo8 ł	●	User operation screen 1–8 Data shown in display field 2	2048–3071: Standard numerical codes	2048	
Uo ł3 to Uo8 ł	●	User operation screen 1–8 Data shown in display field 3	2048–3071: Standard numerical codes	2048	

UF [User function bank]

Display		Item	Description	Initial value	Setting
UF- ł to UF-8	●	User Function 1–8	–	–	

LoC [Lock bank]

Display		Item	Description	Initial value	Setting
LoC		Key lock	0: All settings can be specified. 1:Mode, event, operation display, SP, UF, lock, manual MV, and [FN] key operation can be specified. 2:Operation display, SP, UF, lock, manual MV, and [FN] key operation can be specified. 3:UF, lock, manual MV, and [FN] key operation can be specified.	0	
CLoC	●	Communication lock	0: Unlocked 1: Locked	0	
LLoC	●	Loader lock	0: Unlocked 1: Locked	0	
PASS		Password display	0–15 (5: Displays passwords 1A–2B)	0	
P5 1A		Password 1A	0000–FFFF (hex)	0000	
P52A		Password 2A	0000–FFFF (hex)	0000	
P5 1b		Password 1B	0000–FFFF (hex)	0000	
P52b		Password 2B	0000–FFFF (hex)	0000	

Id [Instrument information bank]

Display		Item	Description	Initial value	Setting
I d0 1	●	ROM ID	Model C2A: 18 Model C2B: 19 Model C3A: 20 Model C3B: 21	The setting cannot be changed.	
I d02	●	ROM version 1		The setting cannot be changed.	
I d03	●	ROM version 2		The setting cannot be changed.	
I d04	●	Loader information		The setting cannot be changed.	
I d05	●	EST information		The setting cannot be changed.	
I d06	●	Manufacturing date code (year)	Year – 2000 Example: Year 2024 is 24	The setting cannot be changed.	
I d07	●	Manufacturing date code (month, day)	Month + (day ÷ 100) Example: Dec. 1 is 12.01.	The setting cannot be changed.	
I d08	●	Serial No.		The setting cannot be changed.	
I d09	●	Model No.		The setting cannot be changed.	
I d 10	●	Model information		The setting cannot be changed.	
I d 11	●	Production base code		The setting cannot be changed.	
FP0 1 to FP 16	●	Advanced function password 1–16	0000–FFFF (hex)	0000	
A50 1	●	Control output 1 ON/OFF count	Actual on/off count ÷ 10 Example: 11 when the actual count is 110.	The setting cannot be changed.	
A502	●	Control output 2 ON/OFF count	Same as for Control output 1 ON/OFF count	The setting cannot be changed.	
A503	●	Event output 1 ON/OFF count	Same as for Control output 1 ON/OFF count	The setting cannot be changed.	
A504	●	Event output 2 ON/OFF count	Same as for Control output 1 ON/OFF count	The setting cannot be changed.	
A505	●	Event output 3 ON/OFF count	Same as for Control output 1 ON/OFF count	The setting cannot be changed.	

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Changing the user level

The user level can be selected from three options with C079.

The number of available displays and settings increases in the order: simple < standard < advanced.

All items are displayed when 2 (advanced) is selected.

1 Press [MENU] once to show the operation display.



2 Hold down [MENU] for 2 s or longer.

The screen for selecting a bank is shown and ModE flashes in display field 1.



3 Press [V] or [Λ] several times.

StUP is shown in display field 1.



4 Press [ENT].

C001 is shown in display field 1.



5 Press [V] or [Λ] several times to change to C079.

(C079: User level)



6 Press [ENT]. Display field 2 flashes.

Press [V] or [Λ] to change to the desired setting and then press [ENT] to set the value.



0: Simple
1: Standard (initial value)
2: Advanced

PV input range table

[Thermocouple]

C001 setting	Sensor type	Range (Celsius)			Range (Fahrenheit)		
1	K	–200.0	to	+1200.0	-300	to	+2200
2	K	0.0	to	1200.0	0	to	2200
3	K	0.0	to	800.0	0.0	to	1500.0
4	K	0.0	to	600.0	0.0	to	1100.0
5	K	0.0	to	400.0	0.0	to	700.0
6	K	–200.0	to	+400.0	-300.0	to	+700.0
7	K	–200.0	to	+200.0	-300.0	to	+400.0
8	J	0.0	to	1200.0	0	to	2200
9	J	0.0	to	800.0	0.0	to	1500.0
10	J	0.0	to	600.0	0.0	to	1100.0
11	J	–200.0	to	+400.0	-300.0	to	+700.0
12	E	0.0	to	800.0	0.0	to	1500.0
13	E	0.0	to	600.0	0.0	to	1100.0
14	T	–200.0	to	+400.0	-300.0	to	+700.0
15	R	0.0	to	1600.0	0	to	3000
16	S	0.0	to	1600.0	0	to	3000
17	B	0.0	to	1800.0	0	to	3300
18	N	0.0	to	1300.0	0	to	2300
19	PL Ⅱ	0.0	to	1300.0	0	to	2300
20	WRe5-26	0.0	to	1400.0	0	to	2400
21	WRe5-26	0	to	2300	0	to	4200
22	Ni-Ni•Mo	0.0	to	1300.0	0	to	2300
23	PR40-20	0	to	1900	0	to	3400
24	DINU	–200.0	to	+400.0	-300.0	to	+700.0
25	DINL	–100.0	to	+800.0	-150.0	to	+1500.0
26	Gold iron-Chromel	0.0	to	360.0	0.0	to	360.0
28	E	–200.0	to	+800.0	-300.0	to	+1500.0

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[RTD]

C00 1 setting	Sensor type	Range (Celsius)			Range (Fahrenheit)		
41	Pt100	−200.0	to	+500.0	-300.0	to	+900.0
42	JPt100	−200.0	to	+500.0	-300.0	to	+900.0
43	Pt100	−200.0	to	+200.0	-300.0	to	+400.0
44	JPt100	−200.0	to	+200.0	-300.0	to	+400.0
45	Pt100	−100.0	to	+300.0	-150.0	to	+500.0
46	JPt100	−100.0	to	+300.0	-150.0	to	+500.0
47	Pt100	−100.0	to	+200.0	-150.0	to	+400.0
48	JPt100	−100.0	to	+200.0	-150.0	to	+400.0
49	Pt100	−100.00	to	+150.00	-150.0	to	+300.0
50	JPt100	−100.00	to	+150.00	-150.0	to	+300.0
51	Pt100	−50.0	to	+200.0	-50.0	to	+400.0
52	JPt100	−50.0	to	+200.0	-50.0	to	+400.0
53	Pt100	−50.00	to	+100.00	-50.0	to	+200.0
54	JPt100	−50.00	to	+100.00	-50.0	to	+200.0
55	Pt100	−60.00	to	+40.00	-60.00	to	+100.00
56	JPt100	−60.00	to	+40.00	-60.00	to	+100.00
57	Pt100	−40.00	to	+60.00	-40.00	to	+140.00
58	JPt100	−40.00	to	+60.00	-40.00	to	+140.00
59	Pt100	−10.00	to	+60.00	-10.00	to	+140.00
60	JPt100	−10.00	to	+60.00	-10.00	to	+140.00
61	Pt100	0.00	to	100.00	0.0	to	200.0
62	JPt100	0.00	to	100.00	0.0	to	200.0
63	Pt100	0.0	to	200.0	0.0	to	400.0
64	JPt100	0.0	to	200.0	0.0	to	400.0
65	Pt100	0.0	to	300.0	0.0	to	500.0
66	JPt100	0.0	to	300.0	0.0	to	500.0
67	Pt100	0.0	to	500.0	0.0	to	900.0
68	JPt100	0.0	to	500.0	0.0	to	900.0
69	Pt100	−200.0	to	+850.0	-300.0	to	+1560.0
70	JPt100	−200.0	to	+640.0	-300.0	to	+1180.0

[DC voltage / DC current]

C00 1 setting	Sensor type	Range (Celsius)
81	0 to 10 mV	The scaling range is −19999 to +19999 U. The range is reset to 0–1000 if the setting of C00 1 is changed.
82	−10 to +10 mV	
83	0 to 100 mV	
84	0 to 1 V	
86	1 to 5 V	
87	0 to 5 V	
88	0 to 10 V	
89	0 to 20 mA	
90	4 to 20 mA	
91	2 to 10 V	
92	−10 to +10 V	

Alarm codes

● Input errors

Alarm code*1	Description	Cause	Corrective action
AL01	PV input error (over range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for PV input range type, etc.	Check the PV input range type (C00 1) and other settings.
AL02	PV input error (under range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for PV input range type, etc.	Check the PV input range type (C00 1) and other settings.
AL03	Reference junction compensation (cold junction compensation) error	Measurement range error in terminal temperature at reference junction compensation	Make sure that the ambient temperature is within the specifications of this product.
	RTD input error	Sensor burnout, incorrect wiring	Check the wiring.
AL05	RSP input error (over range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for RSP input range type, etc.	Check the RSP input range type (C0 10) and other settings.
AL06	RSP input error (under range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for RSP input range type, etc.	Check the RSP input range type (C0 10) and other settings.
AL07	MFB input error	MFB burnout, incorrect wiring	Check the wiring.
AL 10	Motor adjustment error	MFB automatic adjustment failure	Check the wiring and readjust.
		Incorrect setting of adjustment value during manual adjustment	Check the adjustment value when fully open and the adjustment value when fully closed.
AL 11	CT1/CT input error	Current input exceeding the high limit of the display range	Use a current transformer with a number of turns that matches the display range. Check the number of CT turns and the settings. Check the settings and the number of times the power wire passes through the CT.
		Incorrect wiring	Check the wiring.
AL 12	CT2/VT input error	Current (voltage) input exceeding the high limit of the display range	For a model with two CT inputs Use a current transformer with a number of turns that matches the display range. Check the number of CT turns and the settings. Check the settings and the number of times the power wire passes through the CT. For a CT/VT model Check the primary and secondary voltage values of the VT.
		Incorrect wiring	Check the wiring.

● Operation or setting errors

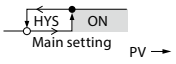
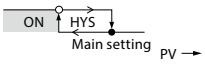
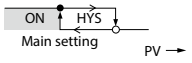
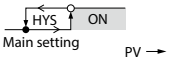
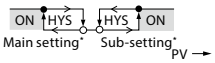
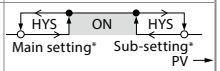
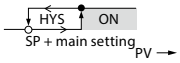
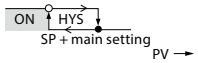
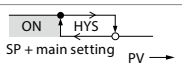
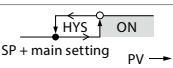
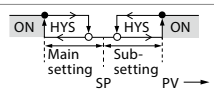
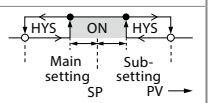
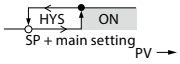
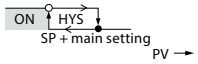
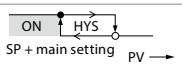
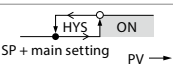
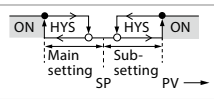
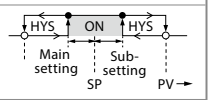
Alarm code*1	Description	Cause	Corrective action
AL50	Loader cable error	The USB loader cable (A to micro-B) is not being used to connect the loader.	Use the USB loader cable (A to micro-B).
AL51	PLC link error	Incorrect PLC link setup	Check the PLC link setup.
		Incorrect communication setup on the PLC	Check the communication setup of the connected PLC.
		Incorrect network configuration	Do not connect anything other than the C1M/C1A/C2/C3/PLC to the RS-485 communication line.
		Incorrect wiring	Check if the RS-485 communication line is properly connected.

● Instrument errors

Alarm code*1	Description	Cause	Corrective action
AL70	PV A/D conversion error	A/D conversion unit failure	Turn the power off and then on again. If the alarm is triggered when the power is turned on again, replace the device.
AL71	RSP A/D conversion error		
AL72	MFB A/D conversion error		
AL74	Nonvolatile memory error	Temporary communication error, corruption of written data, or failure of this device	
AL80	Nonvolatile memory not initialized		
AL81	Settings area error*2		The problem can be corrected with the following procedure: • Initialize the settings • Write the setting again If this procedure does not correct the problem, replace the device.
AL82	Adjustment value area error*2		Turn the power off and then on again. If the alarm is triggered when the power is turned on again, replace the device.
AL83	Internal system error		
AL84	Settings initialization error		Turn the power off and then on again. If the alarm is triggered after turning the power on again, the problem can be corrected with the following procedure: • Initialize the settings • Write the setting again If this procedure does not correct the problem, replace the device.
AL95	Settings error		
AL96	Adjustment value error		Turn the power off and then on again. If the alarm is triggered after turning the power on again, the problem can be corrected with the following procedure: • Restore adjustment values*3 If this procedure does not correct the problem, replace the device.
AL97	Extended data memory error	Pattern operation error, asset information read/write error, or corruption of data written of the extended data memory function, or failure of this device	Turn the power off and then on again. If the alarm is triggered after turning the power on again, the problem can be corrected with the following procedure: • Initialize the settings • Write the setting again If this procedure does not correct the problem, replace the device.
AL99	Internal program error	An internal error that interrupted execution of operation was detected.	

*1. Multiple alarms may occur at the same time. If the corrective action for one of the alarms says that the device should be replaced, it should be replaced.
*2. This error may occur when updating the firmware.
*3. If the area in memory for restoring the adjustment value has been corrupted, the value cannot be restored.

Event types

Operation type	Setting	Direct action ●: ON/OFF changes at the value ○: ON/OFF changes when the value is exceeded	Reverse action ●: ON/OFF changes at the value ○: ON/OFF changes when the value is exceeded
No event	0	Always OFF	Always OFF
PV high limit	1		
PV low limit	2		
PV high and low limits	3		
Deviation high limit	4		
Deviation low limit	5		
Deviation high and low limits	6		
Deviation high limit (final SP reference)	7		
Deviation low limit (final SP reference)	8		
Deviation high and low limits (final SP reference)	9		

: Initial value

* If the main setting is greater than the sub-setting, operations are performed with the settings automatically swapped.

Event types other than the above

Operation	
Type	Setting
SP high limit	10
SP low limit	11
SP high and low limits	12
MV high limit	13
MV low limit	14
MV high and low limits	15
MFB opening high and low limits	16
Loop diagnosis 1	20
Loop diagnosis 2	21
Loop diagnosis 3	22
High limit of standard numerical code	26
Low limit of standard numerical code	27
High and low limits of standard numerical code	28
PV change rate	29

Operation	
Type	Setting
High limit of PV change rate	55
Low limit of PV change rate	56
High limit of the change rate of standard numerical code	57
Low limit of the change rate of standard numerical code	58
Alarm (status)	61
READY (status)	62
MANUAL (status)	63
RSP (status)	64
AT in progress (status)	65
SP ramp in progress (status)	66
Control direct action (status)	67
Timer (status)	70
Estimating MFB (status)	71

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Chapter 1. Overview

1 - 1 Overview

This is a controller with a 48 × 96 mm / 96 × 96 mm front panel that features the following:

- LED display for excellent visibility
- Easy setting by [MENU], [FUNC], [ENT], and digit-change keys on the front panel.
- Input type: thermocouples (K, J, E, T, R, S, B, N, PLII, WRe5-26, Ni/Ni-Mo, PR40-20, DIN U, DIN L, Gold iron-Chromel), resistance temperature detectors (Pt100, JPt100), current signals (4–20 or 0–20 mA DC), voltage signals (0–10, −10 to +10, 0–100 mV DC or 0–1, 1–5, 0–5, 0–10, 2–10, −10 to +10 V DC).
- Control output type: relay, voltage pulse, current. These signals are assigned to control outputs 1 and 2 as specified by the model No. that the customer orders.
- Heating and cooling control using control output 2 and event relays
- ON/OFF control and PID control
- Event type: 3 events (common contacts), or 2 events (independent contacts)
- CT input, micro CT input, VT input, digital input, RSP input, RS-485 communication, and auxiliary output can be selected by the model number specified. In addition, the pattern operation extension and asset information storage function can be added.
- Loader connector as a standard feature
- The SLP-C1F Smart Loader Package can be used for easy reading and writing of parameters by connecting it with the USB loader cable (A to micro-B).
  With the SLP-C1F, the user can specify settings in a table format, operate this device, and monitor the control situation on the trend screen. The user can set up and monitor this device without having to create programs to communicate with a host device.
- This product is compliant with the EU Directive and is CE-marked (compliant with EN 61010-1, EN 61326-1, and EN IEC63000)

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■ Model selection table

Model selection of this device is shown below.

Basic model No.			Connection	Control output		Power	Options			Add'l proc.		Specifications	
										1	2		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	← Model No. digits	
C	2	A											
C	2	B											
C	3	A										48 × 96 mm front panel	
C	3	B										96 × 96 mm front panel	
			T									Screw terminal block	
		*2	S									Screwless terminal block	
												Control output 1	Control output 2
				R	0							Relay output (C.O. contacts)	None
		*3 *5		R	1							Motor drive relay output	None
				V	0							Voltage pulse output *1	None
				V	C							Voltage pulse output *1	Current output
				V	V							Voltage pulse output *1	Voltage pulse output *1
				C	0							Current output	None
				C	C							Current output	Current output
						A						AC power supply (100–240 V AC)	
					*2	D						DC power supply (24 V DC / 24 V AC)	
							1					3 event relay outputs (common contacts)	
							2					3 event relay outputs (common contacts), auxiliary output (current)	
							*3 3					3 event relay outputs (common contacts), auxiliary output (voltage)	
							4					2 event relay outputs (independent contacts)	
							5					2 event relay outputs (independent contacts), auxiliary output (current)	
							*3 6					2 event relay outputs (independent contacts), auxiliary output (voltage)	
								0				None	
								1				4 digital inputs	
								2				4 digital inputs, RS-485 communication	
								*3 3				2 digital inputs, RSP input	
								*3 4				2 digital inputs, RSP input, RS-485 communication	
									0			None	
									*4 1			2 CT inputs	
								*3	*4 2			CT/VT input	
								*3	*4 3			2 micro CT inputs	
								*3	*4 5			2 CT inputs, extended data memory	
								*3	*4 6			CT/VT input, extended data memory	
								*3	*4 7			2 micro CT inputs, extended data memory	
										0		None	
										D		With inspection report	
										Y		With traceability certificate	
											0	None	
										*2	A	UL-compatible model	

*1. For SSR drive

*2. Available soon

*3. Models C3A and C3B only

*4. Not selectable when R1 is selected for control output

*5. Not selectable for DC power models

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■ Accessories

Name	Qty.	Notes
Mounting bracket	2	When replacing, use model 84525941-001.
Gasket	1	When replacing, use model 84525942-001 or model 84525943-001.
User's Manual	1	Document No. CP-UM-6003JEC or CP-UM-6004JEC

■ Optional parts

Name	Model No.	Note (model No., etc.)
Mounting bracket *5	84525941-001	For maintenance of C2A, C2B, C3A, or C3B (qty. 2)
Gasket *5	84525942-001	For maintenance of C2A or C3A (qty. 20)
	84525943-001	For maintenance of C2B or C3B (qty. 20)
Hard cover *5	84525944-001	For C2A or C3A
	84525945-001	For C2B or C3B
Soft cover *5	84525946-001	For C2A or C3A
	84525947-001	For C2B or C3B
Terminal cover *1 *5	84525948-001	For C2A or C3A
	84525949-001	For C2B or C3B
Current transformer	QN206A*2	800 turns, hole diameter 5.8 mm
	QN212A*2	800 turns, hole diameter 12 mm
Voltage transformer	81406725-003*2	Primary side 200 V, secondary side 10 V
Smart Loader Package*3	SLP-C1FJA1	USB loader cable not included
	SLP-C1FJA2	USB loader cable for C1A/C2/C3 (A to micro-B) (model SLP-ULCJA0) included
	SLP-C1FJA3	USB loader cable for C1A/C2/C3 (A to micro-B) (model SLP-ULCJA0) and USB loader cable for C1M (model 81441177-001) included
USB loader cable (A to micro-B)*4	SLP-ULCJA0	USB loader cable for C1A/C2/C3
Right angle extension cable	SLP-ULLJA0	For SLP-ULCJA0

*1. Only for models with a screw terminal block

*2. Not UL-certified

*3. Ver. 2 and later support the C1A. Ver. 3 and later support the C2/C3.

*4. Hereafter "loader cable"

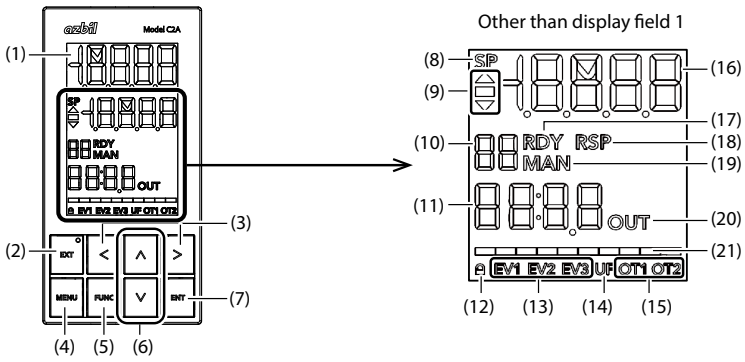
*5. Available soon

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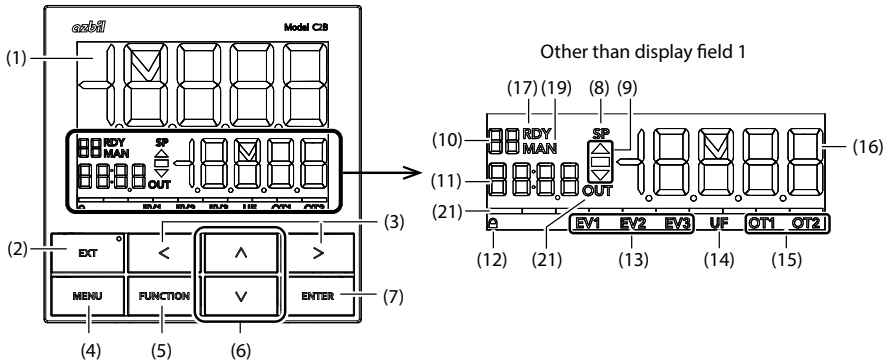
1 - 2 Names and Functions of Parts

■ Model C2/C3 and its console

Model C2A/C3A



Model C2B/C3B



(1)	Display field 1	Shows PV (present temperature, etc.) and items that can be set. When an alarm occurs, the normal display and an alarm code are displayed alternately.
(2)	Loader connector	Connect to a PC using the USB loader cable (A to micro-B) included with the Smart Loader Package.
(3)	[<] and [>] keys	Used for shifting between the digits of a number.
(4)	[MENU] key	Switches between the operation display, bank selection display, and settings display.
(5)	[FUNC] and [FUNCTION] keys	If it is held down for 2 seconds or longer when the operation display is shown, the preset operation (initial setting: AUTO/MANUAL selection) can be executed.
(6)	[∧] and [∨] keys	Used for incrementing/decrementing numeric values.
(7)	[ENT] and [ENTER] keys	Finalizes the entered value.
(8)	SP indicator	Lights up when the SP is displayed in display field 2.
(9)	Ramp indicator	Indicates the operating status of a pattern operation, SP ramp, and RSP ramp.
(10)	Display field 4	Shows the segment No. during a pattern operation or user operation screen No.
(11)	Display field 3	Shows the manipulated value (MV) or present values of monitored items.
(12)	Lock indicator	Lights up when any of the lock functions is enabled.
(13)	Event indicator	Lights up when the corresponding event output is ON.
(14)	User-defined function indicator	Lights up according to the setting of the user-defined function indicator.
(15)	Control output indicator	Lights up when the corresponding control output is ON.
(16)	Display field 2	Shows the SP (set temperature, etc.) or other settings.
(17)	RDY mode indicator	Lights up in READY (control stop) mode.
(18)	RSP mode indicator	Lights up in RSP mode.
(19)	MAN mode indicator	Lights up in MANUAL mode.
(20)	MV indicator	Lights up when the MV is displayed in display field 3.
(21)	Multi-status (MS) indicator	Various ON/OFF states or analog values such as an MV graph can be displayed by specifying the light-up condition and design.

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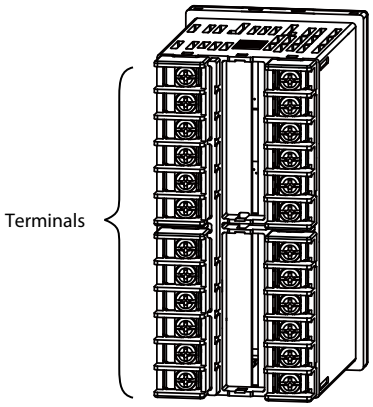
Handling Precautions

- The liquid crystal display (LCD) may respond slowly in low temperature environments, but this will not affect the control functions.
- The visibility of the LCD may vary depending on the viewing angle. It may be difficult to see what is displayed, especially when viewed from below, so make sure to install the controller so that the LCD can be seen from the front.
- The brightness of the LCD backlight may decrease over time. In this case, replace the controller as necessary.
- Do not press the keys with your fingernails or hard objects. Doing so may cause holes in the keys or remove the printing on the keys.
- Do not press the buttons too hard. Applying strong force to the console, including the buttons and LCD, may cause temporary display distortion, but this will not affect the control functions.

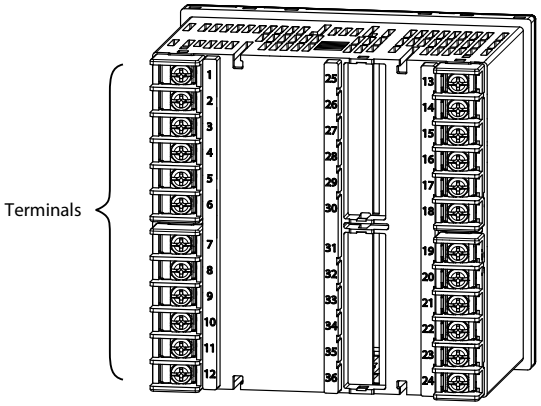
■ Terminals

Terminals: Used to connect the power, inputs, outputs, etc.
M3 screws are used. For terminal connections, use crimp terminal lugs compatible with M3 screws.
The tightening torque of the terminal screws is 0.6 ± 0.1 N·m.

● Model C2A/C3A



● Model C2B/C3B



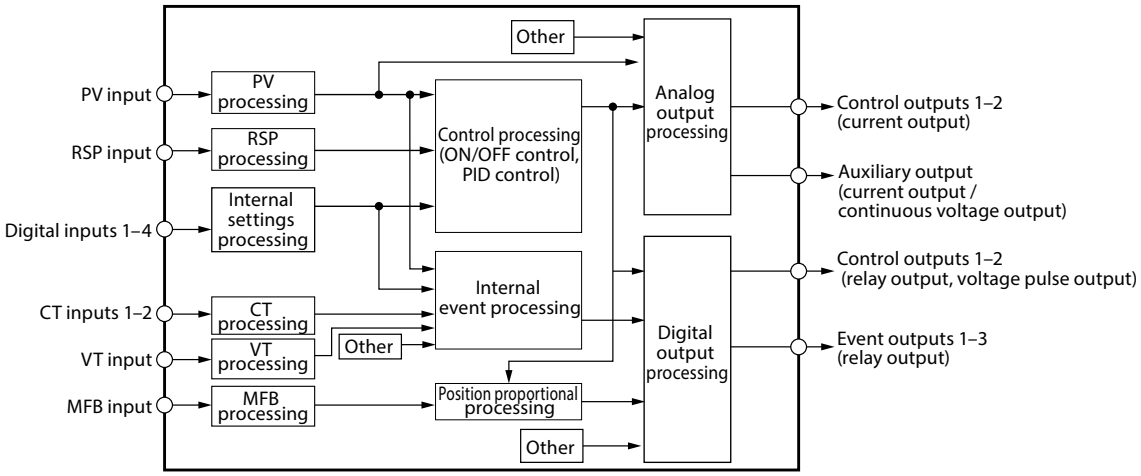
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Chapter 2. Outline of Functions

2-1 Input/Output Configuration



● PV input

The range and the sensor used for the PV input can be selected.

● Control output

If R0 (relay output) or V (voltage pulse output) is specified by the model number (digits (5) and (6)), ON/OFF output or time proportional output can be selected. For time proportional output, the time proportional cycle can be specified. If C (current output) is specified by the model number (digits (5) and (6)), continuous output (analog output) is available, and scaling of the output can be set. If R1 (motor drive relay output) is specified by the model number (digits (5) and (6)), position proportional control is available.

● Auxiliary output

For models with optional auxiliary output (digit (8)), scaling of the continuous output can be set.

● Event output

For models with optional event outputs (digit (8)), the alarm or control mode set for the event operation type is output as digital output (DO).

● Digital input

For models with optional digital inputs (digit (9)), the functions set for internal contacts can be switched.

● Current transformer input (CT)

For models with optional current transformer inputs (digit (10)), the heater burnout alarm can be output from the event output terminals.

● Voltage transformer input (VT)

For models with optional voltage transformer inputs (digit (10)), the heater resistance can be measured.

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● **RSP (remote SP) input**

For models with optional RSP input (digit (9)), RSP can be used.

● **MFB (motor feedback) input**

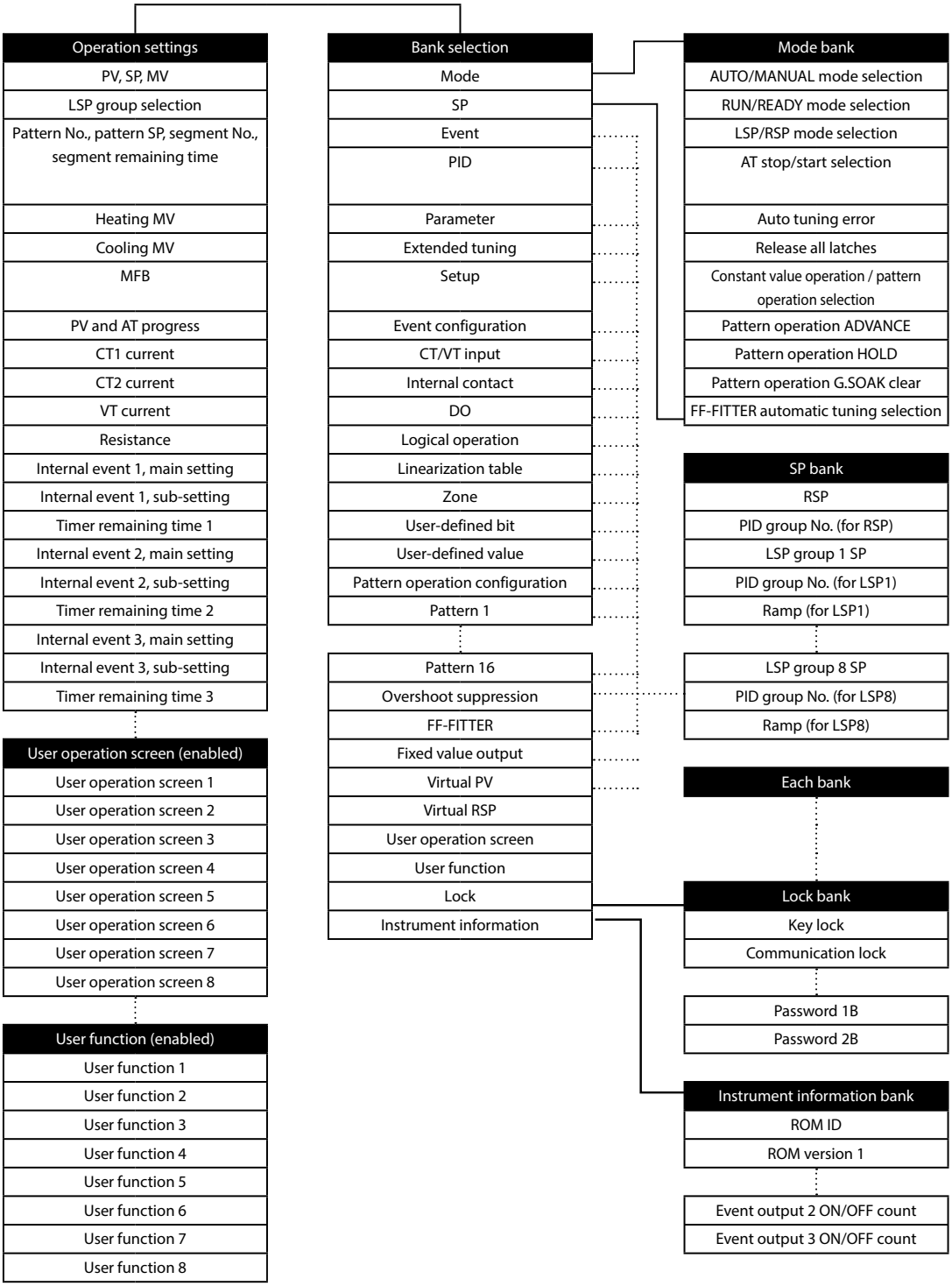
If R1 (motor drive relay output) is specified by the model number (digits (5) and (6)), feedback of the control motor opening can be input.

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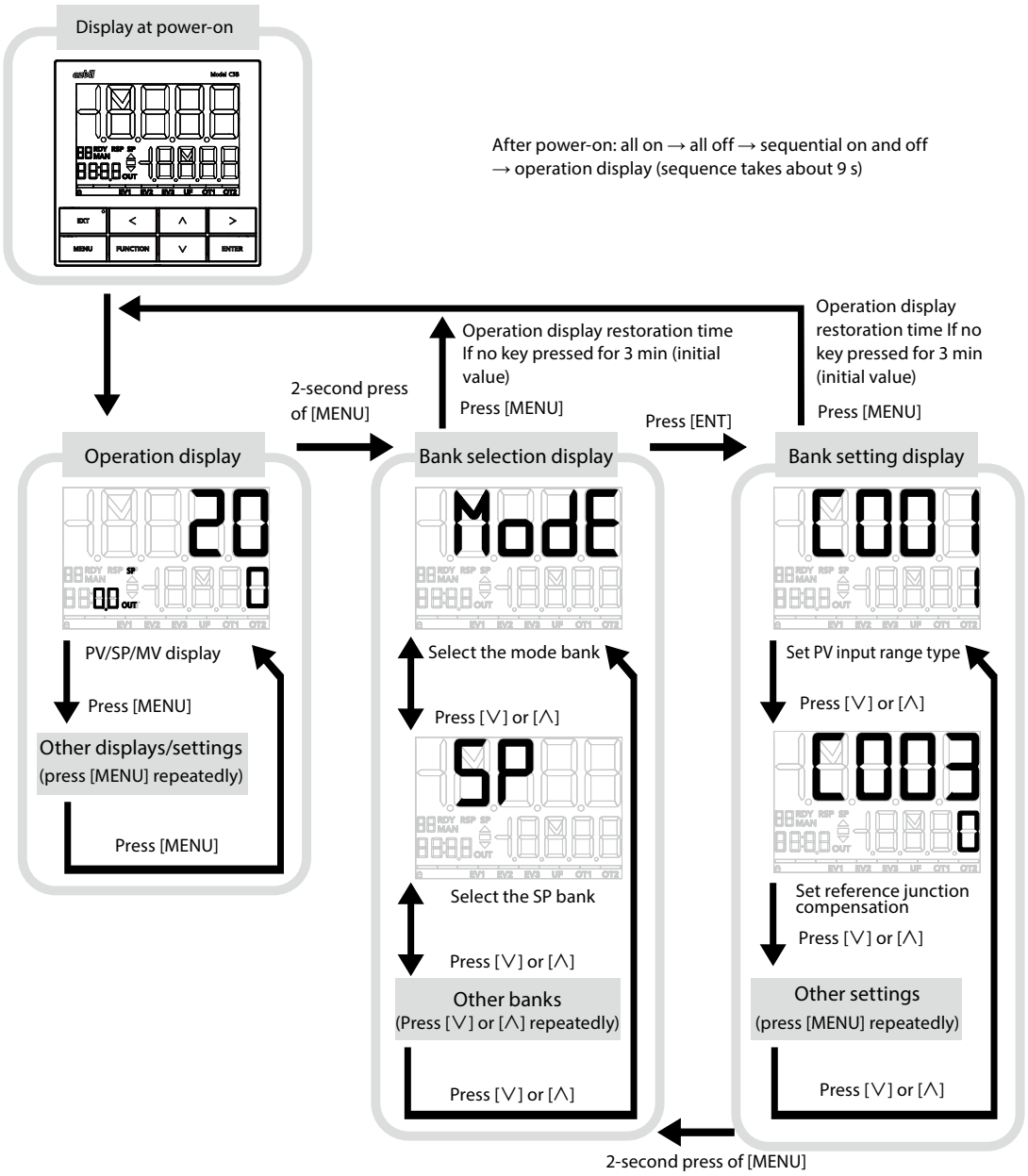
2-2 Key Operation

Various displays and settings can be called up to the console using keys.

Display transitions and key use are shown below.



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The displays and settings shown in this figure are illustrative examples. They may differ depending on the model and settings.

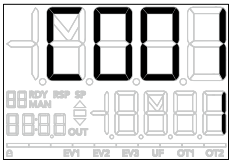
Handling Precautions

- ☞ 6-1 Operation Settings (p. 6-1)
  6-2 Parameter Settings (p. 6-5)
  6-3 Setup Bank, etc., Settings (p. 6-18)
  (for details on operation settings, bank selection, items in banks)
  The sections above describe the banks to which the settings belong.
- Do not press the keys with your fingernails or hard objects. The labels may peel off.

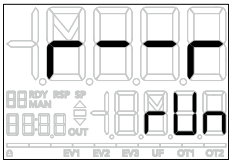
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■ How to set data

(1) Press [∨] or [∧] until the desired item is displayed.
☞ Display transitions and the use of [∨] or [∧] are described on p. 2-3 and p. 2-4.



When configuring C001 (PV input range type) in the setup bank

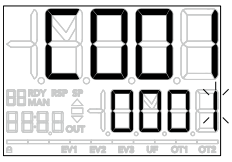


When switching between RUN and READY by the r--r parameter

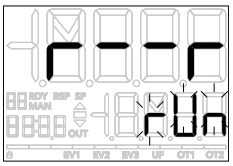
⇩

(2) Press [ENT].

≫ If display field 2 shows numbers, the value in the 1st digit will start flashing (blinking). If it shows characters, they will all start flashing.
For numbers, the flashing digit can be shifted and the flashing value can be incremented/decremented using [<], [>], [∧], and [∨].
For characters, the entire flashing string can be changed using [∧] and [∨].



The 1st digit of 0001 is flashing

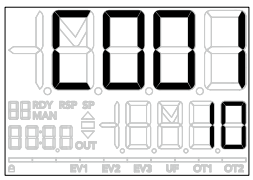


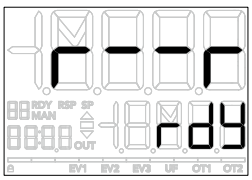
rUn is flashing

⇩

(3) Press [ENT].

≫ The new value is now set.





Handling Precautions

- If a value does not flash after [ENT] is pressed, the value cannot be changed.
  For example, if the RUN/READY selection is set in the internal contact bank, the device keys cannot be used to switch between RUN and READY.
- If pressing [∧] does not change the flashing value, press [∨], and vice versa.

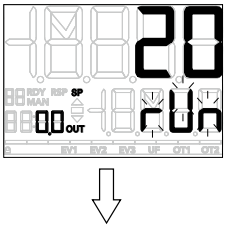
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- If [ENT] is pressed while the display is flashing, this device returns to the operation display screen. If [MENU] is pressed while the display is flashing, this device shows the operation display without making any changes.
- The PV/SP/MV displayed in MANUAL mode continues flashing even after the key is released. In this case, the flashing value is being output as the MV.

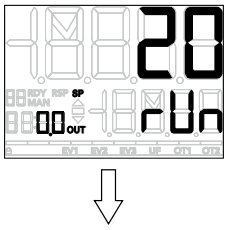
■ Using the [FUNC] and [FUNCTION] keys

When the operation display is shown, press [FUNC]/[FUNCTION] for two seconds or longer to execute the switch that is set by C072 ([FN] key function) in the setup bank.

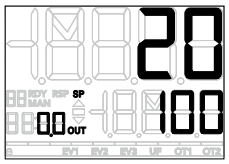
The figures on the right show an example of pressing [FUNC]/[FUNCTION] when C072 is set to 2 (RUN/READY selection).



(1) If [FUNC]/[FUNCTION] is pressed when the operation display is shown in READY mode, display field 2 shows run flashing.



(2) If [FUNC]/[FUNCTION] is held down for two seconds or longer, the mode will switch from READY to RUN, and run stops flashing.



(3) When you release [FUNC]/[FUNCTION], the operation display is shown again.

Handling Precautions

- If C072 (the [FN] key function) in the setup bank is set to 0 (invalid), or if the specified switching operation is disabled, switching by pressing [FUNC]/[FUNCTION] is not possible.

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■ User level

The user level can be selected from three options (simple, standard, advanced) with [079] (user level) in the setup bank.

☞ Chapter 6. Displayed Items and Settings (p. 6-1) (for items that are displayed according to the user level)

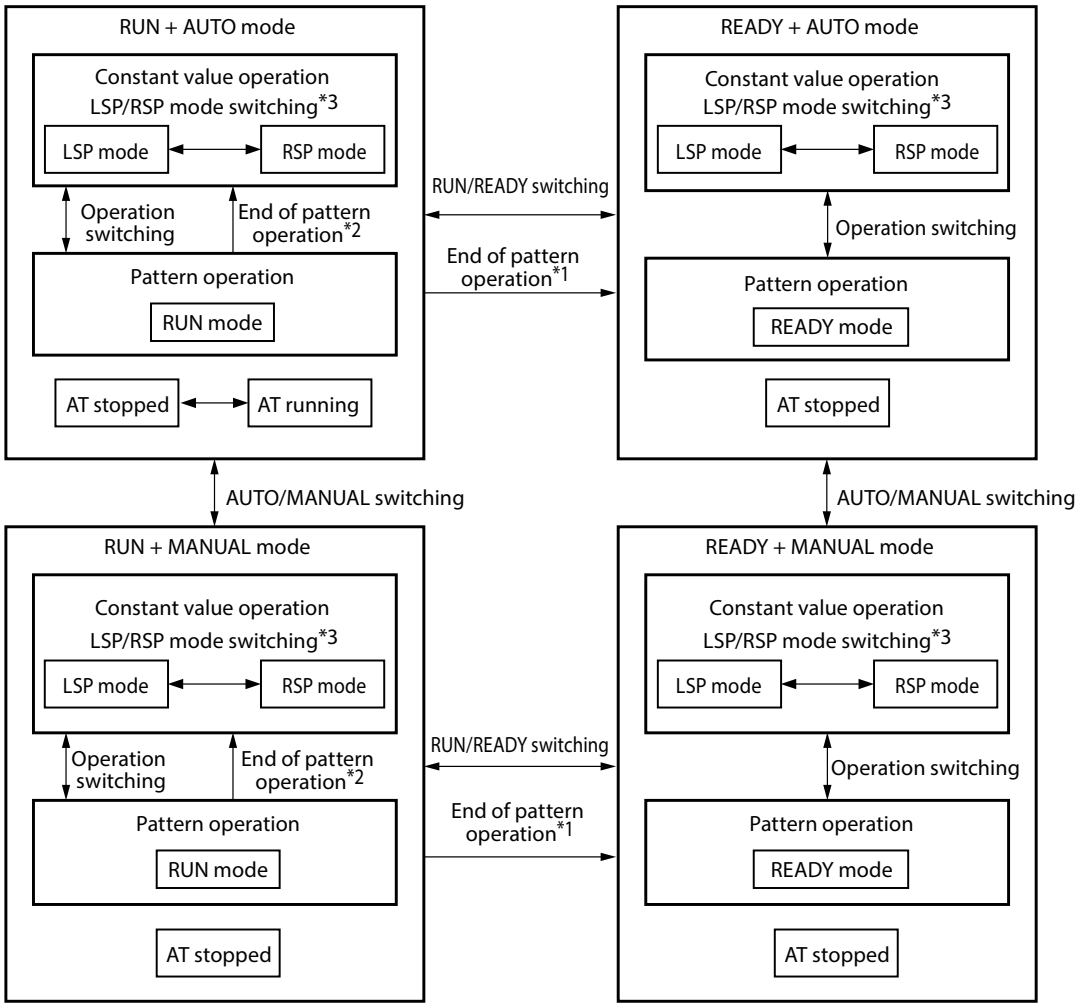
Handling Precautions

- If the user level is changed, the displayed items will change but settings that have been made will remain valid. For example, if you set the user level to 2 (standard configuration) or 3 (advanced configuration) in order to configure advanced functions and then return the setting to 1 (simple configuration), the settings available for 2 and 3 will not be displayed, but the new settings will apply to the advanced functions.

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2-3 Operation Modes

The following shows the transition of the operation modes.



*1. A transition in which [Operation end status] is set to 0 (READY)

*2. A transition in which [Operation end status] is set to 2 (Constant value operation)

*3. Available only on the C3 controller with the RSP function.

Constant value operation: Control using the LSP or RSP.

Pattern operation:	Control using the pattern SP (the SP is generated from the segment settings stored in this device).
RUN:	Controlling (RUN, RUN-HOLD, or RUN-END for pattern operation)
READY:	The process is not being controlled.
AUTO:	Automatic operation (this device automatically determines the MV)
MANUAL:	Manual operation (the user can change the MV manually)
LSP:	Local SP (control using the SP stored in this device.)
RSP:	Remote SP (The analog input from an external device is used as the SP.)
AT:	Auto tuning (this device automatically sets the PID constants by generating limit cycles)

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2-4 Loader Connection

When you use the special cable to connect the loader connector on this device to a PC on which the Smart Loader Package (model SLP-C1FJA_) is running, you can supply power to this device and read and write parameter settings from the PC without needing a connection to the power terminals on the back of this device.

Handling Precautions

- Do not connect any cables other than the loader cable. Doing so will cause a malfunction.

■ Power

This device operates using the main supply of power or power supplied through the loader connector.

The main supply of AC or DC power is received from the terminals on the back of this device.

Power supplied from the loader connector is received from a PC using the loader cable.

All functions of this device are operational with power from the main supply.

With power from the loader connector, parameters can be read and written with the model SLP-C1FJA_ Smart Loader Package, but other functions (including PV input) are limited.

If both the main power and loader connector power are active, the main power takes priority.

Handling Precautions

- Do not turn the main power on or off while the loader cable is connected.

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■ Available functions

Active functions differ depending on the method of power supply.

- Functions of this device

Function		Power from loader connector	Power from main power terminals
Loader communication function		✓	✓
Console	Display function	U5b is displayed.	✓
	Key operation function	N/A	✓
Input/output function		N/A	✓
Internal operation function		N/A	✓
RS-485 communication function		N/A	✓

✓: Available

N/A: Not available

- Loader functions

Function	Power from loader connector	Power from main power terminals
Parameter reading/writing function	✓	✓
Monitoring function	△	✓
PID simulator function	△	✓
Calibration and checking function	N/A	✓
RS-485 communication connection	N/A	✓

✓: Available

△: Some functions are limited

N/A: Not available

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Chapter 3. Installation

WARNING
To prevent electrical shock, this device must be installed in a location that is only accessible to people with appropriate knowledge about electrical safety. Install this device inside a control panel that cannot be opened without the use of a key or tool.
Do not use this device in an environment with conductive contamination, or with dry non-conductive contamination which can become conductive due to condensation, etc. **Problems such as tracking phenomena may damage parts, resulting in fire.**
Before removing, mounting, or wiring this device, be sure to turn off the power to this device and all connected devices. After wiring this device, attach the separately sold terminal cover (model 84525948-001 for the C2A/C3A, model 84525949-001 for the C2B/C3B). Otherwise, there is a danger of electric shock.
Do not touch live parts such as the power terminals. There is a danger of electric shock.
Do not disassemble this device. There is a danger of electric shock or device failure.

CAUTION
Use this device within the operating ranges given in the specifications (for temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.). Otherwise, there is a danger of fire or device failure.
Do not block the ventilation holes. There is a danger of fire or device failure.
Do not allow wire clippings, metal shavings, water, etc., to enter the case of this device. There is a danger of fire or device failure.

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■ Installation location

Install this device as specified in ☞● Operating conditions (p. 14-12) and in a location that meets the following criteria:

- Common mode voltage of all I/O except for the supply power and relay contact outputs:
  voltage to ground of 30 Vrms max., 42.4 V peak max., and 60 V DC max.
- Avoid high/low temperatures and humidity
- No sulfide gas or other corrosive gases
- Little dust or soot
- Protected from direct sunlight, wind, and rain
- Little mechanical vibration or shock
- Not close to high voltage lines, welding machines, or other sources of electrical noise
- At least 15 meters away from the high voltage igniter for a boiler, etc.
- Little influence from strong magnetic fields
- No flammable liquids or gases
- Indoors

■ Mounting precautions

Pay attention to the following when mounting this device:

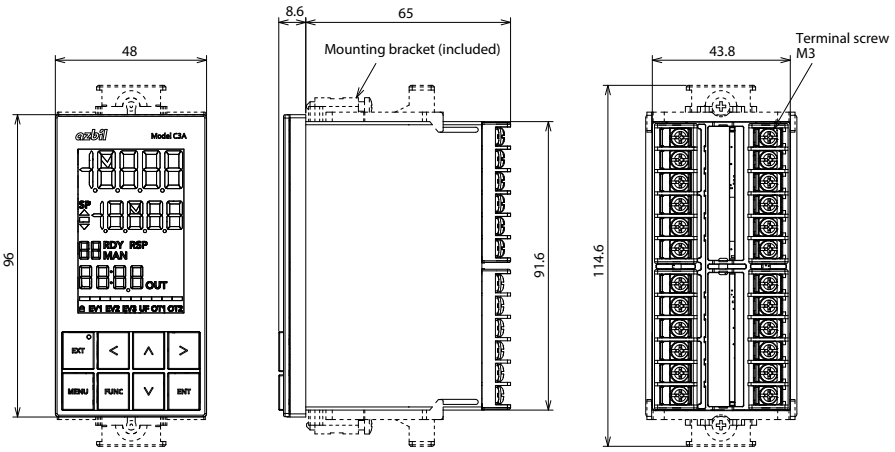
- Do not block the ventilation holes.
- When using fans or cooling equipment, make sure the air does not blow directly on this device.
- Mount this device horizontally with the back not raised or lowered more than 10°.
- Use a rigid panel whose thickness is no more than 8 mm.
- Do not overtighten the screws, as it may deform the case.

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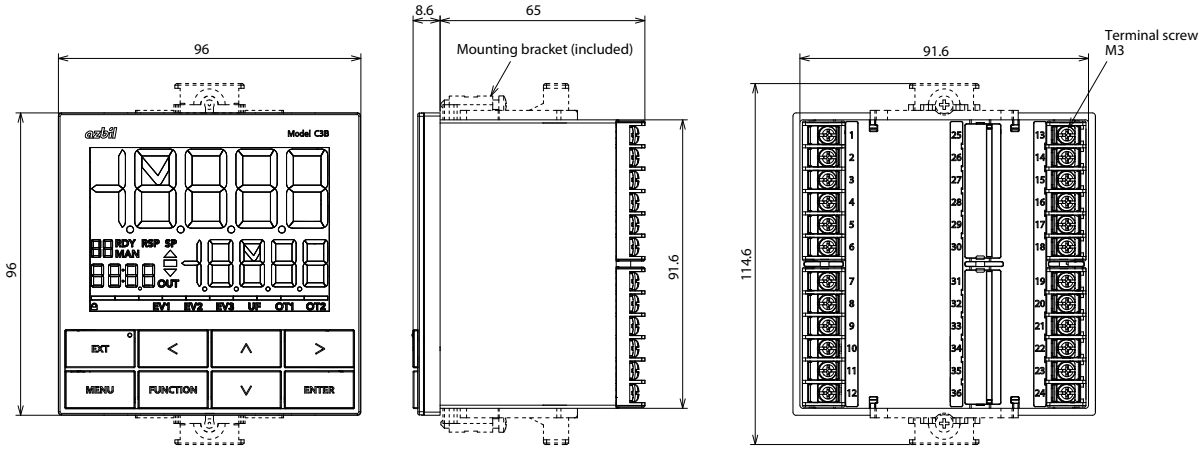
■ External dimensions

● Model C2A/C3A

Unit: mm



● Model C2B/C3B



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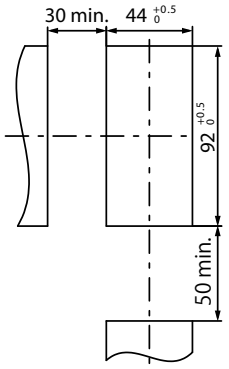
■ Panel cutout dimensions

For a panel-mounted model, open a hole in the panel as shown below.

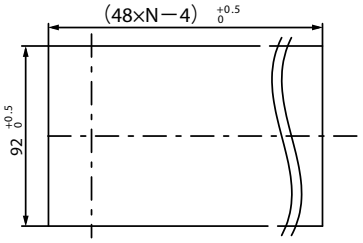
● Model C2A/C3A

Unit: mm

Independent mounting



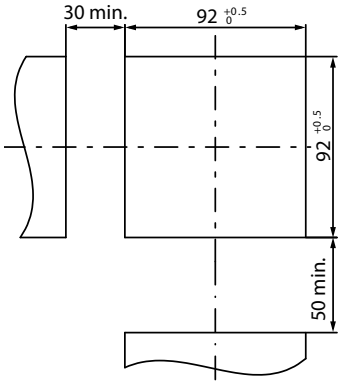
Gang mounting

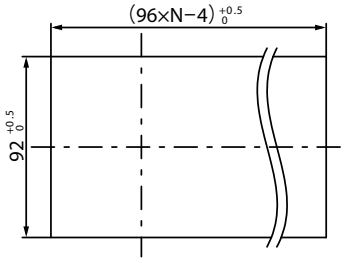


(N: number of mounted units)

● Model C2B/C3B

Unit: mm





Handling Precautions

- The maximum allowable ambient temperature for gang-mounted products: 50 °C (two units), 45 °C (three or more units)
- When waterproofing and dustproofing are required, mount the units individually. If units are gang mounted, waterproofing and dustproofing performance cannot be maintained.
- Leave a space of at least 50 mm above and below this device.

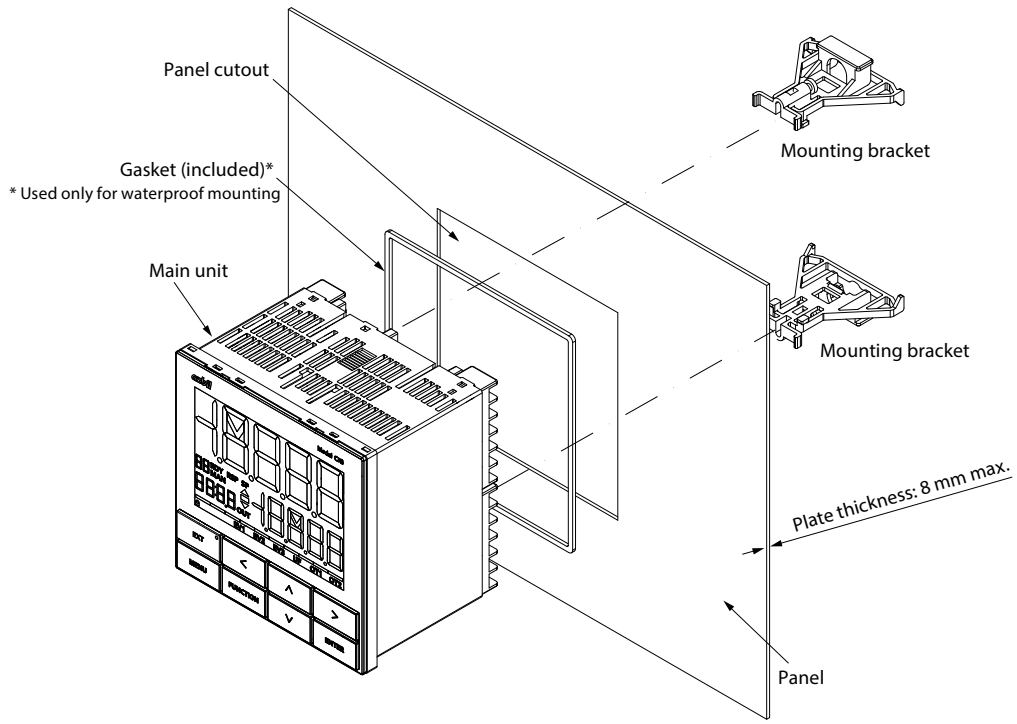
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■ Mounting method

- Mount this device horizontally with the back not raised or lowered more than 10°.
- Use a rigid panel whose thickness is no more than 8 mm.

● For waterproof mounting (when not using the cover)

Tools: Phillips-head screwdriver



(1) Place the gasket on the terminal side of this device and slide it to the back of the console.

(2) Insert this device from the front of the panel.

(3) Attach the mounting bracket from behind the panel.

(4) Push the mounting bracket onto the panel until its tip touches the panel and stops moving.

(5) Check that the catches of the bracket are engaged with the grooves in this device.

(6) Tighten the screws at the top and bottom of the bracket.

Handling Precautions

- To secure the mounting bracket to the panel, tighten the supplied screws until the bracket is stable and no longer moves, and then further tighten each screw by only one full turn. Excessive tightening of the screws may deform the case.
- If units are gang mounted, waterproofing and dustproofing performance cannot be maintained.

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● **For normal mounting (when not using the cover)**

For normal mounting (not waterproof/dustproof), skip step 1 of the above procedure and use step 2 and the rest of the procedure.

Handling Precautions

- To secure the mounting bracket to the panel, tighten the supplied screws until the bracket is stable and no longer moves, and then further tighten each screw by only one full turn. Excessive tightening of the screws may deform the case.

■ Pulling this device out of the case

You can pull this device out from the front to view the interior.

For maintenance and inspection, you can pull this device out of the case without removing wires from the terminals.

This should be done only during maintenance or inspection.

Handling Precautions

- If this device is pulled out of the case, the accuracy, waterproofing, and dustproofing specifications of the product are no longer covered by warranty.
- Any damage to the product that occurs while it is pulled out is not covered by warranty.
- Because the front mask may be damaged, do not pull this device out of the case more than 20 times.
- Remove the loader cable from this device before pulling it out.
- Take care to avoid impact to the circuit board when pulling out or inserting this device.
- Do not insert a different model into the case of this device.

● **Procedure for pulling this device out from the front**

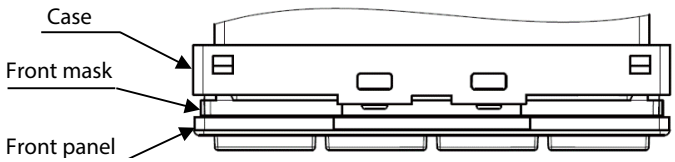
(1) Turn off this device and connected devices.

(2) Insert a flat-head screwdriver (width 1.8–3 mm max., thickness 0.25–0.5 mm max.) into the hole at the top of the front mask of this device. Angle the screwdriver about 30° from the horizontal and flex the case to detach the hooks on the front mask from the case.

(3) With the screwdriver tip inserted in the hole, use the screwdriver to pull the upper part of the front mask toward you until there is a gap of 1 mm between the front mask and the case.

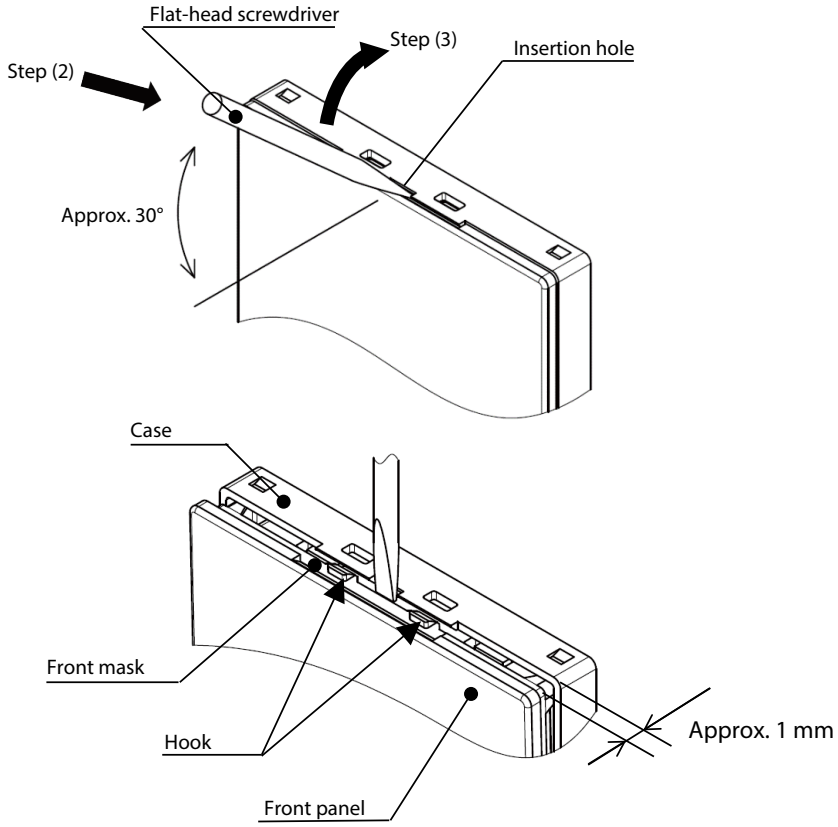
Handling Precautions

- Do not insert the screwdriver between the front panel and the front mask. The front panel could come off from the front mask.



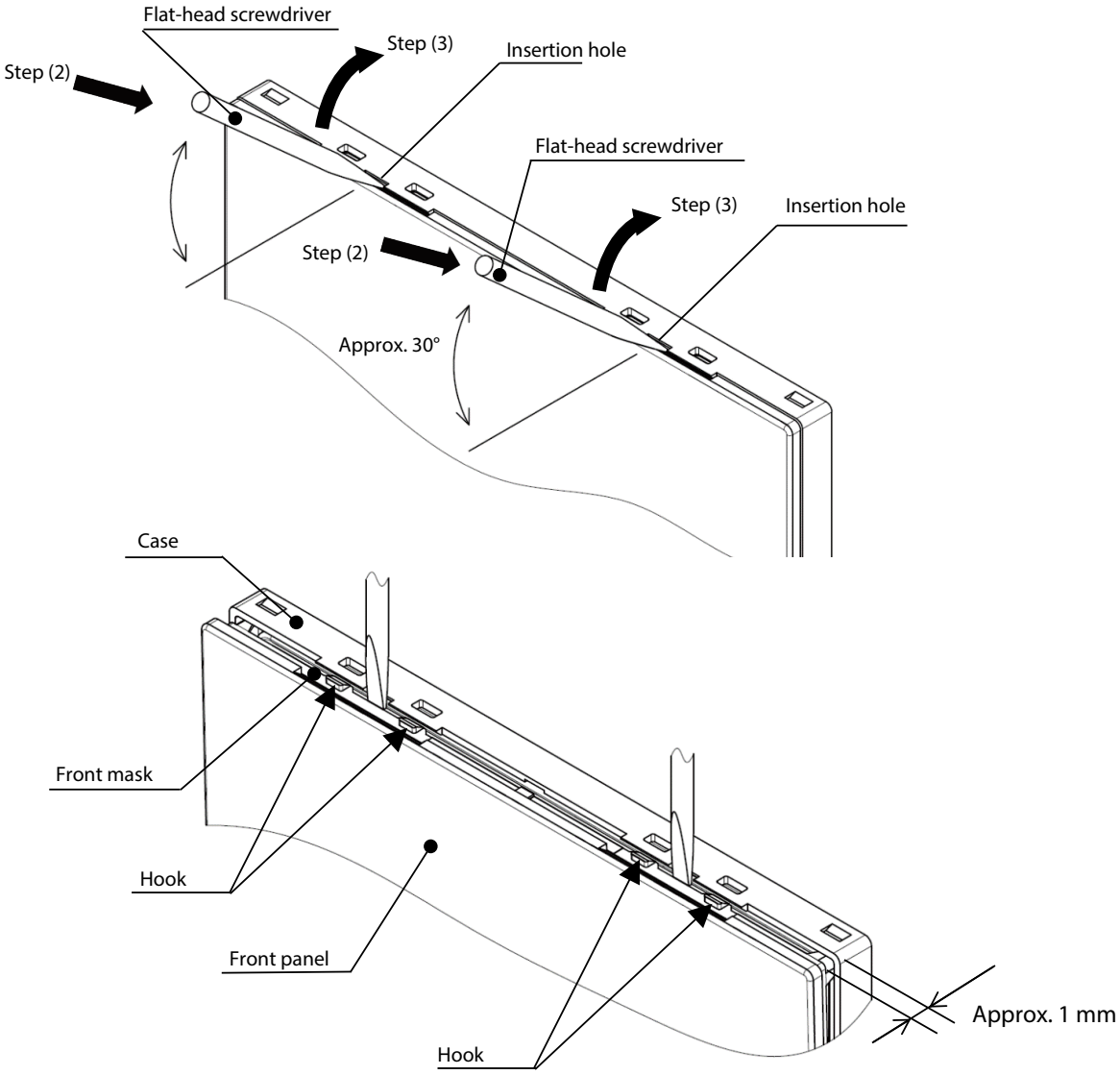
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- Model C2A/C3A



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● **Model C2B/C3B**



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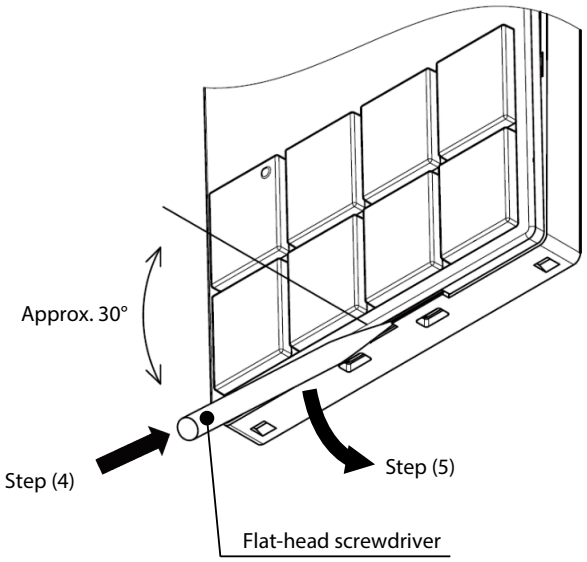
(4) Next, insert the screwdriver into the hole at the bottom of the front mask of this device at about a 30° angle from the horizontal. Flex the case to detach the hooks on the front mask from the case.

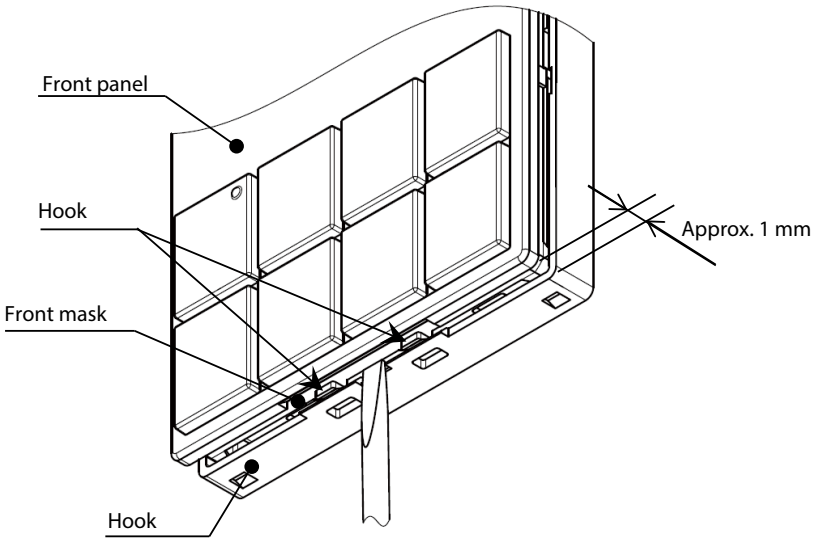
(5) With the screwdriver tip inserted in the hole, pull the lower part of the front mask toward you until there is a gap of 1 mm between the front mask and the case.

Handling Precautions

- Do not insert the screwdriver under the buttons.

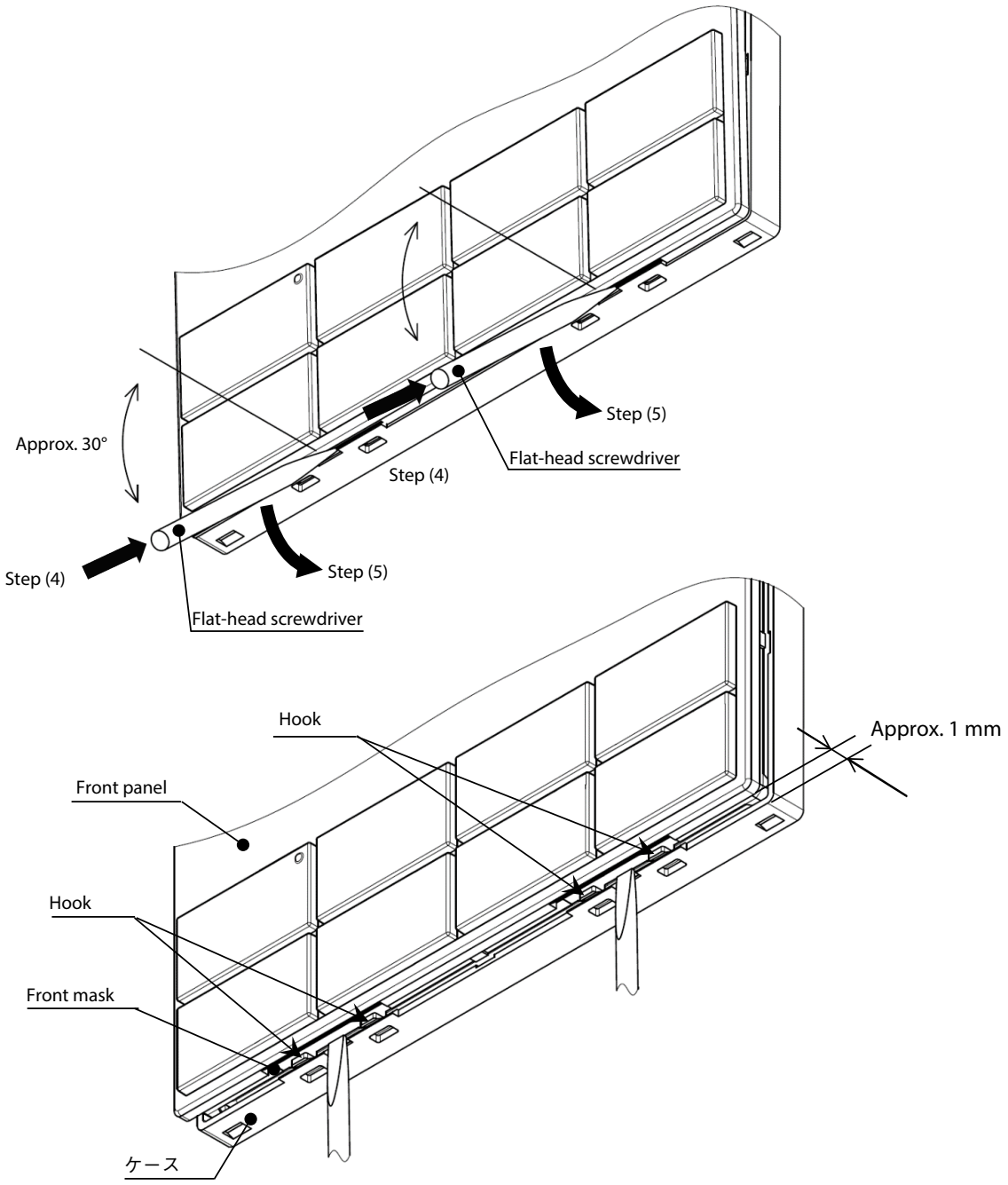
● **Model C2A/C3A**





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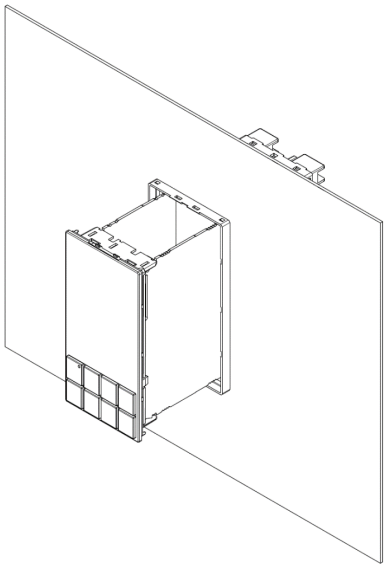
● **Model C2B/C3B**



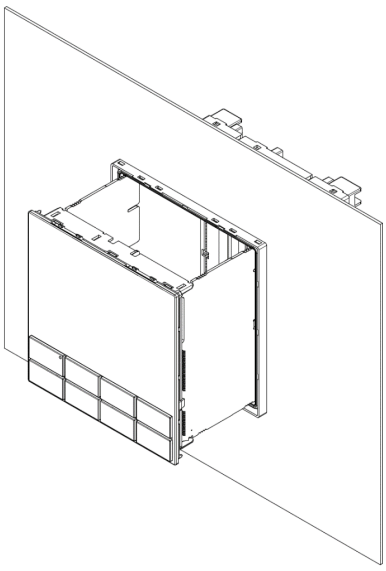
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(6) Hold both ends of the front panel with your fingers and slowly pull this device straight out of the case.

- Model C2A/C3A



- Model C2B/C3B



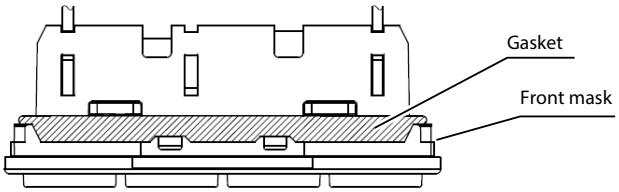
Handling Precautions

- Excessive tightening of the screws of the mounting bracket may deform the case toward the inside, making it difficult to pull this device out.
- Touch only the front panel and the front mask, not the interior of the device.

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● **Procedure for inserting this device into the case**

(1) Check that the gasket on the front mask is not removed or twisted.



(2) Slowly insert this device into the case from the front of the case, keeping the circuit board parallel.

Handling Precautions

- Check the orientation of the front and interior of this device after pulling it out so that you do not reinsert it backwards.
- If this device gets stuck when you are reinserting it, do not force it in. Instead, pull it slightly toward you and gently shake it, and reinsert it so that the circuit board is aligned with the guides in the case.
- Excessive tightening of the screws of the mounting bracket may cause the case to deform inward, making it difficult to reinsert this device.

(3) Insert the hooks on the front mask into the holes so that the front mask is securely attached to the case.

(4) Check that the hooks on the front mask are securely inserted into the holes in the case.

Chapter 4. Wiring

4 - 1 Wiring

WARNING
To prevent electrical shock, this device must be installed in a location that is only accessible to people with appropriate knowledge about electrical safety. Install this device inside a control panel that cannot be opened without the use of a key or tool.
Do not use this device in an environment with conductive contamination, or with dry non-conductive contamination which can become conductive due to condensation, etc. Problems such as tracking phenomena may damage parts, resulting in fire.
Be sure to use the fuse described in the specifications for the power wiring of this device. Otherwise, tracking phenomena or parts failure due to other factors may cause fire.
Be sure to check that the device has been correctly wired before turning on the power. Incorrect wiring of this device may cause device failure and also lead to a dangerous accident.
Before removing, mounting, or wiring this device, be sure to turn off the power to this device and all connected devices. After wiring this device, attach the separately sold terminal cover (model 84525948-001 for the C2A/C3A, model 84525949-001 for the C2B/C3B). Otherwise, there is a danger of electric shock.
Do not touch live parts such as the power terminals. There is a danger of electric shock.

CAUTION
Wire this device correctly in compliance with applicable standards, and use the power source and installation methods specified in this user's manual. Otherwise, there is a danger of fire, electric shock, or device failure.
Do not allow wire clippings, metal shavings, water, etc., to enter the case of this device. There is a danger of fire or device failure.
Firmly tighten the terminal screws to the torque listed in the specifications. Insufficient tightening may result in fire or electric shock.
Do not use unused terminals as relay terminals. There is a danger of fire, electric shock, or device failure.
Use the relays within the recommended service life. Otherwise, there is a danger of fire or device failure.
Use an appropriate overcurrent protection device (fuse, circuit breaker, etc.) with a sufficient breaking capacity for the lines to which the relays of this device are connected to protect the circuits. Otherwise, there is a danger of fire or device failure.
If there is a risk of a power surge caused by lightning, use a surge absorber (surge protector). Otherwise, there is a danger of fire or device failure.

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■ Symbols used in the terminal wiring label

Symbols in the terminal wiring label on the side of this device:

Symbol	Description
~	AC
⎓	AC/DC
⚠	Caution: risk of electric shock
⚠	Caution: risk of device failure, electric shock, or fire due to wrong wiring Check the wiring and the wiring diagram.

■ Installing a fuse

Be sure to use a fuse with the following rating for the power wiring of this device.

Fuse type: Time-lag (T) (IEC 60127)

Rated voltage: 250 V AC

Rated current: 1 A (AC models), 1 A (DC models)

If the power supply is grounded, install a fuse on the non-grounded side.

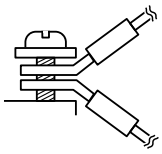
■ Wiring precautions

Pay attention to the following when wiring this device:

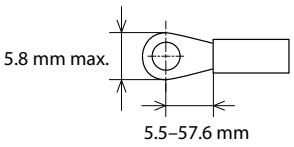
- Before wiring this device, verify its model No. and terminal Nos., which are written on the wiring diagram on the side of the device.
- Wire the power lines separately from input/output signal lines.
  Keep them at least 50 cm away from each other.
  Do not pass these two types of wiring through the same conduit or wiring duct.
- Do not use any terminals as relay terminals.
- Fasten screws to the correct tightening torque.
- To separately turn the power supply of this device on and off in instrumentation where current signals are input to multiple devices (including this device) connected in series, use the separately sold resistor (model No. 81401325) and set the input range type to voltage.
- Connect a terminating resistor (120 Ω, ½ W or more recommended) to both ends of the RS-485 transmission line.
  However, if terminal resistance is not specified for other devices connected to the same transmission line, do not connect the resistor. If they do specify a resistor, use the highest resistance value specified, at least 120 Ω.
- Make sure that devices or equipment connected to the control outputs (excluding relay outputs), PV input, RSP input, CT inputs, VT input, MFB input, digital inputs, and communication of this device have reinforced insulation or double insulation suitable for their operating voltage and for this device's power.

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- Attach the cover after completing the wiring work.
- Remove the protective film from the LCD before use.
- Control outputs 1 and 2 are not isolated. Use isolation equipment as needed.
- Do not use cables containing silicone or apply silicone adhesives or silicone-based grease. Doing so may cause conductivity failure of the contacts.
- Use 16–22 AWG cables.
- Be careful not to allow crimp terminal lugs to touch adjacent terminals.
- Connect no more than two crimp terminal lugs to the same terminal screw. Bend the crimp terminal lugs in advance.



- Use crimp terminal lugs compatible with M3 screws.
  Recommended crimp terminal lug: V1.25-MS3, manufactured by J.S.T. Mfg. Co., Ltd.



■ Precautions when turning on the device:

To ensure reliable operation, this device suspends operation for a maximum of nine seconds after power-on. To satisfy the specified accuracy, at least 30 minutes of warm-up time is required for this device.

■ Precautions when operating the device

Make sure that the heater current does not exceed the allowable current specified in the specifications.

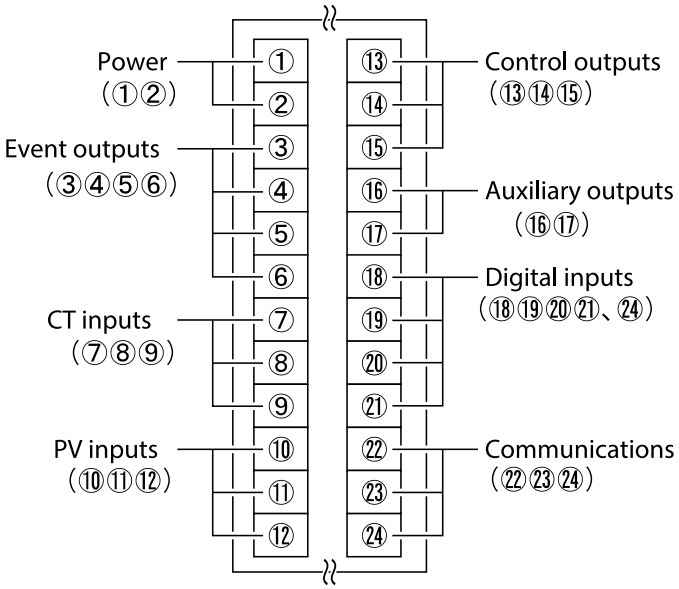
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■ Wiring of model C2A/C2B

Run the lead wires to each terminal in the direction indicated below.

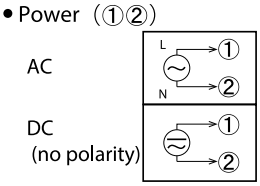
(1) to (6), (13) to (18): to the left

(7) to (12): to the right

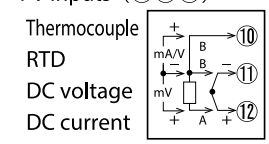


● Sample input/output that can be connected to terminals

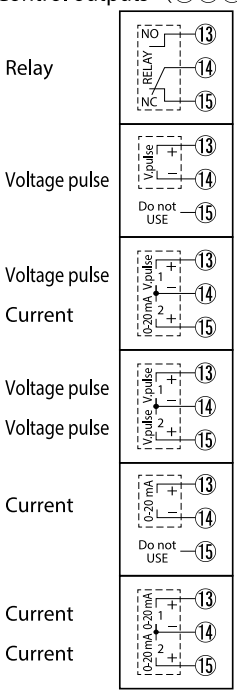
• Power (①②)



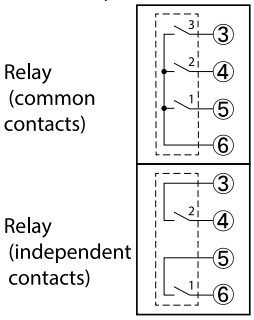
• PV inputs (⑩⑪⑫)



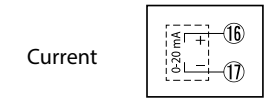
• Control outputs (⑬⑭⑮)



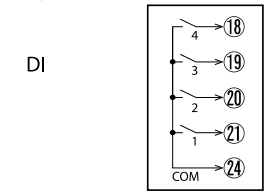
• Event outputs (③④⑤⑥)



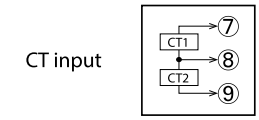
• Auxiliary outputs (⑯⑰)



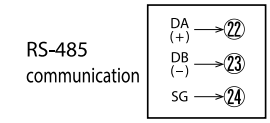
•Digital inputs (⑱⑲⑳㉑、㉔)



• CT input (⑦⑧⑨)



• Communications (㉒㉓㉔)



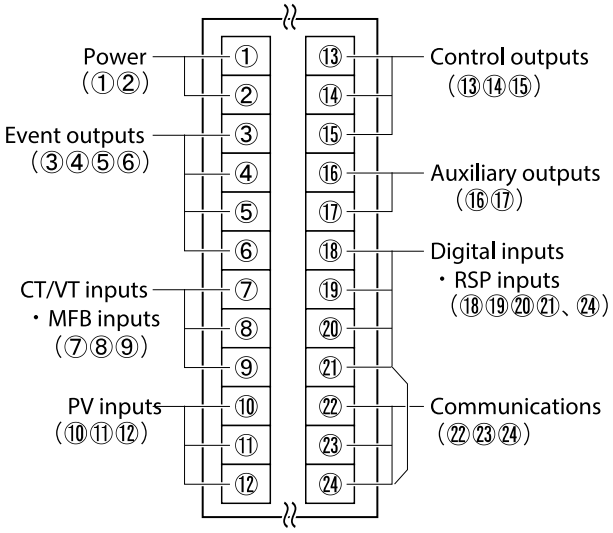
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■ Wiring of model C3A/C3B

Run the lead wires to each terminal in the direction indicated below.

(1) to (12): to the left

(13) to (24): to the right



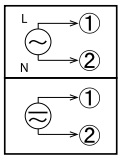
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● Sample input/output that can be connected to terminals

• Power (①②)

AC

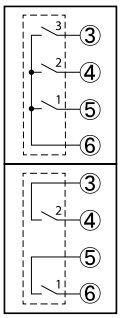
DC
(no polarity)



• Event outputs (③④⑤⑥)

Relay
(common
contacts)

Relay
(independent
contacts)

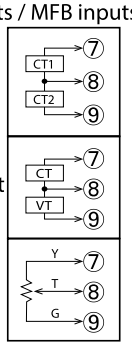


• CT/ VT inputs / MFB inputs
(⑦⑧⑨)

CT input

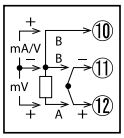
CT/VT input

MFB input



• PV inputs (⑩⑪⑫)

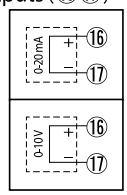
Thermocouple
RTD
DC voltage
DC current



• Auxiliary outputs (⑯⑰)

Current

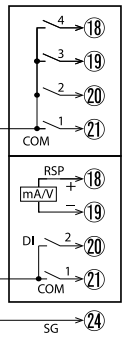
Voltage



• Digital inputs / RSP inputs
(⑱⑲⑳㉑、㉔)

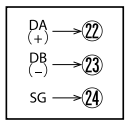
Digital input

RSP/DI
RSP input
Digital input



• Communications (㉒㉓㉔)

RS-485
communication



• Control outputs (⑬⑭⑮)

Relay

Voltage pulse

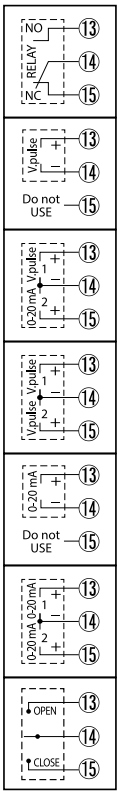
Voltage pulse
Current

Voltage pulse
Voltage pulse

Current

Current
Current

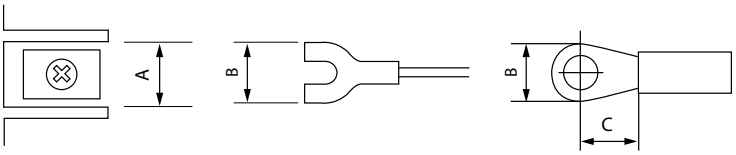
Motor
drive relay



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● Recommended crimp terminal lugs

Use crimp terminal lugs compatible with M3 screws.

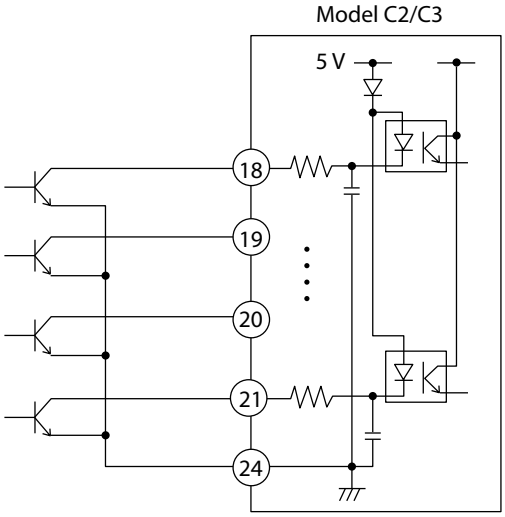


Mounting method	Compatible screw	Terminal dimensions (mm)			Compatible wire size	J.S.T. Mfg. Co., Ltd. Model No. (reference)
		A	B	C		
C2, C3 (for panel mounting)	M3	6.1	5.8 max.	5.5–7.6	0.3–1.2 mm^2 22–16 AWG	V1.25-MS3 (round terminals) V1.25 B3A (Y terminals)

Handling Precautions

- If this device is installed where there is considerable vibration or shock, be sure to use round crimp terminal lugs to prevent wires from coming off the terminals.
- Do not allow crimp terminal lugs to touch adjacent terminals.

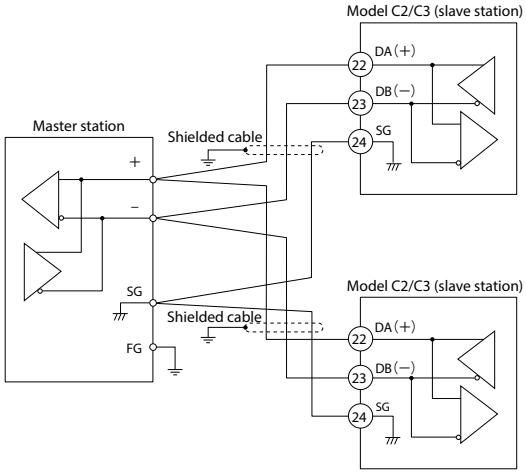
■ Connecting open collector outputs to digital inputs



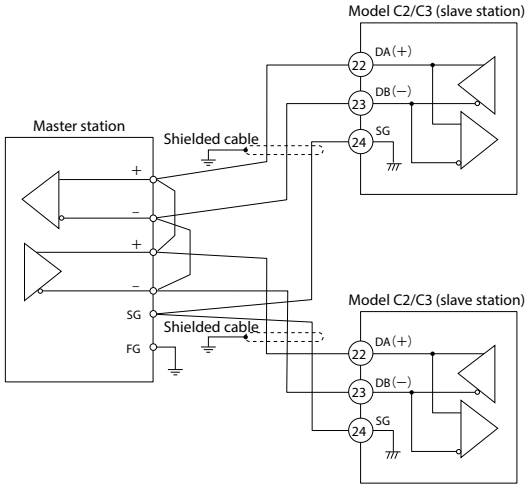
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■ RS-485 communication connections

If the system includes 3-wire devices only



If the system includes 5-wire devices only



Terminating resistor

- Connect a terminating resistor (120 Ω, ½ W or more recommended) to both ends of the RS-485 transmission line.
- However, if terminal resistance is not specified for other devices connected to the same transmission line, do not connect the resistor. If they do specify a resistor, use the highest resistance value specified, at least 120 Ω.

Handling Precautions

- Do not connect DA (+) to DB (–). Doing so might damage this device.
- Ground only one end of the shielded cable.
- Be sure to connect the signal ground (SG) terminals to each other. Otherwise, communication may be unreliable.

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■ Connecting solid state relays (SSR)

To drive the SSR, controllers with voltage pulse outputs must be used. Specify a model No. that includes "V0," "VC," or "VV" (codes for control output).

An SSR can be roughly categorized as either a constant-current SSR or a resistance SSR. The following describes how to connect each type.

● Constant-current SSR

Check the following specifications of your SSR and the specification of the voltage pulse output of the C2/C3.

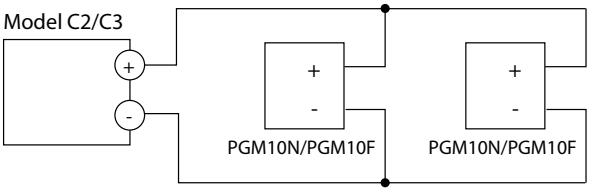
- Input current (maximum): If it is below the maximum current allowed for the voltage pulse output, the SSRs can be connected in parallel.
- Operating voltage: Check that the voltage between the voltage pulse output terminals is within the specified range.

1. Azbil's PGM10N or PGM10F

This example shows the calculation for the connection of the C2/C3 and the PGM10N015.
For connection with other models, check the specifications of the model.

- Input current: Since the input current is 10 mA or less, up to two units (10 mA × 2 = 20 mA < 24 mA [maximum allowable current]) can be connected in parallel.
- Operating voltage: The input voltage of the SSR is 3.5 to 30 V. Therefore, the voltage between the terminals is within the specified range.

Connection diagram



Number of connectable units

SSR	Connection	V0/VC model	VV model
PGM10N	Parallel	2 units max.	4 units max.*
PGM10F	Parallel	2 units max.	4 units max.*

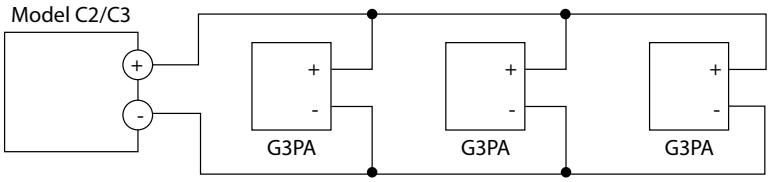
* Two units per output

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2. Omron's G3PA, G3PE-_ _ _B, G3NA

- Input current: Since the input current is 7 mA or less, up to three units (7 mA × 3 = 21 mA < 24 mA [maximum allowable current]) can be connected in parallel.
- Operating voltage:The rated voltage is 5–24 V DC or 12–24 V DC. Therefore, the voltage between the terminals is within the specified range.

Connection diagram



Number of connectable units

SSR	Connection	V0/VC model	VV model
G3PA	Parallel	3 units max.	6 units max.*
G3PE-_ _ _B	Parallel	3 units max.	6 units max.*
G3NA	Parallel	3 units max.	6 units max.*

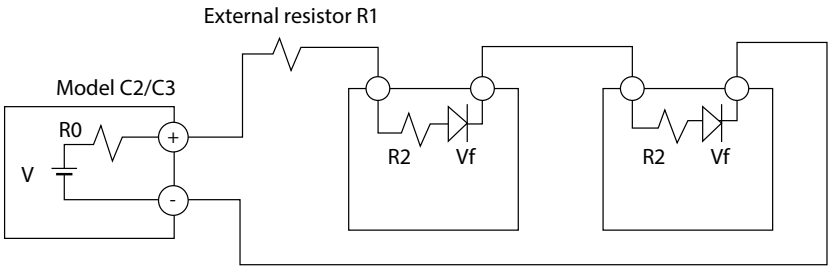
* Three units per output

● **Resistance SSR**

Connect an external resistor in series as needed so that the voltage between the input terminals of the SSR is within the specified range.

Example: when connecting two SSRs

Connection diagram



When connecting n units of the SSR, the voltage between the terminals of the SSR can be calculated by the expression below:

$(VOUT \times R2 + Vf \times R1) \div (R1 + n \times R2)$

When n = 2 and external resistance R1 = 220 Ω, the result is:

Vout: 12 V ±20 %

R1: 220 Ω

R2: 260 Ω

Vf: 1.1 V

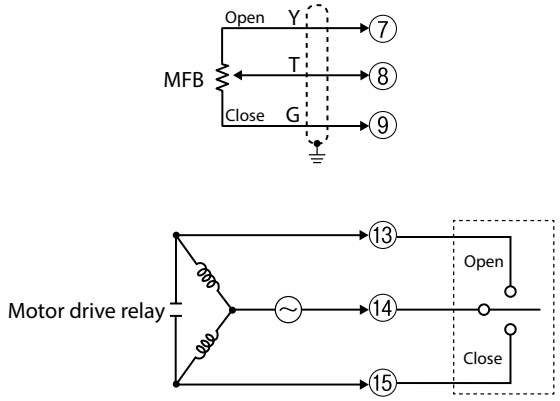
Voltage between terminals= $(12 \times 260 + 1.1 \times 220) \div (220 + 2 \times 260)$

≈ 4.5 V

If the input voltage range of the SSR is 3–6 V, it can operate.

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■ Connecting motor drive relay output and MFB input



Handling Precautions

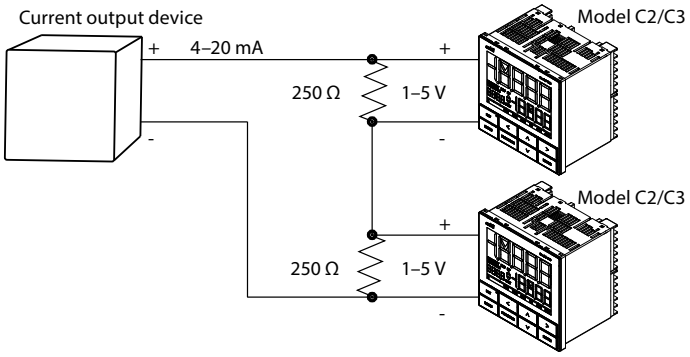
- If connecting a 100 or 200 V AC motor to the motor drive relay output, use an external auxiliary relay. Also, insert a surge suppressor circuit in parallel with the load of the motor drive relay output to eliminate sparks.
- Do not run wires from motor drive relay terminals (13, 14, 15) and wires from MFB input terminals (7, 8, 9) through the same duct. Also, do not put them in the same 6-core cable.
  Otherwise, this device could fail due to electromagnetic noise at motor startup.
- Electromagnetic noise generated from a motor connected to this device may affect communication between this device and other devices.
  In such a case, attach a noise suppression component such as a ferrite core near the terminal of the wire connecting this device to the motor.
- Do not specify PID constants that cause excessive repeats of ON/OFF because the service life of the built-in relay will be shortened. By setting C059 (Position proportional control: long service life) to 1 (Priority on service life), it may be possible to reduce the number of times the relay operates with almost no effect on the control results.
- If MFB control is not used (C057 (Position proportional control: method selection) = 2 (Control with estimated position) or 3 (Control with estimated position + position adjustment at power-on)), the wiring for the MFB terminals (4, 5, 6) is not needed.
- If MFB control is used (C057 (Position proportional control: method selection) = 0 (MFB control + control with estimated position) or 1 (MFB control + close upon error)), be sure to execute C060 (Position proportioning: automatic adjustment) after completing the wiring. (☞■ Automatic adjustment for position proportional control (p. 5-114))
- If MFB control is not used (C057 (Position proportional control: method selection) = 2 (Control with estimated position) or 3 (Control with estimated position + position adjustment at power-on)), be sure to set a correct value for C063 (Position proportioning: adjustment value for time until fully open).

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■ Connecting a current output device

When the power of this device is turned off, its current input circuit is disconnected.

When connecting a current output device to multiple C2/C3 units whose power can be turned on and off individually, use the separately sold resistor (81401325) and specify a voltage input range.



■ Connection when using zener barriers

● Resistance temperature detector

Pay attention to the following points when connecting a resistance temperature detector (RTD) to the PV input of this device via zener barriers.

- Be sure to adjust the zener barriers as described in chapter 5.
  When you combine the recommended zener barriers with this device and adjustment the barriers, the maximum PV indication accuracy is ±0.5 % FS ± 1 digit, although this may differ depending on the instrumentation conditions.
- Use zener barriers recommended by Azbil Corporation.
  Combining this device with zener barriers that do not satisfy the following requirements may significantly lower the accuracy of this device. Contact the nearest Azbil office before using zener barriers other than those recommended by Azbil Corporation.

  Internal resistance ≤ 85 Ω (note that wiring resistance should be considered in addition to internal resistance)

  Operating voltage ≥ 1 V

  Leakage current ≤ 1 μA (at 1 V)

  Recommended zener barriers (for RTD)

  NZB3-1R75 (Nakamura Electric Mfg. Co., Ltd.)

  Zener barrier (for RTD) whose accuracy has been confirmed under conditions set by Azbil Corporation

  MTL7756ac (Cooper Industries Japan K.K.)

  Note If the MTL7756ac is used and wired incorrectly, the wrong alarms may occur or alarms may not occur at all. Check before use.

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● Thermocouple

Pay attention to the following points when connecting a thermocouple (TC) to the PV input of this device via zener barriers.

- When you combine the recommended zener barriers with this device, the maximum PV indication accuracy is ±0.5 % FS ± 1 digit, although this may differ depending on the instrumentation conditions.
- Use zener barriers recommended by Azbil Corporation.
  Combining this device with zener barriers that do not satisfy the following requirements may significantly lower the accuracy of this device. Contact the nearest Azbil office before using zener barriers other than those recommended by Azbil Corporation.

  Operating voltage ≥ 1 V

  Leakage current ≤ 1 μA (at 1 V)

  Recommended zener barriers (for TC)

  NZB2-1R52 (Nakamura Electric Mfg. Co., Ltd.)

  Zener barrier (for TC) whose accuracy has been confirmed under conditions set by Azbil Corporation

  MTL7760ac (Cooper Industries Japan K.K.)

  Note If the MTL7760ac is used and disconnection occurs, alarm generation make take more time than disconnection with standard instrumentation. Check before use.

  Recommended zener barriers (for DC current input)

  MTL7787+ (Cooper Industries Japan K.K.)

■ Noise suppression measures

Use a single-phase instrument power supply to minimize the effect of electromagnetic noise on this device.

If there is a large amount of electromagnetic noise from the power supply, use an isolation transformer and a line filter.

(Azbil's line filter model No.: 81442557-001)

Use a CR filter for quick-rising noise.

(Azbil's CR filter model No.: 81446365-001)

Handling Precautions

- If anti-noise measures are taken, do not bundle primary and secondary power lines of the isolation transformer together, and do not put them in the same conduit or duct.

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4-2 Cables

For thermocouple input, connect the unshielded wires of the thermocouple to the PV input terminals.
If a thermocouple with a terminal block is used, or if the wiring distance is long, use compensating lead wires to connect to the terminals of this device. Use shielded compensating lead wires.

- For inputs and outputs other than thermocouples, use JCS 4364 cables for low-power instruments or the equivalent (generally called twisted shielded cable for instrumentation use).
  The following cables are recommended.

Fujikura Dia Cable Ltd.	2 cores	IPEV-S-0.9 mm^2×1P (pair)
	3 cores	ITEV-S-0.9 mm^2×1T (triple)
Sumiden HST Cable Co., Ltd.	2 cores	JKPEV-S-0.9 mm^2×1P (pair)

Note: The model No. of the recommended cable may change without notice, so please contact the manufacturer.

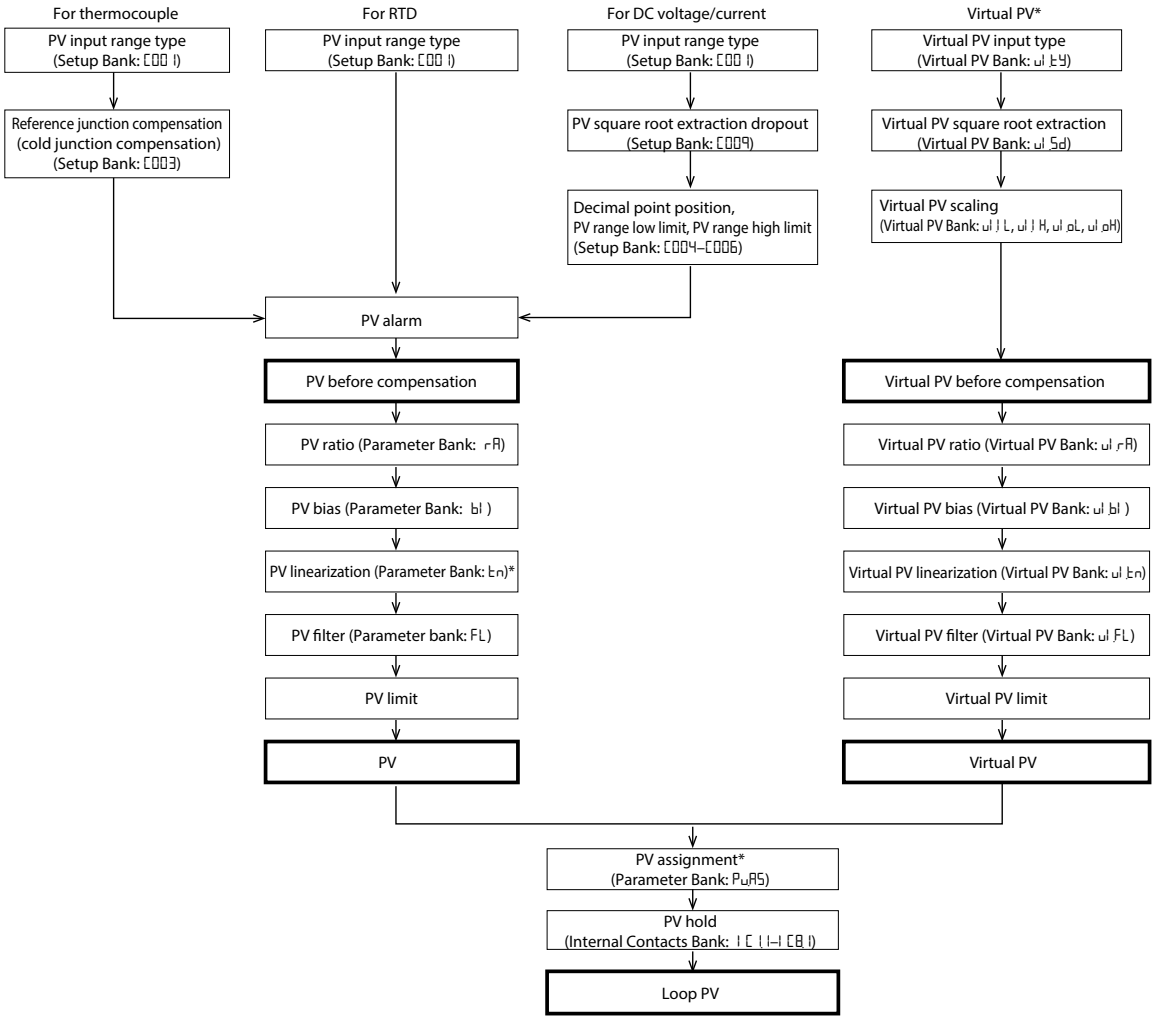
- If there is relatively little electromagnetic induction noise, shielded multi-core microphone cables (MVVS) can be used.

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Chapter 5. Functions

5 - 1 PV Input

The following is a functional block diagram for PV input.



* Not available for the C2A/C2B.

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■ PV input range type

For thermocouple and resistance temperature detector, the sensor type and the temperature range can be selected.

For DC voltage and DC current, the signal type can be selected.

Item (bank)	Display	Description	Initial value	User level
PV input range type (Setup Bank)	C001	See the PV input range table.	88	Simple, standard, advanced

Handling Precautions

- If the user sets a different range No. than last time for a thermocouple or resistance temperature detector, the PV decimal point position and the range will default to the values shown in the following tables. ☞ ■ PV decimal point position (p. 5-9) (for details on PV decimal point position)
- Be sure to specify the correct C001 setting according to the type and range of the sensor connected to this device. If the setting for a different sensor type is used, a large error in the temperature, etc., may cause abnormal output.
- ☞Chapter 14. Specifications (for the accuracy of each PV input range type)

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● PV input range table (thermocouple)

PV input range type	Sensor type	Range (Celsius)*1			PV decimal point position		
					Display	Setting range	Initial value*2
1	K	−200.0	to	+1200.0	✓	0–1	0
2	K	0.0	to	1200.0	✓	0–1	0
3	K	0.0	to	800.0	✓	0–1	1
4	K	0.0	to	600.0	✓	0–1	1
5	K	0.0	to	400.0	✓	0–1	1
6	K	−200.0	to	+400.0	✓	0–1	1
7	K	−200.0	to	+200.0	✓	0–1	1
8	J	0.0	to	1200.0	✓	0–1	0
9	J	0.0	to	800.0	✓	0–1	1
10	J	0.0	to	600.0	✓	0–1	1
11	J	−200.0	to	+400.0	✓	0–1	1
12	E	0.0	to	800.0	✓	0–1	1
13	E	0.0	to	600.0	✓	0–1	1
14	T	−200.0	to	+400.0	✓	0–1	1
15	R	0.0	to	1600.0	✓	0–1	0
16	S	0.0	to	1600.0	✓	0–1	0
17	B	0.0	to	1800.0	✓	0–1	0
18	N	0.0	to	1300.0	✓	0–1	0
19	PL II	0.0	to	1300.0	✓	0–1	0
20	WRe5-26	0.0	to	1400.0	✓	0–1	0
21	WRe5-26	0	to	2300	-	(Fixed)	No decimal point
22	Ni-Ni·Mo	0.0	to	1300.0	✓	0–1	0
23	PR40-20	0	to	1900	-	(Fixed)	No decimal point
24	DIN U	−200.0	to	+400.0	✓	0–1	1
25	DIN L	−100.0	to	+800.0	✓	0–1	1
26	Gold iron-Chromel*3	0.0	to	360.0	✓	0–1	1
28	E	−200.0	to	+800.0	✓	0–1	1

*1. If the display range is exceeded, this device continues displaying the maximum or minimum value that can be displayed.

*2. The PV decimal point position is reset to the initial value if the PV input range type is changed.

*3. The unit of indication is K (kelvin).

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PV input range type	Sensor type	Range (Fahrenheit)*1			PV decimal point position		
					Display	Setting Range	Initial value*2
1	K	−300	to	+2200	-	(Fixed)	No decimal point
2	K	0	to	2200	-	(Fixed)	No decimal point
3	K	0.0	to	1500.0	✓	0–1	1
4	K	0.0	to	1100.0	✓	0–1	1
5	K	0.0	to	700.0	✓	0–1	1
6	K	−300.0	to	+700.0	✓	0–1	1
7	K	−300.0	to	+400.0	✓	0–1	1
8	J	0	to	2200	-	(Fixed)	No decimal point
9	J	0.0	to	1500.0	✓	0–1	0
10	J	0.0	to	1100.0	✓	0–1	0
11	J	−300.0	to	+700.0	✓	0–1	0
12	E	0.0	to	1500.0	✓	0–1	0
13	E	0.0	to	1100.0	✓	0–1	0
14	T	−300.0	to	+700.0	✓	0–1	0
15	R	0	to	3000	-	(Fixed)	No decimal point
16	S	0	to	3000	-	(Fixed)	No decimal point
17	B	0	to	3300	-	(Fixed)	No decimal point
18	N	0	to	2300	-	(Fixed)	No decimal point
19	PL II	0	to	2300	-	(Fixed)	No decimal point
20	WRe5-26	0	to	2400	-	(Fixed)	No decimal point
21	WRe5-26	0	to	4200	-	(Fixed)	No decimal point
22	Ni-Ni•Mo	0	to	2300	-	(Fixed)	No decimal point
23	PR40-20	0	to	3400	-	(Fixed)	No decimal point
24	DIN U	−300.0	to	+700.0	✓	0–1	0
25	DIN L	−150.0	to	+1500.0	✓	0–1	0
26	Gold iron-Chromel*3	0.0	to	360.0	✓	0–1	0
28	E	−300.0	to	+1500.0	✓	0–1	0

*1. If the display range is exceeded, this device continues displaying the maximum or minimum value that can be displayed.

*2. PV decimal point position is reset to the initial value if PV input range type is changed.

*3. The unit of indication is K (kelvin).

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● **PV input range table (RTD)**

PV input range type	Sensor type	Range (Celsius)*1			PV decimal point position		
					Display	Setting range	Initial value*2
41	Pt100	−200.0	to	+500.0	✓	0–1	1
42	JPt100	−200.0	to	+500.0	✓	0–1	1
43	Pt100	−200.0	to	+200.0	✓	0–1	1
44	JPt100	−200.0	to	+200.0	✓	0–1	1
45	Pt100	−100.0	to	+300.0	✓	0–1	1
46	JPt100	−100.0	to	+300.0	✓	0–1	1
47	Pt100	−100.0	to	+200.0	✓	0–1	1
48	JPt100	−100.0	to	+200.0	✓	0–1	1
49	Pt100	−100.00	to	+150.00	✓	0–2	2
50	JPt100	−100.00	to	+150.00	✓	0–2	2
51	Pt100	−50.0	to	+200.0	✓	0–1	1
52	JPt100	−50.0	to	+200.0	✓	0–1	1
53	Pt100	−50.00	to	+100.00	✓	0–2	1
54	JPt100	−50.00	to	+100.00	✓	0–2	1
55	Pt100	−60.00	to	+40.00	✓	0–2	1
56	JPt100	−60.00	to	+40.00	✓	0–2	1
57	Pt100	−40.00	to	+60.00	✓	0–2	1
58	JPt100	−40.00	to	+60.00	✓	0–2	1
59	Pt100	−10.00	to	+60.00	✓	0–2	2
60	JPt100	−10.00	to	+60.00	✓	0–2	2
61	Pt100	0.00	to	100.00	✓	0–2	1
62	JPt100	0.00	to	100.00	✓	0–2	1
63	Pt100	0.0	to	200.0	✓	0–1	1
64	JPt100	0.0	to	200.0	✓	0–1	1
65	Pt100	0.0	to	300.0	✓	0–1	1
66	JPt100	0.0	to	300.0	✓	0–1	1
67	Pt100	0.0	to	500.0	✓	0–1	1
68	JPt100	0.0	to	500.0	✓	0–1	1
69	Pt100	−200.0	to	+850.0	✓	0–1	1
70	JPt100	−200.0	to	+640.0	✓	0–1	1

*1. If the display range is exceeded, this device continues displaying the maximum or minimum value that can be displayed.

*2. The PV decimal point position is reset to the initial value if the PV input range type is changed.

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PV input range type	Sensor type	Range (Fahrenheit)*1			PV decimal point position		
					Display	Setting Range	Initial value*2
41	Pt100	−300.0	to	+900.0	✓	0–1	0
42	JPt100	-300.0	to	+900.0	✓	0–1	0
43	Pt100	−300.0	to	+400.0	✓	0–1	0
44	JPt100	−300.0	to	+400.0	✓	0–1	0
45	Pt100	−150.0	to	+500.0	✓	0–1	0
46	JPt100	−150.0	to	+500.0	✓	0–1	0
47	Pt100	−150.0	to	+400.0	✓	0–1	0
48	JPt100	−150.0	to	+400.0	✓	0–1	0
49	Pt100	−150.0	to	+300.0	✓	0–1	0
50	JPt100	−150.0	to	+300.0	✓	0–1	0
51	Pt100	−50.0	to	+400.0	✓	0–1	0
52	JPt100	−50.0	to	+400.0	✓	0–1	0
53	Pt100	−50.0	to	+200.0	✓	0–1	0
54	JPt100	−50.0	to	+200.0	✓	0–1	0
55	Pt100	−60.00	to	+100.00	✓	0–2	0
56	JPt100	−60.00	to	+100.00	✓	0–2	0
57	Pt100	−40.00	to	+140.00	✓	0–2	0
58	JPt100	−40.00	to	+140.00	✓	0–2	0
59	Pt100	−10.00	to	+140.00	✓	0–2	0
60	JPt100	−10.00	to	+140.00	✓	0–2	0
61	Pt100	0.0	to	200.0	✓	0–1	0
62	JPt100	0.0	to	200.0	✓	0–1	0
63	Pt100	0.0	to	400.0	✓	0–1	0
64	JPt100	0.0	to	400.0	✓	0–1	0
65	Pt100	0.0	to	500.0	✓	0–1	0
66	JPt100	0.0	to	500.0	✓	0–1	0
67	Pt100	0.0	to	900.0	✓	0–1	0
68	JPt100	0.0	to	900.0	✓	0–1	0
69	Pt100	−300.0	to	+1560.0	✓	0–1	0
70	JPt100	−300.0	to	+1180.0	✓	0–1	0

*1. If the display range is exceeded, this device continues displaying the maximum or minimum value that can be displayed.

*2. PV decimal point position is reset to the initial value if PV input range type is changed.

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● **PV input range (DC voltage/current)**

PV input range type	Sensor type			Range*1	PV decimal point position		
					Display	Setting range	Initial value*2
81	0	to	10 mV	The scaling range is –19999 to +19999 U. The range is reset to 0–1000 if the PV input range type is changed.	✓	0–3	0
82	–10	to	+10 mV		✓	0–3	0
83	0	to	100 mV		✓	0–3	0
84	0	to	1 V		✓	0–3	0
86	1	to	5 V		✓	0–3	0
87	0	to	5 V		✓	0–3	0
88	0	to	10 V		✓	0–3	0
89	0	to	20 mA		✓	0–3	0
90	4	to	20 mA		✓	0–3	0
91	2	to	10 V		✓	0–3	0
92	–10	to	+10 V		✓	0–3	0

*1. If the display range is exceeded, this device continues displaying the maximum or minimum value that can be displayed.

*2. The PV decimal point position is not reset to the initial value when the PV input range type is changed.

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■ Reference junction compensation (cold junction compensation)

If the PV input range type is thermocouple, either one of the options below can be selected:

- This device performs reference junction compensation (cold junction compensation).
- This device does not perform reference junction compensation (cold junction compensation) because an external cold junction compensation device (ice bath, etc.) is used.

Item (bank)	Display	Description	Initial value	User level
Reference junction compensation (cold junction compensation) (Setup Bank)	C003	0: Internal compensation (by this device) 1:External compensation (by another device)	0	Advanced

■ PV square root extraction dropout

If the PV input range type is DC voltage/current, a dropout value can be set so that the result of the PV square root extraction used to convert the pressure (differential pressure) into the flow rate equals 0.

Item (bank)	Display	Description	Initial value	User level
PV square root extraction dropout (Setup Bank)	C009	0.0 %: PV square root extraction is not performed. 0.1–100.0 %	0.0 %	Advanced

- If the PV input range type is DC voltage/current, this item is displayed and the setting can be changed.
- Details of PV square root extraction

  The calculation input in % and the calculation result in % are expressed as PVIN and PVOUT, respectively.

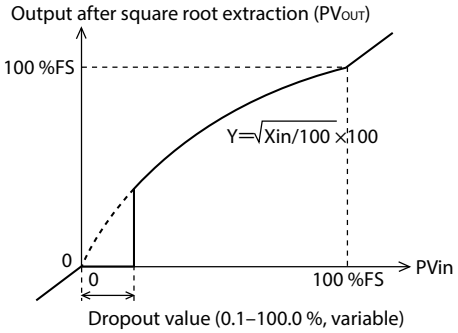
  If the PV input is greater than or equal to the PV square root extraction dropout value and is less than 100.0 %, the calculation formula will be:

  $PV_{OUT} = \sqrt{PVin / 100} \times 100$

  If the PV input is more than 0.0 % and is smaller than the PV square root extraction dropout value, PV_{OUT} = 0.0 %.

  If the PV input is 0.0 % or less, or 100.0 % or more, PV square root extraction is not performed, so

  $PV_{OUT} = PVin$.



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■ PV decimal point position

If the PV input range type is DC voltage/current, or if some thermocouple or RTD range types are selected, the decimal point position of the PV input can be specified.

Item (bank)	Display	Description	Initial value	User level
PV decimal point position (Setup Bank)	C004	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	Simple, standard, advanced

Handling Precautions

- This setting also applies to other parameters, including those listed below.
  - SP
  - SP low limit / high limit
  - RSP input range low limit / high limit
  - PV input range low limit / high limit
  - Event setting and continuous output setting related to PV
  - Event setting and continuous output setting related to SP
  - Event setting and continuous output setting related to deviation
  - ON/OFF control differential
  - ON/OFF control operating point offset
  - MV switching point PV for AT

Note

- ☞■ PV input range type (p. 5-2) (for whether this parameter is displayed for the range No. set for C00 1. The setting range and initial value also vary depending on the setting.)

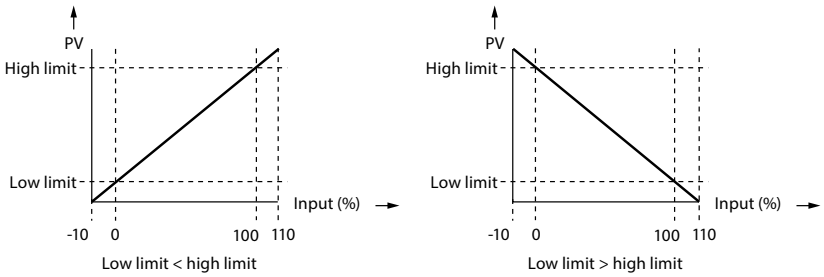
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■ PV input range low/high limit

If the PV input range type is DC voltage/current, scaling of the PV input can be specified.

Item (bank)	Display	Description	Initial value	User level
PV input range low limit (Setup Bank)	C005	If the PV input range type is DC voltage/current: –19999 to +19999 (if no decimal point) –1999.9 to +1999.9 (if 1 digit after the decimal point) –199.99 to +199.99 (if 2 digits after the decimal point) –19.999 to +19.999 (if 3 digits after the decimal point) If the PV input range type is thermocouple or RTD: the low and high limits of the specified PV input range type	0	Simple, standard, advanced
PV input range high limit (Setup Bank)	C006		1000	

- If the PV input range type is thermocouple or RTD, this item is displayed but the setting cannot be changed.
- If the PV input range type is DC voltage/current, this item is displayed and the setting can be changed. The following figures show the relationship between the PV input and the PV according to the range low and high limit settings.



■ PV ratio and PV bias

The PV ratio and PV bias can be set to compensate the PV.

Item (bank)	Display	Description	Initial value	User level
PV ratio (Parameter Bank)	rA	0.001 to 19.999	1.000	Standard, advanced
PV bias (Parameter Bank)	bI	–19999 to +19999 U	0	Simple, standard, advanced

- Details of PV ratio/bias calculation

  When the input is PVin, the result is PVOUT, the PV ratio is RA, and the PV bias BI, the formula will be:

  $PV_{OUT} = (PVin \times RA) + BI$

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■ PV low limit alarm threshold

Item (bank)	Display	Description	Initial value	User level
PV input error (under-range) type (Setup Bank)	C097	0: –10 % FS 1: –5 mV (valid only when C001 (PV input range type) is set to 17 or 23.)	0	Simple, standard, advanced

This setting is valid when C001 (PV input range type) is set to 17 (sensor type B) or 23 (sensor type PR40-20). If 1 (–5 mV) is set, the PV low limit alarm is not triggered when the sensor is connected normally.

The PV low limit alarm is triggered if the sensor is connected in the wrong direction. ☞■ PV limiting and PV low/high limit alarm (p. 5-11)(for the lowest PV that can be displayed)

■ PV linearization

The linearization table group used for linear approximation of PV input can be set.

Item (bank)	Display	Description	Initial value	User level
PV linearization table group definition (Parameter Bank)	PuTn	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced

This item is displayed and the setting can be changed for the C3A/C3B.

☞ 5 - 14 Linearization Table (p. 5-127) (for details about linearization processing)

■ PV filter

The PV filter is a first-order lag filter used if the PV fluctuates sharply and repeatedly out of control or if it changes slightly due to electromagnetic noise, etc. The larger the setting is, the less likely it is that the PV used for control will change.

Under normal circumstances, use the initial value of 0.0.

Item (bank)	Display	Description	Initial value	User level
PV filter (Parameter Bank)	FL	0.0: No filter 0.1–120.0 s	0.0 s	Simple, standard, advanced

$$OUT = OUT_{LAST} + (IN - OUT_{LAST}) \div (T \div TS + 1)$$

IN: Input to the filter
OUT: Current filter calculation output
OUT_{LAST}: Previous filter calculation output
T: Filter setting (s)
Ts: Sampling cycle (s)

■ PV limiting and PV low/high limit alarm

The PV low and high limits are specified for each PV input range type. ☞ ■ PV input range type (p. 5-2) (for PV low and high limits)

☞ ■ Operation when a PV input error occurs (p. 11-5)

The PV is limited to the range between the low and high limits.

If the PV before application of the PV ratio, PV bias, and PV filter is greater than the PV high limit, a PV input error (over range) (AL01) occurs. If it is less than the PV low limit, a PV input error (under range) (AL02) occurs.

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■ Zener barrier adjustment

When using zener barriers where PV input is from a resistance temperature detector, be sure to adjust the zener barriers. In addition, this adjustment is necessary if the resistance is different between the three wires to the PV input terminals, even if zener barriers are not used.

This adjustment is not needed and not possible for inputs other than input from an RTD.

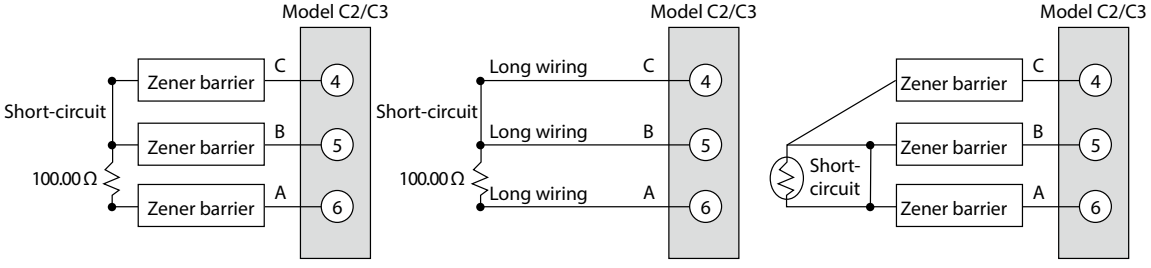
Item (bank)	Display	Description	Initial value	User level
Zener barrier adjustment function (Setup Bank)	C088	0–15 5: Zener barrier adjustment is possible	0 (0 is set at power-on)	Advanced
Zener barrier adjustment value (Setup Bank)	C089	–20.00 to +20.00 Ω Overwriting as a result of adjustment is allowed. Manual input of values is not allowed.	0.00 Ω	Advanced

● Adjustment procedure

Use the following procedure to adjust zener barriers.

(1) After setting the range No. to be used, turn off this device, and wire it in wiring configuration 1. To adjust error caused by a long wire when zener barriers are not used, wire it in wiring configuration 2.

Wiring configuration	Wiring description
1	Remove the RTD, connect a 100.00 Ω resistor between zener barriers A and B, and short between zener barriers B and C. Connect a resistor that satisfies the following specifications: Tolerance: ±0.05 %, rated power: 0.1 W or more Recommended resistor: C2610E (100 ΩA) from PCN Corporation
2	Remove the RTD from the end of the long extension wire, connect a 100.00 Ω resistor between A and B, and short between B and C.
3	Short between zener barriers A and B in the terminal section of the RTD.



Wiring configuration 1 Wiring configuration 2 Wiring configuration 3

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(2) Turn this device on and set 5 for [088 (Special function).

(3) Display [089 (Zener barrier adjustment).

Handling Precautions

- If [001 (PV input range type) is not RTD or if [088 (Special function) is not set to 5, [089 (Zener barrier adjustment) is not displayed.

(4) Press [ENT] to display the difference in wiring resistance between lines A and B in display field 2.

(5) Press [ENT] to save the difference in wiring resistance between lines A and B as the adjustment value (the amount of adjustment).

(6) Turn off this device and wire the RTD properly.

Handling Precautions

- Use zener barriers that have a resistance of 85 Ω or less, including the resistance of the wire.
- Adjust so that the difference in resistance of the zener barriers and the long extension wire is less than 20 Ω. At 20 Ω or more, adjustment is not possible, so the adjustment value will be 0.00 Ω.
- If you change PV input range type to the range type of another RTD, do the zener barrier adjustment again. (Only one zener barrier adjustment value can be saved regardless of the range.)
- To return the adjustment value to 0.00 Ω, do steps 2–5 above with PV input terminals 10 and 11 connected to each other and PV input terminal 12 disconnected.
- Use zener barriers recommended by Azbil Corporation.
  Combining this device with zener barriers other than those recommended may significantly lower the accuracy of this device. Please consult with Azbil Corporation before using other zener barriers.
- The adjustment cannot be made using CPL/Modbus or other RS-485 communication.
  Through communication it is possible only to check or clear the adjustment value. Use the following procedures.
  Clearing the adjustment value through communication:
  1. Allow the amount of zener barrier adjustment to be overwritten by writing "5" to 5288W. Adjustment of the controller starts at this time.
  2. Check and clear the amount of zener barrier adjustment by writing "0" to 21673W.
  3. Write-protect the amount of zener barrier adjustment by writing "0" to 5288W. Controller operation will begin at this time.
- Checking the adjustment value through communication
  1. Read 21673W. (This value can be read regardless of the value of 5288W.)

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■ Virtual PV

You can apply ratio, bias, linearization, filter, and other compensation to a numerical data item specified by a standard numerical code.

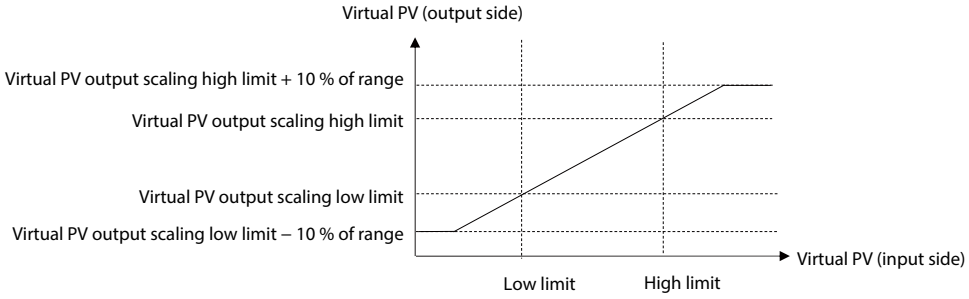
The data before compensation can be monitored as the virtual PV before application of ratio, bias, or filter, and the data after compensation can be monitored as the virtual PV.

Item	Display	Description	Initial value	User level
Virtual PV input type	uI tY	2048–3071: Standard numerical codes	2048	Advanced
Virtual PV filter	uI FL	0.0: No filter 0.1–120.0 s	0.0	Advanced
Virtual PV ratio	uI rA	0.001–19.999	1.000	Advanced
Virtual PV bias	uI bI	−19999 to +19999 U	0	Advanced
Virtual PV input scaling low limit	uI IL	−19999 to +19999 U	0	Advanced
Virtual PV input scaling high limit	uI IH	−19999 to +19999 U	1000	Advanced
Virtual PV output scaling low limit	uI oL	−19999 to +19999 U	0	Advanced
Virtual PV output scaling high limit	uI oH	−19999 to +19999 U	1000	Advanced
Virtual PV square root extraction dropout	uI Sd	0.0 %: PV square root extraction is not performed. 0.1 to 100.0 %	0.0	Advanced
Virtual PV linearization table group definition	uI tn	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced

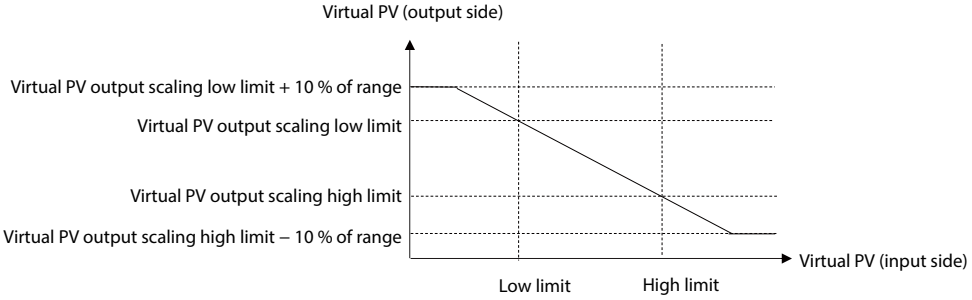
- This item is displayed and the setting can be changed for the C3A/C3B.
- Specify the numeric data that is used as a virtual PV for uI tY (Virtual PV input type) by a standard numerical code.
- Using uI Sd (Virtual PV square root extraction dropout), you can apply the same square root extraction as the PV to the virtual PV.
  ☞ ■ PV square root extraction dropout (p. 5-8) (for details about the operation of square root extraction)
- It is possible to convert the scale for input, which is set by uI IL (Virtual PV input scaling low limit) and uI IH (Virtual PV input scaling high limit), to the scale for output, which is set by uI oL (Virtual PV output scaling low limit) and uI oH (Virtual PV output scaling high limit).
  The number of decimal places for [Virtual PV input scaling low limit] and [Virtual PV input scaling high limit] changes according to the number of decimal places set for [Virtual PV input type]. This device determines the scale for input by taking the smaller setting as the low limit and the larger setting as the high limit.
  The number of decimal places for [Virtual PV output scaling low limit] and [Virtual PV output scaling high limit] changes according to the [PV decimal point position] setting. This device determines the scale for output by taking the specified low and high limits as they are.
  The virtual PV is limited to an extrapolated point of ± 10 % of the range defined by [Virtual PV output scaling low limit] and [Virtual PV output scaling high limit].

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Virtual PV output scaling low limit < Virtual PV output scaling high limit



Virtual PV output scaling low limit > Virtual PV output scaling high limit



- The alarm function is not provided for the virtual PV.
- Using ui rA (Virtual PV ratio) or ui bi (Virtual PV bias), the same ratio or bias compensation applied to the PV can be applied to the virtual PV.
  ☞ ■ PV ratio and PV bias (p. 5-10) (for details about ratio and bias compensation)
- Using ui tn (Virtual PV linearization table group definition), the same linearization processing that is applied to the PV can be applied to the virtual PV.
  ☞ ■ Linearization table group definition (p. 5-45) (for details about linearization processing)
- Using ui FL (Virtual PV filter), the same filter processing that is applied to the PV can be applied to the virtual PV.
  ☞ ■ PV filter (p. 5-11) (for details about filter processing)
- Virtual PV is limited to ±10 % of the width set by ui oL (Virtual PV output scaling low limit) and ui oH (Virtual PV output scaling high limit).

! Handling Precautions

- Do not set the following standard numerical codes for [Virtual PV input type]. If set, the virtual PV will not change.
  2288: Virtual PV before compensation
  2296: Virtual PV
  2320: Loop PV
  2576: Displayed loop PV
- If a standard numerical code for a value that is determined later in the processing order than this process is set for [Virtual PV input type], the value from the previous sampling cycle will be used. ☞ ■ Processing order (p. App.-1) (for the processing order)

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■ PV assignment and PV hold

The PV used for control can be specified.

Item (bank)	Display	Description	Initial value	User level
PV assignment	PuAS	0: PV 1: Virtual PV	0	Advanced

- This item is displayed and the setting can be changed for the C3A/C3B.
- If the PV display is fluctuating, the PV used for control can be held steady in one of three ways by assigning PV hold, PV max. hold, or PV min. hold to a digital input (DI).

  PV hold: The specified type of PV is displayed and not updated.

  PV max. hold: The maximum PV of the specified type is displayed. The maximum PV is updated only when there is a larger PV.

  PV min. hold: The minimum PV of the specified type is displayed. The minimum PV is updated only when there is a smaller PV.

  When the PV from a certain time, the maximum PV, or the minimum PV is being displayed, the PV in display field 1 flashes (blinks).
- The PV value after PV assignment or PV hold can be monitored with Loop PV.

■ Sampling cycle

The sampling cycle for acquiring the PV can be set.

Item (bank)	Display	Description	Initial value	User level
Sampling cycle (Setup Bank)	C098	0: 25 ms 1: 50 ms 2: 100 ms 3: 300 ms 4: 500 ms	1 or 2	Advanced

For the C2A/C2B, 0 (25 ms) cannot be selected.

For controllers whose model No. includes "R1," the initial value is 2 (100 ms).

Handling Precautions

- If you set this item to 0 (25 ms), set [Power frequency] also. Controllers whose model No. includes "R1" should be used with this item set to 2 (100 ms).

■ Power frequency

If the sampling cycle is 25 ms, set the power frequency.

Item (bank)	Display	Description	Initial value	User level
Power frequency (Setup Bank)	C099	0: 50 Hz 1: 60 Hz	0	Advanced

This item is displayed and the setting can be changed if [Sampling cycle] is set to 0 (25 ms).

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5-2 Mode

You can switch between AUTO and MANUAL modes, RUN and READY modes, LSP and RSP modes, and constant value operation / pattern operation. You can also stop or start automatic tuning (AT), enable or disable FF-FITTER automatic tuning, and set the release of all latches.

■ AUTO/MANUAL mode

AUTO and MANUAL modes can be switched.

Item (bank)	Display	Description	Initial value	User level
AUTO/MANUAL (Mode Bank)	A--M	AUto(0): AUTO mode MAn(1): MANUAL mode	AUto	Simple, standard, advanced

- After a switch between AUTO and MANUAL modes, the operation display is shown.
- If the operation type of any of internal contacts 1–8 is set to AUTO/MANUAL, A--M (AUTO/MANUAL) is displayed but the setting cannot be changed with the keys.
- If CtrL (Control method) is set to 0 (ON/OFF control), AUTO mode will apply. A--M (AUTO/MANUAL) is not displayed and the setting cannot be changed with the keys.
- If bit 0 (AUTO/MANUAL display) of C073 (Mode display setup) is set to 0 (disabled), A--M (AUTO/MANUAL) is not displayed and the setting cannot be changed with the keys.
- When the power is restored after a power outage in MANUAL mode, the manual MV before the power outage is used if the model of this device has extended data memory and if C101 (MANUAL operation at power-on) is set to 1 (Restoring MV before power outage).

■ RUN/READY mode

RUN and READY modes can be switched.

Item (bank)	Display	Description	Initial value	User level
RUN/READY (Mode Bank)	r---r	rUn(0):RUN mode rdY(1):READY mode	rUn	Simple, standard, advanced

- If the operation type of one or more of internal contacts 1–8 is set to RUN/READY, r---r (RUN/READY) is displayed but the setting cannot be changed with the keys.
- If bit 1 (RUN/READY display) of C073 (Mode display setup) is set to 0 (disabled), r---r (RUN/READY) is not displayed and the setting cannot be changed with the keys.

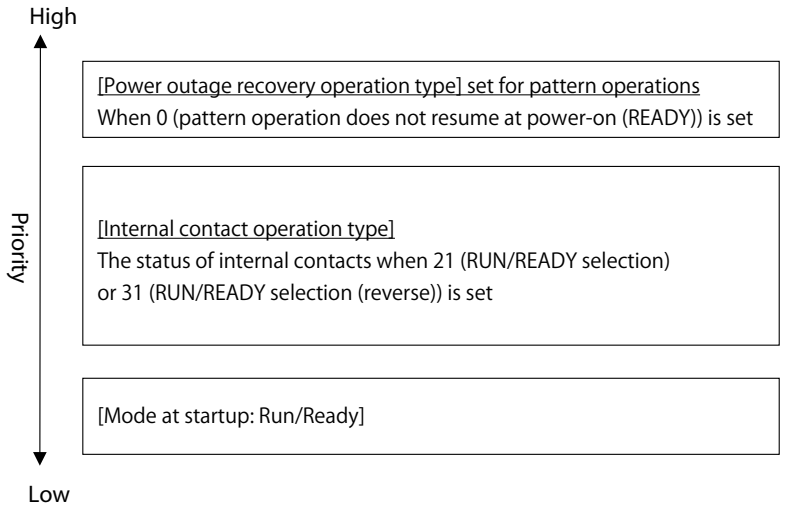
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■ Mode at startup: Run/Ready

The mode when the power is turned on (RUN or READY) can be specified.

Item (bank)	Display	Description	Initial value	User level
Mode at startup: Run/Ready (Setup Bank)	C 115	0: Value saved in the nonvolatile memory 1: RUN 2: READY	0	Simple, standard, advanced

- The priority in determining the mode (RUN or READY) when the power is turned on is shown in the figure below.



- To give a higher priority to the [Mode at startup: Run/Ready] setting than the status of internal contacts in selection of the mode (RUN or READY), set [Internal contact operation type] to 51 (RUN/READY selection (edge)), 54 (RUN selection (edge)), or 55 (READY selection (edge). With this setting, the controller will operate according to the [Mode at startup: Run/Ready] setting when the power is turned on, and then mode switching by internal contacts will be enabled.

! Handling Precautions

- Use [Mode at startup: Run/Ready] with ROM version 1.03 or later.

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■ LSP/RSP mode

LSP and RSP modes can be switched.

Item (bank)	Display	Description	Initial value	User level
LSP/RSP (Mode Bank)	L--r	LSP (0): LSP mode rSP (1): RSP mode	LSP	Simple, standard, advanced

- This item is displayed and the setting can be changed for models with RSP input.
- If the operation type of one or more of internal contacts 1–8 is set to LSP/RSP, L--r (LSP/RSP) is displayed but the setting cannot be changed with the keys.
- If bit 2 (LSP/RSP display) of C73 (Mode display setup) is set to 0 (disabled), L--r (LSP/RSP) is not displayed and the setting cannot be changed with the keys.
- For models without RSP input, L--r (LSP/RSP) is not displayed and the setting cannot be changed.

■ AT (automatic tuning) stop/start

AT can be started or stopped.

Item (bank)	Display	Description	Initial value	User level
AT (Auto-Tuning) stop/start (Mode Bank)	AT	AToF(0):AT stop ATon(1):AT start	AToF	Simple, standard, advanced

- AT stops in MANUAL mode, READY mode, or during fixed value output.
- If an over-range (AL01) or under-range (AL02) PV input error occurs, AT stops.
- If the operation type of any of internal contacts 1–8 is set to AT stop/start, AT (AT stop/start) is displayed but the setting cannot be changed with the keys.
- If CtrL (Control method) is set to 0 (ON/OFF control), AT (AT stop/start) is not displayed and the setting cannot be changed with the keys. If CtrL (Control method) is changed to 0 (ON/OFF control) while AT is running, AT stops.
- If bit 3 (AT stop/start display) of C073 (Mode display setup) is set to 0 (disabled), AT (AT stop/start) is not displayed and the setting cannot be changed with the keys.
☞■ AT (automatic tuning) (p. 5-39), 5-5 AT (Automatic Tuning) Function (p. 5-48)(for details on AT)

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■ AT error

AT status can be monitored, and if it ends abnormally, the error can be cleared by this setting.

Item (bank)	Display	Description	Initial value	User level
Auto tuning error (Mode Bank)	AtEr	ErnF (0): Normal Ern (1): Abnormal	ErnF	Simple, Standard, Advanced

- After executing the AT start operation, if AT does not start, or if it stops without changing the PID constants, AtEr (Auto tuning error) will be set to Ern (abnormal) (1).
- The error can be reset to ErnF (normal) (0) by any of the following operations.
  - Change the setting of AtEr (auto tuning error) to ErnF (normal) (0).
  - Try executing AT again until it ends normally.
  - Turn the power off and then back on.

☞■ AT (automatic tuning) (p. 5-39), 5 - 5 AT (Automatic Tuning) Function (p. 5-48)(for details on AT)

■ Constant value operation / pattern operation selection

Constant value operation and pattern operation can be switched.

Item (bank)	Display	Description	Initial value	User level
Constant value operation / pattern operation selection (Mode Bank)	C--P	CSt (0): Constant value operation Ptn (1): Pattern operation	CSt	Advanced

⚠ Handling Precautions

- Switching from constant value operation to pattern operation
  While in READY mode, if you switch from constant value operation to pattern operation, the mode during pattern operation is READY mode.
  While in RUN mode, if you switch from constant value operation to pattern operation, the mode during pattern operation is RUN mode and operation begins from the pattern start number.
- Switching from pattern operation to constant value operation
  While in READY mode, if you switch from pattern operation to constant value operation, the mode during constant value operation is READY mode.
  While in RUN, HOLD, or END mode, if you switch from pattern operation to constant value operation, the mode during constant value operation is RUN mode.

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■ Release all latches

The release of all logical operation latches can be enabled/disabled.

Item (bank)	Display	Description	Initial value	User level
Release all latches (Mode Bank)	bFLt	bF□n(0):Continue latches bF□F(1):Release latches	bF□n	Simple, standard, advanced

- If the operation type of any of internal contacts 1–8 is set to Release all latches, bFLt (Release all latches) is displayed but the setting cannot be changed with the keys.
- If bit 4 (Release all latches display) of C073 (Mode display setup) is set to 0 (disabled), bFLt (Release all latches) is not displayed and the setting cannot be changed with the keys.

■ FF-FITTER automatic tuning selection

Whether to enable FF-FITTER automatic tuning can be selected.

Item (bank)	Display	Description	Initial value	User level
FF-FITTER automatic tuning selection (Mode Bank)	FFAt	FA□F (0):No auto-tuning FA□n (1):Use auto-tuning	0	Advanced

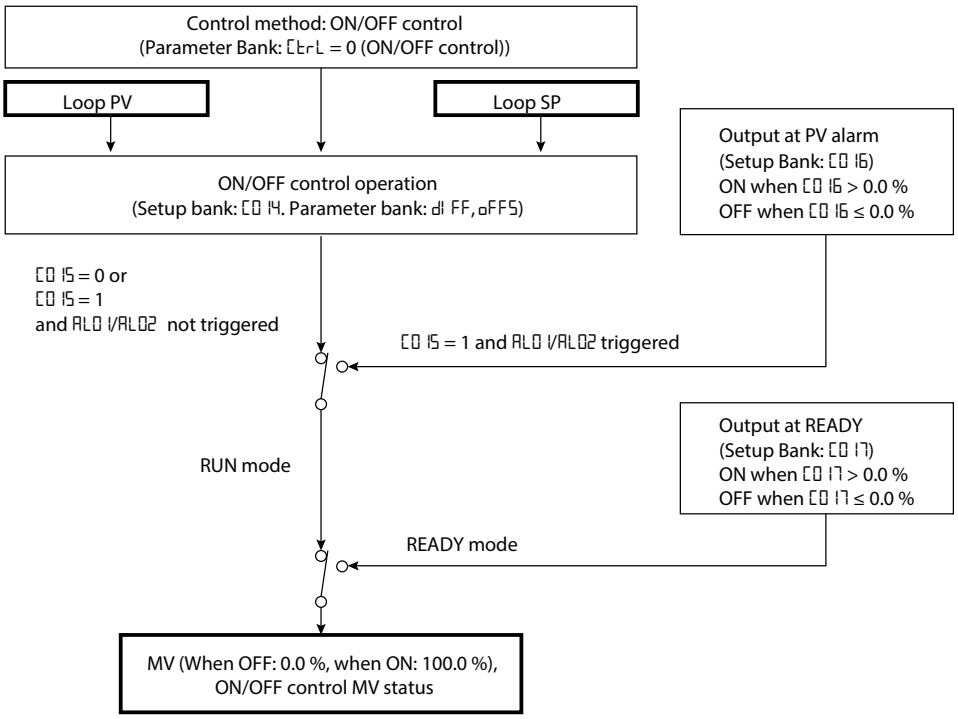
- This item is displayed and the setting can be changed for the C3A/C3B.

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5-3 Control

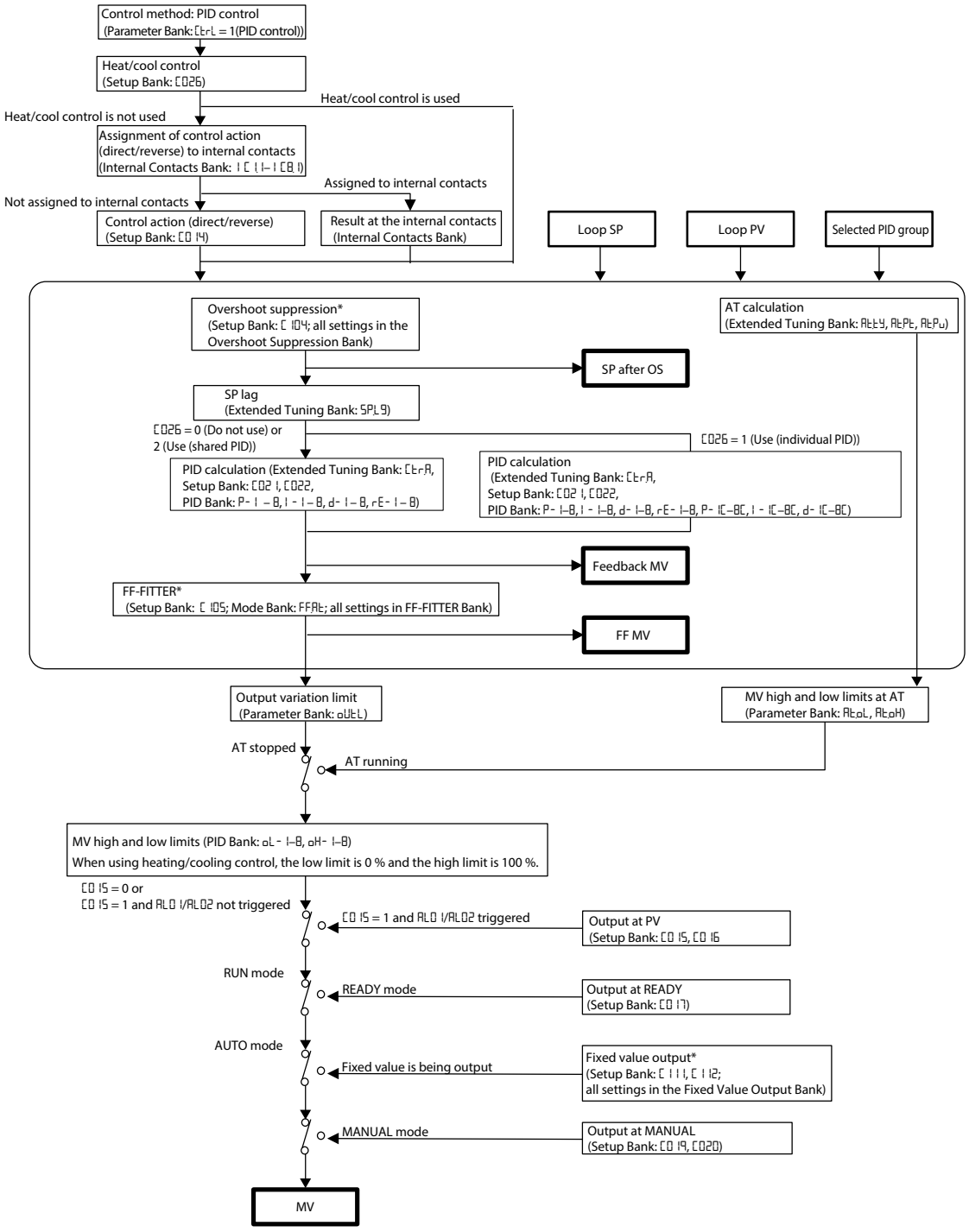
Functional block diagrams for control (ON/OFF control, PID control, Ra-PID control, heating/cooling control, etc.) are shown below.

■ ON/OFF control



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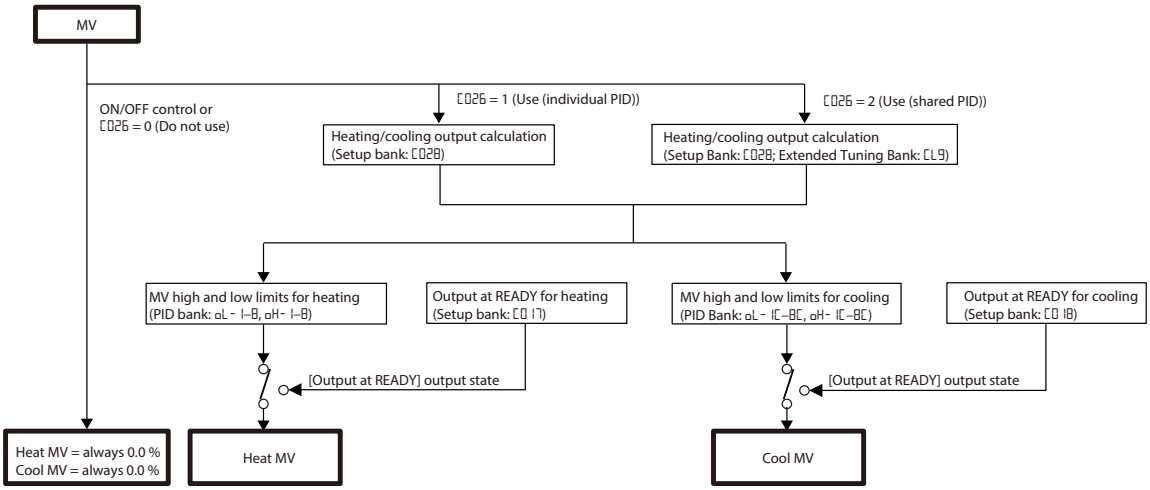
■ PID control, Ra-PID control, heating/cooling control



* Not available for the C2A/C2B.

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■ Heating MV and cooling MV



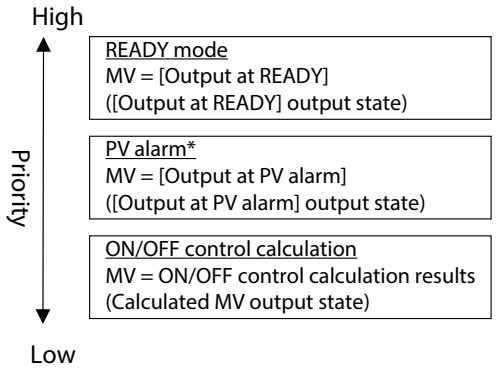
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■ Control method

There are two control methods.

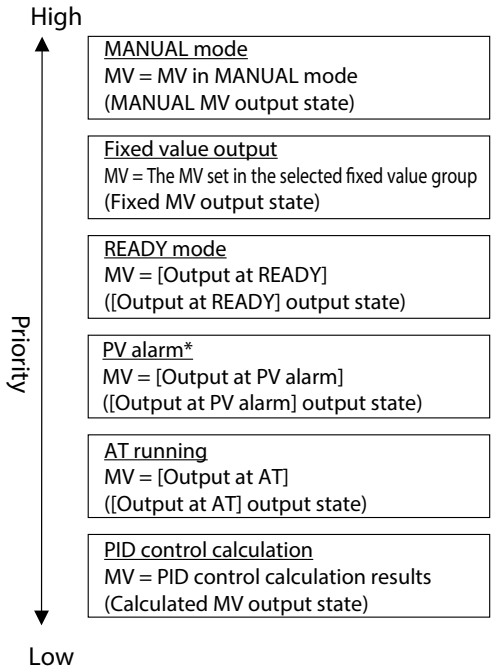
Item (bank)	Display	Description	Initial value	User level
Control method (Parameter Bank)	CtrL	0: ON/OFF control 1: PID control	0 or 1	Simple, standard, advanced

- If relay (R0) is specified for control output by the model No., the initial value is 0 (ON/OFF control). For other models, the initial value is 1 (PID control).
- The MV that is output in ON/OFF control is shown below.



* Valid only when [Output operation at PV alarm] is set to 1 (output the value set for [at PV alarm]).

- The MV that is output in PID control is shown below.



* Valid only when [Output operation at PV alarm] is set to 1 (output the value set for [at PV alarm]).

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■ Control operation and heating/cooling control

Direct/reverse of the control operation and whether to use the heating/cooling control can be selected.

Item (bank)	Display	Description	Initial value	User level
Control action (direct/reverse) (Setup Bank)	C014	0: Heating control (reverse action) 1: Cooling control (direct action)	0	Simple, standard, advanced
Heat/cool control (Setup Bank)	C026	0: Do not use 1: Use (individual PID) 2: Use (shared PID)	0	Simple, standard, advanced

- If CtrL (Control method) is set to 1 (PID control) and the total number of control outputs and event outputs is 2 or more, C026 (Heat/cool control) is displayed and the setting can be changed.
- If C026 (Heat/cool control) is set to 0 (Do not use), C014 (Control operation) is displayed and the setting can be changed.
- If C026 (Heat/cool control) is set to 0 (Do not use), C020 (Preset MANUAL value) and C022 (Initial output of PID control) will change to 0.0.
- If the setting of C026 (Heat/cool control) is changed from 0 (Do not use) to another setting, C020 (Preset MANUAL value) will change to 50.0 and C022 (Initial output of PID control) will change to 50.0.
- If C026 (Heat/cool control) is set to 2 (Use (shared PID)), AtoL (MV low limit at AT) will change to 50.0 and AtoH (MV high limit at AT) will be 100.0.
- If C026 (Heat/cool control) is changed from 2 (Use (shared PID)) to another setting, AtoL (MV low limit at AT) will change to 0.0 and AtoH (MV high limit at AT) will be 100.0.
- Reverse action (heating control) reduces (or turns off) the MV when the PV increases.
  Direct action (cooling control) increases (or turns on) the MV when the PV increases.

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■ Special control output

The MV in the [Output at PV alarm] output state and the [Output at READY] output state can be specified.

Item (bank)	Display	Description	Initial value	User level
Output operation at PV alarm (Setup Bank)	C015	0: Continue control calculations 1: Output the value set for Output at PV alarm	0	Advanced
Output at PV alarm (Setup Bank)	C016	−10.0 to +110.0 %	0.0 %	Advanced
Output at READY (Heat) (Setup Bank)	C017	−10.0 to +110.0 %	0.0 %	Standard, advanced
Output at READY (Cool) (Setup Bank)	C018	−10.0 to +110.0 %	0.0 %	Standard, advanced

- If CtrL (Control method) is set to 1 (PID control) and C026 (Heat/cool control) is set to 1 or 2, C018 (Output at READY (Cool)) is displayed and the setting can be changed.
- When the PV is abnormal, AL01 or AL02 is triggered.

■ Operation when switched to MANUAL mode

The MV in the MANUAL MV output state can be set.

Item (bank)	Display	Description	Initial value	User level
Output operation at changing Auto/Manual (Setup Bank)	C019	0: Bumpless transfer 1: Preset	0	Standard, advanced
Preset MANUAL value (Setup Bank)	C020	−10.0 to +110.0 %	0.0 or 50.0 %	Standard, advanced

- If C019 (Output operation at changing Auto/Manual) is set to 0 (Bumpless transfer), the MV is retained after a switch from AUTO to MANUAL .
  If 1 (Preset) is set, the MV is changed to the value set here in C020 when the mode is switched from AUTO to MANUAL.
- If CtrL (Control method) is set to 1 (PID control), C019 (Output operation at changing Auto/Manual) and C020 (Preset MANUAL value) are displayed and the settings can be changed.
- The initial value of C020 (Preset MANUAL value) is 0.0 when C026 (Heat/cool control) is set to 0 (Do not use), and 50.0 when the setting is 1 or 2 (Use).

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■ MANUAL operation at power-on

MANUAL operation at power-on can be set if this device has extended data memory.

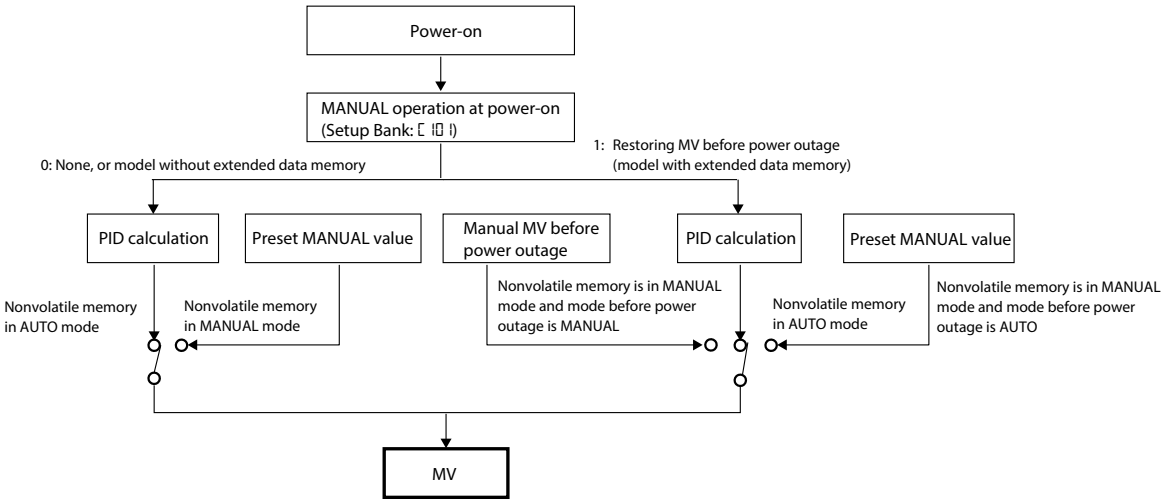
Item (bank)	Display	Description	Initial value	User level
MANUAL operation at power-on (Setup Bank)	C 101	0: Disable (normal operation) 1: Restoring MV before power outage	0	Advanced

- If 1 (Restoring MV before power outage) is set

  If the power is restored in MANUAL mode from the off status or a power outage, the MV is determined as shown in the following figure, depending on whether the nonvolatile memory and RAM were in AUTO or MANUAL mode before the power went off.

Handling Precautions

- The C0 19 (Output operation at changing Auto/Manual) setting is disabled when 1 (Restoring MV before power outage) is selected for power-on.



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■ Fixed value output

The MV set in a fixed value output group can be used as the MV. The group is determined by the internal contacts settings and the [Fixed value output group definition] setting. The MV for eight fixed value output groups can be set. In addition, the ramp when the MV is applied can be set for each fixed value output group.

Item (bank)	Display	Description	Initial value	User level
Fixed value output 1–8 MV (Fixed Value Output Bank)	Fo1.1 to Fo8.1	−10.0 to +110.0 %	0.0 %	Advanced
Fixed value output 1–8 up ramp (Fixed Value Output Bank)	Fo1.2 to Fo8.2	0 to 19999 U (0: No slope)	0 U	Advanced
Fixed value output 1–8 down ramp (Fixed Value Output Bank)	Fo1.3 to Fo8.3		0 U	Advanced
Fixed value output group definition (Setup Bank)	C110	0: Do not use 1–8: Groups 1–8	0	Advanced
Fixed value output slope time unit (Setup Bank)	C111	0: 1 s 1: 1 min 2: 1 h 3: 1 day	0	Advanced
Fixed value output slope decimal point position (Setup Bank)	C112	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	Advanced

- These items are displayed and the settings can be changed only for the C3A/C3B.
- The fixed value output group used is determined by adding the value set for [Fixed value output group definition] to the sum of the weightings for fixed value output group selection that are set for internal contacts. ☞ ■ Operation type (p. 5-81) (for fixed value output group selection by internal contacts)
- During fixed value output, the ramp set for [Fixed value output 1–8 up ramp] and [Fixed value output 1–8 down ramp] of the selected fixed value output group are applied. However, if the setting is 0, there will be no ramp and the MV will change stepwise.
- The units for [Fixed value output 1–8 up ramp] and [Fixed value output 1–8 down ramp] can be set by [Fixed value output slope time unit]. In addition, the number of decimal places for [Fixed value output 1–8 up ramp] and [Fixed value output 1–8 down ramp] can be set by [Fixed value output slope decimal point position].

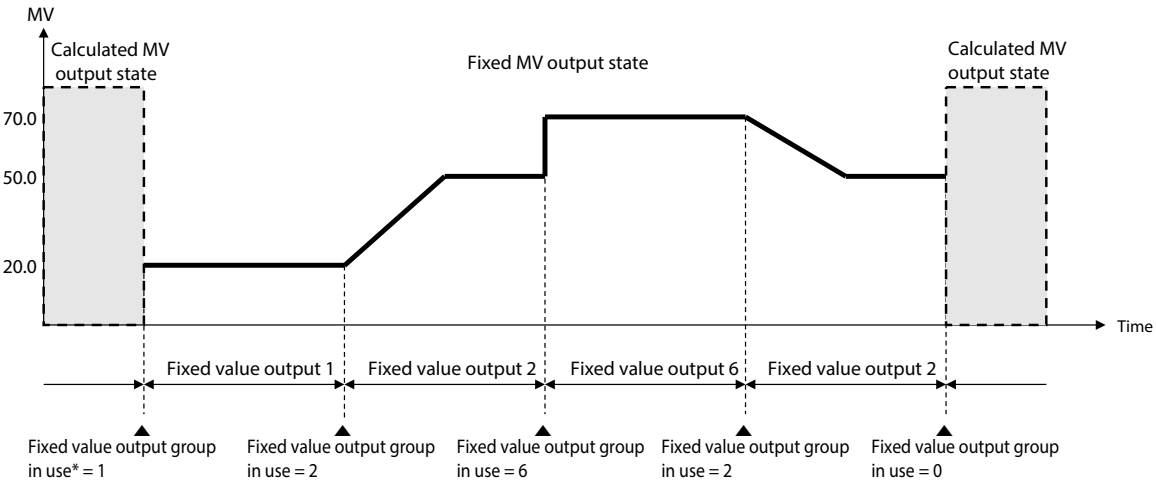
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The relationship between [Fixed value output slope time unit] and [Fixed value output slope decimal point position] is shown below.

Fixed value output slope time unit	Fixed value output slope decimal point position	Fixed value output 1–8 up ramp / down ramp
0: 1 s	0: No decimal point	0–19999 (s)
	1: 1 digit after the decimal point	0.0–1999.9 (s)
	2: 2 digits after the decimal point	0.00–199.99 (s)
	3: 3 digits after the decimal point	0.000–19.999 (s)
1: 1 min	0: No decimal point	0–19999 (min)
	1: 1 digits after the decimal point	0.0–1999.9 (min)
	2: 2 digits after the decimal point	0.00–199.99 (min)
	3: 3 digits after the decimal point	0.000–19.999 (min)
2: 1 h	0: No decimal point	0–19999 (h)
	1: 1 digits after the decimal point	0.0–1999.9 (h)
	2: 2 digits after the decimal point	0.00–199.99 (h)
	3: 3 digits after the decimal point	0.000–19.999 (h)
3: 1 day	0: No decimal point	0–19999 (day)
	1: 1 digits after the decimal point	0.0–1999.9 (day)
	2: 2 digits after the decimal point	0.00–199.99 (day)
	3: 3 digits after the decimal point	0.000–19.999 (day)

With the settings shown in the following table, if [Fixed value output group in use] changes as 0→1→2→6→2→0, the MV will change as shown in the figure below.

	MV	Up ramp	Down ramp
Fixed value output 1	20.0	0.00	0.00
Fixed value output 2	50.0	3.00	2.00
Fixed value output 6	70.0	0.00	0.00



* The fixed value output group in use is calculated by adding the sum of the weightings (+1, +2, +4) for fixed value output group selection that are set for [Internal contacts 1–8 operation type] to the value set for [Fixed value output group definition].

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■ Initial output type of PID control

Item (bank)	Display	Description	Initial value	User level
Initial output type of PID control (Setup Bank)	C021	0: Automatic 1: Do not initialize 2: Initialize (if a new SP is set)	0	Advanced

- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- When PID groups are switched according to a change in the SP or the SP group, the MV may be stuck at the low or high limit, and the loop PV may not change or may overshoot. PID control initialization is useful for preventing these problems.
- If 0 (Automatic) is set:
  When the SP is changed or SP groups are switched, whether the PID calculation must be initialized or not is determined automatically, and it is initialized only when necessary.
- If 1 (Do not initialize) is set:
  PID control is not initialized when the SP is changed or SP groups are switched. This setting is useful if the continuity of the MV is important when the SP is changed or SP groups are switched.
- If 2 (Initialize) is set:
  PID control is always initialized when the SP is changed or SP groups are switched. This setting is useful if it is important that, when the SP is changed or SP groups are switched, the MV increases or decreases quickly according to the relationship between the loop PV and loop SP.

■ Initial output of PID control

Item (bank)	Display	Description	Initial value	User level
Initial output of PID control (Setup Bank)	C022	−10.0 to +110.0 %	0.0 or 50.0 %	Advanced

- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- This value is used for PID control immediately after the operation mode is changed from READY to RUN, or after RUN mode is activated when the power is turned on. This value greatly affects the MV when the mode is switched.
- If the setting for C026 (Heat/cool control) is changed, the value will be reset automatically. If C026 (Heat/cool control) is changed to 1 or 2 (Use), 50.0 % will apply. If it is changed to 0 (Do not use), 0.0 % will apply.

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■ PID decimal point position

Item (bank)	Display	Description	Initial value	User level
PID decimal point position (Setup Bank)	C023	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	Advanced

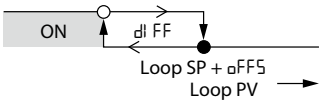
- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- If 0 is set, the integral and derivative time setting range will be 0–19999 s.
- If 1 is set, the integral and derivative time setting range will be 0.0–1999.9 s.

■ ON/OFF control

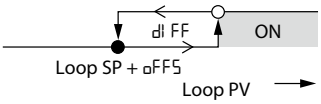
The settings related to ON/OFF control can be specified.

Item (bank)	Display	Description	Initial value	User level
ON/OFF control differential (Parameter Bank)	dIFF	0 to 19999 U	5	Simple, standard, advanced
ON/OFF control operating point offset (Parameter Bank)	oFFS	−19999 to +19999 U	0	Advanced

- If CtrL (Control method) is set to 0 (ON/OFF control), dIFF (ON/OFF control differential) and oFFS (ON/OFF control operating point offset) are displayed and the settings can be changed.
- The operation of ON/OFF control is shown below.



Heating control (reverse action)



Cooling control (direct action)

In the figure, the black circle (●) means that there is an ON/OFF change at that value, and the white circle (○) means that there is an ON/OFF change when that value is exceeded.

- Example of how to use the ON/OFF control differential and the ON/OFF control operating point offset:
  In heating control with loop SP = 200 °C, if you want to turn off the output when the temperature is 205 °C or higher and turn on the output when the temperature falls below 190 °C, set the differential to 15 °C and the offset to 5 °C.
  In cooling control with loop SP = 10 °C, if you want to turn off the output when the temperature is 5 °C or lower and turn on the output when the temperature is above 10 °C, set the differential to 5 °C and the offset to −5 °C.

[!] Handling Precautions

- dIFF (ON/OFF control differential) and OFFS (ON/OFF control operating point offset) should be set so that the output is turned on or off within the PV range. ☞ ■ PV input range type (p. 5-2) (for details on the PV range)

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■ Output variation limit

Variation in the MV can be limited.

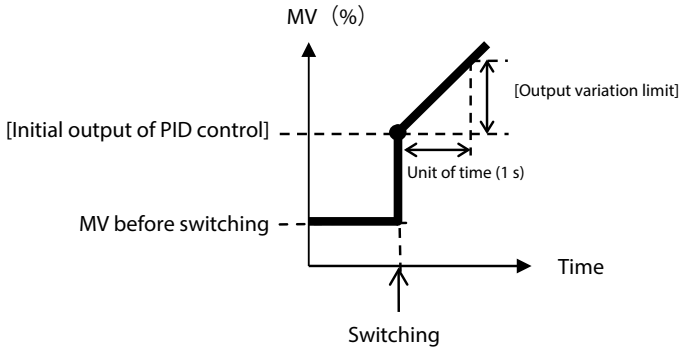
Item (bank)	Display	Description	Initial value	User level
Output variation limit (Parameter Bank)	oUtL	0.0: No limit 0.1 to 1999.9 %/s	0.0	Advanced

- Set the high limit of the absolute value of MV variation per second (%). For example, if the [Sampling cycle] setting is 0.1 s and oUtL (Output variation limit) is set to 5.0 (%/s), variation of the MV in each sampling cycle is limited to ±0.5 %.
- If 0.0 is set, variation of the MV is not limited.
- The [Initial output of PID control] setting is used as the base value for the output variation limit function that starts to work in one of the following three situations:

  (1) When [Output at Ready] is switched to the MV obtained by PID calculation in RUN mode

  (2) When [Output at PV alarm] is switched to the MV obtained by PID calculation after the PV alarm is cleared

  (3) When the MV obtained by PID calculation is output for the first time at the startup of the product



  The MV before switching is as follows.

  For situation (1): the value set for [Output at Ready]

  For situation (2): the value set for [Output at PV alarm]

  For situation (3): always 0.0 %

- To eliminate sudden changes in the MV before and after the switching described above, set [Initial output of PID control] to the same value as the MV before switching.

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■ PID control

The settings related to PID control can be specified.

Item (bank)	Display	Description	Initial value	User level
P (Proportional Band) (PID Bank 1–8)	P-1 to 8	0.1 to 1999.9 %	5.0 %	Simple, standard, advanced
I (Integral time) (PID Bank 1–8)	I-1 to 8	0 to 19999 U (0 = no integral operation)	120 s	
D (Derivative time) (PID Bank 1–8)	d-1 to 8	0 to 19999 U (0 = no derivative operation)	30 s	
Manual reset (PID Bank 1–8)	rE-1 to 8	−10.0 to +110.0 %	50.0 %	
Output low limit (PID Bank 1–8)	oL-1 to 8	−10.0 to +110.0 %	0.0 %	Standard, advanced
Output high limit (PID Bank 1–8)	oH-1 to 8	−10.0 to +110.0 %	100.0 %	
P (Proportional Band) (Cool) (PID Bank 1–8)	P-1C to 8C	0.1 to 1999.9 %	5.0 %	Simple, standard, advanced
I (Integral time)(Cool) (PID Bank 1–8)	I-1C to 8C	0 to 19999 U (0 = no integral operation)	120 s	
D (Derivative time)(Cool) (PID Bank 1–8)	d-1C to 8C	0 to 19999 U (0 = no derivative operation)	30 s	
Output low limit (Cool) (PID Bank 1–8)	oL1C to 8C	−10.0 to +110.0 %	0.0 %	Standard, advanced
Output high limit (Cool) (PID Bank 1–8)	oH1C to 8C	−10.0 to +110.0 %	100.0 %	

- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- [P (Proportional Band)(Cool)], [I (Integral time)(Cool)], and [D (Derivative time)(Cool)] are displayed and the settings can be changed if C026 (Heat/cool control) is set to 1 (Use (individual PID)).
- [Output low limit (Cool)] and [Output high limit (Cool)] are displayed and the settings can be changed if C026 (Heat/cool control) is set to 1 or 2 (Use).
- In heating/cooling control, if the integral time (I-1 to 8) or the integral time for cooling (I-1C to 8C) is 0 seconds, there is no integration. Manual reset (rE-1 to 8) is used for both heating and cooling.
- Manual reset (rE-1 to 8) is displayed if the integral time setting for either heating or cooling is 0.
- If the integral time for either heating or cooling is 0 seconds, both integral times are processed as 0 seconds.
- If [Output low limit] is greater than [Output high limit], the low and high limits are automatically interchanged.

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● PID operation initialization

PID operation is initialized when:

- PID control starts after the MANUAL MV output state changes to the calculated MV output state
- PID control starts after the fixed MV output state changes to the calculated MV output state
- PID control starts after the [Output at READY] output state changes to the calculated MV output state
- PID control starts after the [Output at PV alarm] output state changes to the calculated MV output state
- PID control starts after the [Output at AT] output state changes to the calculated MV output state after AT ends normally
- PID control starts after the [Output at AT] output state changes to the calculated MV output state after AT ends abnormally
- The settings below are changed in the calculated MV output state:

  Control method

  Heat/cool control

  Control operation

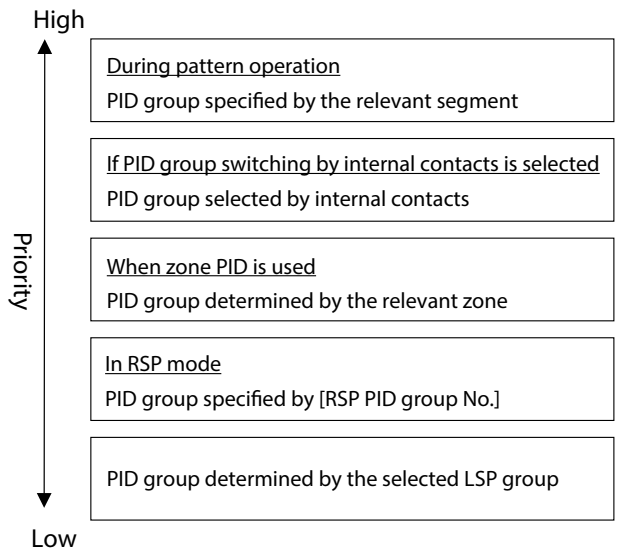
  Sampling cycle

  Control algorithm

- PID calculation results are initialized according to the setting for [Initial output type of PID control] (C02 I) in the calculated MV output state

● Priority in PID group selection

The priority order for PID group selection is shown below.



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Handling Precautions

- In pattern operation, PID group selection based on the operation type setting of internal contacts and PID group automatic selection by the zone PID function are disabled. Change the mode to constant value operation in order to enable these functions.
- If PID group selection is set for the operation type of internal contacts, the zone PID function is disabled. To use the zone PID, do not set PID group selection for the operation type of internal contacts.

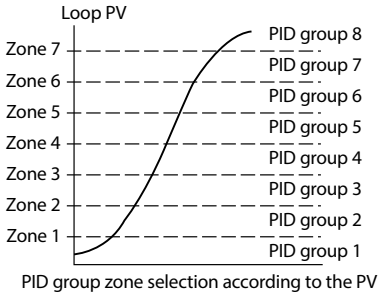
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■ Zone PID

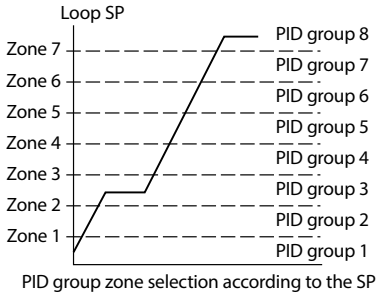
In PID control, the PID group can be automatically switched according to the SP or PV.

Item (bank)	Display	Description	Initial value	User level
Zone PID operation (Setup Bank)	C024	0: Do not use 1: Used with SP change 2: Used with PV change	0	Advanced
Zone 1 (Zone Bank)	Zn-1	−19999 to +19999 U	19999	Advanced
Zone 2 (Zone Bank)	Zn-2		19999	
Zone 3 (Zone Bank)	Zn-3		19999	
Zone 4 (Zone Bank)	Zn-4		19999	
Zone 5 (Zone Bank)	Zn-5		19999	
Zone 6 (Zone Bank)	Zn-6		19999	
Zone 7 (Zone Bank)	Zn-7		19999	
Zone hysteresis (Zone Bank)	ZndF	0 to 19999 U	5	

- This item is displayed and the setting can be changed for the C3A/C3B.
- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- If C024 (Zone PID operation) is set to 0 (Do not use), this device operates according to the PID group setting in the SP Bank.
- If C024 (Zone PID operation) is set to 1 or 2 (Use), the PID group setting in the SP Bank is disabled and the PID group is automatically selected as shown in the following figure. In addition, hysteresis can be set in order to prevent frequent PID group selection due to small changes in the loop PV or loop SP around the value set for the zone.

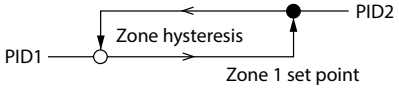


PID group zone selection according to the PV



PID group zone selection according to the SP

The method of operation at zone boundaries is shown below.
This example shows the zone boundary between PID1 and PID2.



The black circle (●) indicates that the next PID group is selected at that value.
The white circle (○) indicates that the next PID group is selected when that value is exceeded by 1 U.

Note

- ☞ ● Priority in PID group selection (p. 5-35) (for details about the operating conditions for zone PID)

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■ Heating/cooling control

The dead zone and cooling gain can be set for heating/cooling control.

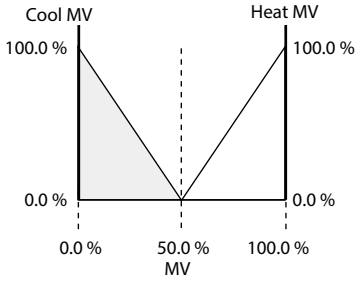
Item (bank)	Display	Description	Initial value	User level
Heat/cool control dead zone (Setup Bank)	C028	−100.0 to +100.0 %	0.0 %	Simple, standard, advanced
Cooling gain	CL9	−10.0 to +110.0 %	30.0 %	Advanced

- C028 (Heat/cool control dead zone) is displayed and the setting can be changed if C026 (Heat/cool control) is set to 1 or 2 (Use).
- If C026 (Heat/cool control) is set to 1 (Use (individual PID)), the settings for heating in the selected PID group apply when the MV is 50 % or more, and the settings for cooling in the selected PID group apply when the MV is less than 50 %.
- CL9 (Cooling gain) is displayed and the setting can be changed if C026 (Heat/cool control) is set to 2 (Use (shared PID)).
- Set CL9 (Cooling gain) to a higher value to boost the cooling capacity, and set it to a lower value to decrease the cooling capacity.

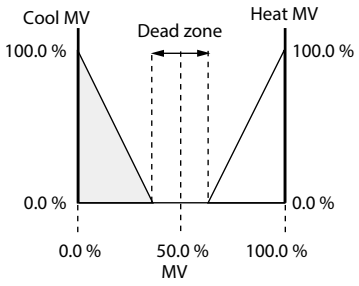
Note

● Heating/cooling output

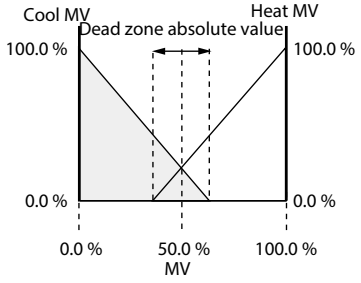
If C026 (Heat/cool control) is set to 1 (Use (individual PID)), the heating and cooling MVs shown in the figures below are output in accordance with the setting for [Heat/cool control dead zone].



If the dead zone is 0.0 %



If the dead zone is more than 0.0 %



If the dead zone is less than 0.0 %

The figure below shows the relationship between [Output low limit], [Output high limit], [Output low limit (cool)], and [Output high limit (cool)].

Output low limit ≤ Heating MV ≤ Output high limit

Output high limit (cool) ≤ Cooling MV ≤ Output high limit (cool)

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■ AT (automatic tuning)

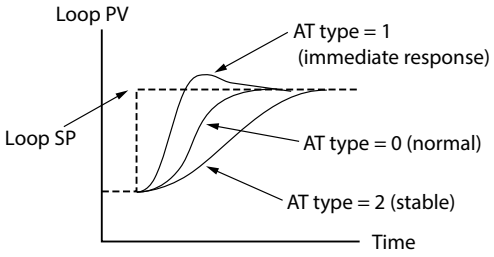
The following settings can be specified for AT.

Item (bank)	Display	Description	Initial value	User level
MV low limit at AT (Parameter Bank)	AtoL	−10.0 to +110.0 %	0.0 %	Simple, standard, advanced
MV high limit at AT (Parameter Bank)	AtoH	−10.0 to +110.0 %	100.0 %	
AT type (Extended Tuning Bank)	AtTY	0: Normal (regular control characteristics) 1: Immediate response (to disturbance) 2: Stable (minimal PV fluctuation)	0	
AT proportional band adjust (extended tuning bank)	At-P	0.00 to 199.99	1.00	Advanced
AT integral time adjust (extended tuning bank)	At-I	0.00 to 199.99	1.00	
AT derivative time adjust (extended tuning bank)	At-d	0.00 to 199.99	1.00	
MV switching point type for AT (Extended Tuning Bank)	AtPt	0: Default (2/3 of the deviation of the initial PV from the initial SP) 1: SP 2: PV	0	
MV switching point PV for AT (Extended Tuning Bank)	AtPu	−19999 to+19999 U	0	

- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- The MV when AT is executed can be limited by [MV low limit at AT] (AtoL) / [MV high limit at AT] (AtoH).
  - If C026 (Heat/cool control) is set to 0 (Do not use), the MV is limited by both [MV low limit at AT] (AtoL) / [MV high limit at AT] (AtoH) and by [Output low limit] (oL-1) / [Output high limit] (oH-1) for the PID constants.
  - If C026 (Heat/cool control) is set to 1 or 2 (Use),
    · The MV is limited by [MV low limit at AT] (AtoL) / [MV high limit at AT] (AtoH).
    · The heating MV is limited by [Output low limit] (oL-1 to 8) / [Output high limit] (oH-1 to 8).
    · The cooling MV is limited by [Output low limit (cool)] (oL.1C to 8C) / [Output high limit (cool)] (oH.1C to 8C).
- AT type (AtTY) is used to calculate the PID constants that are appropriate for the control characteristics of the equipment by AT.
  1 (Immediate response): adjustment for speed-oriented applications, such as a process where the loop PV directly reflects heating by a heater.
  2 (Stable): adjustment for stability-oriented applications, such as a process where the loop PV indirectly reflects heating by a heater.

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The following graph illustrates the differences in control results using PID constants calculated with each AT type.



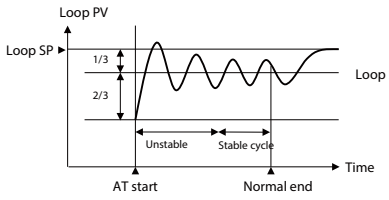
Difference in PV change when loop SP is changed

- [AT proportional band adjust] (Atp), [AT integral time adjust] (Ati), [AT derivative time adjust] (Atd):
  The PID constants calculated with AT are multiplied by these factors before being written to the PID constant settings. Note that only values within the setting range of the PID constants will be written.
- [MV switching point type for AT] is a setting for changing the MV switching point during AT.

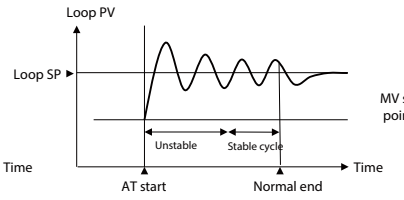
  0 (Default): A new MV applies when the loop PV passes the two-thirds point in the amount of loop PV deviation from the loop SP at the start of AT.

  1 (SP): A new MV applies when the loop PV passes the loop SP at the start of AT.

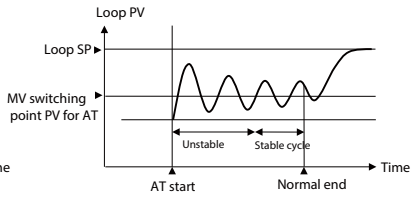
  2 (PV): A new MV applies when the loop PV passes the setting for [MV switching point PV for AT].



MV switching point type for AT = 0 (default)



MV switching point type for AT = 1 (SP)



MV switching point type for AT = 2 (PV)

Note

- To execute AT only for heating PID constants when C26 (heat/cool control) is set to 1 (use (individual PID)), the settings should satisfy:
  50.0 % < MV low limit at AT (AtpL) < MV high limit at AT (AtpH)
  To execute AT only for cooling PID constants, the settings should satisfy:
  MV low limit at AT(AtpL) < MV high limit at AT(AtpH) < 50.0 %

☞■ AT (automatic tuning) stop/start (p. 5-19),
5 - 5 AT (Automatic Tuning) Function (p. 5-48)(for details on AT)

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Handling Precautions

- If C026 (Heat/cool control) is set to 2 (Use (shared PID), execute AT with settings that satisfy: 50.0 % < MV low limit at AT (AtoL) < MV high limit at AT (AtoH)
- If you change a setting such as PV input range type or linear scaling low/high limit while AT is running, AT may not end. Do not change any settings other than At (AT stop/start selection) while AT is running.
- To execute AT only for heating PID constants when C026 (Heat/cool control) is set to 1 (Use (individual PID), the settings should satisfy: 50.0 % < MV low limit at AT (AtoL) < MV high limit at AT (AtoH)
- To execute AT only for cooling PID constants when C026 (Heat/cool control) is set to 1 (Use (individual PID), the settings should satisfy: MV low limit at AT (AtoL) < MV high limit at AT (AtoH) < 50.0 %

■ Control algorithm

Item (bank)	Display	Description	Initial value	User level
Control algorithm (Extended Tuning Bank)	CtrA	0: PID-A (deviation-derivative type) 1: Ra-PID (high-performance PID) 2: PID-B (PV derivative type)	0	Standard, advanced

- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- PID-A (deviation-derivative type) is a PID control algorithm that causes derivative operations in response to changes in the loop SP as well.
- PID-B (PV derivative type) is a PID control algorithm that causes derivative operations only in response to changes in the loop PV. This item is displayed and the setting can be changed for the C3A/C3B.
- Ra-PID (high-performance PID) is a deviation-derivative type PID control algorithm that reduces instability when response to disturbance is enhanced.

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■ SP lag

The SP lag is a filter function to prevent sudden changes in control operations when the loop SP changes. Use the setting below for SP lag.

Item (bank)	Display	Description	Initial value	User level
SP lag time (Extended Tuning Bank)	SPL9	0.0 to 1999.9 s (0.0 = no effect)	0.0	Advanced

- If CtrL (Control method) is set to 1 (PID control), this item is displayed and the setting can be changed.
- The function of SPL9 (SP lag time):
  If 0.0 is set: The SP lag function has no effect.
  If 0.1 or more is set: The larger the constant, the smaller the amount of MV change when the SP is changed, and the more strongly overshoot is suppressed.
- The output value of the SP lag that is input to the PID operation is reset as follows.
  - Reset to the loop SP when PID control starts after the [Output at MANUAL] output state changes to the calculated MV output state
  - Reset to the loop SP when PID control starts after the fixed MV output state changes to the calculated MV output state
  - Reset to the loop PV when PID control starts after the [Output at READY] output state changes to the calculated MV output state
  - Reset to the loop PV when PID control starts after the [Output at PV alarm] output state changes to the calculated MV output state
  - Reset to the loop SP when PID control starts after the [Output at AT] output state changes to the calculated MV output state after AT ends abnormally
  - Reset to the loop PV when PID control starts after the [Output at AT] output state changes to the calculated MV output state after AT ends abnormally
  - Reset to the loop PV if the settings below are changed in the calculated MV output state:

    Control method

    Heat/cool control

    Control operation

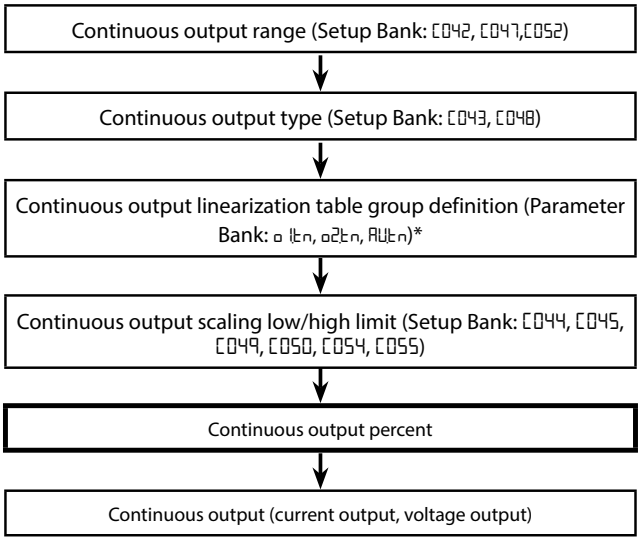
    Sampling cycle

    Control algorithm
  - Reset to the loop PV if PID calculation results are reset according to the setting for [Initial output type of PID control] (C02 1) in the calculated MV output state

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5-4 Continuous Output

The following is a functional block diagram for continuous output.



* This item is displayed and the setting can be changed for the C3A/C3B.

■ Output range

The range for current output and voltage output can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 continuous output range (Setup Bank)	C042	For current output 1: 4–20 mA 2: 0–20 mA For voltage output 1: 1–5 V 2: 0–5 V 3: 0–10 V	1	Simple, standard, advanced
OUT 2 continuous output range (Setup Bank)	C047			
AUX output: continuous output range (Setup Bank)	C052			

- These items are displayed and the settings can be changed if the specifications required for continuous output are specified for the above output terminals by the model number.

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■ Output type

The type of current output can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 continuous output type (Setup Bank)	C043	0: MV 1: Heating MV 2: Cooling MV 3: Loop PV 4: Loop PV before compensation 5: Loop SP 6: Deviation 7: CT1 current when output ON 8: CT2 current when output ON 9: MFB opening (including estimate) 10: Loop SP + MV 11: Loop PV + MV 12–2047: Invalid 2048–3071: Standard numerical codes	0	Simple, standard, advanced
OUT 2 continuous output type (Setup Bank)	C048		3	
AUX output: continuous output type (Setup Bank)	C053			

- These items are displayed and the settings can be changed if the specifications required for continuous output are specified for the above output terminals by the model number.
- The MV scaling width is used for calculation of loop SP + MV and loop PV + MV.
  ☞ ■ MV scaling width (p. 5-47)(for details)

! Handling Precautions

- Do not set a standard numerical code, 2768 to 2770 (continuous output percent), that has already been set for the same channel. If set, the continuous output percent will not change.
- If a standard numerical code for a value that is determined later in the processing order than this process is set, the value from the previous sampling cycle will be used.
  ☞ ■ Processing order (p. App.-1) (for the processing order)
- If a standard numerical code, 2768 to 2770 (continuous output percent), that has already been set for a channel with a greater channel No. than the channel being configured is set, the continuous output percent of that channel from the previous sampling cycle will be used.

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■ Linearization table group definition

The linearization group used for linear approximation of continuous output can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 Continuous output linearization table group definition (Parameter Bank)	o1tn	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced
OUT 2 Continuous output linearization table group definition (Parameter Bank)	o2tn			
AUX output: continuous output linearization table group definition (Parameter Bank)	AUtn			

- These items are displayed and the settings can be changed for the C3A/C3B if the specifications required for continuous output are specified for the above output terminals by the model number.
- The settings of each continuous output terminal can be combined with a group definition that depends on internal contacts. ☞ 5-7 Digital Input (DI) / Internal Contacts (p. 5-65) (for details)

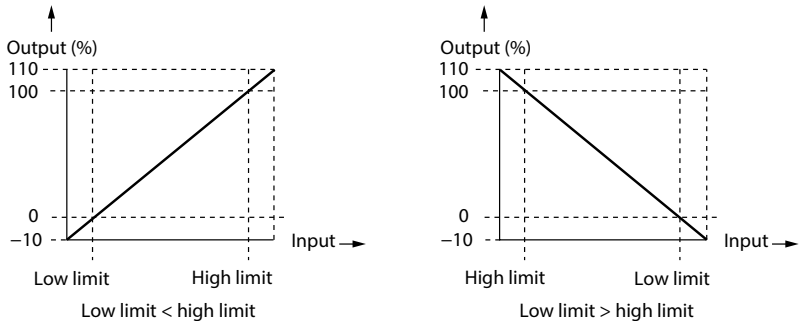
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■ Output scaling low/high limit

Output scaling low and high limits can be set for the current output.

Item (bank)	Display	Description	Initial value	User level
OUT 1 continuous output scaling low limit (Setup Bank)	C044	−19999 to +19999 U The number of decimal places changes according to the output type. Either of the following units is used depending on the output type. Output type = 0–2: % (of the MV) Output type =3–6: same as for the PV (°C, etc.) Output type = 7–8: A (current) Output type = 2048–3071: the unit for the selected standard numerical code	0.0	Simple, standard, advanced
OUT 1 continuous output scaling high limit (Setup Bank)	C045		100.0	
OUT 2 continuous output scaling low limit (Setup Bank)	C049		0	
OUT 2 continuous output scaling high limit (Setup Bank)	C050		1000	
AUX output: continuous output scaling low limit (Setup Bank)	C054		0	
AUX output: continuous output scaling high limit (Setup Bank)	C055		1000	

- These items are displayed and the settings can be changed if the specifications required for continuous output are specified for the above output terminals by the model number.
- The relationship between the output type and the output based on the output scaling low and high limit settings is shown in the figure below.



However, in the 0–20 mA range the output is 0–110 %.

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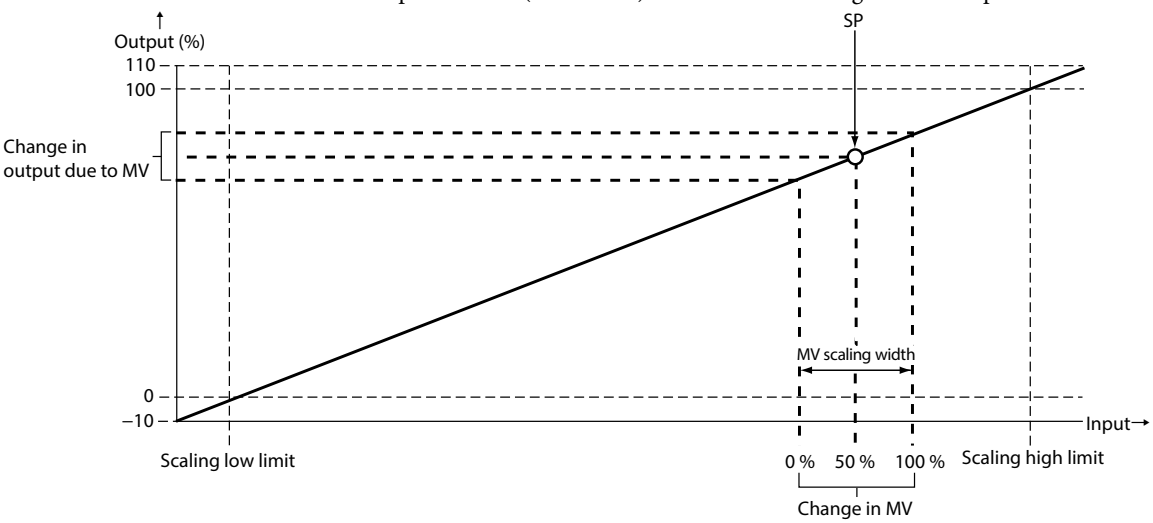
■ MV scaling width

If the output type is set to either loop SP + MV or loop PV + MV, the output can be made continuous by adding the change in the MV to the loop SP or loop PV.

Item (bank)	Display	Description	Initial value	User level
OUT 1 continuous output MV scaling width (Setup Bank)	C046	0 to 19999 U The number of decimal places and the unit are the same as for the PV.	200	Simple, standard, advanced
OUT 2 continuous output MV scaling width (Setup Bank)	C051			
AUX output: continuous output MV scaling width (Setup Bank)	C056			

- These items are displayed and the settings can be changed if the specifications required for continuous output are specified for the above output terminals by the model number and if the continuous output type is set to loop SP + MV or loop PV + MV.
- The value calculated by the following expression is output according to the output scaling low and high limit settings.

  Loop SP + MV: (MV − 50.0) ÷ 100.0 × MV scaling width + loop SP
  Loop PV + MV: (MV − 50.0) ÷ 100.0 × MV scaling width + loop PV



When continuous output type is loop SP + MV

Handling Precautions

- This function is used when the continuous output from the C2/C3 is connected to the remote SP (RSP) input of another controller for the purpose of cascade control in which the C2/C3 operates as the primary device and another controller operates as the secondary device. Set the width of the RSP of the secondary device that changes according to the changes of the MV (0–100 %) of the C2/C3 as the MV scaling width.

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5-5 AT (Automatic Tuning) Function

Use the AT function if:

- You want to set CtrL (Control method) to 1 (PID control) and set PID constants automatically.
- The rise of PV is slow or the overshoot is large.

The AT function is available if CtrL (Control method) is set to 1 (PID control).

■ How to start AT

(1) Check that the PV input and the actuators (heater power, etc.) are ready for control.

(2) Check that the RDY mode indicator is off, which indicates that the device is in RUN mode. If the RDY mode indicator is on and the device is in READY mode, change the mode to RUN.

(3) Check that the MAN mode indicator is off, which indicates that the device is in AUTO mode. If the MAN mode indicator is on and the device is in MANUAL mode, change the mode to AUTO.

(4) Set At (AT stop/start) in the mode bank to AtonAT start).

■ How to stop AT

AT ends automatically. To stop AT while it is running, set At (AT stop/start) in the mode bank to AtoF (AT stop).

AT can also be stopped by changing the mode to READY or MANUAL.

● Display while AT is running

If C080 (User-defined function indicator lighting conditions) is set to 1600 (AT stopped/started status) (default: 1024 (always off (0)), the UF indicator is lit during AT and is turned off when AT ends.

! Handling Precautions

- When AT is running during pattern operation, the pattern operation stops even in RUN mode.
- When AT stops or ends, the controller returns to a state according to RUN, HOLD, END, or READY.
- For controllers whose model No. includes "R1," run the AT with the automatic adjustment for position proportional control stopped.

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● Operation while AT is running

During AT, PID constants are calculated using limit cycles.

(1) A limit cycle operation is performed using the MV switching point specified by [MV switching point type for AT].
During AT, two values are output repeatedly. One of the values is [Output low limit] (oL-1 to 8) or [MV low limit at AT] (AToL), whichever is greater, and the other is [Output high limit] (oH-1 to 8) or [MV high limit at AT] (AToH), whichever is smaller.

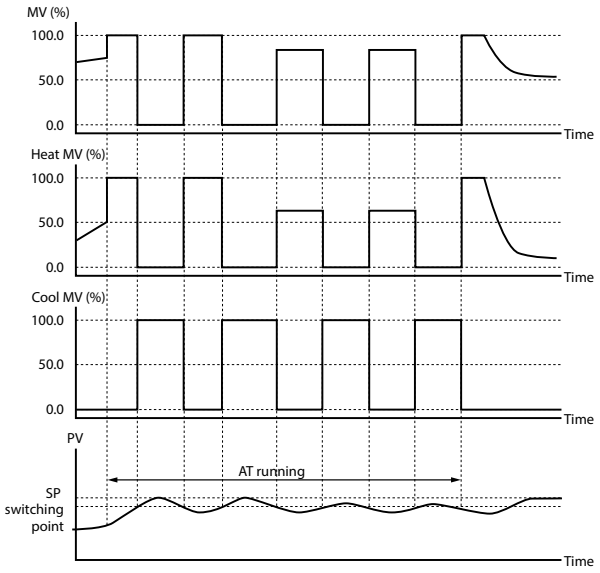
(2) When the limit cycle has stabilized, the PID constants are changed, and AT ends.

If C026 (Heat/cool control) is set to 1 (Use (individual PID)), AT is executed using both heating and cooling MVs.

In the first half, the MV changes to its low and high limits. In the second half, it changes within a relatively narrow range.

If C026 (Heat/cool control) is set to 2 (Use (shared PID)), AT is executed using only heating MV.

The figures below illustrates AT with the following settings:
C026 (Heat/cool control) = 1 (Use (individual PID), [Heat/cool control dead zone] = 0.0 %, [Output low limit] = 0.0 %, [Output high limit] = 100.0 %



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Handling Precautions

- Before starting AT, check that the PV input and the actuators (heater power, etc.) are ready for control.
- If CtrL (Control method) is set to 0 (ON/OFF control), AT cannot start. Change the control method setting to 1 (PID control).
- To start AT, this device should be in the calculated MV output state and the setting for [MV switching point PV for AT] should be within the PV input range.
  ☞ ■ AT (automatic tuning) (p. 5-39)(for MV switching point for AT)
  ☞ ■ PV input range type (p. 5-2) (for the PV input range)
- If any of the following is detected during AT, AT will stop without changing the PID constants:
  - A change to READY mode
  - A change to MANUAL mode
  - A change to fixed value output
  - PV error
  - Change in the setting of [Control method], [Heat/cool control], [Control operation] (only if [Heat/cool control] is set to 0 (Do not use)), [Sampling cycle], or [Control algorithm]
  - Change in the setting of [Output low limit] (oL-1 to 8), [MV low limit at AT] (AtoL), [Output high limit] (oH-1 to 8), or [MV high limit at AT] (AtoH) that would prevent change in the two-value output during AT
  - For forcible termination of AT by At (AT stop/start selection) in the mode bank or by the internal contacts to which the function to stop/start AT is assigned, see the section below:
    ☞5-7 Digital Input (DI) / Internal Contacts (p. 5-65)
    If AT is forced to stop, AtEr (Auto tuning error) is set to Er.on (Abnormal) (1).
- AtEr (Auto tuning error) can be reset to Er.oF (Normal) (0) by any of the following operations.
  - Change the setting of AtEr (Auto tuning error) to Er.oF (Normal) (0).
  - Try executing AT again until it ends normally.
  - Turn the power off and then back on.
- If C026 (Heat/cool control) is set to 2 (Use (shared PID)), specify [AT output low limit] (AtoL) / [AT output high limit] (AtoH) and [Output low limit] (oL-1 to 8) / [Output high limit] (oH-1 to 8) so that both values that are output to the MV are 50 % or more.
- If C026 (Heat/cool control) is set to 1 (Use (individual PID)),
  · The MV is limited by [MV low limit at AT] (At.OL) / [MV high limit at AT] (At.OH).
  · The heating MV is limited by [Output low limit] (oL-1 to 8) / [Output high limit] (oH-1 to 8) for the PID constants.
  · The cooling MV is limited by [Output low limit (cool)] (oL.1C to 8C) / [Output high limit (cool)] (oH.1C to 8C).

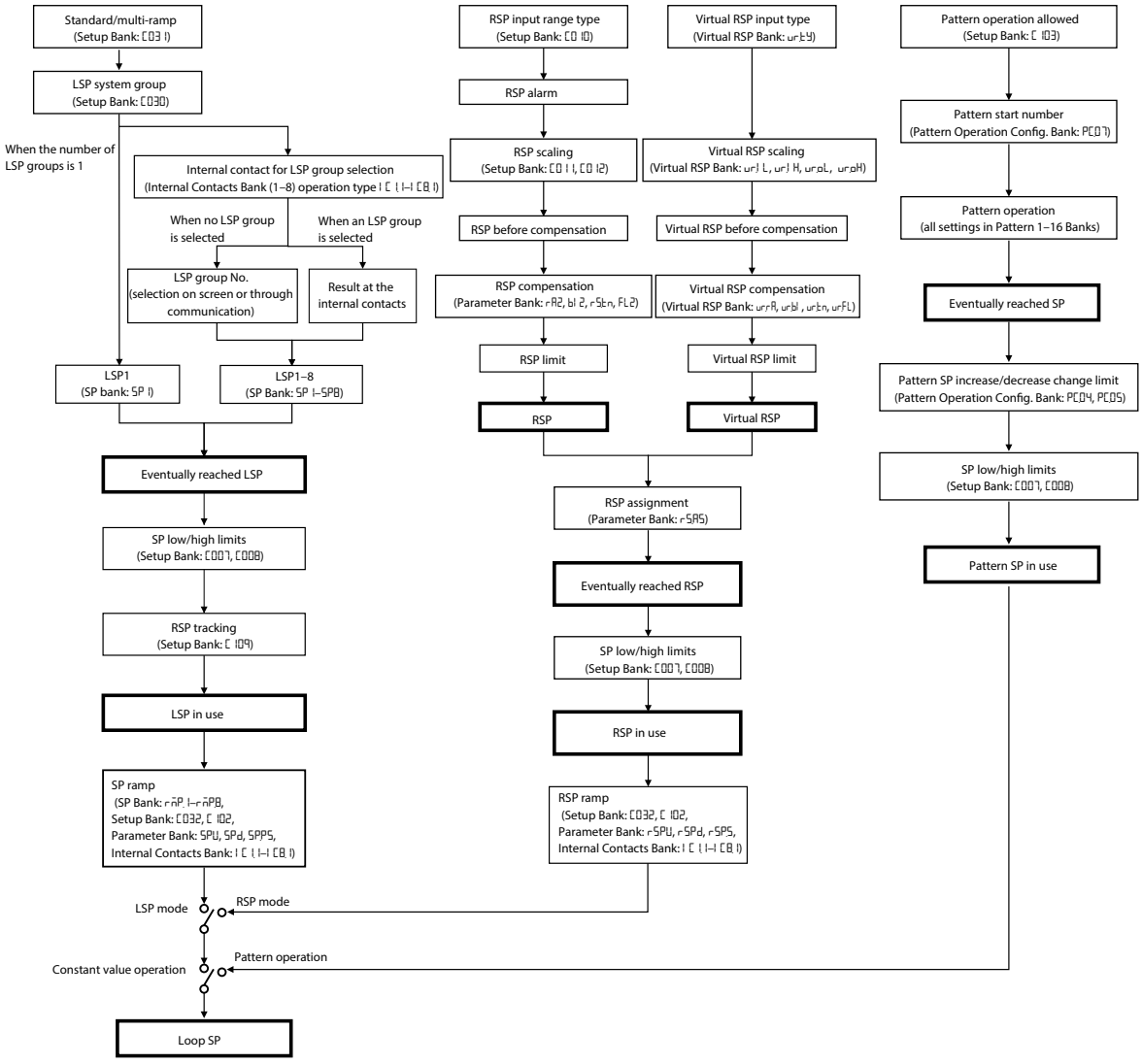
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- If the two MVs that are output during AT are close, the PV may not change even if the MVs have changed.
  In this case, AT may not end. If this happens, stop AT manually, reset the MV low and high limits, and then start AT again.
- The number of limit cycles from the start to the end of AT and how long the AT takes differ depending on the process being controlled.
- If AT always fails, instead of using it, set the PID constants manually.
- The progress of AT can be checked on the operation display.
  ☞ ■ Operation settings (p. 6-1)
- If C026 (Heat/cool control) is set to 0 (Do not use) or 2 (Use (shared PID)), a value indicating the progress of AT is displayed. The value starts at 4 and is decremented to 0, when which means that AT is complete.
  If C026 (Heat/cool control) is set to 1 (Use (individual PID)), AT starts at 7, decreases by increments of 1, and finishes at 0.
  The AT progress value indicates the number of steps remaining until AT ends. It does not indicate the time until AT ends.
- Depending on the process being controlled, it may not be possible to obtain suitable PID constants with AT. In such a case, set the PID constants manually.
- Do not change any settings other than At (AT stop/start selection) while AT is running.
  ☞ ■ AT (automatic tuning) stop/start (p. 5-19), ■ AT (automatic tuning) (p. 5-39)(for details on AT)

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5-6 SP

The following is a functional block diagram for the SP. ☞ 5-16 Pattern Operation (p. 5-135)(for pattern operation)



Note

- A local set point (LSP) is a set point stored in this device.
  A set point given by an external analog input is called a remote set point (RSP).
- While the LSP is provided for constant value operation, the pattern SP is provided for pattern operation. It is possible to switch between these two types of operation.
- The pattern start number is selected according to a specification made on the display, or through communication, or determined by the internal contacts.
  ☞ 5-16 Pattern Operation (p. 5-135) (for pattern operation)

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■ Specifying the SP using operation settings

The SP for the LSP group (LSP1–8) that is being used can be specified.

During an SP ramp, the SP that is displayed will be different from the LSP group SP, but when the setting is being changed using the keys, the value specified for the LSP group will be displayed.

Item (bank)	Display	Description	Initial value	User level
SP (operation settings)	PV is shown in display field 1	SP low limit to high limit	0	Simple, standard, advanced

- If bit 1 (SP display) in C074 (PV/SP display setup) is set to "Yes," this item is displayed and the setting can be changed.
- The SP cannot be specified in RSP mode.

■ Number of LSP groups

The number of LSP groups to be used can be specified.

Item (bank)	Display	Description	Initial value	User level
LSP system group (Setup Bank)	C030	1–8	1	Simple, standard, advanced

■ LSP1–8

The SP for up to eight LSP groups can be specified individually.

Item (bank)	Display	Description	Initial value	User level
SP (SP Bank)	SP-1	SP low limit to high limit	0	Simple, standard, advanced
	SP-2			
	SP-3			
	SP-4			
	SP-5			
	SP-6			
	SP-7			
	SP-8			

- SPs for as many LSP groups as are specified by C030 (LSP system group) are displayed for setting.

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■ LSP group No.

The LSP group to display can be selected.

Item (bank)	Display	Description	Initial value	User level
LSP No. (operation settings)	LSP	The rightmost digit shows the number. From 1 to the number set for [LSP system group]	1	Simple, standard, advanced

- This item is displayed if C030 (LSP system group) is set to 2 or more and bit 2 (LSP group No. display) of C074 (PV/SP display setup) is set to "Yes."
- If this item is displayed and if there are no internal contacts for LSP group selection, the setting can be changed.

■ Assigning LSP group selection to internal contacts

LSP group selection can be set using [Internal contacts 1–8 operation type].

Item (bank)	Display	Description	Initial value	User level
Internal contacts 1–8 operation type (Internal Contacts Bank)	IC1.1 IC2.1 IC3.1 IC4.1 IC5.1 IC6.1 IC7.1 IC8.1	0: No function 1: LSP group selection (0/+1) 2: LSP group selection (0/+2) 3: LSP group selection (0/+4) 4–57: other functions	0	Advanced

- Details of LSP group selection by internal contact

  The LSP group No. set by ON/OFF of internal contacts is shown below.

  LSP group selection (0/+1) OFF: 0 ON: 1
  LSP group selection (0/+2) OFF: 0 ON: 2
  LSP group selection (0/+4) OFF: 0 ON: 4

  The LSP group No. is determined by adding 1 to the sum of the LSP group selection values set by ON/OFF of internal contacts.
  For example, if the sum of the values set by internal contacts 1–8 is 1, the LSP group No. will be 2.

- If the number of LSP groups is 1, this item can be displayed and the setting can be changed, but LSP group selection by DI assignment is invalid.

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■ SP ramp unit

The time unit for the slope of the SP ramp can be specified.

Item (bank)	Display	Description	Initial value	User level
SP ramp unit (Setup Bank)	C032	0: 1 s 1: 1 min 2: 1 h	1	Advanced

■ SP ramp decimal point position

The decimal point position for the slope of the SP ramp can be specified.

Item (bank)	Display	Description	Initial value	User level
SP ramp decimal point position (Setup Bank)	C 102	0–3	0	Advanced

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■ SP up/down ramp slope

The slope can be specified if the SP ramp type is 0 (Normal).

Item (bank)	Display	Description	Initial value	User level
SP up ramp (Parameter Bank)	SPU	0: No slope 1–19999 U: With slope Select the time unit for the slope with the SP ramp unit setting. Select the number of digits after the decimal point of the ramp time with the SP slope decimal point position setting.	0	Advanced
SP down ramp (Parameter Bank)	SPd		0	Advanced

- If the initial value 0 is set, the SP ramp function does not operate. Therefore, if the up slope is set to a value above 0 and the down slope is set to 0, the SP ramp function will operate when the SP is increasing but not when the SP is decreasing. Likewise, the SP ramp function can be set to operate only when the SP is decreasing.
- The SP ramp decimal point position determines the number of digits after the decimal point for the setting. The time unit of the slope can be selected from per second, per minute, and per hour by C032 (SP ramp unit).

Example of the relationship between SP ramp unit and SP ramp decimal point position:

C032 (SP ramp unit)	C102 (SP ramp decimal point position)	SPU (SP up ramp)	SPd (SP down ramp)
0: 1 s	0 (no decimal point)	0–19999 (s)	0–19999 (s)
	1 (1 digit after the decimal point)	0.0–1999.9 (s)	0.0–1999.9 (s)
	2 (2 digits after the decimal point)	0.00–199.99 (s)	0.00–199.99 (s)
	3 (2 digits after the decimal point)	0.000–19.999 (s)	0.000–19.999 (s)
1: 1 min	0 (no decimal point)	0–19999 (min)	0–19999 (min)
	1 (1 digit after the decimal point)	0.0–1999.9 (min)	0.0–1999.9 (min)
	2 (2 digits after the decimal point)	0.00–199.99 (min)	0.00–199.99 (min)
	3 (2 digits after the decimal point)	0.000–19.999 (min)	0.000–19.999 (min)
2: 1 h	0 (no decimal point)	0–19999 (h)	0–19999 (h)
	1 (1 digit after the decimal point)	0.0–1999.9 (h)	0.0–1999.9 (h)
	2 (2 digits after the decimal point)	0.00–199.99 (h)	0.00–199.99 (h)
	3 (2 digits after the decimal point)	0.000–19.999 (h)	0.000–19.999 (h)

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■ SP ramp PV start

Whether to enable PV start in SP ramp can be set.

Item (bank)	Display	Description	Initial value	User level
SP ramp PV start (Parameter Bank)	SPPS	0: PV start allowed 1: PV start prohibited	0	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for the C3A/C3B.
- If one of the following conditions is met when [SP ramp PV start] is set to 0 (PV start allowed), the ramp will start at the present PV (PV start) . This function is disabled if [SP ramp PV start] is set to 1 (PV start prohibited).
  - The power is turned on.
  - The MANUAL MV output state changes to the calculated MV output state
  - The fixed MV output state changes to the calculated MV output state
  - The [Output at READY] output state changes to the calculated MV output state
  - Pattern operation changes to constant value operation in the calculated MV output state

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■ Slope of multi ramp

The slope for LSP1–8 can be specified if the [SP ramp type] is set to 1 (Multi-ramp).

Item (bank)	Display	Description	Initial value	User level
Ramp slope (SP Bank)	rāP.1 to rāP8	0: No slope 1–19999 U: With slope Select the time unit for the slope with the SP ramp unit setting. Select the number of digits after the decimal point of the ramp time with the SP slope decimal point position setting.	0	Standard Advanced

■ RSP input range type

The RSP input range type can be selected.

Item (bank)	Display	Description	Initial value	User level
RSP input range type (Setup Bank)	C010	84: 0–1 V 86: 1–5 V 87: 0–5 V 88: 0–10 V 89: 0–20 mA 90: 4–20 mA 91: 2–10 V 92: −10 to +10 V	88	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for models with RSP input.
- The lower limit is −10 % FS and the upper limit is + 110 % FS. If the input reaches the lower limit, an RSP input error (under range) (AL06) occurs. If the input reaches the upper limit, an RSP input error (over range) (AL05) occurs.
- RSP input errors (AL05 / AL06) also occur during pattern operation or in LSP mode.

■ RSP scaling

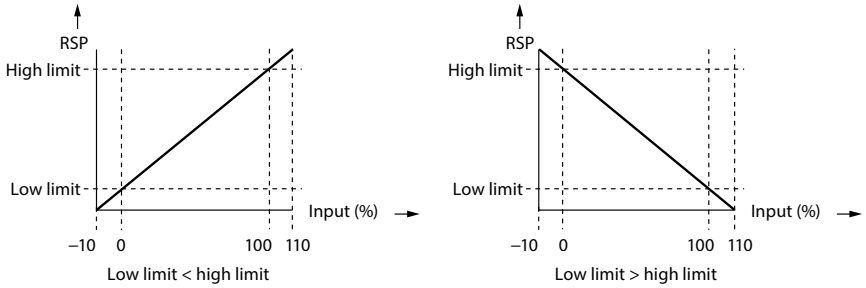
The scaling of the RSP input can be specified.

Item (bank)	Display	Description	Initial value	User level
RSP input range low limit (Setup Bank)	C011	−19999 to +19999 U	0	Simple, Standard, Advanced
RSP input range high limit (Setup Bank)	C012		1000	

- This item is displayed and the setting can be changed for models with RSP input.
- Select the number of decimal places for [RSP input range low limit] and [RSP input range high limit] by [PV decimal point position].

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- The input is scaled according to the settings for [RSP input range low limit] and [RSP input range high limit] as shown in the figures below.



■ RSP compensation

The RSP can be compensated by applying the specified RSP ratio, bias, linearization, or filter.

Item (bank)	Display	Description	Initial value	User level
RSP ratio (Parameter Bank)	rA2	0.001–19.999	1.000	Standard, Advanced
RSP bias (Parameter Bank)	bI 2	–19999 to +19999 U	0	Standard, Advanced
RSP linearization table group definition (Parameter Bank)	r5tn	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced
RSP filter (Parameter Bank)	FL2	0.0–120.0 s (0.0: no filter)	0.0	Standard, Advanced

- This item is displayed and the setting can be changed for models with RSP input.
- The RSP ratio and RSP bias calculations are expressed as follows, with the calculation input as IN and the calculation result as OUT, the RSP ratio as RA, and the RSP bias as BI.
  OUT = (IN × RA) + BI
- ☞ ■ Linearization table group definition (p. 5-45) (for details about linearization processing)
- The RSP filter is a first-order lag filter constant used when the RSP changes slightly due to electromagnetic noise, etc. The larger the setting is, the less likely it is that the RSP will change. Under normal circumstances, use the initial value of 0.0.

  The first-order lag filter calculation is as follows:

  $OUT = OUT_{LAST} + (IN - OUT_{LAST}) \div (T \div TS + 1)$

  IN: Input to the filter
  OUT: Current filter calculation output
  T: Filter setting (s)
  Ts: Sampling cycle (s)

  OUT_{LAST}: Previous filter calculation output

  However, if an RSP input error (AL05/AL06) occurs, the filter calculation stops and OUT becomes equal to IN. When the RSP input error is eliminated, the filter calculation resumes with $OUT_{LAST} = IN$.

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■ RSP limit

The monitored RSP is limited to an extrapolated point of ± 10 % of the range defined by [RSP input range low limit] and [RSP input range high limit] after RSP compensation.

■ Virtual RSP

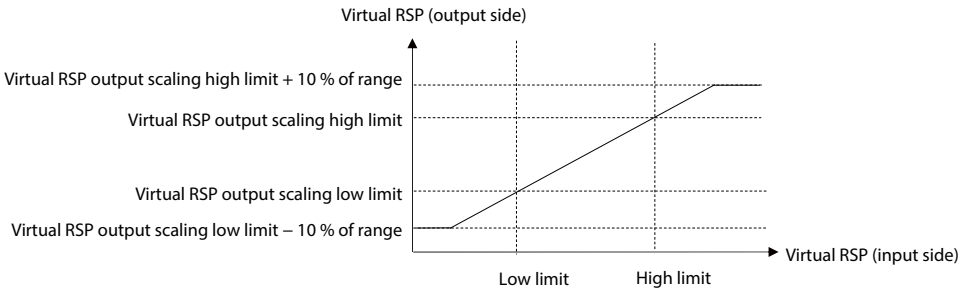
Numeric data specified by a standard numerical code can be applied to a virtual RSP. The virtual RSP can be compensated by applying the specified virtual RSP ratio, bias, linearization, or filter. The data of [Virtual RSP before compensation] and [Virtual RSP] that is specified by standard numerical codes can be monitored.

Item (bank)	Display	Description	Initial value	User level
Virtual RSP input type (Virtual RSP Bank)	urty	2048–3071: Standard numerical codes	2048	Advanced
Virtual RSP input scaling low limit (Virtual RSP Bank)	uril	–19999 to +19999 U	0	Advanced
Virtual RSP input scaling high limit (Virtual RSP Bank)	urih	–19999 to +19999 U	1000	Advanced
Virtual RSP output scaling low limit (Virtual RSP Bank)	urol	–19999 to +19999 U	0	Advanced
Virtual RSP output scaling high limit (Virtual RSP Bank)	uroh	–19999 to +19999 U	1000	Advanced
Virtual RSP ratio (Virtual RSP Bank)	urrA	0.001–19.999	1.000	Advanced
Virtual RSP bias (Virtual RSP Bank)	urbi	–19999 to +19999 U	0	Advanced
Virtual RSP linearization table group definition (Virtual RSP Bank)	urtn	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced
Virtual RSP filter (Virtual RSP Bank)	urFL	0.0–120.0 s (0.0: no filter)	0.0	Advanced

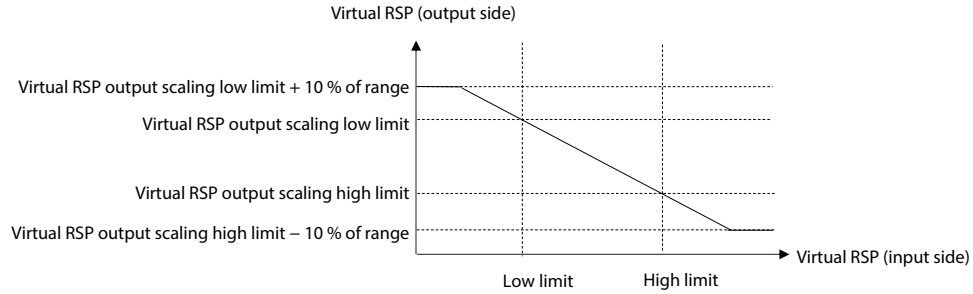
- This item is displayed and the setting can be changed for models with RSP input.
- Specify the numeric data used as a virtual PV for [Virtual RSP input type] by a standard numerical code.
- It is possible to convert the scale for input, which is set by [Virtual RSP input scaling low limit] and [Virtual RSP input scaling high limit], to the scale for output, which is set by [Virtual RSP output scaling low limit] and [Virtual RSP output scaling high limit].
- The number of decimal places for [Virtual RSP input scaling low limit] and [Virtual RSP input scaling high limit] changes according to the number of decimal places set for [Virtual RSP input type]. This device determines the scale for input by taking the smaller setting as the low limit and the larger setting as the high limit.
- The number of decimal places for [Virtual RSP output scaling low limit] and [Virtual RSP output scaling high limit] can be set by [PV decimal point position].

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Virtual RSP output scaling low limit < Virtual RSP output scaling high limit



Virtual RSP output scaling low limit > Virtual RSP output scaling high limit



- The alarm function is not provided for the virtual RSP.
- The virtual RSP can also be compensated in the same manner as the RSP by using [Virtual RSP ratio], [Virtual RSP bias], [Virtual RSP linearization table group definition], and [Virtual RSP filter]. ☞ ■ RSP compensation (p. 5-59)(for details on RSP compensation)
- The monitored virtual RSP is limited to an extrapolated point of ± 10 % of the range defined by [Virtual RSP output scaling low limit] and [Virtual RSP output scaling high limit].

Handling Precautions

- Do not set the following standard numerical codes for [Virtual RSP input type]. If set, the specified virtual RSP will not change.
  2289: Virtual RSP before compensation
  2297: Virtual RSP
  2336: Loop SP
  2368: Eventually reached RSP
  2376: Present RSP
  2577: Displayed loop SP
- If a standard numerical code for a value that is determined later in the processing order than this process is set for [Virtual RSP input type], the value from the previous sampling cycle will be used.
  ☞ ■ Processing order (p. App.-1) (for the processing order)

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■ RSP assignment

The eventually reached RSP can be selected.

Item (bank)	Display	Description	Initial value	User level
RSP assignment (Parameter Bank)	rSAS	0: RSP 1: Virtual RSP	0	Advanced

- This item is displayed and the setting can be changed for models with RSP input.

■ RSP ramp

You can make the monitored [RSP in use] change at a constant rate.

Item (bank)	Display	Description	Initial value	User level
RSP up ramp (Parameter Bank)	rSPU	0 to 19999 U (0: No slope)	0	Advanced
RSP down ramp (Parameter Bank)	rSPd		0	Advanced
RSP ramp PV start (Parameter Bank)	rSPS	0: PV start allowed 1: PV start prohibited	0	Advanced

- This item is displayed and the setting can be changed for models with RSP input.
- As with the SP ramp, the number of decimal places for the setting can be set by [SP ramp decimal point position], and the unit for ramp can be set by [SP ramp unit]. ☞ ■ SP up/down ramp slope (p. 5-56) (for SP ramp)
- If one of the following conditions is met when [RSP ramp PV start] is set to 0 (PV start allowed), the ramp will start at the present PV.
  - The power is turned on.
  - The MANUAL MV output state changes to the calculated MV output state
  - The fixed MV output state changes to the calculated MV output state
  - The READY MV output state changes to the calculated MV output state
  - Pattern operation changes to constant value operation in the calculated MV output state

  However, if a PV error occurs, ramping starting at the present PV will not be performed regardless of the setting of [RSP ramp PV start].
- In constant value operation in the calculated MV output state, if LSP mode is switched to RSP mode, RSP ramping will start at the loop SP before the switch.

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■ RSP tracking

In constant value operation in the calculated MV output state, if RSP mode is switched to LSP mode, the loop SP before the switch can be written to the SP of the selected LSP group.

Item (bank)	Display	Description	Initial value	User level
RSP tracking (Setup Bank)	C 109	0: Tracking OFF 1: Tracking ON	0	Advanced

- This item is displayed and the setting can be changed for models with RSP input.
- RSP tracking is not executed when this device is in:
  - Pattern operation mode
  - MANUAL MV output state
  - Fixed MV output state
  - [Output at READY] output state

■ SP low/high limits

The SP low/high limit can be set in order to limit the range of the SP.

Item (bank)	Display	Description	Initial value	User level
SP low limit (Setup Bank)	C007	[PV input range low limit] to [PV input range high limit]	PV input range low limit	Standard, advanced
SP high limit (Setup Bank)	C008	[PV input range low limit] to [PV input range high limit]	PV input range high limit	Standard, advanced

- The SP limit applies to the LSP of constant value operation and the SP for pattern operation. It also applies to the SP ramp.
- If the SP low limit is greater than the SP high limit, the low and high limits are automatically interchanged.

Handling Precautions

- If the setting for C001 (PV input range type) is changed, the SP low/high limit will be reset (excluding linear ranges)

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■ Assigning enabling/disabling of SP ramp to internal contacts

The SP ramp can be enabled or disabled by specifying [Internal contacts 1–8 operation type].

Item (bank)	Display	Description	Initial value	User level
Internal contacts 1–8 operation type (Internal Contacts Bank)	IC1.1	0: No function 42: SP ramp enable/disable 1–41, 43–57: other functions	0	Simple, standard, advanced
	IC2.1		0	
	IC3.1		0	
	IC4.1		0	
	IC5.1		0	
	IC6.1		0	
	IC7.1		0	
	IC8.1		0	

- Details of SP ramp enabling/disabling by internal contacts:
  SP ramp is enabled or disabled by ON/OFF of internal contacts as shown below.

  OFF: SP ramp enabled, ON: SP ramp disabled

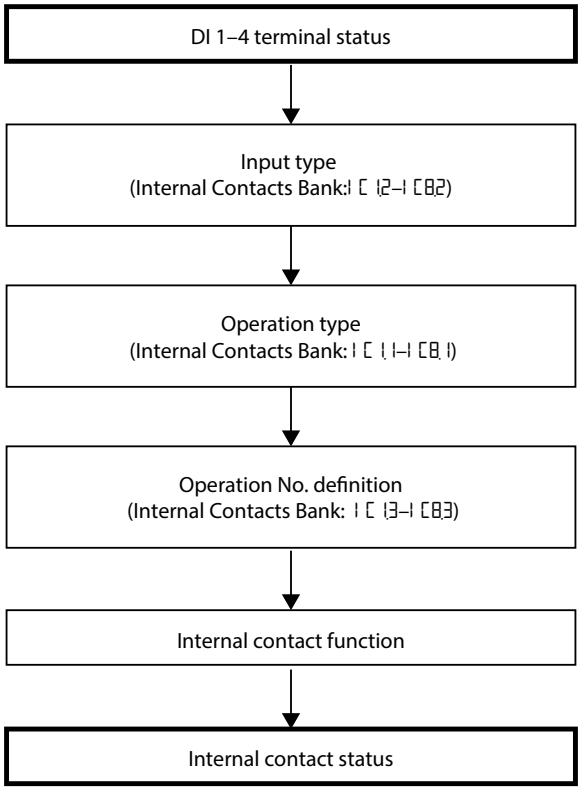
  Assign SP ramp enabling/disabling to one internal contact only.

- If the SP ramp is disabled while it is running, SP ramping stops and the SP at that time will be the final SP.

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5-7 Digital Input (DI) / Internal Contacts

The following is a functional block diagram for digital inputs (DI) and internal contacts.



Handling Precautions

- There are 8 internal contacts, 1 to 8. The number of digital inputs (0–4) can be selected by specifying the appropriate model No. The operation of digital inputs 1–4 is assigned to internal contacts 1–4 when the product is shipped.

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■ Operation type

The operation by internal contacts can be specified.

Item (bank)	Display	Description	Initial value	User level
Internal contact 1 operation type (Internal Contacts Bank)	IC1.1	0–73 See the following table for the functions of these settings.	0	Simple, standard, advanced
Internal contact 2 operation type (Internal Contacts Bank)	IC2.1			
Internal contact 3 operation type (Internal Contacts Bank)	IC3.1			
Internal contact 4 operation type (Internal Contacts Bank)	IC4.1			
Internal contact 5 operation type (Internal Contacts Bank)	IC5.1			
Internal contact 6 operation type (Internal Contacts Bank)	IC6.1			
Internal contact 7 operation type (Internal Contacts Bank)	IC7.1			
Internal contact 8 operation type (Internal Contacts Bank)	IC8.1			

The functions that can be assigned by the settings of IC12–IC82 are shown below.

Setting	Operation	Action type	Operation when OFF	Operation when ON
0	No function	None	No operation	No operation
1	LSP group selection (0/+1)	State	LSP group in use: +0	LSP group in use: +1
2	LSP group selection (0/+2)	State	LSP group in use: +0	LSP group in use: +2
3	LSP group selection (0/+4)	State	LSP group in use: +0	LSP group in use: +4
4	PID group selection (0/+1)	State	PID group in use: +0	PID group in use: +1
5	PID group selection (0/+2)	State	PID group in use: +0	PID group in use: +2
6	PID group selection (0/+4)	State	PID group in use: +0	PID group in use: +4
8	PV hold	State	No hold.	Holds the value.
9	PV max. hold	State	No hold.	Holds the value.
10	PV min. hold	State	No hold.	Holds the value.
11	Fixed value output group selection (0/+1)	State	Fixed value output group number: +0	Fixed value output group number: +1
12	Fixed value output group selection (0/+2)	State	Fixed value output group number: +0	Fixed value output group number: +2
13	Fixed value output group selection (0/+4)	State	Fixed value output group number: +0	Fixed value output group number: +4
15	Output linearization table group selection (0/+1)	State	Output linearization table group number: +0	Output linearization table group number: +1

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Setting	Operation	Action type	Operation when OFF	Operation when ON
16	Output linearization table group selection (0/+2)	State	Output linearization table group number: +0	Output linearization table group number: +2
17	Output linearization table group selection (0/+4)	State	Output linearization table group number: +0	Output linearization table group number: +4
21	RUN/READY selection	State	RUN	READY
22	AUTO/MANUAL selection	State	AUTO	MANUAL
23	LSP/RSP selection	State	LSP	RSP
24	AT stop/start selection	Edge	Stops AT.	Starts AT.
31	RUN/READY selection (reverse)	State	READY	RUN
32	AUTO/MANUAL selection (reverse)	State	MANUAL	AUTO
33	LSP/RSP selection (reverse)	State	RSP	LSP
41	Control action (direct/reverse)	State	Direct/reverse operation set using Control operation in the Control Bank	Move by reversing the direct/ reverse operation set using Control operation in the Control Bank
42	SP ramp enable/disable selection	State	Ramping enabled	Ramping disabled
46	Timer stop/start selection	State	Stops the timer.	Starts the timer.
47	Release/continue all latches	State	No latch release	Release all latches
48	Motor drive output: opening operation	State	Operation not specified	Opening operation specified
49	Motor drive output: closing operation	State	Operation not specified	Closing operation specified
51	RUN/READY selection (edge)	Edge	RUN	READY
52	AUTO/MANUAL selection (edge)	Edge	AUTO	MANUAL
53	LSP/RSP selection (edge)	Edge	LSP	RSP
54	RUN selection (edge)	Edge	None	RUN
55	READY selection (edge)	Edge	None	READY
56	AUTO selection (edge)	Edge	None	AUTO
57	MANUAL selection (edge)	Edge	None	MANUAL
58	LSP selection (edge)	Edge	None	LSP
59	RSP selection (edge)	Edge	None	RSP
60	Constant value operation / pattern operation selection	State	Constant value operation	Pattern operation
61	ADVANCE	Edge	None	ADVANCE
62	HOLD	State	Release hold	Hold
63	G.SOAK clear	State	None	Clear guaranteed soak
66	Constant value operation / pattern operation selection (edge)	Edge	Constant value operation	Pattern operation
67	HOLD (edge)	Edge	Release hold	Hold
68	G.SOAK clear (edge)	Edge	None	Clear guaranteed soak
70	Pattern selection (0/+1)	State	Pattern number: +0	Pattern number: +1
71	Pattern selection (0/+2)	State	Pattern number: +0	Pattern number: +2
72	Pattern selection (0/+4)	State	Pattern number: +0	Pattern number: +4
73	Pattern selection (0/+8)	State	Pattern number: +0	Pattern number: +8

Handling Precautions

- The value obtained by adding 1 to the sum of the LSP group selection weightings (+1, +2, +4) (set for internal contacts 1–8 with "1–3" (LSP group selection)) is selected as the LSP group. However, if the value exceeds the setting for C030 (LSP system group), the value set for C030 will be used as the LSP group No.
- The value obtained by adding 1 to the sum of the PID group selection weightings (+1, +2, +4) (set for internal contacts 1–8 with "4–6" (PID group selection)) is selected as the PID group. However, if the value exceeds 8, PID group 8 is selected.

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- The value obtained by adding the sum of the fixed value output group selection weightings (+1, +2, +4) (set for internal contacts 1–8 with “11–13” (fixed value output group selection)) to the value set for [Fixed value output group definition] is selected as the fixed value output group. However, if the value exceeds 8, fixed value output group 8 is selected.
- 8 (PV hold), 9 (PV max. hold), and 10 (PV min. hold) cannot be used at the same time. Use any one of them for all.
- For operation types other than 0 (no function) and 1–6 (LSP group selection and PID group selection), do not set the same operation for multiple internal contacts.
- The value obtained by adding the sum of the output linearization table group selection weightings (+1, +2, +4) (set for internal contacts 1–8 with "15–17" (Output linearization table group selection)) to the value set for [Linearization table group definition] is selected as the output linearization table group. However, if the value exceeds 4, group 4 is selected.
  Specify the output type by [Operation No. definition].
- When using heating/cooling control, do not set 41 (Control action (direct/reverse)).
- If 46 (Timer stop/start selection) is set, specify an internal event No. by [Operation No. definition].

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■ Input type

Item (bank)	Display	Description	Initial value	User level
Internal contact 1 input type (Internal Contacts Bank)	1C12	1024–2047: Standard bit numbers	1152	Simple Standard Advanced
Internal contact 2 input type (Internal Contacts Bank)	1C22		1153	
Internal contact 3 input type (Internal Contacts Bank)	1C32		1154	
Internal contact 4 input type (Internal Contacts Bank)	1C42		1155	
Internal contact 5 input type (Internal Contacts Bank)	1C52		1024	
Internal contact 6 input type (Internal Contacts Bank)	1C62		1024	
Internal contact 7 input type (Internal Contacts Bank)	1C72		1024	
Internal contact 8 input type (Internal Contacts Bank)	1C82		1024	

Specify the ON/OFF data that the internal contact input uses as input. This ON/OFF data is called a standard bit and can indicate various statuses of this device.
☞■ Standard bit numbers and standard numerical codes (p. App.-3) (for the standard bit numbers)

! Handling Precautions

- Do not set a standard bit No., 1184 to 1191 (internal contact status), that has already been set for the same channel. If set, the internal contact status will not change.
- If a standard bit No. for a bit status that is determined later in the processing order than this process is set, the bit status from the previous sampling cycle will be used.
  ☞■ Processing order (p. App.-1) (for the processing order)
- If a standard bit No., 1184 to 1191 (internal contact status), that has already been set for a channel with a smaller channel No. than the channel being configured is set, the bit status from the previous sampling cycle will be used.

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■ Operation No. definition

Specify additional settings according to the [Operation type] setting.

If it is set to "Timer stop/start," specify an internal event No. by [Operation No. definition].

If it is set to "Output linearization table group selection," specify the output type by [Operation No. definition].

Item (bank)	Display	Description	Initial value	User level
Internal contact 1 operation No. definition (Internal Contacts Bank)	1C 13	When [Operation type] is "Timer start/stop selection": 0: All internal events 1–8: Specify an internal event No. Other: Invalid (does not operate) When [Operation type] is "Output linearization table group selection": 1: Control output 1 continuous output 2: Control output 2 continuous output 3: AUX output: continuous output 11: Control output 1 time proportional output 12: Control output 2 time proportional output 13: Event output 1 time proportional output 14: Event output 2 time proportional output 15: Event output 3 time proportional output Other: Invalid (does not operate)	0	Advanced
Internal contact 2 operation No. definition (Internal Contacts Bank)	1C23		0	
Internal contact 3 operation No. definition (Internal Contacts Bank)	1C33		0	
Internal contact 4 operation No. definition (Internal Contacts Bank)	1C43		0	
Internal contact 5 operation No. definition (Internal Contacts Bank)	1C53		0	
Internal contact 6 operation No. definition (Internal Contacts Bank)	1C63		0	
Internal contact 7 operation No. definition (Internal Contacts Bank)	1C73		0	
Internal contact 8 operation No. definition (Internal Contacts Bank)	1C83		0	

- This item is displayed and the setting can be changed if the internal contact's operation type is set to one of 15–17 (Output linearization table group selection) or 46 (Timer stop/start).

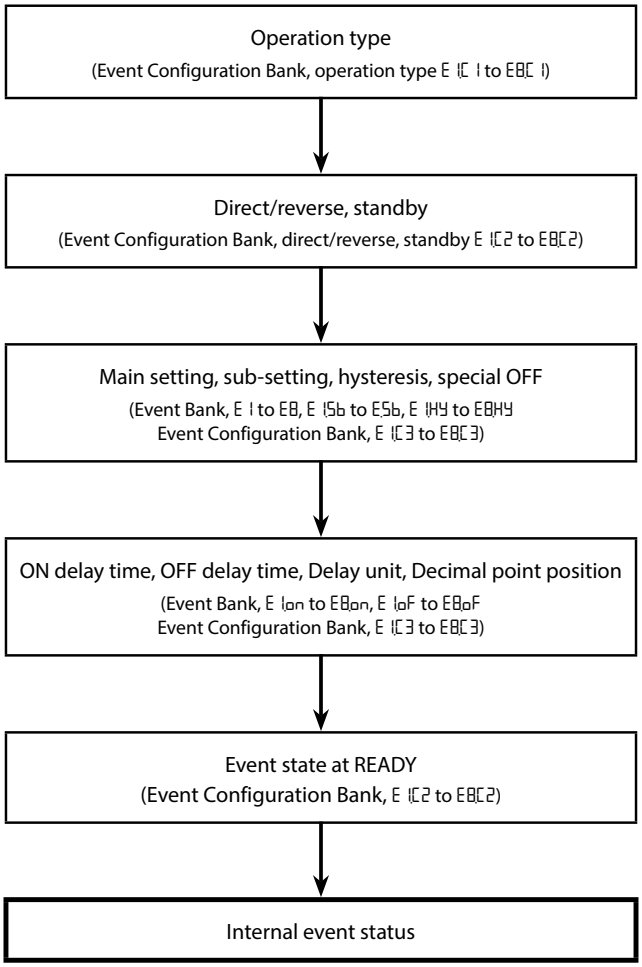
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5-8 Internal Events

The result of internal event processing can be output as control outputs or event outputs via the digital output (DO) processing circuit.

☞ 2-1 Input/Output Configuration (p. 2-1) (for details)

The following is a functional block diagram for internal events.



Handling Precautions

- There are 8 internal events numbered 1–8. The number of event outputs (0–3) can be selected by specifying the appropriate model No. When the product is shipped, the operation results of internal events 1–3 are set to be output from event output terminals 1–3. To use the operation results of internal events 4–8, it is necessary to assign a DO.

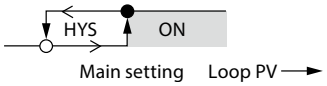
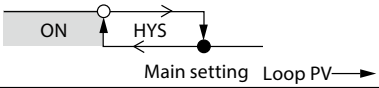
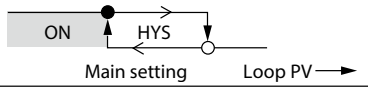
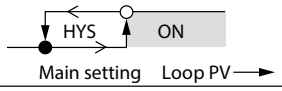
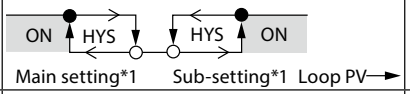
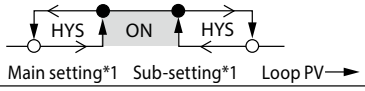
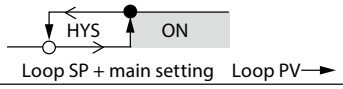
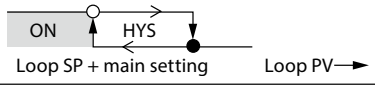
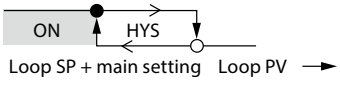
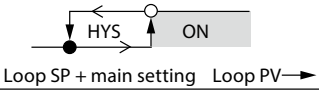
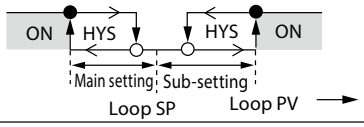
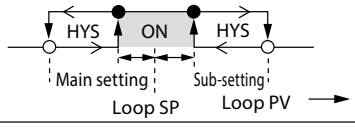
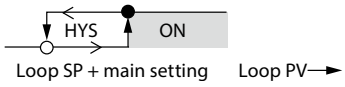
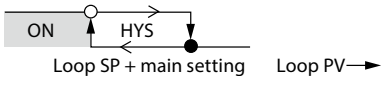
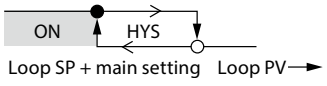
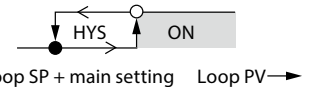
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■ Operation

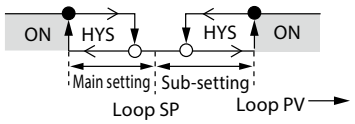
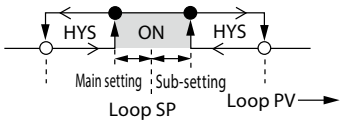
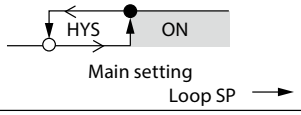
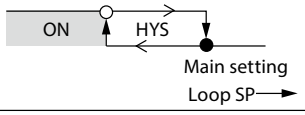
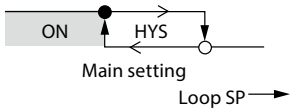
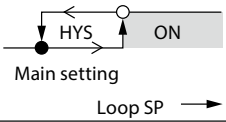
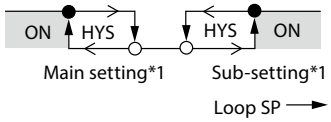
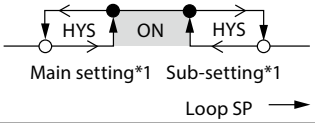
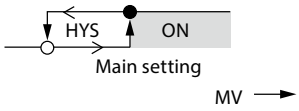
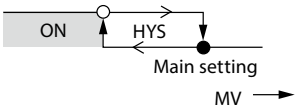
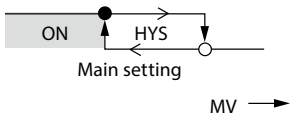
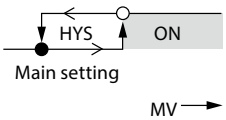
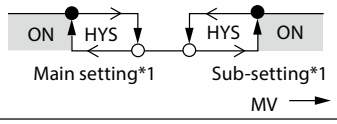
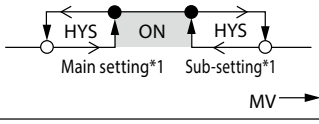
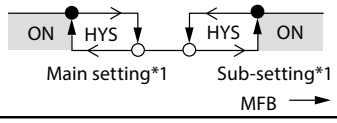
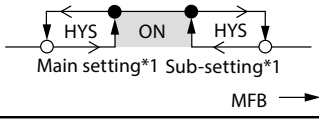
The operation of internal events is shown below. Operation differs depending on the type of operation, direct/reverse setting, event main setting, event sub-setting, hysteresis settings, etc.

Note

- For the meaning of U (unit), see the terminology list in the Appendix.

Operation type	Setting	Direct action ●: ON/OFF changes at the value*2 ○: ON/OFF changes when the value is exceeded by 1 U.	Reverse action ●: ON/OFF changes at the value*2 ○: ON/OFF changes when the value is exceeded by 1 U.
No event	0	Always OFF	Always OFF
PV high limit	1		
PV low limit	2		
PV high and low limits	3		
Deviation high limit	4		
Deviation low limit	5		
Deviation high and low limits	6		
Deviation high limit (final SP reference)	7	 When not during an SP ramp: same as the direct action of the deviation high limit. During an SP ramp: the operation is different in that the final loop SP is used instead of the present loop SP.	 When not during an SP ramp: same as the reverse action of the deviation high limit. During an SP ramp: the operation is different in that the final loop SP is used instead of the present loop SP.
Deviation low limit (final SP reference)	8	 When not during an SP ramp: same as the direct action of the deviation low limit. During an SP ramp: the operation is different in that the final loop SP is used instead of the present loop SP.	 When not during an SP ramp: same as the reverse action of the deviation low limit. During an SP ramp: the operation is different in that the final loop SP is used instead of the present loop SP.

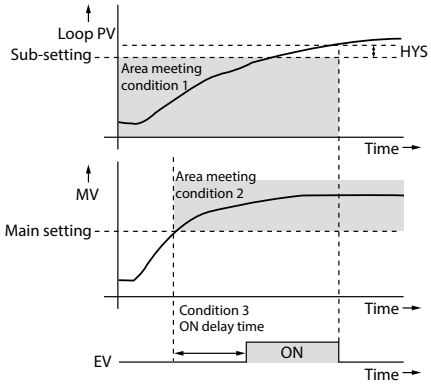
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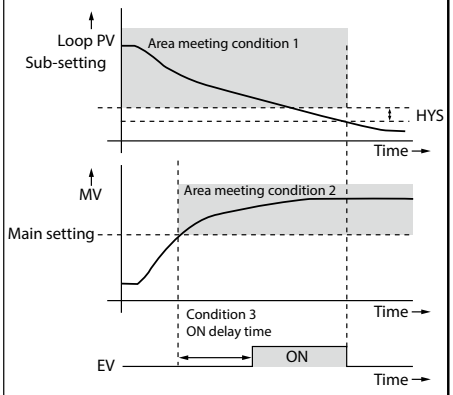
Operation type	Setting	Direct action ●: ON/OFF changes at the value*2 ○: ON/OFF changes when the value is exceeded by 1 U.	Reverse action ●: ON/OFF changes at the value*2 ○: ON/OFF changes when the value is exceeded by 1 U.
Deviation high and low limits (final SP reference)	9	 When not during an SP ramp: same as the direct action of the deviation high and low limits. During an SP ramp: the operation is different in that the final loop SP is used instead of the present loop SP.	 When not during an SP ramp: same as the reverse action of the deviation high and low limits. During an SP ramp: the operation is different in that the final loop SP is used instead of the present loop SP.
SP high limit	10		
SP low limit	11		
SP high and low limits	12		
MV high limit	13		
MV low limit	14		
MV high and low limits	15		
MFB opening high and low limits	16		

*1. If the main setting is greater than the sub-setting, operations are performed with the settings automatically swapped.

*2. If the target data is a real number (with decimal points), the displayed value may not match the main setting / sub-setting, and the event may not turn ON or OFF. In this case, set the main setting / sub-setting to a value that allows for a margin of 1U.

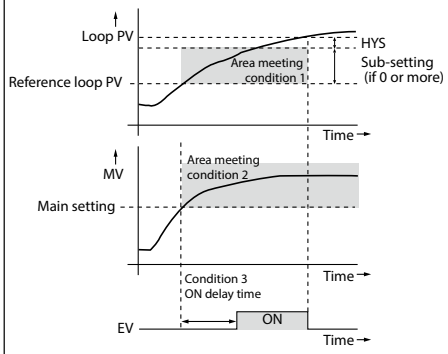
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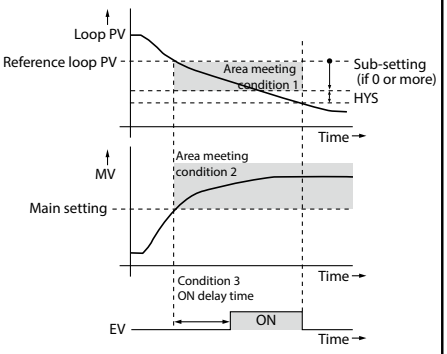
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<tr><td>Loop diagnosis 1</td><td>20</td><td colspan="2">Turns on if the loop PV does not change according to the increase or decrease of the MV.
Use this setting to detect a failure of the actuator, etc.
● Settings
· Main setting: MV
· Sub-setting: loop PV
· ON delay time: diagnosis time
● Operation specifications
Turns ON if the loop PV set for the sub-setting (condition 1) is not reached within the diagnosis time (ON delay time, condition 3) even though an MV greater than or equal to the main setting was maintained (condition 2).
● Caution
To set the ON delay time, the user level (C079) must be set to Advanced.
The ON delay time is set to 0.0 s when the product is shipped.</td></tr>
<tr><td></td><td></td><td>For heating control


If conditions 1 & 2 are met, ON delay starts</td><td>For cooling control


If conditions 1 & 2 are met, ON delay starts</td></tr>
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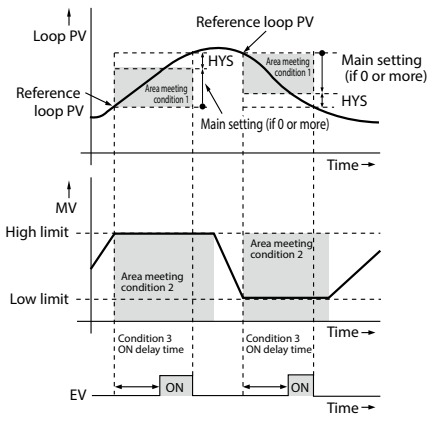
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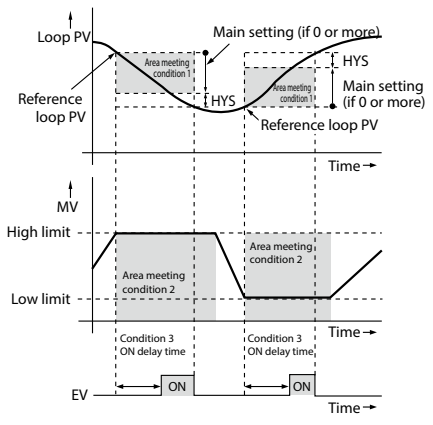
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<tr><td>Loop diagnosis 2</td><td>21</td><td colspan="2">Turns on if the loop PV does not change according to the increase or decrease of the MV.
Use this setting to detect a failure of the actuator, etc.
● Settings
· Main setting: MV
· Sub-setting: the amount of change in the loop PV from the time when the MV exceeds the value set for the main setting
· ON delay time: diagnosis time
● Operation specifications
Turns ON if the loop PV does not reach the value obtained by adding (or subtracting) the sub-setting value to (or from) the loop PV during the diagnosis time (ON delay time, condition 1) even though an MV equal to or greater than the main setting was maintained (condition 2).
● Note
To set the ON delay time, the user level (C079) must be set to Advanced.
The ON delay time is set to 0.0 s when the product is shipped.</td></tr>
<tr><td></td><td></td><td>For heating control


If conditions 1 & 2 are met, ON delay starts</td><td>For cooling control


If conditions 1 & 2 are met, ON delay starts</td></tr>
</table>

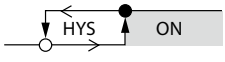
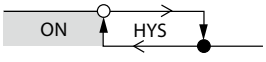
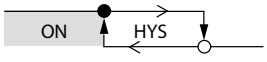
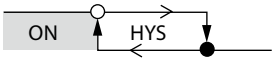
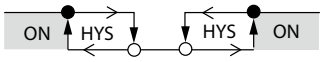
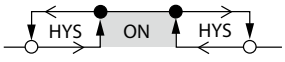
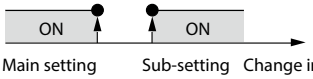
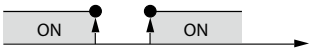
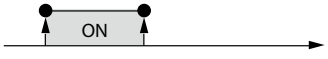
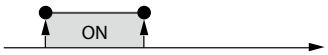
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<table>
<tr><th>Operation type</th><th>Setting</th><th>Direct action</th><th>Reverse action</th></tr>
<tr><td>Loop diagnosis 3</td><td>22</td><td colspan="2">
Turns on if the loop PV does not change according to the increase or decrease of the MV.
Use this setting to detect a failure of the actuator, etc.
● Settings
· Main setting: the amount of change in the loop PV from the time when the MV reaches the high limit (100 %) or the low limit (0 %)
· Sub-setting: the range of the absolute value of deviation (Loop PV – Loop SP) that will turn off the event
· ON delay time: diagnosis time
· OFF delay time: time from power-on to event OFF
● Operation specifications
In direct operation of heating control, the event turns ON if:
·After the MV reaches its high limit, the amount of loop PV increase after the diagnosis time (ON delay time) is less than the main setting.
·After the MV reaches its low limit, the amount of loop PV decrease after the diagnosis time (ON delay time) is less than the main setting.
In a reverse operation of cooling control, the event turns ON if:
·After the MV reaches its high limit, the amount of loop PV decrease after the diagnosis time (ON delay time) is less than the main setting.
·After the MV reaches its low limit, the amount of loop PV increase after the diagnosis time (ON delay time) is less than the main setting.
The conditions below have priority over the conditions above, and if any of these conditions is met, the event will turn OFF.
·The absolute value of deviation (Loop PV – Loop SP) is less than the sub-setting However, after the absolute value of deviation exceeds the sub-setting, the event turns OFF if the absolute value of deviation becomes less than the value obtained by subtracting the hysteresis from the sub-setting.
·The time from the start of operation after power-on is less than the OFF delay time
● Caution
To set the ON and OFF delay times, the user level (C079) must be set to Advanced.
The ON and OFF delay times are set to 0.0 s when the product is shipped.
</td></tr>
<tr><td></td><td></td><td>For heating control


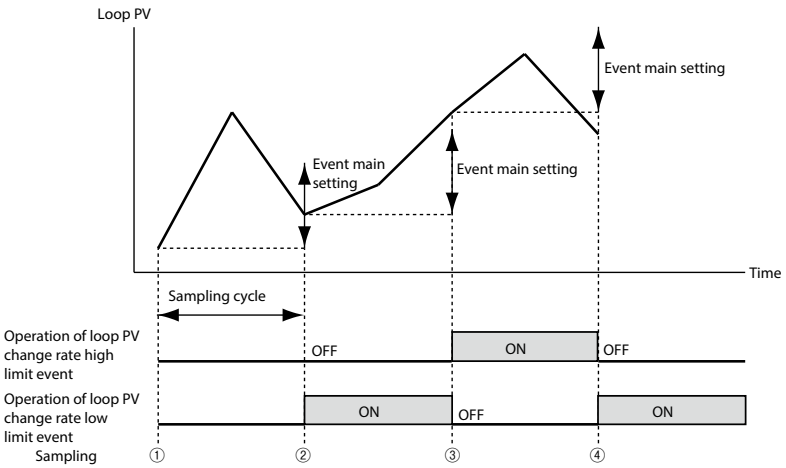
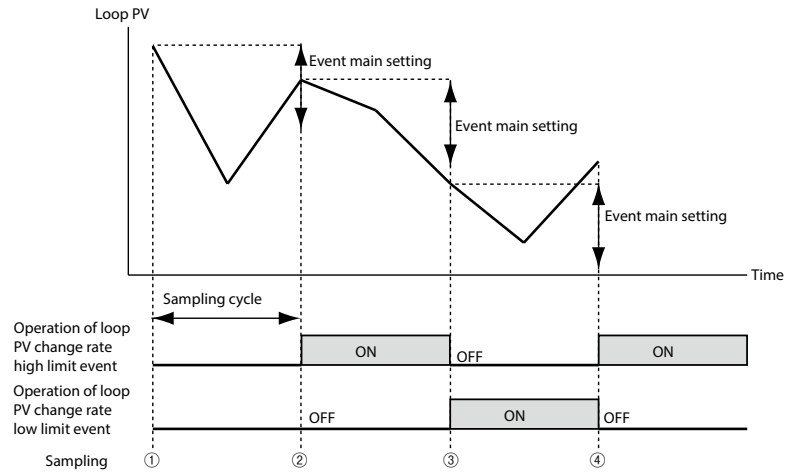
If conditions 1 & 2 are met, ON delay starts</td><td>For cooling control


If conditions 1 & 2 are met, ON delay starts</td></tr>
</table>

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Operation type	Setting	Direct action	Reverse action
High limit of standard numerical code	26	 Main setting Value selected with a standard numerical code →	 Main setting Value selected with a standard numerical code →
Low limit of standard numerical code	27	 Main setting Value selected with a standard numerical code →	 Main setting Value selected with a standard numerical code →
High and low limits of standard numerical code	28	 Main setting*1 Sub-setting*1 Value selected with a standard numerical code →	 Main setting*1 Sub-setting*1 Value selected with a standard numerical code →
PV change rate	29	Operates according to how much the loop PV value changes. Change in the value = Previous value – Current value  Main setting Sub-setting Change in loop PV or  Sub-setting Main setting Change in loop PV Loop PV change rate →	Operates according to how much the loop PV value changes. Change in the value = Previous value – Current value  Main setting Sub-setting Change in loop PV Or  Sub-setting Main setting Change in loop PV Loop PV change rate →
		● Caution If the same change rate event is set for multiple event groups, the groups may be turned on or off at different times. To turn them on or off simultaneously, turn the power of this device off and then back on after specifying the setting.	

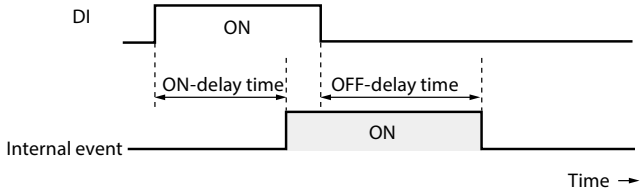
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Operation type	Setting	Direct action	Reverse action
High limit of PV change rate	55	The specified high or low limit of change is set in Event main setting. The loop PV is measured for every sampling cycle (unit: seconds) that is set by the Event sub-setting, and changes in the loop PV are compared with the high or low limit to determine whether to turn the event on or off. Events are turned ON and OFF according to the sampling cycle. Changes in the loop PV between sampling cycles are ignored. The event hysteresis and event direct/reverse settings are disabled. The event ON delay and event OFF delay can be combined. When event setting > 0 (high limit event is normally used)  When event setting < 0 (low limit event is normally used)  ● Caution If the same change rate event is set for multiple event groups, the groups may be turned on or off at different times. To turn them on or off simultaneously, turn the power of this device off and then back on after specifying the setting.	
Low limit of PV change rate	56		

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Operation type	Setting	Direct action	Reverse action
High limit of the change rate of standard numerical code	57	The specified change rate high or low limit is set in the Event main setting and the sampling cycle is set in the Event sub setting. Specify a standard numerical code for [Operation No. definition]. The value specified by the standard numerical code is checked for every specified sampling cycle and changes in the value are compared with the high or low limit value to determine whether to turn the event on or off. This is the same kind of operation as for the PV change rate high and low limits.	
Low limit of the change rate of standard numerical code	58		
Alarm (status)	61	Alarm (alarm codes AL01–AL96) ON when an alarm occurs, OFF otherwise	Alarm (alarm codes AL01–AL96) OFF when an alarm occurs, ON otherwise
READY (status)	62	ON in READY mode OFF in RUN mode	OFF in READY mode ON in RUN mode
MANUAL (status)	63	ON in MANUAL mode OFF in AUTO mode	OFF in MANUAL mode ON in AUTO mode
RSP (status)	64	ON in RSP mode OFF in LSP mode	OFF in RSP mode ON in LSP mode
AT in progress (status)	65	ON when AT is running OFF when AT is stopped	OFF when AT is running ON when AT is stopped
SP ramp in progress (status)	66	ON during SP ramp OFF when there is no SP ramp or it is completed, or during pattern operation	OFF during SP ramp ON when there is no SP ramp or it is completed, or during pattern operation
Control direct action (status)	67	ON during direct action (cooling) OFF during reverse action (heating)	OFF during direct action (cooling) ON during reverse action (heating)

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Operation type	Setting	Direct action	Reverse action
Timer (status)	70	The direct and reverse action settings are disabled for timer events. To use timer events, set the operation type to Timer stop/start selection in the Internal Contacts bank. Multiple timer events can be controlled by a separate internal contact by setting event channel specification in the Internal Contacts bank. ● Settings · ON delay time: Time until the event changes from OFF to ON after the DI changes from OFF to ON · OFF delay time: Time until the event changes from ON to OFF ● Operation specifications ·Turns ON if DI ON continues for the ON delay time or longer. ·Turns OFF if DI OFF continues for the OFF delay time or longer. ·In other cases, the current status is retained.  ● Caution To set the ON and OFF delay times, the user level (C079) must be set to Advanced. The ON and OFF delay times are set to 0.0 s when the product is shipped. Event channel specification in the Internal Contacts bank is set to 0 when the product is shipped. With this setting, a timer can be started or stopped for all internal events by a single internal contact. If the setting is changed to 1 or more, a timer can be started or stopped for one specified internal event by one internal contact. To change the setting, the user level (C079) must be set to Advanced.	
Estimating MFB (status)	71	ON during control with estimated position OFF when not estimating	OFF during control with estimated position ON when not estimating

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■ Operation type

The operation type can be set for internal events.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 operation type (Event Configuration Bank)	E1C1	0: No event 1: PV high limit 2: PV low limit 3: PV high and low limits 4: Deviation high limit 5: Deviation low limit 6: Deviation high and low limits 7: Deviation high limit (final SP reference) 8: Deviation low limit (final SP reference) 9: Deviation high and low limits (final SP reference) 10: SP high limit 11: SP low limit 12: SP high and low limits 13: MV high limit 14: MV low limit 15: MV high and low limits 16: MFB opening high and low limits 20: Loop diagnosis 1 21: Loop diagnosis 2 22: Loop diagnosis 3 26: High limit of standard numerical code 27: Low limit of standard numerical code 28: High and low limits of standard numerical code 29: PV change rate 55: High limit of PV change rate 56: Low limit of PV change rate 57: High limit of the change rate of standard numerical code 58: Low limit of the change rate of standard numerical code 61: Alarm (status) 62: READY (status) 63: MANUAL (status) 64: RSP (status) 65: AT in progress (status) 66: SP ramp in progress (status) 67: Control direct action (status) 70: Timer (status) 71: Estimating MFB (status)	0	Simple, standard, advanced
Internal event 2 operation type (Event Configuration Bank)	E2C1			
Internal event 3 operation type (Event Configuration Bank)	E3C1			
Internal event 4 operation type (Event Configuration Bank)	E4C1			
Internal event 5 operation type (Event Configuration Bank)	E5C1			
Internal event 6 operation type (Event Configuration Bank)	E6C1			
Internal event 7 operation type (Event Configuration Bank)	E7C1			
Internal event 8 operation type (Event Configuration Bank)	E8C1			

Note

- The functions available vary depending on the operation type.
  ☞ ■ Event operation type and available functions (p. App.-2) (for details)

Handling Precautions

- Do not set an operation type number that is not listed in the description or that is for a function not supported by the model. Unintended values may result.

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■ Direct/Reverse

Direct/reverse that is associated with the operation type setting can be set.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 direct/reverse (Event Configuration Bank)	E1C2	0: Direct 1: Reverse	0	Simple, standard, advanced
Internal event 2 direct/reverse (Event Configuration Bank)	E2C2			
Internal event 3 direct/reverse (Event Configuration Bank)	E3C2			
Internal event 4 direct/reverse (Event Configuration Bank)	E4C2			
Internal event 5 direct/reverse (Event Configuration Bank)	E5C2			
Internal event 6 direct/reverse (Event Configuration Bank)	E6C2			
Internal event 7 direct/reverse (Event Configuration Bank)	E7C2			
Internal event 8 direct/reverse (Event Configuration Bank)	E8C2			

- If [Internal event 1–8 operation type] is set to 0 (No event), [Internal event 1–8 direct/reverse] is not displayed.
- ☞ ■ Operation (p. 5-72)(for the operation of internal events according to the direct/reverse setting)

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■ Standby

Standby that is associated with the operation type setting can be set.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 standby (Event Configuration Bank)	E1C3	0: None 1: Standby 2: Standby + standby when the SP is changed	0	Standard Advanced
Internal event 2 standby (Event Configuration Bank)	E2C3			
Internal event 3 standby (Event Configuration Bank)	E3C3			
Internal event 4 standby (Event Configuration Bank)	E4C3			
Internal event 5 standby (Event Configuration Bank)	E5C3			
Internal event 6 standby (Event Configuration Bank)	E6C3			
Internal event 7 standby (Event Configuration Bank)	E7C3			
Internal event 8 standby (Event Configuration Bank)	E8C3			

- If [Internal event 1–8 operation type] is set to 0 (No event), [Internal event 1–8 standby] is not displayed.

Note

- The functions available vary depending on the operation type.
☞ ■ Event operation type and available functions (p. App.-2) (for details)

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■ Event status in READY mode

The event status in READY mode that is associated with the operation type setting can be set.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 event state at READY (Event Configuration Bank)	E1C4	0: Remain ON 1: Forced OFF	0	Standard Advanced
Internal event 2 event state at READY (Event Configuration Bank)	E2C4			
Internal event 3 event state at READY (Event Configuration Bank)	E3C4			
Internal event 4 event state at READY (Event Configuration Bank)	E4C4			
Internal event 5 event state at READY (Event Configuration Bank)	E5C4			
Internal event 6 event state at READY (Event Configuration Bank)	E6C4			
Internal event 7 event state at READY (Event Configuration Bank)	E7C4			
Internal event 8 event state at READY (Event Configuration Bank)	E8C4			

- If [Internal event 1–8 operation type] is set to 0 (No event), [Internal event 1–8 event state at READY] is not displayed.

Note

- The functions available vary depending on the operation type.
  ☞ ■ Event operation type and available functions (p. App.-2) (for details)

Handling Precautions

- The standby function makes it possible to have an event not turn ON even if the ON conditions (before reversing) are satisfied after this device's power has just been turned ON or when the mode is switched from READY to RUN. The event will turn ON after the OFF conditions are satisfied if the ON conditions are satisfied again.
- "Standby + standby when the SP is changed" is a function that reactivates the standby function when the SP or LSP group No. is changed, in addition to the regular standby function operation. However, if the changed SP is the same as the previous one or if the SP does not change after a change of LSP group No., the device does not enter standby mode.

	READY		When changed from READY to RUN	
Event status in READY mode / Standby setting	0: Remain ON	1: Forced OFF	0: Remain ON	1: Forced OFF
0: None	Normal operation	OFF	Normal operation	Normal operation
1: Standby	OFF	OFF	OFF (standby status)	OFF (standby status)
2: Standby + standby when the SP is changed	OFF	OFF	OFF (standby status)	OFF (standby status)

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■ Delay time unit

Delay time unit associated with the operation type setting can be set.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 delay unit (Event Configuration Bank)	E1C5	0: 1 s 1: 1 min 2: 1 h	0	Advanced
Internal event 2 delay unit (Event Configuration Bank)	E2C5			
Internal event 3 delay unit (Event Configuration Bank)	E3C5			
Internal event 4 delay unit (Event Configuration Bank)	E4C5			
Internal event 5 delay unit (Event Configuration Bank)	E5C5			
Internal event 6 delay unit (Event Configuration Bank)	E6C5			
Internal event 7 delay unit (Event Configuration Bank)	E7C5			
Internal event 8 delay unit (Event Configuration Bank)	E8C5			

- If [Internal event 1–8 operation type] is set to 0 (No event), [Internal event 1–8 delay unit] is not displayed.

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■ Delay time decimal point position

Delay time decimal point position associated with the operation type setting can be set.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 Delay time decimal point position (Event Configuration Bank)	E 1C6	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	Advanced
Internal event 2 Delay time decimal point position (Event Configuration Bank)	E2C6			
Internal event 3 Delay time decimal point position (Event Configuration Bank)	E3C6			
Internal event 4 Delay time decimal point position (Event Configuration Bank)	E4C6			
Internal event 5 Delay time decimal point position (Event Configuration Bank)	E5C6			
Internal event 6 Delay time decimal point position (Event Configuration Bank)	E6C6			
Internal event 7 Delay time decimal point position (Event Configuration Bank)	E7C6			
Internal event 8 Delay time decimal point position (Event Configuration Bank)	E8C6			

- If [Internal event 1–8 operation type] is set to 0 (No event), [Internal event 1–8 delay time decimal point position] is not displayed.

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■ Operation No. definition

Specify the standard numerical code that is used when [Internal event 1–8 operation type] is set to 26 (High limit of the standard numerical code), 27 (Low limit of the standard numerical code), 28 (High and low limits of the standard numerical code), 57 (High limit of the change rate of the standard numerical code), or 58 (Low limit of the change rate of the standard numerical code).

Item (bank)	Display	Description	Initial value	User level
Internal event 1 operation No. definition (Event Configuration Bank)	E1C	2048–3071: Standard numerical codes	2048	Simple, Standard, Advanced
Internal event 2 operation No. definition (Event Configuration Bank)	E2C			
Internal event 3 operation No. definition (Event Configuration Bank)	E3C			
Internal event 4 operation No. definition (Event Configuration Bank)	E4C			
Internal event 5 operation No. definition (Event Configuration Bank)	E5C			
Internal event 6 operation No. definition (Event Configuration Bank)	E6C			
Internal event 7 operation No. definition (Event Configuration Bank)	E7C			
Internal event 8 operation No. definition (Event Configuration Bank)	E8C			

! Handling Precautions

- If a standard numerical code for a value that is determined later in the processing order than this process is set, the value from the previous sampling cycle will be used.
☞ ■ Processing order (p. App.-1) (for the processing order)

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■ Main setting, sub-setting, hysteresis

The main setting, sub-setting, and hysteresis associated with the operation type setting can be set.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 main setting (Event Bank)	E 1	–19999 to +19999 U The number of decimal places changes according to the operation type. For some operation types, the range is 0 to 19999 U.	0	Simple, standard, advanced
Internal event 1 sub-setting (Event Bank)	E 1Sb	–19999 to +19999 U The number of decimal places changes according to the operation type. For some operation types, the range is 0 to 19999 U.	0	
Internal event 1 hysteresis (Event Bank)	E 1HY	0 to 19999 U The number of decimal places changes according to the operation type.	5	
Internal event 2 main setting (Event Bank)	E2	Same as for Internal event 1 main setting	0	
Internal event 2 sub-setting (Event Bank)	E2Sb	Same as for Internal event 1 sub-setting	0	
Internal event 2 hysteresis (Event Bank)	E2HY	Same as for Internal event 1 hysteresis	5	
Internal event 3 main setting (Event Bank)	E3	Same as for Internal event 1 main setting	0	
Internal event 3 sub-setting (Event Bank)	E3Sb	Same as for Internal event 1 sub-setting	0	
Internal event 3 hysteresis (Event Bank)	E3HY	Same as for Internal event 1 hysteresis	5	
Internal event 4 main setting (Event Bank)	E4	Same as for Internal event 1 main setting	0	
Internal event 4 sub-setting (Event Bank)	E4Sb	Same as for Internal event 1 sub-setting	0	
Internal event 4 hysteresis (Event Bank)	E4HY	Same as for Internal event 1 hysteresis	5	
Internal event 5 main setting (Event Bank)	E5	Same as for Internal event 1 main setting	0	
Internal event 5 sub-setting (Event Bank)	E5Sb	Same as for Internal event 1 sub-setting	0	
Internal event 5 hysteresis (Event Bank)	E5HY	Same as for Internal event 1 hysteresis	5	
Internal event 6 main setting (Event Bank)	E6	Same as for Internal event 1 main setting	0	
Internal event 6 sub-setting (Event Bank)	E6Sb	Same as for Internal event 1 sub-setting	0	
Internal event 6 hysteresis (Event Bank)	E6HY	Same as for Internal event 1 hysteresis	5	

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Item (bank)	Display	Description	Initial value	User level
Internal event 7 main setting (Event Bank)	E7	Same as for Internal event 1 main setting	0	Simple, standard, advanced
Internal event 7 sub-setting (Event Bank)	E7.Sb	Same as for Internal event 1 sub-setting	0	
Internal event 7 hysteresis (Event Bank)	E7HY	Same as for Internal event 1 hysteresis	5	
Internal event 8 main setting (Event Bank)	E8	Same as for Internal event 1 main setting	0	
Internal event 8 sub-setting (Event Bank)	E8.Sb	Same as for Internal event 1 sub-setting	0	
Internal event 8 hysteresis (Event Bank)	E8.HY	Same as for Internal event 1 hysteresis	5	

- Internal event 1-8 main setting / sub-setting / hysteresis are not displayed if these settings are not required for the operation type.
- ☞For the operation of internal events according to the main setting, sub-setting, and hysteresis, see “Operation” (p. 5-72 to p. 5-80).

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■ ON delay time, OFF delay time

ON delay is a function that delays the timing at which the internal event status is changed from OFF to ON.
OFF delay is a function that delays the timing at which the internal event status is changed from ON to OFF.
Note that, if the operation type is set to 20 (loop diagnosis 1), 21 (loop diagnosis 2), 22 (loop diagnosis 3), or 32 (timer), it operates as a different function.
☞"Operation" (p. 5-72 to p. 5-80)
The ON and OFF delay times can be specified by the parameters below.

Item (bank)	Display	Description	Initial value	User level
Internal event 1 ON delay time (Event Bank)	E 1.on	0 to 19999 U	0.0 s	Advanced
Internal event 1 OFF delay time (Event Bank)	E 1.oF			
Internal event 2 ON delay time (Event Bank)	E2.on			
Internal event 2 OFF delay time (Event Bank)	E2.oF			
Internal event 3 ON delay time (Event Bank)	E3.on			
Internal event 3 OFF delay time (Event Bank)	E3.oF			
Internal event 4 ON delay time (Event Bank)	E4.on			
Internal event 4 OFF delay time (Event Bank)	E4.oF			
Internal event 5 ON delay time (Event Bank)	E5.on			
Internal event 5 OFF delay time (Event Bank)	E5.oF			
Internal event 6 ON delay time (Event Bank)	E6.on			
Internal event 6 OFF delay time (Event Bank)	E6.oF			
Internal event 7 ON delay time (Event Bank)	E7.on			
Internal event 7 OFF delay time (Event Bank)	E7.oF			
Internal event 8 ON delay time (Event Bank)	E8.on			
Internal event 8 OFF delay time (Event Bank)	E8.oF			

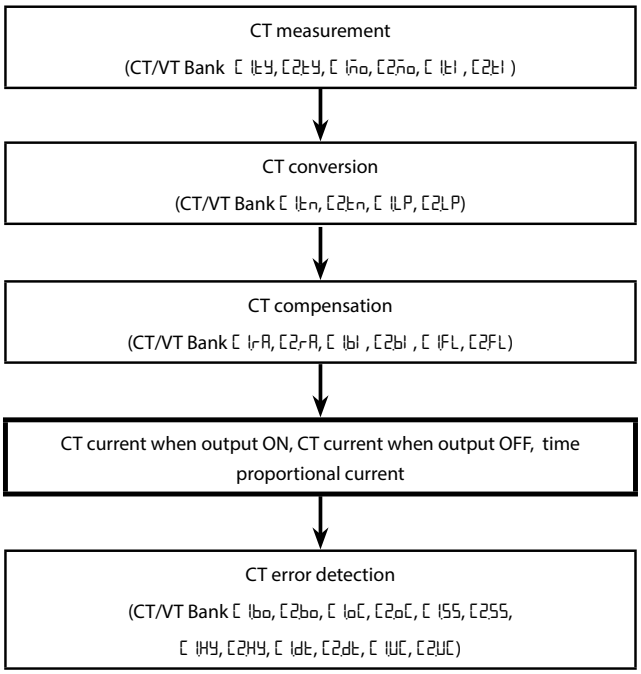
- If [Internal event 1–8 operation type] is set to 0 (no event), the internal event ON delay time and OFF delay time settings are not displayed.
- The unit for the delay time is the value set for [Internal event 1–8 delay unit].
- The setting range for delay time varies according to the setting for [Internal event 1–8 delay time decimal point position].

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5-9 Current Transformer (CT) Input

You can, for example, measure alternating current by the true RMS method or detect the status of a heater and actuator by using two inputs if this device is a model with two CT inputs or two micro CT inputs, or by using a CT input on a model with CT/VT input.

The following is a functional block diagram.



■ CT measurement

Item (bank)	Display	Description	Initial value	User level
CT1 operation type (CT/VT Bank)	C 1tY	0: Continuous current measurement 1: Heater burnout detection	0	Simple, Standard, Advanced
CT2 operation type (CT/VT Bank)	C2tY			
CT1 output (CT/VT Bank)	C 1no	0: Control output 1 1: Control output 2 2: Event output 1 3: Event output 2 4: Event output 3	0	
CT2 output (CT/VT Bank)	C2no			
CT1 measurement wait time (CT/VT Bank)	C 1t1	30–300 ms	30	Simple, Standard, Advanced
CT2 measurement wait time (CT/VT Bank)	C2t1			

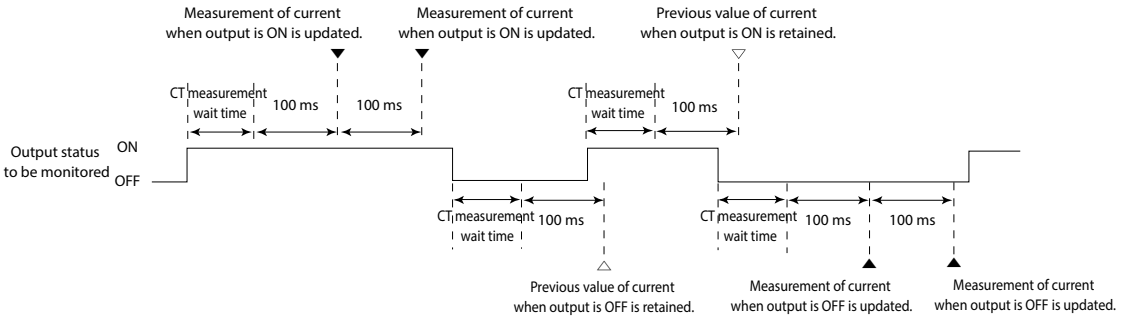
- When 0 (Continuous current measurement) is set to CT operation type, current is constantly measured.
  When 1 (Heater burnout detection) is set, different types of current value are measured depending on the ON/OFF status of the output to be monitored, which is specified with the CT1(/2) output setting.
  The measurable current values and detectable errors, which depend on the CT operation type, are shown in the table below.

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CT operation type	Current value type	Current measurement capability	Error detection setting	Error detection
0: Continuous current measurement	Current when output ON	Measurable	Heater burnout detection threshold	Current low limit error (Current ≤ set value)
			Overcurrent detection threshold	Current high limit error (Current ≥ set value)
	Current when output OFF	Not measurable (current = 0 A)	None	None
	Time proportional current	Not measurable (current = 0 A)	None	None
1: Heater burnout detection	Current when output ON	Measurable	Heater burnout detection threshold	Heater burnout (Current ≤ set value)
			Overcurrent detection threshold	Overcurrent (Current ≥ set value)
	Current when output OFF	Measurable	Short-circuit detection threshold	Short-circuit (Current ≥ set value)
	Time proportional current	Measurable when the Operation type setting of the target output specified by the CT1(/2) output setting is 1 (Time proportional output) and the Time proportional operation type setting is set to 1 (Priority on actuator service life). Otherwise, not measurable (current = 0 A).	None	None

- For control using a thyristor, set [CT operation type] to 0 (continuous current measurement). With this setting, current is measured in phase angle control that uses a thyristor.
- If the CT operation type setting is 1 (Heater burnout detection), the CT measurement wait time setting can be used to specify the time from change in the monitored output ON/OFF status to the start of current measurement.
- The time proportional current can be calculated using the following formula:
  Time proportional current = Current when output ON × √ (Time proportional output ON time ÷ Time proportional cycle)
- To use the time proportional current, set [Time proportional operation type] to 1 (Priority on actuator service life).
  If [Time proportional operation type] is set to 0 (Priority on controllability), the time proportional current is 0 A.
- The detection statuses for heater burnout, overcurrent, and short-circuit are applied to standard bits.
  In continuous current measurement, a current low limit error is reflected in the standard bit for heater burnout detection, and a current high limit error is reflected in the standard bit for overcurrent detection.
  ☞ ■ Standard bit numbers and standard numerical codes (p. App.-3)
- If 1 (Heater burnout detection) is set for the CT operation setting, the current when output ON/OFF is updated as follows.

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When the ON/OFF output status of the OUT terminal has been maintained for at least 100 ms plus the wait time for CT measurement, the current when output ON/OFF is updated.

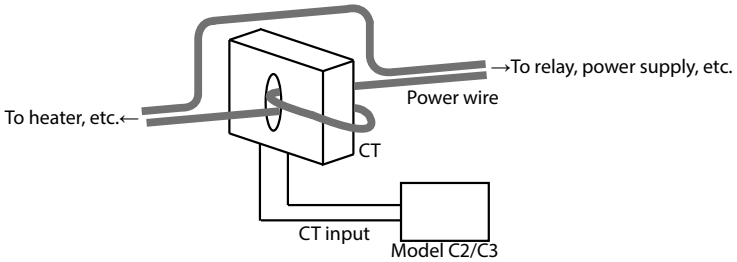
If the period of OUT terminal ON/OFF output is shorter than 100 ms plus the wait time for CT measurement, the previous value of the current when output ON/OFF is retained.

If the MV changes to 0 % due to a temperature drop in READY mode or during reverse action, the previous value of the current when output ON is retained.

■ CT conversion

Item (bank)	Display	Description	Initial value	User level
CT1 CT turn num (CT/VT Bank)	C 1tn	100–6000 turns	800	Advanced
CT2 CT turn num (CT/VT Bank)	C2tn			
CT1 number of power wire passes (CT/VT Bank)	C 1LP	1–6 times	1	
CT2 number of power wire passes (CT/VT Bank)	C2LP			

- For the number of turns, set the number of turns of the CT connected to this device.
- For the number of power wire passes, set the number of times that the power wire passes through the hole in the CT.
  For example, if the power wire passes through the hole of the CT twice as shown in the following figure, set 2.



- Make sure to specify a suitable number of turns and power wire passes for the connected CT.
  The display range and the current measurement range vary depending on the number of turns of the CT and power wire passes through the CT.
  The display range and the current measurement range are calculated using the expression below. (Any digits after the displayed digits are cut off.)

  Display range low limit (A) = 0.0
  Display range high limit (A) = Number of turns ÷ (16 × number of power wire passes) × 2.2 × M
  Current measurement range low limit (A) = Number of turns ÷ (800 × number of power wire passes) × M
  Current measurement range high limit (A) = Number of turns ÷ (8 × number of power wire passes) × M

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However, M is 1.0 for models with two CT inputs or CT/VT input and 0.1 for models with micro CT input.
The following table shows an example of the display range (allowable measured current) and the current measurement range determined by the number of turns and power wire passes of the CT. The current measurement range is shown in parentheses.
If the current value exceeds the high limit of the display range, it is limited to the high limit of the display range and a CT1/CT input error (AL 11) or CT2/VT input error (AL 12) occurs.

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● **If a model with two CT inputs or CT/VT input is used**

Number of turns / Number of power wire passes	100 turns	800 turns	1000 turns	2000 turns	6000 turns
1	0.0–13.7 A (0.1–12.5 A)	0.0–110.0 A (1.0–100.0 A)	0.0–137.5 A (1.2–125.0 A)	0.0–275.0 A (2.5–250.0 A)	0.0–825.0 A (7.5–750.0 A)
2	0.0–6.8 A (0.0–6.2 A)	0.0–55.0 A (0.5–50.0 A)	0.0–68.7 A (0.6–62.5 A)	0.0–137.5 A (1.2–125.0 A)	0.0–412.5 A (3.7–375.0 A)
6	0.0–2.2 A (0.0–2.0 A)	0.0–18.3 A (0.1–16.6 A)	0.0–22.9 A (0.2–20.8 A)	0.0–45.8 A (0.4–41.6 A)	0.0–137.5 A (1.2–125.0 A)

● **If a model with micro CT input is used**

Number of turns / Number of power wire passes	100 turns	800 turns	1000 turns	2000 turns	6000 turns
1	0.00–1.37 A (0.01–1.25 A)	0.00–11.00 A (0.10–10.00 A)	0.00–13.75 A (0.12–12.50 A)	0.00–27.50 A (0.25–25.00 A)	0.00–82.50 A (0.75–75.00 A)
2	0.00–0.68 A (0.00–0.62 A)	0.00–5.50 A (0.05–5.00 A)	0.0–6.87 A (0.06–6.25 A)	0.00–13.75 A (0.12–12.50 A)	0.00–41.25 A (0.37–37.50 A)
6	0.00–0.22 A (0.00–0.20 A)	0.00–1.83 A (0.01–1.66 A)	0.00–2.29 A (0.02–2.08 A)	0.00–4.58 A (0.04–4.16 A)	0.00–13.75 A (0.12–12.50 A)

Handling Precautions

- Do not apply a current above the allowable input current for CT input (0–150 mA AC with a peak current of 212 mA for models with two CT inputs or CT/VT input and 0–15.0 mA AC with a peak current of 21.2 mA for models with micro CT input). Exceeding the high limit may cause a malfunction.

Recommended current transformers are as follows:

- If a model with two CT inputs or CT/VT input is used

Azbil Corporation	QN206A	Hole diameter: 5.8 mm 800 turns
	QN212A	Hole diameter: 12 mm 800 turns

- If a model with micro CT input is used

U.R.D. Co., Ltd. Precision Purpose CTL-Z series	CTL-6-S-Z	Hole diameter: 5.8 mm 800 turns
	CTL-12-S30-10Z	Hole diameter: 12 mm 1000 turns

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■ CT compensation

Item (bank)	Display	Description	Initial value	User level
CT1 ratio (CT/VT Bank)	C 1rA	0.001 to 19.999	1.000	Advanced
CT2 ratio (CT/VT Bank)	C2rA			
CT1 bias (CT/VT Bank)	C 1bI	−1999.9 to 1999.9 (for models with two CT inputs or CT/VT input) −199.99 to 199.99 (for models with micro CT input)	0.0	
CT2 bias (CT/VT Bank)	C2bI			
CT1 filter (CT/VT Bank)	C 1FL	0.0–120.0 s	0.1	
CT2 filter (CT/VT Bank)	C2FL			

- The CT ratio and CT bias settings can compensate for the influence of the coupling coefficient of the current transformer and other factors.
  Ratio and bias compensation can be expressed with the following equation:

  OUT = (IN × RA) + BI
  IN: Operation input
  OUT: Operation result
  RA: Ratio setting
  BI: Bias setting

- The CT filter settings can be used to apply first-order lag filter compensation according to the expression below.
  The larger the setting is, the less likely it is that the measured value will change.

  $OUT = OUT_{LAST} + (IN - OUT_{LAST}) \div (T \div Ts + 1)$
  IN: Input to the filter
  T: Filter setting (s)
  OUT: Current filter calculation output
  OUT_{LAST}: Previous filter calculation output
  TS: Update cycle (fixed at 0.1 s)

- The CT filter is disabled in the following cases:
  · If the current when the output is ON (or OFF) is not measured.
  · If there is a CT1 or CT input error (AL 11), or a CT2 or VT input error (AL 12).
  · If the setting for CT number of turns or power wire passes is changed.

The reference coupling coefficient values for recommended current transformers are shown in the table below.

You may be able to reduce indication errors by setting this value to the CT ratio.

Recommended current transformer	Coupling coefficient (reference value)
Azbil Corporation QN206A (hole diameter: 5.8 mm, 800 turns) QN212A (hole diameter: 12 mm, 800 turns)	0.98
Precision Purpose CTL-Z series from U.R.D. Co., Ltd. CTL-6-S-Z (hole diameter: 5.8 mm, 800 turns) CTL-12-S30-10Z (hole diameter: 12 mm, 1000 turns)	0.99

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■ CT error detection

Item (bank)	Display	Description	Initial value	User level
CT1 heater burnout detection threshold (CT/VT Bank)	C 1bo	0.0 to 1999.9 (for models with two CT inputs or CT/VT input) 0.00 to 199.99 (for models with micro CT input)	0	Advanced
CT2 heater burnout detection threshold (CT/VT Bank)	C2bo			
CT1 overcurrent detection threshold (CT/VT Bank)	C 1oC		0	
CT2 overcurrent detection threshold (CT/VT Bank)	C2oC			
CT1 short-circuit detection threshold (CT/VT Bank)	C 1SC		0	
CT2 short-circuit detection threshold (CT/VT Bank)	C2SC			
CT1 hysteresis (CT/VT Bank)	C 1HY		0.5/0.05	
CT2 hysteresis (CT/VT Bank)	C2HY			
CT1 delay time (CT/VT Bank)	C 1dt	0.0–1999.9 s	2.0	
CT2 delay time (CT/VT Bank)	C2dt			
CT1 condition for restoring not-measured status (CT/VT Bank)	C 1UC	1024–2047: Standard bit numbers	1024	
CT2 condition for restoring not-measured status (CT/VT Bank)	C2UC			

- If the current when output ON is less than or equal to the CT heater burnout detection threshold setting, heater burnout is detected.
  If the CT heater burnout detection threshold setting is 0.0, the detection function is stopped.
  - As a general guide, set the CT heater burnout detection threshold at around the midpoint between the measured value at normal times and the measured value at burnout. In addition, make sure that the difference between the CT heater burnout detection threshold and the measured value at normal times is 2.5 % FS or more of the current measurement range.

    $$\text{Value to be set} = \frac{\text{Current at normal times} + \text{Current at burnout}}{2}$$

  - When the CT operation type setting is 0 (Continuous current measurement), a current low limit value error can be detected using the CT heater burnout detection threshold setting as the low limit.
- If the current when output ON is greater than or equal to the CT overcurrent detection threshold, an overcurrent is detected.
  If the CT overcurrent detection threshold setting is 0.0, the detection function is stopped.
  - As a general guide, set the CT overcurrent detection threshold at around the midpoint between the measured value at normal times and the measured value when there is an overcurrent. In addition, make sure that the difference between the CT overcurrent detection threshold and the measured value at normal times is 2.5 % FS or more of the current measurement range.

    $$\text{Value to be set} = \frac{\text{Current at overcurrent} + \text{Current at normal times}}{2}$$

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- If the CT operation type setting is 0 (Continuous current measurement), a current high limit value error can be detected using the CT overcurrent detection threshold as the high limit.

- If the current when output OFF is greater than or equal to the CT short-circuit detection threshold setting, a short circuit is detected.
  If the CT short-circuit detection threshold setting is 0.0, the detection function is stopped.

  - As a general guide, set the CT short-circuit detection threshold at around the midpoint between the measured value at normal times and the measured value when there is a short circuit. In addition, make sure that the difference between the CT short-circuit detection threshold and the measured value at normal times is 2.5 % FS or more of the current measurement range.

    $$\text{Value to be set} = \frac{\text{Current at short circuit} + \text{Current at normal times}}{2}$$

  - If the CT operation type setting is 0 (Continuous current measurement), the detection function is stopped.

- The CT hysteresis settings can be used to apply the same hysteresis for heater burnout detection, overcurrent detection, and short-circuit detection.

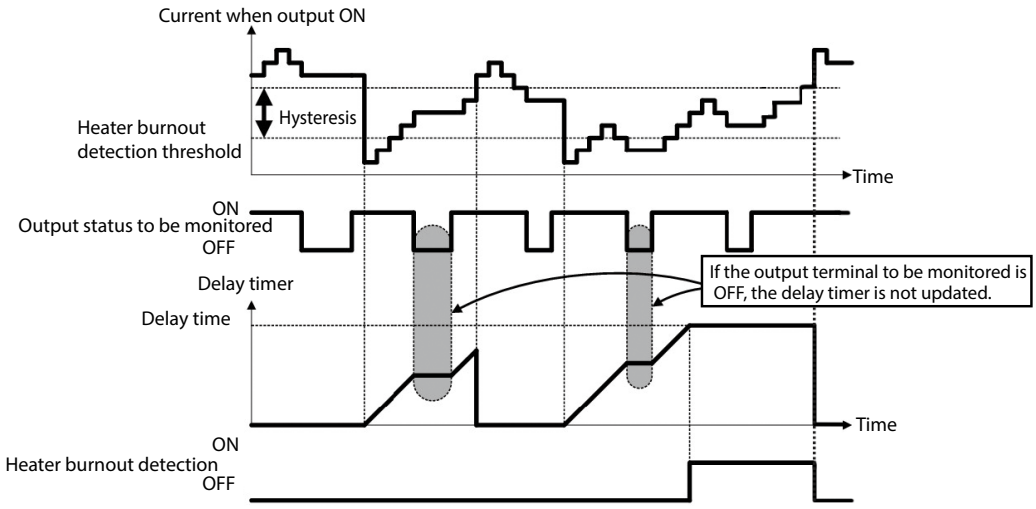
- The CT delay time settings can be used to set the same ON delay time for heater burnout detection, overcurrent detection, and short-circuit detection.
  This delay timer starts or is reset according to the conditions in the table below.

Detection type	Start condition	Reset condition
Heater burnout detection	Current when output ON ≤ Heater burnout detection threshold	Current when output ON > Heater burnout detection threshold + Hysteresis
Overcurrent detection	Current when output ON ≥ Overcurrent detection threshold	Current when output ON < Overcurrent detection threshold – Hysteresis
Short-circuit detection	Current when output OFF ≥ Short-circuit detection threshold	Current when output OFF < Short-circuit detection threshold - Hysteresis

Reference

- If heater burnout detection, overcurrent detection, or short-circuit detection is ON (detection enabled), it remains ON (detection enabled) even if the reset conditions for the delay timer are met.
  To turn OFF detection (detection disabled), disable measurement.
- When the CT operation type setting is 0 (Continuous current measurement), the delay timer is constantly updated every millisecond.
- When the CT operation type setting is 1 (Heater burnout detection), the delay timer is updated every millisecond according to the ON/OFF status of the output to be monitored.
  The delay timer is updated only while the monitored output is ON during heater burnout detection and overcurrent detection because the current when output ON is what is being monitored.
  The delay timer is updated only while the monitored output is OFF during short-circuit detection because the current when output OFF is what is being monitored.
  For example, the operation of heater burnout detection is shown in the following figure.

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- The CT condition for restoring not-measured status setting can be used to specify the criterion for restoring "not-measured" status for the current when output ON or the current when output OFF, using a standard bit.
  Use the setting to stop burnout detection from continuing even though control has stopped after burnout is detected.
  - The CT condition for restoring not-measured status is used to turn OFF (disable) heater burnout detection, overcurrent detection, and short-circuit detection until the current when output ON and the current when output OFF are measured again.
  - Measurement remains disabled while the standard bit specified for the CT condition for restoring not-measured status setting is ON.
    While measurement is disabled, CT1/CT input errors (AL11) and CT2 input errors (AL12) will not occur.
  - Heater burnout detection, overcurrent detection, and short-circuit detection are not turned OFF (disabled) until the current when output ON or the current when output OFF is updated to the specified measured value.
    To force heater burnout detection, overcurrent detection, or short-circuit detection to turn OFF, turn ON the standard bit specified for the CT condition for restoring not-measured status setting.

! Handling Precautions

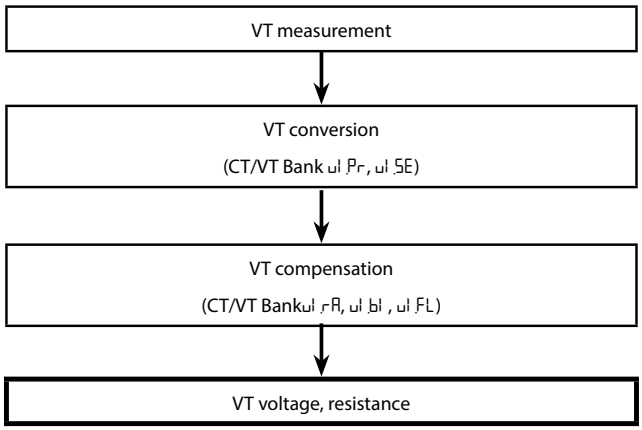
- Do not set [CT condition for restoring not-measured status] to the standard bit No. 1952/1953 (CT current when output ON was measured) or 1960/1961 (CT current when output OFF was measured) that has already been set for the same channel. If set, the measurement status related to CT output will not change.
- If a standard bit No. for a bit status that is determined later in the processing order than this process is set, the bit status from the previous sampling cycle will be used.
  ☞ ■ Processing order (p. App.-1) (for the processing order)
- If [CT condition for restoring not-measured status] is set to the following standard bits that have been set for a channel with a greater channel No. than the channel being configured, the bit status from the previous sampling cycle will be used.
  1120/ 1121: Heater burnout detection
  1128/ 1129: CT overcurrent detection
  1136/1137: CT short-circuit detection
  1818/1819: CT input error
  1952/ 1953: CT current when output ON was measured
  1960/ 1961: CT current when output OFF was measured

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5 - 10 VT (Voltage Transformer) Input

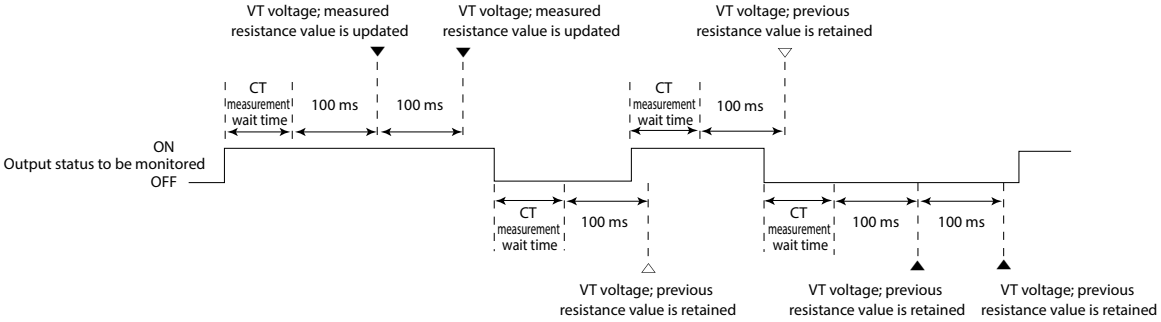
If a model with CT/VT input is used, one VT input can be used, for example, to measure the AC voltage and heater resistance with true RMS.

The following is a functional block diagram.



■ VT measurement

- When 0 (Continuous current measurement) is set for CT operation type, VT voltage is always measured and the resistance is derived.
  When 1 (Heater burnout detection) is set, the VT voltage is measured and the resistance is derived as follows.
  When the output to be monitored as specified by the CT1(/2) output setting is ON: The VT voltage is measured in sync with the current when output ON to derive the resistance.
  When the output to be monitored specified by the CT1(/2) output setting is OFF: The previous value is retained and the VT voltage is not measured. The previous resistance is also retained.
- The resistance is derived with the formula below:
  Resistance (Ω) = VT voltage (V) ÷ Current when output ON (A)
- If 1 (Heater burnout detection) is set for the CT operation setting, the VT voltage and resistance value are updated as shown below.



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■ VT conversion

Item (bank)	Display	Description	Initial value	User level
VT primary voltage (CT/VT Bank)	uI.Pr	1.0–500.0 V	200	Advanced
VT secondary voltage (CT/VT Bank)	uI.SE	1.0–11.0 V	10	

- Set uI.Pr (VT primary voltage) and uI.SE (VT secondary voltage) to be suitable for the VT transformer connected to this device.
- The display range and the current measurement range vary depending on the uI.Pr (VT primary voltage) and uI.SE (VT secondary voltage) settings.

  The display range and the current measurement range are calculated using the expression below. (Any digits after the displayed digits are cut off.)

  Voltage display range low limit (V) = 0.0

  Voltage display range high limit (V) = 13.2 × VT primary voltage ÷ VT secondary voltage

  Voltage measurement range low limit (V) = 1.2 × Primary voltage ÷ Secondary voltage

  Voltage measurement range high limit (V) = 12.0 × Primary voltage ÷ Secondary voltage

  If the value of the current exceeds the high limit of the display range, it is limited to the high limit and a CT2/VT input error (AL I2) occurs.

Handling Precautions

- Make sure that the voltage does not exceed the allowable input voltage of the VT input (0–16 V AC with a peak voltage of 23 V). Exceeding the high limit may cause a malfunction.
- If the VT voltage is less than 0.1 V and the current when output ON is less than 0.1 A, the previous value is retained and the resistance is not calculated. When the standard bit set for the CT condition for restoring not-measured status setting is ON, the resistance value will be 0.0.
- Resistance can be measured if phase angle control is performed using an SSR or a thyristor. In the case of cycle control using a thyristor, this device cannot measure resistance appropriately.

Note

- ☞ ■ Optional parts (p. 1-3) (for recommended voltage transformers)

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■ VT compensation

Item (bank)	Display	Description	Initial value	User level
VT ratio (CT/VT Bank)	ul.rA	0.001–19.999	1.000	Advanced
VT bias (CT/VT Bank)	ul.bl	–1999.9 to +1999.9	0.0	
VT filter (CT/VT Bank)	ul.FL	0.0–120.0 s	0.1	

- The VT ratio and VT bias settings can compensate for individual differences of the transformer and other factors.

  Ratio and bias compensation can be expressed with the following equation:

  $OUT = (IN \times RA) + BI$

  IN: Operation input

  OUT: Operation result

  RA: Ratio setting

  BI: Bias setting

- The VT filter settings can be used to apply first-order lag filter compensation according to the expression below.

  The larger the setting is, the less likely it is that the measured value will change.

  $OUT = OUT_{LAST} + (IN - OUT_{LAST}) \div (T \div T_s + 1)$

  IN: Input to the filter
  T: Filter setting (s)

  OUT: Current filter calculation output

  OUT_{LAST}: Previous filter calculation output

  T_S: Update cycle (fixed at 0.1 s)

- The VT filter is disabled in the following cases:

  • If the VT voltage is not yet measured

  • If there is a CT2/VT input error (AL 12)

  • If the VT primary or secondary voltage setting is changed

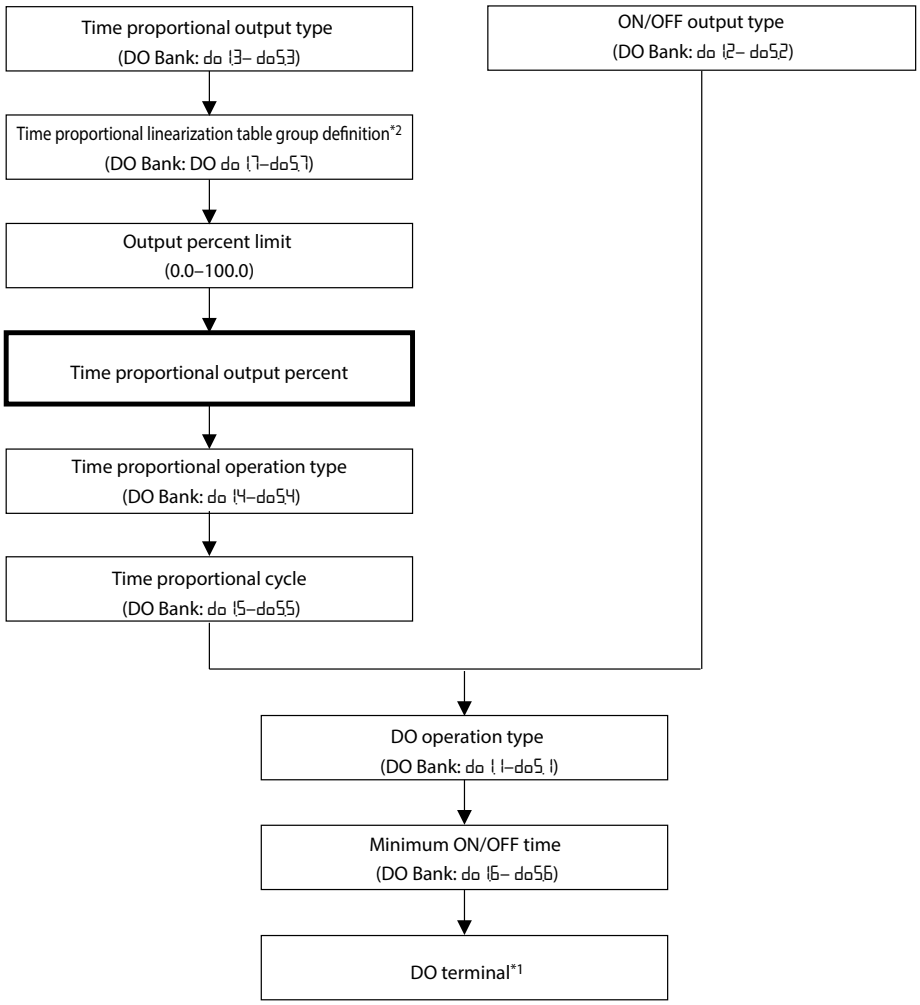
Note

- The VT filter settings may be used to reduce the fluctuation in the measured VT voltage due to untimely measurement of a target waveform or other cause. In addition, with regard to reducing fluctuation in the resistance value, successful reduction is more likely by increasing the value set for the CT filter if the cause is fluctuation in the current when output ON, and by increasing the value set for the VT filter if the cause is fluctuation in the VT voltage.

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5 - 11 Digital Output (DO)

The following is a functional block diagram for digital output (DO).



*1. The terminal status can be checked by [OUT 1–2 terminal status] and [EV1–3 terminal status].

*2. This item is displayed and the setting can be changed for the C3A/C3B.

Handling Precautions

- Since the [OUT 1–2 terminal status] and [EV1–3 terminal status] settings are updated on a 1-ms cycle, if the status of a terminal is used as an input for several logical operations, the status used may differ depending on the timing of the operation. ☞ 5 - 12 Position proportional control (p. 5-110) (for details on logical operations)
- For controllers whose model No. includes "R1," the settings for control outputs1 and 2 cannot be specified. Specify the desired motor drive output operation with the internal contacts.

Note

- ☞ ■ Specifying motor operation by internal contacts (p. 5-121) (for details)

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■ Operation type

The operation type can be selected for each DO terminal.

- For ON/OFF output, the output is ON when the state set by the ON/OFF output type is 1 (ON) and is OFF when the state is 0 (OFF).
- For time proportional output, the time proportional output depends on the numerical code set with the time proportional output type.

Item (bank)	Display	Description	Initial value	User level
OUT 1 DO operation type (DO Bank)	do1.1	0: ON/OFF output 1: Time proportional output	0 or 1	Simple, Standard, Advanced
OUT 2 DO operation type (DO Bank)	do2.1		1	
EV1 DO operation type (DO Bank)	do3.1		0	
EV2 DO operation type (DO Bank)	do4.1		0	
EV3 DO operation type (DO Bank)	do5.1		0	

These items are displayed and the settings can be changed if the specifications required for relay output or voltage pulse output are specified for the above output terminals by the model number.

! Handling Precautions

- If relay (R0) is specified for control output by the model No., the initial value of [OUT 1 DO operation type] depends on the ROM version; for versions earlier than 1.03, it is 1 (time proportional output), and for version 1.03 or later, it is 0 (ON/OFF output). If "R0" is not specified, the initial value is 1 (time proportional output), regardless of the ROM version.

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■ ON/OFF output type

The information that is output in the case of ON/OFF output can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 ON/OFF output type (DO Bank)	do 12	1024–2047: Standard bit numbers	1024 or 1264	Simple, Standard, Advanced
OUT 2 ON/OFF output type (DO Bank)	do22		1024	
EV 1 ON/OFF output type (DO Bank)	do32		1088	
EV 2 ON/OFF output type (DO Bank)	do42		1089	
EV 3 ON/OFF output type (DO Bank)	do52		1090	

These items are displayed and the settings can be changed if the specifications required for relay output or voltage pulse output are specified for the above output terminals by the model number and if ON/OFF output is set for the DO operation type.

[!] Handling Precautions

- Do not set the standard bit No., 1280 to 1284 (OUT terminal status), that has already been set for the same channel. If set, the ON/OFF output status will not change.
- To output the same value from multiple DOs, set the same standard bit No. for [ON/OFF output type] of each DO.
- If a standard bit No. for a bit status that is determined later in the processing order than this process is set, the bit status from the previous sampling cycle will be used.
  ☞ ■ Processing order (p. App.-1) (for the processing order)
- If relay (R0) is specified for control output by the model No., the initial value of [OUT 1 ON/OFF output type] depends on the ROM version; for versions earlier than 1.02, it is 1024 (always 0 (OFF)), and for version 1.02 or later, it is 1264 (ON/OFF control MV status). If "R0" is not specified, the initial value is 1024 (always 0 (OFF)), regardless of the ROM version.

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■ Time proportional output type

The output value for the time proportional output type can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 time proportional output type (DO Bank)	do 1.3	2048–3071: Standard numerical codes	2416	Simple, Standard, Advanced
OUT 2 time proportional output type (DO Bank)	do2.3		2048	
EV 1 time proportional output type (DO Bank)	do3.3		2048	
EV 2 time proportional output type (DO Bank)	do4.3		2048	
EV 3 time proportional output type (DO Bank)	do5.3		2048	

These items are displayed and the settings can be changed if the specifications required for relay output or voltage pulse output are specified for the above output terminals by the model number and if time proportional output is set for the DO operation type.

[!] Handling Precautions

- Do not set the standard numerical code, 2784 to 2788 (time proportional output percent), that has already been set for the same channel. If set, the time proportional output will not change.
- To output the same value from multiple DOs, set the same standard numerical code for [Time proportional output type] of each DO.
- If a standard numerical code for a value that is determined later in the processing order than this process is set, the value from the previous sampling cycle will be used.
  ☞ ■ Processing order (p. App.-1) (for the processing order)

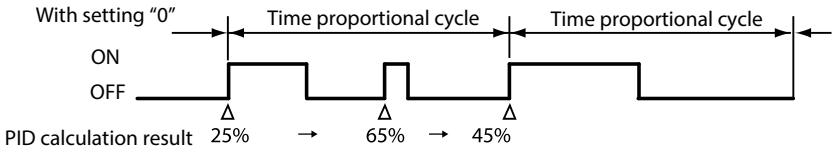
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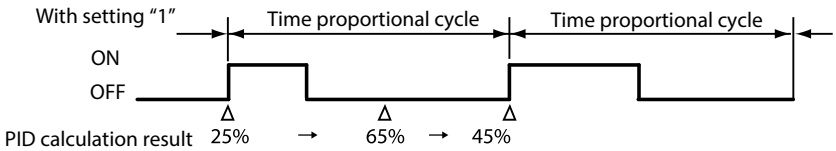
■ Time proportional operation type

The time proportional operation type can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 time proportional operation type (DO Bank)	do 1.4	0: Priority on controllability 1: Priority on actuator service life	0 or 1	Advanced
OUT 2 time proportional operation type (DO Bank)	do2.4			
EV 1 time proportional operation type (DO Bank)	do3.4			
EV 2 time proportional operation type (DO Bank)	do4.4			
EV 3 time proportional operation type (DO Bank)	do5.4			

- These items are displayed and the settings can be changed if the specifications required for relay output or voltage pulse output are specified for the above output terminals by the model number and if time proportional output is set for the DO operation type.
- The initial value is 1 for relay output or event relay output and 0 for other output.
- When 0 (Priority on controllability) is set, the output may be turned ON twice or more within the time proportional cycle.
- When 1 (Priority on actuator service life) is set, the output may not be turned ON or may be turned ON once.





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■ Time proportional cycle

The time proportional cycle can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 time proportional cycle (DO Bank)	do 1.5	0.1–120.0 s	10.0 or 2.0	Simple, Standard, Advanced
OUT 2 time proportional cycle (DO Bank)	do2.5			
EV1 time proportional cycle (DO Bank)	do3.5			
EV2 time proportional cycle (DO Bank)	do4.5			
EV3 time proportional cycle (DO Bank)	do5.5			

- These items are displayed and the settings can be changed if the specifications required for relay output or voltage pulse output are specified for the above output terminals by the model number and if time proportional output is set for the DO operation type.
- The initial value is 10.0 s for relay output or event relay output and 2.0 s in other cases.
- When a value between 0.1 s and 5.0 s is set for relay output or event relay output, the relay operates at 5.0 s.

Handling Precautions

- The shorter the time proportional cycle, the better the controllability. However, when specifying the settings, please take the electrical service life of the relay into consideration.

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■ Linearization table group definition

The linearization group used for linear approximation of time proportional output can be set.

Item (bank)	Display	Description	Initial value	User level
OUT 1 time proportional linearization table group definition (DO Bank)	do 17	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced
OUT 2 time proportional linearization table group definition (DO Bank)	do2.7			
EV 1 time proportional linearization table group definition (DO Bank)	do3.7			
EV 2 time proportional linearization table group definition (DO Bank)	do4.7			
EV 3 time proportional linearization table group definition (DO Bank)	do5.7			

- These items are displayed and the settings can be changed for the C3A/C3B if the specifications required for relay output or voltage pulse output are specified for the above output terminals by the model number, and if time proportional output is set for the DO operation type.
- The settings of each DO terminal can be combined with a group definition that depends on internal contacts. ☞ 5-7 Digital Input (DI) / Internal Contacts (p. 5-65) (for details)

● ON/OFF control setting

When a DO terminal outputs the MV for ON/OFF control, set up the DO terminal used for output as follows.

☞ ■ ON/OFF control (p. 5-32) (for ON/OFF control)

● If [DO operation type] is set to 0 (ON/OFF output)

Item	Setting
DO operation type	0: ON/OFF output
ON/OFF output type	1264: ON/OFF control MV status

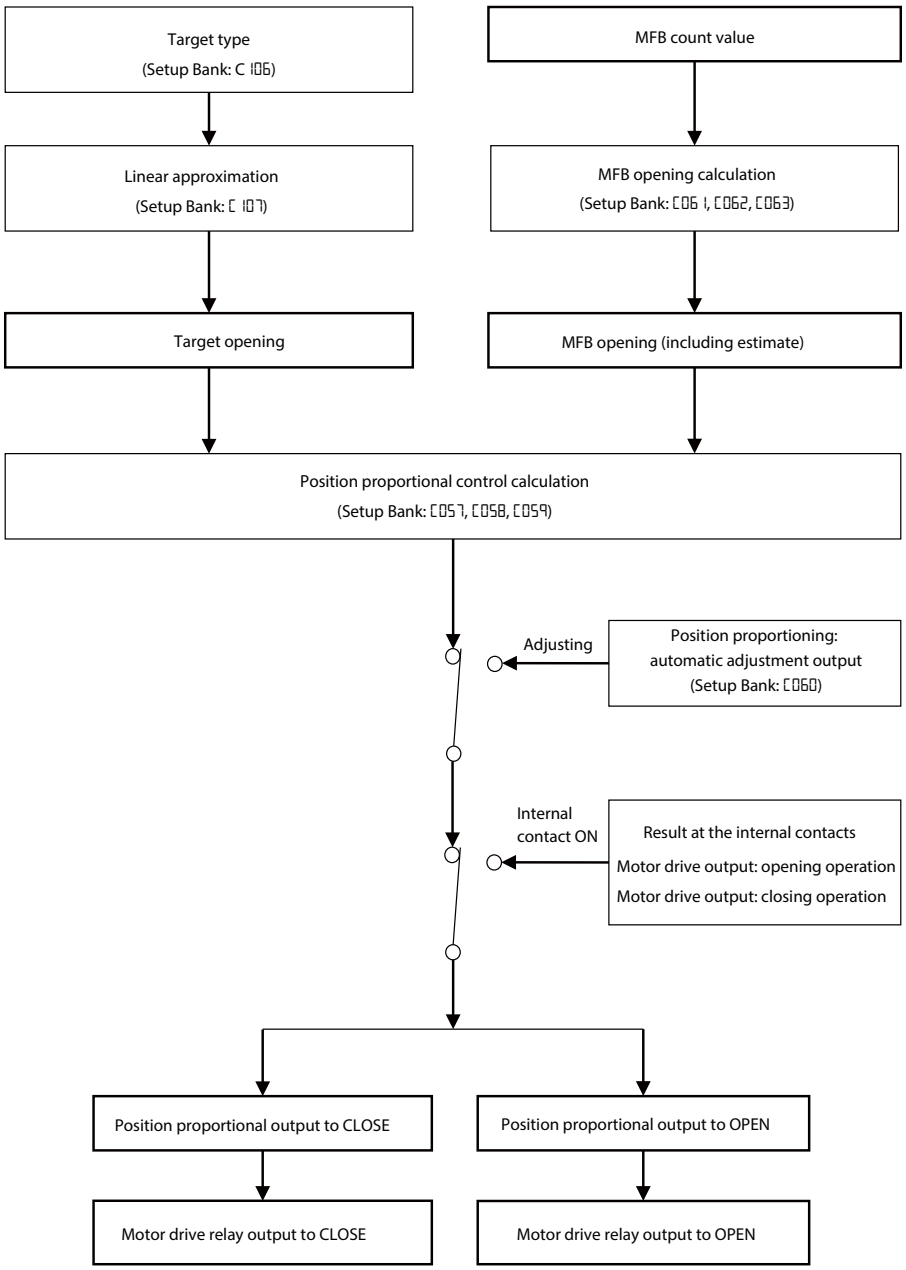
● If [DO operation type] is set to 1 (Time proportional output)

Item	Setting
DO operation type	1: Time proportional output
Time proportional output type	2416: MV
Time proportional operation type	0: Priority on controllability
Time proportional cycle	0.1 s (for voltage pulse output) 5.0 s (for relay control output or event relay output)
Minimum ON/OFF time	1 ms (for voltage pulse output) 50 ms (for relay control output or event relay output)
Linearization table group definition	0: Do not use

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5 - 12 Position proportional control

If “R1” (motor drive relay output) is specified for control output by the model number, position proportional control is available. In position proportional control, the ON/OFF of the motor drive relay outputs for opening and closing is controlled to ensure that the target opening (initial setting: MV) and the motor position (valve opening) are the same.



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■ Position proportional control target opening type

The data used as the target opening for position proportional control can be set using a standard numerical code.

Item (bank)	Display	Description	Initial value	User level
Position proportional control: target type (Setup Bank)	C 106	2048–3071: Standard numerical codes	2416	Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1."

Handling Precautions

- Do not set the following standard numerical codes. If set, the target opening will not change.
  2468: MFB opening (including estimate)
  2472: MFB opening
  2476: Estimated MFB opening
  2480: Target opening
- If a standard numerical code for a value that is determined later in the processing order than this process is set, the value from the previous sampling cycle will be used. ☞ ■ Processing order (p. App.-1) (for the processing order)

■ Specifying the linearization table group for position proportional control

The linearization table group used for linear approximation of the target opening can be set.

Item (bank)	Display	Description	Initial value	User level
Position proportional control: linearization table group definition (Setup Bank)	C 107	0: Do not use 1–4: Number of the linearization table group to use	0	Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1."
- The linearization table group cannot be selected by internal contacts.

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■ Selecting the method of position proportional control

The method of position proportional control can be set.

Item (bank)	Display	Description	Initial value	User level
Position proportional control: method selection (Setup Bank)	C057	0: MFB control + control with estimated position 1: MFB control + close upon error 2: Control with estimated position 3: Control with estimated position + position adjustment at power-on	0	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1."

Note

- If MFB control is used (if 0 or 1 is set for this item), perform automatic adjustment for position proportional control.
☞ ■ Automatic adjustment for position proportional control (p. 5-114)
- If MFB control is not used (if 2 or 3 is set for this item), manually set the correct value for [Position proportioning: adjustment value for time until fully open].
☞ ■ Adjustment value for time until fully open for position proportional control (p. 5-117)
- When controlling with an estimated position, the motor feedback (MFB) opening that is displayed blinks. ☞ 6-1 Operation Settings (p. 6-1) (for details)
- When using the position proportional function, set [Sampling cycle] to 2 (100 ms).

● If 0 (MFB control + control with estimated position) is selected

If the MFB input is normal, a measured MFB opening is used for position proportional control. This is called "MFB control." If an MFB input error (AL07) or MFB A/D conversion error (AL72) occurs, an estimated MFB opening is used for position proportional control. This is called "control with estimated position," and the control status is called "Estimating MFB."

● If 1 (MFB control + close upon error) is selected

A measured MFB opening is used for position proportional control. If an MFB input error (AL07) or MFB A/D conversion error (AL72) occurs, the CLOSE relay will be kept turned ON.

● If 2 (Control with estimated position) is selected

The motor is controlled with an estimated MFB opening regardless of whether MFB input terminals are wired or not.

- The status is "Estimating MFB."
- No MFB input error (AL07) or MFB A/D conversion error (AL72) will occur.
- The error between the actual MFB opening and the estimated MFB opening is corrected by keeping the CLOSE relay ON when the target opening is ≤ 0.0 % and keeping the OPEN relay ON when the target opening is ≥ 100.0 % for at least the time required for the motor to fully close or fully open.

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● **If 3 (Control with estimated position + position adjustment at power-on) is selected**

By turning ON the CLOSE relay when the power is turned on for the time set for [Position proportioning: adjustment value for time until fully open], this device adjusts the motor position so that both the actual MFB opening and the estimated MFB opening will be 0.0 %. The operation afterwards is the same as that of 2 (Control with estimated position).

If the operation mode changes to MANUAL or READY when the power is turned on or during position adjustment, or if the internal contacts whose operation type is set to 48 (Motor drive output: opening operation) or 49 (Motor drive output: closing operation) turn ON, this device stops position adjustment and starts controlling with an estimated position.

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■ Automatic adjustment for position proportional control

Automatic adjustment for position proportional control can be started or stopped by this item.

Item (bank)	Display	Description	Initial value	User level
Position proportioning: automatic adjustment (Setup Bank)	C060	0: Stop 1: Start	0	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1."
- Automatic adjustment conditions
  Automatic adjustment is available if all of the following conditions are met:
  - [Position proportional control: method selection] is set to 0 (MFB control + control with estimated position) or 1 (MFB control + close upon error).
  - MFB input terminals and motor drive relay output terminals are wired correctly, and neither MFB input error (AL07) nor MFB A/D conversion error (AL72) has occurred.
  - The motor is turned on and the motor can rotate.
  - The internal contacts whose operation type is set to 48 (Motor drive output: opening operation) or 49 (Motor drive output: closing operation) are turned OFF.
- How to execute automatic adjustment:

(1) Change the setting for [Position proportioning: automatic adjustment] from 0 (Stop) to 1 (Start) to start automatic adjustment.

(2) First, adjustment for the fully closed position is started. The CLOSE relay turns ON and the motor operates to close the valve. When the motor reaches the fully closed position and the count becomes stable, adjustment for the fully closed position is complete. Then, adjustment for the fully open position is started. The OPEN relay turns ON and the motor rotates toward the opening direction. When the motor reaches the fully open position and the count becomes stable, adjustment for the fully open position is complete and automatic adjustment ends.

(3) When the automatic adjustment ends, the result of automatic adjustment for position proportional control is written and the setting for [Position proportioning: automatic adjustment] changes from 1 (Start) to 0 (Stop).

(4) If the automatic adjustment is successful, the adjustment values are saved to [Position proportioning: adjustment value when fully closed], [Position proportioning: adjustment value when fully open], and [Position proportioning: adjustment value for time until fully open].

(5) During automatic adjustment, display field 1 shows CAL (adjustment for the fully closed position in progress) or CAoP (adjustment for the fully open position in progress) and display field 2 showsthe MFB count, and only the [MENU] key can be used (to cancel adjustment).

(6) Under any of the circumstances below, automatic adjustment will stop:

- The setting for [Position proportioning: automatic adjustment] was changed from 1 (Start) to 0 (Stop).
- The [MENU] key was pressed.
- The conditions for automatic adjustment are no longer satisfied.

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- Automatic adjustment result

  When an automatic adjustment ends, the result is saved to [Position proportioning: automatic adjustment result].

  "2" (Failed) is saved if any of the following conditions is met:

  - The fully closed MFB count subtracted from the fully open MFB count is less than 394.
  - The time until fully open is less than 1 s or more than 300 s.
  - Either the time required to determine full closure (the time for which CALC is displayed) or the time required for the motor position to change from the fully closed position to the fully open position (the time for which CAP IS dISPLAYEd) took 6 minutes or more.

Handling Precautions

- If the power of this device is turned off during automatic adjustment, any changes that have been made will be discarded, and the adjustment will stop.
- If mode switching between AUTO/MANUAL, RUN/READY, LSP/RSP, or constant value operation / pattern operation is executed during automatic adjustment, the adjustment will continue.

■ Result of automatic adjustment for position proportional control

The result of automatic adjustment for position proportional control can be checked.

Item (bank)	Display	Description	Initial value	User level
Position proportioning: automatic adjustment result (Setup Bank)	C 108	0: Not executed 1: Succeeded 2: Failed	0	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1" and if [Position proportional control: method selection] is set to 0 (MFB control + control with estimated position) or 1 (MFB control + close upon error).
- The result is automatically saved when automatic adjustment for position proportional control ends. It is also possible to set 0–2 manually.

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■ Adjustment value when fully closed / fully open for position proportional control

The adjustment values when fully open and fully closed that are used to calculate the MFB opening can be displayed and changed.

Item (bank)	Display	Description	Initial value	User level
Position proportioning: adjustment value when fully closed (Setup Bank)	C061	0–9999	1000	Simple, Standard, Advanced
Position proportioning: adjustment value when fully open (Setup Bank)	C062	0 to 9999	3000	

- These items are displayed and the settings can be changed for controllers whose model No. includes "R1" and if [Position proportional control: method selection] is set to 0 (MFB control + control with estimated position) or 1 (MFB control + close upon error).
- If [Position proportional control: method selection] is set to 0 (MFB control + control with estimated position) or 1 (MFB control + close upon error), the adjustment result is saved only when [Position proportioning: automatic adjustment result] = 1 (succeeded). You can also set the result manually like other settings.
- The setting range for [Position proportioning: adjustment value when fully closed] and [Position proportioning: adjustment value when fully open] is shown below. A value outside this range will cause a motor adjustment error (AL10).

  • Adjustment value when fully closed − Adjustment value when fully open ≥ 394

Handling Precautions

- When replacing an old model, be sure to perform automatic adjustment for proportional position control.

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■ Adjustment value for time until fully open for position proportional control

The time until the motor becomes fully open is displayed. The value is used to calculate the estimated MFB opening and the time required for the motor to change from fully open to fully closed during position adjustment at power-on.

Item (bank)	Display	Description	Initial value	User level
Position proportioning: adjustment value for time until full open (Setup Bank)	C063	1.0–300.0 s	30.0	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1."
- This device calculates the estimated MFB opening based on the setting for [Position proportioning: adjustment value for time until full open] and the motor drive output operations (open, close, stop)
- If the position proportional control method is set to 3 (Control with estimated position + position adjustment at power-on), the adjustment value for time until fully open is used to calculate the closing operation time when the power is turned on.
- If [Position proportional control: method selection] is set to 0 (MFB control + control with estimated position) or 1 (MFB control + close upon error), the adjustment result is saved only when [Position proportioning: automatic adjustment result] = 1 (succeeded). You can also set the result manually like other settings.
- If [Position proportional control: method selection] is set to 2 (Control with estimated position] or 3 (Control with estimated position + position adjustment at power-on), manually set the time measured until the motor fully opens.
- This device calculates the estimated MFB opening based on the setting for [Position proportioning: adjustment value for time until full open] and the motor drive output operations (open, close, stop).
- If [Position proportional control: method selection] is set to 3 (Control with estimated position + position adjustment at power-on), this device's system will add a closing operation that takes the time specified by [Position proportioning: adjustment value for time until full open] when the power is turned on.

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■ Wiring for motor and motor operation during automatic adjustment

There are two wiring methods between a controller and a motor: direct wiring and reverse wiring.

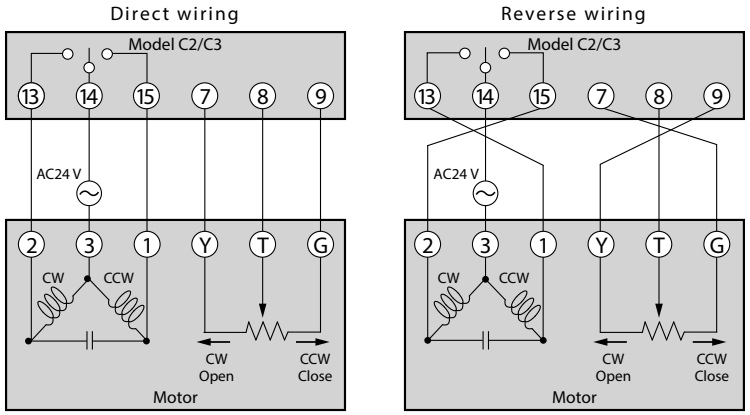
With direct wiring, the motor rotates clockwise (CW) if the output from the controller increases.

For a control that requires the motor to rotate counterclockwise, like cooling control, the following two methods are available.

- Switching the control direction on the controller with no change in wiring
- Reverse wiring

With this controller, the control direction (direct/reverse) can be switched. If the wiring between this controller and the motor is direct, troubleshooting is easier in both control directions.

Thus, the use of direct wiring is recommended whenever possible.



CW: clockwise direction,

CCW: counterclockwise direction,

● With correct direct wiring

Display field 1	Lit indicator	Display field 2	Motor operation	Notes
CACL ↓ CAoP	ot2 ot 1	Becomes stable after decreasing (ex. 2000 → 1500) Becomes stable after increasing (ex. 1500 → 3500)	CCW CW	When the OT2 indicator is lit, the motor rotates counterclockwise.

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● **With correct reverse wiring**

Display field 1	Lit indicator	Display field 2	Motor operation	Notes
CACL ↓ CAoP	ot2 ot 1	Becomes stable after decreasing (ex. 3500 → 1500) Becomes stable after increasing (ex. 1500 → 3500)	CW CCW	When the OT2 indicator is lit, the motor rotates clockwise.

● **Alarms due to incorrect wiring and their causes**

Display field 1	Lit indicator	Display field 2	Motor operation	Displayed alarm	Cause
CACL ↓ CAoP	ot2 ot 1	Becomes stable after increasing Becomes stable after decreasing	CW CCW	AL10	G ↔ Y: Reverse connection
CACL ↓ CAoP	ot2 ot 1	Becomes stable after decreasing Becomes stable after increasing	CCW CW	No alarm indication (However, the MFB count and the motor position (valve opening do not match)	T ↔ G: Reverse connection
CACL ↓ CAoP	ot2 ot 1	Decreasing and increasing are uncertain. (The motor rotation direction changes before the valve is fully open or closed.)	CCW CW	AL10 or no alarm	T ↔ Y: Reverse connection
CACL ↓ CAoP	ot2 ot 1	Becomes stable after increasing Becomes stable after decreasing	CW CCW	AL10	① ↔ ②: Reverse connection
CACL ↓ CAoP	ot2 ot 1	Becomes stable after increasing Becomes stable after decreasing	CW CCW	AL10	① ↔ ②: Reverse connection T ↔ G: Reverse connection
CACL ↓ CAoP	ot2 ot 1	Decreasing and increasing are uncertain. (The motor rotation direction changes before the valve is fully open or closed.)	CW CCW	AL10 or no alarm	① ↔ ②: Reverse connection T ↔ G: Reverse connection

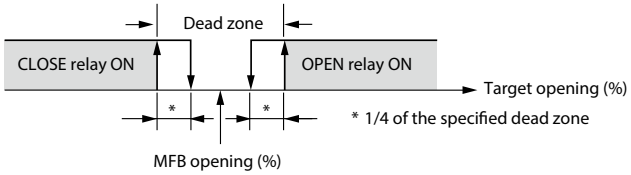
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■ Dead zone for position proportional control

The dead zone for the motor drive output can be set.

Item (bank)	Display	Description	Initial value	User level
Position proportional control: dead zone (Setup Bank)	C058	0.5–25.0 %	10.0	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1" and if [Position proportional control: long service life] is set to 1 (Priority on service life).
- Specify the dead zone (from the MFB opening at which the CLOSE relay turns ON to the MFB opening at which the OPEN relay turns ON) for motor drive output.
  Set a value considering the controllability and service life, using the initial value of 10.0 % as a general guide.
  If the dead zone is small, the MFB opening will quickly reach the target value (such as MV), resulting in good controllability, but the motor drive output will turn on and off frequently, which can shorten the service life of the motor and motor drive output relays. On the other hand, if the dead zone is large, the service life will be long but controllability will be poor.
  To determine the minimum value of the dead zone, output the same value in MANUAL mode, etc., change the dead zone setting, and find the value where the motor open/close operation stops hunting.
  If the minimum value is set, the service life of the motor and motor drive output relays will be extremely shortened, so set a value larger than the minimum value to act as a safety margin.



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■ Service life-orientated position proportional control

Position proportional control with priority on long service life can be set.

Item (bank)	Display	Description	Initial value	User level
Position proportional control: long service life (Setup Bank)	C059	0: Priority on controllability 1: Priority on service life	1	Simple, Standard, Advanced

- This item is displayed and the setting can be changed for controllers whose model No. includes "R1."
- If 1 (Priority on service life) is set, the setting for [Position proportional control: dead zone] will be invalid, and the optimal dead zone will be automatically calculated and used.

■ Specifying motor operation by internal contacts

The operation of the motor can be specified by internal contacts.

When this function is used, the operation is determined by the ON/OFF status of the internal contacts whose operation type is set to 48 (Motor drive output: opening operation) or 49 (Motor drive output: closing operation), as shown in the table below.

Note that, in this table, if only one of the operation types (48 or 49) is set to the internal contacts, the status of the internal contact for which neither 48 nor 49 is set will be regarded as OFF.

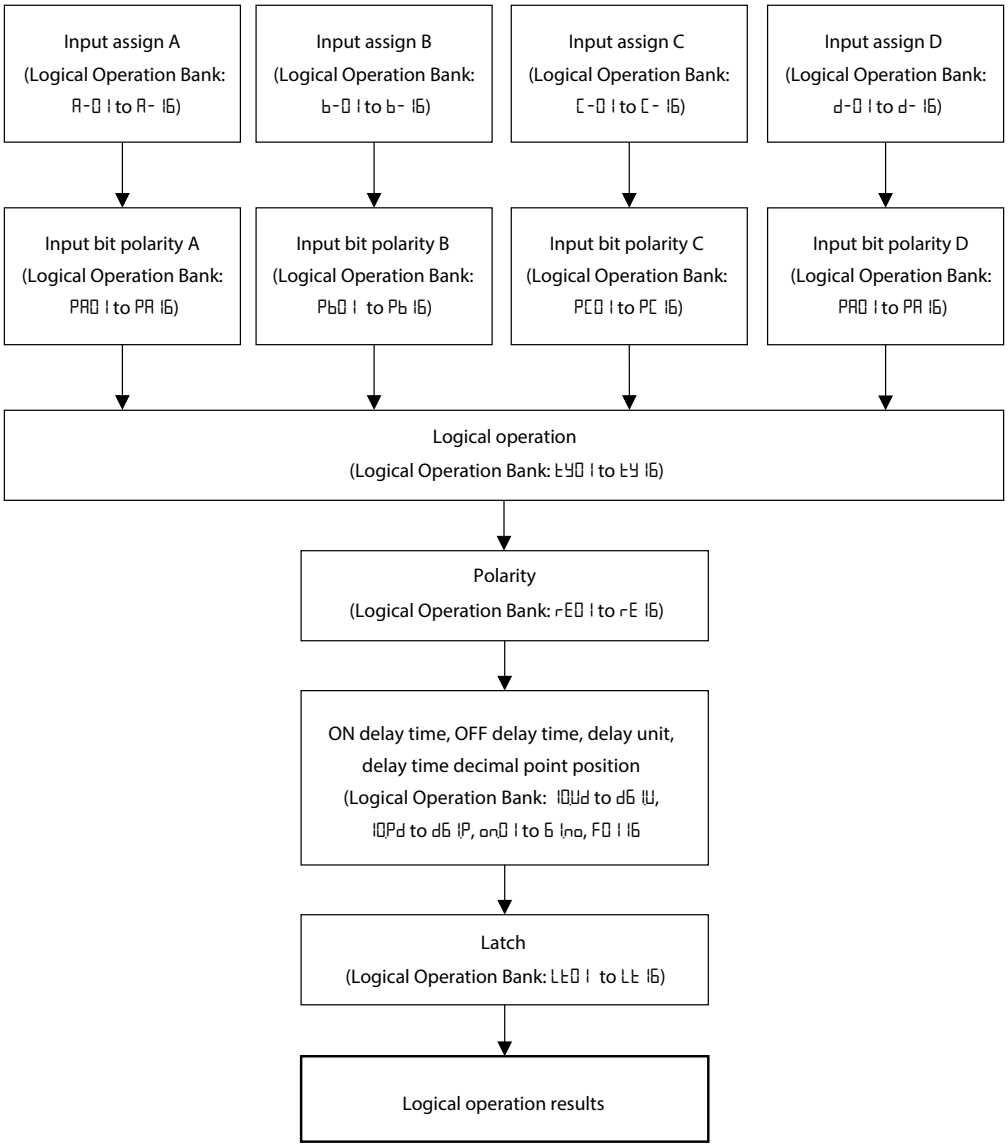
Internal contact set to 48 (Motor drive output: opening operation)	Internal contact set to 49 (Motor drive output: closing operation)	Operation specification result
OFF	OFF	Operation not specified
ON	OFF	Opening operation
OFF	ON	Closing operation
ON	ON	Stop

- If the result is "opening operation," "closing operation," or "stop," the operation specified by internal contacts will be valid instead of the operation determined by position proportional control or automatic adjustment for position proportional control.
- If the result is "operation not specified," the operation determined by position proportional control or automatic adjustment for position proportional control will be valid.

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5-13 Logical Operations

This device can perform logical operations (0/1 Boolean operations) for various statuses and use the results for ON/OFF outputs or internal contacts. Sixteen groups of logical operations are provided. Each operation group consists of four inputs and one output. There are five types of logical operation. In addition, the input or output logic can be inverted.



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■ Processing order of logical operations

Logical operation results can be used as input for other logical operations. The result and the logical operation to which it is input can be in the same group or in different groups.

Operation results are processed according to group No. in every cycle.

Therefore, logical operation results for smaller group Nos. can be used for another operation during the same cycle. Logical operation results in the same group or in a group with a larger No. are used during the next cycle.

Note

- Logical operations in groups 1–8 are executed before control operations. Those in groups 9–16 are executed after control operations.

■ Calculation type

Select the type of logical operation from the following five combinations.

Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 calculation type (Logical Operation Bank)	LY.01 to LY.16	1: Function 1 (A and B) or (C and D) 2: Function 2 (A or B) and (C or D) 3: Function 3 (A or B or C or D) 4: Function 4 (A and B and C and D) 5: Function 5 (((A and B) or C) and D)	1	Advanced

■ Input assignment

Assign data items to the four inputs, A–D, by standard bit numbers.

Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 input assign A (Logical Operation Bank)	A-01 to A-16	1024–2047: Standard bit numbers	1024	Advanced
Logical operations 1–16 input assign B (Logical Operation Bank)	b-01 to b-16			
Logical operations 1–16 input assign C (Logical Operation Bank)	C-01 to C-16			
Logical operations 1–16 input assign D (Logical Operation Bank)	d-01 to d-16			

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Handling Precautions

- If a standard bit No. for a bit status that is determined later in the processing order than this process is set, the bit status from the previous sampling cycle will be used.
  ☞ ■ Processing order (p. App.-1) (for the processing order)
- If a standard bit No., 1440 to 1455 (result of logical operation), that has already been set for a channel with a greater channel No. than the channel being configured is set, the bit status from the previous sampling cycle will be used.

■ Input bit polarity

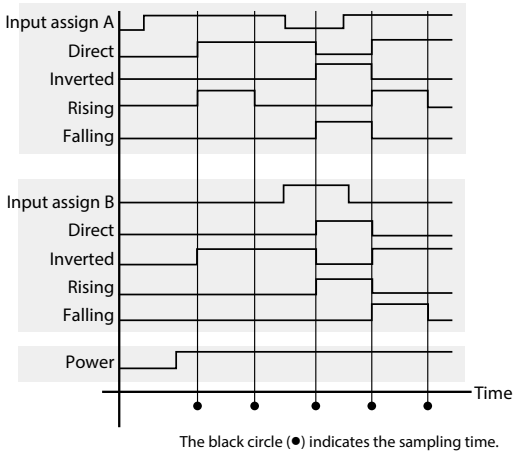
For the data items assigned to the four inputs, A–D, select whether to use their inverted status or to use the rising or falling edge detections in logical operations.

Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 input bit polarity A (Logical Operation Bank)	PA01 to PA16	0: Direct 1: Invert 2: Rising 3: Falling	0	Advanced
Logical operations 1–16 input bit polarity B (Logical Operation Bank)	Pb01 to Pb16			
Logical operations 1–16 input bit polarity C (Logical Operation Bank)	PC01 to PC16			
Logical operations 1–16 input bit polarity D (Logical Operation Bank)	Pd01 to Pd16			

Handling Precautions

- If 2 (rising) is set, rising is detected if the target data is ON at power-on.
- If 3 (falling) is set, falling is not detected if the target data is OFF at power-on.

Direct, Invert, Rising, and Falling are turned ON/OFF according to ON/OFF of input as shown in the figure below.



The black circle (●) indicates the sampling time.

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■ Polarity

Whether to invert the results of logical operations can be set.

Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 polarity (Logical Operation Bank)	rE01 to rE16	0: Direct 1: Invert	0	Advanced

■ Delay time unit and decimal point position

The unit and decimal point position can be specified for ON-/OFF- delay time.

Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 delay unit (Logical Operation Bank)	dU01 to dU16	0: 1 s 1: 1 min 2: 1 h	0	Advanced
Logical operations 1–16 delay time decimal point position (Logical Operation Bank)	dP01 to dP16	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	Advanced

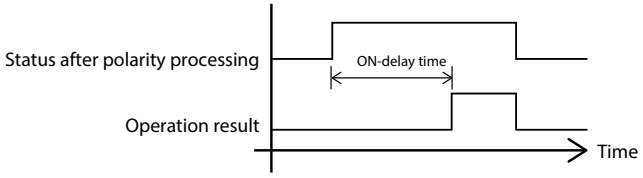
■ ON-delay time, OFF-delay time

The ON-delay time and OFF-delay time can be set.

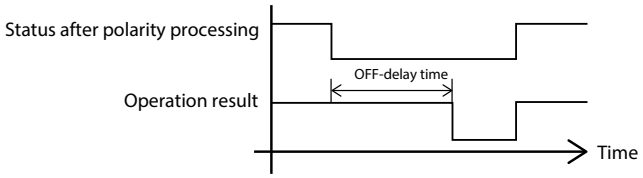
Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 ON delay time (Logical Operation Bank)	on01 to on16	0 to 19999 U	0	Advanced
Logical operations 1–16 OFF delay time (Logical Operation Bank)	oF01 to oF16	0 to 19999 U	0	Advanced

- The unit for the delay time is the value set for [Delay unit].
- The setting range for delay time varies according to the [Delay time decimal point position] setting.
- The ON-delay and OFF-delay operations are shown in the figures below.

● ON-delay processing



● OFF-delay processing



Handling Precautions

- The time resolution for logical operations is the sampling cycle.

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■ Latch

Whether to latch the ON or OFF status of logical operations can be specified.

Item (bank)	Display	Description	Initial value	User level
Logical operations 1–16 latch (Logical Operation Bank)	LE.01 to LE.16	0: No 1: Yes (ON latch) 2: Yes (OFF latch) (except OFF at power-on)	0	Advanced

● Releasing latches

Latches are released if any of the following conditions are met.

- [Latch] in the logical operation bank is set to 0 (No).
- All latches are released using the internal contact function.
- [Release all latches] in the mode bank is set to LE.oF (Release latches).
- The C2/C3 is turned off and then on again.

Handling Precautions

- If 1 (Yes (ON latch)) is set, the ON status is latched if the power is turned on when the logical operation result is ON.
- If 2 (Yes (OFF latch)) is set, the OFF status is not latched if the power is turned on when the logical operation result is OFF.

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5-14 Linearization Table

Ideal values for measured or input values, etc., can be obtained by linear approximation compensation.

Linear approximation can be applied to the PV, virtual PV, analog output, or time proportional output. Four line groups are provided. Each line group has 20 settings. The linear approximation methods are breakpoint specification and bias specification. Select one of them with [Operation type].

■ Settings

Use the following items for setup.

Item (bank)	Display	Description	Initial value	User level
Linearization tables 1–4 operation type (Linearization Table Bank)	Lt 1tY to Lt4tY	0: Breakpoint 1: Bias	0	Advanced
Linearization tables 1–4 decimal point position (Linearization Table Bank)	Lt 1dP to Lt4dP	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	Advanced
Linearization tables 1–4 breakpoint A1 (Linearization Table Bank)	1A0 1 to 4A0 1	–19999 to +19999 U	–1999.9	Advanced
Linearization tables 1–4 breakpoint A2 (Linearization Table Bank)	1A02 to 4A02	–19999 to +19999 U	1999.9	Advanced
Linearization tables 1–4 breakpoint A3 (Linearization Table Bank)	1A03 to 4A03	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A4 (Linearization Table Bank)	1A04 to 4A04	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A5 (Linearization Table Bank)	1A05 to 4A05	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A6 (Linearization Table Bank)	1A06 to 4A06	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A7 (Linearization Table Bank)	1A07 to 4A07	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A8 (Linearization Table Bank)	1A08 to 4A08	–19999 to +19999 U	0.0	Advanced

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Item (bank)	Display	Description	Initial value	User level
Linearization tables 1–4 breakpoint A9 (Linearization Table Bank)	1A09 to 4A09	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A10 (Linearization Table Bank)	1A 10 to 4A 10	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A11 (Linearization Table Bank)	1A 11 to 4A 11	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A12 (Linearization Table Bank)	1A 12 to 4A 12	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A13 (Linearization Table Bank)	1A 13 to 4A 13	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A14 (Linearization Table Bank)	1A 14 to 4A 14	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A15 (Linearization Table Bank)	1A 15 to 4A 15	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A16 (Linearization Table Bank)	1A 16 to 4A 16	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A17 (Linearization Table Bank)	1A 17 to 4A 17	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A18 (Linearization Table Bank)	1A 18 to 4A 18	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A19 (Linearization Table Bank)	1A 19 to 4A 19	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint A20 (Linearization Table Bank)	1A20 to 4A20	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B1 (Linearization Table Bank)	1b01 to 4b01	–19999 to +19999 U	–1999.9	Advanced
Linearization tables 1–4 breakpoint B2 (Linearization Table Bank)	1b02 to 4b02	–19999 to +19999 U	1999.9	Advanced

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Item (bank)	Display	Description	Initial value	User level
Linearization tables 1–4 breakpoint B3 (Linearization Table Bank)	1b.03 to 4b.03	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B4 (Linearization Table Bank)	1b.04 to 4b.04	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B5 (Linearization Table Bank)	1b.05 to 4b.05	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B6 (Linearization Table Bank)	1b.06 to 4b.06	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B7 (Linearization Table Bank)	1b.07 to 4b.07	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B8 (Linearization Table Bank)	1b.08 to 4b.08	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B9 (Linearization Table Bank)	1b.09 to 4b.09	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B10 (Linearization Table Bank)	1b. 10 to 4b. 10	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B11 (Linearization Table Bank)	1b. 11 to 4b. 11	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B12 (Linearization Table Bank)	1b. 12 to 4b. 12	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B13 (Linearization Table Bank)	1b. 13 to 4b. 13	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B14 (Linearization Table Bank)	1b. 14 to 4b. 14	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B15 (Linearization Table Bank)	1b. 15 to 4b. 15	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B16 (Linearization Table Bank)	1b. 16 to 4b. 16	–19999 to +19999 U	0.0	Advanced

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Item (bank)	Display	Description	Initial value	User level
Linearization tables 1–4 breakpoint B17 (Linearization Table Bank)	16.17 to 46.17	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B18 (Linearization Table Bank)	16.18 to 46.18	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B19 (Linearization Table Bank)	16.19 to 46.19	–19999 to +19999 U	0.0	Advanced
Linearization tables 1–4 breakpoint B20 (Linearization Table Bank)	16.20 to 46.20	–19999 to +19999 U	0.0	Advanced

- This item is displayed and the setting can be changed for the C3A/C3B.

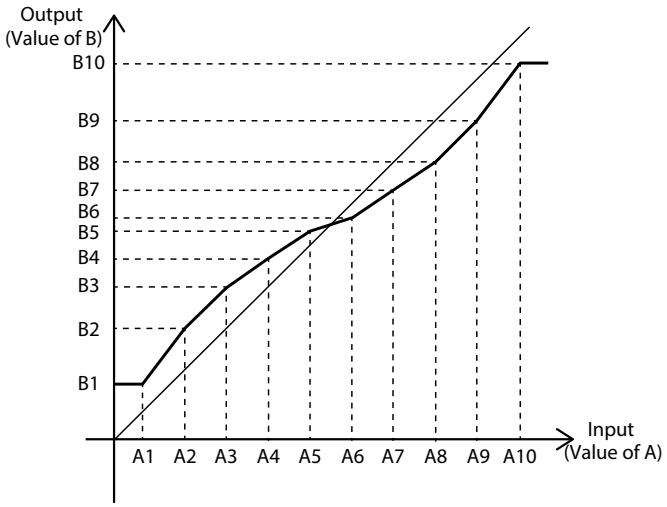
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■ Breakpoint specification

The breakpoint settings A1–A20 are input to linear approximation and the breakpoint settings B1–B20 are output from linear approximation. They are illustrated in the graph below.

When the input is A1 or less, the output is B1.

When the input is A20 or more, the output is B20.

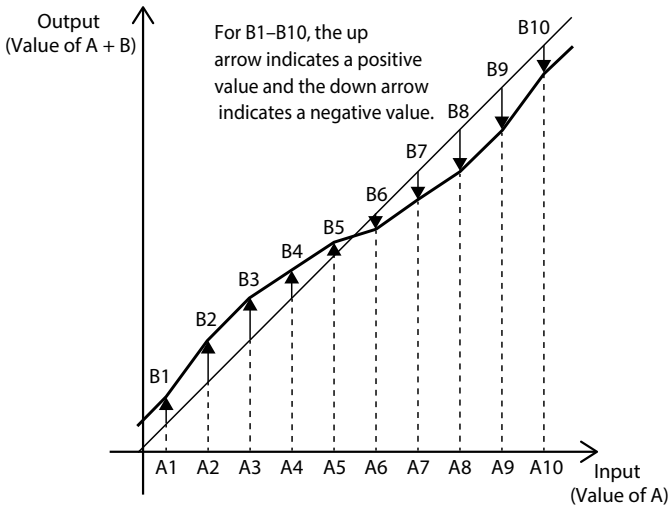


■ Bias specification

The breakpoint settings A1–A20 are input to linear approximation and the breakpoint settings B1–B20 are the biased values output from linear approximation. The output values are (A1 + B1) to (A20 + B20). They are illustrated in the graph below.

When the input is A1 or less, the output is (input value + B1).

When the input is A20 or more, the output is (input value + B20).



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■ How to use

The linearization table can be specified and used in the following functions.

- PV
  Specify a PV linearization table group.
- Virtual PV
  Specify a virtual PV linearization table group.
- Internal contact
  Specify a virtual PV linearization group for the operation type of the internal contact.
- DO
  Specify linearization table groups. (Specify linearization table groups individually for control outputs 1–2 and event outputs 1–3.)
  Specify an output linearization group for the operation type of the internal contact and set the operation No.
- Continuous output
  Specify linearization table groups for control outputs 1–2.
  Specify an output linearization group for the operation type of the internal contact and set the operation No.

Handling Precautions

- For the PV, RSP, and the target opening of position proportional control, it is not possible to specify a linearization group by internal contacts.

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5 - 15 User-Defined Bits and User-Defined Values

The user can specify any desired data (bits and values). The specified bits' status (ON/OFF) and the specified values can be used for logical operations or as a virtual PV.

■ User-defined bit

Item (bank)	Display	Description	Initial value	User level
User-defined bits 1–16 (User-Defined Bit Bank)	Ub01 to Ub16	0: OFF 1: ON	0	Advanced

■ User-defined value

Item (bank)	Display	Description	Initial value	User level
User-defined values 1–16 Sign type (User-Defined Value Bank)	St01 to St16	0: Signed 1: Unsigned	0	Advanced
User-defined values 1–16 Settings decimal point position (User-Defined Value Bank)	PS01 to PS16	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	0	Advanced
User-defined values 1–16 Settings user-defined value (User-Defined Value Bank)	Uu01 to Uu16	–32768 to +32767 U (signed) 0 to 65535 U (unsigned)	0	Advanced
User-defined values 1–16 Monitor decimal point position (User-Defined Value Bank)	Pn01 to Pn16	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	0	Advanced
User-defined values 1–16 User-defined monitor value (User-Defined Value Bank)	Un01 to Un16	–19999 to +19999 U (signed) 0 to 19999 U (unsigned) * Fixed	0	Advanced

- You can write the Settings user-defined value with key operations or through communication. In addition, you can import the written Settings user-defined value as the value according to the Sign type setting or Settings decimal point position setting into this device and monitor it by checking the User-defined monitor value.
- The decimal point position for User-defined monitor value can be specified with the Monitor decimal point position setting of User-defined values 1–16.
- User-defined monitor value is limited to the low limit (–19999 U) and the high limit (19999 U).

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Note

- To import a value of123.45 into User-defined monitor value

(1) Set 2 (2 digits after the decimal point) for Settings decimal point position.

(2) Set the Sign type according to the range of values written to Settings user-defined value.

(3) Set 12345 U for the Settings user-defined value.

(4) If Monitor decimal point position is set to 2 (2 digits after the decimal point), User-defined monitor value will be 123.45. If Monitor decimal point position is set to 1 (1 digit after the decimal point), User-defined monitor value will be 123.5 (the digits after the decimal point specified in Monitor decimal point position are rounded half up) and host communication will return 1235 U.

- To import a value of 54.321 into User-defined monitor value

(1) Set the Settings decimal point position to 3 (3 digits after the decimal point).

(2) Set the Sign type according to the range of values written to Settings user-defined value. In this case, you must set Sign type to 1 (unsigned) to set a value larger than 32767 U for Settings user-defined value.

(3) Set 54321 U for Settings user-defined value.

(4) If Monitor decimal point position is set to 3 (3 digits after the decimal point), User-defined monitor value will be 19.999, which is limited to the high limit. If Monitor decimal point position is set to 2 (2 digits after the decimal point), User-defined monitor value will be 54.32 and host communication returns 5432 U.

Handling Precautions

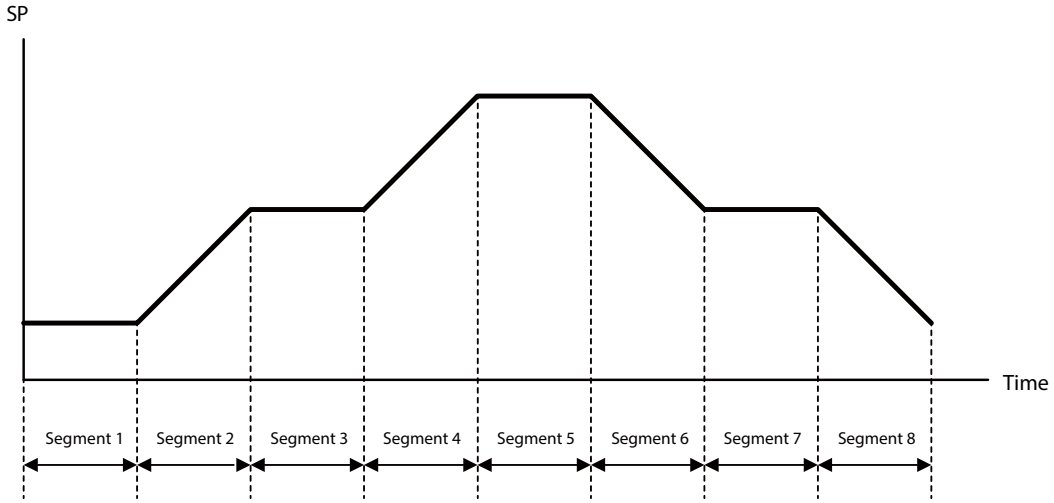
- Changes to the Sign type setting are only applied to User-defined monitor value. The Settings user-defined value is not changed.
- The following are the bits for checking with the User-defined function indicators that RS-485 communication is being made. Do not assign them to relay output because they quickly switch between on and off when there is RS-485 communication.
  1545 RS-485 status (1 message received normally)
  1546 RS-485 status (1 message sent normally)

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5 - 16 Pattern Operation

Pattern operations in which the SP is changed over time, as shown in the figure, are available.

A pattern consists of multiple segments, each of which is set by an SP and a time. In addition, a PID group No., G.SOAK (guaranteed soak) time, and segment event can be set for each segment.



The following settings are provided.

Range	Bank name	Item
All patterns	Pattern Operation Config. Bank	Pattern time unit, Pattern time decimal point position, Pattern start number, Pattern SP increase/decrease change limit, power outage recovery operation type
Each pattern	Pattern Bank	Segment count, G.SOAK time, PV start, Cycle, Pattern link, Operation end status
Each segment	Pattern Bank	SP, Time, PID, G.SOAK type, G.SOAK width, Segment event

Handling Precautions

- Pattern 1–16 banks are used if the model of this device has extended data memory.
- Pattern 1 bank is used if there is no extended data memory.

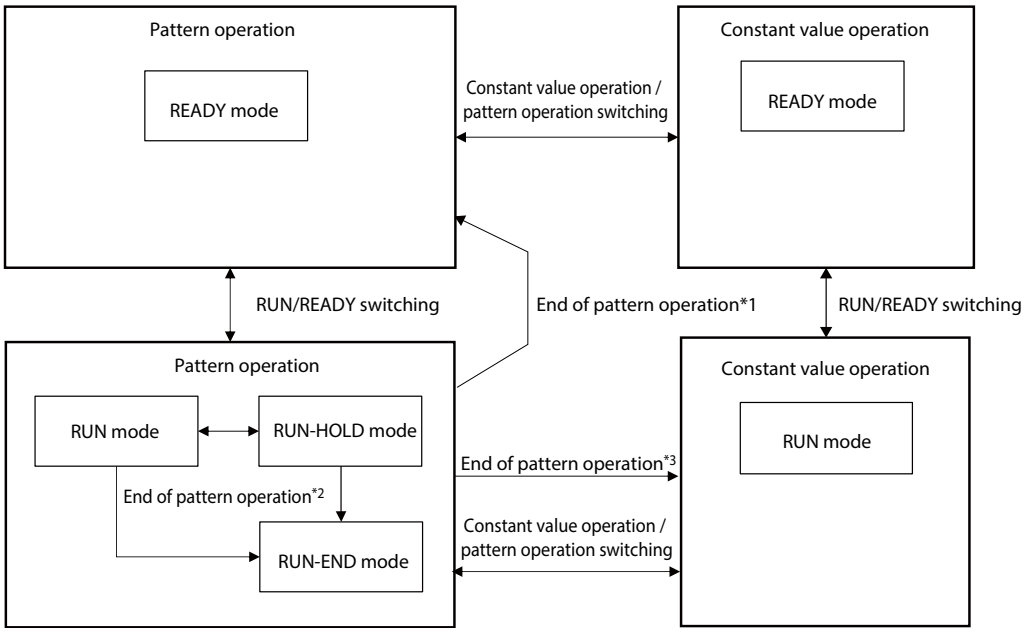
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■ Constant value operation / pattern operation

Mode transition between pattern operation and constant value operation is shown below.

Switching between constant value operation and pattern operation can be done in the Mode Bank.

☞ 5 - 2 Mode (p. 5-17) (for details on the mode bank)



*1. A transition in which Operation end status is set to READY

*2. A transition in which Operation end status is set to END

*3. A transition in which Operation end status is set to Constant value operation

Constant value operation: Control using the LSP.

Pattern operation: Control using pattern SPs (SPs are generated from segment settings stored in this device).

READY: The process is not being controlled.

RUN: Control status (RUN, RUN-HOLD, or RUN-END for pattern operation)

RUN-HOLD: Control status in which pattern progression has stopped

RUN-END: Control status in which pattern progression has stopped at the final point

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■ Constant value operation / pattern operation selection

Item (bank)	Display	Description	Initial value	User level
Constant value operation / pattern operation mode selection (Mode Bank)	C--P	CSt: Constant value operation Ptn: Pattern operation	CSt	Advanced

Handling Precautions

- Parameters for pattern operation cannot be set if Pattern operation prohibited/allowed is set to 0 (Prohibited).
- Switching from constant value operation to pattern operation
  While in READY mode, if you switch from constant value operation to pattern operation, the mode during pattern operation is READY mode.
  While in RUN mode, if you switch from constant value operation to pattern operation, the mode during pattern operation is RUN mode and operation begins from the pattern start number.
- Switching from pattern operation to constant value operation
  While in READY mode, if you switch from pattern operation to constant value operation, the mode during constant value operation is READY mode.
  While in RUN, RUN-HOLD, or RUN-END mode, if you switch from pattern operation to constant value operation, the mode during constant value operation is RUN mode.

■ Pattern time unit

The time unit for segments in all patterns can be set.

Item (bank)	Display	Description	Initial value	User level
Pattern time unit (Pattern Operation Config. Bank)	PC.01	0: 1 s 1: 1 min 2: 1 h	0	Advanced

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■ Pattern time decimal point position

A decimal point position for the segment time and the G.SOAK time in all patterns can be set.

Item (bank)	Display	Description	Initial value	User level
Pattern time decimal point position (Pattern Operation Config. Bank)	PC.02	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	Advanced

Handling Precautions

- The display format for segment remaining time is different depending on the settings for Pattern time unit and Pattern time decimal point position.
  - It is displayed in MM.SS format if Pattern time unit is 0 (1 s) and Pattern time decimal point position is 0 (No decimal point).
    Example: 685 seconds (11 minutes 25 seconds) is displayed as 11.25.
  - It is displayed in SSS.S format if Pattern time unit is 0 (1 s) and Pattern time decimal point position is 1 (1 digit after the decimal point) or greater.
    Example: 123.45 seconds is displayed as 123.5.
  - It is displayed in HH:MM format if Pattern time unit is 1 (1 min) or 2 (1 h).
    Example: 735 minutes (12 hours 15 minutes) is displayed as 12.25
  - 99:99 is displayed if the display format is MM:SS or HH:MM and the segment remaining time is 5999 seconds or more (time unit: s) or 5999 minutes or more (time unit: min or h).

■ Segment count

The number of segments that operate can be set for each pattern.

Item (bank)	Display	Description	Initial value	User level
Segment count (Pattern Bank)	Pt 1.1 to Pt9.1	1–16	1	Advanced

- Pt_ 1: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.

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■ SP and time

SP and time can be set for each segment.

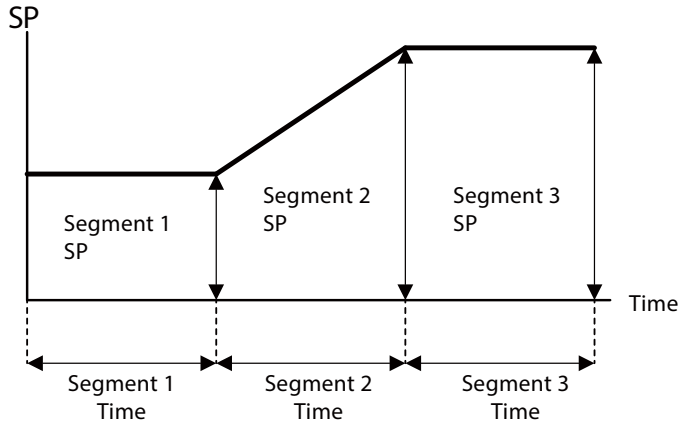
SP indicates the SP at the end point of the segment.

Time is the duration from the start point to the end point of the segment.

Item (bank)	Display	Description	Initial value	User level
SP (Pattern Bank)	SP 1.1 to S 16.1	SP low limit (C007) to SP high limit (C008)	0	Advanced
Time (Pattern Bank)	SP 12 to S 162	0 to 19999 U Select the time unit with Pattern time unit (PC01). Select the number of digits after the decimal point of the time with Pattern time decimal point position (PC02).	0	Advanced

The following figure shows an example of the SP and time settings and how the SP changes.

The SP changes along the line from the SP set for the previous segment and the SP set for the current segment.



Handling Precautions

- If you set the segment time to a value smaller than the sampling cycle, it is treated as time = 0.
- Because the unit for time settings is determined by Pattern time unit and Pattern time decimal point position, the segment time will differ depending on the Pattern time unit setting even for the same segment time setting.
  Ex.: Segment time setting = 700

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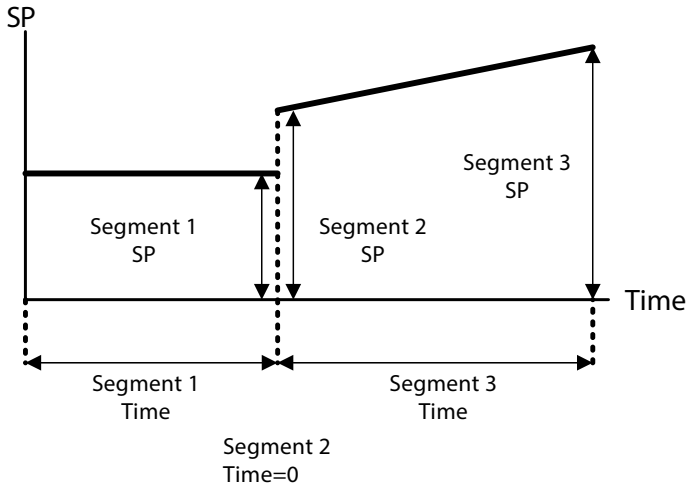
Pattern time unit (PC01)	Pattern time decimal point position (PC02)	Segment time
0: 1 s	0: No decimal point	700 seconds (11 minutes 40 seconds)
	1: 1 digit after the decimal point	70.0 seconds (1 minute 10 seconds)
	2: 2 digits after the decimal point	7.00 seconds
	3: 3 digits after the decimal point	0.7 seconds (700 milliseconds)
1: 1 min	0: No decimal point	700 minutes (11 hours 40 minutes)
	1: 1 digit after the decimal point	70.0 minutes (1 hour 10 minutes)
	2: 2 digits after the decimal point	7.00 minutes
	3: 3 digits after the decimal point	0.7 minutes (42 seconds)
2: 1 h	0: No decimal point	700 hours (29 days and 4 hours)
	1: 1 digit after the decimal point	70.0 hours (2 days and 22 hours)
	2: 2 digits after the decimal point	7.00 hours
	3: 3 digits after the decimal point	0.7 hours (42 minutes)

The Sampling cycle or Pattern time unit, whichever is larger, is the resolution of the pattern operation time.

It takes the time equivalent to one sampling cycle to move from the end point of a segment to the start point of the next segment.

The SP of segment 1 is the same at the start point and end point.

If the time for a segment is set to 0, the segments before and after it are connected and the SP changes stepwise as shown in the following figure.



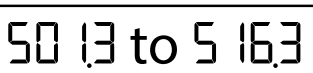
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■ PID group No.

A PID group can be set for each segment.

Groups 1–8 can be set for segment 1.

Groups 0–8 can be set for segment 2 or higher. Group 0 means the same PID group as the previous segment.

Item (bank)	Display	Description	Initial value	User level
PID group No. (Pattern Bank)		For segment 1 Groups 1–8	1	Advanced
		Segment 2 or higher 0: Same group as the previous segment Groups 1–8	0	Advanced

Handling Precautions

- PID group selection using an internal contact is disabled for pattern operation.

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■ G.SOAK (guaranteed soak)

G.SOAK is a function which stops the progression of pattern operation until the PV is near the SP.

The G.SOAK type and G.SOAK width can be set for each segment.

Item (bank)	Display	Description	Initial value	User level
G.SOAK type (Pattern Bank)	SO 15 to S 165	0: No G.SOAK 1: G.SOAK at the segment end point 2: G.SOAK at the start of a segment	0	Advanced
G.SOAK width (Pattern Bank)	SO 16 to S 166	0 to 19999 U Select the number of digits after the decimal point of the G.SOAK width with PV decimal point position (C004).	1	Advanced

The G.SOAK time can be set for each pattern.

Item (bank)	Display	Description	Initial value	User level
G.SOAK time (Pattern Bank)	Pt 16 to Pt96	0 to 19999 U Select the unit for the G.SOAK time with Pattern time unit (PC01). Select the number of digits after the decimal point of the G.SOAK time with Pattern time decimal point position (PC02).	2	Advanced

- Pt_6: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.

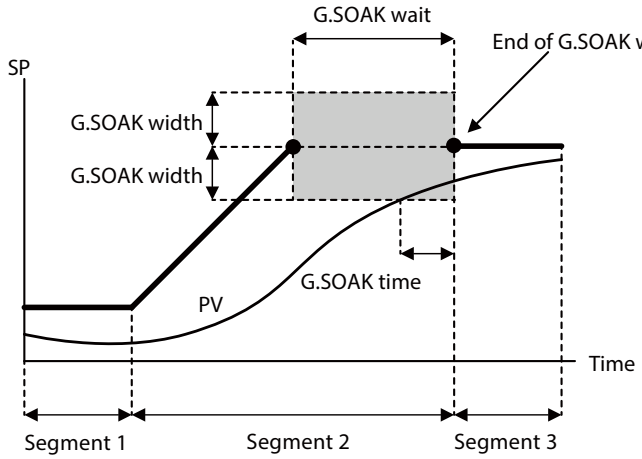
● G.SOAK at the end point of a segment

The G.SOAK wait period starts and pattern operation progression stops at the end point of the segment.

The ramp indicators ▲▼ flash during the G.SOAK wait period.

If the deviation (absolute value) between the PV and the SP is less than or equal to the G.SOAK width for the G.SOAK time or longer, the G.SOAK wait period ends, processing advances to the start point of the next segment, and pattern operation continues progressing.

The following figure shows an example of G.SOAK at the end point of segment 2.



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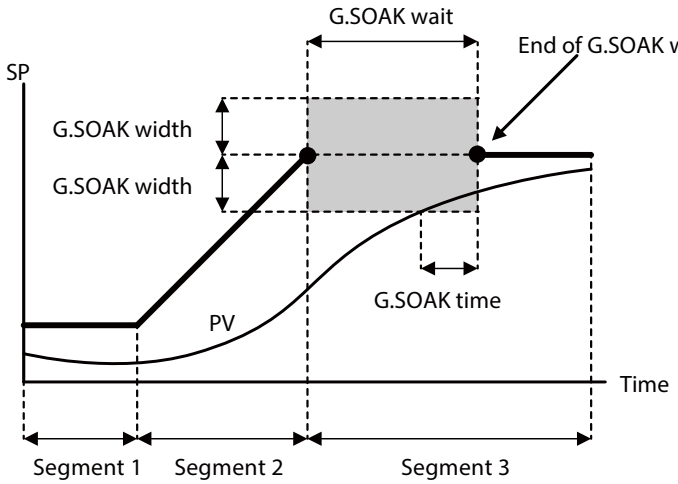
● G.SOAK at the start point of a segment

The G.SOAK wait period starts and pattern operation stops progressing at the start point of the segment.

The SEG (segment) No. display on the monitor screen flashes during the G.SOAK wait period.

If the deviation (absolute value) between the PV and the SP is less than or equal to the G.SOAK width for the G.SOAK time or longer, the G.SOAK wait period ends and the pattern operation resumes progression.

The following figure shows an example of G.SOAK at the start point of segment 3.



Handling Precautions

- The minimum resolution of the G.SOAK time for operation is the sampling cycle. In addition, if the G.SOAK time is 0, the G.SOAK wait period is cleared if the deviation (absolute value) between the PV and the SP is less than or equal to the G.SOAK width for only one sampling cycle.

■ Segment event

Besides events that can be used in both constant value operation and the pattern operation, 16 segment events are available for pattern operation.

Only one segment event can be set ON for each segment. Segment events that are not set are OFF.

Item (bank)	Display	Description	Initial value	User level
Segment event (Pattern Bank)	SO 14 to S 164	0: No segment event 1–16: Segment events 1–16	0	Advanced

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■ PV start

PV start is a function for starting pattern operation from an SP in segment 2 that matches the PV.

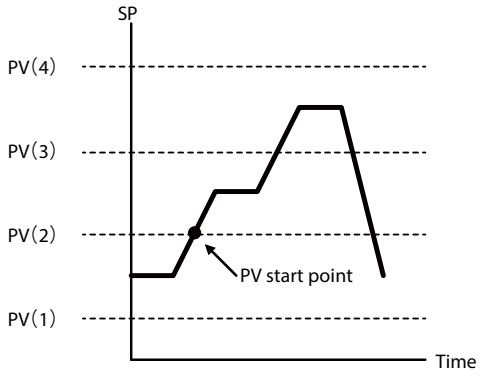
Whether to enable PV start can be set for each pattern.

If there is a set point that matches the PV, operation starts from that point. Otherwise, operation starts from the start point of segment 1.

Item (bank)	Display	Description	Initial value	User level
PV start (Pattern Bank)	Pt 12 to Pt92	0: Disable PV start 1: Enable PV start	0	Advanced

- Pt_2: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.

The following figure shows whether PV start can be enabled for four PVs.



For PV (2), PV start functions from the point at which the PV matches the SP in segment 2.

For PV (1) and PV (4), PV start does not function because no SP matches the PV.

For PV (3), PV start does not function because the SP that matches the PV is not in segment 2.

Handling Precautions

- If the cycle function returns operation to the start point of a pattern, PV start does not function.
- When patterns are linked and PV start is enabled for the next pattern, PV start functions.
- PV start becomes valid when READY mode is switched to RUN mode, or when constant value operation is switched to pattern operation in RUN mode. If [Power outage recovery operation type] is set to 1 (Resume pattern operation at power-on), PV start is invalid when the system is restored from a power outage.

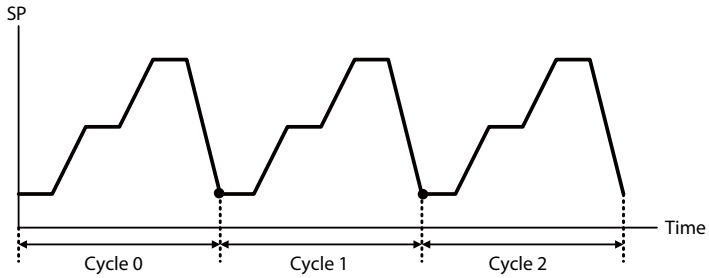
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■ Cycle

Cycle is a function for repeating the operation of an entire pattern.
The repetition count can be set for each pattern.
The entire pattern is executed the set count + 1 times.

Item (bank)	Display	Description	Initial value	User level
Cycle (Pattern Bank)	Pt 14 to Pt94	0 to 19999	0	Advanced

- Pt_4: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.

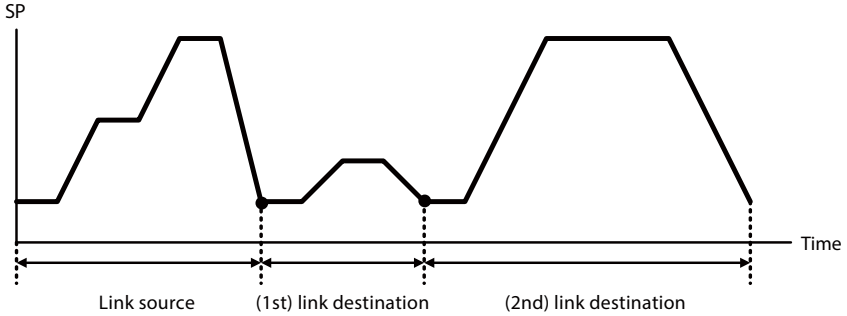


■ Pattern link

Pattern link is a function to link (connect) multiple patterns.
A pattern number that is the link destination can be set for each pattern.
The pattern number of another pattern to be linked can also be set for the link destination pattern.

Item (bank)	Display	Description	Initial value	User level
Pattern link (Pattern Bank)	Pt 15 to Pt95	Model with extended data memory: 0–16 Model without extended data memory: 0–1 0 means that patterns are not linked.	0	Advanced

- Pt_5: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.



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Handling Precautions

- If the link source pattern is set to cycle, it is cycled before the link is followed.
- If the pattern number of the link source is set as the link destination for the link destination pattern, the patterns will repeat endlessly.

■ Operation end status

The status after the end of pattern operation can be set for each pattern.

If 0 (READY) is set, the pattern ends in READY mode.

If 1 (END) is set, the pattern ends in RUN-END mode.

If 2 (Constant value operation) is set, the pattern ends in RUN mode for constant value operation.

Item (bank)	Display	Description	Initial value	User level
Operation end status (Pattern Bank)	Pt 13 to Pt93	0: READY 1: END 2: Constant value operation	0	Advanced

- Pt_3: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.

Handling Precautions

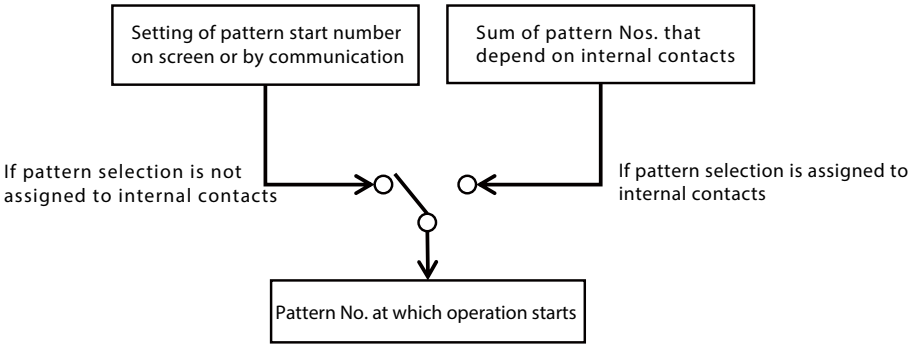
- If one or more cycles are set, the operation end status becomes effective after the cycles are completed.
- If a link destination is set for a pattern link, the link destination pattern is executed rather than the operation end status.
- If the power outage recovery operation type (PC06) is set to 1 (Resume pattern operation at power-on), the mode in Operation end status is retained. If 0 (Stop pattern operation at power-on (READY)) is selected, the mode in Operation end status is not retained.

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■ Pattern start number

You can select the pattern to be executed when READY mode is switched to RUN (when beginning pattern operation) in one of two ways.

- Set the pattern start number on the display screen or through communication.
- Add 1 to the sum of pattern selection values specified with internal contacts and use the result as the pattern start number.



Item (bank)	Display	Description	Initial value	User level
Pattern start number (Pattern Operation Config. Bank)	PC.07	Model without extended data memory: Fixed at 1 Model with extended data memory: 1–16	1	Advanced

Ex.: Selecting a pattern No. with internal contacts 1–2

Setting	Setting details	Operation according to the setting
Internal contact 1	Assign Pattern selection (0/+1) to the operation type of Internal contact 1.	The sum of pattern Nos. that depend on internal contacts changes within the 0–3 range.
Internal contact 2	Assign Pattern selection (0/+2) to the operation type of Internal contact 2.	

Internal contact status	Internal contact processing	Pattern start number
Internal contact 1: OFF Internal contact 2: OFF	The sum of pattern Nos. that depend on internal contacts is 0.	Pattern start number 1
Internal contact 1: ON Internal contact 2: OFF	The sum of pattern Nos. that depend on internal contacts is 1.	Pattern start number 2
Internal contact 1: OFF Internal contact 2: ON	The sum of pattern Nos. that depend on internal contacts is 2.	Pattern start number 3
Internal contact 1: ON Internal contact 2: ON	The sum of pattern Nos. that depend on internal contacts is 3.	Pattern start number 4

Handling Precautions

- If the model does not have extended data memory, the pattern start number is always 1 even if it is 2 or more according to the internal contacts.

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■ Pattern SP increase/decrease change limit

The limit for change per second can be set for the pattern SP.

This function prevents a rapid change in the SP due to a setting error or operator error. It protects the object of equipment processing and the equipment itself by limiting change in the SP.

Item (bank)	Display	Description	Initial value	User level
Pattern SP increase change limit (Pattern Operation Config. Bank)	PC.04	0: Change not limited 1–19999 U: Change limited The number of digits after the decimal point of the change limit can be set with Pattern SP change limit decimal point position (PC.03).	0	Advanced
Pattern SP decrease change limit (Pattern Operation Config. Bank)	PC.05		0	Advanced

- The ramp indicators ▲■ flash when the pattern SP increase change is limited.
- The ramp indicators ■▼ flash when the pattern SP decrease change is limited.
- Ramping continues even after pattern operation ends in RUN-END mode until the SP is reached if the SP is not reached due to the pattern SP increase/decrease change limit.

Handling Precautions

- ADVANCE does not operate when Pattern SP increase (or decrease) change limit is a value other than 0.
- The SP continues to change in RUN-HOLD or RUN-END mode or even during the G.SOAK wait period if a pattern SP change limit is enabled.
- The pattern SP change limit is disabled if the mode changes from READY to RUN, from RUN to READY, from RUN-HOLD to READY, or from RUN-END to READY.
- G.SOAK operates using the SP before the pattern SP change limit is applied. Ramping continues even after pattern operation ends in RUN-END mode until the SP is reached if the SP is not reached due to the pattern SP increase/decrease change limit.
- If the SP change per second falls below 1/100,000 of the SP change width, the error in the end time of each segment will increase.
  Ex.: When starting from SP=0 and ending at SP=1000, if the change limit is 0.01/s, the error is about 1 %.
  When starting from SP=0 and ending at SP=1000, if the change limit is 0.001/s, the error is about 2 %.

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■ Pattern SP change limit decimal point position

The decimal point position of the pattern SP increase/decrease change limit can be set.

Item (bank)	Display	Description	Initial value	User level
Pattern SP change limit decimal point position (Pattern Operation Config. Bank)	PC.03	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	Advanced

■ ADVANCE (advanced operation)

ADVANCE can be used to advance to the next segment during pattern operation.

ADVANCE can be set by setting the operation type of internal contacts 1–8. It can also be assigned to a user function key.

Note

- ☞ 5 - 7 Digital Input (DI) / Internal Contacts (p. 5-65) (for details on internal contacts)
- ☞ Chapter 6. Displayed Items and Settings (p. 6-1) (for details on user functions)

Item (bank)	Display	Description	Initial value	User level
Internal contacts 1–8 operation type (Internal Contacts Bank)	IC1.1 IC2.1 IC3.1 IC4.1 IC5.1 IC6.1 IC7.1 IC8.1	0: No function 61: ADVANCE (edge) Other than the above: other functions	0	Advanced

Handling Precautions

- ADVANCE is only available in RUN and RUN-HOLD modes.
- It is not available in READY and RUN-END modes.
- If ADVANCE is executed during the G.SOAK wait period, the G.SOAK wait period for the segment ends and processing advances to the beginning of the next segment.
- When ADVANCE is executed in the last segment of a pattern, the pattern cycles for the remaining cycle count and links to another pattern if a pattern link has been set. If there is no cycle or link, READY mode, RUN-END mode, or constant value operation starts according to the Operation end status setting.
- ADVANCE does not operate if Pattern SP increase change limit or Pattern SP decrease change limit is a value other than 0.

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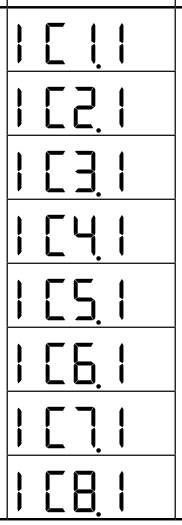
■ HOLD

Pattern operation in progress can be stopped.

HOLD can be set by setting the operation type of internal contacts 1 to 8. It can also be assigned to a user function key.

Note

- ☞ 5 - 7 Digital Input (DI) / Internal Contacts (p. 5-65) (for details on internal contacts)
- ☞ Chapter 6. Displayed Items and Settings (p. 6-1) (for details on user functions)

Item (bank)	Display	Description	Initial value	User level
Internal contacts 1–8 operation type (Internal Contacts Bank)		0: No function 62: HOLD (state) 67: HOLD (edge) Other than the above: other functions	0	Advanced

The ramp indicators ▲■▼ flash in HOLD mode.

Handling Precautions

- HOLD is only available in RUN mode. Progression of the operation is also stopped during the G.SOAK wait period.
- If a power outage occurs when pattern operation is in the HOLD state, to hold pattern operation at power-on, set [Power outage recovery operation type] to 1 (Resume pattern operation at power-on) and the operation type of internal contacts to 62 (HOLD) and turn ON the contacts.
- If a pattern operation goes to HOLD when the Pattern SP increase/decrease change limit is working, the SP ramp continues to the pattern SP that was in effect at the time the HOLD started.

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■ G.SOAK clear

The G.SOAK wait status can be ended during pattern operation.

G.SOAK cancellation can be set with the operation type of internal contacts 1–8. It can also be assigned to a user function key.

Note

- ☞ 5 - 7 Digital Input (DI) / Internal Contacts (p. 5-65) (for details on internal contacts)
- ☞ Chapter 6. Displayed Items and Settings (p. 6-1) (for details on user functions)

Item (bank)	Display	Description	Initial value	User level
Internal contacts 1–8 operation type (Internal Contacts Bank)	IC1.1	0: No function 63: G.SOAK clear (state) 68: G.SOAK clear (edge) Other than the above: other functions	0	Advanced
	IC2.1			
	IC3.1			
	IC4.1			
	IC5.1			
	IC6.1			
	IC7.1			
	IC8.1			

Handling Precautions

- G.SOAK can be ended only during the G.SOAK wait period.
- The ramp indicators ▲▼ flash during the G.SOAK wait period.

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■ Power outage recovery operation type

You can select 1 (Resume pattern operation at power-on) or 0 (Stop pattern operation at power-on (READY)) in case a power outage occurs during pattern operation. If 1 is selected, the system is restored with the status before the power outage. If 0 is selected, the system starts from initial system operation.

Item (bank)	Display	Description	Initial value	User level
Power outage recovery operation type (Pattern Operation Config. Bank)	PC06	0: Pattern operation does not resume at power-on (READY) 1: Pattern operation resumes at power-on	0	Advanced

- Mode where pattern operation does not resume at power-on (READY)
  The system starts up in READY mode when power is restored after a power outage during pattern operation.
- Mode where pattern operation resumes at power-on
  - For models with extended data memory:
    When power is restored after a power outage in READY, RUN, RUN-HOLD, or RUN-END mode during pattern operation, operation resumes with the mode, pattern No., segment No., remaining cycle count, and segment elapsed time that were in effect before the outage.
    However, the G.SOAK elapsed time is not retained. Therefore, if a power outage occurs when the system is in the G.SOAK waiting state and the PV is less than the G.SOAK width, the G.SOAK time count restarts from the beginning even if the PV after restoration is greater than the G.SOAK width.
  - For models without extended data memory:
    When power is restored after a power outage in READY, RUN, RUN-HOLD, or RUN-END mode during pattern operation, operation resumes with the mode, segment No., and remaining cycle count that were in effect before the outage. However, the segment elapsed time is not retained. Therefore, the operation resumes with the elapsed time reset to 0.

Handling Precautions

- If you do not want pattern operation to start after a normal power-on, set a change to READY mode at the end of pattern operation or change Power outage recovery operation type to 0 (Pattern operation does not resume at power-on(READY)).
- When Power outage recovery operation type is 0 (Pattern operation does not resume at power-on (READY)), the system starts up in READY mode but retains the RUN/READY mode in nonvolatile memory when the system is restored from a power outage.
- If power is restored after an outage during constant value operation, the system follows the settings for RUN/READY mode.
- To enable the mode where pattern operation resumes at power-on, set [Pattern operation prohibited/allowed] to 1 (allowed) and [Constant value operation / pattern operation selection] to 1 (pattern operation mode), and write these settings to non-volatile memory.

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■ Power outage recovery occurrence

This can be checked to see if the system has been restored after a power outage during pattern operation.

If the system enters READY mode or starts constant value operation during pattern operation with 1 (Power restored after an outage) selected, the setting is automatically changed to 0. You can also change the value to 0 on the operation screen or through communication.

Item (bank)	Display	Description	User level
Power outage recovery occurrence (Pattern Operation Config. Bank)	PC.08	0: None 1: Power restored after an outage	Advanced

Handling Precautions

- If the system is in READY mode during pattern operation or during constant value operation before a power outage, Power outage recovery occurrence is 0 (None) when the system is restored from the power outage.
- A value other than 0 cannot be set for Power outage recovery occurrence through communication.

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■ Accessing pattern operation settings by communication

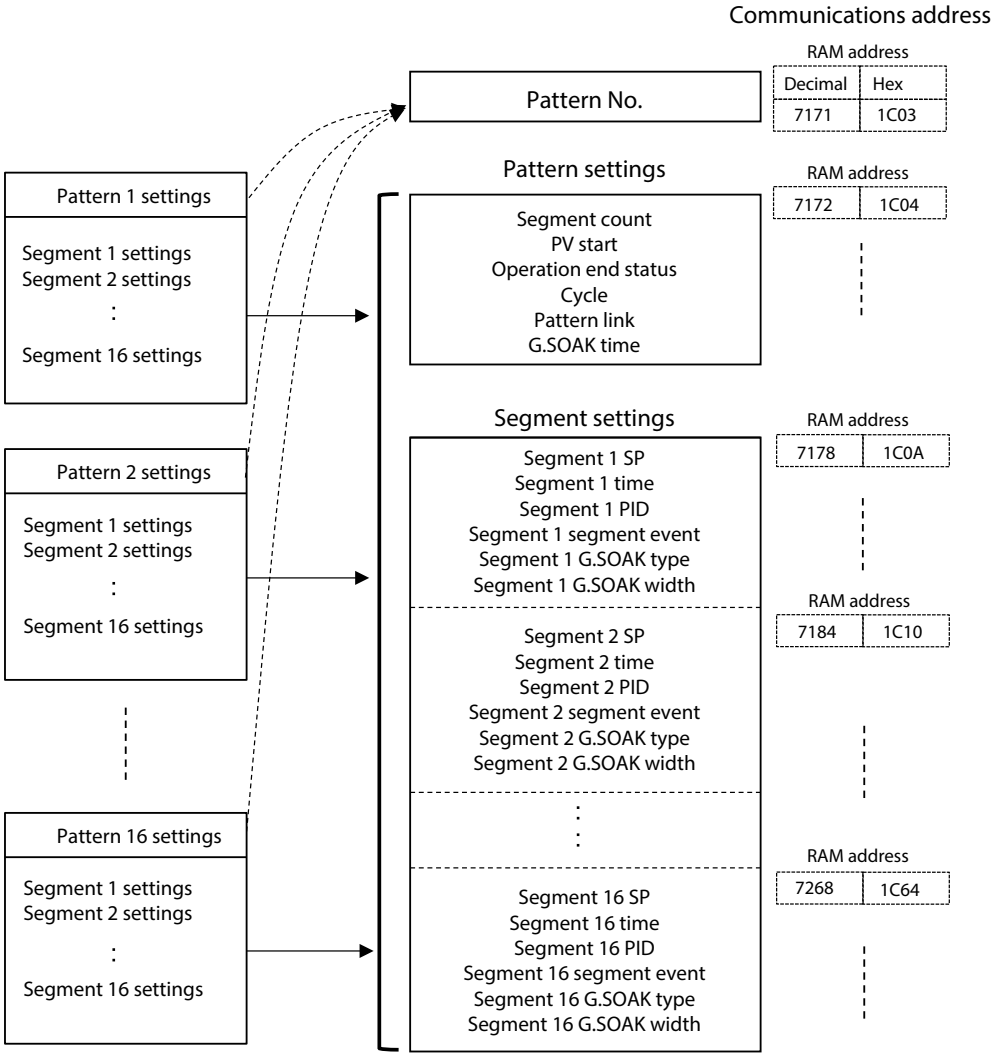
- Pattern operation settings include common-to-all pattern settings, pattern settings, and segment settings.
- To access pattern settings and segment settings of a specific pattern via communication, specify the pattern No.
- The specifiable pattern Nos. differ depending on the model.
  Models without extended data memory: pattern 1 only
  Models with extended data memory: patterns 1–16

Handling Precautions

- It is not possible to read or write settings of multiple patterns in one communication.

Note

- ☞ Chapter 10. List of Communication Data (p. 10-1)(for details on communication addresses)



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■ Pattern communication access procedure

● Preparation

Before writing or reading settings, specify the Pattern start number, Pattern time unit, and Pattern time decimal point position.

● Writing pattern data

(1) As the pattern No., write the No. of the pattern whose settings must be written.

(2) Write the pattern settings.

(3) Write the settings for segment 1 to the last segment that is used.

● Reading pattern data

(1) As the pattern No., write the No. of the pattern whose settings must be read out.

(2) Read the pattern settings.

(3) Read the settings for segment 1 to the last segment that is used.

Handling Precautions

- Write the pattern No. at the start of writing or reading. Pattern No., pattern settings, and segment settings can be written by one message.
- There is no restriction on the order of writing and reading of pattern settings and segment settings after writing the pattern No.. Writing and reading in the following order is possible.
  - · Write pattern settings after writing segment settings
  - · Skip a segment
  - · Write settings for one segment only
  - · Writing and reading settings alternately

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5 - 17 Display on the Console and Key Operation

What is displayed on the console and the use of the keys can be customized.

■ [FN] key function

The switching operation by the [FN]/[FUNCTION] key can be selected. Switching occurs when the key is pressed for 2 seconds or longer while the operation display is shown.

Item (bank)	Display	Description	Initial value	User level
[FN] key function (Setup Bank)	C072	0: Disable 1: AUTO/MANUAL selection 2: RUN/READY selection 3: AT stop/start instruction 4: LSP group selection 5: Release all latches 6: LSP/RSP selection 7: Invalid 8: Constant value operation / pattern operation selection 9: Pattern operation ADVANCE 10: Pattern operation HOLD 11: Pattern operation G.SOAK clear 12: FF-FITTER automatic tuning selection 13–20: Invalid 21–36:User-defined bits 1–16 selection	1	Simple, standard, advanced

Handling Precautions

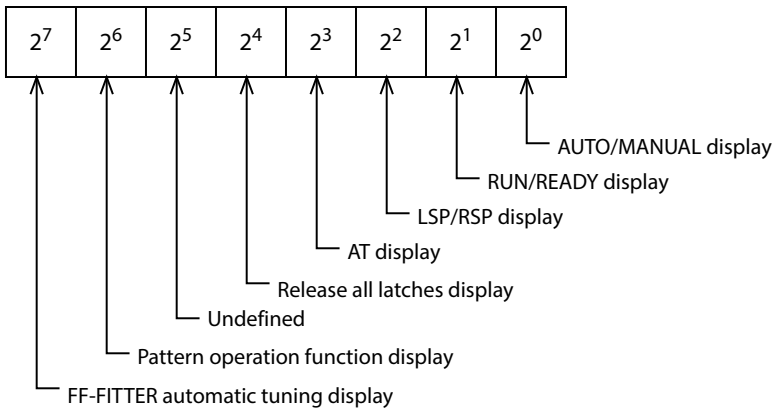
- If CtrL (Control method) is set to 0 (ON/OFF control), the AUTO/MANUAL selection setting is invalid.
- If CtrL (Control method) is set to 0 (ON/OFF control), or if the PV high/low limit alarm has been triggered, the AT stop/start setting is invalid.
- If C030 (LSP system group) is set to 1, the LSP group selection setting is invalid.
- If C 103 (Pattern operation prohibited/allowed) is set to 0 (Prohibited), Constant value operation / pattern operation selection, Pattern operation ADVANCE, Pattern operation HOLD, and Pattern operation G.SOAK clear are disabled.

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■ Mode display setup

Whether to display the mode settings in the mode bank can be selected.

Item (bank)	Display	Description	Initial value	User level
Mode display setup (Setup Bank)	C073	Whether to display the settings in the mode bank is determined by the sum of the weights shown below. Bit 0: AUTO/MANUAL display No: 0, Yes: +1 Bit 1: RUN/READY display No: 0, Yes: +2 Bit 2: LSP/RSP display No: 0, Yes: +4 Bit 3: AT display No: 0, Yes: +8 Bit 4: Release all latches display No: 0, Yes: +16 Bit 6: Pattern operation function display No: 0, Yes: +64 Bit 7: FF-FITTER automatic tuning display No: 0, Yes: +128 Invalid settings: 0, +32	255	Standard, advanced



- If the SLP-C1F Smart Loader Package is used, the setting for C073 (Mode display setting) can be specified not only by a numerical value but also by bit input.

Handling Precautions

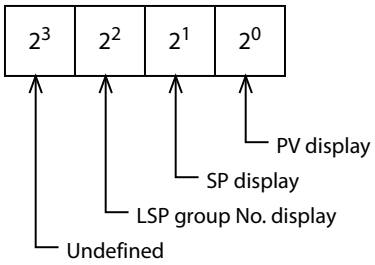
- Even if AUTO/MANUAL display is enabled, if CtrL (Control method) is set to 0 (ON/OFF control), the AUTO/MANUAL selection setting is not displayed.
- Even if AT display is enabled, if CtrL (Control method) is set to 0 (ON/OFF control), the AT stop/start setting is not displayed.
- Even if LSP/RSP display is enabled, LSP/RSP is not displayed for models without RSP input.

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■ PV/SP display setup

Whether to show PV- and SP-related settings on the operation display can be selected.

Item (bank)	Display	Description	Initial value	User level
PV/SP display setup (Setup Bank)	C074	Whether to show the following items on the operation display is determined by the sum of the weights shown below. Bit 0: PV display No: 0, Yes: +1 Bit 1: SP display No: 0, Yes: +2 Bit 2: LSP group No. display No: 0, Yes: +4 Pattern operation display No: 0, Yes: +8 Invalid settings: 0	15	Standard, advanced



- If the SLP-C1F Smart Loader Package is used, the setting for C074 (PV/SP display setup) can be specified not only by a numerical value but also by bit input.

Handling Precautions

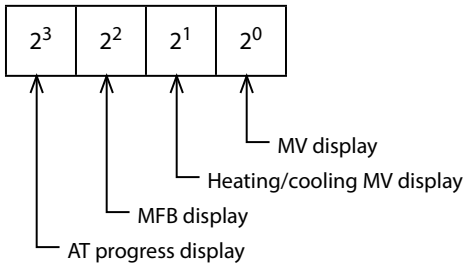
- Even if LSP group No. display is enabled, if C030 (LSP system group) is set to 1, LSP group numbers are not displayed.

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■ MV display setup

Whether to show MV-related settings on the operation display can be selected.

Item (bank)	Display	Description	Initial value	User level
MV display setup (Setup Bank)	C075	Whether to show the following items on the operation display is determined by the sum of the weights shown below. Bit 0: MV display No: 0, Yes: +1 Bit 1: Heating MV / cooling MV No: 0, Yes: +2 Bit 2: MFB display No: 0, Yes: +4 Bit 3: AT progress display No: 0, Yes: +8 Invalid settings: 0	15	Standard, advanced



- If the SLP-C1F Smart Loader Package is used, the setting for C075 (MV display setup) can be specified not only by a numerical value but also by bit input.

Handling Precautions

- Even if heating/cooling MV display is enabled, if C026 (Heat/cool control) is set to 0 (Do not use), the heating/cooling MV is not displayed.
- Even if AT progress display is enabled, progress is not displayed if AT is not running.
- Even if MFB display is enabled, MFB is not displayed for controllers whose model No. does not include "R1."

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■ Event settings display setup

Whether to show the main and sub-settings of internal events 1–3 on the operation display can be selected.

Item (bank)	Display	Description	Initial value	User level
Event settings display setup (Setup Bank)	C076	0: Do not show internal event settings on the operation display 1: Show internal event 1 settings on the operation display 2: Show internal event 1–2 settings on the operation display 3: Show internal event 1–3 settings on the operation display	0	Standard, advanced

Handling Precautions

- Even if internal event settings are set for display, they are not displayed if an internal event operation type that does not require main and sub-settings is specified.
- The main and sub-settings of internal events 4–8 cannot be displayed on the operation display.

■ Event remaining time display setup

Whether to show the ON/OFF delay remaining time of internal events 1–3 on the operation display can be selected.

Item (bank)	Display	Description	Initial value	User level
Event remaining time display setup (Setup Bank)	C077	0: Do not show the ON/OFF delay remaining time of internal events on the operation display 1: Show the ON/OFF delay remaining time of internal event 1 on the operation display 2: Show the ON/OFF delay remaining time of internal events 1–2 on the operation display 3: Show the ON/OFF delay remaining time of internal events 1–3 on the operation display	0	Standard, advanced

Handling Precautions

- Even if the internal event remaining time is set for display, it is not displayed if an internal event operation type that does not require display of the remaining time is specified.
- The remaining time of internal events 4–8 cannot be displayed on the operation display.

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■ CT/VT display setup

Whether to show CT/VT-related items on the operation display can be selected.

Item (bank)	Display	Description	Initial value	User level
CT/VT display setup (Setup Bank)	C078	Whether to show the following items on the operation display is determined by the sum of the weights shown below. Bit 0: CT1 display No: 0, Yes: +1 Bit 1: CT2 display No: 0, Yes: +2 Bit 2: VT display No: 0, Yes: +4 Bit 3: Resistance display No: 0, Yes: +8 Invalid settings: 0, +16, +32, +64, +128	0	Standard, advanced

- This item is displayed and the setting can be changed if a model with CT or VT input is used.

■ User level

What is displayed on the console can be restricted by specifying the user level. The higher the setting, the more items can be set and displayed.

Item (bank)	Display	Description	Initial value	User level
User level (Setup Bank)	C079	0: Simple 1: Standard 2: Advanced	1	Simple, standard, advanced

■ User-defined function indicator lighting conditions

The conditions for turning on the user-defined function indicator can be set. The indicator turns off when the set standard bit is OFF (0) and lights up when the set standard bit is ON (1).

Item (bank)	Display	Description	Initial value	User level
User-defined function indicator lighting conditions (Setup Bank)	C080	1024–2047: Standard bit numbers	1024	Advanced

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■ Multi-status (MS) indicator

For the multi-status (MS) indicator on the console, three sets of lighting condition plus lighting state and their priority can be set.

Item (bank)	Display	Description	Initial value	User level
Multi-status (MS) display, condition (top priority) (Setup Bank)	C081	1024–2047: Standard bit numbers	1568	Advanced
Multi-status (MS) display, status (top priority) (Setup Bank)	C082	0: Lit 1: Slow blink 2: 2 times blink 3: Fast blink 4: Left to right 5: Right to left 6: Left ↔ right 7: Dev OK 8: Dev graph 9: MV graph 10: Heating MV graph (for heat/cool control) 11: Cooling MV graph (for heat/cool control) 12: MFB graph (including currently estimated MFB) 13: DI monitor 14: Internal contact monitor 15: Internal event monitor 16: Polarity MV graph 17: Progress time in pattern 18: Pattern remaining time 19: Progress time in segment 20: Segment remaining time	1	Advanced
Multi-status (MS) display, condition (second priority) (Setup Bank)	C083	Same as for Multi-status (MS) display, condition (top priority)	1792	Advanced
Multi-status (MS) display, status (second priority) (Setup Bank)	C084	Same as for Multi-status (MS) display, status (top priority)	6	Advanced
Multi-status (MS) display, condition (third priority) (Setup Bank)	C085	Same as for Multi-status (MS) display, condition (top priority)	1025	Advanced
Multi-status (MS) display, status (third priority) (Setup Bank)	C086	Same as for Multi-status (MS) display, status (top priority)	9	Advanced
Multi-status (MS) display, deviation range (Setup Bank)	C087	0 to 19999 U	5	Advanced

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■ Lighting condition

- For the MS (multi-status) indicator on the console, three sets of lighting condition plus lighting state and their priority can be set.
- The lighting condition is true (is met) if the status set as the condition is ON. Therefore, if 1024 (Always 0 (OFF)) is set as the lighting condition, the condition is always false. If 1025 (Always 1 (ON)) is set, the condition is always true.

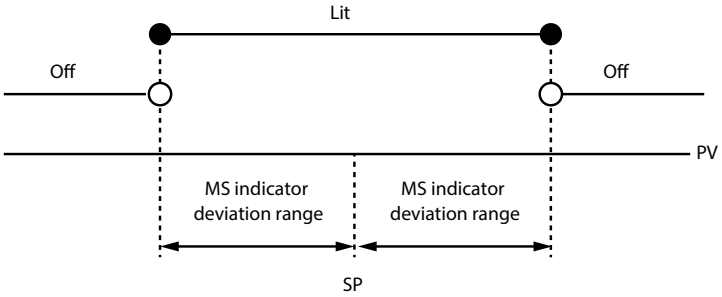
■ Priority order of the MS indicator

Three priority levels can be set for the MS indicator.

- When the lighting condition with priority 1 is true, the MS indicator will have the lighting state with priority 1.
- When the lighting condition with priority 1 is false but the lighting condition with priority 2 is true, the MS indicator will have the lighting state with priority 2.
- When the lighting conditions with priorities 1 and 2 are false but the lighting condition with priority 3 is true, the MS indicator will have the lighting state with priority 3.
- When the lighting conditions with priorities 1–3 are false, the MS indicator remains off.

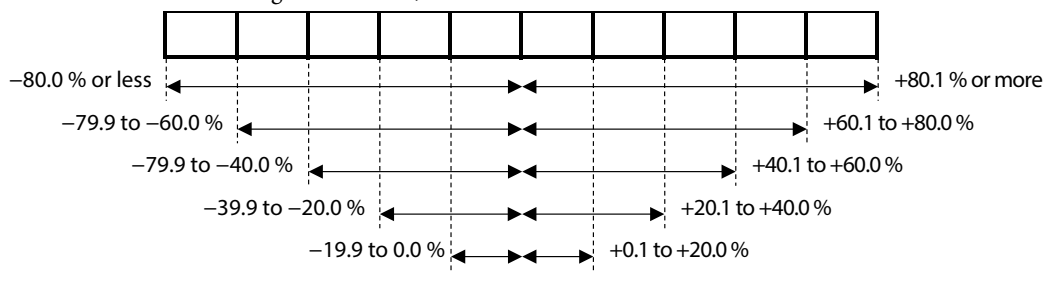
■ Lighting state

- If 7 (Dev OK) is set as the lighting state, the MS indicator is turned on and off as shown in the figure below. If 0 U is set for Multi-status (MS) display deviation range, the MS indicator lights up only when the displayed PV is equal to the displayed SP.



Indicator on/off with Dev OK

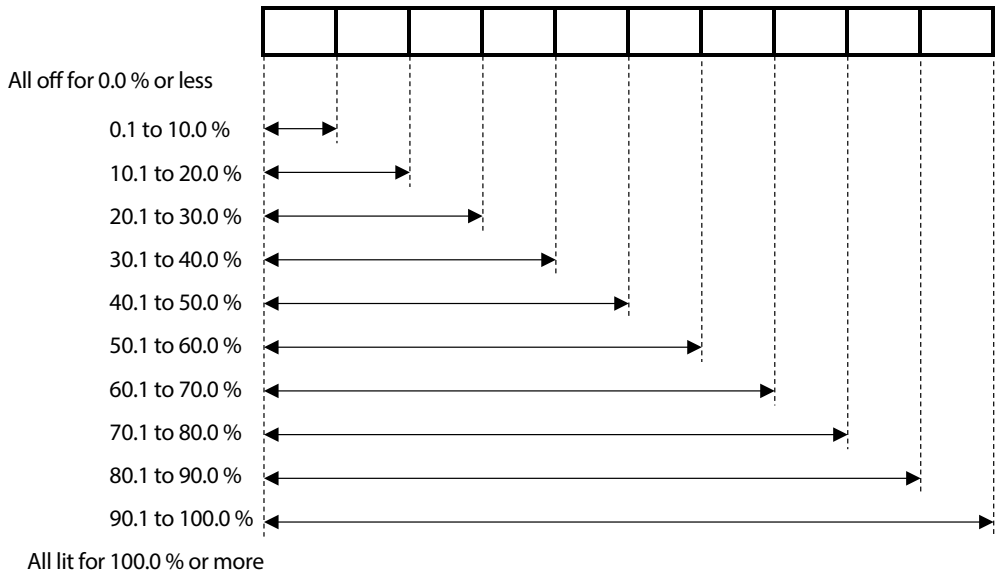
- If 8 (Dev graph) is set for the lighting state, the MS indicator lights up as shown in the figure below. Set 1 U or more for the Multi-status (MS) display deviation range. If 0 U is set, the MS indicator will be turned off.



LEDs lit to show a deviation graph (Deviation = (PV – SP) ÷ Multi-status (MS) display deviation range)

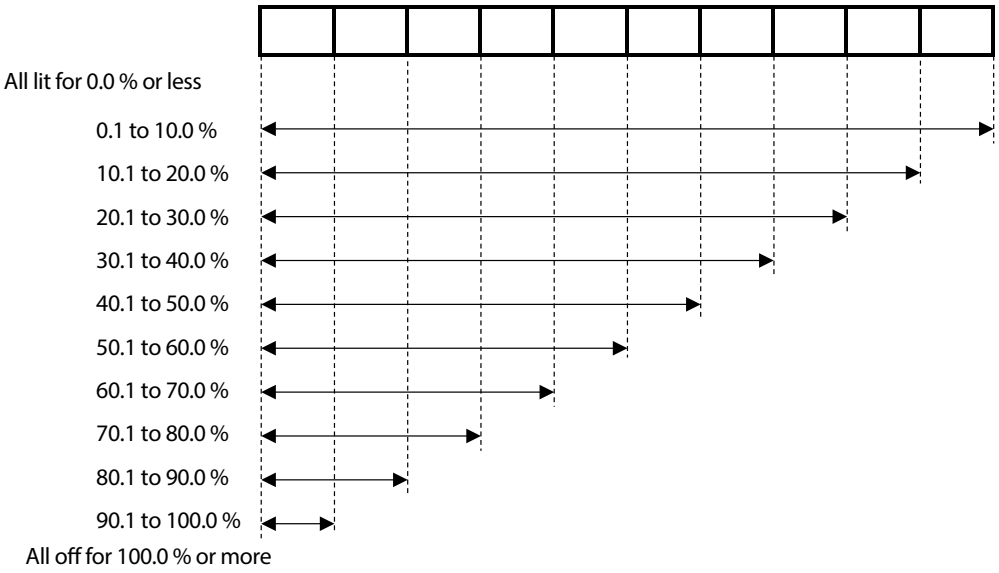
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- If 9 (MV graph), 10 (Heating MV graph), 11 (Cooling MV graph), 12 (MFB graph (including currently estimated MFB)), 17 (Progress time in pattern), 18 (Pattern remaining time), 19 (Progress time in segment), or 20 (Segment remaining time) is set for the lighting state, the MS indicator lights up as shown in the figure below.



LEDs lit to show an MV graph, heating MV graph, cooling MV graph, MFB graph, progress time in pattern, pattern remaining time, progress time in segment, or segment remaining time

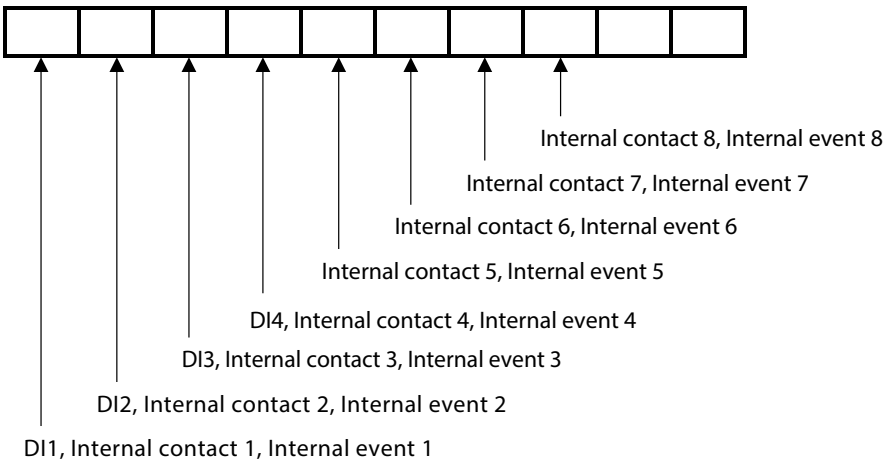
- If 16 (Polarity MV graph) is set for the lighting state, the MS indicator lights up as shown in the figure below.



LEDs lit to show a polarity MV graph

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- If 13 (DI monitor), 14 (Internal contact monitor), or 15 (Internal event monitor) is set for the lighting state, the MS indicator lights up as shown in the figure below.



LEDs lit to show DI, internal contacts, and internal events

■ Operation display restoration time

This setting determines the period without key operations after which the bank selection display or bank setting display automatically returns to the operation display.

Item (bank)	Display	Description	Initial value	User level
Operation display restoration time (Setup Bank)	C 100	0: Do not switch to the operation display 1–60 minutes	3	Advanced

- If 0 is set, the screen does not return to the operation display even when there are no key operations.

■ User operation screen

With the C3A/C3B, up to eight user operation screens that show the data specified by standard numerical codes can be added. The data is shown in display fields 1–3 when the device shows the operation display.

Item (bank)	Display	Description	Initial value	User level
Available user operation screens (Setup Bank)	C 113	0: Do not use 1–8: Available user operation screens	0	Advanced

- Items for the number of screens set for [Available user operation screens] are displayed in the user operation screen bank and the settings can be changed. The screens are shown on the operation display.
- You can specify the data to be shown in display fields 1–3 by standard numerical codes for each of user operation screens 1–8.
- Display field 4 indicates the user operation screen No. that is shown.

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Item (bank)	Display	Description	Initial value	User level
User operation screens 1–8 Data shown in display field 1 (User Operation Screen Bank)	Uo 1.1 to Uo8.1	2048–3071: Standard numerical codes	2048	Advanced
User operation screens 1–8 Data shown in display field 2 (User Operation Screen Bank)	Uo 1.2 to Uo8.2			
User operation screens 1–8 Data shown in display field 3 (User Operation Screen Bank)	Uo 1.3 to Uo8.3			

With the C3A/C3B, items for the number of screens set for [Available user operation screens] are displayed and the settings can be changed.

Handling Precautions

- If the data specified by the standard numerical code set for [User operation screens 1–8 Data shown in display field 3] has two or more decimal places, display field 3 shows the value with one decimal place.

■ Operation display settings

The screens to be shown when the device is in operation display mode can be selected.

Item (bank)	Display	Description	Initial value	User level
Operation display settings (Setup Bank)	C 1 14	0: Displays all operation screens 1: Displays basic + UO + UF screens	0	Advanced

- This item is displayed and the setting can be changed for the C3A/C3B.
- The basic screen shows the PV, SP, and MV. “UO” means “user operation” and “UF” means “user function.”
- If 0 (Display all operation screens) is set, all operation display screens that meet the display conditions will be displayed.
- If 1 (Displays basic + UO + UF screens) is set, the UO and UF screens that meet the display conditions and the basic screen will be displayed. Other operation display screens will always be hidden.

Note

- For the display conditions for operation display screens, see the sections below.
  - ☞ ■ PV/SP display setup (p. 5-158)
  - ☞ ■ MV display setup (p. 5-159)
  - ☞ ■ Event settings display setup (p. 5-160)
  - ☞ ■ Event remaining time display setup (p. 5-160)
  - ☞ ■ CT/VT display setup (p. 5-161)
  - ☞ ■ User operation screen (p. 5-165)
  - ☞ ■ User Function (p. 5-167)
  - ☞ ■ Operation settings (p. 6-1)

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■ User Function

Up to eight items selected from various settings can be displayed as user functions 1–8 on the operation display.

Item (bank)	Display	Description	Initial value	User level
User Function 1 (User Function Bank)	UF-1	Displayed text can be defined for each item. The following are special cases. ----: Unregistered P-_: P(Proportional band) in use I-_: I (Integral time) in use d-_: D (Derivative time) in use rE-_: Manual reset in use oL-_: Output low limit in use oH-_: Output high limit in use P-_C: P (Proportional band) (Cool) in use I-_C: I (Integral time) (Cool) in use d-_C: D (Derivative time) (Cool) in use oL_C: Output low limit (Cool) in use oH_C: Output high limit(Cool) in use	----	Standard, advanced
User Function 2 (User Function Bank)	UF-2		----	
User Function 3 (User Function Bank)	UF-3		----	
User Function 4 (User Function Bank)	UF-4		----	
User Function 5 (User Function Bank)	UF-5		----	
User Function 6 (User Function Bank)	UF-6		----	
User Function 7 (User Function Bank)	UF-7		----	
User Function 8 (User Function Bank)	UF-8		----	

- Only settings that can be displayed can be registered.
  (Ex.: Manual reset of the PID constants can be registered when integral time = 0)
- Items cannot be registered from the console using the parameter number displayed on the setup screen of the SLP-C1F Smart Loader Package.
- To select a parameter, use the keys as follows.

  [<] key: Displays the first parameter in the next parameter bank.

  [>] key: Displays the first parameter in the previous parameter bank.

  [∨]: Displays the next parameter.

  [∧]: Displays the previous parameter.

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● Specifying user functions

This section gives examples of settings using the SLP-C1F Smart Loader Package.

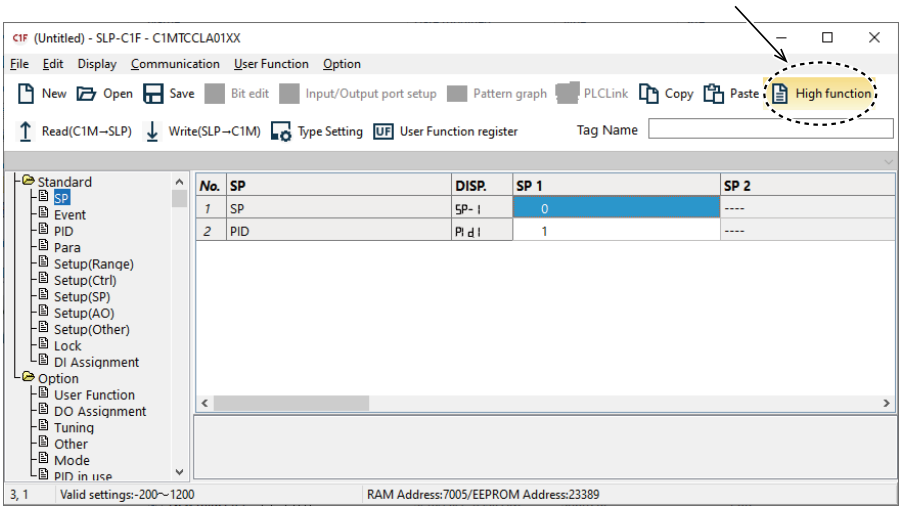
Up to eight parameters can be registered on the operation display by registering user functions. Use the [MENU] key to switch the display.

Set frequently used functions to make the operation of this device easier.

In the example below, the main setting of event 1 is set as UF1.

1. Specifying from the user function screen

To use this function, set the user level to Standard or Advanced (High function) first.



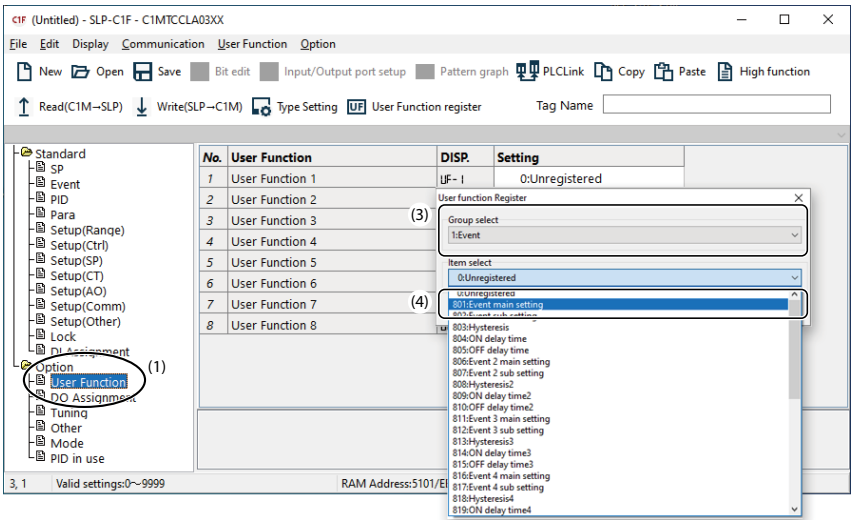
(1) Select [User Function] under [Option].

(2) Select any of user-defined functions 1–8.

≫ The [User Function Register] dialog box is displayed.

(3) In [Group select], select [1: Event].

(4) In [Item select], select [801: Event main setting (low limit)].



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2. If, while changing settings, you find a parameter you want to set as a user function

Use the procedure below.

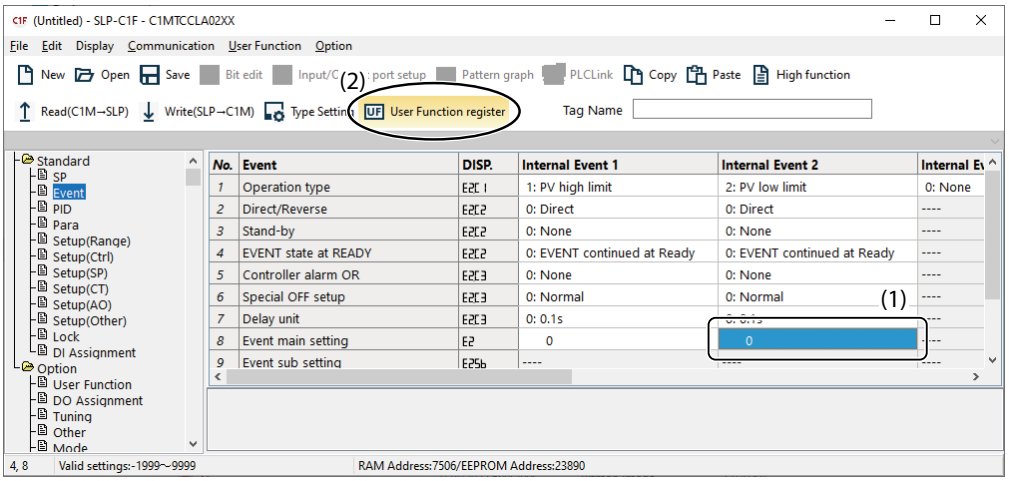
(1) Place the cursor on the parameter you want to register.

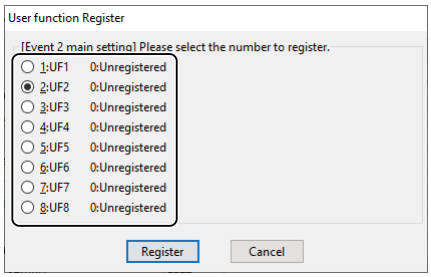
(2) Click the [User Function Register] button.

≫ The [User Function register] dialog box is displayed.

(3) Click the radio button for the UF No. to use for the parameter and then click [Register].

≫ The parameter is now registered.





Note

- A list of registered parameters can be checked by selecting [User function] under [Option].

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■ Key lock, communication lock, loader lock

Changing the settings and communication can be prohibited by means of various lock functions.

Item (bank)	Display	Description	Initial value	User level
Key lock (Lock Bank)	LoC	0: All settings can be specified. 1: Mode, event, operation display, SP, UF, lock, manual MV, and [FN] key operation can be specified. 2: Operation display, SP, UF, lock, manual MV, and [FN] key operation can be specified. 3: UF, lock, manual MV, and [FN] key operation can be specified.	0	Simple, standard, advanced
Communication lock (Lock Bank)	C.LoC	0: Unlocked 1: Locked	0	Advanced
Loader lock (Lock Bank)	L.LoC	0: Unlocked 1: Locked	0	Advanced

- If you set a password in addition to the key lock, only the items whose settings can be changed using the keys (shown in the table above) are displayed.

The parameters shown below can be read and written even if communication lock or loader lock is enabled.

Bank	Parameter
Setup	PV decimal point position
Mode	AUTO/MANUAL mode selection
	RUN/READY mode selection
	AT stop/start selection
	Release all latches
Operation settings	Loop PV
	Loop SP
	LSP group No.
	MV
	Heat MV
	Cool MV
	AT progress
	CT1 current when output ON
	CT2 current when output ON
	Timer remaining time 1
	Timer remaining time 2
	Timer remaining time 3
	Timer remaining time 4
	Timer remaining time 5
	Present LSP
	Loop PV before compensation
Status	Input alarm status

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■ Password

If a password is set (password lock), key-locked items whose settings cannot be changed using the keys will not be displayed.

Item (bank)	Display	Description	Initial value	User level
Password display (Lock Bank)	PASS	0–15 5: Display passwords 1A–2B	0 (0 is set at power-on)	Simple, standard, advanced
Password 1A (Lock Bank)	PS 1A	0000–FFFF (hex)	0000	
Password 2A (Lock Bank)	PS2A	0000–FFFF (hex)	0000	
Password 1B (Lock Bank)	PS 1b	0000–FFFF (hex)	0000	
Password 2B (Lock Bank)	PS2b	0000–FFFF (hex)	0000	

- PS 1A (password 1A) and PS2A (password 2A) are displayed and the settings can be changed if PASS (password display) is set to 5 and the two sets of passwords (1A and 1B, 2A and 2B) match.
- PS 1b (password 1B) and PS2b (password 2B) are displayed and the settings can be changed if PASS (password display) is set to 5.
- The value set for PS 1A (password 1A) is automatically set for PS 1b (password 1B).
- The value set for PS2A (password 2A) is automatically set for PS2b (password 2B).

Handling Precautions

- Before setting passwords 1A–2B, decide on two hexadecimal numbers that will be the passwords, and make a note so that you will remember them.
- PASS is provided to prevent accidental changing of passwords by restricting the display conditions of passwords 1A–2B.
- If you set a value for passwords 1A and 2A and then set a different value for passwords 1B and 2B, passwords 1A and 2A will no longer be displayed, and the settings for key lock, communication lock, and loader lock cannot be changed. This is called a password locked state.
- Settings that cannot be changed due to key lock cannot be displayed in the password locked state.
- If the password lock cannot be reset, initialize settings from the [Calibration and checking] screen of Smart Loader Package model SLP-C1F. In this case, any settings configured by the user will also be initialized (lost).

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5 - 18 Address Replacement

The address replacement function replaces the communication address of data read and written through host communication with a specific address.

You can improve performance by reading and writing data in a communication session rather than by reading and writing the same data in multiple communication sessions with nonsequential communication addresses. To do so, you assign data with arbitrary communication addresses to consecutive communication addresses specially designed for the address replacement function.

Handling Precautions

- This function is available only for models with RS-485 communication.
- The items below can only be displayed and set by the SLP or host communication.

■ Actual, setting, and alias addresses

The address replacement function uses the following three communication addresses to replace one address.

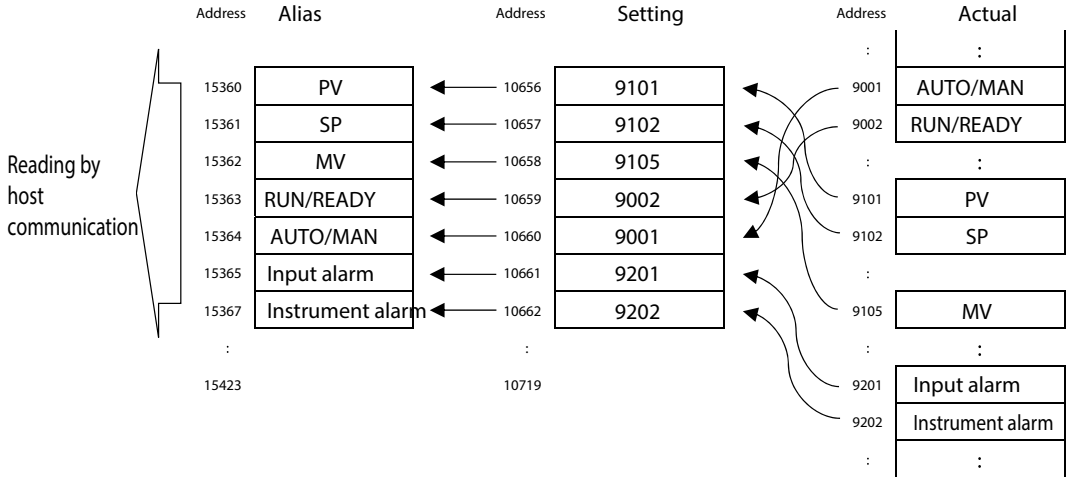
- Actual (the address to be replaced)
  The original communication address that is to be replaced
- Setting (for setup of the replacement address)
  Address to specify which actual address is associated with the alias address
- Alias (replacement address)
  The virtual image of the actual item, and the address that is actually read and written by host communication

Item (bank)	Display	Description	Initial value	User level
Address link setting 1 (Address Replacement Bank)	– – – –	0–65535 Address defined in the list of communication data	0	Advanced
:	:			
Address link setting 64 (Address Replacement Bank)	– – – –			

■ Number of data units whose address can be replaced

The addresses of up to 64 data units can be replaced.

■ Sample settings



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5-19 Reception Monitoring

The reception monitoring function monitors whether host communication using the RS-485 port continues to be processed.

This function monitors instruction messages from constantly active host communication and detects if communication has been lost for some reason.

The result of detection is reflected in a Reception monitoring access error standard bit. This result can be assigned to various functions using logic functions, etc., and output as an event.

Handling Precautions

- This function is available only for models with RS-485 communication.
- The items below can only be displayed and set by the SLP or host communication.

■ Monitored address, Monitoring time, and Monitoring mode

The reception monitoring function has the following setting items for each item monitored.

- Monitored address
  Communication address that is monitored.
- Monitoring time
  Monitoring time.
  The reception monitoring function is disabled by setting 0.
- Monitoring mode
  Specify the reception monitoring method. Select from two modes depending on whether you want to monitor both read and written instruction messages or only monitor written instruction messages at the monitored receiving address.

Item (bank)	Display	Description	Initial value	User level
Monitored address 1 (Reception Monitoring Bank)	– – – –	0–65535 Address defined in the list of communication data	0	Advanced
Monitoring time 1 (Reception Monitoring Bank)	– – – –	0–3600 s 0: Disable reception monitoring	180	Advanced
Monitoring mode 1 (Reception Monitoring Bank)	– – – –	0: Monitor both read and written messages 1: Monitor written messages only	0	Advanced
Monitored address 2 (Reception Monitoring Bank)	– – – –	Same as for Monitored address 1.	0	Advanced
Monitoring time 2 (Reception Monitoring Bank)	– – – –	Same as for Monitoring time 1.	0	Advanced
Monitoring mode 2 (Reception Monitoring Bank)	– – – –	Same as for Monitoring mode 1.	0	Advanced
Monitored address 3 (Reception Monitoring Bank)	– – – –	Same as for Monitored address 1.	0	Advanced
Monitoring time 3 (Reception Monitoring Bank)	– – – –	Same as for Monitoring time 1.	0	Advanced
Monitoring mode 3 (Reception Monitoring Bank)	– – – –	Same as for Monitoring mode 1.	0	Advanced
Monitored address 4 (Reception Monitoring Bank)	– – – –	Same as for Monitored address 1.	0	Advanced
Monitoring time 4 (Reception Monitoring Bank)	– – – –	Same as for Monitoring time 1.	0	Advanced
Monitoring mode 4 (Reception Monitoring Bank)	– – – –	Same as for Monitoring mode 1.	0	Advanced

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■ Reception monitoring access error

A reception monitoring access error occurs if no instruction messages are received at the monitored address for the monitoring time or longer.

The reception monitoring access error (latched) is retained until the latch is cleared.

You can restore the normal status by clearing the reception monitoring access error latch.

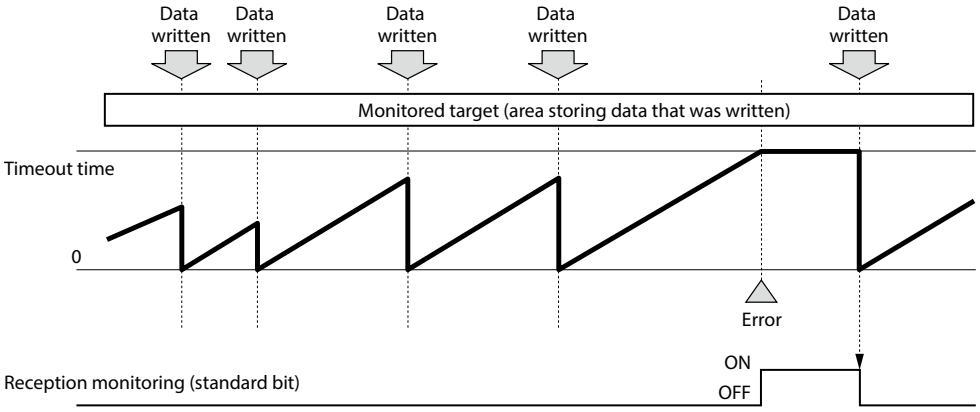
Item (bank)	Display	Description	Initial value	User level
Reception monitoring access error 1	– – – –	0: Normal status 1: Communication error	0	–
Reception monitoring access error 2	– – – –			
Reception monitoring access error 3	– – – –			
Reception monitoring access error 4	– – – –			
Reception monitoring access error 1 (latched)	– – – –	0: Normal status 1: Communication error	0	–
Reception monitoring access error 2 (latched)	– – – –			
Reception monitoring access error 3 (latched)	– – – –			
Reception monitoring access error 4 (latched)	– – – –			
Reception monitoring access error latch clear 1	– – – –	0: Retain latch 1: Clear latch	0	–
Reception monitoring access error latch clear 2	– – – –			
Reception monitoring access error latch clear 3	– – – –			
Reception monitoring access error latch clear 4	– – – –			

■ Number of reception monitoring units

The reception of up to four data units can be monitored.

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■ Usage example



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5-20 Asset Information

The following information is stored as asset information.

The operating time and on/off count are stored if the model of this device has extended data memory.

- Asset information for models with extended data memory

  NVM write count

  Operating time (days)

  On/off count for each DO (terminal)

- Asset information for models without extended data memory

  NVM write count

Standard numerical code	Item	Value range	Model
2705	NVM write count	0–10000 (The write count is calculated by multiplying this value by 10.)	
2704	Operating time (days)	0–19999	Model with extended data memory only
2688	Control output 1 ON/OFF count	0–11000 (The on/off count is calculated by multiplying this value by 10.)	Model with extended data memory only
2689	Control output 2 ON/OFF count	0–11000 (The on/off count is calculated by multiplying this value by 10.)	Model with extended data memory only
2690	Event output 1 ON/OFF count	0–11000 (The on/off count is calculated by multiplying this value by 10.)	Model with extended data memory only
2691	Event output 2 ON/OFF count	0–11000 (The on/off count is calculated by multiplying this value by 10.)	Model with extended data memory only
2692	Event output 3 ON/OFF count	0–11000 (The on/off count is calculated by multiplying this value by 10.)	Model with extended data memory only

Handling Precautions

- Single digits of the write count for the nonvolatile memory and on/off count are rounded off.
- Asset information values cannot be cleared.

Note

- ☞ ■ Standard bit numbers and standard numerical codes (p. App.-3) (for standard numerical codes)

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Chapter 6. Displayed Items and Settings

6 - 1 Operation Settings

Meaning of user level settings
0: Simple configuration, 1: Standard configuration, 2: Advanced configuration

■ Operation settings

Display	Item	Description	Initial value	User level	Notes
Display field 1: Loop PV Display field 2: Loop SP Display field 3: MV	Loop PV Loop SP MV	Loop SP: SP low limit (C007) to SP high limit (C008) MV: −10.0 to +110.0 % If both AUTO and LSP modes are set, the SP of the currently selected LSP group No. can be specified. In MANUAL mode, the MV can be specified.	0	0	Whether to display can be selected by [PV/SP display setup] (C074) and [MV display setup] (C075).
LSP 1 Display field 2: LSP	LSP group No. (the last digit)	From 1 to the number set for [LSP system group] (C30, max. = 8)	1	0	Displayed if [LSP system group] (C030) is set to 2 or more. Display field 2 shows the LSP for the LSP group. Whether to display can be selected by [PV/SP display setup] (C074).
Pt01 Display field 2: Loop SP Display field 3: Segment remaining time Display field 4: Segment No.	Pattern No. and segment No. Loop SP Segment remaining time	The setting cannot be changed. Display field 1 shows the pattern No. (1–16) in the first and second digits. Display field 2 shows the Loop SP. Display field 3 shows the segment remaining time. Display field 4 shows the segment No. (1–16).	–	0	Displayed if [Constant value operation / pattern operation mode selection](C--P) is set to Ptn (Pattern operation). Whether to display can be selected by [PV/SP display setup] (C074). The segment remaining time is displayed according [Pattern time unit](PC01). 1 s: in seconds or MM:SS 1 min or 1 hour: HH:MM
HEAt	Heat MV	The setting cannot be changed.	–	0	Displayed if heat/cool control is used (C026 ≠ 0).
CooL	Cool MV	The setting cannot be changed.	–	0	Whether to display can be selected by [MV display setup] (C075).
Fb	MFB (motor feedback) Opening	The setting cannot be changed. −10.0 to +110.0 % When controlling with an estimated position, it blinks at 0.0–100.0 %.	–	0	This item is displayed for controllers with motor drive relay output (whose model No. includes "R1"). Whether to display can be selected by [MV display setup] (C075).
Display field 1: PV At 1	AT progress (the last digit)	The setting cannot be changed. x to 1: AT is running (the value decrements) 0: AT is complete	–	0	Displayed if AT is running (display continues even after AT ends). Whether to display can be selected by [MV display setup] (C075).

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Display	Item	Description	Initial value	User level	Notes
Ct 1	CT1 current when output ON	The setting cannot be changed.	–	0	Displayed if a model with two CT inputs or micro CT input is used.
Ct2	CT2 current when output ON	The setting cannot be changed.	–	0	Whether to display can be selected by [CT/VT display setup] (C078).
Ut	VT voltage	The setting cannot be changed.	–	0	Displayed if a model with CT/VT input is used.
rStr	Resistance	The setting cannot be changed.	–	0	Whether to display can be selected by [CT/VT display setup] (C078).
E 1	Internal event 1 main setting	−19999 to +19999 U The number of decimal places changes according to the operation type of the internal event. For some operation types, the range is 0–19999.	0	0	The settings required for Internal event 1 operation type are displayed. Whether to display can be selected by [Event settings display setup] (C076).
E 1.5b	Internal event 1 sub-setting		0	0	
t 1	Internal event 1 timer remaining time	The setting cannot be changed. The rightmost digit shows r for ON delay time. The rightmost digit shows L for OFF delay time.	–	0	Whether to display can be selected by [Event remaining time display setup] (C077).
E2	Internal event 2 main setting	−19999 to +19999 U The number of decimal places changes according to the operation type of the internal event. For some operation types, the range is 0–19999.	0	0	The settings required for Internal event 2 operation type are displayed. Whether to display can be selected by [Event settings display setup] (C076).
E2.5b	Internal event 2 sub-setting		0	0	
t2	Internal event 2 timer remaining time	The setting cannot be changed. The rightmost digit shows r for ON delay time. The rightmost digit shows L for OFF delay time.	–	0	Whether to display can be selected by [Event remaining time display setup] (C077).
E3	Internal event 3 main setting	−19999 to +19999 U The number of decimal places changes according to the operation type of the internal event. For some operation types, the range is 0–19999.	0	0	The settings required for Internal event 3 operation type are displayed. Whether to display can be selected by [Event settings display setup] (C076).
E3.5b	Internal event 3 sub-setting		0	0	

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Display	Item	Description	Initial value	User level	Notes
t3	Internal event 3 timer remaining time	The setting cannot be changed. The rightmost digit shows r for ON delay time. The rightmost digit shows L for OFF delay time.	–	0	Whether to display can be selected by [Event remaining time display setup] (d077).
Display fields 1–3: Standard numerical code Display field 4: 01	User operation screen 1	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 1: Data shown in display fields 1–3 (U011 to U013)	–	0	Whether to display can be selected by [Available user operation screens] (d113).
Display fields 1–3: Standard numerical code Display field 4: 02	User operation screen 2	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 2: Data shown in display fields 1–3 (U021 to U023)	–	0	
Display fields 1–3: Standard numerical code Display field 4: 03	User operation screen 3	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 3: Data shown in display fields 1–3 (U031 to U033)	–	0	
Display fields 1–3: Standard numerical code Display field 4: 04	User operation screen 4	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 4: Data shown in display fields 1–3 (U041 to U043)	–	0	
Display fields 1–3: Standard numerical code Display field 4: 05	User operation screen 5	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 5: Data shown in display fields 1–3 (U051 to U053)	–	0	
Display fields 1–3: Standard numerical code Display field 4: 06	User operation screen 6	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 6: Data shown in display fields 1–3 (U061 to U063)	–	0	

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Display	Item	Description	Initial value	User level	Notes
Display fields 1–3: Standard numerical code Display field 4: U7	User operation screen 7	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 7: Data shown in display fields 1–3 (U071 to U073)]	–	0	Whether to display can be selected by [Available user operation screens] (C113).
Display fields 1–3: Standard numerical code Display field 4: U8	User operation screen 8	The setting cannot be changed. Displays the standard numerical code set for [User operation screen 8: Data shown in display fields 1–3 (U081 to U083)]	–	0	
Display field 1: Item Display field 2: Setting	User function 1	The value of the item set for [User Function 1] (UF-1) is displayed.	–	0	Displayed if the item set for [User Function 1] (UF-1) can be displayed.
	User function 2	The value of the item set for [User Function 2] (UF-2) is displayed.	–	0	Displayed if the item set for [User Function 2] (UF-2) can be displayed.
	User function 3	The value of the item set for [User Function 3] (UF-3) is displayed.	–	0	Displayed if the item set for [User Function 3] (UF-3) can be displayed.
	User function 4	The value of the item set for [User Function 4] (UF-4) is displayed.	–	0	Displayed if the item set for [User Function 4] (UF-4) can be displayed.
	User function 5	The value of the item set for [User Function 5] (UF-5) is displayed.	–	0	Displayed if the item set for [User Function 5] (UF-5) can be displayed.
	User function 6	The value of the item set for [User Function 6] (UF-6) is displayed.	–	0	Displayed if the item set for [User Function 6] (UF-6) can be displayed.
	User function 7	The value of the item set for [User Function 7] (UF-7) is displayed.	–	0	Displayed if the item set for [User Function 7] (UF-7) can be displayed.
	User function 8	The value of the item set for [User Function 8] (UF-8) is displayed.	–	0	Displayed if the item set for [User Function 8] (UF-8) can be displayed.

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6-2 Parameter Settings

Meaning of user level settings
0: Simple configuration, 1: Standard configuration, 2: Advanced configuration

■ Mode bank

Bank selection: mode

Display	Item	Description	Initial value	User level	Notes
A--m	AUTO/MANUAL	AUto: AUTO (automatic) mode MAn: MANUAL (manual) mode	AUTO	0	Displayed if the control method is PID control (Ctrl = 1). Whether to display can be selected by [Mode display setup] (C073).
r--r	RUN/READY	rUn: RUN mode rdY: READY mode	RUN	0	Whether to display can be selected by [Mode display setup] (C073).
L--r	LSP/RSP	LSP: LSP mode rSP: RSP mode	LSP	0	This item is displayed for models with RSP input. Whether to display can be selected by [Mode display setup] (C073).
At	AT stop/start selection	AtoF: AT stop Aton: AT start	AT stop	0	Displayed if the control method is PID control (Ctrl = 1). Whether to display can be selected by [Mode display setup] (C073).
AtEr	Auto tuning error	ErnF: Normal Ern: Abnormal	Normal	0	Displayed if the control method is PID control (Ctrl = 1). Whether to display can be selected by [Mode display setup] (C073).
bFLt	Release all latches	LtoN: Continue latches LtoF: Release latches	Continue latches	0	Whether to display can be selected by [Mode display setup] (C073).
C--P	Constant value operation / pattern operation selection	CSt: Constant value operation mode Ptn: Pattern operation mode	Constant value operation	2	Displayed if pattern operation is allowed (C103 = 1). Whether to display can be selected by [Mode display setup] (C073).
Adu	Pattern operation ADVANCE	AdoF: No ADVANCE Adon: ADVANCE	No ADVANCE	2	
HoLd	Pattern operation HOLD	HdoF: No HOLD Hdon: HOLD	No HOLD	2	
gSK	Pattern operation G.SOAK clear	gSon: G.SOAK continues gSoF: G.SOAK ends	G.SOAK continues	2	
FFAt	FF-FITTER automatic tuning selection	FFoF: No auto-tuning FFon: Use auto-tuning	No auto-tuning	2	Displayed if FF-FITTER is allowed (C105 = 1) and the control method is PID control (Ctrl = 1). Whether to display can be selected by [Mode display setup] (C073).

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■ SP bank

Bank selection: SP

Display	Item	Description	Initial value	User level	Notes
rSP	RSP	The setting cannot be changed.	–	0	This item is displayed for models with RSP input.
PId.r	RSP PID group No.	1–8	1	1	Displayed for models with RSP input and if the control method is PID control (CtrL = 1), [Zone PID operation] (C024) is set to 0, and the operation types of internal contacts (IC11–IC81) are not 4–6.
SP-1	LSP1 SP	SP low limit to high limit	0	0	
PId.1	LSP1 PID group No.	1–8	1	1	Displayed if the control method is PID control (CtrL = 1), [Zone PID operation] (C024) is set to 0, and the operation types of internal contacts (IC11–IC81) are not 4–6.
rMP.1	LSP1 ramp	0–19999 U	0	1	Displayed if [SP ramp type] (C031) is set to 1. The number of decimal places changes according to [SP ramp decimal point position] (C102).
SP-2	LSP2 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C030) is set to 2 or more and the conditions for LSP1 described above are met.
PId.2	LSP2 PID group No.		1	1	
rMP.2	LSP2 ramp		0	1	
SP-3	LSP3 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C030) is set to 3 or more and the conditions for LSP1 described above are met.
PId.3	LSP3 PID group No.		1	1	
rMP.3	LSP3 ramp		0	1	
SP-4	LSP4 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C030) is set to 4 or more and the conditions for LSP1 described above are met.
PId.4	LSP4 PID group No.		1	1	
rMP.4	LSP4 ramp		0	1	
SP-5	LSP5 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C030) is set to 5 or more and the conditions for LSP1 described above are met.
PId.5	LSP5 PID group No.		1	1	
rMP.5	LSP5 ramp		0	1	

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Display	Item	Description	Initial value	User level	Notes
SP-6	LSP6 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C03D) is set to 6 or more and the conditions for LSP1 described above are met.
Pid6	LSP6 PID group No.		1	1	
rmP6	LSP6 ramp		0	1	
SP-7	LSP7 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C03D) is set to 7 or more and the conditions for LSP1 described above are met.
Pid7	LSP7 PID group No.		1	1	
rmP7	LSP7 ramp		0	1	
SP-8	LSP8 SP	Same as for LSP1	0	0	Displayed if [LSP system group] (C03D) is set to 8 or more and the conditions for LSP1 described above are met.
Pid8	LSP8 PID group No.		1	1	
rmP8	LSP8 ramp		0	1	

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■ Event bank

Bank selection: Eu

Display	Item	Description	Initial value	User level	Notes
E 1	Internal event 1 main setting	−19999 to +19999 U For some operation types, the range is 0–19999 U.	0	0	The settings required for [Internal event 1 operation type] (E 1C 1) are displayed. The number of decimal places changes according to the operation type of the internal event.
E 1.Sb	Internal event 1 sub-setting		0	0	
E 1HY	Internal event 1 hysteresis	0–19999 U	5	0	The settings required for [Internal event 1 operation type] (E 1C 1) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E 1.on	Internal event 1 ON delay time	0–19999 U	0	2	
E 1.oFF	Internal event 1 OFF delay time		0	2	
E2	Internal event 2 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 2 operation type] (E2C 1) are displayed. The number of decimal places changes according to the operation type of the internal event.
E2.Sb	Internal event 2 sub-setting		0	0	
E2HY	Internal event 2 hysteresis		5	0	The settings required for [Internal event 2 operation type] (E2C 1) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E2.on	Internal event 2 ON delay time		0	2	
E2.oFF	Internal event 2 OFF delay time		0	2	
E3	Internal event 3 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 3 operation type] (E3C 1) are displayed. The number of decimal places changes according to the operation type of the internal event.
E3.Sb	Internal event 3 sub-setting		0	0	
E3HY	Internal event 3 hysteresis		5	0	The settings required for [Internal event 3 operation type] (E3C 1) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E3.on	Internal event 3 ON delay time		0	2	
E3.oFF	Internal event 3 OFF delay time		0	2	
E4	Internal event 4 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 4 operation type] (E4C 1) are displayed. The number of decimal places changes according to the operation type of the internal event.
E4.Sb	Internal event 4 sub-setting		0	0	
E4HY	Internal event 4 hysteresis		5	0	The settings required for [Internal event 4 operation type] (E4C 1) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E4.on	Internal event 4 ON delay time		0	2	
E4.oFF	Internal event 4 OFF delay time		0	2	

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Display	Item	Description	Initial value	User level	Notes
E5	Internal event 5 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 5 operation type] (E5C ı) are displayed. The number of decimal places changes according to the operation type of the internal event.
E5.5b	Internal event 5 sub-setting		0	0	
E5HY	Internal event 5 hysteresis		5	0	The settings required for [Internal event 5 operation type] (E5C ı) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E5on	Internal event 5 ON delay time		0	2	
E5oFF	Internal event 5, OFF delay time		0	2	
E6	Internal event 6 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 6 operation type] (E6C ı) are displayed. The number of decimal places changes according to the operation type of the internal event.
E6.5b	Internal event 6 sub-setting		0	0	
E6HY	Internal event 6 hysteresis		5	0	The settings required for [Internal event 6 operation type] (E6C ı) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E6on	Internal event 6 ON delay time		0	2	
E6oFF	Internal event 6 OFF delay time		0	2	
E7	Internal event 7 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 7 operation type] (E7C ı) are displayed. The number of decimal places changes according to the operation type of the internal event.
E7.5b	Internal event 7 sub-setting		0	0	
E7HY	Internal event 7 hysteresis		5	0	The settings required for [Internal event 7 operation type] (E7C ı) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E7on	Internal event 7 ON delay time		0	2	
E7oFF	Internal event 7 OFF delay time		0	2	
E8	Internal event 8 main setting	Same as for Internal event 1	0	0	The settings required for [Internal event 8 operation type] (E8C ı) are displayed. The number of decimal places changes according to the operation type of the internal event.
E8.5b	Internal event 8 sub-setting		0	0	
E8HY	Internal event 8 hysteresis		5	0	The settings required for [Internal event 8 operation type] (E8C ı) are displayed. The number of decimal places changes according to the delay time decimal point position of the internal event.
E8on	Internal event 8 ON delay time		0	2	
E8oFF	Internal event 8 OFF delay time		0	2	

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■ PID bank

Bank selection: PId

Display	Item	Description	Initial value	User level	Notes
P-1	PID1 proportional band	0.1–1999.9 %	5.0	0	Displayed if the control method is PID control (CtrL = 1).
I-1	PID1 integral time	0–19999 s (0 = no operation)	120	0	The number of decimal places of the integral time and derivative time change according to [Integral time and derivative time decimal point position] (C023).
d-1	PID1 derivative time	0–19999 s (0 = no operation)	30	0	
rE-1	PID1 manual reset	−10.0 to +110.0 %	50.0	0	Displayed if either of the set of conditions below is met ⅔The control method is PID control (CtrL = 1), individual PID heat/cool control is not used (C026 = 0), and the integral time of the PID group is 0 (02⅛ -2⅔= 0) ⅔The control method is PID control (CtrL = 1), individual PID heat/cool control is used (C026 ≠ 0), and the integral time (I -2⅔ or integral time for cooling of the PID group (I -2⅛) is 0.
oL-1	PID1 output low limit	−10.0 to +110.0 %	0.0	1	Displayed if the control method is PID control (CtrL = 1).
oH-1	PID1 output high limit	−10.0 to +110.0 %	100.0	1	
P-1C	PID1 proportional band (cool)	0.1–1999.9 %	5.0	0	Displayed if the control method is PID control (CtrL = 1) and individual PID heat/cool control is used (C026 = 1). The number of decimal places of the integral time for cooling and derivative time for cooling change according to [Integral time and derivative time decimal point position] (C023).
I-1C	PID1 integral time (cool)	0–19999 s (0 = no operation)	120	0	
d-1C	PID1 derivative time (cool)	0–19999 s (0 = no operation)	30	0	
oL.1C	PID1 output low limit (cool)	−10.0 to +110.0 %	0.0	1	Displayed if the control method is PID control (CtrL = 1) and heat/cool control is used (C026 ≠ 0).
oH.1C	PID1 output high limit (cool)	−10.0 to +110.0 %	100.0	1	

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Display	Item	Description	Initial value	User level	Notes
P-2	PID2 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I -2	PID2 integral time		120	0	
d-2	PID2 derivative time		30	0	
rE-2	PID2 manual reset		50.0	0	
oL-2	PID2 output low limit		0.0	1	
oH-2	PID2 output high limit		100.0	1	
P-2C	PID2 proportional band (cool)		5.0	0	
I -2C	PID2 integral time (cool)		120	0	
d-2C	PID2 derivative time (cool)		30	0	
oL.2C	PID2 output low limit (cool)		0.0	1	
oH.2C	PID2 output high limit (cool)		100.0	1	
P-3	PID3 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I -3	PID3 integral time		120	0	
d-3	PID3 derivative time		30	0	
rE-3	PID3 manual reset		50.0	0	
oL-3	PID3 output low limit		0.0	1	
oH-3	PID3 output high limit		100.0	1	
P-3C	PID3 proportional band (cool)		5.0	0	
I -3C	PID3 integral time (cool)		120	0	
d-3C	PID3 derivative time (cool)		30	0	
oL.3C	PID3 output low limit (cool)		0.0	1	
oH.3C	PID3 output high limit (cool)		100.0	1	

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Display	Item	Description	Initial value	User level	Notes
P-4	PID4 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I -4	PID4 integral time		120	0	
d-4	PID4 derivative time		30	0	
rE-4	PID4 manual reset		50.0	0	
oL-4	PID4 output low limit		0.0	1	
oH-4	PID4 output high limit		100.0	1	
P-4C	PID4 proportional band (cool)		5.0	0	
I -4C	PID4 integral time (cool)		120	0	
d-4C	PID4 derivative time (cool)		30	0	
oL.4C	PID4 output low limit (cool)		0.0	1	
oH.4C	PID4 output high limit (cool)		100.0	1	
P-5	PID5 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I -5	PID5 integral time		120	0	
d-5	PID5 derivative time		30	0	
rE-5	PID5 manual reset		50.0	0	
oL-5	PID5 output low limit		0.0	1	
oH-5	PID5 output high limit		100.0	1	
P-5C	PID5 proportional band (cool)		5.0	0	
I -5C	PID5 integral time (cool)		120	0	
d-5C	PID5 derivative time (cool)		30	0	
oL.5C	PID5 output low limit (cool)		0.0	1	
oH.5C	PID5 output high limit (cool)		100.0	1	

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Display	Item	Description	Initial value	User level	Notes
P-6	PID6 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I-6	PID6 integral time		120	0	
d-6	PID6 derivative time		30	0	
rE-6	PID6 manual reset		50.0	0	
oL-6	PID6 output low limit		0.0	1	
oH-6	PID6 output high limit		100.0	1	
P-6C	PID6 proportional band (cool)		5.0	0	
I-6C	PID6 integral time (cool)		120	0	
d-6C	PID6 derivative time (cool)		30	0	
oL.6C	PID6 output low limit (cool)		0.0	1	
oH.6C	PID6 output high limit (cool)		100.0	1	
P-7	PID7 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I-7	PID7 integral time		120	0	
d-7	PID7 derivative time		30	0	
rE-7	PID7 manual reset		50.0	0	
oL-7	PID7 output low limit		0.0	1	
oH-7	PID7 output high limit		100.0	1	
P-7C	PID7 proportional band (cool)		5.0	0	
I-7C	PID7 integral time (cool)		120	0	
d-7C	PID7 derivative time (cool)		30	0	
oL.7C	PID7 output low limit (cool)		0.0	1	
oH.7C	PID7 output high limit (cool)		100.0	1	

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Display	Item	Description	Initial value	User level	Notes
P-8	PID8 proportional band	Same as for PID1	5.0	0	Same as for PID group 1
I -8	PID8 integral time		120	0	
d-8	PID8 derivative time		30	0	
rE-8	PID8 manual reset		50.0	0	
oL-8	PID8 output low limit		0.0	1	
oH-8	PID8 output high limit		100.0	1	
P-8C	PID8 proportional band (cool)		5.0	0	
I -8C	PID8 integral time (cool)		120	0	
d-8C	PID8 derivative time (cool)		30	0	
oL8C	PID8 output low limit (cool)		0.0	1	
oH8C	PID8 output high limit (cool)		100.0	1	

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■ Parameter bank

Bank selection: PArA

Display	Item	Description	Initial value	User level	Notes
CtrL	Control method	0: ON/OFF control 1: PID control	0 or 1	0	The initial value is 0 if control output 1 is a relay output, and 1 otherwise.
At.oL	MV low limit at AT	−10.0 to +110.0 %	0.0	0	Displayed if the control method is PID control (CtrL = 1).
At.oH	MV high limit at AT		100.0	0	
dIFF	ON/OFF control differential	0–19999 U	5	0	Displayed if the control method is ON/OFF control (CtrL = 0).
oFFS	ON/OFF control operating point offset	−19999 to +19999 U	0	2	
FL	PV filter	0.0–120.0 s	0.0	0	
rA	PV ratio	0.001–19.999	1.000	1	
bI	PV bias	−19999 to +19999 U	0	0	
FL2	RSP filter	0.0–120.0 s	0.0	0	This item is displayed for models with RSP input.
rA2	RSP ratio	0.001–19.999	1.000	1	
bI2	RSP bias	−19999 to +19999 U	0	0	
r5tn	RSP linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	2	
Pu.AS	PV assignment	0: PV 1: Virtual PV	0	2	
Putn	PV linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	2	
o1tn	OUT 1 continuous output linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	2	Displayed if current output is set as control output 1 by the model No.
o2tn	OUT 2 continuous output linearization table group definition		0	2	Displayed if current output is set as control output 2 by the model No.
AUtn	AUX output continuous output linearization table group definition		0	2	This item is displayed for models with auxiliary output.
outL	Output variation limit	0.0–1999.9 %/s (0.0 = no operation)	0.0	2	Displayed if the control method is PID control (CtrL = 1).

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Display	Item	Description	Initial value	User level	Notes
SPU	SP up ramp	0–19999 U 0: No slope	0	2	Displayed if [SP ramp type] (C03 1) is set to 0 (standard). Select the time unit of the slope by [SP ramp unit] (C032). The number of decimal places changes according to [SP ramp decimal point position] (C 102).
SPd	SP down ramp		0	2	
SPPS	SP ramp PV start	0: PV start allowed 1: PV start prohibited	0	2	This item is displayed for models C3A and C3B.
rSPU	RSP up ramp	0–19999 U 0: No slope	0	2	This item is displayed for models with RSP input.
rSPd	RSP down ramp		0	2	
rSPS.	RSP ramp PV start	0: PV start allowed 1: PV start prohibited	0	2	
rSAS	RSP assignment	0: RSP 1: Virtual RSP	0	2	
rStn	RSP linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	2	

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■ Extended tuning bank

Bank selection: EE

Display	Item	Description	Initial value	User level	Notes
AtTY	AT type	0: Normal 1: Immediate response 2: Stable	0	0	Displayed if the control method is PID control (CtrL = 1).
SPLG	SP lag time	0.0–1999.9	0.0	2	
At-P	AT proportional band adjust	0.00–199.99	1.00	2	
At-I	AT integral time adjust	0.00–199.99	1.00	2	
At-d	AT derivative time adjust	0.00–199.99	1.00	2	
AtPt	MV switching point type for AT	0: Default (⅔ of the deviation of the initial PV from the initial SP) 1: SP 2: PV	0	2	
AtPu	MV switching point PV for AT	−19999 to +19999 U	0	2	Displayed if [Control method] (CtrL) is set to 1 (PID control) and [MV switching point type for AT] (AtPt) is set to 2(PV).
CtrA	Control algorithm	0: PID-A (deviation-derivative type) 1: Ra-PID (high-performance PID) 2: PID-B (PV derivative type)	0	1	Displayed if the control method is PID control (CtrL = 1).
CLG	Cooling gain	−10.0 to +110.0 %	30.0	2	Displayed if [Control method] (CtrL) is set to 1(PID control) and [Heat/cool control] (C026) is set to 2(shared PID).

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6-3 Setup Bank, etc., Settings

Meaning of user level settings
0: Simple configuration, 1: Standard configuration, 2: Advanced configuration

■ Setup bank

Bank selection: SETUP

Display	Item	Description	Initial value	User level	Notes
C001	PV input range type	For thermocouple: 1–28 For RTD: 41–70 For DC current/voltage: 81–84, 86–92	88	0	☞ ■ PV input range type (p. 5-2) (for details)
C003	Reference junction compensation (cold junction compensation)	0: Internal compensation (by this device) 1: External compensation (by another device)	0	2	Displayed if a thermocouple range is set for [PV input range type].
C004	PV decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	0	If a DC voltage/current range is set for [PV input range type] or if a thermocouple or RTD range with a decimal point is selected.
C005	PV range low limit	If a thermocouple or RTD range is set for [PV input range type] (C001),the low limit of the specified PV input range is displayed but the setting cannot be changed.	–	0	
		If a DC voltage/current range is set for [PV input range type]: –19999 to +19999 U	0		
C006	PV range high limit	If a thermocouple or RTD range is set for [PV input range type] (C001),the low limit of the specified PV input range is displayed but the setting cannot be changed.	–	0	
		If a DC voltage/current range is set for [PV input range type]: –19999 to +19999 U	1000		
C007	SP low limit	PV range low limit to PV range high limit	0	1	
C008	SP high limit		1000	1	
C009	PV square root extraction dropout	0.0–100.0 % (0.0 = no square root extraction)	0.0	2	Displayed if a DC voltage/current range is set for [PV input range type].
C010	RSP input range type	84: 0–1 V 86: 1–5 V 87: 0–5 V 88: 0–10 V 89: 0–20 mA 90: 4–20 mA 91: 2–10 V 92: –10 to +10 V	88	0	This item is displayed for models with RSP input.
C011	RSP range low limit	–19999 to +19999 U	0	0	
C012	RSP range high limit	–19999 to +19999 U	1000	0	

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Display	Item	Description	Initial value	User level	Notes
C014	Control action (direct/reverse)	0: Heating control (reverse action) 1: Cooling control (direct action)	0	0	Displayed if the control method is ON/OFF control (CtrL = 0) or PID control (CtrL = 1) and heat/cool control is not used (C026 = 0).
C015	Output operation at PV alarm	0: Continue control calculations 1: Output the value set for [Output at PV alarm]	0	2	
C016	Output at PV alarm	−10.0 to +110.0 %	0.0	2	
C017	Output at READY	−10.0 to +110.0 %	0.0	1	
C018	Output at READY (cool)	−10.0 to +110.0 %	0.0	1	Displayed if the control method is PID control (CtrL = 1) and heat/cool control is used (C026 ≠ 0)
C019	Output operation at changing AUTO/MANUAL	0: Bumpless transfer 1: Preset	0	1	Displayed if the control method is PID control (CtrL = 1). If the mode is MANUAL at power-on, the MV will be the value set by [Preset MANUAL value] (C020).
C020	Preset MANUAL value	−10.0 to +110.0 %	0.0 or 50.0	1	
C021	Initial output type of PID control	0: Automatic 1: Do not initialize 2: Initialize	0	2	
C022	Initial output of PID control	−10.0 to +110.0 %	0.0 or 50.0	2	
C023	Integral time and derivative time decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	2	Displayed if the control method is PID control (CtrL = 1).
C024	Zone PID operation	0: Do not use 1: Used with SP change 2: Used with PV change	0	2	
C026	Heat/cool control	0: Do not use 1: Individual PID 2: Shared PID	0	0	Displayed if the control method is PID control (CtrL = 1) and the sum of control outputs and event relay outputs is 2 or more. ☞ ■ Control operation and heating/cooling control (p. 5-26) (for details)
C028	Heat/cool control dead zone	−100.0 to +100.0 %	0.0	0	Displayed if heat/cool control is used (C026 ≠ 0).
C030	LSP system group	1–8	1	0	
C031	SP ramp type	0: Standard 1: Multi-ramp	0	2	
C032	SP ramp unit	0: 1 s 1: 1 min 2: 1 h	1	2	

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Display	Item	Description	Initial value	User level	Notes
C042	OUT 1 continuous output range	For current output 1: 4–20 mA 2: 0–20 mA For voltage output 1: 1–5 V 2: 0–5 V 3: 0–10 V	1	0	If OUT 1 is current output for the model of this device, the display scaling low and high limits have one digit after the decimal point when OUT 1 type is MV. When OUT 1 type is CT, the display scaling low and high limits have one digit after the decimal point for a CT model and two digits for a micro CT model. If these limits are related to the PV and SP, their decimal point position is the same as for the PV. If a standard numerical code is set, their decimal point position is the same as that of the selected standard numerical code. The unit for scaling low and high limits If OUT 1 type is set to MV: % PV or SP: the same as the PV unit CT: A (current) Standard numerical code: the same as for the unit for the selected standard numerical code
C043	OUT 1 continuous output type	0: MV 1: Heating MV 2: Cooling MV 3: Loop PV 4: Loop PV before compensation 5: Loop SP 6: Deviation 7: CT1 current when output ON 8: CT2 current when output ON 9: MFB opening (including estimate) 10: Loop SP + MV 11: Loop PV + MV 12–2047: Invalid 2048–3071: Standard numerical codes	0	0	
C044	OUT 1 continuous output scaling low limit	–19999 to +19999 U	0.0	0	
C045	OUT 1 continuous output scaling high limit		100.0	0	
C046	OUT 1 continuous output MV scaling width	0–19999 U	200	0	Displayed if current output is set as control output 1 by the model No. and if the type of control output 1 is set to loop SP + MV or loop PV + MV.
C047	OUT 2 continuous output range	Same as for OUT 1 continuous output range	1	0	Displayed if current output is set as control output 2 by the model No. The decimal point position and unit of scaling low and high limits are the same as for those of control output 1.
C048	OUT 2 continuous output type	Same as for OUT 1 continuous output type	3	0	
C049	OUT 2 continuous output scaling low limit	Same as for Output 1 continuous output scaling low limit	0	0	
C050	OUT 2 continuous output scaling high limit	Same as for Output 1 continuous output scaling high limit	1000	0	
C051	OUT 2 continuous output MV scaling width	Same as for Output 1 continuous output MV scaling width	200	0	Displayed if current output is set as control output 2 by the model No. and if the type of control output 2 is set to loop SP + MV or loop PV + MV.

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Display	Item	Description	Initial value	User level	Notes
C052	AUX output continuous output range	Same as for OUT 1 continuous output range	1	0	For models with auxiliary output, the decimal point position and unit of scaling low and high limits are the same as for those of control output 1.
C053	AUX output continuous output type	Same as for OUT 1 continuous output type	3	0	
C054	AUX output scaling low limit	Same as for Output 1 continuous output scaling low limit	0	0	
C055	AUX output scaling high limit	Same as for Output 1 continuous output scaling high limit	1000	0	
C056	AUX output MV scaling width	Same as for Output 1 continuous output MV scaling width	200	0	
C057	Position proportional control: method selection	0: MFB control + control with estimated position 1: MFB control + close upon error 2: Control with estimated position 3: Control with estimated position + position adjustment at power-on	0	0	This item is displayed for controllers with motor drive relay output (whose model No. includes "R1").
C058	Position proportional control: dead zone	0.5–25.0 %	10.0	0	
C059	Position proportional control: long service life	0: Priority on controllability 1: Priority on service life	1	0	
C060	Position proportioning: automatic adjustment	0: Stop 1: Start	0	0	This item is displayed for controllers with motor drive relay output (whose model No. includes "R1"). When using the console, press <MENU> to stop adjustment. Writing from the loader is prohibited.

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Display	Item	Description	Initial value	User level	Notes
C061	Position proportioning: adjustment value when fully closed	0–9999	1000	0	This item is displayed for controllers with motor drive relay output (whose model No. includes "R1"). Writing from the loader is prohibited.
C062	Position proportioning: adjustment value when fully open	0–9999	3000	0	
C063	Position proportioning: adjustment value for time until fully open	1.0–300.0 s	30.0	0	
C064	Communication type	0: CPL 1: Modbus/ASCII 2: Modbus/RTU 3: PLC Link Communication	0	0	Displayed if a model with RS-485 is used.
C065	Station address	1–127 (0: no communication)	0	0	
C066	Transmission speed	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4: 57600 bps	2	0	
C067	Data format (data length)	0: 7 bits 1: 8 bits	1	0	Displayed if a model with RS-485 is used and Communication type is anything other than Modbus/RTU (C064 ≠ 2).
C068	Data format (parity)	0: Even 1: Odd 2: None	0	0	Displayed if a model with RS-485 is used.
C069	Data format (stop bits)	0: 1 bit 1: 2 bits	0	0	
C070	Response time-out	1–250 ms	3	2	

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Display	Item	Description	Initial value	User level	Notes
C072	[FN] key function	0: Disable 1: AUTO/MANUAL selection 2: RUN/READY selection 3: AT stop/start instruction 4: LSP group selection 5: Release all latches 6: LSP/RSP selection 7: Invalid 8: Constant value operation / pattern operation selection 9: Pattern operation ADVANCE 10: Pattern operation HOLD 11: Pattern operation G.SOAK clear 12: FF-FITTER automatic tuning selection 13–20: Invalid 21–36: User-defined bits 1–16 selection	1	0	
C073	Mode display setup	Whether to display the settings in the mode bank is determined by the sum of the weights shown below. Bit 0: AUTO/MANUAL display No: 0, Yes: +1 Bit 1: RUN/READY display No: 0, Yes: +2 Bit 2: LSP/RSP display No: 0, Yes: +4 Bit 3: AT stop/start display No: 0, Yes: +8 Bit 4: Release all latches display No: 0, Yes: +16 Bit 6: Pattern operation function display No: 0, Yes: +64 Bit 7: FF-FITTER automatic tuning No: 0, Yes: +128 Bit 5: Invalid	255	1	
C074	PV/SP display setup	Whether to show the following items on the operation display is determined by the sum of the weights shown below. Bit 0: PV display No: 0, Yes: +1 Bit 1: SP display No: 0, Yes: +2 Bit 2: LSP group No. display No: 0, Yes: +4 Bit 3: Pattern operation display No: 0, Yes: +4 Bits 4–7: Invalid	15	1	

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Display	Item	Description	Initial value	User level	Notes
C075	MV display setup	Whether to show the following items on the operation display is determined by the sum of the weights shown below. Bit 0: MV display No: 0, Yes: +1 Bit 1: Heating MV / cooling MV No: 0, Yes: +2 Bit 2: MFB display No: 0, Yes: +8 Bit 3: AT display No: 0, Yes: +8 Bits 4–7: Invalid	15	1	
C076	Event settings display setup	0:Do not show internal event settings on the operation display 1:Show internal event 1 settings on the operation display 2:Show internal event 1–2 settings on the operation display 3:Show internal event 1–3 settings on the operation display	0	1	
C077	Event remaining time display setup	0:Do not show the ON/OFF delay remaining time of internal events on the operation display 1:Show the ON/OFF delay remaining time of internal event 1 on the operation display 2:Show the ON/OFF delay remaining time of internal events 1–2 on the operation display 3:Show the ON/OFF delay remaining time of internal events 1–3 on the operation display	0	1	
C078	CT/VT display setup	Whether to show the following items on the operation display is determined by the sum of the weights shown below. Bit 0: CT1 display No: 0, Yes: +1 Bit 1: CT2 display No: 0, Yes: +2 Bit 2: VT display No: 0, Yes: +4 Bit 3: Resistance display No: 0, Yes: +8 Bits 4–7: Invalid	0	1	Displayed if a model with two CT inputs, micro CT input, or CT/VT input is used.
C079	User level	0: Simple 1: Standard 2: Advanced	1	0	
C080	User-defined function indicator lighting conditions	1024–2047: Standard bit numbers	1024	2	
C081	Multi-status (MS) display, condition (top priority)	1024–2047: Standard bit numbers	1568	2	

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Display	Item	Description	Initial value	User level	Notes
C082	Multi-status (MS) display, status (top priority)	0: On 1: Slow blink 2: 2 times blink 3: Fast blink 4: Left to right 5: Right to left 6: Left ↔ right 7: Dev OK 8: Dev graph 9: MV graph 10: Heating MV graph (for heat/cool control) 11: Cooling MV graph (for heat/cool control) 12: MFB graph (including currently estimated MFB) 13: DI monitor 14: Internal contact monitor 15: Internal event monitor 16: Polarity MV graph 17: Progress time in pattern 18: Pattern remaining time 19: Progress time in segment 20: Segment remaining time	1	2	
C083	Multi-status (MS) display, condition (second priority)	Same as for Multi-status (MS) display, condition (top priority)	1792	2	
C084	Multi-status (MS) display, status (second priority)	Same as for Multi-status (MS) display, status (top priority)	6	2	
C085	Multi-status (MS) display, condition (third priority)	Same as for Multi-status (MS) display, condition (top priority)	1025	2	
C086	Multi-status (MS) display, status (third priority)	Same as for Multi-status (MS) display, status (top priority)	9	2	
C087	Multi-status (MS) display, deviation range	0–19999 U	5	2	
C088	Zener barrier adjustment function	0–15 Set 5 to enable adjustment.	0	2	Displayed if an RTD range is set for [PV input range type].
C089	Zener barrier adjustment value	−20.00 to +20.00	0.00	2	Displayed and can be changed if an RTD range is set for [PV input range type] and [Zener barrier adjustment function] (C088) is set to 5.
C097	PV input failure (under range) type	0: −10 % FS 1: −5 mV (valid only when C001 (PV input range type) is set to 17 or 23.)	0	0	Displayed if a thermocouple range is set for [PV input range type].
C098	Sampling cycle	0: 25 ms 1: 50 ms 2: 100 ms 3: 300 ms 4: 500 ms	1	2	

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Display	Item	Description	Initial value	User level	Notes
C099	Power frequency	0: 50 Hz 1: 60 Hz	0	2	Displayed if the sampling cycle is 25 ms (C098 = 0).
C 100	Operation display restoration time	0–60 min (Display does not switch automatically to the operation display if 0 is set.)	3	2	
C 101	MANUAL operation at power-on	0: Normal 1: Restoring MV before power outage	0	2	Displayed if a model with extended data memory is used and the control method is PID control (CtrL = 1).
C 102	SP ramp decimal point position	0: None 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	2	
C 103	Pattern operation prohibited/allowed	0: Prohibited 1: Allowed	0	2	
C 104	OS prohibited/ allowed	0: Prohibited 1: Allowed	0	2	Displayed if the control method is PID control (CtrL = 1).
C 105	FF-FITTER prohibited/allowed	0: Prohibited 1: Allowed	0	2	
C 106	Position proportional control: target type	2048–3071: Standard numerical codes	2416	2	This item is displayed for controllers with motor drive relay output (whose model No. includes "R1").
C 107	Position proportional control: linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	2	
C 108	Position proportioning: automatic adjustment result	0: Not executed 1: Succeeded 2: Failed	0	2	This item is displayed for controllers with motor drive relay output (whose model No. includes "R1").
C 109	RSP tracking	0: Tracking OFF 1: Tracking ON	0	2	This item is displayed for models with RSP input.
C 110	Fixed value output group definition	0: Do not use 1–8: Groups 1–8	0	2	This item is displayed for models C3A and C3B.
C 111	Fixed value output slope time unit	0: 1 s 1: 1 min 2: 1 h 3: 1 day	0	2	This item is displayed for models C3A and C3B.
C 112	Fixed value output slope decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0	2	
C 113	Available user operation screens	0: Do not use 1–8: Available user operation screens	0	2	This item is displayed for models C3A and C3B.
C 114	Operation display settings	0: Displays all operation screens 1: Displays basic + UO + UF screens	0	2	
C 115	Mode at startup: Run/Ready	0: Value saved in the nonvolatile memory 1: RUN 2: READY	0	0	

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■ Event configuration bank

Bank selection: EuCF

Display	Item	Description	Initial value	User level	Notes
E1C1	Internal event 1 operation type	0: No event 1: PV high limit 2: PV low limit 3: PV high and low limits 4: Deviation high limit 5: Deviation low limit 6: Deviation high and low limits 7: Deviation high limit (final SP reference) 8: Deviation low limit (final SP reference) 9: Deviation high and low limits (final SP reference) 10: SP high limit 11: SP low limit 12: SP high and low limits 13: MV high limit 14: MV low limit 15: MV high and low limits 16: MFB opening high and low limits 20: Loop diagnosis 1 21: Loop diagnosis 2 22: Loop diagnosis 3 26: High limit of standard numerical code 27: Low limit of standard numerical code 28: High and low limits of standard numerical code 29: PV change rate 55: High limit of PV change rate 56: Low limit of PV change rate 57: High limit of the change rate of standard numerical code 58: Low limit of the change rate of standard numerical code 61: Alarm (status) 62: READY (status) 63: MANUAL (status) 64: RSP (status) 65: AT in progress (status) 66: SP ramp in progress (status) 67: Control direct action (status) 70: Timer (status) 71: Estimating MFB (status)	0	0	

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Display	Item	Description	Initial value	User level	Notes
E 1C2	Internal event 1 direct/reverse	0: Direct 1: Reverse	0	0	The settings required for [Internal event 1 operation type] (E 1C 1) are displayed.
E 1C3	Internal event 1 standby	0: None 1: Standby 2: Standby + standby when the SP is changed	0	1	
E 1C4	Internal event 1 event state at READY	0: EVENT continued at Ready 1: EVENT OFF at Ready	0	1	
E 1C5	Internal event 1 delay unit	0: 1 s 1: 1 min 2: 1 h	0	2	
E 1C6	Internal event 1 delay time decimal point position	0: None 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1	2	
E 1C7	Internal event 1 operation No. definition	2048–3071: Standard numerical codes	2048	0	
E2C 1	Internal event 2 operation type	Same as for Internal event 1	0	0	
E2C2	Internal event 2 direct/reverse		0	0	The settings required for [Internal event 2 operation type] (E2C 1) are displayed.
E2C3	Internal event 2 standby		0	1	
E2C4	Internal event 2 event state at READY		0	1	
E2C5	Internal event 2 delay unit		0	2	
E2C6	Internal event 2 delay time decimal point position		1	2	
E2C7	Internal event 2 operation No. definition		2048	0	

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Display	Item	Description	Initial value	User level	Notes
E3C1	Internal event 3 operation type	Same as for Internal event 1	0	0	
E3C2	Internal event 3 direct/reverse		0	0	The settings required for [Internal event 3 operation type] (E3C1) are displayed.
E3C3	Internal event 3 standby		0	1	
E3C4	Internal event 3 event state at READY		0	1	
E3C5	Internal event 3 delay unit		0	2	
E3C6	Internal event 3 delay time decimal point position		1	2	
E3C7	Internal event 3 operation No. definition		2048	0	
E4C1	Internal event 4 operation type	Same as for Internal event 1	0	0	
E4C2	Internal event 4 direct/reverse		0	0	The settings required for [Internal event 4 operation type] (E4C1) are displayed.
E4C3	Internal event 4 standby		0	1	
E4C4	Internal event 4 event state at READY		0	1	
E4C5	Internal event 4 delay unit		0	2	
E4C6	Internal event 4 delay time decimal point position		1	2	
E4C7	Internal event 4 operation No. definition		2048	0	
E5C1	Internal event 5 operation type	Same as for Internal event 1	0	0	
E5C2	Internal event 5 direct/reverse		0	0	The settings required for [Internal event 5 operation type] (E5C1) are displayed.
E5C3	Internal event 5 standby		0	1	
E5C4	Internal event 5 event state at READY		0	1	
E5C5	Internal event 5 delay unit		0	2	
E5C6	Internal event 5 delay time decimal point position		1	2	
E5C7	Internal event 5 operation No. definition		2048	0	

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Display	Item	Description	Initial value	User level	Notes
E6C 1	Internal event 6 operation type	Same as for Internal event 1	0	0	
E6C2	Internal event 6 direct/reverse		0	0	The settings required for [Internal event 6 operation type] (E6C 1) are displayed.
E6C3	Internal event 6 standby		0	1	
E6C4	Internal event 6 event state at READY		0	1	
E6C5	Internal event 6 delay unit		0	2	
E6C6	Internal event 6 delay time decimal point position		1	2	
E6C7	Internal event 6 operation No. definition		2048	0	
E7C 1	Internal event 7 operation type	Same as for Internal event 1	0	0	
E7C2	Internal event 7 direct/reverse		0	0	The settings required for [Internal event 7 operation type] (E7C 1) are displayed.
E7C3	Internal event 7 standby		0	1	
E7C4	Internal event 7 event state at READY		0	1	
E7C5	Internal event 7 delay unit		0	2	
E7C6	Internal event 7 delay time decimal point position		1	2	
E7C7	Internal event 7 operation No. definition		2048	0	
E8C 1	Internal event 8 operation type	Same as for Internal event 1	0	0	
E8C2	Internal event 8 direct/reverse		0	0	The settings required for [Internal event 8 operation type] (E8C 1) are displayed.
E8C3	Internal event 8 standby		0	1	
E8C4	Internal event 8 event state at READY		0	1	
E8C5	Internal event 8 delay unit		0	2	
E8C6	Internal event 8 delay time decimal point position		1	2	
E8C7	Internal event 8 operation No. definition		2048	0	

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■ CT/VT bank

Bank selection: CtuE

Display	Item	Description	Initial value	User level	Notes
C1tY	CT1 operation type	0: Continuous current measurement 1: Heater burnout detection	0	0	Displayed if a model with two CT inputs, micro CT input, or CT/VT input is used.
C1no	CT1 output	0: Control output 1 1: Control output 2 2: Event output 1 3: Event output 2 4: Event output 3	0	0	Displayed if a model with two CT inputs, micro CT input, or CT/VT input is used and CT1 operation is set to heater burnout detection (C1tY = 1).
C1t1	CT1 measurement wait time	30–300 ms	30	0	
C1tn	CT1 CT turn num	100–6000 turns	800	2	Displayed if a model with two CT inputs, micro CT input, or CT/VT input is used.
C1LP	CT1 number of power wire passes	1–6 times	1	2	
C1FL	CT1 filter	0.0–120.0 s	0.1	2	
C1rA	CT1 ratio	0.001–19.999	1.000	2	
C1b1	CT1 bias	–1999.9 to +1999.9 (for a model with CT input) –199.99 to +199.99 (for a model with micro CT input)	0	2	
C1bo	CT1 heater burnout detection threshold	0.0 to 1999.9 (for a model with CT input) 0.00 to 199.99 (for a model with micro CT input)	0	2	
C1oC	CT1 overcurrent detection threshold		0	2	
C1SC	CT1 short-circuit detection threshold		0	2	Displayed if a model with two CT inputs, micro CT input, or CT/VT input is used and CT1 operation is set to heater burnout detection (C1tY = 1).
C1HY	CT1 hysteresis		0.5 or 0.05	2	Displayed if a model with two CT inputs, micro CT input, or CT/VT input is used.
C1dt	CT1 delay time	0.0–1999.9 s	2.0	2	
C1UC	CT1 condition for restoring not-measured status	1024–2047: Standard bit numbers	1024	2	

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Display	Item	Description	Initial value	User level	Notes
C2tY	CT2 operation type	Same as for CT1	0	0	Displayed if a model with two CT inputs or micro CT input is used.
C2no	CT2 output		0	0	Displayed if a model with two CT inputs or micro CT input is used and CT2 operation is set to heater burnout detection (C2tY = 2).
C2t1	CT2 measurement wait time		30	0	
C2tn	CT2 CT turn num		800	2	Displayed if a model with two CT inputs or micro CT input is used.
C2LP	CT2 number of power wire passes		1	2	
C2FL	CT2 filter		0.1	2	
C2rA	CT2 ratio		1.0000	2	
C2bI	CT2 bias		0	2	
C2bo	CT2 heater burnout detection threshold		0	2	
C2oC	CT2 overcurrent detection threshold		0	2	
C2SC	CT2 short-circuit detection threshold		0	2	Displayed if a model with two CT inputs or micro CT input is used and CT2 operation is set to heater burnout detection (C2tY = 1).
C2HY	CT2 hysteresis		0.5 or 0.05	2	Displayed if a model with two CT inputs or micro CT input is used.
C2dt	CT2 delay time		2.0	2	
C2UC	CT2 condition for restoring not-measured status		1024	2	
utPr	VT primary voltage	1.0–500.0 V	200.0	2	Displayed if a model with CT/VT input is used.
utSE	VT secondary voltage	1.0–11.0 V	10.0	2	
utFL	VT filter	0.0–120.0 s	0.1	2	
utrA	VT ratio	0.001–19.999	1.000	2	
utbI	VT bias	−1999.9 to +1999.9 V	0.0	2	

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■ Internal contacts bank

Bank selection: I C

Display	Item	Description	Initial value	User level	Notes
I C 1.1	Internal contact 1 operation type	0: No function 1: LSP group selection (0/+1) 2: LSP group selection (0/+2) 3: LSP group selection (0/+4) 4: PID group selection (0/+1) 5: PID group selection (0/+2) 6: PID group selection (0/+4) 7: Reserved 8: PV hold 9: PV max. hold 10: PV min. hold 11: Fixed value output selection (0/+1) 12: Fixed value output selection (0/+2) 13: Fixed value output selection (0/+4) 14: Reserved 15: Output linearization table group selection (0/+1) 16: Output linearization table group selection (0/+2) 17–20: Reserved 21: RUN/READY selection 22: AUTO/MANUAL selection 23: LSP/RSP selection 24: AT stop/start selection 25–30: Reserved 31: RUN/READY selection (reverse) 32: AUTO/MANUAL selection (reverse) 33: LSP/RSP selection (reverse) 34–40: Reserved 41: Control operation direct/reverse selection 42: SP ramp enabled/disabled 43–45: Reserved 46: Timer stop/start selection 47: Release/continue all latches 48: Motor drive output: opening operation 49: Motor drive output: closing operation 50: Reserved 51: RUN/READY selection (edge) 52: AUTO/MANUAL selection (edge) 53: LSP/RSP selection (edge) 54: RUN selection (edge) 55: READY selection (edge) 56: AUTO selection (edge) 57: MANUAL selection (edge) 58: LSP selection (edge) 59: RSP selection (edge) 60: Constant value operation / pattern operation selection 61: ADVANCE 62: HOLD 63: G.SOAK clear 64–65: Reserved 66: Constant value operation / pattern operation selection (edge) 67: HOLD (edge) 68: G.SOAK clear (edge) 69: Reserved 70: Pattern selection (0/+1) 71: Pattern selection (0/+2) 72: Pattern selection (0/+4) 73: Pattern selection (0/+8) 74: Reserved	0	0	

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Display	Item	Description	Initial value	User level	Notes
1C12	Internal contact 1 input type	1024–2047: Standard bit numbers	1152	2	
1C13	Internal contact 1 operation No. definition	When [Operation type] is [Timer start/stop selection]: 0: All internal events 1–8: Internal event No. Other: Invalid (does not operate) When [Operation type] is [Output linearization table group selection]: 1:Control output 1 continuous output 2:Control output 2 continuous output 3:AUX output continuous output 11:Control output 1 time proportional output 12:Control output 2 time proportional output 13:Event output 1 time proportional output 14:Event output 2 time proportional output 15:Event output 3 time proportional output Other: Invalid (does not operate)	0	2	
1C2.1	Internal contact 2 operation type	Same as for Internal contact 1	0	0	
1C22	Internal contact 2 input type		1153	2	
1C23	Internal contact 2 operation No. definition		0	2	
1C3.1	Internal contact 3 operation type	Same as for Internal contact 1	0	0	
1C32	Internal contact 3 input type		1054	2	
1C33	Internal contact 3 operation No. definition		0	2	
1C4.1	Internal contact 4 operation type	Same as for Internal contact 1	0	0	
1C42	Internal contact 4 input type		1055	2	
1C43	Internal contact 4 operation No. definition		0	2	
1C5.1	Internal contact 5 operation type	Same as for Internal contact 1	0	0	
1C52	Internal contact 5 input type		1024	2	
1C53	Internal contact 5 operation No. definition		0	2	

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Display	Item	Description	Initial value	User level	Notes
1 C6.1	Internal contact 6 operation type	Same as for Internal contact 1	0	0	
1 C6.2	Internal contact 6 input type		1024	2	
1 C6.3	Internal contact 6 operation No. definition		0	2	
1 C7.1	Internal contact 7 operation type	Same as for Internal contact 1	0	0	
1 C7.2	Internal contact 7 input type		1024	2	
1 C7.3	Internal contact 7 operation No. definition		0	2	
1 C8.1	Internal contact 8 operation type	Same as for Internal contact 1	0	0	
1 C8.2	Internal contact 8 input type		1024	2	
1 C8.3	Internal contact 8 operation No. definition		0	2	

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■ DO bank

Bank selection: do

Display	Item	Description	Initial value	User level	Notes
do 1.1	OUT 1 DO operation type	0: ON/OFF output 1: Time proportional output	1 or 0	0	Displayed if control output 1 is set to relay output or voltage pulse output by the model No.
do 1.2	OUT 1 ON/OFF output type	1024–2047: Standard bit numbers	1024 or 1264	0	Displayed if relay output or voltage pulse output is set as control output 1 by the model No. and [OUT 1 DO operation type] is set to ON/OFF output (do 1.1 = 0).
do 1.3	OUT 1 time proportional output type	2048–3071: Standard numerical codes	2416	0	Displayed if relay output or voltage pulse output is set as control output 1 by the model No. and [OUT 1 DO operation type] is set to time proportional output (do 1.1 = 1).
do 1.4	OUT 1 time proportional operation type	0: Priority on controllability 1: Priority on actuator service life	0 or 1	2	
do 1.5	OUT 1 time proportional cycle	0.1–120.0 s	10.0 or 2.0	0	
do 1.6	OUT 1 minimum ON/OFF time	1–250 ms At least 50 ms operation for relay output	50 or 1	2	Displayed if control output 1 is set to relay output or voltage pulse output by the model No.
do 1.7	OUT 1 time proportional linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0	2	Displayed if relay output or voltage pulse output is set as control output 1 by the model No. and [OUT 1 DO operation type] is set to time proportional output (do 1.1 = 1).
do2.1	OUT 2 DO operation type	Same as for OUT 1	1	0	Displayed if control output 2 is set to relay output or voltage pulse output by the model No.
do2.2	OUT 2 ON/OFF output type		1024	0	Displayed if relay output or voltage pulse output is set as control output 2 by the model No. and [OUT 2 DO operation type] is set to ON/OFF output (do2.1 = 0).
do2.3	OUT 2 time proportional output type		2048	0	Displayed if relay output or voltage pulse output is set as control output 2 by the model No. and [OUT 2 DO operation type] is set to time proportional output (do2.1 = 1).
do2.4	OUT 2 time proportional operation type		0 or 1	2	
do2.5	OUT 2 time proportional cycle		10.0 or 2.0	0	
do2.6	OUT 2 minimum ON/OFF time		50 or 1	2	Displayed if control output 2 is set to relay output or voltage pulse output by the model No.
do2.7	OUT 2 time proportional linearization table group definition		0	2	Displayed if relay output or voltage pulse output is set as control output 2 by the model No. and [OUT 2 DO operation type] is set to time proportional output (do2.1 = 1).

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Display	Item	Description	Initial value	User level	Notes
do3.1	EV1 DO operation type	Same as for OUT 1	0	0	Displayed if a model with event output 1 is used.
do3.2	EV1 ON/OFF output type		1088	0	Displayed if event output 1 is selected by the model No. and [EV1 DO operation type] is set to ON/OFF output (do31 = 0).
do3.3	EV1 time proportional output type		2048	0	Displayed if event output 1 is selected by the model No. and [EV1 DO operation type] is set to time proportional output (do31 = 1).
do3.4	EV1 time proportional operation type		0 or 1	2	
do3.5	EV1 time proportional cycle		10.0 or 2.0	0	
do3.6	EV1 minimum ON/OFF time		50 or 1	2	Displayed if a model with event output 1 is used.
do3.7	EV1 time proportional linearization table group definition		0	2	Displayed if event output 1 is selected by the model No. and [EV1 DO operation type] is set to time proportional output (do31 = 1).
do4.1	EV2 DO operation type	Same as for OUT 1	0	0	Displayed if a model with event output 2 is used.
do4.2	EV2 ON/OFF output type		1089	0	Displayed if event output 2 is selected by the model No. and [EV2 DO operation type] is set to ON/OFF output (do41 = 0).
do4.3	EV2 time proportional output type		2048	0	Displayed if event output 2 is selected by the model No. and [EV2 DO operation type] is set to time proportional output (do41 = 2).
do4.4	EV2 time proportional operation type		0 or 1	2	
do4.5	EV2 time proportional cycle		10.0 or 2.0	0	
do4.6	EV2 minimum ON/OFF time		50 or 1	2	Displayed if a model with event output 2 is used.
do4.7	EV2 time proportional linearization table group definition		0	2	Displayed if event output 2 is selected by the model No. and [EV2 DO operation type] is set to time proportional output (do41 = 2).

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Display	Item	Description	Initial value	User level	Notes
do5.1	EV3 DO operation type	Same as for OUT 1	0	0	Displayed if a model with event output 3 is used.
do5.2	EV3 ON/OFF output type		1090	0	Displayed if event output 3 is selected by the model No. and [EV3 DO operation type] is set to ON/OFF output (do5.1 = 0).
do5.3	EV3 time proportional output type		2048	0	Displayed if event output 3 is selected by the model No. and [EV3 DO operation type] is set to time proportional output (do5.1 = 3).
do5.4	EV3 time proportional operation type		0 or 1	2	
do5.5	EV3 time proportional cycle		10.0 or 2.0	0	
do5.6	EV3 minimum ON/OFF time 1		50 or 1	2	Displayed if a model with event output 3 is used.
do5.7	EV3 time proportional linearization table group definition		0	2	Displayed if event output 3 is selected by the model No. and [EV3 DO operation type] is set to time proportional output (do5.1 = 3).

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■ Logical operation bank

Bank selection: bF

Display	Item	Description	Initial value	User level	Notes
tY01	Logical operation 1 calculation type	1: Function 1 (A and B) or (C and D) 2: Function 2 (A or B) and (C or D) 3: Function 3 (A or B or C or D) 4: Function 4 (A and B and C and D) 5: Function 5 (((A and B) or C) and D)	1	2	
A-01	Logical operation 1 input assign A	1024–2047: Standard bit numbers	1024		
b-01	Logical operation 1 input assign B		1024		
C-01	Logical operation 1 input assign C		1024		
d-01	Logical operation 1 input assign D		1024		
PA01	Logical operation 1 input bit polarity A	0: Direct 1: Invert 2: Rising 3: Falling	0		
Pb01	Logical operation 1 input bit polarity B		0		
PC01	Logical operation 1 input bit polarity C		0		
Pd01	Logical operation 1 input bit polarity D		0		
dU01	Logical operation 1 delay unit	0: 1 s 1: 1 min 2: 1 h	0		
dP01	Logical operation 1 delay time decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	1		
on01	Logical operation 1 ON delay time	0–19999 U (The decimal point position is determined by [Logical operation 1 delay time decimal point position] (dP□ 1).)	0		
oF01	Logical operation 1 OFF delay time		0		
rE01	Logical operation 1 polarity	0: Direct 1: Invert	0		
Lt01	Logical operation 1 latch	0: No 1: Yes (ON latch) 2: Yes (OFF latch) (except OFF at power-on)	0		

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Display	Item	Description	Initial value	User level	Notes
tY02	Logical operation 2 calculation type	Same as for Logical operation 1	1	2	
A-02	Logical operation 2 input assign A		1024		
b-02	Logical operation 2 input assign B		1024		
C-02	Logical operation 2 input assign C		1024		
d-02	Logical operation 2 input assign D		1024		
PA02	Logical operation 2 input bit polarity A		0		
Pb02	Logical operation 2 input bit polarity B		0		
PC02	Logical operation 2 input bit polarity C		0		
Pd02	Logical operation 2 input bit polarity D		0		
dU02	Logical operation 2 delay unit		0		
dP02	Logical operation 2 delay time decimal point position		1		
on02	Logical operation 2 ON delay time		0		
oF02	Logical operation 2 OFF delay time		0		
rE02	Logical operation 2 polarity		0		
LE02	Logical operation 2 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY03	Logical operation 3 calculation type	Same as for Logical operation 1	1	2	
A-03	Logical operation 3 input assign A		1024		
b-03	Logical operation 3 input assign B		1024		
C-03	Logical operation 3 input assign C		1024		
d-03	Logical operation 3 input assign D		1024		
PA03	Logical operation 3 input bit polarity A		0		
Pb03	Logical operation 3 input bit polarity B		0		
PC03	Logical operation 3 input bit polarity C		0		
Pd03	Logical operation 3 input bit polarity D		0		
dU03	Logical operation 3 delay unit		0		
dP03	Logical operation 3 delay time decimal point position		1		
on03	Logical operation 3 ON delay time		0		
oF03	Logical operation 3 OFF delay time		0		
rE03	Logical operation 3 polarity		0		
Lt03	Logical operation 3 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY.04	Logical operation 4 calculation type	Same as for Logical operation 1	1	2	
A-04	Logical operation 4 input assign A		1024		
b-04	Logical operation 4 input assign B		1024		
C-04	Logical operation 4 input assign C		1024		
d-04	Logical operation 4 input assign D		1024		
PA.04	Logical operation 4 input bit polarity A		0		
Pb.04	Logical operation 4 input bit polarity B		0		
PC.04	Logical operation 4 input bit polarity C		0		
Pd.04	Logical operation 4 input bit polarity D		0		
dU.04	Logical operation 4 delay unit		0		
dP.04	Logical operation 4 delay time decimal point position		1		
on.04	Logical operation 4 ON delay time		0		
oF.04	Logical operation 4 OFF delay time		0		
rE.04	Logical operation 4 polarity		0		
LE.04	Logical operation 4 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY.05	Logical operation 5 calculation type	Same as for Logical operation 1	1	2	
A-05	Logical operation 5 input assign A		1024		
b-05	Logical operation 5 input assign B		1024		
C-05	Logical operation 5 input assign C		1024		
d-05	Logical operation 5 input assign D		1024		
PA.05	Logical operation 5 input bit polarity A		0		
Pb.05	Logical operation 5 input bit polarity B		0		
PC.05	Logical operation 5 input bit polarity C		0		
Pd.05	Logical operation 5 input bit polarity D		0		
dU.05	Logical operation 5 delay unit		0		
dP.05	Logical operation 5 delay time decimal point position		1		
on.05	Logical operation 5 ON delay time		0		
oF.05	Logical operation 5 OFF delay time		0		
rE.05	Logical operation 5 polarity		0		
LE.05	Logical operation 5 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY.06	Logical operation 6 calculation type	Same as for Logical operation 1	1	2	
A-06	Logical operation 6 input assign A		1024		
b-06	Logical operation 6 input assign B		1024		
C-06	Logical operation 6 input assign C		1024		
d-06	Logical operation 6 input assign D		1024		
PA.06	Logical operation 6 input bit polarity A		0		
Pb.06	Logical operation 6 input bit polarity B		0		
PC.06	Logical operation 6 input bit polarity C		0		
Pd.06	Logical operation 6 input bit polarity D		0		
dU.06	Logical operation 6 delay unit		0		
dP.06	Logical operation 6 delay time decimal point position		1		
on.06	Logical operation 6 ON delay time		0		
oF.06	Logical operation 6 OFF delay time		0		
rE.06	Logical operation 6 polarity		0		
LE.06	Logical operation 6 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY07	Logical operation 7 calculation type	Same as for Logical operation 1	1	2	
A-07	Logical operation 7 input assign A		1024		
b-07	Logical operation 7 input assign B		1024		
C-07	Logical operation 7 input assign C		1024		
d-07	Logical operation 7 input assign D		1024		
PA07	Logical operation 7 input bit polarity A		0		
Pb07	Logical operation 7 input bit polarity B		0		
PC07	Logical operation 7 input bit polarity C		0		
Pd07	Logical operation 7 input bit polarity D		0		
dU07	Logical operation 7 delay unit		0		
dP07	Logical operation 7 delay time decimal point position		1		
on07	Logical operation 7 ON delay time		0		
oF07	Logical operation 7 OFF delay time		0		
rE07	Logical operation 7 polarity		0		
LE07	Logical operation 7 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY08	Logical operation 8 calculation type	Same as for Logical operation 1	1	2	
A-08	Logical operation 8 input assign A		1024		
b-08	Logical operation 8 input assign B		1024		
C-08	Logical operation 8 input assign C		1024		
d-08	Logical operation 8 input assign D		1024		
PA08	Logical operation 8 input bit polarity A		0		
Pb08	Logical operation 8 input bit polarity B		0		
PC08	Logical operation 8 input bit polarity C		0		
Pd08	Logical operation 8 input bit polarity D		0		
dU08	Logical operation 8 delay unit		0		
dP08	Logical operation 8 delay time decimal point position		1		
on08	Logical operation 8 ON delay time		0		
oF08	Logical operation 8 OFF delay time		0		
rE08	Logical operation 8 polarity		0		
LE08	Logical operation 8 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY09	Logical operation 9 calculation type	Same as for Logical operation 1	1	2	
A-09	Logical operation 9 input assign A		1024		
b-09	Logical operation 9 input assign B		1024		
C-09	Logical operation 9 input assign C		1024		
d-09	Logical operation 9 input assign D		1024		
PA09	Logical operation 9 input bit polarity A		0		
Pb09	Logical operation 9 input bit polarity B		0		
PC09	Logical operation 9 input bit polarity C		0		
Pd09	Logical operation 9 input bit polarity D		0		
dU09	Logical operation 9 delay unit		0		
dP09	Logical operation 9 delay time decimal point position		1		
on09	Logical operation 9 ON delay time		0		
oF09	Logical operation 9 OFF delay time		0		
rE09	Logical operation 9 polarity		0		
LE09	Logical operation 9 latch		0		

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Display	Item	Description	Initial value	User level	Notes
Ey.10	Logical operation 10 calculation type	Same as for Logical operation 1	1	2	
A-10	Logical operation 10 input assign A		1024		
b-10	Logical operation 10 input assign B		1024		
C-10	Logical operation 10 input assign C		1024		
d-10	Logical operation 10 input assign D		1024		
PA.10	Logical operation 10 input bit polarity A		0		
Pb.10	Logical operation 10 input bit polarity B		0		
PC.10	Logical operation 10 input bit polarity C		0		
Pd.10	Logical operation 10 input bit polarity D		0		
dU.10	Logical operation 10 delay unit		0		
dP.10	Logical operation 10 delay time decimal point position		1		
on.10	Logical operation 10 ON delay time		0		
oF.10	Logical operation 10 OFF delay time		0		
rE.10	Logical operation 10 polarity		0		
LE.10	Logical operation 10 latch		0		

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Display	Item	Description	Initial value	User level	Notes
tY.11	Logical operation 11 calculation type	Same as for Logical operation 1	1	2	
A-11	Logical operation 11 input assign A		1024		
b-11	Logical operation 11 input assign B		1024		
C-11	Logical operation 11 input assign C		1024		
d-11	Logical operation 11 input assign D		1024		
PA.11	Logical operation 11 input bit polarity A		0		
Pb.11	Logical operation 11 input bit polarity B		0		
PC.11	Logical operation 11 input bit polarity C		0		
Pd.11	Logical operation 11 input bit polarity D		0		
dU.11	Logical operation 11 delay unit		0		
dP.11	Logical operation 11 delay time decimal point position		1		
on.11	Logical operation 11 ON delay time		0		
oF.11	Logical operation 11 OFF delay time		0		
rE.11	Logical operation 11 polarity		0		
LE.11	Logical operation 11 latch		0		

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Display	Item	Description	Initial value	User level	Notes
Ey.12	Logical operation 12 calculation type	Same as for Logical operation 1	1	2	
A-12	Logical operation 12 input assign A		1024		
b-12	Logical operation 12 input assign B		1024		
C-12	Logical operation 12 input assign C		1024		
d-12	Logical operation 12 input assign D		1024		
PA.12	Logical operation 12 input bit polarity A		0		
Pb.12	Logical operation 12 input bit polarity B		0		
PC.12	Logical operation 12 input bit polarity C		0		
Pd.12	Logical operation 12 input bit polarity D		0		
dU.12	Logical operation 12 delay unit		0		
dP.12	Logical operation 12 delay time decimal point position		1		
on.12	Logical operation 12 ON delay time		0		
oF.12	Logical operation 12 OFF delay time		0		
rE.12	Logical operation 12 polarity		0		
Lt.12	Logical operation 12 latch		0		

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Display	Item	Description	Initial value	User level	Notes
ty.13	Logical operation 13 calculation type	Same as for Logical operation 1	1	2	
A-13	Logical operation 13 input assign A		1024		
b-13	Logical operation 13 input assign B		1024		
C-13	Logical operation 13 input assign C		1024		
d-13	Logical operation 13 input assign D		1024		
PA.13	Logical operation 13 input bit polarity A		0		
Pb.13	Logical operation 13 input bit polarity B		0		
PC.13	Logical operation 13 input bit polarity C		0		
Pd.13	Logical operation 13 input bit polarity D		0		
dU.13	Logical operation 13 delay unit		0		
dP.13	Logical operation 13 delay time decimal point position		1		
on.13	Logical operation 13 ON delay time		0		
oF.13	Logical operation 13 OFF delay time		0		
rE.13	Logical operation 13 polarity		0		
Lt.13	Logical operation 13 latch		0		

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Display	Item	Description	Initial value	User level	Notes
ty.14	Logical operation 14 calculation type	Same as for Logical operation 1	1	2	
A-14	Logical operation 14 input assign A		1024		
b-14	Logical operation 14 input assign B		1024		
C-14	Logical operation 14 input assign C		1024		
d-14	Logical operation 14 input assign D		1024		
PA.14	Logical operation 14 input bit polarity A		0		
Pb.14	Logical operation 14 input bit polarity B		0		
PC.14	Logical operation 14 input bit polarity C		0		
Pd.14	Logical operation 14 input bit polarity D		0		
dU.14	Logical operation 14 delay unit		0		
dP.14	Logical operation 14 delay time decimal point position		1		
on.14	Logical operation 14 ON delay time		0		
oF.14	Logical operation 14 OFF delay time		0		
rE.14	Logical operation 14 polarity		0		
Lt.14	Logical operation 14 latch		0		

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Display	Item	Description	Initial value	User level	Notes
ty.15	Logical operation 15 calculation type	Same as for Logical operation 1	1	2	
A-15	Logical operation 15 input assign A		1024		
b-15	Logical operation 15 input assign B		1024		
C-15	Logical operation 15 input assign C		1024		
d-15	Logical operation 15 input assign D		1024		
PA.15	Logical operation 15 input bit polarity A		0		
Pb.15	Logical operation 15 input bit polarity B		0		
PC.15	Logical operation 15 input bit polarity C		0		
Pd.15	Logical operation 15 input bit polarity D		0		
dU.15	Logical operation 15 delay unit		0		
dP.15	Logical operation 15 delay time decimal point position		1		
on.15	Logical operation 15 ON delay time		0		
oF.15	Logical operation 15 OFF delay time		0		
rE.15	Logical operation 15 polarity		0		
LE.15	Logical operation 15 latch		0		

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Display	Item	Description	Initial value	User level	Notes
Ly.16	Logical operation 16, Calculation type	Same as for Logical operation 1	1	2	
A-16	Logical operation 16 input assign A		1024		
b-16	Logical operation 16 input assign B		1024		
C-16	Logical operation 16 input assign C		1024		
d-16	Logical operation 16 input assign D		1024		
PA.16	Logical operation 16 input bit polarity A		0		
Pb.16	Logical operation 16 input bit polarity B		0		
PC.16	Logical operation 16 input bit polarity C		0		
Pd.16	Logical operation 16 input bit polarity D		0		
dU.16	Logical operation 16 delay unit		0		
dP.16	Logical operation 16 delay time decimal point position		1		
on.16	Logical operation 16 ON delay time		0		
oF.16	Logical operation 16 OFF delay time		0		
rE.16	Logical operation 16 polarity		0		
Lt.16	Logical operation 16 latch		0		

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■ Linearization table bank

Bank selection: tbL

Display	Item	Description	Initial value	User level	Notes
t 1ty	Linearization table 1 operation type	0: Breakpoint 1: Bias	0	2	
t 1dP	Linearization table 1 decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	1		
1A01	Linearization table 1 breakpoint A1	−19999 to +19999 U	−1999.9		The number of decimal places changes according to [Linearization table 1 decimal point position] (t 1dP).
1A02	Linearization table 1 breakpoint A2		1999.9		
1A03	Linearization table 1 breakpoint A3		0.0		
1A04	Linearization table 1 breakpoint A4		0.0		
1A05	Linearization table 1 breakpoint A5		0.0		
1A06	Linearization table 1 breakpoint A6		0.0		
1A07	Linearization table 1 breakpoint A7		0.0		
1A08	Linearization table 1 breakpoint A8		0.0		
1A09	Linearization table 1 breakpoint A9		0.0		
1A 10	Linearization table 1 breakpoint A10		0.0		
1A 11	Linearization table 1 breakpoint A11		0.0		
1A 12	Linearization table 1 breakpoint A12		0.0		
1A 13	Linearization table 1 breakpoint A13		0.0		
1A 14	Linearization table 1 breakpoint A14		0.0		
1A 15	Linearization table 1 breakpoint A15		0.0		
1A 16	Linearization table 1 breakpoint A16		0.0		
1A 17	Linearization table 1 breakpoint A17		0.0		

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Display	Item	Description	Initial value	User level	Notes
1A.18	Linearization table 1 breakpoint A18	−19999 to +19999 U	0.0	2	The number of decimal places changes according to [Linearization table 1 decimal point position] (Ł ıdP).
1A.19	Linearization table 1 breakpoint A19		0.0		
1A20	Linearization table 1 breakpoint A20		0.0		
1b01	Linearization table 1 breakpoint B1		−1999.9		
1b02	Linearization table 1 breakpoint B2		1999.9		
1b03	Linearization table 1 breakpoint B3		0.0		
1b04	Linearization table 1 breakpoint B4		0.0		
1b05	Linearization table 1 breakpoint B5		0.0		
1b06	Linearization table 1 breakpoint B6		0.0		
1b07	Linearization table 1 breakpoint B7		0.0		
1b08	Linearization table 1 breakpoint B8		0.0		
1b09	Linearization table 1 breakpoint B9		0.0		
1b.10	Linearization table 1 breakpoint B10		0.0		
1b.11	Linearization table 1 breakpoint B11		0.0		
1b.12	Linearization table 1 breakpoint B12		0.0		
1b.13	Linearization table 1 breakpoint B13		0.0		
1b.14	Linearization table 1 breakpoint B14		0.0		
1b.15	Linearization table 1 breakpoint B15		0.0		
1b.16	Linearization table 1 breakpoint B16		0.0		
1b.17	Linearization table 1 breakpoint B17		0.0		
1b.18	Linearization table 1 breakpoint B18		0.0		

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Display	Item	Description	Initial value	User level	Notes
1b.19	Linearization table 1 breakpoint B19	−19999 to +19999 U	0.0	2	The number of decimal places changes according to [Linearization table 1 decimal point position] (Lt 1dP).
1b20	Linearization table 1 breakpoint B20		0.0		
Lt2Ty	Linearization table 2 operation type	Same as for Linearization table 1	0		
Lt2dP	Linearization table 2 decimal point position		1		
2A01	Linearization table 2 breakpoint A1		−1999.9		The number of decimal places changes according to [Linearization table 2 decimal point position] (Lt2dP).
2A02	Linearization table 2 breakpoint A2		1999.9		
2A03	Linearization table 2 breakpoint A3		0.0		
2A04	Linearization table 2 breakpoint A4		0.0		
2A05	Linearization table 2 breakpoint A5		0.0		
2A06	Linearization table 2 breakpoint A6		0.0		
2A07	Linearization table 2 breakpoint A7		0.0		
2A08	Linearization table 2 breakpoint A8		0.0		
2A09	Linearization table 2 breakpoint A9		0.0		
2A.10	Linearization table 2 breakpoint A10		0.0		
2A.11	Linearization table 2 breakpoint A11		0.0		
2A.12	Linearization table 2 breakpoint A12		0.0		
2A.13	Linearization table 2 breakpoint A13		0.0		
2A.14	Linearization table 2 breakpoint A14		0.0		
2A.15	Linearization table 2 breakpoint A15		0.0		
2A.16	Linearization table 2 breakpoint A16		0.0		
2A.17	Linearization table 2 breakpoint A17		0.0		

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Display	Item	Description	Initial value	User level	Notes
2A.18	Linearization table 2 breakpoint A18	Same as for Linearization table 1	0.0	2	The number of decimal places changes according to [Linearization table 2 decimal point position] (t2dP).
2A.19	Linearization table 2 breakpoint A19		0.0		
2A20	Linearization table 2 breakpoint A20		0.0		
2b01	Linearization table 2 breakpoint B1		–1999.9		
2b02	Linearization table 2 breakpoint B2		1999.9		
2b03	Linearization table 2 breakpoint B3		0.0		
2b04	Linearization table 2 breakpoint B4		0.0		
2b05	Linearization table 2 breakpoint B5		0.0		
2b06	Linearization table 2 breakpoint B6		0.0		
2b07	Linearization table 2 breakpoint B7		0.0		
2b08	Linearization table 2 breakpoint B8		0.0		
2b09	Linearization table 2 breakpoint B9		0.0		
2b.10	Linearization table 2 breakpoint B10		0.0		
2b.11	Linearization table 2 breakpoint B11		0.0		
2b.12	Linearization table 2 breakpoint B12		0.0		
2b.13	Linearization table 2 breakpoint B13		0.0		
2b.14	Linearization table 2 breakpoint B14		0.0		
2b.15	Linearization table 2 breakpoint B15		0.0		
2b.16	Linearization table 2 breakpoint B16		0.0		
2b.17	Linearization table 2 breakpoint B17		0.0		
2b.18	Linearization table 2 breakpoint B18		0.0		

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Display	Item	Description	Initial value	User level	Notes
2b.19	Linearization table 2 breakpoint B19	Same as for Linearization table 1	0.0	2	The number of decimal places changes according to [Linearization table 2 decimal point position] (t2dP).
2b20	Linearization table 2 breakpoint B20		0.0		
t3tY	Linearization table 3 operation type	Same as for Linearization table 1	0		
t3dP	Linearization table 3 decimal point position		1		
3A01	Linearization table 3 breakpoint A1		–1999.9		The number of decimal places changes according to [Linearization table 3 decimal point position] (t3dP).
3A02	Linearization table 3 breakpoint A2		1999.9		
3A03	Linearization table 3 breakpoint A3		0.0		
3A04	Linearization table 3 breakpoint A4		0.0		
3A05	Linearization table 3 breakpoint A5		0.0		
3A06	Linearization table 3 breakpoint A6		0.0		
3A07	Linearization table 3 breakpoint A7		0.0		
3A08	Linearization table 3 breakpoint A8		0.0		
3A09	Linearization table 3 breakpoint A9		0.0		
3A.10	Linearization table 3 breakpoint A10		0.0		
3A.11	Linearization table 3 breakpoint A11		0.0		
3A.12	Linearization table 3 breakpoint A12		0.0		
3A.13	Linearization table 3 breakpoint A13		0.0		
3A.14	Linearization table 3 breakpoint A14		0.0		
3A.15	Linearization table 3 breakpoint A15		0.0		
3A.16	Linearization table 3 breakpoint A16		0.0		
3A.17	Linearization table 3 breakpoint A17		0.0		

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Display	Item	Description	Initial value	User level	Notes
3A.18	Linearization table 3 breakpoint A18	Same as for Linearization table 1	0.0	2	The number of decimal places changes according to [Linearization table 3 decimal point position] (t3dP).
3A.19	Linearization table 3 breakpoint A19		0.0		
3A20	Linearization table 3 breakpoint A20		0.0		
3b01	Linearization table 3 breakpoint B1		–1999.9		
3b02	Linearization table 3 breakpoint B2		1999.9		
3b03	Linearization table 3 breakpoint B3		0.0		
3b04	Linearization table 3 breakpoint B4		0.0		
3b05	Linearization table 3 breakpoint B5		0.0		
3b06	Linearization table 3 breakpoint B6		0.0		
3b07	Linearization table 3 breakpoint B7		0.0		
3b08	Linearization table 3 breakpoint B8		0.0		
3b09	Linearization table 3 breakpoint B9		0.0		
3b.10	Linearization table 3 breakpoint B10		0.0		
3b.11	Linearization table 3 breakpoint B11		0.0		
3b.12	Linearization table 3 breakpoint B12		0.0		
3b.13	Linearization table 3 breakpoint B13		0.0		
3b.14	Linearization table 3 breakpoint B14		0.0		
3b.15	Linearization table 3 breakpoint B15		0.0		
3b.16	Linearization table 3 breakpoint B16		0.0		
3b.17	Linearization table 3 breakpoint B17		0.0		
3b.18	Linearization table 3 breakpoint B18		0.0		

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Display	Item	Description	Initial value	User level	Notes
3b.19	Linearization table 3 breakpoint B19	Same as for Linearization table 1	0.0	2	The number of decimal places changes according to [Linearization table 3 decimal point position] (t3dP).
3b20	Linearization table 3 breakpoint B20		0.0		
t4t4	Linearization table 4 operation type	Same as for Linearization table 1	0		
t4dP	Linearization table 4 decimal point position		1		
4A01	Linearization table 4 breakpoint A1		–1999.9		The number of decimal places changes according to [Linearization table 4 decimal point position] (t4dP).
4A02	Linearization table 4 breakpoint A2		1999.9		
4A03	Linearization table 4 breakpoint A3		0.0		
4A04	Linearization table 4 breakpoint A4		0.0		
4A05	Linearization table 4 breakpoint A5		0.0		
4A06	Linearization table 4 breakpoint A6		0.0		
4A07	Linearization table 4 breakpoint A7		0.0		
4A08	Linearization table 4 breakpoint A8		0.0		
4A09	Linearization table 4 breakpoint A9		0.0		
4A.10	Linearization table 4 breakpoint A10		0.0		
4A.11	Linearization table 4 breakpoint A11		0.0		
4A.12	Linearization table 4 breakpoint A12		0.0		
4A.13	Linearization table 4 breakpoint A13		0.0		
4A.14	Linearization table 4 breakpoint A14		0.0		
4A.15	Linearization table 4 breakpoint A15		0.0		
4A.16	Linearization table 4 breakpoint A16		0.0		
4A.17	Linearization table 4 breakpoint A17		0.0		

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Display	Item	Description	Initial value	User level	Notes
4A.18	Linearization table 4 breakpoint A18		0.0	2	The number of decimal places changes according to [Linearization table 4 decimal point position] (tYdP).
4A.19	Linearization table 4 breakpoint A19		0.0		
4A20	Linearization table 4 breakpoint A20		0.0		
4b01	Linearization table 4 breakpoint B1		–1999.9		
4b02	Linearization table 4 breakpoint B2		1999.9		
4b03	Linearization table 4 breakpoint B3		0.0		
4b04	Linearization table 4 breakpoint B4		0.0		
4b05	Linearization table 4 breakpoint B5		0.0		
4b06	Linearization table 4 breakpoint B6		0.0		
4b07	Linearization table 4 breakpoint B7		0.0		
4b08	Linearization table 4 breakpoint B8		0.0		
4b09	Linearization table 4 breakpoint B9		0.0		
4b.10	Linearization table 4 breakpoint B10		0.0		
4b.11	Linearization table 4 breakpoint B11		0.0		
4b.12	Linearization table 4 breakpoint B12		0.0		
4b.13	Linearization table 4 breakpoint B13		0.0		
4b.14	Linearization table 4 breakpoint B14		0.0		
4b.15	Linearization table 4 breakpoint B15		0.0		
4b.16	Linearization table 4 breakpoint B16		0.0		
4b.17	Linearization table 4 breakpoint B17		0.0		
4b.18	Linearization table 4 breakpoint B18		0.0		
4b.19	Linearization table 4 breakpoint B19	Same as for Linearization table 1	0.0	2	The number of decimal places changes according to [Linearization table 4 decimal point position] (tYdP).
4b20	Linearization table 4 breakpoint B20		0.0		

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■ Zone bank

Bank selection: ZonE

Display	Item	Description	Initial value	User level	Notes
Zn-1	Zone 1	−19999 to +19999 U	19999	2	Displayed if the control method is PID control (CtrL = 1) and use of zone PID is enabled (C024 ≠ 0).
Zn-2	Zone 2				
Zn-3	Zone 3				
Zn-4	Zone 4				
Zn-5	Zone 5				
Zn-6	Zone 6				
Zn-7	Zone 7				
Zndf	Zone hysteresis	0–19999 U	5		

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■ User-defined bit bank

Bank selection: Ud0

Display	Item	Description	Initial value	User level	Notes
Ub01	User-defined bit 1	0–1	0	2	
Ub02	User-defined bit 2				
Ub03	User-defined bit 3				
Ub04	User-defined bit 4				
Ub05	User-defined bit 5				
Ub06	User-defined bit 6				
Ub07	User-defined bit 7				
Ub08	User-defined bit 8				
Ub09	User-defined bit 9				
Ub 10	User-defined bit 10				
Ub 11	User-defined bit 11				
Ub 12	User-defined bit 12				
Ub 13	User-defined bit 13				
Ub 14	User-defined bit 14				
Ub 15	User-defined bit 15				
Ub 16	User-defined bit 16				

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■ User-defined value bank

Bank selection: Udu

Display	Item	Description	Initial value	User level	Notes
St01	User-defined value 1 Sign type	0: Signed 1: Unsigned	0	2	
PS01	User-defined value 1 Settings decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	0		
Uu01	User-defined value 1 Settings user-defined value	−32768 to +32767U (signed) 0 to 65535U (unsigned)	0		The number of decimal places changes according to [Settings decimal point position] (PS0 1).
Pn01	User-defined value 1 Monitor decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point 4: 4 digits after the decimal point	0		
Un01	User-defined value 1 User-defined monitor value	−19999 to +19999 U (signed) 0 to 19999 U (unsigned)	–		The number of decimal places changes according to [Monitor decimal point position] (Pn0 1).
St02	User-defined value 2 Sign type	Same as for User-defined value 1	0		
PS02	User-defined value 2 Settings decimal point position		0		
Uu02	User-defined value 2 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS02).
Pn02	User-defined value 2 Monitor decimal point position		0		
Un02	User-defined value 2 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn02).
St03	User-defined value 3 Sign type	Same as for User-defined value 1	0		
PS03	User-defined value 3 Settings decimal point position		0		
Uu03	User-defined value 3 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS03).
Pn03	User-defined value 3 Monitor decimal point position		0		
Un03	User-defined value 3 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (PS03).

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Display	Item	Description	Initial value	User level	Notes
St04	User-defined value 4 Sign type	Same as for User-defined value 1	0	2	
P504	User-defined value 4 Settings decimal point position		0		
Uu04	User-defined value 4 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P504).
Pn04	User-defined value 4 Monitor decimal point position		0		
Un04	User-defined value 4 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn04).
St05	User-defined value 5 Sign type	Same as for User-defined value 1	0		
P505	User-defined value 5 Settings decimal point position		0		
Uu05	User-defined value 5 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P505).
Pn05	User-defined value 5 Monitor decimal point position		0		
Un05	User-defined value 5 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn05).
St06	User-defined value 6 Sign type	Same as for User-defined value 1	0		
P506	User-defined value 6 Settings decimal point position		0		
Uu06	User-defined value 6 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P506).
Pn06	User-defined value 6 Monitor decimal point position		0		
Un06	User-defined value 6 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn06).
St07	User-defined value 7 Sign type	Same as for User-defined value 1	0		
P507	User-defined value 7 Settings decimal point position		0		
Uu07	User-defined value 7 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P507).
Pn07	User-defined value 7 Monitor decimal point position		0		
Un07	User-defined value 7 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn07).

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Display	Item	Description	Initial value	User level	Notes
St08	User-defined value 8 Sign type	Same as for User-defined value 1	0	2	
P508	User-defined value 8 Settings decimal point position		0		
Uu08	User-defined value 8 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P508).
Pn08	User-defined value 8 Monitor decimal point position		0		
Un08	User-defined value 8 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn08).
St09	User-defined value 9 Sign type	Same as for User-defined value 1	0		
P509	User-defined value 9 Settings decimal point position		0		
Uu09	User-defined value 9 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P509).
Pn09	User-defined value 9 Monitor decimal point position		0		
Un09	User-defined value 9 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn09).
St 10	User-defined value 10 Sign type	Same as for User-defined value 1	0		
P5 10	User-defined value 10 Settings decimal point position		0		
Uu 10	User-defined value 10 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P5 10).
Pn 10	User-defined value 10 Monitor decimal point position		0		
Un 10	User-defined value 10 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 10).
St 11	User-defined value 11 Sign type	Same as for User-defined value 1	0		
P5 11	User-defined value 11 Settings decimal point position		0		
Uu 11	User-defined value 11 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (P5 11).
Pn 11	User-defined value 11 Monitor decimal point position		0		
Un 11	User-defined value 11 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 11).

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Display	Item	Description	Initial value	User level	Notes
St 12	User-defined value 12 Sign type	Same as for User-defined value 1	0	2	
PS 12	User-defined value 12 Settings decimal point position		0		
Uu 12	User-defined value 12 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS 12).
Pn 12	User-defined value 12 Monitor decimal point position		0		
Un 12	User-defined value 12 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 12).
St 13	User-defined value 13 Sign type	Same as for User-defined value 1	0		
PS 13	User-defined value 13 Settings decimal point position		0		
Uu 13	User-defined value 13 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS 13).
Pn 13	User-defined value 13 Monitor decimal point position		0		
Un 13	User-defined value 13 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 13).
St 14	User-defined value 14 Sign type	Same as for User-defined value 1	0		
PS 14	User-defined value 14 Settings decimal point position		0		
Uu 14	User-defined value 14 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS 14).
Pn 14	User-defined value 14 Monitor decimal point position		0		
Un 14	User-defined value 14 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 14).
St 15	User-defined value 15 Sign type	Same as for User-defined value 1	0		
PS 15	User-defined value 15 Settings decimal point position		0		
Uu 15	User-defined value 15 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS 15).
Pn 15	User-defined value 15 Monitor decimal point position		0		
Un 15	User-defined value 15 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 15).

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Display	Item	Description	Initial value	User level	Notes
St 16	User-defined value 16 Sign type	Same as for User-defined value 1	0	2	
PS 16	User-defined value 16 Settings decimal point position		0		
Uu 16	User-defined value 16 Settings user-defined value		0		The number of decimal places changes according to [Settings decimal point position] (PS 16).
Pn 16	User-defined value 16 Monitor decimal point position		0		
Un 16	User-defined value 16 User-defined monitor value		–		The number of decimal places changes according to [Monitor decimal point position] (Pn 16).

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■ Pattern operation configuration bank

Bank selection: PtCF

Display	Item	Description	Initial value	User level	Notes
PC.01	Pattern time unit	0: 1 s 1: 1 min 2: 1 h	0	2	Displayed if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed).
PC.02	Pattern time decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0		
PC.03	Pattern SP change limit decimal point position	0: No decimal point 1: 1 digit after the decimal point 2: 2 digits after the decimal point 3: 3 digits after the decimal point	0		
PC.04	Pattern SP increase change limit	0–19999 U (0 = no change limit)	0		Displayed if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed). The number of decimal places changes according to Pattern SP change limit decimal point position (PC03).
PC.05	Pattern SP decrease change limit		0		
PC.06	Power outage recovery operation type	0: Stop pattern operation at power-on (READY) 1: Resume pattern operation at power-on	0		Displayed if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed).
PC.07	Pattern start number	Model with extended data memory: 1–16 Model without extended data memory: 1	1		Displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed](C 103) is set to 1 (Allowed).
PC.08	Power outage recovery occurrence	0: None 1: Power restored after an outage 0 (None) can be set from Power outage recovery occurrence.	0		Displayed if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed).
PC.09	Number of executed cycles	0–19999 times	–		Displayed (but cannot be changed) if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed).
PC.10	Number of remaining cycles				
PC.11	Progress time in pattern	0–19999 U	–		Displayed (but cannot be changed) if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed). The number of decimal places changes according to [Pattern time decimal point position] (PC02). Fractional amounts less than 25 ms are truncated.
PC.12	Pattern remaining time				
PC.13	Progress time in segment				
PC.14	Segment remaining time				
PC.15	Segment event status	0: No segment event 1–16: Current segment event	–		Displayed if [Pattern operation prohibited/ allowed] (C 103) is set to 1 (Allowed).

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■ Patterns 1–16 bank

Bank selection: Pbn1 to Pbn9

Display	Item	Description	Initial value	User level	Notes
Pt 1.1 to Pt9.1	Patterns 1–16 segment count	1–16	16	2	Pattern 1 is displayed if [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). Patterns 2–16 are displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed).
Pt 1.2 to Pt9.2	Patterns 1–16 PV start	0: Disable PV start 1: Enable PV start	0		
Pt 1.3 to Pt9.3	Patterns 1–16 operation end status	0: READY 1: END 2: Constant value operation	0		
Pt 1.4 to Pt9.4	Patterns 1–16 cycle	0–19999	0		
Pt 1.5 to Pt9.5	Patterns 1–16 pattern link	Model with extended data memory: 0–16 Model without extended data memory: 0–1 0 means no link.	0		
Pt 1.6 to Pt9.6	Patterns 1–16 G.SOAK time	0–19999 U	2		Pattern 1 is displayed if [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). Patterns 2–16 are displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). The number of decimal places changes according to Pattern time decimal point position (PC02).
SP 1.1	Patterns 1–16 segment 1 SP	SP low limit to high limit	0		Pattern 1 is displayed if [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). Patterns 2–16 are displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). The number of decimal places changes according to [PV decimal point position] (C004).

Note Pt_1 to Pt_6: A pattern No. (hex) is displayed in place of "_". The 16th pattern is displayed as 9.

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Display	Item	Description	Initial value	User level	Notes
SG 12	Patterns 1–16 segment 1 time	0–19999 U	0	2	Pattern 1 is displayed if [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). Patterns 2–16 are displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). The number of decimal places changes according to Pattern time decimal point position (PC02).
SG 13	Patterns 1–16 segment 1 PID group No.	1–8	1		Pattern 1 is displayed if [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). Patterns 2–16 are displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed).
SG 14	Patterns 1–16 segment 1 segment event	0: No segment event 1–16: Segment No.	0		
SG 15	Patterns 1–16 segment 1 G.SOAK type	0: No G.SOAK 1: G.SOAK at the segment end point 2: G.SOAK at the start of a segment	0		
SG 16	Patterns 1–16 segment 1 G.SOAK width	0–19999 U	1		Pattern 1 is displayed if [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). Patterns 2–16 are displayed if a model with extended data memory is used and [Pattern operation prohibited/allowed] (C103) is set to 1 (Allowed). The number of decimal places changes according to PV decimal point position (C004).
SG2.1	Patterns 1–16 segment 2 SP	Same as for segment 1	0		Displayed if the selected pattern has two or more segments and the same condition as segment 1 is met.
SG22	Patterns 1–16 segment 2 time	Same as for segment 1	0		
SG23	Patterns 1–16 segment 2 PID group No.	0–8 0 means the same PID group number as the previous segment.	0		
SG24	Patterns 1–16 segment 2 segment event	Same as for segment 1	0		
SG25	Patterns 1–16 segment 2 G.SOAK type	Same as for segment 1	0		
SG26	Patterns 1–16 segment 2 G.SOAK width	Same as for segment 1	1		

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Display	Item	Description	Initial value	User level	Notes
503.1	Patterns 1–16 segment 3 SP	Same as for segment 2	0	2	Displayed if the selected pattern has three or more segments and the same condition as segment 1 is met.
503.2	Patterns 1–16 segment 3 time		0		
503.3	Patterns 1–16 segment 3 PID group No.		0		
503.4	Patterns 1–16 segment 3 segment event		0		
503.5	Patterns 1–16 segment 3 G.SOAK type		0		
503.6	Patterns 1–16 segment 3 G.SOAK width		1		
504.1	Patterns 1–16 segment 4 SP	Same as for segment 2	0		Displayed if the selected pattern has four or more segments and the same condition as segment 1 is met.
504.2	Patterns 1–16 segment 4 time		0		
504.3	Patterns 1–16 segment 4 PID group No.		0		
504.4	Patterns 1–16 segment 4 segment event		0		
504.5	Patterns 1–16 segment 4 G.SOAK type		0		
504.6	Patterns 1–16 segment 4 G.SOAK width		1		
505.1	Patterns 1–16 segment 5 SP	Same as for segment 2	0		Displayed if the selected pattern has five or more segments and the same condition as segment 1 is met.
505.2	Patterns 1–16 segment 5 time		0		
505.3	Patterns 1–16 segment 5 PID group No.		0		
505.4	Patterns 1–16 segment 5 segment event		0		
505.5	Patterns 1–16 segment 5 G.SOAK type		0		
505.6	Patterns 1–16 segment 5 G.SOAK width		1		

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Display	Item	Description	Initial value	User level	Notes
506.1	Patterns 1–16 segment 6 SP	Same as for segment 2	0	2	Displayed if the selected pattern has six or more segments and the same condition as segment 1 is met.
506.2	Patterns 1–16 segment 6 time		0		
506.3	Patterns 1–16 segment 6 PID group No.		0		
506.4	Patterns 1–16 segment 6 segment event		0		
506.5	Patterns 1–16 segment 6 G.SOAK type		0		
506.6	Patterns 1–16 segment 6 G.SOAK width		1		
507.1	Patterns 1–16 segment 7 SP	Same as for segment 2	0		Displayed if the selected pattern has seven or more segments and the same condition as segment 1 is met.
507.2	Patterns 1–16 segment 7 time		0		
507.3	Patterns 1–16 segment 7 PID group No.		0		
507.4	Patterns 1–16 segment 7 segment event		0		
507.5	Patterns 1–16 segment 7 G.SOAK type		0		
507.6	Patterns 1–16 segment 7 G.SOAK width		1		
508.1	Patterns 1–16 segment 8 SP	Same as for segment 2	0		Displayed if the selected pattern has eight or more segments and the same condition as segment 1 is met.
508.2	Patterns 1–16 segment 8 time		0		
508.3	Patterns 1–16 segment 8 PID group No.		0		
508.4	Patterns 1–16 segment 8 segment event		0		
508.5	Patterns 1–16 segment 8 G.SOAK type		0		
508.6	Patterns 1–16 segment 8 G.SOAK width		1		

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Display	Item	Description	Initial value	User level	Notes
509.1	Patterns 1–16 segment 9 SP	Same as for segment 2	0	2	Displayed if the selected pattern has nine or more segments and the same condition as segment 1 is met.
509.2	Patterns 1–16 segment 9 time		0		
509.3	Patterns 1–16 segment 9 PID group No.		0		
509.4	Patterns 1–16 segment 9 segment event		0		
509.5	Patterns 1–16 segment 9 G.SOAK type		0		
509.6	Patterns 1–16 segment 9 G.SOAK width		1		
510.1	Patterns 1–16 segment 10 SP	Same as for segment 2	0		Displayed if the selected pattern has 10 or more segments and the same condition as segment 1 is met.
510.2	Patterns 1–16 segment 10 time		0		
510.3	Patterns 1–16 segment 10 PID group No.		0		
510.4	Patterns 1–16 segment 10 segment event		0		
510.5	Patterns 1–16 segment 10 G.SOAK type		0		
510.6	Patterns 1–16 segment 10 G.SOAK width		1		
511.1	Patterns 1–16 segment 11 SP	Same as for segment 2	0		Displayed if the selected pattern has 11 or more segments and the same condition as segment 1 is met.
511.2	Patterns 1–16 segment 11 time		0		
511.3	Patterns 1–16 segment 11 PID group No.		0		
511.4	Patterns 1–16 segment 11 segment event		0		
511.5	Patterns 1–16 segment 11 G.SOAK type		0		
511.6	Patterns 1–16 segment 11 G.SOAK width		1		

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Display	Item	Description	Initial value	User level	Notes
S 12.1	Patterns 1–16 segment 12 SP	Same as for segment 2	0	2	Displayed if the selected pattern has 12 or more segments and the same condition as segment 1 is met.
S 12.2	Patterns 1–16 segment 12 time		0		
S 12.3	Patterns 1–16 segment 12 PID group No.		0		
S 12.4	Patterns 1–16 segment 12 segment event		0		
S 12.5	Patterns 1–16 segment 12 G.SOAK type		0		
S 12.6	Patterns 1–16 segment 12 G.SOAK width		1		
S 13.1	Patterns 1–16 segment 13 SP	Same as for segment 2	0		Displayed if the selected pattern has 13 or more segments and the same condition as segment 1 is met.
S 13.2	Patterns 1–16 segment 13 time		0		
S 13.3	Patterns 1–16 segment 13 PID group No.		0		
S 13.4	Patterns 1–16 segment 13 segment event		0		
S 13.5	Patterns 1–16 segment 13 G.SOAK type		0		
S 13.6	Patterns 1–16 segment 13 G.SOAK width		1		
S 14.1	Patterns 1–16 segment 14 SP	Same as for segment 2	0		Displayed if the selected pattern has 14 or more segments and the same condition as segment 1 is met.
S 14.2	Patterns 1–16 segment 14 time		0		
S 14.3	Patterns 1–16 segment 14 PID group No.		0		
S 14.4	Patterns 1–16 segment 14 segment event		0		
S 14.5	Patterns 1–16 segment 14 G.SOAK type		0		
S 14.6	Patterns 1–16 segment 14 G.SOAK width		1		

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Display	Item	Description	Initial value	User level	Notes
S 15.1	Patterns 1–16 segment 15 SP	Same as for segment 2	0	2	Displayed if the selected pattern has 15 or more segments and the same condition as segment 1 is met.
S 15.2	Patterns 1–16 segment 15 time		0		
S 15.3	Patterns 1–16 segment 15 PID group No.		0		
S 15.4	Patterns 1–16 segment 15 segment event		0		
S 15.5	Patterns 1–16 segment 15 G.SOAK type		0		
S 15.6	Patterns 1–16 segment 15 G.SOAK width		1		
S 16.1	Patterns 1–16 segment 16 SP	Same as for segment 2	0		Displayed if the selected pattern has 16 or more segments and the same condition as segment 1 is met.
S 16.2	Patterns 1–16 segment 16 time		0		
S 16.3	Patterns 1–16 segment 16 PID group No.		0		
S 16.4	Patterns 1–16 segment 16 segment event		0		
S 16.5	Patterns 1–16 segment 16 G.SOAK type		0		
S 16.6	Patterns 1–16 segment 16 G.SOAK width		1		

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■ Overshoot suppression bank

Bank selection: o5

Display	Item	Description	Initial value	User level	Notes
o55.1	SPOS prohibited/ allowed	0: Prohibited 1: Allowed	0	2	Displayed if the control method is PID control (CtrL = 1) and OS is allowed (C 104 = 1).
o552	OS SP change detection threshold	0–19999 U (0 = SPOS operation stopped)	0		Displayed if the control method is PID control (CtrL = 1) and OS is allowed (C 104 = 1).
o553	SPOS operation type	0: Peak reference 1: Deviation reference	0		Displayed if the control method is PID control (CtrL = 1), OS is allowed (C 104 = 1), and SPOS is allowed (o55.1 = 1).
o554	SPOS starting threshold	0–19999 U (The peak reference operation of SPOS is stopped when 0 is set or when the sum of the SPOS starting threshold and the OS disturbance detection threshold is greater than or equal to the peak deviation.)	0		Displayed if the control method is PID control (CtrL = 1), OS is allowed (C 104 = 1), SPOS is allowed (o55.1 = 1), and SPOS operation type is peak reference (o553 = 0).
o555	SPOS starting deviation	0–19999 U (The deviation reference operation of SPOS is stopped when 0 or a value less than the OS disturbance detection threshold is set.)	0		Displayed if the control method is PID control (CtrL = 1), OS is allowed (C 104 = 1), SPOS is allowed (o55.1 = 1), and SPOS operation type is deviation reference (o553 = 1).
o556	SPOS PV start	0: PV start prohibited 1: PV start allowed	0		Displayed if the control method is PID control (CtrL = 1), OS is allowed (C 104 = 1), and SPOS is allowed (o55.1 = 1).
o557	SPOS correction strength	−1999.9 to +1999.9 % (0.0 = SPOS operation stopped)	0.0		
o558	SPOS correction constant	0–1999.9 (0.0 = SPOS operation stopped)	0.0		
o5d.1	DROS prohibited/ allowed	0: Prohibited 1: Allowed	0		Displayed if the control method is PID control (CtrL = 1) and OS is allowed (C 104 = 1).
o5d2	OS disturbance detection threshold	0–19999 U (DROS operation is stopped if 0 is set. The peak reference operation of SPOS is stopped when the sum of the SPOS starting threshold and the OS disturbance detection threshold is greater than or equal to the peak deviation.)	0		
o5d3	DROS operation type	0: Peak reference 1: Deviation reference	0		Displayed if the control method is PID control (CtrL = 1), OS is allowed (C 104 = 1), and DROS is allowed (o5d.1 = 1).
o5d4	DROS correction before start	0: No correction 1: Use correction	0		
o5d5	DROS starting threshold	0–19999 U (0 = Peak reference operation of DROS stopped)	0		Displayed if the control method is PID control (CtrL = 1), OS is allowed (C 104 = 1), and DROS is allowed (o5d.1 = 1).

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Display	Item	Description	Initial value	User level	Notes
o5.d6	DROS starting deviation	−19999 to +19999 U (0 = Deviation reference operation of DROS stopped)	0	2	Displayed if the control method is PID control (Ctrl = 1), OS is allowed (C104 = 1), DROS is allowed (o5d.1 = 1), and DROS operation type is deviation reference (o5d3 = 1).
o5.d7	DROS correction strength	−1999.9 to +1999.9 % (0.0 = DROS operation stopped)	0.0		Displayed if the control method is PID control (Ctrl = 1), OS is allowed (C104 = 1), and DROS is allowed (o5d.1 = 1).
o5.d8	DROS correction constant	0–1999.9 (0.0 = DROS operation stopped)	0.0		

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■ FF-FITTER bank

Bank selection: FFF

Display	Item	Description	Initial value	User level	Notes
oP	FF-FITTER operation type	1024–2047: Standard bit numbers	1024	2	Displayed if the control method is PID control (CtrL = 1) and FF-FITTER is allowed (C 105 = 1).
t 1	T1 period	0.0–1999.9 s	0.0		
t 1tY	T1 period MV type	0: Feedback MV 1: Fixed MV (bumpless) 2: Fixed MV (preset)	0		
FF 1	FF1 preset MV	−10.0 to +110.0 %	0.0		
t 1A	T1A period	0.0–1999.9 s	0.0		
FF 1A	FF1A MV	−10.0 to +110.0 %	0.0		
t2tY	T2 period initial output type of PID control	0: Feedback MV 1: Fixed MV	0		
t2nu	T2 period initial output of PID control	−10.0 to +110.0 %	0.0		
t2	T2 period	0.0–1999.9 s	0.0		
FF2	FF2 MV	−120.0 to +120.0 %	0.0		
FF3	FF3 MV	−120.0 to +120.0 %	0.0		
AC.1	T1 period automatic tuning coefficient	0.00–199.99	1.00		
AC2	T2 period automatic tuning coefficient	0.00–199.99	1.00		
At.1	T1 period automatic tuning threshold	0.00–199.99 %	1.00		
At3	FF3 MV automatic tuning type	0: (Maximum − Minimum) ÷ 2 1: Maximum 2: Minimum 3: Average	0		
AStS	FF-FITTER automatic tuning status	0: Not run / normal termination 1: Automatic tuning in progress 2: Abnormal termination	0		

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■ Fixed value output bank

Bank selection: Fo

Display	Item	Description	Initial value	User level	Notes
Fo1.1	Fixed value output 1 MV	−10.0 to +110 %	0.0	2	This item is displayed for models C3A and C3B.
Fo1.2	Fixed value output 1 up ramp	0–19999 U (0 U = no slope)	0		This item is displayed for models C3A and C3B. The number of decimal places changes according to [Fixed value output slope decimal point position] (dP12).
Fo1.3	Fixed value output 1 down ramp				
Fo2.1	Fixed value output 2 MV	Same as for Fixed value output 1	0.0		Same as for Fixed value output 1
Fo2.2	Fixed value output 2 up ramp		0		
Fo2.3	Fixed value output 2 down ramp				
Fo3.1	Fixed value output 3 MV	Same as for Fixed value output 1	0.0		Same as for Fixed value output 1
Fo3.2	Fixed value output 3 up ramp		0		
Fo3.3	Fixed value output 3 down ramp				
Fo4.1	Fixed value output 4 MV	Same as for Fixed value output 1	0.0		Same as for Fixed value output 1
Fo4.2	Fixed value output 4 up ramp		0		
Fo4.3	Fixed value output 4 down ramp				
Fo5.1	Fixed value output 5 MV	Same as for Fixed value output 1	0.0		Same as for Fixed value output 1
Fo5.2	Fixed value output 5 up ramp		0		
Fo5.3	Fixed value output 5 down ramp				
Fo6.1	Fixed value output 6 MV	Same as for Fixed value output 1	0.0		Same as for Fixed value output 1
Fo6.2	Fixed value output 6 up ramp		0		
Fo6.3	Fixed value output 6 down ramp				

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Display	Item	Description	Initial value	User level	Notes
Fo7.1	Fixed value output 7 MV	Same as for Fixed value output 1	0.0	2	Same as for Fixed value output 1
Fo7.2	Fixed value output 7 up ramp		0		
Fo7.3	Fixed value output 7 down ramp				
Fo8.1	Fixed value output 8 MV	Same as for Fixed value output 1	0.0		Same as for Fixed value output 1
Fo8.2	Fixed value output 8 up ramp		0		
Fo8.3	Fixed value output 8 down ramp				

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■ Virtual PV bank

Bank selection: uPu

Display	Item	Description	Initial value	User level	Notes
ui.tY	Virtual PV input type	2048–3071: Standard numerical codes	2048	2	
ui.FL	Virtual PV filter	0.0–120.0 s	0.0		
ui.rA	Virtual PV ratio	0.001–19.999	1.000		
ui.bI	Virtual PV bias	–19999 to +19999 U	0		The number of decimal places changes according to [PV decimal point position] (dP4).
ui.iL	Virtual PV input scaling low limit	–19999 to +19999 U	0		The number of decimal places changes according to the standard numerical code selected by [Virtual PV input type] (utY).
ui.iH	Virtual PV input scaling high limit		1000		
ui.oL	Virtual PV output scaling low limit	–19999 to +19999 U	0		The number of decimal places changes according to [PV decimal point position] (dP4).
ui.oH	Virtual PV output scaling high limit		1000		
ui.Sd	Virtual PV square root extraction dropout	0.0–100.0	0.0		
ui.tn	Virtual PV linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0		

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■ Virtual RSP bank

Bank selection: urSP

Display	Item	Description	Initial value	User level	Notes
urty	Virtual RSP input type	2048–3071: Standard numerical codes	2048	2	This item is displayed for models with RSP input.
urFL	Virtual RSP filter	0.0–120.0 s	0.0		This item is displayed for models with RSP input.
urrA	Virtual RSP ratio	0.001–19.999	1.000		This item is displayed for models with RSP input.
urbI	Virtual RSP bias	–19999 to +19999 U	0		This item is displayed for models with RSP input. The number of decimal places changes according to [PV decimal point position] (dP04).
uri L	Virtual RSP input scaling low limit	–19999 to +19999 U	0		This item is displayed for models with RSP input. The number of decimal places changes according to the standard numerical code selected by [Virtual RSP input type] (utty).
uri H	Virtual RSP input scaling high limit		1000		
uroL	Virtual RSP output scaling low limit	–19999 to +19999 U	0		This item is displayed for models with RSP input. The number of decimal places changes according to [PV decimal point position] (dP04).
uroH	Virtual RSP output scaling high limit		1000		
urtn	Virtual RSP linearization table group definition	0: Do not use 1–4: Number of the linearization table group to use	0		This item is displayed for models with RSP input.

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■ User operation screen bank

Bank selection: Uo

Display	Item	Description	Initial value	User level	Notes
Uo 1.1	User operation screen 1 Data shown in display field 1	2048–3071: Standard numerical codes	2048	2	This item is displayed for models C3A/C3B and if [Available user operation screens] (C113) is set to 1 or more.
Uo 1.2	User operation screen 1 Data shown in display field 2				
Uo 1.3	User operation screen 1 Data shown in display field 3				
Uo2.1	User operation screen 2 Data shown in display field 1	Same as for User operation screen 1			This item is displayed for models C3A/C3B and if [Available user operation screens] (C113) is set to 2 or more.
Uo2.2	User operation screen 2 Data shown in display field 2				
Uo2.3	User operation screen 2 Data shown in display field 3				
Uo3.1	User operation screen 3 Data shown in display field 1	Same as for User operation screen 1			This item is displayed for models C3A/C3B and if [Available user operation screens] (C113) is set to 3 or more.
Uo3.2	User operation screen 3 Data shown in display field 2				
Uo3.3	User operation screen 3 Data shown in display field 3				
Uo4.1	User operation screen 4 Data shown in display field 1	Same as for User operation screen 1			This item is displayed for models C3A/C3B and if [Available user operation screens] (C113) is set to 4 or more.
Uo4.2	User operation screen 4 Data shown in display field 2				
Uo4.3	User operation screen 4 Data shown in display field 3				
Uo5.1	User operation screen 5 Data shown in display field 1	Same as for User operation screen 1			This item is displayed for models C3A/C3B and if [Available user operation screens] (C113) is set to 5 or more.
Uo5.2	User operation screen 5 Data shown in display field 2				
Uo5.3	User operation screen 5 Data shown in display field 3				
Uo6.1	User operation screen 6 Data shown in display field 1	Same as for User operation screen 1			This item is displayed for models C3A/C3B and if [Available user operation screens] (C113) is set to 6 or more.
Uo6.2	User operation screen 6 Data shown in display field 2				
Uo6.3	User operation screen 6 Data shown in display field 3				

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Display	Item	Description	Initial value	User level	Notes
Uo7.1	User operation screen 7 Data shown in display field 1	Same as for User operation screen 1	2048	2	This item is displayed for models C3A/C3B and if [Available user operation screens] (E113) is set to 7 or more.
Uo7.2	User operation screen 7 Data shown in display field 2				
Uo7.3	User operation screen 7 Data shown in display field 3				
Uo8.1	User operation screen 8 Data shown in display field 1	Same as for User operation screen 1			This item is displayed for models C3A/C3B and if [Available user operation screens] (E113) is set to 8 or more.
Uo8.2	User operation screen 8 Data shown in display field 2				
Uo8.3	User operation screen 8 Data shown in display field 3				

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■ User function bank

Bank selection: UF

Display	Item	Description	Initial value	User level	Notes
UF-1	User Function 1	Displayed text can be defined for each item. The following are special cases. ---- : Unregistered P-_: P(Proportional Band) in use I-_: I (Integral time) in use d-_: D (Derivative time) in use rE-_: Manual Reset in use oL-_: Output low limit in use oH-_: Output high limit in use P-_C: P (Proportional Band) (Cool) in use I-_C: I (Integral time) (Cool) in use d-_C: D (Derivative time) (Cool) in use oL_C: Output low limit (Cool) in use oH_C: Output high limit (Cool) in use	----	1	Only the settings that can be displayed can be registered. (For example, manual reset of the PID constants can be registered when integral time = 0) Registered settings are added to the end of the list of settings that are shown on the operation display.
UF-2	User Function 2				
UF-3	User Function 3				
UF-4	User Function 4				
UF-5	User Function 5				
UF-6	User Function 6				
UF-7	User Function 7				
UF-8	User Function 8				

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■ Lock bank

Bank selection: LoC

Display	Item	Description	Initial value	User level	Notes
LoC	Key lock	0: All settings can be specified. 1:Mode, event, operation display, SP, UF, lock, manual MV, and [FN] key operation can be specified. 2:Operation display, SP, UF, lock, manual MV, and [FN] key operation can be specified. 3:UF, lock, manual MV, and [FN] key operation can be specified.	0	0	The setting can be specified if the two sets of passwords (1A and 1B, 2A and 2B) match. The [FN] key operation, MV in MANUAL mode, key lock, password display, and passwords 1A–2B can be specified when any value from 0–3 is set for key lock (LOC).
C.LoC	Communication lock	0: Unlocked 1: Locked	0	2	Reset to 0 each time the power is turned on.
L.LoC	Loader lock	0: Unlocked, 1: Locked	0	2	
PASS	Password display	0–15 (5: Displays passwords 1A–2B)	0	0	
PS 1A	Password 1A	0000–FFFF (hex)	0000	0	The setting can be specified if password display (PASS) is set to 5 and the two sets of passwords (1A and 1B, 2A and 2B) match.
PS2A	Password 2A	0000–FFFF (hex)	0000	0	
PS 1b	Password 1B	0000–FFFF (hex)	0000	0	Displayed if password display (PASS) is set to 5.
PS2b	Password 2B	0000–FFFF (hex)	0000	0	

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■ Instrument Information Bank

Bank selection: Id

Display	Item	Description	Initial value	User level	Notes
Id01	ROM ID	Model C2A: 18 Model C2B: 19 Model C3A: 20 Model C3B: 21	–	2	ROM firmware identification The setting cannot be changed.
Id02	ROM version 1		–		
Id03	ROM version 2		–		
Id04 *	Loader information		–		
Id05 *	EST information		–		
Id06 *	Manufacturing date code (year)	Year – 2000 Example: Year 2024 is 24	–		Date of manufacture and serial No. The setting cannot be changed.
Id07 *	Manufacturing date code (month, day)	Month + (day ÷ 100) Example: Dec. 1 is 12.01.	–		
Id08 *	Serial No.		–		
Id09 *	Model No.		–		Product identification code The setting cannot be changed.
Id10 *	Model information		–		
Id11 *	Production base code		–		
FP01	Advanced function password 1	0000–FFFF (hex)	0000		
FP02	Advanced function password 2	0000–FFFF (hex)	0000		
FP03	Advanced function password 3	0000–FFFF (hex)	0000		
FP04	Advanced function password 4	0000–FFFF (hex)	0000		
FP05	Advanced function password 5	0000–FFFF (hex)	0000		
FP06	Advanced function password 6	0000–FFFF (hex)	0000		
FP07	Advanced function password 7	0000–FFFF (hex)	0000		
FP08	Advanced function password 8	0000–FFFF (hex)	0000		
FP09	Advanced function password 9	0000–FFFF (hex)	0000		

* For these items of the instrument information bank, the parameter settings screen of the SLP-C1F shows different code/name/data.

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Display	Item	Description	Initial value	User level	Notes
FP 10	Advanced function password 10	0000–FFFF (hex)	0000	2	
FP 11	Advanced function password 11	0000–FFFF (hex)	0000		
FP 12	Advanced function password 12	0000–FFFF (hex)	0000		
FP 13	Advanced function password 13	0000–FFFF (hex)	0000		
FP 14	Advanced function password 14	0000–FFFF (hex)	0000		
FP 15	Advanced function password 15	0000–FFFF (hex)	0000		
FP 16	Advanced function password 16	0000–FFFF (hex)	0000		
A501	Control output 1 ON/OFF count	Actual on/off count ÷ 10 Example: 11 when the actual count is 110.	–		ON/OFF change count of DO terminal The setting cannot be changed.
A502	Control output 2 ON/OFF count	Same as Control output 1 ON/OFF count	–		
A503	Event output 1 ON/OFF count	Same as Control output 1 ON/OFF count	–		
A504	Event output 2 ON/OFF count	Same as Control output 1 ON/OFF count	–		
A505	Event output 3 ON/OFF count	Same as Control output 1 ON/OFF count	–		

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Chapter 7. CPL Communication Function

7 - 1 Overview of Communications

If a model with RS-485 communication is used, the C2/C3 can communicate with a PC, PLC, or other host device using a program created by the user.

Controller Peripheral Link (CPL, Azbil Corporation's host communication protocol) or MODBUS can be selected as the communication protocol. This chapter describes CPL communications.

■ Features

Key features of the C2/C3's communication functions are as follows:

- Up to 31 C2/C3 units can be connected to a single master station (host device).
- Almost all of the parameter data (settings) of the C2/C3 can be communicated.
  ☞Chapter 10. List of Communication Data (p. 10-1)(for details on communication parameters)
- Random access commands are available.
  Two or more parameters at separated addresses can be read or written by a single command.

■ Configuration

The settings shown below must be specified for CPL communication.

They can be displayed and configured if a model with RS-485 communication is used.

Item	Display	Description	Initial value	User level
Communication type	C064	0: CPL 1: Modbus/ASCII 2: Modbus/RTU 3: PLC Link Communication	0	Simple, Standard, Advanced
Station address	C065	0: No communication 1–127	0	
Transmission speed	C066	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4: 57600 bps	2	
Data format (data length)	C067	0: 7 bits 1: 8 bits	1	
Data format (parity)	C068	0: Even parity 1: Odd parity 2: No parity	0	
Data format (stop bits)	C069	0: 1 bit 1: 2 bits	0	
Communication minimum response time	C070	1–250 ms	3	Advanced

Handling Precautions

- The settings can be configured using the keys on the C2/C3 or Smart Loader Package model SLP-C1F. RS-485 communications cannot be used for configuration.

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■ Communication procedure

The communication procedure is as follows.

(1) The host device (master station) sends an instruction message to one C2/C3 unit (slave station).

(2) The slave station receives the instruction message and performs read or write processing according to the content of the message.

(3) The slave station sends a response message appropriate for the type of processing.

(4) The master station receives the response message.

Handling Precautions

- Sending data using several protocols intermixed (CPL, Modbus/ASCII, Modbus/RTU, PLC link) to the same RS-485 transmission line is not allowed.

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7-2 Message Structure

■ Message structure

The following shows the message structure.

Messages are broadly classified into two layers: the data link layer and the application layer.

- Data link layer

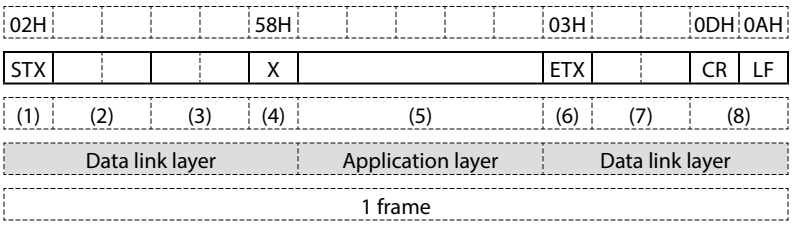
  This layer contains the basic information required for communication. For example, the destination of the communication message and the message check information are in this layer.

- Application layer

  Data is read and written in this layer. The content of the layer varies according to the purpose of the message.

A message consists of (1) to (8) below.

The command (details sent from the master station) and the response (details returned from the slave station) are stored in the application layer.



(1) STX (start of message)

(2) Station address

(3) Sub-address

(4) Device ID code

(5) Instruction message = command, response message = response

(6) ETX (end of command/response)

(7) Checksum

(8) Delimiter (end of message)

■ Data link layer

● Overview

The data link layer is of a fixed length. The position of each data item and the number of its characters are already decided. Note, however, that the data positions of the data link layer from ETX onwards shift according to the number of characters in the application layer.

● Response start conditions

- The C2/C3 sends a response message only when all the message components in the data link layer of the instruction message are correct. If even one of these is incorrect, no response message is sent, and the device stands by for reception of STX.
- The maximum number of word addresses that can be accessed by one frame is 32.

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● List of data link layer data definitions

The following list shows the definitions for data in the data link layer.

Data name	Character code	Number of characters	Meaning of data
STX	02H	1	Start of message
Station address	0 to 7FH are expressed as hexadecimal character codes.	2	Identification of device to communicate with
Sub-address	00 (30H, 30H)	2	No function
Device ID code	X (58H) or x (78H)	1	Device type
ETX	03H	1	End position of the application layer
Checksum	00H to FFH are expressed as 2-digit hexadecimal character codes.	2	Checksum of message
Delimiter	CR (0DH), LF (0AH)	2	End of message

● Description of data items

- STX (02H)
  When STX is received, the C2/C3 interprets it as the start of an instruction message. No matter what has been received previously, upon receiving STX, the C2/C3 begins processing a new message. In this way, if an instruction message contains an error due to electromagnetic noise, etc., the C2/C3 can respond to the next proper message (a resent message, etc.) from the master station.
- Station address
  The C2/C3 creates a response message only to instruction messages that mention its station address. A station address is expressed as a 2-digit hexadecimal character code in a message.
  The C2/C3 returns a response message that includes its own station address. The station address can be specified by C65 (station address). Note that, if the station address is set to 0 (30H 30H), the C2/C3 does not respond even if the station addresses match.
- Sub-address
  Set the sub-address to 00 (30H 30H), because the C2/C3 does not use sub-addresses.
  However, the C2/C3 will return a response message that includes a received sub-address.
- Device ID code
  X (58H) or x (78H) can be used. This code is determined for each product series, and other codes cannot be selected. The C2/C3 returns a response message that includes the received device ID code. X (58H) is used as the default, and x (78H) is used to distinguish the message from the resend message.
- ETX
  ETX indicates the end of the application layer.
- Checksum
  This value is for checking whether something abnormal (e.g., electromagnetic noise) has caused the message content to change during transmission.
  The checksum is expressed as a 2-digit hexadecimal character code.

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- How to calculate a checksum

  (1) Add the character codes in the message from STX through ETX in single byte units.

  (2) Take two's complement of the low-order one byte of the sum.

  (3) Convert the obtained two's complement to a two-byte ASCII code.

  The following is a sample checksum calculation:

  Sample message

  STX: 02H

  0: 30H (1st byte of the station address)

  1: 31H (2nd byte of the station address)

  0: 30H (1st byte of the sub-address)

  0: 30H (2nd byte of the sub-address)

  X: 58H (device ID code)

  R: 52H (1st byte of the command)

  S: 53H (2nd byte of the command)

  (omission)

  ETX: 03H

(1) Add the character codes in the message from STX through ETX in single byte units. The addition operation in single byte modules is as follows: 02H + 30H + 31H + 30H + 30H + 58H + 52H + 53H ... + 03H. Assume that the result is 376H.

(2) The low-order byte of the sum, 376H, is 76H. The two's complement of 76H is 8AH.

(3) Convert the obtained 8AH to a two-byte ASCII code.

The result is:

8: 38H

A: 41H

The two bytes, 8 (38H) and A (41H), are the checksum.

- Delimiter (CR/LF)

  This indicates the end of the message. Immediately after LF is received, the device enters a state allowed to process the received message.

■ Application layer

The table below shows the configuration of the application layer.

Item	Description
Command	RS (read decimal format data from consecutive addresses)
	WS (write decimal format data to consecutive addresses)
	RD (read hexadecimal format data from consecutive addresses)
	WD (write hexadecimal format data to consecutive addresses)
	RU (read hexadecimal format data from random addresses)
	WU (write hexadecimal format data to random addresses)
Data delimiter	RS and WS commands: "," (comma) Other commands: None
Word address	RS and WS commands: decimal value and "W" (e.g., 501W) Other commands: hexadecimal value (e.g., 01F5)
Number of data records to read	RS and WS commands: decimal value (e.g., 1) Other commands: hexadecimal value (e.g., 0001)
Data	RS and WS commands: decimal value (ex.: 100) Other commands: hexadecimal value (e.g., 0064)

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7 - 3 Description of Commands

■ Continuous data read command (RS command)

This command reads data from consecutive addresses in one message.

● Instruction message

This is a command—in one message—to read data from consecutive word addresses starting from the specified address. The figure below shows the structure of the application layer of a read instruction message.

R	S	,	9	1	0	1	W	,	1
(1)		(2)	(3)					(2)	(4)

Application layer

(1) Continuous data read command

(2) Data delimiter

(3) Starting word address

(4) Read data count

● Response message

If an instruction message is received successfully, a response message appropriate for the command is returned.

The figure below shows the structure of the application layer of a response message for a read command.

- Normal termination (reading of single data record)

0	0	,				
(1)		(2)	(3)			

- Normal termination (reading of multiple data records)

0	0	,					,		,				
(1)		(2)	(3)				(2)	(4)	(2)	(5)			

- Abnormal termination

X	X
(1)	

A termination code indicating an error is entered in place of XX.

☞ 7 - 6 List of Termination Codes (p. 7-14) (for details about termination codes)

(1) Termination code
(2) Data delimiter
(3) Read data 1
(4) Read data 2 to (n−1)
(5) Read data n

● Maximum read data count per message

64 words

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■ Continuous data write command (WS command)

This command writes data to consecutive addresses.

● Instruction message

The figure below shows the structure of the application layer of a write instruction message.

W	S	,	1	5	0	1	W	,	1	,	6	5
(1)		(2)	(3)					(2)	(4)	(2)	(5)	

(1) Write command

(2) Data delimiter

(3) Starting word address

(4) Write data (1st word)

(5) Write data (2nd word)

● Response message

The figure below shows the structure of the application layer of a response message for a write command.

- Normal termination

0	0
(1)	

- Abnormal termination or warning

X	X
(1)	

A termination code indicating an error is entered in place of XX.

☞ 7 - 6 List of Termination Codes (p. 7-14) (for details about termination codes)

(1) Termination code

● Maximum write data count per message

64 words

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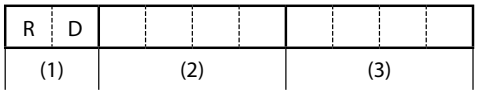
■ Fixed-length continuous data read command (RD command)

This command reads continuous data in two-byte units. This command is suitable for handling data in ladder programs sent by PLC communications as the data is of a fixed length.

The starting word address is expressed as four hexadecimal digits. The data count is expressed as four digits, and data is expressed as four × n (n is a positive integer) hexadecimal digits.

● Instruction message

The read starting word address (four hexadecimal digits) and the read data count (four hexadecimal digits) are sent.

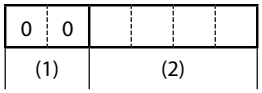


(1) Fixed-length continuous data read command
(2) Starting word address
(3) Read data count

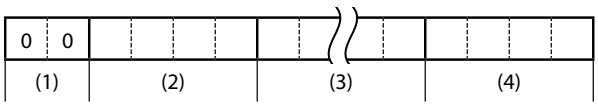
● Response message

If the command is processed successfully, a termination code indicating success (two decimal digits) is returned with the specified number of read data records (four hexadecimal digits × read data count). If there was an error, a termination code indicating error (two decimal digits) is returned without appending the data that was read.

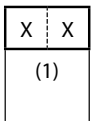
- Normal termination (reading of single data record)



- Normal termination (reading of multiple data records)



- Abnormal termination



A termination code indicating an error is entered in place of XX.

☞ 7-6 List of Termination Codes (p. 7-14) (for details about termination codes)

(1) Termination code

(2) Read data 1

(3) Read data 2 to (n−1)

(4) Read data n

● Maximum read data count per message

64 words

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■ Fixed-length continuous data write command (WD command)

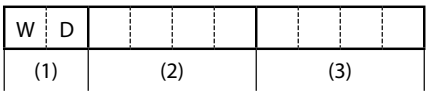
This command writes continuous data in two-byte units. This command is suitable for handling data in ladder programs sent by PLC communications as the data is of a fixed length.

The starting word address is expressed as four hexadecimal digits. Data is expressed as four × n (n is a positive integer) hexadecimal digits.

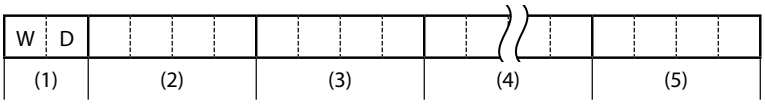
● Instruction message

The write starting word address (four hexadecimal digits) and data to be written (four × n hexadecimal digits) is sent.

- Write 1 data record



- Write multiple data records



(1) Fixed-length continuous data write command

(2) Starting word address

(3) Write data 1

(4) Write data 2 to (n-1)

(5) Write data n

● Response message

If data is written, a termination code indicating success (two decimal digits) is returned. If only part of the data is written, a termination code indicating warning (two decimal digits) is returned. If none of the data is written, a termination code indicating error (two decimal digits) is returned.

- Normal termination



- Abnormal termination or warning



A termination code indicating an error is entered in place of XX.
☞ 7-6 List of Termination Codes (p. 7-14) (for details about termination codes)

(1) Termination code

● Maximum write data count per message

64 words

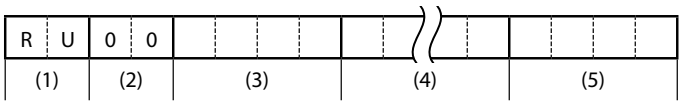
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■ Fixed-length random data read command (RU command)

This command reads random (non-consecutive) data in two-byte units.

● Instruction message

The word address (four hexadecimal digits) of the data to be read is sent in the specified order.



(1) Fixed-length random data read command

(2) Sub-command: fixed to "00"

(3) Word address 1

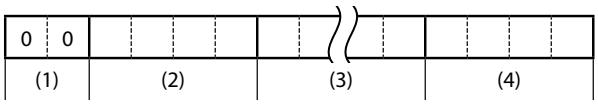
(4) Word address 2 to (n−1)

(5) Word address n

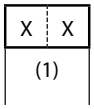
● Response message

If the command is processed successfully, a termination code indicating success (two decimal digits) is returned with the specified number of read data records (four hexadecimal digits × read data count). If there was an error, a termination code indicating error (two decimal digits) is returned without appending the data that was read.

- Normal termination



- Abnormal termination



A termination code indicating an error is entered in place of XX.

☞ 7 - 6 List of Termination Codes (p. 7-14) (for details about termination codes)

(1) Termination code

(2) Read data 1

(3) Read data 2 to (n−1)

(4) Read data n

● Maximum read data count per message

64 words

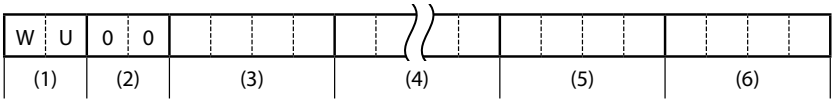
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■ Fixed-length random data write command (WU command)

This command writes data to random (non-consecutive) addresses in two-byte units. Data is expressed in four hexadecimal digits.

● Instruction message

Data is sent for the specified write data count with the data address (four hexadecimal digits) of the data to be written and the data (four hexadecimal digits) as a pair.



(1) Fixed-length random data write command

(2) Sub-command: fixed to "00"

(3) Word address 1

(4) Write data 1

(5) Word address n

(6) Write data n

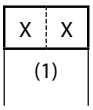
● Response message

If data is written, a termination code indicating success (two decimal digits) is returned. If only part of the data is written, a termination code indicating warning (two decimal digits) is returned. If none of the data is written, a termination code indicating error (two decimal digits) is returned.

- Normal termination



- Abnormal termination or warning



A termination code indicating an error is entered in place of XX.

☞ 7 - 6 List of Termination Codes (p. 7-14) (for details about termination codes)

(1) Termination code

● Maximum write data count per message

64 words

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7 - 4 Definition of Word Addresses

■ RAM and nonvolatile memory areas of data addresses

Word addresses are categorized as follows:

Word address (Hexadecimal)	Name	Notes
273W to 15935W (0111 to 3E3F)	RAM access word address	Reading and writing of these addresses are both performed on RAM. Since writing is not performed to the nonvolatile memory, when the power is turned off and back on, the value stored in the nonvolatile memory is restored.
16657W to 32319W (4111 to 7E3F)	Nonvolatile memory access word address	Writing is performed to both RAM and nonvolatile memory, but reading is performed only on RAM. Since writing is also performed to nonvolatile memory, the value does not change even when the power is turned off and back on.

Handling Precautions

- For models without extended data memory, the number of nonvolatile memory erase/write cycles is limited (about 100,000 cycles). Therefore, it is recommended that very frequently written parameters be written to RAM, which does not have a limitation on erase/write cycles. Note, however, that the data written to the RAM area is overwritten with the data in the nonvolatile memory area when the power is turned on.

■ Write data range

If the value to be written is outside the range specified for the parameter, the value is not written and a termination code indicating error is returned.

■ Write conditions

A termination code indicating an error is also returned if the conditions for writing are not satisfied.

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7 - 5 Numerical Representation in the Application Layer

The specifications of numerical representation are decimal variable-length (zero suppress) for RS and WS commands and hexadecimal fixed-length for RD, WD, RU and WU commands. Details are as follows:

■ RS and WS commands

Item	Specifications	Error handling
Unnecessary space	Cannot be appended.	The message processing is aborted and a termination code indicating error is returned in a response message.
Unnecessary zero	Cannot be appended.	
Numerical value = zero	Cannot be omitted. Be sure to use "0."	
Other unnecessary characters	Numerical values may be prefixed with a –, expressing a negative number. Any other characters cannot be appended. The "+" sign must not be appended to indicate positive numerical values.	
Range of available numerical values	–32768 to +32767 Values outside this range are not allowed.	

■ RD, WD, RU, and WU commands

Item	Specifications	Error handling
Unnecessary space	Cannot be appended.	The message processing is aborted and a termination code indicating error is returned in a response message.
Unnecessary zero	Cannot be appended.	
Numerical value = zero	Cannot be omitted. Be sure to use "0000."	
Other unnecessary characters	Cannot be appended.	
Range of available numerical values	0000H to FFFFH	

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7 - 6 List of Termination Codes

If an error occurred in the application layer, a termination code indicating error is returned in a response message.

Termination code	Description	Process	Example
00	Normal termination	All the processing has completed successfully.	
99	Undefined command Other errors	Only the termination code is returned. The message is not processed.	AA,1001W,1 RX03E80001
10	Numerical value conversion error • A numerical value of 7 digits or more • A figure other than 0 of which the leading digit is 0 • The conversion result is 65535 or greater, or –65536 or smaller. • Other obvious illegal representation of an integer	Processing is aborted when a conversion error or a range error has occurred. (Processing is performed until just before the abnormality occurs)	RS,1001W,100000 RS,01001W,1 RS,+1001W,1 WS,10?1W,1 RD03E9000> RU0103E9
22	The value of read data is outside the specified range. • The decimal point position is changed and the value becomes –32769 or smaller, or 32768 or larger.	The high limit or low limit value is read from the corresponding word address, and the subsequent processing continues.	
	The value of written data is outside the specified range.	Processing is continued excluding the relevant word address.	(Example: Specified range for 5001W is 0 to 1) (Processing aborted) WS,5001W,3000 WD13890BB8 WU0013890BB8
23	Writing disabled due to instrument set value conditions, instrument external conditions, etc.	Processing is continued excluding the relevant word address.	
	Writing/reading disabled because communications/loader locked	Only the termination code is returned. The message is not processed.	
40	Read/write word count error	Only the termination code is returned. The message is not processed.	RS,1001W,100 RD03E90064
41	Word address out of the range • Out of the range between 256 and 65534	Only the termination code is returned. The message is not processed.	RS,100000W,1 RD03G90001 RU00$3E903EA WS,03E9W,1 WD0XXX0001 WU00o3E90001
42	The value of written data is outside the specified range. • –32769 or smaller, or 32768 or greater	Processing is performed up to the relevant word address. The succeeding processing is not performed.	WS,2101W,100,XXX WS,2101W,100000 WD03E900010XXX
83	Any of the following alarms has occurred: • AL74: Nonvolatile memory error • AL80: Nonvolatile memory not initialized • AL81: Settings area error • AL82: Adjustment value area error • AL83: Internal system error • AL84: Settings initialization error • AL95: Settings error • AL96: Adjustment value error • AL97: Extended data memory error • AL99: Internal program error	Only the termination code is returned. The message is not processed.	

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7 - 7 Reception and Transmission Timing

■ Time specifications for instruction and response messages

The cautions below are required with regard to the timing of command message transmission from the master station and response message transmission from the slave station (the C2/C3).

● Response monitoring time

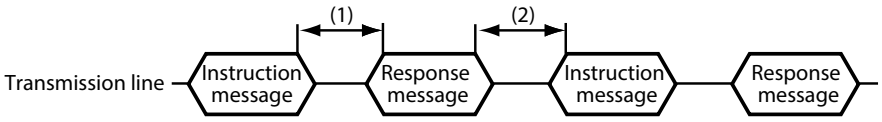
The maximum response time from the end of the instruction message transmission by the master station until when the master station receives a response message from the C2/C3 is two seconds ((1) in the figure below).

So, the response monitoring time should be set to two seconds.

Generally, when a response time-out occurs, the instruction message is resent.

● Transmission start time

A wait time of 10 ms is required before the master station starts to transmit the next instruction message (to the same slave station or a different slave station) after the end of receiving response message ((2) in the figure below).

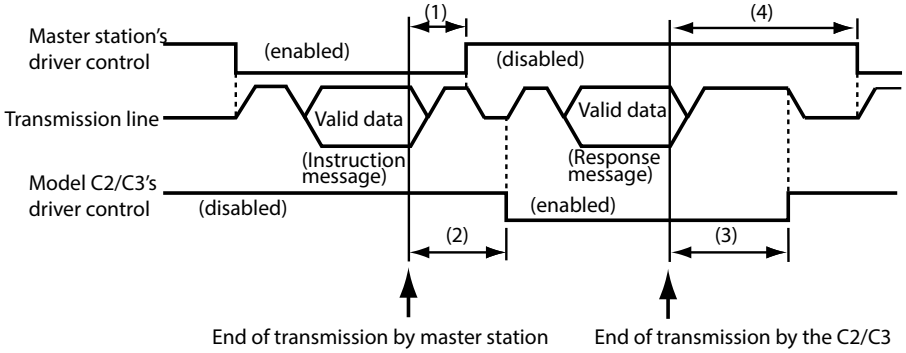


(1) End of transmission by master station – Transmission start time of the C2/C3 = 2000 ms max.

(2) End of transmission by the C2/C3 – Transmission start time of master station = 10 ms min.

■ RS-485 driver control timing specifications

When the transmission/reception on the RS-485 3-wire system is directly controlled by the master station, care should be paid to the following timing:



(1) End of transmission by master station – Driver disable time = 500 µs max.

(2) End of reception by the C2/C3 – Driver enable time = Response time-out setting ([070]) or longer

(3) End of transmission by the C2/C3 – Driver disable time = 10 ms max.

(4) End of reception by master station – Driver enable time = 10 ms min.

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7 - 8 Precautions for Creating Communication Programs for the Master Station

Keep the following points in mind when creating a communication program.

- The C2/C3 takes a maximum of two seconds before it sends a response. Therefore, specify the response monitoring time to two seconds.
- Resend the message if there is no response within two seconds. Set a communications error to occur if there is no response even after two retries.
- Be sure to resend as described above, because sometimes a message is not transmitted correctly for some reason such as electrical noise during communication.

Note

- If X and x device ID codes are alternated when a message is resent by the master station, it will be easy to identify whether the received message is a response to the previous instruction or to the current one.

■ Communication program example

A sample program is installed in the folder in which the SLP-C1F Smart Loader Package has been installed.

In the default setting, the directory is C:¥Program Files (x86)¥SLP¥SLPC1¥Samples¥cpl.cpp.

This program is written in C++.

The sample program is for your reference only, and there is no guarantee that all functions will work properly.

Handling Precautions

- Azbil Corporation will not be liable for any loss or damage caused by applying this sample program.

● Before executing the sample program

Check the settings for communication type, station address, transmission speed, and data format of the instrument.

● Compiling

The following is an example of compiling with Visual Studio 2019.

After launching x86 Native Tools Command Prompt for VS 2019 from the start menu, compile using the cl command.

Example of execution results

```
C:\Sample>cl cpl.cpp
Microsoft (R) C/C++ Optimizing Compiler Version 19.29.30133 for x86
Copyright (C) Microsoft Corporation.  All rights reserved.

cpl.cpp
Microsoft (R) Incremental Linker Version 14.29.30133.0
Copyright (C) Microsoft Corporation.  All rights reserved.

/out:cpl.exe
cpl.obj
```

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● Running the sample program

This program reads and writes data using COM port 1. When executed, the application layers of the instruction and response messages communicated are displayed.

```
command:RS,14356W,2
result:00,0,0
command:WS,14357W,2
result:00
```

Example of execution results

● Processing of the sample program

- Setup for communication
  Call open () and initialize the RS-232C port.
- Executing commands
  Set a desired character string in “command” and call AppCPL().

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Chapter 8. Modbus Communication Function

8 - 1 Overview of Communications

If a model with RS-485 communication is used, the C2/C3 can communicate with a PC, PLC, or other host device using a program created by the user.

CPL (Controller Peripheral Link: Azbil Corporation's host communication protocol) or MODBUS can be selected as the communication protocol. This chapter describes MODBUS communications.

■ Features

Key features of the C2/C3's communication functions are as follows:

- Up to 31 C2/C3 units can be connected to a single master station (host device).
- Almost all of the parameter data (settings) of the C2/C3 can be communicated.
  ☞ Chapter 10. List of Communication Data (p. 10-1)(for details on communication parameters)

[!] Handling Precautions

- In MODBUS communications, the data address of the C2/C3 that is set in the host device may be reduced by 1 in a communication message during transmission. Be sure to understand the specifications of the host device before using the C2/C3.
  Example: If the data address is set to 1001 in the host device, it will be 1000 in a communication message during transmission.

■ Configuration

The settings shown below must be specified for Modbus communication.

Item	Display	Description	Initial value	User level
Communication type	C064	0: CPL 1: Modbus/ASCII 2: Modbus/RTU 3: PLC Link Communication	0	Simple, Standard, Advanced
Station address	C065	0: No communication 1–127	0	
Transmission speed	C066	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4: 57600 bps	2	
Data format (data length)	C067	0: 7 bits 1: 8 bits	1	
Data format (parity)	C068	0: Even parity 1: Odd parity 2: No parity	0	
Data format (stop bits)	C069	0: 1 bit 1: 2 bits	0	
Response time-out	C070	1–250 ms	3	Advanced

- These items can be displayed and configured if a model with RS-485 communication is used.
- When the communication type is set to MODBUS/RTU, the operation is fixed to 8-bit data regardless of the data format (data length) setting.

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Handling Precautions

- The settings can be configured using the keys on the C2/C3 or using Smart Loader Package model SLP-C1F. RS-485 communications cannot be used for configuration.

■ Communication procedure

The communication procedure is as follows.

(1) The host device (master station) sends an instruction message to one C2/C3 unit (slave station).

(2) The slave station receives the instruction message and performs read or write processing according to the content of the message.

(3) The slave station sends a response message appropriate for the type of processing.

(4) The master station receives the response message.

Handling Precautions

- Sending data using several protocols intermixed (CPL, Modbus/ASCII, Modbus/RTU, PLC link) to the same RS-485 transmission line is not allowed.

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8-2 Message Structure

■ Message structure

The following shows the message structure.

All messages are expressed in hexadecimal.

● Modbus/ASCII

All messages are written in hexadecimal ASCII codes (each slot below represents one character).

A MODBUS/ASCII message consists of (1) to (5) below.

The command (details sent from the master station) and the response (details returned from the slave station) are stored in (3).

3AH						--------					0DH	0AH
:						--------					CR	LF
(1)	(2)					(3)				(4)	(5)	
1 frame												

(1) Start of message (colon, expressed with ASCII code 3AH)

(2) Station address (2 bytes)

(3) Instruction message, response message

(4) Checksum (LRC) (2 bytes)

(5) Delimiter (end of message)

- Colon (3AH)

  When a colon (3AH) is received, the C2/C3 interprets it as the start of an instruction message.

  No matter what has been received previously, upon receiving a colon, the C2/C3 begins processing a new message.

  In this way, if an instruction message contains an error due to electromagnetic noise, etc., the C2/C3 can respond to the next proper message (a resent message, etc.) from the master station.

- Station address

  The C2/C3 creates a response message only to instruction messages that mention its station address. A station address is expressed as a 2-digit hexadecimal character code in a message.

  The C2/C3 returns a response message that includes its own station address.

  The station address can be specified by C65 (station address). Note that, if the station address is set to 0 (30H 30H), the C2/C3 does not respond even if the station addresses match.

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- Checksum (LRC)

  This value is for checking whether something abnormal (e.g., electromagnetic noise) has caused the message content to change during transmission. The checksum is expressed as a 2-digit hexadecimal character code. The procedure for calculating the checksum is as follows.

  (1) Add from the start of the station address to immediately before the checksum. Note that the values to be added are not the ASCII character values in the instruction message but the one-byte binary data converted from two ASCII characters.

  (2) Take the two's complement of the sum.

  (3) Convert the low-order one byte of the sum to a 2-digit hexadecimal character code.

  The following is a sample checksum calculation:

  Sample message

  : : 3AH (start of the message)
  0: 30H (1st byte of the station address)
  A: 41H (2nd byte of the station address)
  0: 30H (1st byte of the read command)
  3: 33H (2nd byte of the read command)
  0: 30H (1st byte of the starting word address)
  3: 33H (2nd byte of the starting word address)
  E: 45H (3rd byte of the starting word address)
  9: 39H (4th byte of the starting word address)
  0: 30H (1st byte of the read count)
  0: 30H (2nd byte of the read count)
  0: 30H (3rd byte of the read count)
  2: 32H (4th byte of the read count)

(1) Add from the start of the station address to immediately before the checksum.
The addition calculation is as follows:
0AH + 03H + 03H + E9H + 00H + 02H
The result is FBH.

(2) The low-order byte of FBH is FBH. It remains unchanged. The two's complement of FBH is 05H.

(3) Convert the obtained 05H to a two-byte ASCII code.
The result is:

0: 30H
5: 35H

The two bytes, 0 (30H) and 5 (35H), are the checksum.

- Delimiter (CR/LF)

  This indicates the end of the message. Immediately after LF is received, the device enters a state allowed to process the received message.

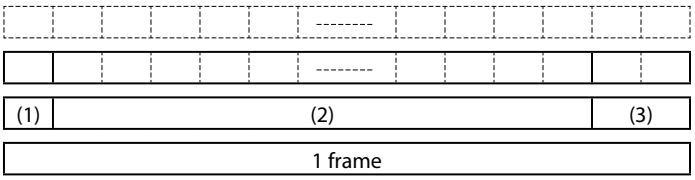
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● Modbus/RTU

All messages use binary data (each slot below represents one byte).

A Modbus RTU message consists of (1) to (3) below.

The command (details sent from the master station) and the response (details returned from the slave station) are stored in (2).



(1) Station address (1 byte)

(2) Instruction message, response message

(3) Checksum (2 bytes)

- Station address
  The C2/C3 creates a response message only to instruction messages that mention its station address. A station address is expressed in one byte in a message. The C2/C3 returns a response message that includes its own station address. The station address can be specified by C65 (station address). Note that, if the station address is set to 0, the C2/C3 does not respond even if the station addresses match.
- Checksum (CRC)
  This value is for checking whether something abnormal (e.g., electromagnetic noise) has caused the message content to change during transmission. The check sum is expressed in two bytes.

The procedure for calculating the checksum (CRC) is as follows.

```
/* CRC calculation */
/* Input      unsigned char length:        Number of bytes sent */
/*                 unsigned char *top:     Sent data start pointer */
/* Output  unsigned short CRC:             CRC calculation result */
unsigned short crc16(unsigned char length, unsigned char *top)
{
        unsigned short CRC= 0xffff;
        unsigned short next;
        unsigned short carry;
        unsigned short n;
        unsigned char  crcl;

        while (length-- ) {
                next = (unsigned short) *top;
                CRC ^= next;
                for (n = 0; n < 8; n++) {
                        carry = CRC & 1;
                        CRC >>= 1;
                        if (carry) {
                                CRC ^= 0xA001;
                        }
                }
                top++;
        }

        crcl = (CRC & 0xff00)>>8;
        CRC <<= 8;
        CRC |= crcl;

        return CRC;
}
```

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- Determining the end of one frame

  The message end (end of 1 frame) is determined when the period of time during which no character is received exceeds the time specified for the transmission speed. If the next character is not received by the timeout time shown in the table below, the frame is determined to have ended.

  Note that the timeout time has a fluctuation of ±1 ms.

Set transmission speed (bps)	Timeout time
4800	9 ms or more
9600	5 ms or more
19200	3 ms or more
38400	2 ms or more
57600	2 ms or more

■ Command type

Command (send message) types supported by the C2/C3 are as follows.

Command type	Description		Conformance class
	ASCII	RTU	
Read multiple data records	03 (2 bytes)	03H (1 byte)	Class 0
Write multiple data records	10 (2 bytes)	10H (1 byte)	Class 0
Write 1 data record	06 (2 bytes)	06H (1 byte)	Class 1*

* The C2/C3 does not support Class 1 commands other than the writing of one data record.

■ Number of data records

The number of data records that can be read or written using a one-frame message is shown in the table below.

Command type (function code)	Description	
	ASCII	RTU
Read command	1–64	1–64
Write command	1–64	1–64
1 data record write command	1	1

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■ Other specifications

If there is an error in a response message, one of the exception codes shown in the table below is added after the function code.

Error type	Exception code		Description
	ASCII	RTU	
Illegal function code	01 (2 bytes)	01H (1 byte)	Function code not supported by the C2/C3 The value is outside the specified range from –32767 to +32768.
Illegal data address	02 (2 bytes)	02H (1 byte)	An included data address cannot be read or written.
Device failure	04 (2 bytes)	04H (1 byte)	Any of the following alarms has occurred: · AL74: Nonvolatile memory error · AL80: Nonvolatile memory not initialized · AL81: Settings area error · AL82: Adjustment value area error · AL83: Internal system error · AL84: Settings initialization error · AL95: Settings error · AL96: Adjustment value error · AL97: Extended data memory error · AL99: Internal program error
Illegal data	03 (2 bytes)	03H (1 byte)	Error other than the above

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8-3 Description of Commands

■ Read command (03H)

● Instruction message

This is a command—in one message—to read data from consecutive word addresses starting from the specified address. The following is a sample read instruction message.

Modbus/ASCII

3AH	30H	41H	30H	33H	30H	33H	45H	39H	30H	30H	30H	32H	30H	35H	0DH	0AH
:	0	A	0	3	0	3	E	9	0	0	0	2	0	5	CR	LF
(1)	(2)		(3)		(4)				(5)				(6)		(7)	

(1) Start of the message
(2) Station address
(3) Read command (03H)
(4) Starting word address
(5) Read data count
(6) Checksum (LRC)
(7) Delimiter

Modbus/RTU

0AH	03H	03H	E9H	00H	02H	14H	C0H
(1)	(2)	(3)		(4)		(5)	

(1) Station address
(2) Read command (03H)
(3) Starting word address
(4) Read data count
(5) Checksum (CRC)

● Response message

If an instruction message is received successfully, a response message appropriate for the command is returned.

The following is a sample response message for a read command.

Modbus/ASCII

- Normal example

3AH	30H	41H	30H	33H	30H	34H	30H	33H	30H	31H	30H	30H	30H	33H	45H	38H	0DH	0AH
:	0	A	0	3	0	4	0	3	0	1	0	0	0	3	E	8	CR	LF
(1)	(2)		(3)		(4)		(5)				(6)				(7)		(8)	

(1) Start of the message
(2) Station address
(3) Read command (03H)
(4) Read data count × 2
(5) Read data 1
(6) Read data 2
(7) Checksum (LRC)
(8) Delimiter

- Abnormal termination

3AH	30H	41H	38H	34H	30H	31H	37H	31H	0DH	0AH
:	0	A	8	4	0	1	7	1	CR	LF
(1)	(2)		(3)		(4)		(5)		(6)	

(1) Start of the message
(2) Station address
(3) Error flag (Since undefined "04" was sent as a command with an instruction message, the most significant bit was turned ON and "84" was returned.)
(4) Termination code indicating error (☞p. 8-7)
(5) Checksum (LRC)
(6) Delimiter

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Modbus/RTU

- Normal example

0AH	03H	04H	03H	01H	00H	03H	51H	76H
(1)	(2)	(3)	(4)		(5)		(6)	

(1) Station address

(2) Read command (03H)

(3) Read data count × 2 (bytes)

(4) Read data 1

(5) Read data 2

(6) Checksum (CRC)

- Abnormal termination

0AH	84H	01H	F3H	02H
(1)	(2)	(3)	(4)	

(1) Station address

(2) Error flag (Since undefined "04H" was sent as a command with an instruction message, the most significant bit was turned ON and "84H" was returned.)

(3) Termination code indicating error (☞p. 8-7)

(4) Checksum (CRC)

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■ Write command (10H)

● Instruction message

This is a command—in one message—to write data to consecutive word addresses starting from the specified address. The following is a sample write instruction message.
Example: 01A0H and 0E53H are written to two consecutive word addresses starting from 1501W (05DDH).
Modbus/ASCII

3AH	30H	31H	31H	30H	30H	35H	44H	44H	30H	30H	30H	32H	30H	34H	30H	31H	41H	30H	30H	45H	35H	33H	30H	35H	0DH	0AH
:	0	1	1	0	0	5	D	D	0	0	0	2	0	4	0	1	A	0	0	E	5	3	0	5	CR	LF
(1)	(2)		(3)		(4)				(5)				(6)		(7)				(8)				(9)		(10)	

(1) Start of the message
(2) Station address
(3) Write command (10H)
(4) Starting word address
(5) Write data count
(6) Write data count ×2
(7) Write data 1
(8) Write data 2
(9) Checksum (LRC)
(10) Delimiter

Modbus/RTU

01H	10H	05H	DDH	00H	02H	04H	01H	A0H	0EH	53H	45H	B9H
(1)	(2)	(3)		(4)		(5)	(6)		(7)		(8)	

(1) Station address
(2) Write command (10H)
(3) Starting word address
(4) Write data count
(5) Write data count ×2
(6) Write data 1
(7) Write data 2
(8) Checksum (CRC)

● Response message

If an instruction message is received successfully, a response message appropriate for the command is returned.
The following is a sample response message for a write command.
Modbus/ASCII

3AH	30H	31H	31H	30H	30H	35H	44H	44H	30H	30H	30H	32H	30H	42H	0DH	0AH
:	0	1	1	0	0	5	D	D	0	0	0	2	0	B	CR	LF
(1)	(2)		(3)		(4)				(5)				(6)		(7)	

(1) Start of the message
(2) Station address
(3) Write command (10H)
(4) Starting word address
(5) Write data count
(6) Checksum (LRC)
(7) Delimiter

Modbus/RTU

01H	10H	05H	DDH	00H	02H	D1H	3EH
(1)	(2)	(3)		(4)		(5)	

(1) Station address
(2) Write command (10H)
(3) Write starting word address
(4) Write data count
(5) Checksum (CRC)

Note

- The format of a response message for abnormal termination is the same as that of the read command.

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■ One data record write command (06H)

● Instruction message

This is a command to write one data record to the specified address. The following is a sample write instruction message.

Example: 01A0H is written to word address 1501W (05DDH).

Modbus/ASCII

3AH	30H	31H	30H	36H	30H	35H	44H	44H	30H	31H	41H	30H	37H	36H	0DH	0AH
:	0	1	0	6	0	5	D	D	0	1	A	0	7	6	CR	LF
(1)	(2)		(3)		(4)				(5)				(6)		(7)	

(1) Start of the message
(2) Station address
(3) Write command (06H)
(4) Word address
(5) Write data
(6) Checksum (LRC)
(7) Delimiter

Modbus/RTU

01H	06H	05H	DDH	01H	A0H	18H	D4H
(1)	(2)	(3)		(4)		(5)	

(1) Station address
(2) Write command (06H)
(3) Word address
(4) Write data
(5) Checksum (CRC)

● Response message

The format of a response message for normal termination is the same as that of the instruction message.

Note

- The format of a response message for abnormal termination is the same as that of the read command.

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8 - 4 Specifications Common with CPL Communication Function

■ Definition of word addresses

☞ 7 - 4 Definition of Word Addresses (p. 7-12)

■ Numerical representation

The specifications of numerical representation are the same as the following:
☞7 - 5 Numerical Representation in the Application Layer (p. 7-13) ■ RD, WD, RU, and WU commands (p. 7-13)

■ Specifications of RS-485 driver control timing

☞ 7 - 7 Reception and Transmission Timing (p. 7-15)

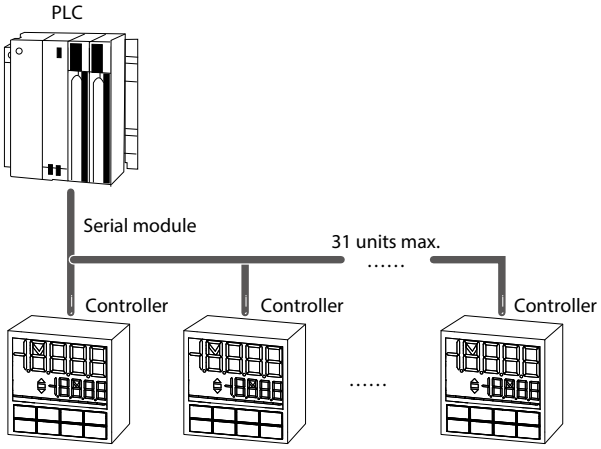
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Chapter 9. PLC Link Communication Function

9-1 Overview

If a model with RS-485 communication is used, this device can directly communicate with a PLC using the PLC link communication function.
With this function, data retained by a PLC can be written to this device and vice versa.
If conditions such as the communication protocol and communication speed are the same, the C1M, C1A, C2 and C3 can use the PLC link communication function at the same time.

■ Sample configuration



■ Supported PLC protocols

- Mitsubishi Electric QnA-compatible 3C frame format 4
- Mitsubishi Electric A-compatible 1C frame format 4
- Omron FINS
- KEYENCE protocol mode 4
- Keyence Modbus/RTU
- Siemens Modbus/RTU
- General-purpose Modbus/RTU

■ Supported PLCs (typical models)

- Mitsubishi Electric
  MELSEC iQ-R/L series (Mitsubishi Electric QnA-compatible 3C format 4 protocol)
  MELSEC iQ-F series (Mitsubishi Electric QnA-compatible 3C format 4 protocol)
  MELSEC Q series (Mitsubishi Electric QnA-compatible 3C format 4 protocol)
  MELSEC F series (Mitsubishi Electric A-compatible 1C format 4 protocol)
- Omron
  CS/CJ/CP series (FINS protocol)
  NJ/NX series (FINS protocol)
- Keyence
  KV-8000/7000/5000/3000 series (Keyence protocol mode 4)
  KV Nano series (Modbus/RTU protocol)
- Siemens
  S7-1200 series (Modbus/RTU protocol)
- Modbus/RTU device
  General-purpose Modbus/RTU device (Modbus/RTU protocol)

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■ Specifications

- Number of connected PLCs: 1
- Number of connected single loop controllers: 31 max.
- Communication data count: 64 (PLC →), 64 (→ PLC)

■ Notes on the PLC link communication function

- When the PLC link communication function is used, RS-485 communication with the host device cannot be used.
- When using the PLC link communication function, set [Data format (data length)] to 1 (8 bits).
- Do not connect anything other than single loop controllers and one PLC to the RS-485 communication line.
- Specify the station address of single loop controllers in a range of 1 to the maximum number of connected controllers. The maximum number of connected controllers can be selected from 8 (default), 16, 24, and 31. Use the same settings for all stations in the same network.
- The PLC and single loop controllers must have unique station addresses.
- Do not use 255 or 254 as the station address of the PLC.
- New settings will apply after the power of the device is turned off and back on. If you have changed the settings, turn the power off and back on.
- Use the required number of consecutive registers on the PLC.
- Different protocols cannot be used at the same time.
- If the single loop controllers on the RS-485 communication line are powered by different power supplies, turn on the power supply connected to the controller with the lowest station address first.
- When connecting to the MELSEC iQ-F series, set the MELSEC to format 4 (X, Y octal).

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9-2 Data Transmission

PLC link communication is a function for transferring data between the PLC and this controller. There are two transfer types: “Cyclic data transfer” and “Triggered data transfer.”

The type of transfer can be set in the PLC link settings of the SLP-C1F Smart Loader Package.

The upper limits for the number of transfer processes and number of sheets are shown below.

Function	Maximum No. of sheets	Maximum No. of processes in 1 sheet	Total maximum No. of sheets for the function	Total maximum No. of processes for the function
Cyclic data transfer	4 sheets	64 lines	4 sheets	64 lines
Triggered data transfer	4 sheets	64 lines		

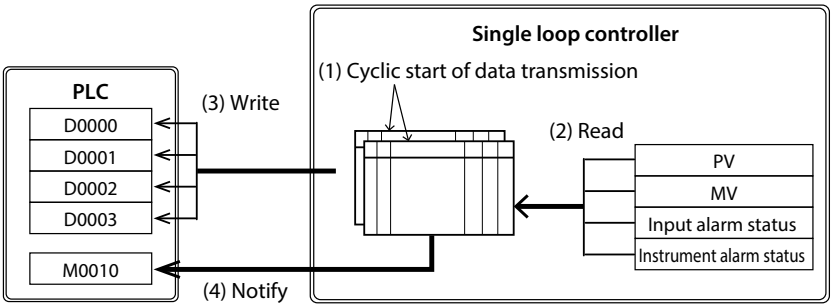
● Cyclic data transfer

Data from the controller can be transferred to the PLC periodically. Data can also be transferred from the host device to the controller.

Major applications:

- Saving controller data to the PLC
- Monitoring controller data by the PLC for device management

The controller transfers data periodically as follows.



(1) The controller starts cyclic data transfer according to the configuration sheets.

(2) Data is read from the controller.

(3) The read data is written to the PLC.

(4) When transfer of the data specified for the sheet is complete, a completion notification is written.

Handling Precautions

- RAM addresses and nonvolatile memory addresses are available for the data written from the PLC to this controller. ☞ Chapter 10. List of Communication Data (p. 10-1) (for details)

Triggered data transfer

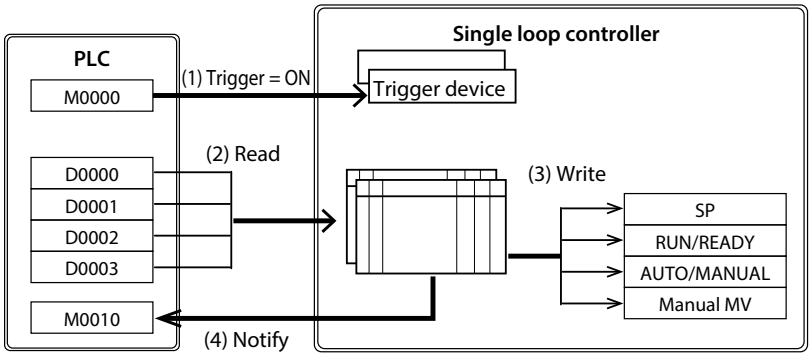
Data from the controller is transferred to the PLC when the trigger device is detected turning from OFF to ON. Data can also be transferred from the PLC to the controller.

Major applications:

- Changing the controller settings (SP, PID, etc.) from the PLC
- Changing the controller operations (RUN/READY mode selection, etc.) from the PLC

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The controller executes triggered data transfer as follows.



(1) The controller reads the trigger device in order to monitor the trigger device turning from OFF to ON. When the trigger device is turned on, triggered data transfer starts.

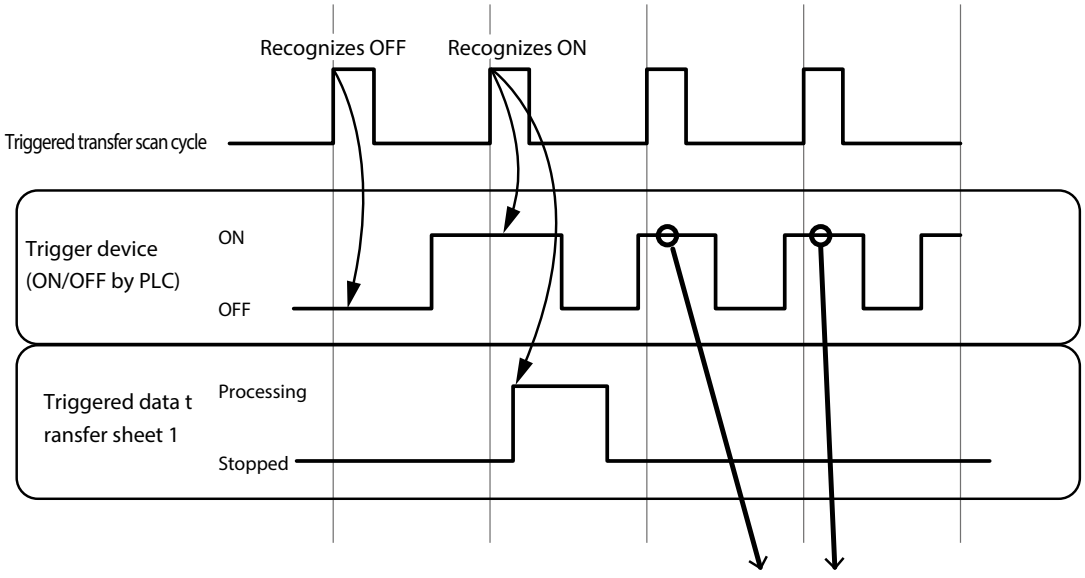
(2) Data is read from the PLC.

(3) The read data is written to the controller.

(4) When transfer of the data specified for the sheet is complete, a completion notification is written.

The triggered transfer scan cycle and triggered data transfer operations are as follows.

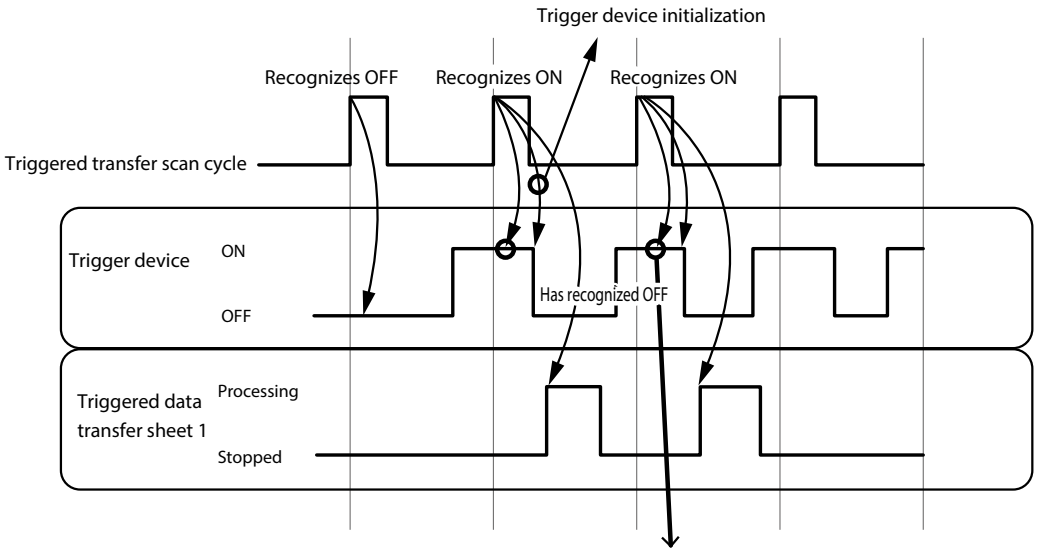
Data transfer is started for all sheets for which trigger device = ON is detected.



"Trigger ON" cannot be detected if the trigger device is turned on and off by PLC on a cycle shorter than the scan cycle.

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- If a device of the PLC is set for [Trigger device/Live notification device] and if the [Trigger device initialization] setting is 1 (enabled), this controller turns off the trigger device immediately after detecting a trigger. In this case, since this controller has recognized that the trigger device is OFF, in a subsequent scan when it recognizes that the trigger device is ON, it will detect triggers.
- If a device of this controller is set for [Trigger device/Live notification device], even if the [Trigger device initialization] setting is 1 (enabled), this controller will not turn off the trigger device immediately after detecting a trigger. However, it will detect triggers continuously as long as the trigger device remains ON.



When the trigger device is turned off
by the trigger device initialization function, the next trigger will be detected.

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■ Usable devices

The address ranges of the devices (data) usable with each model are as follows.

● Controller (this controller)

Various monitoring data and parameters can be selected in the PLC link settings in the SLP-C1F Smart Loader Package. Frequently used data and addresses can be entered directly.

See the following table for the addresses of frequently used data.

Name	R/W	Address	
		Decimal	Hex
Representative alarm	R/-	14336	3800
DO state	R/-	14337	3801
DI state	R/-	14338	3802
Loop PV	R/-	14356	3814
Loop SP	R/-	14357	3815
MV	R/-	14358	3816
CT1 current when output ON	R/-	14418	3852
CT2 current when output ON	R/-	14419	3853
Heat MV	R/-	14420	3854
Cool MV	R/-	14421	3855
LSP group selection	R/W	14592	3900
LSP in use	R/W	14593	3901
Manual MV	R/W	14594	3902
RUN/READY	R/W	14595	3903
AUTO/MANUAL	R/W	14596	3904
AT stop/start selection	R/W	14597	3905
P (Proportional band) in use	R/W	14848	3A00
I (Integral time) in use	R/W	14849	3A01
D (Derivative time) in use	R/W	14850	3A02
Manual reset in use	R/W	14851	3A03
Output low limit in use	R/W	14852	3A04
Output high limit in use	R/W	14853	3A05
P (Proportional band) (Cool) in use	R/W	14854	3A06
I (Integral time) (Cool) in use	R/W	14855	3A07
D (Derivative time) (Cool) in use	R/W	14856	3A08
Output low limit (Cool) in use	R/W	14858	3A0A
Output high limit (Cool) in use	R/W	14859	3A0B

R/-: The data can be read from this controller and written to the PLC.

R/W: The data can be read from this controller and written to the PLC and vice versa.

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● **Mitsubishi Electric MELSEC iQ-R/L series (Mitsubishi Electric QnA-compatible 3C format 4 protocol)**

Device type	Address range		
Input relay	X000000	to	X7FFFFF
Output relay	Y000000	to	Y7FFFFF
Internal relay	M000000	to	M999999
Special relay	SM00000	to	SM99999
Link special relay	SB00000	to	SB7FFFF
Edge relay	V000000	to	V999999
Latch relay	L000000	to	L999999
Link relay	B000000	to	B7FFFFF
Annunciator	F000000	to	F999999
Timer (contact)	TS00000	to	TS99999
Timer (coil)	TC00000	to	TC99999
Retentive timer (contact)	SS00000	to	SS99999
Retentive timer (coil)	SC00000	to	SC99999
Counter (contact)	CS00000	to	CS99999
Counter (coil)	CC00000	to	CC99999
Data register	D000000	to	D999999
Link register	W000000	to	W7FFFFF
Index register	Z000000	to	Z999999
File register (R)	R000000	to	R999999
File register (ZR)	ZR00000	to	ZR99999
Special register	SD00000	to	SD99999
Link special register	SW00000	to	SW7FFFF
Timer current value	TN00000	to	TN99999
Retentive timer current value	SN00000	to	SN99999
Counter current value	CN00000	to	CN99999

Note: The range of available addresses varies depending on the specifications and settings of the CPU unit.

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● **Mitsubishi Electric MELSEC iQ-F series (Mitsubishi Electric QnA-compatible 3C format 4 protocol)**

Device type	Address range		
Input relay	X000000	to	X777777
Output relay	Y000000	to	Y777777
Internal relay	M000000	to	M999999
Special relay	SM00000	to	SM99999
Link special relay	SB00000	to	SB7FFFF
Latch relay	L000000	to	L999999
Link relay	B000000	to	B7FFFFF
Annunciator	F000000	to	F999999
Timer (contact)	TS00000	to	TS99999
Timer (coil)	TC00000	to	TC99999
Retentive timer (contact)	SS00000	to	SS99999
Retentive timer (coil)	SC00000	to	SC99999
Counter (contact)	CS00000	to	CS99999
Counter (coil)	CC00000	to	CC99999
Data register	D000000	to	D999999
Link register	W000000	to	W7FFFFF
Index register	Z000000	to	Z999999
File register (R)	R000000	to	R999999
Special register	SD00000	to	SD99999
Link special register	SW00000	to	SW7FFFF
Timer current value	TN00000	to	TN99999
Retentive timer current value	SN00000	to	SN99999
Counter current value	CN00000	to	CN99999

Note: The range of available addresses varies depending on the specifications and settings of the CPU unit.

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● **Mitsubishi Electric MELSEC Q series (Mitsubishi Electric QnA-compatible 3C format 4 protocol)**

Device type	Address range		
Input relay	X000000	to	X7FFFFF
Output relay	Y000000	to	Y7FFFFF
Internal relay	M000000	to	M999999
Special relay	SM000000	to	SM999999
Link special relay	SB000000	to	SB7FFFFF
Edge relay	V000000	to	V999999
Latch relay	L000000	to	L999999
Link relay	B000000	to	B7FFFFF
Annunciator	F000000	to	F999999
Timer (contact)	TS000000	to	TS999999
Timer (coil)	TC000000	to	TC999999
Retentive timer (contact)	SS000000	to	SS999999
Retentive timer (coil)	SC000000	to	SC999999
Counter (contact)	CS000000	to	CS999999
Counter (coil)	CC000000	to	CC999999
Data register	D000000	to	D999999
Link register	W000000	to	W7FFFFF
Index register	Z000000	to	Z999999
File register (R)	R000000	to	R999999
File register (ZR)	ZR000000	to	ZR7FFFFF
Special register	SD000000	to	SD999999
Link special register	SW000000	to	SW7FFFFF
Timer current value	TN000000	to	TN999999
Retentive timer current value	SN000000	to	SN999999
Counter current value	CN000000	to	CN999999

Note: The range of available addresses varies depending on the specifications and settings of the CPU unit.

● **Mitsubishi Electric MELSEC F series (Mitsubishi Electric A-compatible 1C format 4 protocol)**

Device type	Address range		
Input relay	X000000	to	X000377
Output relay	Y000000	to	Y000377
Auxiliary relay / special auxiliary relay	M000000	to	M009999
Timer (contact)	TS000000	to	TS002047
Counter (contact)	CS000000	to	CS001023
Data register / file register	D000000	to	D009999
Extended register	R000000	to	R009999
Timer current value	TN000000	to	TN001023
Counter current value	CN000000	to	CN004096
State	S000000	to	S004096

Note: The range of available addresses varies depending on the specifications and settings of the CPU unit.

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● **Omron CS/CJ/CP series (Omron FINS protocol)**

● **Omron NJ/NX series (Omron FINS protocol)**

Device type	Address range		
Channel I/O bit	0000.00	to	6143.15
Internal auxiliary relay bit	W0000.00	to	W0511.15
Retaining relay bit	H0000.00	to	H1535.15
Special auxiliary relay bit	A0000.00	to	A1471.15
Timer (up flag)	T00000	to	T04095
Counter (up flag)	C00000	to	C04095
Channel I/O	00000	to	06143
Timer (current value)	TN00000	to	TN04095
Counter (current value)	CN00000	to	CN04095
Data memory	D00000	to	D32767
Extended data memory bank 0	E0_00000	to	E0_32767
Extended data memory bank 1	E1_00000	to	E1_32767
Extended data memory bank 2	E2_00000	to	E2_32767
Extended data memory bank 3	E3_00000	to	E3_32767
Extended data memory bank 4	E4_00000	to	E4_32767
Extended data memory bank 5	E5_00000	to	E5_32767
Extended data memory bank 6	E6_00000	to	E6_32767
Extended data memory bank 7	E7_00000	to	E7_32767
Extended data memory bank 8	E8_00000	to	E8_32767
Extended data memory bank 9	E9_00000	to	E9_32767
Extended data memory bank A	EA_00000	to	EA_32767
Extended data memory bank B	EB_00000	to	EB_32767
Extended data memory bank C	EC_00000	to	EC_32767
Extended data memory bank D	ED_00000	to	ED_32767
Extended data memory bank E	EE_00000	to	EE_32767
Extended data memory bank F	EF_00000	to	EF_32767
Extended data memory bank 10	E10_00000	to	E10_32767
Extended data memory bank 11	E11_00000	to	E11_32767
Extended data memory bank 12	E12_00000	to	E12_32767
Extended data memory bank 13	E13_00000	to	E13_32767
Extended data memory bank 14	E14_00000	to	E14_32767
Extended data memory bank 15	E15_00000	to	E15_32767
Extended data memory bank 16	E16_00000	to	E16_32767
Extended data memory bank 17	E17_00000	to	E17_32767
Extended data memory bank 18	E18_00000	to	E18_32767
Extended data memory current	E00000	to	E32767

Note: The range of available addresses varies depending on the specifications and settings of the CPU unit.

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● **Keyence KV-8000/7000/5000/3000 series (Keyence protocol mode 4)**

Device type	Address range		
Relay	R00000	to	R99915
Link relay	B0000	to	B7FFF
Internal auxiliary relay	MR00000	to	MR99915
Latch relay	LR00000	to	LR99915
Control relay	CR0000	to	CR7915
Timer contact	T0000	to	T3999
Counter contact	C0000	to	C3999
Timer current value	T0000	to	T3999
Counter current value	C0000	to	C3999
Data memory	DM00000	to	DM65534
Extended data memory	EM00000	to	EM65534
File register	FM00000	to	FM32767
File register (sequential numbering)	ZF000000	to	ZF524287
Control memory	CM0000	to	CM7599
Link register	W0000	to	W7FFF

Note: The range of available addresses varies depending on the specifications and settings of the CPU unit.

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● **Keyence KV Nano series (Modbus/RTU protocol)**

● **Siemens S7-1200 series (Modbus/RTU protocol)**

● **General-purpose Modbus/RTU device (Modbus/RTU protocol)**

Device type	Address range		
Coil	000001	to	065536
Input relay	100001	to	165536
Input register	300001	to	365536
Retaining register	400001	to	465536

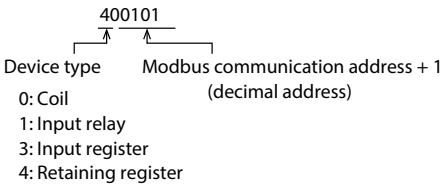
Change the Modbus address used by the SLP in accordance with the address expression used for the connected Modbus device.

The address expression in the Modbus protocol and the SLP is as follows.

Device type	Modbus communication protocol			SLP-C1F
	Function code		Address range	Address range
	For reading	For writing		
Coil	1 (0x01)	15 (0x0F)	0000	000001
			0001	000002
			to	to
			FFFF	065536
Input relay	2 (0x02)	-	0000	100001
			0001	100002
			to	to
			FFFF	165536
Input register	4 (0x04)	-	0000	300001
			0001	300002
			to	to
			FFFF	365536
Retaining register	3 (0x03)	16 (0x10)	0000	400001
			0001	400002
			to	to
			FFFF	465536

In the Modbus communication protocol, a function number is added to an address in order to indicate the device type. In the SLP, the type is expressed by the value (0, 1, 3, 4) at the beginning of an address.

Also, the address used by the loader is the Modbus protocol address + 1, as shown in the above example of “000001” to “065536."



! Handling Precautions

- When connecting to a Keyence KV PLC, set Send Delay Time to 100 ms or longer. If a time shorter than 100 ms is set, faulty communication may result.

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■ Completion notification data

When transfer of data within a sheet is completed during cyclic data transfer and triggered data transfer, completion notification data is written. The contents of the completion notification data are as follows.

Type	Code	Description
Communication succeeded	0	Normal response
Timeout	1	Timeout occurred in communication between the PLC and this controller.
Controller error	2	An error occurred in this controller.
PLC error	3	An abnormal code is included in the reply data from the PLC.

- The device set for [Completion notification data] operates according to the [Notification device initialization] setting.

  If the setting is 0 (disabled):

  Even if the status of PLC link communication changes from abnormal to normal, the device set for [Completion notification data] will retain the latest error code (other than 0). To change the data to 0 (communication succeeded), write 1 to [Clear monitoring information]. Note that the number of communications will also be reset to zero.

  If the setting is 1 (enabled):

  When the communication status changes from abnormal to normal, 0 (communication succeeded) is automatically written to the device set for [Completion notification data].

Handling Precautions

- To write data to [Clear monitoring information], register the address of this item as a user-defined address on the [Numeric Monitor] screen of the SLP-C1F.

Note

- ☞User's Manual for Detailed Functions of Smart Loader Package Model SLP-C1F for Single Loop Controller Model C1M/C1A/C2/C3 (Document No. CP-SP-1463E) (for user-defined addresses on the [Numeric Monitor] screen of the SLP-C1F)

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9-3 PLC Link Setup

To set up PLC link communication, use the SLP-C1F Smart Loader Package.

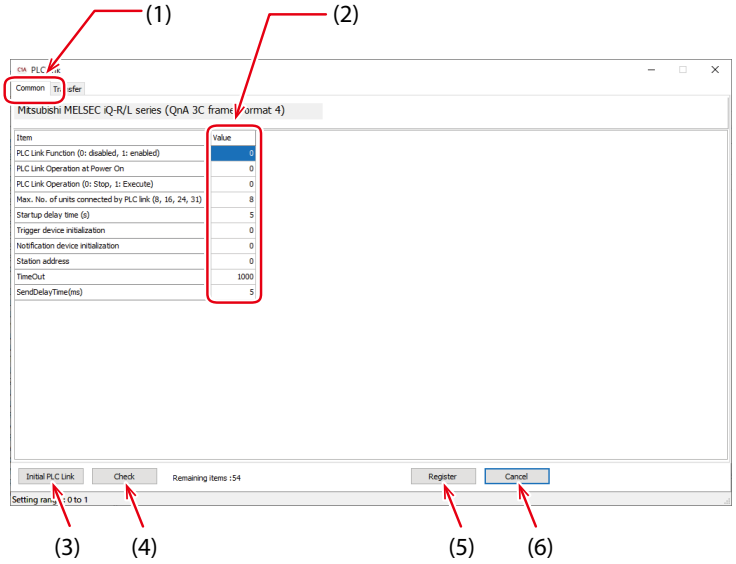
Open the setup screen of the SLP-C1F and click the [PLC Link] button to open the [PLC Link] window.

The method of setup is described below, illustrated by the SLP-C1F screen.

Handling Precautions

- To use PLC link communication, set Communication type to 3 (PLC link communication) in the Setup (communication) Bank.

■ Common settings



(1) Select the [Common] tab to configure the PLC connection settings common to transfer 1 to 4.

(2) Enter a value for each item.

(3) Click the [Initial PLC Link] button to initialize (clear) the PLC link setup screen.

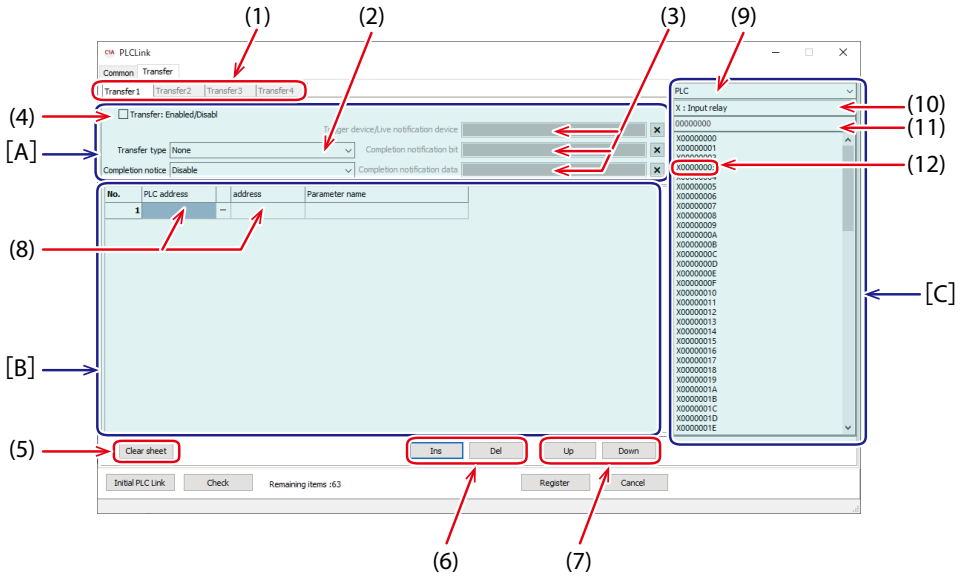
(4) Click the [Check] button to check that all the transfer setting addresses have been defined.

(5) Click the [Register] button to enable the configured PLC link settings.
Note that registration only rewrites the settings in the PC memory. After registration, the settings must be written, along with other parameters, to the controller or be saved in a PC file.

(6) Click the [Cancel] button to discard the configured PLC link settings.

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■ Transfer settings



(1) Select a tab from the [Transfer 1] to [Transfer 4] tabs.

● Section [A] Transfer operation settings

(2) After selecting a tab, first select [Transfer type].

(3) Drag and drop an address in section [C] to [Trigger device/Live notification device], [Completion notification bit], and [Completion notification data]. For cyclic data transfer, specify a device of the PLC for [Trigger device/Live notification device].
Set [Completion notice] to "Enable" and then specify a device of the PLC for [Completion notification bit] and [Completion notification data].
The settings for [Trigger device/Live notification device], [Completion notification bit], and [Completion notification data] can be deleted by clicking the [×] to the right of each item.

(4) You can enable or disable the settings using the [Transfer: Enabled/Disabled] checkbox. Text on disabled tabs is grayed out.

● Section [B] Transfer data settings

(5) [Clear sheet] initializes the sheet for each transfer setting.

(6) The number of lines can be increased or decreased with [Ins] and [Del]. One line corresponds to one item. Up to 64 items can be specified in total for transfer 1 to transfer 4 combined. [Remaining items] is displayed at the bottom of the screen.

(7) Other lines can be selected by using [Up] and [Down].

(8) Set [PLC address] and [Address] by dragging and dropping an address in section [C]. Also, you can enter a decimal address into [Address] directly from the keyboard.

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● **Section [C] Address list**

(9) Select “PLC” or this controller.

(10) Select a data type.

(11) Enter the first address in the list.

(12) An address can be selected from the list and dragged and dropped to sections [A] and [B].

■ Transfer setting examples

● Cyclic data transfer (PLC →)

Used for writing parameters from the PLC to this controller consecutively.

In this example, the data from D0000100 to D0000103 is transferred to this controller periodically.

● Transfer operation settings

Transfer type: Cyclic data transfer (PLC →)

Live notification device: M000100

Completion notification bit: M0000010

Completion notification data: D000010

Note

- 0 and 1 are written alternately to the live notification device periodically.
- If [Notification device initialization] on the [Common] tab is set to 0 (enabled), 0 is written to the device specified by [Completion notification bit] immediately before the data transfer.
- After the data transfer, 1 is written to the completion notification bit.
- If there is an error in the data transfer, a value other than 0 is written to the device set for [Completion notification data]. If [Notification device initialization] on the [Common] tab is set to 1 (enabled), when the error has been removed, 0 (communication succeeded) is written to the device set for [Completion notification data].

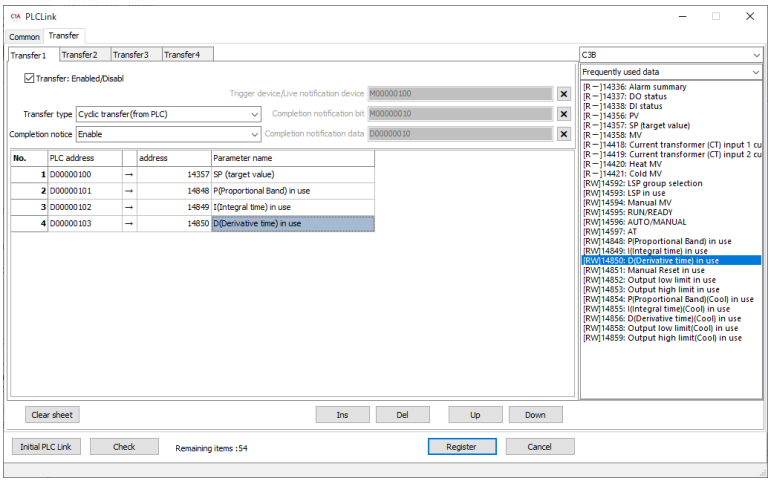
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● **Transfer data settings**

D000100 → SP (target value)
D000101 → P (Proportional band)
D000102 → I (Integral time)
D000103 → D (Derivative time)

Handling Precautions

- Use RAM write addresses for periodic data transfers (writing) to this controller.



● **Cyclic data transfer (→ PLC)**

Used for monitoring the data of this controller on the PLC.

In this example, the data of this controller is transferred to addresses D000200 to D000201.

● **Transfer operation settings**

Transfer type: Cyclic data transfer (→ PLC)
Live notification device: M000101
Completion notification bit: M000011
Completion notification data: D000011

Note

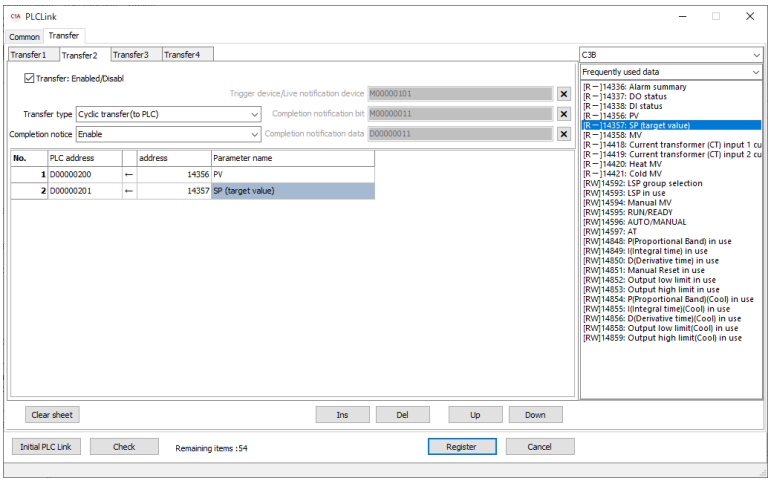
- 0 and 1 are written alternately to the live notification device periodically.
- If [Notification device initialization] on the [Common] tab is set to 0 (enabled), 0 is written to the device specified by [Completion notification bit] immediately before the data transfer.
- After the data transfer, 1 is written to the completion notification bit.
- If there is an error in the data transfer, a value other than 0 is written to the device set for [Completion notification data]. If [Notification device initialization] on the [Common] tab is set to 1 (enabled), when the error has been removed, 0 (communication succeeded) is written to the device set for [Completion notification data].

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- **Transfer data settings**

PV → D000200

SP (target value) → D000201



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● Triggered data transfer (PLC →)

Used for writing parameters from the PLC to this controller at a time determined by the PLC.

In this example, when M000050 turns ON, the data from M000016 and M000017 is transferred to the mode setting of this controller.

● Transfer operation settings

Transfer type: Triggered data transfer (PLC →)
Trigger device: M000050
Completion notification bit: M0000060
Completion notification data: D000050

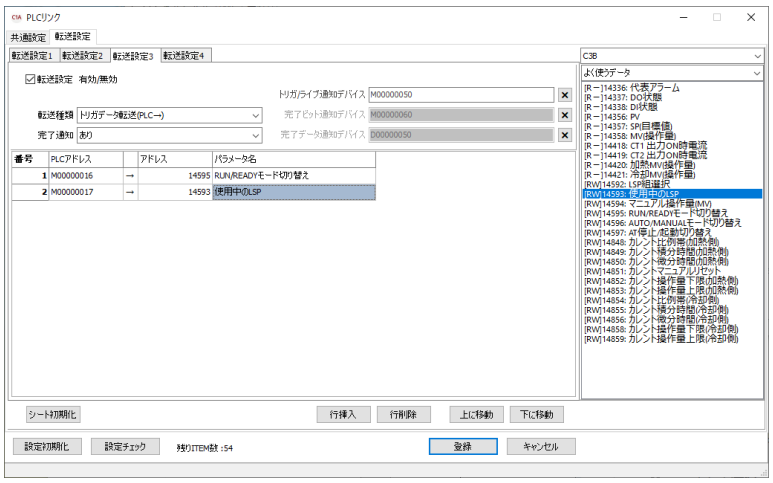
Note

- If [Trigger device initialization] on the [Common] tab is set to 0 (enabled), 0 is written to the trigger device when a trigger is detected.
- If [Notification device initialization] on the [Common] tab is set to 0 (enabled), 0 is written to the device specified by [Completion notification bit] when a trigger is detected.
- After the data transfer, 1 is written to the completion notification bit.
- If there is an error in the data transfer, a value other than 0 is written to the device set for [Completion notification data]. If [Notification device initialization] on the [Common] tab is set to 1 (enabled), when the error has been removed, 0 (communication succeeded) is written to the device set for [Completion notification data].

● Transfer data settings

M000016 → RUN/READY mode selection

M000017 → LSP in use



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● **Triggered data transfer (→ PLC)**

Used for writing the data of this controller to the PLC when an event occurs with this controller.

In this example, when the [Alarm summary] setting of this controller changes to a value other than 0, the data of this controller is transferred to D0000070 and D0000071.

● **Transfer operation settings**

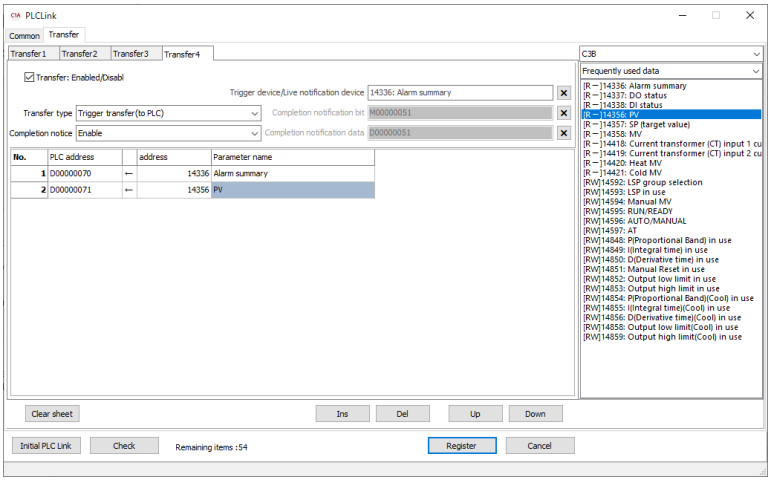
Transfer type: Triggered data transfer (→ PLC)
Trigger device: Representative alarm
Completion notification bit: M0000051
Completion notification data: D000051

Note

- If [Notification device initialization] on the [Common] tab is set to 1 (enabled) and if a device of this controller is set for [Trigger device/Live notification device], this controller will not write 0 to the trigger device immediately after detecting a trigger. However, it will detect triggers continuously as long as the setting for the trigger device remains a value other than 0.
- If [Notification device initialization] on the [Common] tab is set to 0 (enabled), 0 is written to the device specified by [Completion notification bit] when a trigger is detected.
- After the data transfer, 1 is written to the completion notification bit.
- If there is an error in the data transfer, a value other than 0 is written to the device set for [Completion notification data]. If [Notification device initialization] on the [Common] tab is set to 1 (enabled), when the error has been removed, 0 (communication succeeded) is written to the device set for [Completion notification data].

● **Transfer data settings**

Representative alarm → D000070
PV → D000071



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9-4 List of PLC Link Settings

The PLC link settings include common settings, transfer settings, and data settings.

■ Common settings

Item	Settings	Initial value	Remarks
PLC link function	0: Disable 1: Enable	0	
PLC link operation at power-on	0: PLC link operation stops when the power is turned on. 1: PLC link operation is executed when the power is turned on.	0	The setting is valid only if [PLC Link Function] is set to 1.
PLC link operation	0: Stop 1: Execute	0	The setting is valid only if [PLC Link Function] is set to 1.
Max. No. of units connected by PLC link	8, 16, 24, 31	8	
Startup delay time	0–60 s	5	
Trigger device initialization	0: No 1: Yes	0	
Notification device initialization	0: No 1: Yes	0	
Station address	0–127	0	The address of the PLC to communicate with
Timeout time	0–32000 ms	1000	
Send delay time	0–1000 ms	5	

Handling Precautions

- To use PLC link communication, set C064 (Communication type) to 3 (PLC link communication) and configure the above settings on the PLC link screen of the SLP-C1F in advance.

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■ Transfer settings

Transfer sheets 1–4 can be set independently.

Item	Settings	Initial value	Remarks
Transfer: Enabled/Disabled	Unchecked: Disabled Checked: Enabled	Unchecked	
Transfer type	Cyclic data transfer (PLC →) Cyclic data transfer (→ PLC) Triggered data transfer (PLC →) Triggered data transfer (→ PLC)	None	
Trigger device address	For PLC: See the list of device types and address ranges for the PLC. ☞ ■ Usable devices (p. 9-6) For this controller: Selectable from the monitoring data and parameters of this controller.	Not set	For triggered data transfer
Live notification device address	See the list of device types and address ranges for the PLC. ☞ ■ Usable devices (p. 9-6)	Not set	For cyclic data transfer
Completion notification bit address	See the list of device types and address ranges for the PLC. ☞ ■ Usable devices (p. 9-6)	Not set	
Completion notification data address	See the list of device types and address ranges for the PLC. ☞ ■ Usable devices (p. 9-6)	Not set	

■ Data settings

Transfer sheets 1–4 can be set independently. Up to 64 data items can be specified in total for all sheets combined. The settings for each data item are shown in the table below.

Item	Settings	Initial value	Remarks
PLC address	See the list of device types and address ranges for the PLC.	Not set	
Address	Selectable from the monitoring data and parameters of this controller.	Not set	

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Chapter 10. List of Communication Data

■ List of communication data

The meaning of symbols in the RAM and nonvolatile memory Read/Write columns is as follows.

No symbol: Possible

☐: Possible depending on the conditions

△: Possible but data is invalid

×: Not possible

Note: Reading the nonvolatile memory address, like reading the RAM address, reads data from RAM.

Decimal point

–: No decimal point

1–3: The value indicates the decimal point position (for communication, original value is multiplied by 10, 100, or 1000)

P: Varies depending on the PV input range

C: Varies depending on the integral time and derivative time decimal point position

S: Varies depending on various conditions

RS/WS commands for CPL communication: Use a decimal word address followed by W.

RD/WD/RU/WU commands for CPL communication: Use a hexadecimal word address.

Commands for Modbus communication: Use a hexadecimal word address.

Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Instrument information	ROM ID	273	0111	16657	4111		×		×	–	Model C2A: 18 Model C2B: 19 Model C3A: 20 Model C3B: 21
	ROM version 1	274	0112	16658	4112		×		×	2	
	ROM version 2	275	0113	16659	4113		×		×	2	
	Loader Information	276	0114	16660	4114		×		×	–	
	EST Information	277	0115	16661	4115		×		×	–	
	Manufacturing date code (year)	278	0116	16662	4116		×		×	–	Year – 2000 Example: Year 2024 is "24"
	Manufacturing date code (month, day)	279	0117	16663	4117		×		×	2	Month + (day ÷ 100) Example: Dec. 1 is 12.01.
	Serial No.	280	0118	16664	4118		×		×	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Advanced function password	Advanced function password 1	5021	139D	21405	539D					–	
	Advanced function password 2	5022	139E	21406	539E					–	
	Advanced function password 3	5023	139F	21407	539F					–	
	Advanced function password 4	5024	13A0	21408	53A0					–	
	Advanced function password 5	5025	13A1	21409	53A1					–	
	Advanced function password 6	5026	13A2	21410	53A2					–	
	Advanced function password 7	5027	13A3	21411	53A3					–	
	Advanced function password 8	5028	13A4	21412	53A4					–	
	Advanced function password 9	5029	13A5	21413	53A5					–	
	Advanced function password 10	5030	13A6	21414	53A6					–	
	Advanced function password 11	5031	13A7	21415	53A7					–	
	Advanced function password 12	5032	13A8	21416	53A8					–	
	Advanced function password 13	5033	13A9	21417	53A9					–	
	Advanced function password 14	5034	13AA	21418	53AA					–	
	Advanced function password 15	5035	13AB	21419	53AB					–	
	Advanced function password 16	5036	13AC	21420	53AC					–	
Standard bit	Always 0 (OFF)	1024	400	17408	4400		×		×	–	
	Always 1 (ON)	1025	401	17409	4401		×		×	–	
	Internal event 1	1088	440	17472	4440		×		×	–	
	Internal event 2	1089	441	17473	4441		×		×	–	
	Internal event 3	1090	442	17474	4442		×		×	–	
	Internal event 4	1091	443	17475	4443		×		×	–	
	Internal event 5	1092	444	17476	4444		×		×	–	
	Internal event 6	1093	445	17477	4445		×		×	–	
	Internal event 7	1094	446	17478	4446		×		×	–	
	Internal event 8	1095	447	17479	4447		×		×	–	
	Internal event 1 standby	1104	450	17488	4450		×		×	–	
	Internal event 2 standby	1105	451	17489	4451		×		×	–	
	Internal event 3 standby	1106	452	17490	4452		×		×	–	
	Internal event 4 standby	1107	453	17491	4453		×		×	–	
	Internal event 5 standby	1108	454	17492	4454		×		×	–	
	Internal event 6 standby	1109	455	17493	4455		×		×	–	
	Internal event 7 standby	1110	456	17494	4456		×		×	–	
	Internal event 8 standby	1111	457	17495	4457		×		×	–	
	CT1 heater burnout detection	1120	460	17504	4460		×		×	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard bit	CT2 heater burnout detection	1121	461	17505	4461		×		×	–	
	CT1 overcurrent detection	1128	468	17512	4468		×		×	–	
	CT2 overcurrent detection	1129	469	17513	4469		×		×	–	
	CT1 short-circuit detection	1136	470	17520	4470		×		×	–	
	CT2 short-circuit detection	1137	471	17521	4471		×		×	–	
	DI 1 terminal status	1152	480	17536	4480		×		×	–	
	DI 2 terminal status	1153	481	17537	4481		×		×	–	
	DI 3 terminal status	1154	482	17538	4482		×		×	–	
	DI 4 terminal status	1155	483	17539	4483		×		×	–	
	OR of all DI states	1168	490	17552	4490		×		×	–	This function was added in ROM version 1.03.
	Internal contact 1 status	1184	4A0	17568	44A0		×		×	–	
	Internal contact 2 status	1185	4A1	17569	44A1		×		×	–	
	Internal contact 3 status	1186	4A2	17570	44A2		×		×	–	
	Internal contact 4 status	1187	4A3	17571	44A3		×		×	–	
	Internal contact 5 status	1188	4A4	17572	44A4		×		×	–	
	Internal contact 6 status	1189	4A5	17573	44A5		×		×	–	
	Internal contact 7 status	1190	4A6	17574	44A6		×		×	–	
	Internal contact 8 status	1191	4A7	17575	44A7		×		×	–	
	ON/OFF control MV status	1264	4F0	17648	44F0		×		×	–	
	OUT 1 terminal status	1280	500	17664	4500		×		×	–	
	OUT 2 terminal status	1281	501	17665	4501		×		×	–	
	EV1 terminal status	1282	502	17666	4502		×		×	–	
	EV2 terminal status	1283	503	17667	4503		×		×	–	
	EV3 terminal status	1284	504	17668	4504		×		×	–	
	Segment event 1	1360	550	17744	4550		×		×	–	
	Segment event 2	1361	551	17745	4551		×		×	–	
	Segment event 3	1362	552	17746	4552		×		×	–	
	Segment event 4	1363	553	17747	4553		×		×	–	
	Segment event 5	1364	554	17748	4554		×		×	–	
	Segment event 6	1365	555	17749	4555		×		×	–	
	Segment event 7	1366	556	17750	4556		×		×	–	
	Segment event 8	1367	557	17751	4557		×		×	–	
	Segment event 9	1368	558	17752	4558		×		×	–	
	Segment event 10	1369	559	17753	4559		×		×	–	
	Segment event 11	1370	55A	17754	455A		×		×	–	
	Segment event 12	1371	55B	17755	455B		×		×	–	
	Segment event 13	1372	55C	17756	455C		×		×	–	
	Segment event 14	1373	55D	17757	455D		×		×	–	
	Segment event 15	1374	55E	17758	455E		×		×	–	
	Segment event 16	1375	55F	17759	455F		×		×	–	
	User-defined bit 1	1408	580	17792	4580		×		×	–	
	User-defined bit 2	1409	581	17793	4581		×		×	–	
	User-defined bit 3	1410	582	17794	4582		×		×	–	
	User-defined bit 4	1411	583	17795	4583		×		×	–	
	User-defined bit 5	1412	584	17796	4584		×		×	–	
	User-defined bit 6	1413	585	17797	4585		×		×	–	
	User-defined bit 7	1414	586	17798	4586		×		×	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard bit	User-defined bit 8	1415	587	17799	4587		×		×	–	
	User-defined bit 9	1416	588	17800	4588		×		×	–	
	User-defined bit 10	1417	589	17801	4589		×		×	–	
	User-defined bit 11	1418	58A	17802	458A		×		×	–	
	User-defined bit 12	1419	58B	17803	458B		×		×	–	
	User-defined bit 13	1420	58C	17804	458C		×		×	–	
	User-defined bit 14	1421	58D	17805	458D		×		×	–	
	User-defined bit 15	1422	58E	17806	458E		×		×	–	
	User-defined bit 16	1423	58F	17807	458F		×		×	–	
	Result of logical operation 1	1440	5A0	17824	45A0		×		×	–	
	Result of logical operation 2	1441	5A1	17825	45A1		×		×	–	
	Result of logical operation 3	1442	5A2	17826	45A2		×		×	–	
	Result of logical operation 4	1443	5A3	17827	45A3		×		×	–	
	Result of logical operation 5	1444	5A4	17828	45A4		×		×	–	
	Result of logical operation 6	1445	5A5	17829	45A5		×		×	–	
	Result of logical operation 7	1446	5A6	17830	45A6		×		×	–	
	Result of logical operation 8	1447	5A7	17831	45A7		×		×	–	
	Result of logical operation 9	1448	5A8	17832	45A8		×		×	–	
	Result of logical operation 10	1449	5A9	17833	45A9		×		×	–	
	Result of logical operation 11	1450	5AA	17834	45AA		×		×	–	
	Result of logical operation 12	1451	5AB	17835	45AB		×		×	–	
	Result of logical operation 13	1452	5AC	17836	45AC		×		×	–	
	Result of logical operation 14	1453	5AD	17837	45AD		×		×	–	
	Result of logical operation 15	1454	5AE	17838	45AE		×		×	–	
	Result of logical operation 16	1455	5AF	17839	45AF		×		×	–	
	[∧] key status	1536	600	17920	4600		×		×	–	
	[∨] key status	1537	601	17921	4601		×		×	–	
	[<] key status	1538	602	17922	4602		×		×	–	
	[>] key status	1539	603	17923	4603		×		×	–	
	[ENT] key status	1540	604	17924	4604		×		×	–	
	[MENU] key status	1541	605	17925	4605		×		×	–	
	[FUNC] key status	1542	606	17926	4606		×		×	–	
	RS-485 status (1 message received normally)	1545	609	17929	4609		×		×	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard bit	RS-485 status (1 message sent normally)	1546	60A	17930	460A		×		×	–	
	Fixed value output status	1552	610	17936	4610		×		×	–	
	RUN/READY status	1568	620	17952	4620		×		×	–	
	AUTO/MANUAL status	1584	630	17968	4630		×		×	–	
	AT stopped/started status	1600	640	17984	4640		×		×	–	
	Auto tuning error	1608	648	17992	4648		×		×	–	
	LSP/RSP status	1616	650	18000	4650		×		×	–	
	SPOS correction status	1632	660	18016	4660	□	×	□	×	–	
	DROS correction status	1640	668	18024	4668	□	×	□	×	–	
	SP up ramp in progress	1648	670	18032	4670		×		×	–	
	SP down ramp in progress	1656	678	18040	4678		×		×	–	
	SP ramp in progress	1660	67C	18044	467C		×		×	–	*This function was added in ROM version 1.03.
	Pattern SP increase change limit in progress	1664	680	18048	4680		×		×	–	
	Pattern SP decrease change limit in progress	1672	688	18056	4688		×		×	–	
	Pattern operation momentary power outage recovery	1680	690	18064	4690		×		×	–	
	Outputting FF-FITTER FF MV	1704	6A8	18088	46A8	□	×	□	×	–	
	Constant value operation / pattern operation status	1712	6B0	18096	46B0		×		×	–	
	HOLD state	1720	6B8	18104	46B8		×		×	–	
	END state	1728	6C0	18112	46C0		×		×	–	
	G.SOAK state	1736	6C8	18120	46C8		×		×	–	
	PLC link error 1	1744	6D0	18128	46D0		×		×	–	
	PLC link error 2	1745	6D1	18129	46D1		×		×	–	
	PLC link error 3	1746	6D2	18130	46D2		×		×	–	
	PLC link error 4	1747	6D3	18131	46D3		×		×	–	
	Reception monitoring access error 1	1760	6E0	18144	46E0		×		×	–	
	Reception monitoring access error 2	1761	6E1	18145	46E1		×		×	–	
	Reception monitoring access error 3	1762	6E2	18146	46E2		×		×	–	
	Reception monitoring access error 4	1763	6E3	18147	46E3		×		×	–	
	Reception monitoring access error (latch) 1	1776	6F0	18160	46F0		×		×	–	
	Reception monitoring access error (latch) 2	1777	6F1	18161	46F1		×		×	–	
	Reception monitoring access error (latch) 3	1778	6F2	18162	46F2		×		×	–	
	Reception monitoring access error (latch) 4	1779	6F3	18163	46F3		×		×	–	
	PLC link operation stopped/executed	1784	6F8	18168	46F8		×		×	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard bit	Collective result of all alarms (OR of all displayed alarms)	1792	700	18176	4700		×		×	–	
	PV alarm (AL01/AL02)	1793	701	18177	4701		×		×	–	This function was added in ROM version 1.03.
	PV input error (over range) (AL01)	1808	710	18192	4710		×		×	–	
	PV input error (under range) (AL02)	1809	711	18193	4711		×		×	–	
	Reference junction compensation error / RTD input error (AL03)	1810	712	18194	4712		×		×	–	
	RSP input error (over range) (AL05)	1812	714	18196	4714		×		×	–	
	RSP input error (under range) (AL06)	1813	715	18197	4715		×		×	–	
	MFB input error (AL07)	1814	716	18198	4716		×		×	–	
	Motor adjustment error (AL10)	1817	719	18201	4719		×		×	–	
	CT1/CT input error (AL11)	1818	71A	18202	471A		×		×	–	
	CT2/VT input error (AL12)	1819	71B	18203	471B		×		×	–	
	Loader cable error (AL50)	1857	741	18241	4741		×		×	–	
	PLC link error (AL51)	1858	742	18242	4742		×		×	–	
	PV A/D conversion error (AL70)	1877	755	18261	4755		×		×	–	
	RSP A/D conversion error (AL71)	1878	756	18262	4756		×		×	–	
	MFB A/D conversion error (AL72)	1879	757	18263	4757		×		×	–	
	Nonvolatile memory error (AL74)	1881	759	18265	4759		×		×	–	
	Nonvolatile memory not initialized (AL80)	1887	75F	18271	475F		×		×	–	
	Settings area error (AL81)	1888	760	18272	4760		×		×	–	
	Adjustment value area error (AL82)	1889	761	18273	4761		×		×	–	
	Internal system error (AL83)	1890	762	18274	4762		×		×	–	
	Settings initialization error (AL84)	1891	763	18275	4763		×		×	–	
	Settings error (AL95)	1902	76E	18286	476E		×		×	–	
	Adjustment value error (AL96)	1903	76F	18287	476F		×		×	–	
	Extended data memory error (AL97)	1904	770	18288	4770		×		×	–	
	Internal program error (AL99)	1906	772	18290	4772		×		×	–	
	Estimating MFB	1920	780	18304	4780		×		×	–	
	Adjusting MFB	1924	784	18308	4784		×		×	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard bit	Position proportional output to OPEN	1928	788	18312	4788		×		×	–	
	Position proportional output to CLOSE	1932	78C	18316	478C		×		×	–	
	CT1 current when output ON was measured	1952	7A0	18336	47A0		×		×	–	
	CT2 current when output ON / VT voltage was measured	1953	7A1	18337	47A1		×		×	–	
	CT1 current when output OFF was measured	1960	7A8	18344	47A8		×		×	–	
	CT2 current when output OFF was measured	1961	7A9	18345	47A9		×		×	–	
	Loader connector cable connection status	1968	7B0	18352	47B0		×		×	–	
Standard numerical code	0.0 (fixed value)	2048	800	18432	4800		×		×	–	
	1.0 (fixed value)	2049	801	18433	4801		×		×	–	
	User-defined value 1 user-defined monitor value	2112	840	18496	4840		×		×	S	
	User-defined value 2 user-defined monitor value	2113	841	18497	4841		×		×	S	
	User-defined value 3 user-defined monitor value	2114	842	18498	4842		×		×	S	
	User-defined value 4 user-defined monitor value	2115	843	18499	4843		×		×	S	
	User-defined value 5 user-defined monitor value	2116	844	18500	4844		×		×	S	
	User-defined value 6 user-defined monitor value	2117	845	18501	4845		×		×	S	
	User-defined value 7 user-defined monitor value	2118	846	18502	4846		×		×	S	
	User-defined value 8 user-defined monitor value	2119	847	18503	4847		×		×	S	
	User-defined value 9 user-defined monitor value	2120	848	18504	4848		×		×	S	
	User-defined value 10 user-defined monitor value	2121	849	18505	4849		×		×	S	
	User-defined value 11 user-defined monitor value	2122	84A	18506	484A		×		×	S	
	User-defined value 12 user-defined monitor value	2123	84B	18507	484B		×		×	S	
	User-defined value 13 user-defined monitor value	2124	84C	18508	484C		×		×	S	
	User-defined value 14 user-defined monitor value	2125	84D	18509	484D		×		×	S	
	User-defined value 15 user-defined monitor value	2126	84E	18510	484E		×		×	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard numerical code	User-defined value 16 user-defined monitor value	2127	84F	18511	484F		×		×	S	
	Virtual PV before compensation	2288	8F0	18672	48F0		×		×	P	
	Virtual RSP before compensation	2289	8F1	18673	48F1		×		×	P	
	Virtual PV	2296	8F8	18680	48F8		×		×	P	
	Virtual RSP	2297	8F9	18681	48F9		×		×	P	
	PV before compensation	2304	900	18688	4900		×		×	P	
	RSP before compensation	2305	901	18689	4901		×		×	P	
	PV	2313	909	18697	4909		×		×	P	
	RSP	2314	90A	18698	490A		×		×	P	
	Loop PV	2320	910	18704	4910		×		×	P	
	Loop SP	2336	920	18720	4920		×		×	P	
	SP after OS	2344	928	18728	4928	□	×	□	×	P	
	Eventually reached LSP	2352	930	18736	4930		×		×	P	
	Present LSP	2360	938	18744	4938		×		×	P	
	Eventually reached RSP	2368	940	18752	4940		×		×	P	
	Present RSP	2376	948	18760	4948		×		×	P	
	Present pattern SP	2384	950	18768	4950		×		×	P	
	Eventually reached SP	2385	951	18769	4951		×		×	P	
	Present pattern number	2386	952	18770	4952		×		×	–	
	Present segment number	2387	953	18771	4953		×		×	–	
	Number of executed cycles	2388	954	18772	4954		×		×	–	
	Number of remaining cycles	2389	955	18773	4955		×		×	–	
	Progress time in pattern	2390	956	18774	4956		×		×	S	
	Pattern remaining time	2391	957	18775	4957		×		×	S	
	Progress time in segment	2392	958	18776	4958		×		×	S	
	Segment remaining time	2393	959	18777	4959		×		×	S	
	Segment event status	2394	95A	18778	495A		×		×	–	
	MV	2416	970	18800	4970		×		×	1	
	Heat MV	2432	980	18816	4980		×		×	1	
	Cool MV	2440	988	18824	4988		×		×	1	
	FF MV	2448	990	18832	4990	□	×	□	×	1	
	Feedback MV	2456	998	18840	4998	□	×	□	×	1	
	MFB count value	2464	9A0	18848	49A0		×		×	–	
	MFB opening (including estimate)	2468	9A4	18852	49A4		×		×	1	
	MFB opening	2472	9A8	18856	49A8		×		×	1	
	Estimated MFB opening	2476	9AC	18860	49AC		×		×	1	
	Target opening (%)	2480	9B0	18864	49B0		×		×	1	
	CT1 current when output ON	2496	9C0	18880	49C0		×		×	S	
	CT2 current when output ON	2497	9C1	18881	49C1		×		×	S	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard numerical code	CT1 current when output OFF	2512	9D0	18896	49D0		×		×	S	
	CT2 current when output OFF	2513	9D1	18897	49D1		×		×	S	
	Deviation (loop PV – loop SP)	2528	9E0	18912	49E0		×		×	P	
	VT voltage	2548	9F4	18932	49F4		×		×	1	
	Resistance value	2552	9F8	18936	49F8		×		×	1	
	Displayed loop PV	2576	A10	18960	4A10		×		×	P	
	Displayed loop SP	2577	A11	18961	4A11		×		×	P	
	Displayed MV	2578	A12	18962	4A12		×		×	1	
	Displayed MFB amount of opening	2579	A13	18963	4A13		×		×	1	
	Displayed deviation	2580	A14	18964	4A14		×		×	P	
	Internal event 1 timer remaining time	2656	A60	19040	4A60		×		×	S	
	Internal event 2 timer remaining time	2657	A61	19041	4A61		×		×	S	
	Internal event 3 timer remaining time	2658	A62	19042	4A62		×		×	S	
	Internal event 4 timer remaining time	2659	A63	19043	4A63		×		×	S	
	Internal event 5 timer remaining time	2660	A64	19044	4A64		×		×	S	
	Internal event 6 timer remaining time	2661	A65	19045	4A65		×		×	S	
	Internal event 7 timer remaining time	2662	A66	19046	4A66		×		×	S	
	Internal event 8 timer remaining time	2663	A67	19047	4A67		×		×	S	
	Control output 1 ON/OFF count	2688	A80	19072	4A80	☐	×	☐	×	–	
	Control output 2 ON/OFF count	2689	A81	19073	4A81	☐	×	☐	×	–	
	Event output 1 ON/OFF count	2690	A82	19074	4A82	☐	×	☐	×	–	
	Event output 2 ON/OFF count	2691	A83	19075	4A83	☐	×	☐	×	–	
	Event output 3 ON/OFF count	2692	A84	19076	4A84	☐	×	☐	×	–	
	Operating time (in days)	2704	A90	19088	4A90		×		×	–	
	NVM write count	2705	A91	19089	4A91		×		×	–	
	CT1 time proportioning current	2736	AB0	19120	4AB0		×		×	S	
	CT2 time proportioning current	2737	AB1	19121	4AB1		×		×	S	
	OUT 1 continuous output percent	2768	AD0	19152	4AD0		×		×	1	
	OUT 2 continuous output percent	2769	AD1	19153	4AD1		×		×	1	
	AUX output: continuous output percent	2770	AD2	19154	4AD2		×		×	1	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Standard numerical code	OUT 1 time proportional output percent	2784	AE0	19168	4AE0		×		×	1	
	OUT 2 time proportional output percent	2785	AE1	19169	4AE1		×		×	1	
	EV1 time proportional output percent	2786	AE2	19170	4AE2		×		×	1	
	EV2 time proportional output percent	2787	AE3	19171	4AE3		×		×	1	
	EV3 time proportional output percent	2788	AE4	19172	4AE4		×		×	1	
	PLC link communication count	2832	B10	19216	4B10		×		×	–	
	PLC link failure count	2833	B11	19217	4B11		×		×	–	
	PLC link scan count	2834	B12	19218	4B12		×		×	–	
	PLC link scan time	2835	B13	19219	4B13		×		×	–	
	PLC link scan time (max.)	2836	B14	19220	4B14		×		×	–	
	Max. No. of PLC link nodes	2837	B15	19221	4B15		×		×	–	
	PLC link communication count sheet 1	2848	B20	19232	4B20		×		×	–	
	PLC link failure count sheet 1	2849	B21	19233	4B21		×		×	–	
	PLC link communication count sheet 2	2850	B22	19234	4B22		×		×	–	
	PLC link failure count sheet 2	2851	B23	19235	4B23		×		×	–	
	PLC link communication count sheet 3	2852	B24	19236	4B24		×		×	–	
	PLC link failure count sheet 3	2853	B25	19237	4B25		×		×	–	
	PLC link communication count sheet 4	2854	B26	19238	4B26		×		×	–	
	PLC link failure count sheet 4	2855	B27	19239	4B27		×		×	–	
Lock	Key lock	5001	1389	21385	5389					–	
	Communication lock	5002	138A	21386	538A		×		×	–	
	Loader lock	5003	138B	21387	538B		×		×	–	
	Password display	5004	138C	21388	538C				×	–	The value read from communication and from the loader is always 0.
	Password 1A	-	-	-	-	×	×	×	×	–	Passwords cannot be written through communication or using the loader.
	Password 2A	-	-	-	-	×	×	×	×	–	Same as above.
	Password 1B	-	-	-	-	×	×	×	×	–	Same as above.
	Password 2B	-	-	-	-	×	×	×	×	–	Same as above.

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
User-Defined Value	User-defined value 1 sign type	4001	0FA1	20385	4FA1					–	
	User-defined value 1 settings decimal point position	4002	0FA2	20386	4FA2					–	
	User-defined value 1 settings user-defined value	4003	0FA3	20387	4FA3					S	
	User-defined value 1 monitor decimal point position	4004	0FA4	20388	4FA4					–	
	User-defined value 2 sign type	4005	0FA5	20389	4FA5					–	
	User-defined value 2 settings decimal point position	4006	0FA6	20390	4FA6					–	
	User-defined value 2 settings user-defined value	4007	0FA7	20391	4FA7					S	
	User-defined value 2 monitor decimal point position	4008	0FA8	20392	4FA8					–	
	User-defined value 3 sign type	4009	0FA9	20393	4FA9					–	
	User-defined value 3 settings decimal point position	4010	0FAA	20394	4FAA					–	
	User-defined value 3 settings user-defined value	4011	0FAB	20395	4FAB					S	
	User-defined value 3 monitor decimal point position	4012	0FAC	20396	4FAC					–	
	User-defined value 4 sign type	4013	0FAD	20397	4FAD					–	
	User-defined value 4 settings decimal point position	4014	0FAE	20398	4FAE					–	
	User-defined value 4 settings user-defined value	4015	0FAF	20399	4FAF					S	
	User-defined value 4 monitor decimal point position	4016	0FB0	20400	4FB0					–	
	User-defined value 5 sign type	4017	0FB1	20401	4FB1					–	
	User-defined value 5 settings decimal point position	4018	0FB2	20402	4FB2					–	
	User-defined value 5 settings user-defined value	4019	0FB3	20403	4FB3					S	
	User-defined value 5 monitor decimal point position	4020	0FB4	20404	4FB4					–	
	User-defined value 6 sign type	4021	0FB5	20405	4FB5					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
User-Defined Value	User-defined value 6 settings decimal point position	4022	0FB6	20406	4FB6					–	
	User-defined value 6 settings user-defined value	4023	0FB7	20407	4FB7					S	
	User-defined value 6 monitor decimal point position	4024	0FB8	20408	4FB8					–	
	User-defined value 7 sign type	4025	0FB9	20409	4FB9					–	
	User-defined value 7 settings decimal point position	4026	0FBA	20410	4FBA					–	
	User-defined value 7 settings user-defined value	4027	0FBB	20411	4FBB					S	
	User-defined value 7 monitor decimal point position	4028	0FBC	20412	4FBC					–	
	User-defined value 8 sign type	4029	0FBD	20413	4FBD					–	
	User-defined value 8 settings decimal point position	4030	0FBE	20414	4FBE					–	
	User-defined value 8 settings user-defined value	4031	0FBF	20415	4FBF					S	
	User-defined value 8 monitor decimal point position	4032	0FC0	20416	4FC0					–	
	User-defined value 9 sign type	4033	0FC1	20417	4FC1					–	
	User-defined value 9 settings decimal point position	4034	0FC2	20418	4FC2					–	
	User-defined value 9 settings user-defined value	4035	0FC3	20419	4FC3					S	
	User-defined value 9 monitor decimal point position	4036	0FC4	20420	4FC4					–	
	User-defined value 10 sign type	4037	0FC5	20421	4FC5					–	
	User-defined value 10 settings decimal point position	4038	0FC6	20422	4FC6					–	
	User-defined value 10 settings user-defined value	4039	0FC7	20423	4FC7					S	
	User-defined value 10 monitor decimal point position	4040	0FC8	20424	4FC8					–	
	User-defined value 11 sign type	4041	0FC9	20425	4FC9					–	
	User-defined value 11 settings decimal point position	4042	0FCA	20426	4FCA					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
User-Defined Value	User-defined value 11 settings user-defined value	4043	0FCB	20427	4FCB					S	
	User-defined value 11 monitor decimal point position	4044	0FCC	20428	4FCC					–	
	User-defined value 12 sign type	4045	0FCD	20429	4FCD					–	
	User-defined value 12 settings decimal point position	4046	0FCE	20430	4FCE					–	
	User-defined value 12 settings user-defined value	4047	0FCF	20431	4FCF					S	
	User-defined value 12 monitor decimal point position	4048	0FD0	20432	4FD0					–	
	User-defined value 13 sign type	4049	0FD1	20433	4FD1					–	
	User-defined value 13 settings decimal point position	4050	0FD2	20434	4FD2					–	
	User-defined value 13 settings user-defined value	4051	0FD3	20435	4FD3					S	
	User-defined value 13 monitor decimal point position	4052	0FD4	20436	4FD4					–	
	User-defined value 14 sign type	4053	0FD5	20437	4FD5					–	
	User-defined value 14 settings decimal point position	4054	0FD6	20438	4FD6					–	
	User-defined value 14 settings user-defined value	4055	0FD7	20439	4FD7					S	
	User-defined value 14 monitor decimal point position	4056	0FD8	20440	4FD8					–	
	User-defined value 15 sign type	4057	0FD9	20441	4FD9					–	
	User-defined value 15 settings decimal point position	4058	0FDA	20442	4FDA					–	
	User-defined value 15 settings user-defined value	4059	0FDB	20443	4FDB					S	
	User-defined value 15 monitor decimal point position	4060	0FDC	20444	4FDC					–	
	User-defined value 16 sign type	4061	0FDD	20445	4FDD					–	
	User-defined value 16 settings decimal point position	4062	0FDE	20446	4FDE					–	
	User-defined value 16 settings user-defined value	4063	0FDF	20447	4FDF					S	
	User-defined value 16 monitor decimal point position	4064	0FE0	20448	4FE0					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
User Function	User function 1	5101	13ED	21485	53ED					–	
	User function 2	5102	13EE	21486	53EE					–	
	User function 3	5103	13EF	21487	53EF					–	
	User function 4	5104	13F0	21488	53F0					–	
	User function 5	5105	13F1	21489	53F1					–	
	User function 6	5106	13F2	21490	53F2					–	
	User function 7	5107	13F3	21491	53F3					–	
	User function 8	5108	13F4	21492	53F4					–	
User operation screen	User operation screen 1: Data shown in display field 1	5151	141F	21535	541F					–	
	User operation screen 1: Data shown in display field 2	5152	1420	21536	5420					–	
	User operation screen 1: Data shown in display field 3	5153	1421	21537	5421					–	
	User operation screen 2: Data shown in display field 1	5154	1422	21538	5422					–	
	User operation screen 2: Data shown in display field 2	5155	1423	21539	5423					–	
	User operation screen 2: Data shown in display field 3	5156	1424	21540	5424					–	
	User operation screen 3: Data shown in display field 1	5157	1425	21541	5425					–	
	User operation screen 3: Data shown in display field 2	5158	1426	21542	5426					–	
	User operation screen 3: Data shown in display field 3	5159	1427	21543	5427					–	
	User operation screen 4: Data shown in display field 1	5160	1428	21544	5428					–	
	User operation screen 4: Data shown in display field 2	5161	1429	21545	5429					–	
	User operation screen 4: Data shown in display field 3	5162	142A	21546	542A					–	
	User operation screen 5: Data shown in display field 1	5163	142B	21547	542B					–	
	User operation screen 5: Data shown in display field 2	5164	142C	21548	542C					–	
	User operation screen 5: Data shown in display field 3	5165	142D	21549	542D					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
User operation screen	User operation screen 6: Data shown in display field 1	5166	142E	21550	542E					–	
	User operation screen 6: Data shown in display field 2	5167	142F	21551	542F					–	
	User operation screen 6: Data shown in display field 3	5168	1430	21552	5430					–	
	User operation screen 7: Data shown in display field 1	5169	1431	21553	5431					–	
	User operation screen 7: Data shown in display field 2	5170	1432	21554	5432					–	
	User operation screen 7: Data shown in display field 3	5171	1433	21555	5433					–	
	User operation screen 8: Data shown in display field 1	5172	1434	21556	5434					–	
	User operation screen 8: Data shown in display field 2	5173	1435	21557	5435					–	
	User operation screen 8: Data shown in display field 3	5174	1436	21558	5436					–	
Setup	PV input range type	5201	1451	21585	5451					–	
	Reference junction compensation (cold junction compensation)	5203	1453	21587	5453					–	
	PV decimal point position	5204	1454	21588	5454		☐		☐	–	
	PV range low limit	5205	1455	21589	5455		☐		☐	P	
	PV range high limit	5206	1456	21590	5456		☐		☐	P	
	SP low limit	5207	1457	21591	5457					P	
	SP high limit	5208	1458	21592	5458					P	
	PV square root extraction dropout	5209	1459	21593	5459		☐		☐	1	
	RSP input range type	5210	145A	21594	545A					–	
	RSP range low limit	5211	145B	21595	545B		☐		☐	P	
	RSP range high limit	5212	145C	21596	545C		☐		☐	P	
	(Reserved for future use.)	5213	145D	21597	545D	△	△	△	△	–	
	Control action (direct/reverse)	5214	145E	21598	545E					–	
	Output operation at PV alarm	5215	145F	21599	545F					–	
	Output at PV alarm	5216	1460	21600	5460					1	
	Output at READY	5217	1461	21601	5461					1	
	Output at READY (cool)	5218	1462	21602	5462					1	
	Output operation at changing AUTO/MANUAL	5219	1463	21603	5463					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Setup	Preset MANUAL value	5220	1464	21604	5464					1	
	Initial output type (mode) of PID control	5221	1465	21605	5465					–	
	Initial output of PID control	5222	1466	21606	5466					1	
	Integral time and derivative time decimal point position	5223	1467	21607	5467					–	
	Zone PID operation	5224	1468	21608	5468	☐	☐	☐	☐	–	
	(Reserved for future use.)	5225	1469	21609	5469	△	△	△	△	1	
	Heat/cool control	5226	146A	21610	546A					–	
	(Reserved for future use.)	5227	146B	21611	546B	△	△	△	△	–	
	Heat/cool control dead zone	5228	146C	21612	546C					1	
	(Reserved for future use.)	5229	146D	21613	546D	△	△	△	△	1	
	LSP system group	5230	146E	21614	546E					–	
	SP ramp type	5231	146F	21615	546F					–	
	SP ramp unit	5232	1470	21616	5470					–	
	OUT 1 continuous output range	5242	147A	21626	547A		☐		☐	–	
	OUT 1 continuous output type	5243	147B	21627	547B		☐		☐	–	
	OUT 1 continuous output scaling low limit	5244	147C	21628	547C		☐		☐	S	
	OUT 1 continuous output scaling high limit	5245	147D	21629	547D		☐		☐	S	
	OUT 1 continuous output MV scaling width	5246	147E	21630	547E		☐		☐	S	
	OUT 2 continuous output range	5247	147F	21631	547F		☐		☐	–	
	OUT 2 continuous output type	5248	1480	21632	5480		☐		☐	–	
	OUT 2 continuous output scaling low limit	5249	1481	21633	5481		☐		☐	S	
	OUT 2 continuous output scaling high limit	5250	1482	21634	5482		☐		☐	S	
	OUT 2 continuous output MV scaling width	5251	1483	21635	5483		☐		☐	S	
	AUX output: continuous output range	5252	1484	21636	5484		☐		☐	–	
	AUX output: continuous output type	5253	1485	21637	5485		☐		☐	–	
	AUX output: continuous output scaling low limit	5254	1486	21638	5486		☐		☐	S	
	AUX output: continuous output scaling high limit	5255	1487	21639	5487		☐		☐	S	
	AUX output: continuous output MV scaling width	5256	1488	21640	5488		☐		☐	S	
	Position proportional control: method selection	5257	1489	21641	5489					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Setup	Position proportional control: dead zone	5258	148A	21642	548A					1	
	Position proportional control: long service life	5259	148B	21643	548B					–	
	Position proportioning: automatic adjustment	5260	148C	21644	548C					–	
	Position proportioning: adjustment value when fully closed	5261	148D	21645	548D					–	
	Position proportioning: adjustment value when fully open	5262	148E	21646	548E					–	
	Position proportioning: adjustment value for time until fully open	5263	148F	21647	548F					1	
	Communication type	5264	1490	21648	5490		×		×	–	
	Station address	5265	1491	21649	5491		×		×	–	
	Transmission speed	5266	1492	21650	5492		×		×	–	
	Data format (data length)	5267	1493	21651	5493		×		×	–	
	Data format (parity)	5268	1494	21652	5494		×		×	–	
	Data format (stop bits)	5269	1495	21653	5495		×		×	–	
	Response time-out	5270	1496	21654	5496		×		×	–	
	(Reserved for future use.)	5271	1497	21655	5497	△	△	△	△	–	
	[FN] key function	5272	1498	21656	5498					–	
	Mode display setup	5273	1499	21657	5499					–	
	PV/SP display setup	5274	149A	21658	549A					–	
	MV display setup	5275	149B	21659	549B					–	
	Event settings display setup	5276	149C	21660	549C					–	
	Event remaining time display setup	5277	149D	21661	549D					–	
	CT/VT display setup	5278	149E	21662	549E					–	
	User level	5279	149F	21663	549F					–	
	User-defined function indicator lighting conditions	5280	14A0	21664	54A0					–	
	Multi-status (MS) display, condition (top priority)	5281	14A1	21665	54A1					–	
	Multi-status (MS) display, status (top priority)	5282	14A2	21666	54A2					–	
	Multi-status (MS) display, condition (second priority)	5283	14A3	21667	54A3					–	
	Multi-status (MS) display, status (second priority)	5284	14A4	21668	54A4					–	
	Multi-status (MS) display, condition (third priority)	5285	14A5	21669	54A5					–	
	Multi-status (MS) display, status (third priority)	5286	14A6	21670	54A6					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Setup	Multi-status (MS) display, deviation range	5287	14A7	21671	54A7					P	
	Zener barrier adjustment function	5288	14A8	21672	54A8				×	–	
	Zener barrier adjustment value	5289	14A9	21673	54A9		☐		☐	2	
	PV input failure (under range) type	5297	14B1	21681	54B1					–	
	Sampling cycle	5298	14B2	21682	54B2					–	
	Power frequency	5299	14B3	21683	54B3					–	
	Operation display restoration time	5300	14B4	21684	54B4					–	
	MANUAL operation at power-on	5301	14B5	21685	54B5					–	
	SP ramp decimal point position	5302	14B6	21686	54B6					–	
	Pattern operation prohibited/allowed	5303	14B7	21687	54B7					–	
	OS prohibited/allowed	5304	14B8	21688	54B8	☐	☐	☐	☐	–	
	FF-FITTER prohibited/allowed	5305	14B9	21689	54B9	☐	☐	☐	☐	–	
	Position proportional control: target type	5306	14BA	21690	54BA					–	
	Position proportional control: linearization table group definition	5307	14BB	21691	54BB					–	
	Position proportioning: automatic adjustment result	5308	14BC	21692	54BC						
	RSP tracking	5309	14BD	21693	54BD						
	Fixed value output group definition	5310	14BE	21694	54BE					–	
	Fixed value output slope time unit	5311	14BF	21695	54BF					–	
	Fixed value output slope decimal point position	5312	14C0	21696	54C0					–	
	Available user operation screens	5313	14C1	21697	54C1					–	
	Operation display settings	5314	14C2	21698	54C2					–	
	Mode at startup: Run/Ready	5315	14C3	21699	54C3					–	This function was added in ROM version 1.03.

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Internal contact	Internal contact 1 operation type	5401	1519	21785	5519					–	
	Internal contact 1 input type	5402	151A	21786	551A					–	
	Internal contact 1 operation No. definition	5412	1524	21796	5524					–	
	Internal contact 2 operation type	5413	1525	21797	5525					–	
	Internal contact 2 input type	5414	1526	21798	5526					–	
	Internal contact 2 operation No. definition	5424	1530	21808	5530					–	
Internal contact	Internal contact 3 operation type	5425	1531	21809	5531					–	
	Internal contact 3 input type	5426	1532	21810	5532					–	
	Internal contact 3 operation No. definition	5436	153C	21820	553C					–	
	Internal contact 4 operation type	5437	153D	21821	553D					–	
	Internal contact 4 input type	5438	153E	21822	553E					–	
	Internal contact 4 operation No. definition	5448	1548	21832	5548					–	
	Internal contact 5 operation type	5449	1549	21833	5549					–	
	Internal contact 5 input type	5450	154A	21834	554A					–	
	Internal contact 5 operation No. definition	5460	1554	21844	5554					–	
	Internal contact 6 operation type	5461	1555	21845	5555					–	
	Internal contact 6 input type	5462	1556	21846	5556					–	
	Internal contact 6 operation No. definition	5472	1560	21856	5560					–	
	Internal contact 7 operation type	5473	1561	21857	5561					–	
	Internal contact 7 input type	5474	1562	21858	5562					–	
	Internal contact 7 operation No. definition	5484	156C	21868	556C					–	
	Internal contact 8 operation type	5485	156D	21869	556D					–	
	Internal contact 8 input type	5486	156E	21870	556E					–	
	Internal contact 8 operation No. definition	5496	1578	21880	5578					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event configuration	Internal event 1 operation type	5801	16A9	22185	56A9					–	
	Internal event 1 direct/ reverse	5802	16AA	22186	56AA					–	
	Internal event 1 standby	5803	16AB	22187	56AB					–	
	Internal event 1 event state at READY	5804	16AC	22188	56AC					–	
	(Reserved for future use.)	5805	16AD	22189	56AD	△	△	△	△	–	
	(Reserved for future use.)	5806	16AE	22190	56AE	△	△	△	△	–	
	(Reserved for future use.)	5807	16AF	22191	56AF	△	△	△	△	–	
	Internal event 1 delay unit	5808	16B0	22192	56B0					–	
	(Reserved for future use.)	5809	16B1	22193	56B1	△	△	△	△	–	
	Internal event 2 operation type	5810	16B2	22194	56B2					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event configuration	Internal event 2 direct/ reverse	5811	16B3	22195	56B3					–	
	Internal event 2 standby	5812	16B4	22196	56B4					–	
	Internal event 2 event state at READY	5813	16B5	22197	56B5					–	
	(Reserved for future use.)	5814	16B6	22198	56B6	△	△	△	△	–	
	(Reserved for future use.)	5815	16B7	22199	56B7	△	△	△	△	–	
	(Reserved for future use.)	5816	16B8	22200	56B8	△	△	△	△	–	
	Internal event 2 delay unit	5817	16B9	22201	56B9					–	
	(Reserved for future use.)	5818	16BA	22202	56BA	△	△	△	△	–	
	Internal event 3 operation type	5819	16BB	22203	56BB					–	
	Internal event 3 direct/ reverse	5820	16BC	22204	56BC					–	
	Internal event 3 standby	5821	16BD	22205	56BD					–	
	Internal event 3 event state at READY	5822	16BE	22206	56BE					–	
	(Reserved for future use.)	5823	16BF	22207	56BF	△	△	△	△	–	
	(Reserved for future use.)	5824	16C0	22208	56C0	△	△	△	△	–	
	(Reserved for future use.)	5825	16C1	22209	56C1	△	△	△	△	–	
	Internal event 3 delay unit	5826	16C2	22210	56C2					–	
	(Reserved for future use.)	5827	16C3	22211	56C3	△	△	△	△	–	
	Internal event 4 operation type	5828	16C4	22212	56C4					–	
	Internal event 4 direct/ reverse	5829	16C5	22213	56C5					–	
	Internal event 4 standby	5830	16C6	22214	56C6					–	
	Internal event 4 event state at READY	5831	16C7	22215	56C7					–	
	(Reserved for future use.)	5832	16C8	22216	56C8	△	△	△	△	–	
	(Reserved for future use.)	5833	16C9	22217	56C9	△	△	△	△	–	
	(Reserved for future use.)	5834	16CA	22218	56CA	△	△	△	△	–	
	Internal event 4 delay unit	5835	16CB	22219	56CB					–	
	(Reserved for future use.)	5836	16CC	22220	56CC	△	△	△	△	–	
	Internal event 5 operation type	5837	16CD	22221	56CD					–	
	Internal event 5 direct/ reverse	5838	16CE	22222	56CE					–	
	Internal event 5 standby	5839	16CF	22223	56CF					–	
	Internal event 5 event state at READY	5840	16D0	22224	56D0					–	
	(Reserved for future use.)	5841	16D1	22225	56D1	△	△	△	△	–	
	(Reserved for future use.)	5842	16D2	22226	56D2	△	△	△	△	–	
	(Reserved for future use.)	5843	16D3	22227	56D3	△	△	△	△	–	
	Internal event 5 delay unit	5844	16D4	22228	56D4					–	
	(Reserved for future use.)	5845	16D5	22229	56D5	△	△	△	△	–	
	Internal event 6 operation type	5846	16D6	22230	56D6					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event Configuration	Internal event 6 direct/ reverse	5847	16D7	22231	56D7					–	
	Internal event 6 standby	5848	16D8	22232	56D8					–	
	Internal event 6 event state at READY	5849	16D9	22233	56D9					–	
	(Reserved for future use.)	5850	16DA	22234	56DA	△	△	△	△	–	
	(Reserved for future use.)	5851	16DB	22235	56DB	△	△	△	△	–	
	(Reserved for future use.)	5852	16DC	22236	56DC	△	△	△	△	–	
	Internal event 6 delay unit	5853	16DD	22237	56DD					–	
	(Reserved for future use.)	5854	16DE	22238	56DE	△	△	△	△	–	
	Internal event 7 operation type	5855	16DF	22239	56DF					–	
	Internal event 7 direct/ reverse	5856	16E0	22240	56E0					–	
	Internal event 7 standby	5857	16E1	22241	56E1					–	
	Internal event 7 event state at READY	5858	16E2	22242	56E2					–	
	(Reserved for future use.)	5859	16E3	22243	56E3	△	△	△	△	–	
	(Reserved for future use.)	5860	16E4	22244	56E4	△	△	△	△	–	
	(Reserved for future use.)	5861	16E5	22245	56E5	△	△	△	△	–	
	Internal event 7 delay unit	5862	16E6	22246	56E6					–	
	(Reserved for future use.)	5863	16E7	22247	56E7	△	△	△	△	–	
	Internal event 8 operation type	5864	16E8	22248	56E8					–	
	Internal event 8 direct/ reverse	5865	16E9	22249	56E9					–	
	Internal event 8 standby	5866	16EA	22250	56EA					–	
	Internal event 8 event state at READY	5867	16EB	22251	56EB					–	
	(Reserved for future use.)	5868	16EC	22252	56EC	△	△	△	△	–	
	(Reserved for future use.)	5869	16ED	22253	56ED	△	△	△	△	–	
	(Reserved for future use.)	5870	16EE	22254	56EE	△	△	△	△	–	
	Internal event 8 delay unit	5871	16EF	22255	56EF					–	
	(Reserved for future use.)	5872	16F0	22256	56F0	△	△	△	△	–	
	Internal event 1 delay time decimal point position	5951	173F	22335	573F					–	
	Internal event 1 operation No. definition	5952	1740	22336	5740					–	
	Internal event 2 delay time decimal point position	5953	1741	22337	5741					–	
	Internal event 2 operation No. definition	5954	1742	22338	5742					–	
	Internal event 3 delay time decimal point position	5955	1743	22339	5743					–	
	Internal event 3 operation No. definition	5956	1744	22340	5744					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event Configuration	Internal event 4 delay time decimal point position	5957	1745	22341	5745					–	
	Internal event 4 operation No. definition	5958	1746	22342	5746					–	
	Internal event 5 delay time decimal point position	5959	1747	22343	5747					–	
	Internal event 5 operation No. definition	5960	1748	22344	5748					–	
	Internal event 6 delay time decimal point position	5961	1749	22345	5749					–	
	Internal event 6 operation No. definition	5962	174A	22346	574A					–	
	Internal event 7 delay time decimal point position	5963	174B	22347	574B					–	
	Internal event 7 operation No. definition	5964	174C	22348	574C					–	
	Internal event 8 delay time decimal point position	5965	174D	22349	574D					–	
	Internal event 8 operation No. definition	5966	174E	22350	574E					–	
Parameter	Control method	6001	1771	22385	5771					–	
	MV low limit at AT	6002	1772	22386	5772					1	
	MV high limit at AT	6003	1773	22387	5773					1	
	ON/OFF control differential	6004	1774	22388	5774					P	
	ON/OFF control operating point offset	6005	1775	22389	5775					P	
	PV filter	6006	1776	22390	5776					1	
	PV ratio	6007	1777	22391	5777					3	
	PV bias	6008	1778	22392	5778					P	
	RSP filter	6009	1779	22393	5779					–	
	RSP ratio	6010	177A	22394	577A					–	
	RSP bias	6011	177B	22395	577B					–	
	Output variation limit	6017	1781	22401	5781					1	
	SP up ramp	6018	1782	22402	5782					S	
	SP down ramp	6019	1783	22403	5783					S	
	(Reserved for future use.)	6020	1784	22404	5784	△	△	△	△	–	
	PV assignment	6023	1787	22407	5787	□	□	□	□	–	
	PV linearization table group definition	6024	1788	22408	5788	□	□	□	□	–	
	OUT 1 continuous output linearization table group definition	6025	1789	22409	5789	□	□	□	□	–	
	OUT 2 continuous output linearization table group definition	6026	178A	22410	578A	□	□	□	□	–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Parameter	AUX output: continuous output linearization table group definition	6027	178B	22411	578B	☐	☐	☐	☐	–	
	SP ramp PV start	6028	178C	22412	578C					–	
	RSP up ramp	6029	178D	22413	578D					S	
	RSP down ramp	6030	178E	22414	578E					S	
	RSP ramp PV start	6031	178F	22415	578F					–	
	RSP assignment	6032	1790	22416	5790	☐	☐	☐	☐	–	
	RSP linearization table group definition	6033	1791	22417	5791	☐	☐	☐	☐	–	
Zone	Zone 1	6201	1839	22585	5839	☐	☐	☐	☐	P	
	Zone 2	6202	183A	22586	583A	☐	☐	☐	☐	P	
	Zone 3	6203	183B	22587	583B	☐	☐	☐	☐	P	
	Zone 4	6204	183C	22588	583C	☐	☐	☐	☐	P	
	Zone 5	6205	183D	22589	583D	☐	☐	☐	☐	P	
	Zone 6	6206	183E	22590	583E	☐	☐	☐	☐	P	
	Zone 7	6207	183F	22591	583F	☐	☐	☐	☐	P	
	Zone hysteresis	6208	1840	22592	5840	☐	☐	☐	☐	P	
Fixed value output	Fixed value output 1 MV	6224	1850	22608	5850					1	
	Fixed value output 1 up ramp	6225	1851	22609	5851					S	
	Fixed value output 1 down ramp	6226	1852	22610	5852					S	
	Fixed value output 2 MV	6227	1853	22611	5853					1	
	Fixed value output 2 up ramp	6228	1854	22612	5854					S	
	Fixed value output 2 down ramp	6229	1855	22613	5855					S	
	Fixed value output 3 MV	6230	1856	22614	5856					1	
	Fixed value output 3 up ramp	6231	1857	22615	5857					S	
	Fixed value output 3 down ramp	6232	1858	22616	5858					S	
	Fixed value output 4 MV	6233	1859	22617	5859					1	
	Fixed value output 4 up ramp	6234	185A	22618	585A					S	
	Fixed value output 4 down ramp	6235	185B	22619	585B					S	
	Fixed value output 5 MV	6236	185C	22620	585C					1	
	Fixed value output 5 up ramp	6237	185D	22621	585D					S	
	Fixed value output 5 down ramp	6238	185E	22622	585E					S	
	Fixed value output 6 MV	6239	185F	22623	585F					1	
	Fixed value output 6 up ramp	6240	1860	22624	5860					S	
	Fixed value output 6 down ramp	6241	1861	22625	5861					S	
	Fixed value output 7 MV	6242	1862	22626	5862					1	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Fixed value output	Fixed value output 7 up ramp	6243	1863	22627	5863					S	
	Fixed value output 7 down ramp	6244	1864	22628	5864					S	
	Fixed value output 8 MV	6245	1865	22629	5865					1	
	Fixed value output 8 up ramp	6246	1866	22630	5866					S	
	Fixed value output 8 down ramp	6247	1867	22631	5867					S	
Linearization Table	Linearization table 1 operation type	6381	18ED	22765	58ED					–	
	Linearization table 1 decimal point position	6382	18EE	22766	58EE					–	
	Linearization table 1 breakpoint A1	6383	18EF	22767	58EF					S	
	Linearization table 1 breakpoint A2	6384	18F0	22768	58F0					S	
	Linearization table 1 breakpoint A3	6385	18F1	22769	58F1					S	
	Linearization table 1 breakpoint A4	6386	18F2	22770	58F2					S	
	Linearization table 1 breakpoint A5	6387	18F3	22771	58F3					S	
	Linearization table 1 breakpoint A6	6388	18F4	22772	58F4					S	
	Linearization table 1 breakpoint A7	6389	18F5	22773	58F5					S	
	Linearization table 1 breakpoint A8	6390	18F6	22774	58F6					S	
	Linearization table 1 breakpoint A9	6391	18F7	22775	58F7					S	
	Linearization table 1 breakpoint A10	6392	18F8	22776	58F8					S	
	Linearization table 1 breakpoint A11	6393	18F9	22777	58F9					S	
	Linearization table 1 breakpoint A12	6394	18FA	22778	58FA					S	
	Linearization table 1 breakpoint A13	6395	18FB	22779	58FB					S	
	Linearization table 1 breakpoint A14	6396	18FC	22780	58FC					S	
	Linearization table 1 breakpoint A15	6397	18FD	22781	58FD					S	
	Linearization table 1 breakpoint A16	6398	18FE	22782	58FE					S	
	Linearization table 1 breakpoint A17	6399	18FF	22783	58FF					S	
	Linearization table 1 breakpoint A18	6400	1900	22784	5900	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint A19	6401	1901	22785	5901	☐	☐	☐	☐	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Linearization Table	Linearization table 1 breakpoint A20	6402	1902	22786	5902	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B1	6403	1903	22787	5903	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B2	6404	1904	22788	5904	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B3	6405	1905	22789	5905	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B4	6406	1906	22790	5906	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B5	6407	1907	22791	5907	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B6	6408	1908	22792	5908	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B7	6409	1909	22793	5909	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B8	6410	190A	22794	590A	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B9	6411	190B	22795	590B	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B10	6412	190C	22796	590C	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B11	6413	190D	22797	590D	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B12	6414	190E	22798	590E	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B13	6415	190F	22799	590F	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B14	6416	1910	22800	5910	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B15	6417	1911	22801	5911	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B16	6418	1912	22802	5912	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B17	6419	1913	22803	5913	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B18	6420	1914	22804	5914	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B19	6421	1915	22805	5915	☐	☐	☐	☐	S	
	Linearization table 1 breakpoint B20	6422	1916	22806	5916	☐	☐	☐	☐	S	
	Linearization table 2 operation type	6423	1917	22807	5917	☐	☐	☐	☐	–	
	Linearization table 2 decimal point position	6424	1918	22808	5918	☐	☐	☐	☐	–	
	Linearization table 2 breakpoint A1	6425	1919	22809	5919	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A2	6426	191A	22810	591A	☐	☐	☐	☐	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Linearization Table	Linearization table 2 breakpoint A3	6427	191B	22811	591B	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A4	6428	191C	22812	591C	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A5	6429	191D	22813	591D	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A6	6430	191E	22814	591E	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A7	6431	191F	22815	591F	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A8	6432	1920	22816	5920	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A9	6433	1921	22817	5921	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A10	6434	1922	22818	5922	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A11	6435	1923	22819	5923	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A12	6436	1924	22820	5924	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A13	6437	1925	22821	5925	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A14	6438	1926	22822	5926	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A15	6439	1927	22823	5927	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A16	6440	1928	22824	5928	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A17	6441	1929	22825	5929	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A18	6442	192A	22826	592A	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A19	6443	192B	22827	592B	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint A20	6444	192C	22828	592C	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B1	6445	192D	22829	592D	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B2	6446	192E	22830	592E	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B3	6447	192F	22831	592F	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B4	6448	1930	22832	5930	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B5	6449	1931	22833	5931	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B6	6450	1932	22834	5932	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B7	6451	1933	22835	5933	☐	☐	☐	☐	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Linearization Table	Linearization table 2 breakpoint B8	6452	1934	22836	5934	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B9	6453	1935	22837	5935	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B10	6454	1936	22838	5936	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B11	6455	1937	22839	5937	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B12	6456	1938	22840	5938	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B13	6457	1939	22841	5939	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B14	6458	193A	22842	593A	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B15	6459	193B	22843	593B	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B16	6460	193C	22844	593C	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B17	6461	193D	22845	593D	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B18	6462	193E	22846	593E	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B19	6463	193F	22847	593F	☐	☐	☐	☐	S	
	Linearization table 2 breakpoint B20	6464	1940	22848	5940	☐	☐	☐	☐	S	
	Linearization table 3 operation type	6465	1941	22849	5941	☐	☐	☐	☐	–	
	Linearization table 3 decimal point position	6466	1942	22850	5942	☐	☐	☐	☐	–	
	Linearization table 3 breakpoint A1	6467	1943	22851	5943	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A2	6468	1944	22852	5944	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A3	6469	1945	22853	5945	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A4	6470	1946	22854	5946	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A5	6471	1947	22855	5947	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A6	6472	1948	22856	5948	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A7	6473	1949	22857	5949	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A8	6474	194A	22858	594A	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A9	6475	194B	22859	594B	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A10	6476	194C	22860	594C	☐	☐	☐	☐	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Linearization Table	Linearization table 3 breakpoint A11	6477	194D	22861	594D	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A12	6478	194E	22862	594E	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A13	6479	194F	22863	594F	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A14	6480	1950	22864	5950	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A15	6481	1951	22865	5951	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A16	6482	1952	22866	5952	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A17	6483	1953	22867	5953	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A18	6484	1954	22868	5954	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A19	6485	1955	22869	5955	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint A20	6486	1956	22870	5956	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B1	6487	1957	22871	5957	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B2	6488	1958	22872	5958	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B3	6489	1959	22873	5959	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B4	6490	195A	22874	595A	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B5	6491	195B	22875	595B	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B6	6492	195C	22876	595C	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B7	6493	195D	22877	595D	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B8	6494	195E	22878	595E	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B9	6495	195F	22879	595F	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B10	6496	1960	22880	5960	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B11	6497	1961	22881	5961	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B12	6498	1962	22882	5962	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B13	6499	1963	22883	5963	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B14	6500	1964	22884	5964	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B15	6501	1965	22885	5965	☐	☐	☐	☐	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Linearization Table	Linearization table 3 breakpoint B16	6502	1966	22886	5966	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B17	6503	1967	22887	5967	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B18	6504	1968	22888	5968	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B19	6505	1969	22889	5969	☐	☐	☐	☐	S	
	Linearization table 3 breakpoint B20	6506	196A	22890	596A	☐	☐	☐	☐	S	
	Linearization table 4 operation type	6507	196B	22891	596B	☐	☐	☐	☐	–	
	Linearization table 4 decimal point position	6508	196C	22892	596C	☐	☐	☐	☐	–	
	Linearization table 4 breakpoint A1	6509	196D	22893	596D	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A2	6510	196E	22894	596E	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A3	6511	196F	22895	596F	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A4	6512	1970	22896	5970	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A5	6513	1971	22897	5971	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A6	6514	1972	22898	5972	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A7	6515	1973	22899	5973	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A8	6516	1974	22900	5974	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A9	6517	1975	22901	5975	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A10	6518	1976	22902	5976	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A11	6519	1977	22903	5977	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A12	6520	1978	22904	5978	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A13	6521	1979	22905	5979	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A14	6522	197A	22906	597A	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A15	6523	197B	22907	597B	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A16	6524	197C	22908	597C	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A17	6525	197D	22909	597D	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A18	6526	197E	22910	597E	☐	☐	☐	☐	S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Linearization Table	Linearization table 4 breakpoint A19	6527	197F	22911	597F	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint A20	6528	1980	22912	5980	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B1	6529	1981	22913	5981	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B2	6530	1982	22914	5982	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B3	6531	1983	22915	5983	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B4	6532	1984	22916	5984	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B5	6533	1985	22917	5985	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B6	6534	1986	22918	5986	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B7	6535	1987	22919	5987	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B8	6536	1988	22920	5988	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B9	6537	1989	22921	5989	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B10	6538	198A	22922	598A	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B11	6539	198B	22923	598B	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B12	6540	198C	22924	598C	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B13	6541	198D	22925	598D	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B14	6542	198E	22926	598E	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B15	6543	198F	22927	598F	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B16	6544	1990	22928	5990	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B17	6545	1991	22929	5991	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B18	6546	1992	22930	5992	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B19	6547	1993	22931	5993	☐	☐	☐	☐	S	
	Linearization table 4 breakpoint B20	6548	1994	22932	5994	☐	☐	☐	☐	S	
SP	RSP	7001	1B59	23385	5B59		×		×	P	
	RSP PID group No.	7002	1B5A	23386	5B5A					–	
	(Reserved for future use.)	7003	1B5B	23387	5B5B	△	△	△	△	–	
	LSP1 SP	7005	1B5D	23389	5B5D					P	Same as RAM address 13312 (decimal).
	LSP1 PID	7006	1B5E	23390	5B5E					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
SP	LSP1 ramp	7007	1B5F	23391	5B5F					S	
	LSP2 SP	7009	1B61	23393	5B61					P	Same as RAM address 13313 (decimal).
	LSP2 PID	7010	1B62	23394	5B62					–	
	LSP2 ramp	7011	1B63	23395	5B63					S	
	LSP3 SP	7013	1B65	23397	5B65					P	Same as RAM address 13314 (decimal).
	LSP3 PID	7014	1B66	23398	5B66					–	
	LSP3 ramp	7015	1B67	23399	5B67					S	
	LSP4 SP	7017	1B69	23401	5B69					P	Same as RAM address 13315 (decimal).
	LSP4 PID	7018	1B6A	23402	5B6A					–	
	LSP4 ramp	7019	1B6B	23403	5B6B					S	
	LSP5 SP	7021	1B6D	23405	5B6D					P	Same as RAM address 13316 (decimal).
	LSP5 PID	7022	1B6E	23406	5B6E					–	
	LSP5 ramp	7023	1B6F	23407	5B6F					S	
	LSP6 SP	7025	1B71	23409	5B71					P	Same as RAM address 13317 (decimal).
	LSP6 PID	7026	1B72	23410	5B72					–	
	LSP6 ramp	7027	1B73	23411	5B73					S	
	LSP7 SP	7029	1B75	23413	5B75					P	Same as RAM address 13318 (decimal).
	LSP7 PID	7030	1B76	23414	5B76					–	
	LSP7 ramp	7031	1B77	23415	5B77					S	
	LSP8 SP	7033	1B79	23417	5B79					P	Same as RAM address 13319 (decimal).
	LSP8 PID	7034	1B7A	23418	5B7A					–	
	LSP8 ramp	7035	1B7B	23419	5B7B					S	
Pattern Operation Configuration	Present pattern number	7101	1BBD	23485	5BBD		×		×	–	
	Present segment number	7102	1BBE	23486	5BBE		×		×	–	
	READY/RUN/END status	7103	1BBF	23487	5BBF		×		×	–	
	HOLD state	7104	1BC0	23488	5BC0		×		×	–	
	END state	7105	1BC1	23489	5BC1		×		×	–	
	G.SOAK state	7106	1BC2	23490	5BC2		×		×	–	
	Present pattern SP	7107	1BC3	23491	5BC3		×		×	P	
	Pattern SP increase change limit in progress	7108	1BC4	23492	5BC4		×		×	–	
	Pattern SP decrease change limit in progress	7109	1BC5	23493	5BC5		×		×	–	
	Number of executed cycles	7110	1BC6	23494	5BC6		×		×	–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Pattern Operation Configuration	Number of remaining cycles	7111	1BC7	23495	5BC7		×		×	–	
	Progress time in pattern	7112	1BC8	23496	5BC8		×		×	S	
	Pattern remaining time	7113	1BC9	23497	5BC9		×		×	S	
	Progress time in segment	7114	1BCA	23498	5BCA		×		×	S	
	Segment remaining time	7115	1BCB	23499	5BCB		×		×	S	
	Segment event status	7116	1BCC	23500	5BCC		×		×	–	
	Power outage recovery occurrence	7117	1BCD	23501	5BCD		□		□	–	
	Pattern time unit	7151	1BEF	23535	5BEF					–	
	Pattern time decimal point position	7152	1BF0	23536	5BF0					–	
	Pattern SP change limit decimal point position	7153	1BF1	23537	5BF1					–	
	Pattern SP increase change limit	7154	1BF2	23538	5BF2					S	
	Pattern SP decrease change limit	7155	1BF3	23539	5BF3					S	
	Power outage recovery operation type	7156	1BF4	23540	5BF4					–	
	Pattern start number	7157	1BF5	23541	5BF5					–	
Pattern	Pattern number	7171	1C03	23555	5C03					–	
	Segment count	7172	1C04	23556	5C04					–	
	PV start	7173	1C05	23557	5C05					–	
	Operation end status	7174	1C06	23558	5C06					–	
	Cycle	7175	1C07	23559	5C07					–	
	Pattern link	7176	1C08	23560	5C08					–	
	G.SOAK time	7177	1C09	23561	5C09					S	
	Segment 1 SP	7178	1C0A	23562	5C0A					P	
	Segment 1 time	7179	1C0B	23563	5C0B					S	
	Segment 1 PID	7180	1C0C	23564	5C0C					–	
	Segment 1 segment event	7181	1C0D	23565	5C0D					–	
	Segment 1 G.SOAK type	7182	1C0E	23566	5C0E					–	
	Segment 1 G.SOAK width	7183	1C0F	23567	5C0F					P	
	Segment 2 SP	7184	1C10	23568	5C10					P	
	Segment 2 time	7185	1C11	23569	5C11					S	
	Segment 2 PID	7186	1C12	23570	5C12					–	
	Segment 2 segment event	7187	1C13	23571	5C13					–	
	Segment 2 G.SOAK type	7188	1C14	23572	5C14					–	
	Segment 2 G.SOAK width	7189	1C15	23573	5C15					P	
	Segment 3 SP	7190	1C16	23574	5C16					P	
	Segment 3 time	7191	1C17	23575	5C17					S	
	Segment 3 PID	7192	1C18	23576	5C18					–	
	Segment 3 segment event	7193	1C19	23577	5C19					–	
	Segment 3 G.SOAK type	7194	1C1A	23578	5C1A					–	
	Segment 3 G.SOAK width	7195	1C1B	23579	5C1B					P	
	Segment 4 SP	7196	1C1C	23580	5C1C					P	
	Segment 4 time	7197	1C1D	23581	5C1D					S	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Pattern	Segment 4 PID	7198	1C1E	23582	5C1E					–	
	Segment 4 segment event	7199	1C1F	23583	5C1F					–	
	Segment 4 G.SOAK type	7200	1C20	23584	5C20					–	
	Segment 4 G.SOAK width	7201	1C21	23585	5C21					P	
	Segment 5 SP	7202	1C22	23586	5C22					P	
	Segment 5 time	7203	1C23	23587	5C23					S	
	Segment 5 PID	7204	1C24	23588	5C24					–	
	Segment 5 segment event	7205	1C25	23589	5C25					–	
	Segment 5 G.SOAK type	7206	1C26	23590	5C26					–	
	Segment 5 G.SOAK width	7207	1C27	23591	5C27					P	
	Segment 6 SP	7208	1C28	23592	5C28					P	
	Segment 6 time	7209	1C29	23593	5C29					S	
	Segment 6 PID	7210	1C2A	23594	5C2A					–	
	Segment 6 segment event	7211	1C2B	23595	5C2B					–	
	Segment 6 G.SOAK type	7212	1C2C	23596	5C2C					–	
	Segment 6 G.SOAK width	7213	1C2D	23597	5C2D					P	
	Segment 7 SP	7214	1C2E	23598	5C2E					P	
	Segment 7 time	7215	1C2F	23599	5C2F					S	
	Segment 7 PID	7216	1C30	23600	5C30					–	
	Segment 7 segment event	7217	1C31	23601	5C31					–	
	Segment 7 G.SOAK type	7218	1C32	23602	5C32					–	
	Segment 7 G.SOAK width	7219	1C33	23603	5C33					P	
	Segment 8 SP	7220	1C34	23604	5C34					P	
	Segment 8 time	7221	1C35	23605	5C35					S	
	Segment 8 PID	7222	1C36	23606	5C36					–	
	Segment 8 segment event	7223	1C37	23607	5C37					–	
	Segment 8 G.SOAK type	7224	1C38	23608	5C38					–	
	Segment 8 G.SOAK width	7225	1C39	23609	5C39					P	
	Segment 9 SP	7226	1C3A	23610	5C3A					P	
	Segment 9 time	7227	1C3B	23611	5C3B					S	
	Segment 9 PID	7228	1C3C	23612	5C3C					–	
	Segment 9 segment event	7229	1C3D	23613	5C3D					–	
	Segment 9 G.SOAK type	7230	1C3E	23614	5C3E					–	
	Segment 9 G.SOAK width	7231	1C3F	23615	5C3F					P	
	Segment 10 SP	7232	1C40	23616	5C40					P	
	Segment 10 time	7233	1C41	23617	5C41					S	
	Segment 10 PID	7234	1C42	23618	5C42					–	
	Segment 10 segment event	7235	1C43	23619	5C43					–	
	Segment 10 G.SOAK type	7236	1C44	23620	5C44					–	
	Segment 10 G.SOAK width	7237	1C45	23621	5C45					P	
	Segment 11 SP	7238	1C46	23622	5C46					P	
	Segment 11 time	7239	1C47	23623	5C47					S	
	Segment 11 PID	7240	1C48	23624	5C48					–	
	Segment 11 segment event	7241	1C49	23625	5C49					–	
	Segment 11 G.SOAK type	7242	1C4A	23626	5C4A					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Pattern	Segment 11 G.SOAK width	7243	1C4B	23627	5C4B					P	
	Segment 12 SP	7244	1C4C	23628	5C4C					P	
	Segment 12 time	7245	1C4D	23629	5C4D					S	
	Segment 12 PID	7246	1C4E	23630	5C4E					–	
	Segment 12 segment event	7247	1C4F	23631	5C4F					–	
	Segment 12 G.SOAK type	7248	1C50	23632	5C50					–	
	Segment 12 G.SOAK width	7249	1C51	23633	5C51					P	
	Segment 13 SP	7250	1C52	23634	5C52					P	
	Segment 13 time	7251	1C53	23635	5C53					S	
	Segment 13 PID	7252	1C54	23636	5C54					–	
	Segment 13 segment event	7253	1C55	23637	5C55					–	
	Segment 13 G.SOAK type	7254	1C56	23638	5C56					–	
	Segment 13 G.SOAK width	7255	1C57	23639	5C57					P	
	Segment 14 SP	7256	1C58	23640	5C58					P	
	Segment 14 time	7257	1C59	23641	5C59					S	
	Segment 14 PID	7258	1C5A	23642	5C5A					–	
	Segment 14 segment event	7259	1C5B	23643	5C5B					–	
	Segment 14 G.SOAK type	7260	1C5C	23644	5C5C					–	
	Segment 14 G.SOAK width	7261	1C5D	23645	5C5D					P	
	Segment 15 SP	7262	1C5E	23646	5C5E					P	
	Segment 15 time	7263	1C5F	23647	5C5F					S	
	Segment 15 PID	7264	1C60	23648	5C60					–	
	Segment 15 segment event	7265	1C61	23649	5C61					–	
	Segment 15 G.SOAK type	7266	1C62	23650	5C62					–	
	Segment 15 G.SOAK width	7267	1C63	23651	5C63					P	
	Segment 16 SP	7268	1C64	23652	5C64					P	
	Segment 16 time	7269	1C65	23653	5C65					S	
	Segment 16 PID	7270	1C66	23654	5C66					–	
	Segment 16 segment event	7271	1C67	23655	5C67					–	
	Segment 16 G.SOAK type	7272	1C68	23656	5C68					–	
	Segment 16 G.SOAK width	7273	1C69	23657	5C69					P	
Event	Internal event 1 main setting	7501	1D4D	23885	5D4D					S	Same as RAM address 13056 (decimal).
	Internal event 1 sub-setting	7502	1D4E	23886	5D4E					S	Same as RAM address 13057 (decimal).
	Internal event 1 hysteresis	7503	1D4F	23887	5D4F					S	
	Internal event 1 ON delay time	7504	1D50	23888	5D50					S	
	Internal event 1 OFF delay time	7505	1D51	23889	5D51					S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event	Internal event 2 main setting	7506	1D52	23890	5D52					S	Same as RAM address 13058 (decimal).
	Internal event 2 sub-setting	7507	1D53	23891	5D53					S	Same as RAM address 13059 (decimal).
	Internal event 2 hysteresis	7508	1D54	23892	5D54					S	
	Internal event 2 ON delay time	7509	1D55	23893	5D55					S	
	Internal event 2 OFF delay time	7510	1D56	23894	5D56					S	
	Internal event 3 main setting	7511	1D57	23895	5D57					S	Same as RAM address 13060 (decimal).
	Internal event 3 sub-setting	7512	1D58	23896	5D58					S	Same as RAM address 13061 (decimal).
	Internal event 3 hysteresis	7513	1D59	23897	5D59					S	
	Internal event 3 ON delay time	7514	1D5A	23898	5D5A					S	
	Internal event 3 OFF delay time	7515	1D5B	23899	5D5B					S	
	Internal event 4 main setting	7516	1D5C	23900	5D5C					S	Same as RAM address 13062 (decimal).
	Internal event 4 sub-setting	7517	1D5D	23901	5D5D					S	Same as RAM address 13063 (decimal).
	Internal event 4 hysteresis	7518	1D5E	23902	5D5E					S	
	Internal event 4 ON delay time	7519	1D5F	23903	5D5F					S	
	Internal event 4 OFF delay time	7520	1D60	23904	5D60					S	
	Internal event 5 main setting	7521	1D61	23905	5D61					S	Same as RAM address 13064 (decimal).
	Internal event 5 sub-setting	7522	1D62	23906	5D62					S	Same as RAM address 13065 (decimal).
	Internal event 5 hysteresis	7523	1D63	23907	5D63					S	
	Internal event 5 ON delay time	7524	1D64	23908	5D64					S	
	Internal event 5 OFF delay time	7525	1D65	23909	5D65					S	
	Internal event 6 main setting	7526	1D66	23910	5D66					S	Same as RAM address 13066 (decimal).
	Internal event 6 sub-setting	7527	1D67	23911	5D67					S	Same as RAM address 13067 (decimal).
	Internal event 6 hysteresis	7528	1D68	23912	5D68					S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event	Internal event 6 ON delay time	7529	1D69	23913	5D69					S	
	Internal event 6 OFF delay time	7530	1D6A	23914	5D6A					S	
	Internal event 7 main setting	7531	1D6B	23915	5D6B					S	Same as RAM address 13068 (decimal).
	Internal event 7 sub-setting	7532	1D6C	23916	5D6C					S	Same as RAM address 13069 (decimal).
	Internal event 7 hysteresis	7533	1D6D	23917	5D6D					S	
	Internal event 7 ON delay time	7534	1D6E	23918	5D6E					S	
	Internal event 7 OFF delay time	7535	1D6F	23919	5D6F					S	
	Internal event 8 main setting	7536	1D70	23920	5D70					S	Same as RAM address 13070 (decimal).
	Internal event 8 sub-setting	7537	1D71	23921	5D71					S	Same as RAM address 13071 (decimal).
	Internal event 8 hysteresis	7538	1D72	23922	5D72					S	
	Internal event 8 ON delay time	7539	1D73	23923	5D73					S	
	Internal event 8 OFF delay time	7540	1D74	23924	5D74					S	
Logical Operation	Logical operation 1 calculation type	7801	1E79	24185	5E79					–	
	Logical operation 1 input assign A	7802	1E7A	24186	5E7A					–	
	Logical operation 1 input assign B	7803	1E7B	24187	5E7B					–	
	Logical operation 1 input assign C	7804	1E7C	24188	5E7C					–	
	Logical operation 1 input assign D	7805	1E7D	24189	5E7D					–	
	Logical operation 1 input bit polarity A	7806	1E7E	24190	5E7E					–	
	Logical operation 1 input bit polarity B	7807	1E7F	24191	5E7F					–	
	Logical operation 1 input bit polarity C	7808	1E80	24192	5E80					–	
	Logical operation 1 input bit polarity D	7809	1E81	24193	5E81					–	
	Logical operation 1 delay unit	7810	1E82	24194	5E82					–	
	Logical operation 1 delay time decimal point position	7811	1E83	24195	5E83					–	
	Logical operation 1 ON delay time	7812	1E84	24196	5E84					S	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 1 OFF delay time	7813	1E85	24197	5E85					S	
	Logical operation 1 polarity	7814	1E86	24198	5E86					–	
	Logical operation 1 latch	7815	1E87	24199	5E87					–	
	Logical operation 2 calculation type	7816	1E88	24200	5E88					–	
	Logical operation 2 input assign A	7817	1E89	24201	5E89					–	
	Logical operation 2 input assign B	7818	1E8A	24202	5E8A					–	
	Logical operation 2 input assign C	7819	1E8B	24203	5E8B					–	
	Logical operation 2 input assign D	7820	1E8C	24204	5E8C					–	
	Logical operation 2 input bit polarity A	7821	1E8D	24205	5E8D					–	
	Logical operation 2 input bit polarity B	7822	1E8E	24206	5E8E					–	
	Logical operation 2 input bit polarity C	7823	1E8F	24207	5E8F					–	
	Logical operation 2 input bit polarity D	7824	1E90	24208	5E90					–	
	Logical operation 2 delay unit	7825	1E91	24209	5E91					–	
	Logical operation 2 delay time decimal point position	7826	1E92	24210	5E92					–	
	Logical operation 2 ON delay time	7827	1E93	24211	5E93					S	
	Logical operation 2 OFF delay time	7828	1E94	24212	5E94					S	
	Logical operation 2 polarity	7829	1E95	24213	5E95					–	
	Logical operation 2 latch	7830	1E96	24214	5E96					–	
	Logical operation 3 calculation type	7831	1E97	24215	5E97					–	
	Logical operation 3 input assign A	7832	1E98	24216	5E98					–	
	Logical operation 3 input assign B	7833	1E99	24217	5E99					–	
	Logical operation 3 input assign C	7834	1E9A	24218	5E9A					–	
	Logical operation 3 input assign D	7835	1E9B	24219	5E9B					–	
	Logical operation 3 input bit polarity A	7836	1E9C	24220	5E9C					–	
	Logical operation 3 input bit polarity B	7837	1E9D	24221	5E9D					–	
	Logical operation 3 input bit polarity C	7838	1E9E	24222	5E9E					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 3 input bit polarity D	7839	1E9F	24223	5E9F					–	
	Logical operation 3 delay unit	7840	1EA0	24224	5EA0					–	
	Logical operation 3 delay time decimal point position	7841	1EA1	24225	5EA1					–	
	Logical operation 3 ON delay time	7842	1EA2	24226	5EA2					S	
	Logical operation 3 OFF delay time	7843	1EA3	24227	5EA3					S	
	Logical operation 3 polarity	7844	1EA4	24228	5EA4					–	
	Logical operation 3 latch	7845	1EA5	24229	5EA5					–	
	Logical operation 4 calculation type	7846	1EA6	24230	5EA6					–	
	Logical operation 4 input assign A	7847	1EA7	24231	5EA7					–	
	Logical operation 4 input assign B	7848	1EA8	24232	5EA8					–	
	Logical operation 4 input assign C	7849	1EA9	24233	5EA9					–	
	Logical operation 4 input assign D	7850	1EAA	24234	5EAA					–	
	Logical operation 4 input bit polarity A	7851	1EAB	24235	5EAB					–	
	Logical operation 4 input bit polarity B	7852	1EAC	24236	5EAC					–	
	Logical operation 4 input bit polarity C	7853	1EAD	24237	5EAD					–	
	Logical operation 4 input bit polarity D	7854	1EAE	24238	5EAE					–	
	Logical operation 4 delay unit	7855	1EAF	24239	5EAF					–	
	Logical operation 4 delay time decimal point position	7856	1EB0	24240	5EB0					–	
	Logical operation 4 ON delay time	7857	1EB1	24241	5EB1					S	
	Logical operation 4 OFF delay time	7858	1EB2	24242	5EB2					S	
	Logical operation 4 polarity	7859	1EB3	24243	5EB3					–	
	Logical operation 4 latch	7860	1EB4	24244	5EB4					–	
	Logical operation 5 calculation type	7861	1EB5	24245	5EB5					–	
	Logical operation 5 input assign A	7862	1EB6	24246	5EB6					–	
	Logical operation 5 input assign B	7863	1EB7	24247	5EB7					–	
	Logical operation 5 input assign C	7864	1EB8	24248	5EB8					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 5 input assign D	7865	1EB9	24249	5EB9					–	
	Logical operation 5 input bit polarity A	7866	1EBA	24250	5EBA					–	
	Logical operation 5 input bit polarity B	7867	1EBB	24251	5EBB					–	
	Logical operation 5 input bit polarity C	7868	1EBC	24252	5EBC					–	
	Logical operation 5 input bit polarity D	7869	1EBD	24253	5EBD					–	
	Logical operation 5 delay unit	7870	1EBE	24254	5EBE					–	
	Logical operation 5 delay time decimal point position	7871	1EBF	24255	5EBF					–	
	Logical operation 5 ON delay time	7872	1EC0	24256	5EC0					S	
	Logical operation 5 OFF delay time	7873	1EC1	24257	5EC1					S	
	Logical operation 5 polarity	7874	1EC2	24258	5EC2					–	
	Logical operation 5 latch	7875	1EC3	24259	5EC3					–	
	Logical operation 6 calculation type	7876	1EC4	24260	5EC4					–	
	Logical operation 6 input assign A	7877	1EC5	24261	5EC5					–	
	Logical operation 6 input assign B	7878	1EC6	24262	5EC6					–	
	Logical operation 6 input assign C	7879	1EC7	24263	5EC7					–	
	Logical operation 6 input assign D	7880	1EC8	24264	5EC8					–	
	Logical operation 6 input bit polarity A	7881	1EC9	24265	5EC9					–	
	Logical operation 6 input bit polarity B	7882	1ECA	24266	5ECA					–	
	Logical operation 6 input bit polarity C	7883	1ECB	24267	5ECB					–	
	Logical operation 6 input bit polarity D	7884	1ECC	24268	5ECC					–	
	Logical operation 6 delay unit	7885	1ECD	24269	5ECD					–	
	Logical operation 6 delay time decimal point position	7886	1ECE	24270	5ECE					–	
	Logical operation 6 ON delay time	7887	1ECF	24271	5ECF					S	
	Logical operation 6 OFF delay time	7888	1ED0	24272	5ED0					S	
	Logical operation 6 polarity	7889	1ED1	24273	5ED1					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 6 latch	7890	1ED2	24274	5ED2					–	
	Logical operation 7 calculation type	7891	1ED3	24275	5ED3					–	
	Logical operation 7 input assign A	7892	1ED4	24276	5ED4					–	
	Logical operation 7 input assign B	7893	1ED5	24277	5ED5					–	
	Logical operation 7 input assign C	7894	1ED6	24278	5ED6					–	
	Logical operation 7 input assign D	7895	1ED7	24279	5ED7					–	
	Logical operation 7 input bit polarity A	7896	1ED8	24280	5ED8					–	
	Logical operation 7 input bit polarity B	7897	1ED9	24281	5ED9					–	
	Logical operation 7 input bit polarity C	7898	1EDA	24282	5EDA					–	
	Logical operation 7 input bit polarity D	7899	1EDB	24283	5EDB					–	
	Logical operation 7 delay unit	7900	1EDC	24284	5EDC					–	
	Logical operation 7 delay time decimal point position	7901	1EDD	24285	5EDD					–	
	Logical operation 7 ON delay time	7902	1EDE	24286	5EDE					S	
	Logical operation 7 OFF delay time	7903	1EDF	24287	5EDF					S	
	Logical operation 7 polarity	7904	1EE0	24288	5EE0					–	
	Logical operation 7 latch	7905	1EE1	24289	5EE1					–	
	Logical operation 8 calculation type	7906	1EE2	24290	5EE2					–	
	Logical operation 8 input assign A	7907	1EE3	24291	5EE3					–	
	Logical operation 8 input assign B	7908	1EE4	24292	5EE4					–	
	Logical operation 8 input assign C	7909	1EE5	24293	5EE5					–	
	Logical operation 8 input assign D	7910	1EE6	24294	5EE6					–	
	Logical operation 8 input bit polarity A	7911	1EE7	24295	5EE7					–	
	Logical operation 8 input bit polarity B	7912	1EE8	24296	5EE8					–	
	Logical operation 8 input bit polarity C	7913	1EE9	24297	5EE9					–	
	Logical operation 8 input bit polarity D	7914	1EEA	24298	5EEA					–	
	Logical operation 8 delay unit	7915	1EEB	24299	5EEB					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 8 delay time decimal point position	7916	1EEC	24300	5EEC					–	
	Logical operation 8 ON delay time	7917	1EED	24301	5EED					S	
	Logical operation 8 OFF delay time	7918	1EEE	24302	5EEE					S	
	Logical operation 8 polarity	7919	1EEF	24303	5EEF					–	
	Logical operation 8 latch	7920	1EF0	24304	5EF0					–	
	Logical operation 9 calculation type	7921	1EF1	24305	5EF1					–	
	Logical operation 9 input assign A	7922	1EF2	24306	5EF2					–	
	Logical operation 9 input assign B	7923	1EF3	24307	5EF3					–	
	Logical operation 9 input assign C	7924	1EF4	24308	5EF4					–	
	Logical operation 9 input assign D	7925	1EF5	24309	5EF5					–	
	Logical operation 9 input bit polarity A	7926	1EF6	24310	5EF6					–	
	Logical operation 9 input bit polarity B	7927	1EF7	24311	5EF7					–	
	Logical operation 9 input bit polarity C	7928	1EF8	24312	5EF8					–	
	Logical operation 9 input bit polarity D	7929	1EF9	24313	5EF9					–	
	Logical operation 9 delay unit	7930	1EFA	24314	5EFA					–	
	Logical operation 9 delay time decimal point position	7931	1EFB	24315	5EFB					–	
	Logical operation 9 ON delay time	7932	1EFC	24316	5EFC					S	
	Logical operation 9 OFF delay time	7933	1EFD	24317	5EFD					S	
	Logical operation 9 polarity	7934	1EFE	24318	5EFE					–	
	Logical operation 9 latch	7935	1EFF	24319	5EFF					–	
	Logical operation 10 calculation type	7936	1F00	24320	5F00					–	
	Logical operation 10 input assign A	7937	1F01	24321	5F01					–	
	Logical operation 10 input assign B	7938	1F02	24322	5F02					–	
	Logical operation 10 input assign C	7939	1F03	24323	5F03					–	
	Logical operation 10 input assign D	7940	1F04	24324	5F04					–	
	Logical operation 10 input bit polarity A	7941	1F05	24325	5F05					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 10 input bit polarity B	7942	1F06	24326	5F06					–	
	Logical operation 10 input bit polarity C	7943	1F07	24327	5F07					–	
	Logical operation 10 input bit polarity D	7944	1F08	24328	5F08					–	
	Logical operation 10 delay unit	7945	1F09	24329	5F09					–	
	Logical operation 10 delay time decimal point position	7946	1F0A	24330	5F0A					–	
	Logical operation 10 ON delay time	7947	1F0B	24331	5F0B					S	
	Logical operation 10 OFF delay time	7948	1F0C	24332	5F0C					S	
	Logical operation 10 polarity	7949	1F0D	24333	5F0D					–	
	Logical operation 10 latch	7950	1F0E	24334	5F0E					–	
	Logical operation 11 calculation type	7951	1F0F	24335	5F0F					–	
	Logical operation 11 input assign A	7952	1F10	24336	5F10					–	
	Logical operation 11 input assign B	7953	1F11	24337	5F11					–	
	Logical operation 11 input assign C	7954	1F12	24338	5F12					–	
	Logical operation 11 input assign D	7955	1F13	24339	5F13					–	
	Logical operation 11 input bit polarity A	7956	1F14	24340	5F14					–	
	Logical operation 11 input bit polarity B	7957	1F15	24341	5F15					–	
	Logical operation 11 input bit polarity C	7958	1F16	24342	5F16					–	
	Logical operation 11 input bit polarity D	7959	1F17	24343	5F17					–	
	Logical operation 11 delay unit	7960	1F18	24344	5F18					–	
	Logical operation 11 delay time decimal point position	7961	1F19	24345	5F19					–	
	Logical operation 11 ON delay time	7962	1F1A	24346	5F1A					S	
	Logical operation 11 OFF delay time	7963	1F1B	24347	5F1B					S	
	Logical operation 11 polarity	7964	1F1C	24348	5F1C					–	
	Logical operation 11 latch	7965	1F1D	24349	5F1D					–	
	Logical operation 12 calculation type	7966	1F1E	24350	5F1E					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 12 input assign A	7967	1F1F	24351	5F1F					–	
	Logical operation 12 input assign B	7968	1F20	24352	5F20					–	
	Logical operation 12 input assign C	7969	1F21	24353	5F21					–	
	Logical operation 12 input assign D	7970	1F22	24354	5F22					–	
	Logical operation 12 input bit polarity A	7971	1F23	24355	5F23					–	
	Logical operation 12 input bit polarity B	7972	1F24	24356	5F24					–	
	Logical operation 12 input bit polarity C	7973	1F25	24357	5F25					–	
	Logical operation 12 input bit polarity D	7974	1F26	24358	5F26					–	
	Logical operation 12 delay unit	7975	1F27	24359	5F27					–	
	Logical operation 12 delay time decimal point position	7976	1F28	24360	5F28					–	
	Logical operation 12 ON delay time	7977	1F29	24361	5F29					S	
	Logical operation 12 OFF delay time	7978	1F2A	24362	5F2A					S	
	Logical operation 12 polarity	7979	1F2B	24363	5F2B					–	
	Logical operation 12 latch	7980	1F2C	24364	5F2C					–	
	Logical operation 13 calculation type	7981	1F2D	24365	5F2D					–	
	Logical operation 13 input assign A	7982	1F2E	24366	5F2E					–	
	Logical operation 13 input assign B	7983	1F2F	24367	5F2F					–	
	Logical operation 13 input assign C	7984	1F30	24368	5F30					–	
	Logical operation 13 input assign D	7985	1F31	24369	5F31					–	
	Logical operation 13 input bit polarity A	7986	1F32	24370	5F32					–	
	Logical operation 13 input bit polarity B	7987	1F33	24371	5F33					–	
	Logical operation 13 input bit polarity C	7988	1F34	24372	5F34					–	
	Logical operation 13 input bit polarity D	7989	1F35	24373	5F35					–	
	Logical operation 13 delay unit	7990	1F36	24374	5F36					–	
	Logical operation 13 delay time decimal point position	7991	1F37	24375	5F37					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 13 ON delay time	7992	1F38	24376	5F38					S	
	Logical operation 13 OFF delay time	7993	1F39	24377	5F39					S	
	Logical operation 13 polarity	7994	1F3A	24378	5F3A					–	
	Logical operation 13 latch	7995	1F3B	24379	5F3B					–	
	Logical operation 14 calculation type	7996	1F3C	24380	5F3C					–	
	Logical operation 14 input assign A	7997	1F3D	24381	5F3D					–	
	Logical operation 14 input assign B	7998	1F3E	24382	5F3E					–	
	Logical operation 14 input assign C	7999	1F3F	24383	5F3F					–	
	Logical operation 14 input assign D	8000	1F40	24384	5F40					–	
	Logical operation 14 input bit polarity A	8001	1F41	24385	5F41					–	
	Logical operation 14 input bit polarity B	8002	1F42	24386	5F42					–	
	Logical operation 14 input bit polarity C	8003	1F43	24387	5F43					–	
	Logical operation 14 input bit polarity D	8004	1F44	24388	5F44					–	
	Logical operation 14 delay unit	8005	1F45	24389	5F45					–	
	Logical operation 14 delay time decimal point position	8006	1F46	24390	5F46					–	
	Logical operation 14 ON delay time	8007	1F47	24391	5F47					S	
	Logical operation 14 OFF delay time	8008	1F48	24392	5F48					S	
	Logical operation 14 polarity	8009	1F49	24393	5F49					–	
	Logical operation 14 latch	8010	1F4A	24394	5F4A					–	
	Logical operation 15 calculation type	8011	1F4B	24395	5F4B					–	
	Logical operation 15 input assign A	8012	1F4C	24396	5F4C					–	
	Logical operation 15 input assign B	8013	1F4D	24397	5F4D					–	
	Logical operation 15 input assign C	8014	1F4E	24398	5F4E					–	
	Logical operation 15 input assign D	8015	1F4F	24399	5F4F					–	
	Logical operation 15 input bit polarity A	8016	1F50	24400	5F50					–	
	Logical operation 15 input bit polarity B	8017	1F51	24401	5F51					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Logical Operation	Logical operation 15 input bit polarity C	8018	1F52	24402	5F52					–	
	Logical operation 15 input bit polarity D	8019	1F53	24403	5F53					–	
	Logical operation 15 delay unit	8020	1F54	24404	5F54					–	
	Logical operation 15 delay time decimal point position	8021	1F55	24405	5F55					–	
	Logical operation 15 ON delay time	8022	1F56	24406	5F56					S	
	Logical operation 15 OFF delay time	8023	1F57	24407	5F57					S	
	Logical operation 15 polarity	8024	1F58	24408	5F58					–	
	Logical operation 15 latch	8025	1F59	24409	5F59					–	
	Logical operation 16 calculation type	8026	1F5A	24410	5F5A					–	
	Logical operation 16 input assign A	8027	1F5B	24411	5F5B					–	
	Logical operation 16 input assign B	8028	1F5C	24412	5F5C					–	
	Logical operation 16 input assign C	8029	1F5D	24413	5F5D					–	
	Logical operation 16 input assign D	8030	1F5E	24414	5F5E					–	
	Logical operation 16 input bit polarity A	8031	1F5F	24415	5F5F					–	
	Logical operation 16 input bit polarity B	8032	1F60	24416	5F60					–	
	Logical operation 16 input bit polarity C	8033	1F61	24417	5F61					–	
	Logical operation 16 input bit polarity D	8034	1F62	24418	5F62					–	
	Logical operation 16 delay unit	8035	1F63	24419	5F63					–	
	Logical operation 16 delay time decimal point position	8036	1F64	24420	5F64					–	
	Logical operation 16 ON delay time	8037	1F65	24421	5F65					S	
	Logical operation 16 OFF delay time	8038	1F66	24422	5F66					S	
	Logical operation 16 polarity	8039	1F67	24423	5F67					–	
	Logical operation 16 latch	8040	1F68	24424	5F68					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
CT/VT	CT1 operation type	8101	1FA5	24485	5FA5					–	
	CT1 output	8102	1FA6	24486	5FA6					–	
	CT1 measurement wait time	8103	1FA7	24487	5FA7					–	
	CT1 CT sensor turn num	8104	1FA8	24488	5FA8					–	
CT/VT	CT1 number of power wire passes	8105	1FA9	24489	5FA9					–	
	CT1 filter	8106	1FAA	24490	5FAA					1	
	CT1 ratio	8107	1FAB	24491	5FAB					3	
	CT1 bias	8108	1FAC	24492	5FAC					S	
	CT1 heater burnout detection threshold	8109	1FAD	24493	5FAD					S	
	CT1 overcurrent detection threshold	8110	1FAE	24494	5FAE					S	
	CT1 short-circuit detection threshold	8111	1FAF	24495	5FAF					S	
	CT1 hysteresis	8112	1FB0	24496	5FB0					S	
	CT1 delay time	8113	1FB1	24497	5FB1					1	
	CT1 condition for restoring not-measured status	8114	1FB2	24498	5FB2					–	
	CT2 operation type	8115	1FB3	24499	5FB3					–	
	CT2 output	8116	1FB4	24500	5FB4					–	
	CT2 measurement wait time	8117	1FB5	24501	5FB5					–	
	CT2 CT sensor turn num	8118	1FB6	24502	5FB6					–	
	CT2 number of power wire passes	8119	1FB7	24503	5FB7					–	
	CT2 filter	8120	1FB8	24504	5FB8					1	
	CT2 ratio	8121	1FB9	24505	5FB9					3	
	CT2 bias	8122	1FBA	24506	5FBA					S	
	CT2 heater burnout detection threshold	8123	1FBB	24507	5FBB					S	
	CT2 overcurrent detection threshold	8124	1FBC	24508	5FBC					S	
	CT2 short-circuit detection threshold	8125	1FBD	24509	5FBD					S	
	CT2 hysteresis	8126	1FBE	24510	5FBE					S	
	CT2 delay time	8127	1FBF	24511	5FBF					1	
	CT2 condition for restoring not-measured status	8128	1FC0	24512	5FC0					–	
	VT primary voltage	8129	1FC1	24513	5FC1					1	
	VT secondary voltage	8130	1FC2	24514	5FC2					2	
	VT filter	8131	1FC3	24515	5FC3					1	
	VT ratio	8132	1FC4	24516	5FC4					3	
	VT bias	8133	1FC5	24517	5FC5					S	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
DO	OUT 1 DO operation type	8151	1FD7	24535	5FD7					–	
	OUT 1 ON/OFF output type	8152	1FD8	24536	5FD8					–	
	OUT 1 time proportional output type	8153	1FD9	24537	5FD9					–	
	OUT 1 time proportional operation type	8154	1FDA	24538	5FDA					–	
	OUT 1 time proportional cycle	8155	1FDB	24539	5FDB					1	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
DO	OUT 1 minimum ON/OFF time	8156	1FDC	24540	5FDC					–	
	OUT 1 time proportional linearization table group definition	8157	1FDD	24541	5FDD	☐	☐	☐	☐	–	
	OUT 2 DO operation type	8158	1FDE	24542	5FDE					–	
	OUT 2 ON/OFF output type	8159	1FDF	24543	5FDF					–	
	OUT 2 time proportional output type	8160	1FE0	24544	5FE0					–	
	OUT 2 time proportional operation type	8161	1FE1	24545	5FE1					–	
	OUT 2 time proportional cycle	8162	1FE2	24546	5FE2					1	
	OUT 2 minimum ON/OFF time	8163	1FE3	24547	5FE3					–	
	OUT 2 time proportional linearization table group definition	8164	1FE4	24548	5FE4	☐	☐	☐	☐	–	
	EV1 DO operation type	8165	1FE5	24549	5FE5					–	
	EV1 ON/OFF output type	8166	1FE6	24550	5FE6					–	
	EV1 time proportional output type	8167	1FE7	24551	5FE7					–	
	EV1 time proportional operation type	8168	1FE8	24552	5FE8					–	
	EV1 time proportional cycle	8169	1FE9	24553	5FE9					1	
	EV1 minimum ON/OFF time	8170	1FEA	24554	5FEA					–	
	EV1 time proportional linearization table group definition	8171	1FEB	24555	5FEB	☐	☐	☐	☐	–	
	EV2 DO operation type	8172	1FEC	24556	5FEC					–	
	EV2 ON/OFF output type	8173	1FED	24557	5FED					–	
	EV2 time proportional output type	8174	1FEE	24558	5FEE					–	
	EV2 time proportional operation type	8175	1FEF	24559	5FEF					–	
	EV2 time proportional cycle	8176	1FF0	24560	5FF0					1	
	EV2 minimum ON/OFF time	8177	1FF1	24561	5FF1					–	
	EV2 time proportional linearization table group definition	8178	1FF2	24562	5FF2	☐	☐	☐	☐	–	
	EV3 DO operation type	8179	1FF3	24563	5FF3					–	
	EV3 ON/OFF output type	8180	1FF4	24564	5FF4					–	
	EV3 time proportional output type	8181	1FF5	24565	5FF5					–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
DO	EV3 time proportional operation type	8182	1FF6	24566	5FF6					–	
	EV3 time proportional cycle	8183	1FF7	24567	5FF7					1	
	EV3 minimum ON/OFF time 1	8184	1FF8	24568	5FF8					–	
	EV3 time proportional linearization table group definition	8185	1FF9	24569	5FF9	☐	☐	☐	☐	–	
Overshoot Suppression	SPOS prohibited/allowed	8201	2009	24585	6009	☐	☐	☐	☐	–	
	OS SP change detection threshold	8202	200A	24586	600A	☐	☐	☐	☐	P	
	SPOS operation type	8203	200B	24587	600B	☐	☐	☐	☐	–	
	SPOS starting threshold	8204	200C	24588	600C	☐	☐	☐	☐	P	
	SPOS starting deviation	8205	200D	24589	600D	☐	☐	☐	☐	P	
	SPOS PV start	8206	200E	24590	600E	☐	☐	☐	☐	–	
	SPOS correction strength	8207	200F	24591	600F	☐	☐	☐	☐	1	
	SPOS correction constant	8208	2010	24592	6010	☐	☐	☐	☐	1	
	DROS prohibited/allowed	8221	201D	24605	601D	☐	☐	☐	☐	–	
	OS disturbance detection threshold	8222	201E	24606	601E	☐	☐	☐	☐	P	
	DROS operation type	8223	201F	24607	601F	☐	☐	☐	☐	–	
	DROS correction before start	8224	2020	24608	6020	☐	☐	☐	☐	–	
	DROS starting threshold	8225	2021	24609	6021	☐	☐	☐	☐	P	
	DROS starting deviation	8226	2022	24610	6022	☐	☐	☐	☐	P	
	DROS correction strength	8227	2023	24611	6023	☐	☐	☐	☐	1	
	DROS correction constant	8228	2024	24612	6024	☐	☐	☐	☐	1	
FF-FITTER	FF-FITTER operation type	8301	206D	24685	606D	☐	☐	☐	☐	–	
	T1 period	8302	206E	24686	606E	☐	☐	☐	☐	1	
	T1 period MV type	8303	206F	24687	606F	☐	☐	☐	☐	–	
	FF1 preset MV	8304	2070	24688	6070	☐	☐	☐	☐	1	
	T1A period	8305	2071	24689	6071	☐	☐	☐	☐	1	
	FF1A MV	8306	2072	24690	6072	☐	☐	☐	☐	1	
	T2 period initial output type of PID control	8307	2073	24691	6073	☐	☐	☐	☐	–	
	T2 period initial output of PID control	8308	2074	24692	6074	☐	☐	☐	☐	1	
	T2 period	8309	2075	24693	6075	☐	☐	☐	☐	1	
	FF2 MV	8310	2076	24694	6076	☐	☐	☐	☐	1	
	FF3 MV	8311	2077	24695	6077	☐	☐	☐	☐	1	
	T1 period automatic tuning coefficient	8312	2078	24696	6078	☐	☐	☐	☐	2	
	T2 period automatic tuning coefficient	8313	2079	24697	6079	☐	☐	☐	☐	2	
	T1 period automatic tuning threshold	8314	207A	24698	607A	☐	☐	☐	☐	2	
	FF3 MV automatic tuning type	8315	207B	24699	607B	☐	☐	☐	☐	–	
	FF-FITTER automatic tuning status	8316	207C	24700	607C	☐	☐	☐	☐	–	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Virtual PV	Virtual PV input type	8401	20D1	24785	60D1	☐	☐	☐	☐	–	
	Virtual PV filter	8402	20D2	24786	60D2	☐	☐	☐	☐	1	
	Virtual PV ratio	8403	20D3	24787	60D3	☐	☐	☐	☐	3	
	Virtual PV bias	8404	20D4	24788	60D4	☐	☐	☐	☐	P	
	Virtual PV input scaling low limit	8405	20D5	24789	60D5	☐	☐	☐	☐	S	
	Virtual PV input scaling high limit	8406	20D6	24790	60D6	☐	☐	☐	☐	S	
	Virtual PV output scaling low limit	8407	20D7	24791	60D7	☐	☐	☐	☐	P	
	Virtual PV output scaling high limit	8408	20D8	24792	60D8	☐	☐	☐	☐	P	
	Virtual PV square root extraction dropout	8409	20D9	24793	60D9	☐	☐	☐	☐	1	
	Virtual PV linearization table group definition	8410	20DA	24794	60DA	☐	☐	☐	☐	–	
Virtual RSP	Virtual RSP input type	8451	2103	24835	6103	☐	☐	☐	☐	–	
	Virtual RSP filter	8452	2104	24836	6104	☐	☐	☐	☐	1	
	Virtual RSP ratio	8453	2105	24837	6105	☐	☐	☐	☐	3	
	Virtual RSP bias	8454	2106	24838	6106	☐	☐	☐	☐	P	
	Virtual RSP input scaling low limit	8455	2107	24839	6107	☐	☐	☐	☐	S	
	Virtual RSP input scaling high limit	8456	2108	24840	6108	☐	☐	☐	☐	S	
	Virtual RSP output scaling low limit	8457	2109	24841	6109	☐	☐	☐	☐	P	
	Virtual RSP output scaling high limit	8458	210A	24842	610A	☐	☐	☐	☐	P	
	Virtual RSP linearization table group definition	8460	210C	24844	610C	☐	☐	☐	☐	–	
Extended Tuning	AT type	8501	2135	24885	6135					–	
	(Reserved for future use.)	8502	2136	24886	6136	△	×	△	×	–	
	(Reserved for future use.)	8503	2137	24887	6137	△	△	△	△	2	
	SP lag constant	8504	2138	24888	6138					1	
	(Reserved for future use.)	8505	2139	24889	6139	△	△	△	△	–	
	AT proportional band adjust	8506	213A	24890	613A					2	
	AT integral time adjust	8507	213B	24891	613B					2	
	AT derivative time adjust	8508	213C	24892	613C					2	
	MV switching point type for AT	8541	215D	24925	615D					–	
	MV switching point PV for AT	8542	215E	24926	615E					P	
	Control algorithm	8509	213D	24893	613D					–	
	Cooling gain	6071	17B7	22455	57B7					1	
	(Reserved for future use.)	8510	213E	24894	613E	△	△	△	△	–	
	(Reserved for future use.)	8511	213F	24895	613F	△	△	△	△	–	
	(Reserved for future use.)	8512	2140	24896	6140	△	△	△	△	–	
	(Reserved for future use.)	8513	2141	24897	6141	△	△	△	△	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Extended Tuning	(Reserved for future use.)	8514	2142	24898	6142	△	△	△	△	–	
	(Reserved for future use.)	8515	2143	24899	6143	☐	☐	☐	☐	2	
	(Reserved for future use.)	8516	2144	24900	6144	☐	☐	☐	☐	2	
	(Reserved for future use.)	8517	2145	24901	6145	☐	☐	☐	☐	1	
	(Reserved for future use.)	8518	2146	24902	6146	☐	☐	☐	☐	–	
Mode	AUTO/MANUAL	9001	2329	25385	6329		☐		☐	–	Same as RAM address 14596 (decimal). Writable under other conditions if there are no internal contacts.
	RUN/READY	9002	232A	25386	632A		☐		☐	–	Same as RAM address 14595 (decimal). Writable if there are no internal contacts.
	LSP/RSP	9003	232B	25387	632B		☐		☐	–	AC power model: 12 VA max. (9 VA at 100 V AC, 12 VA at 264 V AC) DC power model: 6 W max. (at 24 V DC), 9 VA max. (at 24 V AC)
	AT stop/start selection	9004	232C	25388	632C		☐		☐	–	Same as RAM address 14597 (decimal). Writable under other conditions if there are no internal contacts.
	Auto tuning error	9126	23A6	25510	63A6		☐		☐	–	
	Release all latches	9005	232D	25389	632D		☐		☐	–	Writable if there are no internal contacts.
	Constant value operation / pattern operation mode selection	9006	232E	25390	632E		☐		☐	–	Same as RAM address 9006 (decimal).
	Pattern operation ADVANCE	9007	232F	25391	632F					–	
	Pattern operation HOLD	9008	2330	25392	6330		☐		☐	–	Writable if there are no internal contacts.
	Pattern operation G.SOAK clear	9009	2331	25393	6331		☐		☐	–	Writable if there are no internal contacts.
	FF-FITTER automatic tuning selection	9010	2332	25394	6332	☐	☐	☐	☐	–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Operation Settings	Loop PV	9101	238D	25485	638D		×		×	P	Same as RAM address 14356 (decimal).
	Loop SP	9102	238E	25486	638E					P	The write operation is the same as when writing to RAM address 9123 (decimal).*1
	LSP group No.	9103	238F	25487	638F		□		□	–	Same as RAM address 14592 (decimal). Writable if there are no internal contacts.*2
	PID group in use	9104	2390	25488	6390		×		×	–	
	MV	9105	2391	25489	6391		□		□	1	Same as RAM address 14594 (decimal). Writable in manual mode
	Heat MV	9106	2392	25490	6392		×		×	1	Same as RAM address 14420 (decimal).
	Cool MV	9107	2393	25491	6393		×		×	1	Same as RAM address 14421 (decimal).
	MFB opening (including estimate)	9108	2394	25492	6394		×		×	–	Same as RAM address 14417 (decimal).
	AT progress	9109	2395	25493	6395		×		×	–	
	CT1 current when output ON	9110	2396	25494	6396		×		×	S	Same as RAM address 14418 (decimal).
	CT2 current when output ON	9111	2397	25495	6397		×		×	S	Same as RAM address 14419 (decimal).
	Internal event 1 timer remaining time	9112	2398	25496	6398		×		×	S	
	Internal event 2 timer remaining time	9113	2399	25497	6399		×		×	S	
	Internal event 3 timer remaining time	9114	239A	25498	639A		×		×	S	
	Internal event 4 timer remaining time	9115	239B	25499	639B		×		×	S	
	Internal event 5 timer remaining time	9116	239C	25500	639C		×		×	S	
	Internal event 6 timer remaining time	9117	239D	25501	639D		×		×	S	
	Internal event 7 timer remaining time	9118	239E	25502	639E		×		×	S	
	Internal event 8 timer remaining time	9119	239F	25503	639F		×		×	S	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Operation Settings	Present LSP	9123	23A3	25507	63A3					P	Same as RAM address 14593 (decimal).*1
	Loop PV before compensation	9124	23A4	25508	63A4		×		×	P	Among the pre-compensation PV and the pre-compensation virtual PV, the type of the value selected by [PV assignment] will be used.
	Loop RSP before compensation	9125	23A5	25509	63A5		×		×	P	Among the pre-compensation RSP and the pre-compensation virtual RSP, the type of the value selected by [RSP assignment] will be used.
	VT voltage	9129	23A9	25513	63A9		×		×	S	
	Resistance value	9130	23AA	25514	63AA		×		×	1	
	Fixed value output group in use	9135	23AF	25519	63AF		×		×	–	
Status	Input alarm status	9201	23F1	25585	63F1		×		×	–	Bit 0: AL01 (PV input error (over range)) Bit 1: AL02 (PV input error (under range)) Bit 2: AL03 (Reference junction compensation error / RTD input error) Bit 3: Undefined Bit 4: AL05 (RSP input error (over range)) Bit 5: AL06 (RSP input error (under range)) Bit 6: AL07 (MFB input error) Bits 7–8: Undefined Bit 9: AL 10 (Motor adjustment error) Bit 10: AL 11 (CT1/ CT input error) Bit 11: AL 12 (CT2/ VT input error) Bits 12–15: Undefined

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Status	Operation/setup instrument alarm status	9202	23F2	25586	63F2		×		×	–	Bit 0: AL74 (Nonvolatile memory error) Bit 1: AL97 (Extended data memory error) Bit 2:AL70 (PV A/D conversion error) Bit 3: AL95 (Settings error) Bit 4: AL96 (Adjustment value error) Bit 5: AL81 (Settings area error) Bit 6: AL82 (Adjustment value area error) Bit 7: AL99 (Internal program error) Bit 8: AL83 (Internal system error) Bit 9: AL84 (Settings initialization error) Bit 10:AL71 (RSP A/D conversion error) Bit 11:AL72 (MFB A/D conversion error) Bit 12: AL80 (Nonvolatile memory not initialized) Bit 13: AL50 (Loader cable error) Bit 14: AL51 (PLC link error) Bit 15: Undefined
	Internal event / internal contact function status	9203	23F3	25587	63F3		×		×	–	Bits 0–7: Internal events 1–8 Bits 8–15: Internal contacts 1–8

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Status	Control status	9204	23F4	25588	63F4		×		×	–	Bit 0: MANUAL mode Bit 1: READY mode Bit 2: RSP mode Bit 3: AT in progress Bits 4–5: Undefined Bit 6: SP ramp in progress Bit 7: SP up ramp in progress Bit 8: SP down ramp in progress Bits 9–10: Undefined Bit 11: Estimating MFB Bit 12: Adjusting MFB Bit 13: Heating PID is in use*3 Bit 14: Cooling PID is in use*3 Bit 15: Undefined
	DO state	9205	23F5	25589	63F5		×		×	–	Same as address 14337 (decimal). Bit 0: Control output 1 Bit 1: Control output 2 Bit 2: Event output 1 Bit 3: Event output 2 Bit 4: Event output 3 Bits 5–15: Undefined
	DI state	9206	23F6	25590	63F6		×		×	–	Same as RAM address 14338 (decimal). Bit 0: DI 1 Bit 1: DI 2 Bit 2: DI 3 Bit 3: DI 4 Bits 4–15: Undefined
	User-Defined Bit	9207	23F7	25591	63F7					–	Bits 0–15: User-defined bits 1–16

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Status	Logical operation status	9241	2419	25625	6419		×		×	–	Bits 0–16: Logical operations 1–16
	CT1 current when output OFF	9127	23A7	25511	63A7		×		×	S	
	CT2 current when output OFF	9128	23A8	25512	63A8		×		×	S	
	SPOS operation status	9131	23AB	25515	63AB	☐	×	☐	×	–	
	DROS operation status	9132	23AC	25516	63AC	☐	×	☐	×	–	
	FF-FITTER operation status	9133	23AD	25517	63AD	☐	×	☐	×	–	
	FF-FITTER automatic tuning status	9134	23AE	25518	63AE	☐	☐	☐	☐	–	
User-defined bit	User-defined bit 1	9208	23F8	25592	63F8					–	
	User-defined bit 2	9209	23F9	25593	63F9					–	
	User-defined bit 3	9210	23FA	25594	63FA					–	
	User-defined bit 4	9211	23FB	25595	63FB					–	
	User-defined bit 5	9212	23FC	25596	63FC					–	
	User-defined bit 6	9213	23FD	25597	63FD					–	
	User-defined bit 7	9214	23FE	25598	63FE					–	
	User-defined bit 8	9215	23FF	25599	63FF					–	
	User-defined bit 9	9216	2400	25600	6400					–	
	User-defined bit 10	9217	2401	25601	6401					–	
	User-defined bit 11	9218	2402	25602	6402					–	
	User-defined bit 12	9219	2403	25603	6403					–	
	User-defined bit 13	9220	2404	25604	6404					–	
	User-defined bit 14	9221	2405	25605	6405					–	
	User-defined bit 15	9222	2406	25606	6406					–	
	User-defined bit 16	9223	2407	25607	6407					–	
User-defined value	User-defined value 1 settings user-defined value	9251	2423	25635	6423					S	Same as RAM address 4003 (decimal).
	User-defined value 2 settings user-defined value	9252	2424	25636	6424					S	Same as RAM address 4007 (decimal).
	User-defined value 3 settings user-defined value	9253	2425	25637	6425					S	Same as RAM address 4011 (decimal).
	User-defined value 4 settings user-defined value	9254	2426	25638	6426					S	Same as RAM address 4015 (decimal).
	User-defined value 5 settings user-defined value	9255	2427	25639	6427					S	Same as RAM address 4019 (decimal).
	User-defined value 6 settings user-defined value	9256	2428	25640	6428					S	Same as RAM address 4023 (decimal).
	User-defined value 7 settings user-defined value	9257	2429	25641	6429					S	Same as RAM address 4027 (decimal).

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
User-defined value	User-defined value 8 settings user-defined value	9258	242A	25642	642A					S	Same as RAM address 4031 (decimal).
	User-defined value 9 settings user-defined value	9259	242B	25643	642B					S	Same as RAM address 4035 (decimal).
	User-defined value 10 settings user-defined value	9260	242C	25644	642C					S	Same as RAM address 4039 (decimal).
	User-defined value 11 settings user-defined value	9261	242D	25645	642D					S	Same as RAM address 4043 (decimal).
	User-defined value 12 settings user-defined value	9262	242E	25646	642E					S	Same as RAM address 4047 (decimal).
	User-defined value 13 settings user-defined value	9263	242F	25647	642F					S	Same as RAM address 4051 (decimal).
	User-defined value 14 settings user-defined value	9264	2430	25648	6430					S	Same as RAM address 4055 (decimal).
	User-defined value 15 settings user-defined value	9265	2431	25649	6431					S	Same as RAM address 4059 (decimal).
	User-defined value 16 settings user-defined value	9266	2432	25650	6432					S	Same as RAM address 4063 (decimal).
Tag	Tag 1	9301	2455	25685	6455					–	Cannot be displayed or set on the console
	Tag 2	9302	2456	25686	6456					–	Same as above.
	Tag 3	9303	2457	25687	6457					–	Same as above.
	Tag 4	9304	2458	25688	6458					–	Same as above.
	Tag 5	9305	2459	25689	6459					–	Same as above.
	Tag 6	9306	245A	25690	645A					–	Same as above.
	Tag 7	9307	245B	25691	645B					–	Same as above.
	Tag 8	9308	245C	25692	645C					–	Same as above.
	Tag 9	9309	245D	25693	645D					–	Same as above.
	Tag 10	9310	245E	25694	645E					–	Same as above.
	Tag 11	9311	245F	25695	645F					–	Same as above.
	Tag 12	9312	2460	25696	6460					–	Same as above.
	Tag 13	9313	2461	25697	6461					–	Same as above.
	Tag 14	9314	2462	25698	6462					–	Same as above.
	Tag 15	9315	2463	25699	6463					–	Same as above.
	Tag 16	9316	2464	25700	6464					–	Same as above.
Host Communication	Station address	9984	2700	26368	6700		×		×	–	Same as RAM address 5265 (decimal).
	Communication type	10000	2710	26384	6710		×		×	–	Same as RAM address 5264 (decimal).

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Host Communication	Transmission speed	10001	2711	26385	6711		×		×	–	Same as RAM address 5266 (decimal).
	Data format (data length)	10002	2712	26386	6712		×		×	–	Same as RAM address 5267 (decimal).
	Data format (parity)	10003	2713	26387	6713		×		×	–	Same as RAM address 5268 (decimal).
	Data format (stop bits)	10004	2714	26388	6714		×		×	–	Same as RAM address 5269 (decimal).
	Response time-out	10005	2715	26389	6715		×		×	–	Same as RAM address 5270 (decimal).
	(Reserved for future use.)	10006	2716	26390	6716	△	△	△	△	–	
Address replacement	Address link setting 1	10656	29A0	27040	69A0					–	
	Address link setting 2	10657	29A1	27041	69A1					–	
	Address link setting 3	10658	29A2	27042	69A2					–	
	Address link setting 4	10659	29A3	27043	69A3					–	
	Address link setting 5	10660	29A4	27044	69A4					–	
	Address link setting 6	10661	29A5	27045	69A5					–	
	Address link setting 7	10662	29A6	27046	69A6					–	
	Address link setting 8	10663	29A7	27047	69A7					–	
	Address link setting 9	10664	29A8	27048	69A8					–	
	Address link setting 10	10665	29A9	27049	69A9					–	
	Address link setting 11	10666	29AA	27050	69AA					–	
	Address link setting 12	10667	29AB	27051	69AB					–	
	Address link setting 13	10668	29AC	27052	69AC					–	
	Address link setting 14	10669	29AD	27053	69AD					–	
	Address link setting 15	10670	29AE	27054	69AE					–	
	Address link setting 16	10671	29AF	27055	69AF					–	
	Address link setting 17	10672	29B0	27056	69B0					–	
	Address link setting 18	10673	29B1	27057	69B1					–	
	Address link setting 19	10674	29B2	27058	69B2					–	
	Address link setting 20	10675	29B3	27059	69B3					–	
	Address link setting 21	10676	29B4	27060	69B4					–	
	Address link setting 22	10677	29B5	27061	69B5					–	
	Address link setting 23	10678	29B6	27062	69B6					–	
	Address link setting 24	10679	29B7	27063	69B7					–	
	Address link setting 25	10680	29B8	27064	69B8					–	
	Address link setting 26	10681	29B9	27065	69B9					–	
	Address link setting 27	10682	29BA	27066	69BA					–	
	Address link setting 28	10683	29BB	27067	69BB					–	
	Address link setting 29	10684	29BC	27068	69BC					–	
	Address link setting 30	10685	29BD	27069	69BD					–	
	Address link setting 31	10686	29BE	27070	69BE					–	
	Address link setting 32	10687	29BF	27071	69BF					–	
	Address link setting 33	10688	29C0	27072	69C0					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Address replacement	Address link setting 34	10689	29C1	27073	69C1					–	
	Address link setting 35	10690	29C2	27074	69C2					–	
	Address link setting 36	10691	29C3	27075	69C3					–	
	Address link setting 37	10692	29C4	27076	69C4					–	
	Address link setting 38	10693	29C5	27077	69C5					–	
	Address link setting 39	10694	29C6	27078	69C6					–	
	Address link setting 40	10695	29C7	27079	69C7					–	
	Address link setting 41	10696	29C8	27080	69C8					–	
	Address link setting 42	10697	29C9	27081	69C9					–	
	Address link setting 43	10698	29CA	27082	69CA					–	
	Address link setting 44	10699	29CB	27083	69CB					–	
	Address link setting 45	10700	29CC	27084	69CC					–	
	Address link setting 46	10701	29CD	27085	69CD					–	
	Address link setting 47	10702	29CE	27086	69CE					–	
	Address link setting 48	10703	29CF	27087	69CF					–	
	Address link setting 49	10704	29D0	27088	69D0					–	
	Address link setting 50	10705	29D1	27089	69D1					–	
	Address link setting 51	10706	29D2	27090	69D2					–	
	Address link setting 52	10707	29D3	27091	69D3					–	
	Address link setting 53	10708	29D4	27092	69D4					–	
	Address link setting 54	10709	29D5	27093	69D5					–	
	Address link setting 55	10710	29D6	27094	69D6					–	
	Address link setting 56	10711	29D7	27095	69D7					–	
	Address link setting 57	10712	29D8	27096	69D8					–	
	Address link setting 58	10713	29D9	27097	69D9					–	
	Address link setting 59	10714	29DA	27098	69DA					–	
	Address link setting 60	10715	29DB	27099	69DB					–	
	Address link setting 61	10716	29DC	27100	69DC					–	
	Address link setting 62	10717	29DD	27101	69DD					–	
	Address link setting 63	10718	29DE	27102	69DE					–	
	Address link setting 64	10719	29DF	27103	69DF					–	
	Replacement address 1	15360	3C00	31744	7C00					–	
	Replacement address 2	15361	3C01	31745	7C01					–	
	Replacement address 3	15362	3C02	31746	7C02					–	
	Replacement address 4	15363	3C03	31747	7C03					–	
	Replacement address 5	15364	3C04	31748	7C04					–	
	Replacement address 6	15365	3C05	31749	7C05					–	
	Replacement address 7	15366	3C06	31750	7C06					–	
	Replacement address 8	15367	3C07	31751	7C07					–	
	Replacement address 9	15368	3C08	31752	7C08					–	
	Replacement address 10	15369	3C09	31753	7C09					–	
	Replacement address 11	15370	3C0A	31754	7C0A					–	
	Replacement address 12	15371	3C0B	31755	7C0B					–	
	Replacement address 13	15372	3C0C	31756	7C0C					–	
	Replacement address 14	15373	3C0D	31757	7C0D					–	
	Replacement address 15	15374	3C0E	31758	7C0E					–	
	Replacement address 16	15375	3C0F	31759	7C0F					–	
	Replacement address 17	15376	3C10	31760	7C10					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Address replacement	Replacement address 18	15377	3C11	31761	7C11					–	
	Replacement address 19	15378	3C12	31762	7C12					–	
	Replacement address 20	15379	3C13	31763	7C13					–	
	Replacement address 21	15380	3C14	31764	7C14					–	
	Replacement address 22	15381	3C15	31765	7C15					–	
	Replacement address 23	15382	3C16	31766	7C16					–	
	Replacement address 24	15383	3C17	31767	7C17					–	
	Replacement address 25	15384	3C18	31768	7C18					–	
	Replacement address 26	15385	3C19	31769	7C19					–	
	Replacement address 27	15386	3C1A	31770	7C1A					–	
	Replacement address 28	15387	3C1B	31771	7C1B					–	
	Replacement address 29	15388	3C1C	31772	7C1C					–	
	Replacement address 30	15389	3C1D	31773	7C1D					–	
	Replacement address 31	15390	3C1E	31774	7C1E					–	
	Replacement address 32	15391	3C1F	31775	7C1F					–	
	Replacement address 33	15392	3C20	31776	7C20					–	
	Replacement address 34	15393	3C21	31777	7C21					–	
	Replacement address 35	15394	3C22	31778	7C22					–	
	Replacement address 36	15395	3C23	31779	7C23					–	
	Replacement address 37	15396	3C24	31780	7C24					–	
	Replacement address 38	15397	3C25	31781	7C25					–	
	Replacement address 39	15398	3C26	31782	7C26					–	
	Replacement address 40	15399	3C27	31783	7C27					–	
	Replacement address 41	15400	3C28	31784	7C28					–	
	Replacement address 42	15401	3C29	31785	7C29					–	
	Replacement address 43	15402	3C2A	31786	7C2A					–	
	Replacement address 44	15403	3C2B	31787	7C2B					–	
	Replacement address 45	15404	3C2C	31788	7C2C					–	
	Replacement address 46	15405	3C2D	31789	7C2D					–	
	Replacement address 47	15406	3C2E	31790	7C2E					–	
	Replacement address 48	15407	3C2F	31791	7C2F					–	
	Replacement address 49	15408	3C30	31792	7C30					–	
	Replacement address 50	15409	3C31	31793	7C31					–	
	Replacement address 51	15410	3C32	31794	7C32					–	
	Replacement address 52	15411	3C33	31795	7C33					–	
	Replacement address 53	15412	3C34	31796	7C34					–	
	Replacement address 54	15413	3C35	31797	7C35					–	
	Replacement address 55	15414	3C36	31798	7C36					–	
	Replacement address 56	15415	3C37	31799	7C37					–	
	Replacement address 57	15416	3C38	31800	7C38					–	
	Replacement address 58	15417	3C39	31801	7C39					–	
	Replacement address 59	15418	3C3A	31802	7C3A					–	
	Replacement address 60	15419	3C3B	31803	7C3B					–	
	Replacement address 61	15420	3C3C	31804	7C3C					–	
	Replacement address 62	15421	3C3D	31805	7C3D					–	
	Replacement address 63	15422	3C3E	31806	7C3E					–	
	Replacement address 64	15423	3C3F	31807	7C3F					–	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Reception monitoring	Monitored address 1	10736	29F0	27120	69F0					–	
	Monitoring time 1	10737	29F1	27121	69F1					–	
	Monitoring mode 1	10738	29F2	27122	69F2					–	
	Monitored address 2	10739	29F3	27123	69F3					–	
	Monitoring time 2	10740	29F4	27124	69F4					–	
	Monitoring mode 2	10741	29F5	27125	69F5					–	
	Monitored address 3	10742	29F6	27126	69F6					–	
	Monitoring time 3	10743	29F7	27127	69F7					–	
	Monitoring mode 3	10744	29F8	27128	69F8					–	
	Monitored address 4	10745	29F9	27129	69F9					–	
	Monitoring time 4	10746	29FA	27130	69FA					–	
	Monitoring mode 4	10747	29FB	27131	69FB					–	
	Reception access error 1	15968	3E60	32352	7E60		×		×	–	
	Reception access error 2	15969	3E61	32353	7E61		×		×	–	
	Reception access error 3	15970	3E62	32354	7E62		×		×	–	
	Reception access error 4	15971	3E63	32355	7E63		×		×	–	
	Reception access error 1 (latch)	15972	3E64	32356	7E64		×		×	–	
	Reception access error 2 (latch)	15973	3E65	32357	7E65		×		×	–	
	Reception access error 3 (latch)	15974	3E66	32358	7E66		×		×	–	
	Reception access error 4 (latch)	15975	3E67	32359	7E67		×		×	–	
	Reception access error latch clear 1	15976	3E68	32360	7E68					–	
	Reception access error latch clear 2	15977	3E69	32361	7E69					–	
	Reception access error latch clear 3	15978	3E6A	32362	7E6A					–	
	Reception access error latch clear 4	15979	3E6B	32363	7E6B					–	
PID	PID1 proportional band	12288	3000	28672	7000					1	
	PID1 integral time	12289	3001	28673	7001					C	
	PID1 derivative time	12290	3002	28674	7002					C	
	PID1 manual reset	12291	3003	28675	7003					1	
	PID1 output low limit	12292	3004	28676	7004					1	
	PID1 output high limit	12293	3005	28677	7005					1	
	PID2 proportional band	12294	3006	28678	7006					1	
	PID2 integral time	12295	3007	28679	7007					C	
	PID2 derivative time	12296	3008	28680	7008					C	
	PID2 manual reset	12297	3009	28681	7009					1	
	PID2 output low limit	12298	300A	28682	700A					1	
	PID2 output high limit	12299	300B	28683	700B					1	
	PID3 proportional band	12300	300C	28684	700C					1	
	PID3 integral time	12301	300D	28685	700D					C	
	PID3 derivative time	12302	300E	28686	700E					C	
	PID3 manual reset	12303	300F	28687	700F					1	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
PID	PID3 output low limit	12304	3010	28688	7010					1	
	PID3 output high limit	12305	3011	28689	7011					1	
	PID4 proportional band	12306	3012	28690	7012					1	
	PID4 integral time	12307	3013	28691	7013					C	
	PID4 derivative time	12308	3014	28692	7014					C	
	PID4 manual reset	12309	3015	28693	7015					1	
	PID4 output low limit	12310	3016	28694	7016					1	
	PID4 output high limit	12311	3017	28695	7017					1	
	PID5 proportional band	12312	3018	28696	7018					1	
	PID5 integral time	12313	3019	28697	7019					C	
	PID5 derivative time	12314	301A	28698	701A					C	
	PID5 manual reset	12315	301B	28699	701B					1	
	PID5 output low limit	12316	301C	28700	701C					1	
	PID5 output high limit	12317	301D	28701	701D					1	
	PID6 proportional band	12318	301E	28702	701E					1	
	PID6 integral time	12319	301F	28703	701F					C	
	PID6 derivative time	12320	3020	28704	7020					C	
	PID6 manual reset	12321	3021	28705	7021					1	
	PID6 output low limit	12322	3022	28706	7022					1	
	PID6 output high limit	12323	3023	28707	7023					1	
	PID7 proportional band	12324	3024	28708	7024					1	
	PID7 integral time	12325	3025	28709	7025					C	
	PID7 derivative time	12326	3026	28710	7026					C	
	PID7 manual reset	12327	3027	28711	7027					1	
	PID7 output low limit	12328	3028	28712	7028					1	
	PID7 output high limit	12329	3029	28713	7029					1	
	PID8 proportional band	12330	302A	28714	702A					1	
	PID8 integral time	12331	302B	28715	702B					C	
	PID8 derivative time	12332	302C	28716	702C					C	
	PID8 manual reset	12333	302D	28717	702D					1	
	PID8 output low limit	12334	302E	28718	702E					1	
	PID8 output high limit	12335	302F	28719	702F					1	
	PID1 proportional band (cool)	12336	3030	28720	7030					1	
	PID1 integral time (cool)	12337	3031	28721	7031					C	
	PID1 derivative time (cool)	12338	3032	28722	7032					C	
	(Reserved for future use.)	12339	3033	28723	7033	△	△	△	△	1	
	PID1 output low limit (cool)	12340	3034	28724	7034					1	
	PID1 output high limit (cool)	12341	3035	28725	7035					1	
	PID2 proportional band (cool)	12342	3036	28726	7036					1	
	PID2 integral time (cool)	12343	3037	28727	7037					C	
	PID2 derivative time (cool)	12344	3038	28728	7038					C	
	(Reserved for future use.)	12345	3039	28729	7039	△	△	△	△	1	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
PID	PID2 output low limit (cool)	12346	303A	28730	703A					1	
	PID2 output high limit (cool)	12347	303B	28731	703B					1	
	PID3 proportional band (cool)	12348	303C	28732	703C					1	
	PID3 integral time (cool)	12349	303D	28733	703D					C	
	PID3 derivative time (cool)	12350	303E	28734	703E					C	
	(Reserved for future use.)	12351	303F	28735	703F	△	△	△	△	1	
	PID3 output low limit (cool)	12352	3040	28736	7040					1	
	PID3 output high limit (cool)	12353	3041	28737	7041					1	
	PID4 proportional band (cool)	12354	3042	28738	7042					1	
	PID4 integral time (cool)	12355	3043	28739	7043					C	
	PID4 derivative time (cool)	12356	3044	28740	7044					C	
	(Reserved for future use.)	12357	3045	28741	7045	△	△	△	△	1	
	PID4 output low limit (cool)	12358	3046	28742	7046					1	
	PID4 output high limit (cool)	12359	3047	28743	7047					1	
	PID5 proportional band (cool)	12360	3048	28744	7048					1	
	PID5 integral time (cool)	12361	3049	28745	7049					C	
	PID5 derivative time (cool)	12362	304A	28746	704A					C	
	(Reserved for future use.)	12363	304B	28747	704B	△	△	△	△	1	
	PID5 output low limit (cool)	12364	304C	28748	704C					1	
	PID5 output high limit (cool)	12365	304D	28749	704D					1	
	PID6 proportional band (cool)	12366	304E	28750	704E					1	
	PID6 integral time (cool)	12367	304F	28751	704F					C	
	PID6 derivative time (cool)	12368	3050	28752	7050					C	
	(Reserved for future use.)	12369	3051	28753	7051	△	△	△	△	1	
	PID6 output low limit (cool)	12370	3052	28754	7052					1	
	PID6 output high limit (cool)	12371	3053	28755	7053					1	
	PID7 proportional band (cool)	12372	3054	28756	7054					1	
	PID7 integral time (cool)	12373	3055	28757	7055					C	
	PID7 derivative time (cool)	12374	3056	28758	7056					C	
	(Reserved for future use.)	12375	3057	28759	7057	△	△	△	△	1	
	PID7 output low limit (cool)	12376	3058	28760	7058					1	
	PID7 output high limit (cool)	12377	3059	28761	7059					1	

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
PID	PID8 proportional band (cool)	12378	305A	28762	705A					1	
	PID8 integral time (cool)	12379	305B	28763	705B					C	
	PID8 derivative time (cool)	12380	305C	28764	705C					C	
	(Reserved for future use.)	12381	305D	28765	705D	△	△	△	△	1	
	PID8 output low limit (cool)	12382	305E	28766	705E					1	
	PID8 output high limit (cool)	12383	305F	28767	705F					1	
Event	Internal event 1 main setting	13056	3300	29440	7300					S	Same as RAM address 7501 (decimal).
	Internal event 1 sub-setting	13057	3301	29441	7301					S	Same as RAM address 7502 (decimal).
	Internal event 2 main setting	13058	3302	29442	7302					S	Same as RAM address 7506 (decimal).
	Internal event 2 sub-setting	13059	3303	29443	7303					S	Same as RAM address 7507 (decimal).
	Internal event 3 main setting	13060	3304	29444	7304					S	Same as RAM address 7511 (decimal).
	Internal event 3 sub-setting	13061	3305	29445	7305					S	Same as RAM address 7512 (decimal).
	Internal event 4 main setting	13062	3306	29446	7306					S	Same as RAM address 7516 (decimal).
	Internal event 4 sub-setting	13063	3307	29447	7307					S	Same as RAM address 7517 (decimal).
	Internal event 5 main setting	13064	3308	29448	7308					S	Same as RAM address 7521 (decimal).
	Internal event 5 sub-setting	13065	3309	29449	7309					S	Same as RAM address 7522 (decimal).
	Internal event 6 main setting	13066	330A	29450	730A					S	Same as RAM address 7526 (decimal).
	Internal event 6 sub-setting	13067	330B	29451	730B					S	Same as RAM address 7527 (decimal).
	Internal event 7 main setting	13068	330C	29452	730C					S	Same as RAM address 7531 (decimal).
	Internal event 7 sub-setting	13069	330D	29453	730D					S	Same as RAM address 7532 (decimal).

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Event	Internal event 8 main setting	13070	330E	29454	730E					S	Same as RAM address 7536 (decimal).
	Internal event 8 sub-setting	13071	330F	29455	730F					S	Same as RAM address 7537 (decimal).
LSP	LSP1 SP	13312	3400	29696	7400					P	Same as RAM address 7541 (decimal).
	LSP2 SP	13313	3401	29697	7401					P	Same as RAM address 7542 (decimal).
	LSP3 SP	13314	3402	29698	7402					P	Same as RAM address 7546 (decimal).
	LSP4 SP	13315	3403	29699	7403					P	Same as RAM address 7547 (decimal).
	LSP5 SP	13316	3404	29700	7404					P	Same as RAM address 7551 (decimal).
	LSP6 SP	13317	3405	29701	7405					P	Same as RAM address 7552 (decimal).
	LSP7 SP	13318	3406	29702	7406					P	Same as RAM address 7556 (decimal).
	LSP8 SP	13319	3407	29703	7407					P	Same as RAM address 7557 (decimal).
	LSP1 PID	13440	3480	29824	7480					–	Same as RAM address 7006 (decimal).
	LSP2 PID	13441	3481	29825	7481					–	Same as RAM address 7010 (decimal).
	LSP3 PID	13442	3482	29826	7482					–	Same as RAM address 7014 (decimal).
	LSP4 PID	13443	3483	29827	7483					–	Same as RAM address 7018 (decimal).
	LSP5 PID	13444	3484	29828	7484					–	Same as RAM address 7022 (decimal).
	LSP6 PID	13445	3485	29829	7485					–	Same as RAM address 7026 (decimal).
	LSP7 PID	13446	3486	29830	7486					–	Same as RAM address 7030 (decimal).
	LSP8 PID	13447	3487	29831	7487					–	Same as RAM address 7034 (decimal).

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Instrument Status 1	Representative alarm	14336	3800	30720	7800		×		×	–	Bit 0: PV error(AL01 to AL03) Bit 1: RSP error (AL05/06) Bit 2: CT/VT error (AL11/12) Bit 3: MFB input error (AL07) Bit 4: Undefined Bit 5: Motor adjustment error (AL10) Bits 6–7: Undefined Bit 8: Initialization error (AL80/83/84) Bit 9: Undefined Bit 10: PLC link error (AL51) Bit 11: Nonvolatile memory access error (AL74) Bit 12: A/D conversion error (AL70/71/72) Bit 13: Settings error (AL81/95/97) Bit 14: Adjustment value error (AL82/96) Bit 15: Internal error (AL99)
	DO state	14337	3801	30721	7801		×		×	–	Same as RAM address 9205 (decimal).
	DI state	14338	3802	30722	7802		×		×	–	Same as RAM address 9206 (decimal).
Instrument Status 2	RUN/READY status	14352	3810	30736	7810		×		×	–	
	AUTO/MANUAL status	14353	3811	30737	7811		×		×	–	
	AT stop/start status	14354	3812	30738	7812		×		×	–	
	LSP/RSP status	14355	3813	30739	7813		×		×	–	
	Constant value operation / pattern operation status	14359	3817	30743	7817		×		×	–	
	Loop PV	14356	3814	30740	7814		×		×	P	
	Loop SP	14357	3815	30741	7815		×		×	P	
	MV	14358	3816	30742	7816		×		×	1	

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		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
Instrument Status 3	RSP	14416	3850	30800	7850		×		×	P	Same as RAM address 7001 (decimal).
	MFB opening (including estimate)	14417	3851	30801	7851		×		×	1	Same as RAM address 9108 (decimal).
	CT1 current when output ON	14418	3852	30802	7852		×		×	S	Same as RAM address 9110 (decimal).
	CT2 current when output ON	14419	3853	30803	7853		×		×	S	Same as RAM address 9111 (decimal).
Instrument Status 3	Heat MV	14420	3854	30804	7854		×		×	1	Same as RAM address 9106 (decimal).
	Cool MV	14421	3855	30805	7855		×		×	1	Same as RAM address 9107 (decimal).
Operation	LSP group No.	14592	3900	30976	7900		☐		☐	–	Same as RAM address 9103 (decimal). Writable if there are no internal contacts.
	Present LSP	14593	3901	30977	7901					P	Same as RAM address 9123 (decimal).
	MV	14594	3902	30978	7902		☐		☐	1	Same as RAM address 9105 (decimal). Writable in manual mode
	RUN/READY	14595	3903	30979	7903		☐		☐	–	Same as RAM address 9002 (decimal). Writable if there are no internal contacts.
	AUTO/MANUAL	14596	3904	30980	7904		☐		☐	–	Same as RAM address 9001 (decimal). Writable under other conditions if there are no internal contacts.
	AT stop/start selection	14597	3905	30981	7905		☐		☐	–	Same as RAM address 9004 (decimal).
	LSP/RSP mode selection	14598	3906	30982	7906		☐		☐	–	Same as RAM address 9003 (decimal).

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Bank	Item	RAM address		Nonvolatile memory address		RAM		Nonvolatile memory		Decimal point	Notes
		Decimal	Hex	Decimal	Hex	Read	Write	Read	Write		
PID group in use	P (Proportional Band) in use	14848	3A00	31232	7A00					1	
	I (Integral time) in use	14849	3A01	31233	7A01					C	
	D (Derivative time) in use	14850	3A02	31234	7A02					C	
	Manual Reset in use	14851	3A03	31235	7A03					1	
	Output low limit in use	14852	3A04	31236	7A04					1	
	Output high limit in use	14853	3A05	31237	7A05					1	
	P (Proportional Band) (Cool) in use	14854	3A06	31238	7A06					1	
	I (Integral time) (Cool) in use	14855	3A07	31239	7A07					C	
	D (Derivative time) (Cool) in use	14856	3A08	31240	7A08					C	
PID group in use	(Reserved for future use.)	14857	3A09	31241	7A09	△	△	△	△	1	
	Output low limit (Cool) in use	14858	3A0A	31242	7A0A					1	
	Output high limit (Cool) in use	14859	3A0B	31243	7A0B					1	
Monitoring information	Clear monitoring information	15935	3E3F	32319	7E3F					-	

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-MEMO-

Chapter 11. Maintenance and Troubleshooting

WARNING

To remove dirt from this device, wipe it with a soft dry cloth.
Never use an organic solvent such as paint thinner or benzene, or a detergent.

Do not use this device in wet places or with wet hands.
There is a danger of electric shock.

■ Maintenance

● Cleaning

To remove dirt from this device, wipe it with a soft dry cloth.

Never use an organic solvent such as thinner or benzene.

● Parts replacement

Do not replace any parts of this device.

● Fuse replacement

When replacing the fuse for the power wiring, use a fuse that meets the following conditions:

Standards compliance:	IEC 60127
Speed:	time-lag (T)
Rated voltage:	250 V AC
Rated current:	1 A (AC models, DC models)

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■ Alarm codes and countermeasures

This section describes the alarm codes that are displayed if an error occurs and describes countermeasures.

● Input error

Alarm code*1	Description	Cause	Corrective action
AL01	PV input error (over range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for PV input range type, etc.	Check the PV input range type (C001) and other settings.
AL02	PV input error (under range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for PV input range type, etc.	Check the PV input range type (C001) and other settings.
AL03	Reference junction compensation (cold junction compensation) error	Measurement range error in terminal temperature at reference junction compensation	Make sure that the ambient temperature is within the specifications of this product.
	RTD input error	Sensor burnout, incorrect wiring	Check the wiring.
AL05	RSP input error (over range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for RSP input range type, etc.	Check the RSP input range type (C010) and other settings.
AL06	RSP input error (under range)	Sensor burnout, incorrect wiring	Check the wiring.
		Incorrect settings for RSP input range type, etc.	Check the RSP input range type (C010) and other settings.
AL07	MFB input error	MFB burnout, incorrect wiring	Check the wiring.
AL10	Motor adjustment error	MFB automatic adjustment failure	Check the wiring and readjust.
		Incorrect setting of adjustment value during manual adjustment	Check the adjustment value when fully open and the adjustment value when fully closed.
AL11	CT1/CT input error	Current input exceeding the high limit of the display range	• Use a current transformer with a number of turns that matches the display range. • Check the number of CT turns and the settings. • Check the settings and the number of times the power wire passes through the CT.
		Incorrect wiring	Check the wiring.
AL12	CT2/VT input error	Current (voltage) input exceeding the high limit of the display range	For a model with two CT inputs, • Use a current transformer with a number of turns that matches the display range. • Check the number of CT turns and the settings. • Check the settings and the number of times the power wire passes through the CT. For a CT/VT model, • Check the primary and secondary voltage values of the VT.
		Incorrect wiring	Check the wiring.

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● Operation or setting error

Alarm code*1	Description	Cause	Corrective action
AL50	Loader cable error	The USB loader cable (A to micro-B) is not being used to connect the loader.	Use the USB loader cable (A to micro-B).
AL51	PLC link error	Incorrect PLC link setup	Check the PLC link setup.
		Incorrect communication setup on the PLC	Review the communication setup of the connected PLC.
		Incorrect network configuration	Do not connect anything other than the C1M/C1A/C2/C3/PLC to the RS-485 communication line.
		Incorrect wiring	Check if the RS-485 communication line is properly connected.

● Instrument errors

Alarm code*1	Description	Cause	Corrective action
AL70	PV A/D conversion error	A/D conversion unit failure	Turn the power off and then on again. If the alarm is triggered when the power is turned on again, replace the device.
AL71	RSP A/D conversion error		
AL72	MFB A/D conversion error		
AL74	Nonvolatile memory error	Temporary communication error, corruption of written data, or failure of this device	
AL80	Nonvolatile memory not initialized		
AL81	Settings area error*2		The problem can be corrected with the following procedure: • Initialize the settings • Write the setting again If this procedure does not correct the problem, replace the device.
AL82	Adjustment value area error*2		Turn the power off and then on again. If the alarm is triggered when the power is turned on again, replace the device.
AL83	Internal system error		
AL84	Settings initialization error		Turn the power off and then on again. If the alarm is triggered after turning the power on again, the problem can be corrected with the following procedure: • Initialize the settings*4 • Write the setting again If this procedure does not correct the problem, replace the device.
AL95	Settings error		
AL96	Adjustment value error		Turn the power off and then on again. If the alarm is triggered after turning the power on again, the problem can be corrected with the following procedure: • Restore adjustment values*3 If this procedure does not correct the problem, replace the device.

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Alarm code*1	Description	Cause	Corrective action
AL97	Extended data memory error	Pattern operation error, asset information read/write error, or corruption of data written of the extended data memory function, or failure of this device	Turn the power off and then on again. If the alarm is triggered after turning the power on again, the problem can be corrected with the following procedure: • Initialize the settings*4 • Write the setting again If this procedure does not correct the problem, replace the device.
AL99	Internal program error	An internal error that interrupted execution of operation was detected.	

*1. Multiple alarms may occur at the same time. If the corrective action for one of the alarms says that the device should be replaced, it should be replaced.

*2. This error may occur when updating the firmware.

*3. If the area in memory for restoring the adjustment value has been corrupted, the value cannot be restored.
☞ ■ Starting calibration and inspection (p. 12-1) (for how to perform the restore operation)

*4. ☞ ■ Initializing the settings (p. 12-7) (for how to initialize the settings)

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■ Operation when a PV input error occurs

If a PV input error occurs, this device will operate as follows.

Control output: Whether to continue operation can be specified.

Other operations: Operation continues.

If the PV input is abnormal, this device displays the alarm codes and values shown in the tables below. What is displayed varies depending on the sensor type.

Input type	Error	PV input range type	Indication	Alarm code
Thermocouple	Burnout	1–28	Upscale (110 % FS)	AL01
	Reference junction compensation (cold junction compensation) error	1–28	Unknown	AL03
RTD	Resistor burnout	41–70	Upscale (110 % FS)	AL01
	Line A burnout			
	Line B burnout	41–70	Upscale (110 % FS)*	AL01 AL03 (AL02)
	2- or 3-wire burnout			
	Short circuit, lines A and B	41–44	Downscale (–235 °C)	AL02
		45–70	Downscale (–10 % FS)	AL02
DC voltage (mV)	Burnout	81–83	Upscale (110 % FS)	AL01
DC voltage (V)	Burnout	84	Unknown (around 0 % FS)	None
		86	Downscale (–10 % FS)	AL02
		87	Unknown (around 0 % FS)	None
		88	Unknown (around 0 % FS)	None
		91	Downscale (–10 % FS)	AL02
		92	Unknown (around 50 % FS)	None
DC current	Burnout	89	Unknown (around 0 % FS)	None
		90	Downscale (–10 % FS)	AL02

* It may be upscaled after the indicated value drops for a short period of time.

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■ Operation when an RSP input error occurs

If an RSP input error occurs, all operations will continue.

If the RSP input is abnormal, this device will display the alarm codes and values shown in the tables below.

Input type	Error	RSP input range type	Indication	Alarm code
DC voltage (V)	Burnout	84	Downscale (0 % FS)	None
		86	Downscale (−10 % FS)	AL06
		87	Downscale (0 % FS)	None
		88	Downscale (0 % FS)	None
		91	Downscale (−10 % FS)	AL06
		92	Unknown (around 50 % FS)	None
DC current	Burnout	89	Unknown (around 0 % FS)	None
		90	Downscale (−10 % FS)	AL06

■ If an error occurs in communication with model SLP-C1F

When this device is communicating with a PC running SLP-C1F that is connected using a USB loader cable (A to micro-B), reading or writing may fail.

In this case, unplug the USB loader cable (A to micro-B) from the PC's USB connector, wait at least 10 seconds, and then plug it in again.

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■ Updating the firmware

If necessary, update the firmware using the procedure described in this section.

Handling Precautions

- This device will stop functioning during the update. Please update the firmware when it will not affect your machines or equipment.
- Be sure to use a loader cable.

● The folder for updates

Updaters are stored in the FwUpdates folder where the SLP-C1F is installed.

The following is the default installation folder.

C:\Program Files (x86)\SLP\SLPC1\FwUpdates

● Update names

The names of updates vary depending on the model and ROM version as shown below. Please select an appropriate update.

FWUP_ <model ID> _ <ROM version>.exe

Model ID

Model	Model ID
C1M	84100109001
C1A	84100110001
C2, C3	84100111001

ROM versions are expressed in four digits. If the version is 1.02, the file name ends with "_0102."

☞If there are no updates for the versions shown in ■ ROM version history (p. App.-12), please download the latest version of the SLP-C1F Smart Loader Package from Azbil's website.

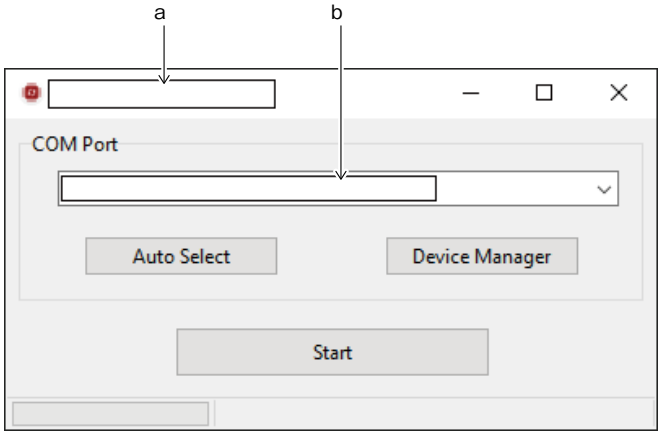
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● Update procedure

(1) Connect the PC to the controller whose firmware should be updated with a USB loader cable.

(2) Refer to "● Update names (p. 11-7)" and run an appropriate update.

(3) Select the communication port from the options. When the program starts up, the port of the controller is set as default. If you click [Auto Select], the port of the loader cable connected to the PC will be set automatically.



a: Name of the firmware update

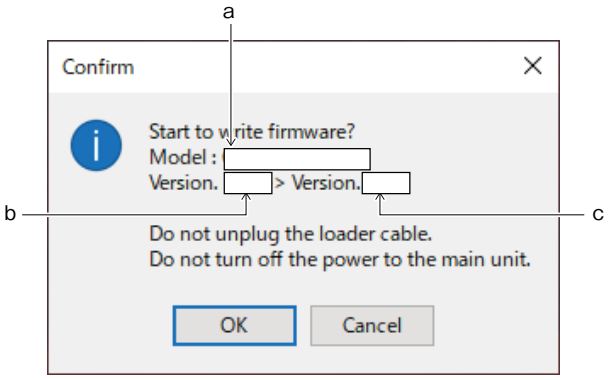
b: Selected communication port No.: communication port name

Handling Precautions

- For the update for the C1M, if the 81441177-001 USB loader cable is not connected, the communication port will not be set.
- For update for the C1A/C2/C3, if the SLP-ULCJA0 USB loader cable (A to micro-B) is not connected, the communication port will not be set.

(4) Click [Start].

≫ The dialog box for confirming whether to start writing is displayed. Check that the model of the controller, the current version, and the version after the update are correct.



a: Model of the controller to be updated

b: Current ROM version

c: ROM version after the update

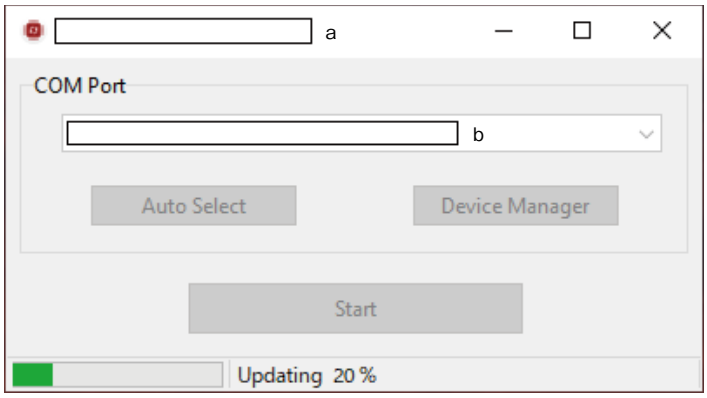
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Handling Precautions

- If the selected update does not match the model, the message "Can't support this instrument" will be displayed and the update will not be executed.
- If the previous writing has failed, the model and current version may not be displayed.

(5) Click [OK].

≫ Writing begins.



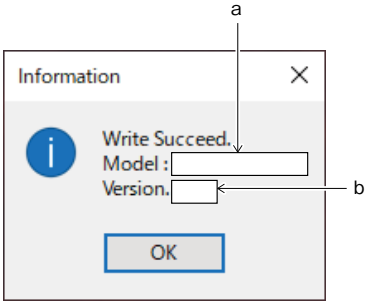
a: Name of the firmware update

b: Selected communication port No.: communication port name

Handling Precautions

- Keep the loader cable connected during writing.

(6) When writing is complete, the writing result dialog box will be displayed. If [Write Succeed.] is displayed, the update was successful.



a: Model of the controller to be updated

b: ROM version after the update

Handling Precautions

- If an error dialog box appears and writing is interrupted, close the update and start again from step 1.
- If a problem occurs during writing, the display on the controller will remain off even when the power is on. The display will turn on after the next successful writing.

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Note

- If AL81 (Settings area error) occurs after writing is complete, initialize the settings.
  ☞ ■ Initializing the settings (p. 12-7)
- If other alarms occur:
  ☞ ■ Alarm codes and countermeasures (p. 11-2)

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Chapter 12. Calibration and Inspection

CAUTION

Do not switch to calibration/inspection mode while your equipment is operating.

When this device is in calibration/inspection mode, the state of control outputs and event outputs cannot be changed, and these outputs do not function. Take this into consideration when calibrating or inspecting this device.

Handling Precautions

- It may be necessary to disconnect or reconnect the wiring for calibration and inspection.
  In this case, follow the warnings and cautions regarding wiring given in Chapter 4. Wiring (p. 4-1).
- Use the SLP-C1F version 2.3.0 or later for calibration and inspection.

The user can calibrate and inspect the input and output functions of this device, and initialize the settings.

The following are available:

- I/O inspection (external contact input, control output and event output, key input)
- PV input calibration
- RSP input calibration
- CT / micro CT / VT input calibration
- Current output / voltage output calibration

Use the SLP-C1F Smart Loader Package for calibration and inspection.

■ Starting calibration and inspection

Supply power from the power terminals (1 and 2) on the back of this device.

Use the USB loader cable (A to microB) for the connection.

Start the SLP-C1F Smart Loader Package to display the menu screen. Select [Menu] → [Calibration and checking] from the pull-down menu. A dialog box saying "Calibrate" will be displayed.

When [OK] is selected, the calibration and checking screen is displayed and this device enters calibration/inspection mode.

When this device is in this mode, display field 2 shows ᵵE5ᵵ.

Handling Precautions

- Azbil Corporation will not be liable for problems caused by incorrect calibration or inspection by the user.
- To restore the values when the product was shipped during calibration or inspection:
  If you select [Command] → [Restore adjustment values] from the pull-down menu, any current calibration settings will be discarded and the values when the product was shipped will be restored. If you accidentally execute this command during calibration or inspection, all the current calibration data will be lost.
- Supply power from the power terminals on the back of this device. If the power is supplied via the loader connector, this device cannot be warmed up, calibrated, or inspected.

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■ Ending calibration and inspection

To end calibration or inspection, do either one of the following.

- On the calibration and checking screen of the Smart Loader Package, select [File] → [Quit] from the pull-down menu.
- When you click the [×] icon in the upper right corner of the calibration and checking screen, ᴇᴇsᴇ disappears and this device returns to normal mode.

Handling Precautions

- If you disconnect the loader cable before completing calibration or inspection with the Smart Loader Package, this device will remain in calibration/inspection mode. To return this device to normal mode, turn the power off and then on.

■ Precautions for calibration

Failure to observe the following precautions will lead to poor accuracy.

- When calibrating the RTD input, use wires of the same type and length for the three wires.
- Power this device for at least 1 hour before starting calibration to warm it up.
- Calibrate this device within the ambient temperature range specified by the standard conditions.
- Do not calibrate this device where it is exposed to wind or in a fluctuating ambient temperature.
- Do not calibrate with instruments or conditions that do not satisfy the specifications shown in ☞ ■ Measuring instruments required for calibration (p. 12-2) below.

■ Measuring instruments required for calibration

Measuring instrument	Specifications
Reference current/ voltage generator	Accuracy: ±0.025 % or less, minimum resolution (voltage): 1 μV or less, minimum resolution (current): 1 μA or less
Resistor	Accuracy: ±0.025 % or less, minimum resolution: 0.1 Ω or less
Ammeter	Accuracy: ±0.05 % or less, minimum resolution: 1 μA or less
Voltmeter	Accuracy: ±0.025 % or less, minimum resolution: 1 μV or less
Thermometer	Accuracy: ±0.1 °C or less, minimum resolution: 0.1 °C or less

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■ Calibration and inspection procedure

● Inspection of I/Os

(1) Select the [I/O check] tab.

(2) Select the desired item to check.

(3) Press [Execute].

For inputs (external contact input, key input), the status (ON/OFF) retained by this device is loaded and displayed on the PC.

For outputs (control output, event output), the status (ON/OFF) selected by the checkbox is output from the output terminals of this device.

● PV input calibration

(1) Select the [PV/RSP input calibration] tab.

(2) Select "PV" from the input type options.

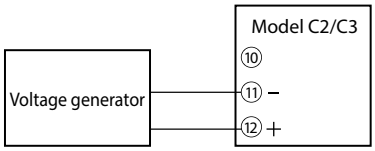
(3) Execute zero point adjustment before span adjustment.

(4) Press [Read].

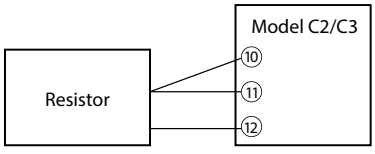
(5) Apply the voltage, current, or resistance indicated on the right of the gain No. to the PV input terminals.

Before application, connect this device to the measuring instrument as follows.

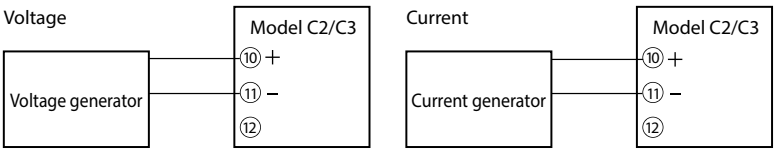
・For thermocouple input or mV input



・For RTD input



・For DC voltage/current input



(6) Continue the input for 30 seconds or longer.

(7) Press [Write].

(8) Return to step 4 and repeat the procedure until the calibration of the last gain is completed.

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● RSP input calibration

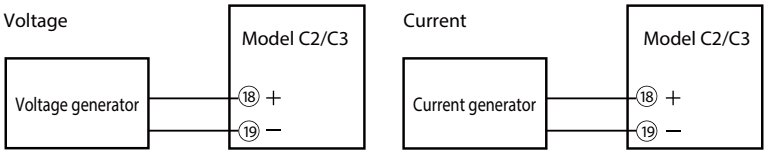
(1) Select the [PV/RSP input calibration] tab.

(2) Select "RSP" from the input type options.

(3) Execute zero point adjustment before span adjustment.

(4) Press [Read].

(5) Apply the voltage or current indicated on the right of the gain No. to the RSP input terminals.
Before application, connect this device to the measuring instrument as follows.



(6) Continue the input for 30 seconds or longer.

(7) Press [Write].

(8) Return to step 4 and repeat the procedure until the calibration of the last gain is completed.

Handling Precautions

- When calibrating the PV/RSP input, be sure to adjust all gains according to the model that is used.
- Warm up this device from power-on to the start of calibration.
- Connect external instruments for adjustment before starting warm-up to achieve the following input statuses:
  - Thermocouple: 0 mV input
  - RTD: 100 Ω input
  - Voltage: 0 mV input
  - Current: 0 mA input
- Do not leave the PV/RSP input terminals open during warm-up.

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● Current transformer (CT), micro CT, and voltage transformer (VT) input calibration

(1) Select the [CT /VT Input Calibration] tab.

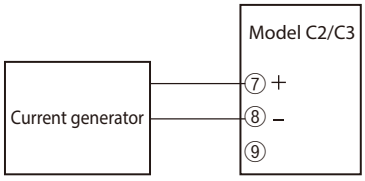
(2) Select the channel to calibrate.

(3) Select [Zero] in the [Zero/Span] field.
Both the zero point and the span should be calibrated for one channel.
Therefore, after selecting a channel, first calibrate the zero point and then the span.

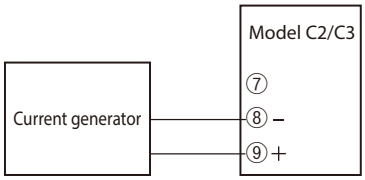
(4) Press [Read].

(5) Keep applying the zero-point current or voltage to the CT/VT input terminals of the selected channel for 30 seconds or longer.
Before application of current, connect this device to the measuring instrument as shown.

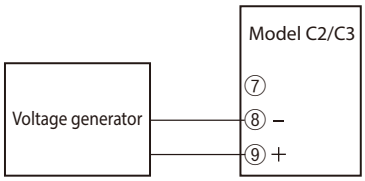
・For CT input 1 or micro CT input 1



・For CT input 2 or micro CT input 2



・For VT



(6) Press [Write].

(7) Select [Span] in the [Zero/Span] field.

(8) Press [Read].

(9) Keep applying the span current or voltage to the CT/VT input terminals of the selected channel for 30 seconds or longer.

(10) Press [Write].

(11) If there are other channels to calibrate, return to step 4.

Handling Precautions

- When calibrating the CT input, apply a DC current (mA) to the input terminals.
- The current to apply is different between CT input and micro CT input.
- When calibrating the VT input, connect a DC voltage (mV) to the input terminals.

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● **Current output / voltage output calibration**

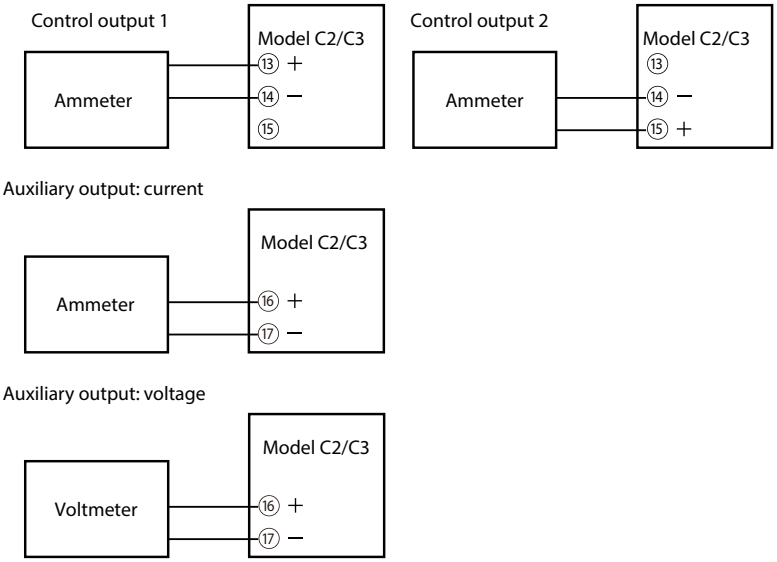
(1) Select the [Analog Output Calibration] tab.

(2) Select the channel to calibrate.
Control output 1 is indicated as "OUT1," control output 2 is" OUT2," and auxiliary output is "AUX."

(3) Select [Zero] in the [Zero/Span] field.
Both the zero point and the span should be calibrated for one channel. Therefore, after selecting a channel, first calibrate the zero point and then the span.

(4) Press [Read].

(5) The current for zero-point calibration is output to the output terminal of the selected channel. Keep this state for 30 seconds or longer.
The figures below illustrate how to connect the measuring instrument.



(6) Check the current/voltage indicated by the ammeter/voltmeter to the 3rd digit after the decimal point, enter it in [Adjustment value], and press [Write].

(7) Select [Span] in the [Zero/Span] field.

(8) Press [Read].

(9) The current for span calibration is output to the output terminal of the selected channel. Keep this state for 30 seconds or longer.

(10) Check the current/voltage indicated by the ammeter/voltmeter to the 3rd digit after the decimal point, enter it in [Adjustment value], and press [Write].

(11) If there are other channels to calibrate, return to step 4.

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■ Initializing the settings

If you select [Command] → [Setting initialization] from the pull-down menu after starting calibration and inspection, the default settings can be restored.

Note

- ☞.■ Standard bit numbers and standard numerical codes (p. App.-3) (for how to start calibration and inspection)

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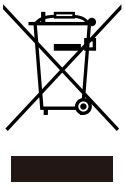
Chapter 13. Disposal

Disposal of Electrical and Electronic Equipment (for Environmental Protection)

This is an industrial product subject to the WEEE Directive.

Do not dispose of electrical and electronic equipment in the same way as household waste.

Old products contain valuable raw materials and must be returned to an authorized collection point for correct disposal or recycling.



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Chapter 14. Specifications

■ Specifications

● PV input

Item		Description
Number of inputs		1
Sampling cycle		25 (C3A/C3B only), 50, 100, 300, 500 ms
Thermocouple input		
	Thermocouple type	K, J, E, T, R, S, B, N (JIS C 1602: 2015) PL II, PR40-20, Ni-Ni·Mo, Gold iron-Chromel (ASTM E1751/E1751M-20) WRe5/26 (ASTM E988-96 (reapproved 2002), JIS C 1602: 2015 (C thermocouple)) DIN U, DIN L (DIN 43710:1985)
	Indication accuracy (under standard conditions)	C3A/C3B: ±0.1 % rdg. ±1 digit C2A/C2B: ±0.2 % FS ±1 digit (excluding reference junction compensation) (for exceptions see the PV input range table)
	Reference junction compensation (cold junction compensation) accuracy	±0.5 °C (under standard conditions) (For every 1 °C outside the temperature range of the standard conditions, the accuracy decreases by ± 0.05 °C.)
	Allowable input*1	±1 V
	Input bias current	+0.2 μA max., from the positive (+) terminal
	Wiring resistance effect	0.2 μV/Ω max.
	Thermocouple/ compensating lead wire diameter	0.3–0.65 mm
	Operation upon input wire burnout	☞ ■ Operation when a PV input error occurs (p. 11-5)
RTD		
	RTD type	Pt100 (JIS C 1604:2013) JPt100 (JIS C 1604:1989)
	Indication accuracy (under standard conditions)	C3A/C3B: ±0.1 % rdg. ±1 digit C2A/C2B: ±0.2 % FS ±1 digit (for exceptions see the PV input range table)
	Measuring current (under standard conditions)	1 mA (typical), from terminals 11 and 12
	Wiring resistance effect	±0.03 °C/Ω max.
	Allowable wiring resistance	85 Ω max.
	Operation upon input wire burnout	☞ ■ Operation when a PV input error occurs (p. 11-5)
	Allowable input*1	± 1 V
DC voltage		
	DC voltage type	0–10 mV –10 to +10 mV 0–100 mV 0–1 V 1–5 V 0–5 V 0–10 V 2–10 V –10 to +10 V
	Indication accuracy (under standard conditions)	C3A/C3B: ±0.1 % FS ±1 digit C2A/C2B: ±0.2 % FS ±1 digit (for exceptions see the PV input range table)
	Allowable input*1	±12 V (±1 V for 0–10, –10 to +10, or 0–100 mV input)
	Input impedance	1 MΩ min.
	Operation upon input wire burnout	☞ ■ Operation when a PV input error occurs (p. 11-5)

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Item		Description
DC current		
	DC current type	0–20 mA, 4–20 mA
	Indication accuracy (under standard conditions)	C3A/C3B: ±0.1 % FS ±1 digit C2A/C2B: ±0.2 % FS ±1 digit
	Allowable input*1	25 mA max., ±12 V*2
	Input impedance	100 Ω max. (with 20 mA input)
	Operation upon input wire burnout	☞ ■ Operation when a PV input error occurs (p. 11-5)

*1. A voltage or current input greater than the allowable input may damage the circuits.

*2. If a current greater than the allowable input is detected, the current path may be cut off intermittently to protect the circuit.

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● Model C2A/C2B: Indication accuracy of thermocouples

PV input range type	Sensor type	Range (Celsius)	Resolution (Celsius)	Indication accuracy					
					*1	*2	*3	*4	*5
1	K	−200.0 to +1200.0	0.1	±0.2 % FS ±1 digit	*1				
2	K	0.0 to 1200.0	0.1	±0.2 % FS ±1 digit					
3	K	0.0 to 800.0	0.1	±0.2 % FS ±1 digit					
4	K	0.0 to 600.0	0.1	±0.2 % FS ±1 digit					
5	K	0.0 to 400.0	0.1	±0.15 % FS ±1 digit					
6	K	−200.0 to +400.0	0.1	±0.2 % FS ±1 digit	*1				
7	K	−200.0 to +200.0	0.1	±0.15 % FS ±1 digit	*1				
8	J	0.0 to 1200.0	0.1	±0.2 % FS ±1 digit					
9	J	0.0 to 800.0	0.1	±0.2 % FS ±1 digit					
10	J	0.0 to 600.0	0.1	±0.2 % FS ±1 digit					
11	J	−200.0 to +400.0	0.1	±0.2 % FS ±1 digit	*1				
12	E	0.0 to 800.0	0.1	±0.2 % FS ±1 digit					
13	E	0.0 to 600.0	0.1	±0.2 % FS ±1 digit					
14	T	−200.0 to +400.0	0.1	±0.2 % FS ±1 digit	*1				
15	R	0.0 to 1600.0	0.1	±0.2 % FS ±1 digit		*2			
16	S	0.0 to 1600.0	0.1	±0.2 % FS ±1 digit		*2			
17	B	0.0 to 1800.0	0.1				*3		
18	N	0.0 to 1300.0	0.1	±0.2 % FS ±1 digit					
19	PL II	0.0 to 1300.0	0.1	±0.2 % FS ±1 digit					
20	WRe5-26	0.0 to 1400.0	0.1	±0.2 % FS ±1 digit					
21	WRe5-26	0 to 2300	1	±0.2 % FS ±1 digit					
22	Ni-Ni·Mo	0.0 to 1300.0	0.1	±0.2 % FS ±1 digit					
23	PR40-20	0 to 1900	1	±0.2 % FS ±1 digit				*4	
24	DIN U	−200.0 to +400.0	0.1	±0.2 % FS ±1 digit	*1				
25	DIN L	−100.0 to +800.0	0.1	±0.2 % FS ±1 digit	*1				
26	Gold iron-Chromel	0.0 to 360.0*6	0.1						*5
28	E	−200.0 to +800.0	0.1	±0.2 % FS ±1 digit	*1				

*1. Below 0 °C, ±0.4 % FS ±1 digit

*2. Below 200 °C, ±4 °C ±1 digit

*3.The low limit of indication is 20 °C. Below 260 °C, accuracy is ±72 °C (reference value); at or above 260 °C but below 650 °C, ±7 °C ±1 digit; at or above 650 °C but below 1000 °C, ±2 °C ±1 digit; at or above 1000 °C, ±1.5 °C ±1 digit

*4. Below 400 °C, accuracy not specified; at or above 400 °C but below 1100 °C, ±12.5 °C ±1 digit; at or above 1100 °C, ±8 °C ±1 digit

*5. Below 10 K, ±2.5 K ±1 digit. At or above 10K but 280 K or less, ±1.5 K ±1 digit, at or above 280.1 K electromotive force is linearly interpolated

*6. The unit is K (kelvin).

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● Model C3A/C3B: Indication accuracy of thermocouples

PV input range type	Sensor type	Range (Celsius)			Resolution (Celsius)	Indication accuracy								
							*1	*2	*3	*4	*5	*6	*7	*8
1	K	−200.0	to	+1200.0	0.1	±0.1 % rdg. ±1 digit	*1	*2						
2	K	0.0	to	1200.0	0.1	±0.1 % rdg. ±1 digit		*2						
3	K	0.0	to	800.0	0.1	±0.1 % rdg. ±1 digit		*2						
4	K	0.0	to	600.0	0.1	±0.1 % rdg. ±1 digit		*2						
5	K	0.0	to	400.0	0.1			*2						
6	K	−200.0	to	+400.0	0.1	±0.1 % rdg. ±1 digit	*1	*2						
7	K	−200.0	to	+200.0	0.1		*1	*2						
8	J	0.0	to	1200.0	0.1			*2						
9	J	0.0	to	800.0	0.1	±0.1 % rdg. ±1 digit		*2						
10	J	0.0	to	600.0	0.1	±0.1 % rdg. ±1 digit		*2						
11	J	−200.0	to	+400.0	0.1	±0.1 % rdg. ±1 digit	*1	*2						
12	E	0.0	to	800.0	0.1	±0.1 % rdg. ±1 digit		*2						
13	E	0.0	to	600.0	0.1	±0.1 % rdg. ±1 digit		*2						
14	T	−200.0	to	+400.0	0.1	±0.1 % rdg. ±1 digit	*1	*2						
15	R	0.0	to	1600.0	0.1	±0.1 % rdg. ±1 digit			*3					
16	S	0.0	to	1600.0	0.1	±0.1 % rdg. ±1 digit			*3					
17	B	0.0	to	1800.0	0.1					*4				
18	N	0.0	to	1300.0	0.1	±0.1 % rdg. ±1 digit					*5			
19	PL II	0.0	to	1300.0	0.1	±0.1 % rdg. ±1 digit					*5			
20	WRe5-26	0.0	to	1400.0	0.1	±0.1 % rdg. ±1 digit						*6		
21	WRe5-26	0	to	2300	1	±0.1 % rdg. ±1 digit						*6		
22	Ni-Ni·Mo	0.0	to	1300.0	0.1	±0.1 % rdg. ±1 digit					*5			
23	PR40-20	0	to	1900	1								*7	
24	DIN U	−200.0	to	+400.0	0.1		*1	*2						
25	DIN L	−100.0	to	+800.0	0.1	±0.1 % rdg. ±1 digit					*5			
26	Gold iron-Chromel	0.0	to	360.0*9	0.1									*8
28	E	−200.0	to	+800.0	0.1	±0.1 % rdg. ±1 digit	*1	*2						

*1. Below −50 °C, ±1.5 °C ±1 digit

*2. At or above −50 °C but below 400 °C, ±0.4 °C ±1 digit

*3. Below 200 °C, ±3.0 °C ±1 digit. At or above 200 °C but below 1500 °C, ±1.5 °C ±1 digit.

*4.The low limit of indication is 20 °C. Below 260 °C, accuracy is ±72 °C (reference value); at or above 260 °C but below 650 °C, ±7 °C ±1 digit; at or above 650 °C but below 1000 °C, ±2 °C ±1 digit; at or above 1000 °C, ±1.5 °C ±1 digit

*5. Below 500 °C, ±0.5 °C ±1 digit

*6. Below 1000 °C, ±1 °C ±1 digit

*7. Below 400 °C, ±45 °C ±1 digit; at or above 400 °C but below 1100 °C, ±12.5 °C ±1 digit; at or above 1100 °C, ±4 °C ±1 digit

*8. Below 10 K, ±2.5 K ±1 digit. At or above 10K but 280 K or less, ±1.5 K ±1 digit, at or above 280.1 K electromotive force is linearly interpolated

*9. The unit is K (kelvin).

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● **Indication accuracy of resistance temperature detectors (RTDs)**

PV input range type	Sensor type	Range (Celsius)			Resolution (Celsius)	C2A/C2B indication accuracy	C3A/C3B indication accuracy	*1
41	Pt100	−200.0	to	+500.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
42	JPt100	−200.0	to	+500.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
43	Pt100	−200.0	to	+200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
44	JPt100	−200.0	to	+200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
45	Pt100	−100.0	to	+300.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
46	JPt100	−100.0	to	+300.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
47	Pt100	−100.0	to	+200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
48	JPt100	−100.0	to	+200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
49	Pt100	−100.00	to	+150.00	0.01	±0.2 % FS ±1 digit		*1
50	JPt100	−100.00	to	+150.00	0.01	±0.2 % FS ±1 digit		*1
51	Pt100	−50.0	to	+200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
52	JPt100	−50.0	to	+200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
53	Pt100	−50.00	to	+100.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
54	JPt100	−50.00	to	+100.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
55	Pt100	−60.00	to	+40.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
56	JPt100	−60.00	to	+40.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
57	Pt100	−40.00	to	+60.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
58	JPt100	−40.00	to	+60.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
59	Pt100	−10.00	to	+60.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
60	JPt100	−10.00	to	+60.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
61	Pt100	0.00	to	100.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
62	JPt100	0.00	to	100.00	0.01	±0.2 % FS ±1 digit	±0.11 °C ±1 digit	
63	Pt100	0.0	to	200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
64	JPt100	0.0	to	200.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
65	Pt100	0.0	to	300.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
66	JPt100	0.0	to	300.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
67	Pt100	0.0	to	500.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
68	JPt100	0.0	to	500.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
69	Pt100	−200.0	to	+850.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1
70	JPt100	−200.0	to	+640.0	0.1	±0.2 % FS ±1 digit	±0.1 % rdg. ±1 digit	*1

*1. Below 200 °C, ±0.15 °C ±1 digit

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● **Indication accuracy of DC voltage and current**

PV input range type	Sensor type	Resolution	C2A/C2B indication accuracy	C3A/C3B indication accuracy
81	0 to 10 mV	It varies depending on the PV decimal point position setting. −19999 to +19999 −1999.9 to +1999.9 −199.99 to +199.99 −19.999 to +19.999	±0.4 % FS ±1 digit	±0.2 % FS ±1 digit
82	−10 to +10 mV		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
83	0 to 100 mV		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
84	0 to 1 V		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
86	1 to 5 V		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
87	0 to 5 V		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
88	0 to 10 V		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
89	0 to 20 mA		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
90	4 to 20 mA		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
91	2 to 10 V		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit
92	−10 to +10 V		±0.2 % FS ±1 digit	±0.1 % FS ±1 digit

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● Digital inputs (DI 1–4) (optional)

Item	Description
Number of inputs	2 or 4
Input type	Non-voltage contacts or open collector (sink type)
Allowable ON contact resistance	250 Ω max.
Allowable OFF contact resistance	100 kΩ min.
Allowable ON residual voltage	1.0 V max.
Terminal current while ON	Approx. 7.5 mA (when shorted) / approx. 5.0 mA (at a contact resistance of 250 Ω)
Minimum hold time	Sampling cycle + 10 ms
Open terminal voltage	5.5 V DC ±1 V
Parallel connection circuit voltage	24 V DC max.

● Current transformer inputs (CT1–2) (optional)

Item		Description
Number of inputs		2 or 1
Input object		Current transformer with 100–6000 turns
Indication accuracy (under standard conditions)		±2.5 % FS ±1 digit (not including accuracy of current transformer in the case of sine waves)
Current transformer input		
	Measurement current	1.0–100.0 A AC, 50/60 Hz (800 turns, 1 power wire pass)
	Allowable measured current	0.0–110.0 A AC, peak current: 155.0 A (800 turns, 1 pass of the power wire)
	Allowable input	150 mA and 212 mA peak (AC) 1.0 V and 1.4 V peak (AC)
	Transient overvoltage	Supply voltage 250 V
	Indication resolution	0.1A
Micro current transformer input		
	Measurement current	0.10–10.00 A AC, 50/60 Hz (800 turns, 1 pass of the power wire)
	Allowable measured current	0.00–11.00 A AC, peak current: 15.50 A (800 turns, 1 pass of the power wire)
	Allowable input	15.0 mA and 21.2 mA peak (AC) 1.0 V and 1.4 V peak (AC)
	Indication resolution	0.01A
	Transient overvoltage	Supply voltage 250 V

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● Voltage transformer input (VT1) (optional)

Item	Description
Number of inputs	1
Corresponding transformer voltage ratio	(1–500):(1–11)
Indication accuracy (under standard conditions)	±2.5 % FS ±1 digit, 50/60 Hz (not including accuracy of voltage transformer in the case of sine waves)
Voltage measurement range	24–240 V AC, 50/60 Hz
Allowable measurement voltage	0–264 V AC
Allowable input voltage	0–16 V AC
Indication resolution	0.1 V

● RSP input (optional)

Item	Description
DC voltage type	0–1 V, 1–5 V, 0–5 V, 0–10 V, 2–10 V, –10 to +10 V
DC current type	0–20 mA, 4–20 mA
Indication accuracy	±0.1 %FS ±1 digit
Allowable input (DC voltage)*1	±12 V
Allowable input (DC current)*1	25 mA max., ±12 V*2

*1. A voltage or current input greater than the allowable input may damage the circuits.

*2. If a current greater than the allowable input is detected, the current path may be cut off intermittently to protect the circuit.

● Motor feedback (MFB) input (optional)

Item	Description
Input type	Potentiometer resistance
Resistance range	100–2500 Ω
Indication accuracy	±0.5 % FS ±1 digit
Input update cycle	100 ms

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● **Control output (selectable by model No.)**

Item		Description
Relay output		
	Contact configuration	1c (SPDT)
	Contact rating	250 V AC / 30 V DC, 3 A (resistive load)
	Service life	N.O.: 100,000 cycles or more N.C.: 100,000 cycles or more
	Minimum switching specifications (reference value)	5 V, 100 mA
	Minimum open/close time	50 ms
Voltage pulse output (for SSR drive)		
	Output voltage	12 V DC ±20 %
	Allowable current	24 mA max.
	OFF-state leak current	100 µA max.
	Short-circuit protection function	Yes
	Minimum OFF/ON time	1 ms
Current output		
	Output type	0–20 mA DC or 4–20 mA DC
	Allowable load resistance	600 Ω max.
	Output accuracy (under standard conditions)	±0.1 % FS
	Output resolution	1/12500 (at 0–20 mA DC), 1/10000 (at 4–20 mA DC)
	Output update cycle	Same as sampling cycle
Motor drive relay output		
	Contact configuration	2 circuits Switching between OPEN output and CLOSE output (with function for turning both outputs OFF at the same time)
	Contact rating	250 V AC, 6 A (resistive load); 250 V AC, 2 A (cosφ = 0.4); 24 V DC, 2.5 A (L/R = 0.7 ms)
	Service life	120,000 cycles or more (at the rated resistive load) 100,000 cycles or more (at the rated inductive load)

● **Event outputs (EV1–3) (optional)**

Item	Description
Number of outputs	3 (for models with EV outputs with common contacts) 2 (for models with EV outputs with independent contacts)
Contact configuration	1a (SPST)
Contact rating	250 V AC / 30 V DC, 2 A (resistive load)
Service life	100,000 cycles or more
Minimum switching voltage and current (reference value)	5 V, 10 mA
Minimum open/close time	50 ms

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● **Auxiliary output (optional)**

Item		Description
Output accuracy		±0.1 % FS
Output update cycle		Same as sampling cycle
Current output		
	Output type	0–20 mA DC, 4–20 mA DC
	Allowable load resistance	600 Ω max.
Voltage output		
	Output type	0–5 V, 1–5 V, 0–10 V, 2–10 V
	Allowable load resistance	1 kΩ min.

● **Loader communication**

Item	Description
Cables	· USB loader cable (A to microB) (model SLP-ULCJA0) · The cable that is included with Smart Loader Package (model SLP-C1FJA2 / SLP-C1FJA3)

● **RS-485 communication (optional)**

Item	Description
Transmission line	3-wire system
Transmission speed	4800, 9600, 19200, 38400, 57600 bps
Data length	8 or 7 bits
Parity bit	Even parity, odd parity, no parity
Stop bits	1 or 2
Communication protocol	Host communication: compliant with CPL, Modbus™/RTU, Modbus/ASCII, or PLC link
Terminating resistor	External resistor (120 Ω, ½ W or more) recommended
Network	Multidrop (up to 31 slave stations for 1 host station)
Communications/synchronization type	Half-duplex, start-stop synchronization
Maximum cable length	500 m

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● I/O isolation

Items enclosed by solid lines are isolated from other signals. The presence or absence of input/output depends on the model. Thick solid lines indicate reinforced insulation.

● Model C2A/C2B

AC power	Internal circuits	Event outputs 1–3 * On models with independent contacts, event outputs 1 and 2 have reinforced insulation.
DC power		Control output 1 (relay)
		Control outputs 1–2 (voltage pulse, current)
AUX (current)		CT input
DI		PV
RS-485		Loader communication

● Model C3A/C3B

AC power	Internal circuits	Event outputs 1–3 * On models with independent contacts, event outputs 1 and 2 have reinforced insulation.
DC power		Control output 1 (relay, motor drive relay)
MFB		Control outputs 1–2 (voltage pulse, current)
RSP		CT input / micro CT input
AUX (current, voltage)		VT
DI		PV
RS-485		Loader communication

● Standard conditions

Item	Description
Ambient temperature	25 ±3 °C (provided there is a space of 2 cm below the product)
Ambient humidity	60 ±5 % RH (without condensation or freezing)
Power	AC models: 105 V AC ±10 % DC models: 24 V DC ±5 %, 24 V AC ±5 %
Power frequency	50/60 Hz ±1 %
Vibration	0 m/s^2
Shock	0 m/s^2
Mounting angle	Reference plane ±3°

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● Operating conditions

Item	Description
Ambient temperature	−10 to +55 °C (for independent mounting)
Ambient humidity	10–85 % RH (without condensation or freezing)
Power	AC models: 85–264 V AC, 50/60 Hz ±2 % (rated power: 100–240 V AC, 50/60 Hz) DC models: 20.4–26.4 V DC, 20.4–26.4 V AC, 50/60 Hz ±2 % (rated power: 24 V DC, 24 V AC, 50/60 Hz)
Vibration	0–5 m/s^2 (10–60 Hz for 2 h each in the x, y, and z directions)
Shock	0–100 m/s^2
Mounting angle	(Reference plane) ±10°

● Transport and storage conditions

Item	Description
Ambient temperature	−20 to +70 °C
Ambient humidity	10–85 % RH (without condensation or freezing, protected from humidity and dust)
Vibration	0–10 m/s^2 (10–60 Hz for 2 h each in the x, y, and z directions)
Shock	0–300 m/s^2 (vertically 3 times)
Package drop test	Drop height 60 cm (free fall on 1 corner, 3 edges, 6 sides)

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● Other specifications

Item	Description			
Protection class	IP65 (device front side) (when individually mounted in a panel using the included gasket)			
Nonvolatile memory	Models with extended data memory: FRAM Other models: EEPROM (durability: 100,000 erase-write cycles)			
Time accuracy (reference)	±0.18 s typ. (per hour)			
Power consumption	AC models: 12 VA max. (9 VA at 100 V AC, 12 VA at 264 V AC) DC models: 6 W max. (at 24 V DC), 9 VA max. (at 24 V AC)			
Allowable transient power loss	AC models: 20 ms max. DC models: 5 ms max.			
Elevation	2000 m max.			
Mass	C2A/C3A: Approx. 220 g C2B/C3B: Approx. 280 g (including the supplied mounting bracket, model No. 84525941-001)			
Installation location	Indoors			
Installation	Panel mounting (using the supplied mounting bracket, model No. 84525941-001)			
Terminal screw tightening torque	0.6 ±0.1 N·m			
Legal control/ authentication*		Law/ directive	Certificate/file No., etc.	Notes
	CE	LVD		EN 61010-1
	CE	EMC		EN 61326-1 (For use in industrial locations)
	CE	RoHS		EN IEC63000
	UKCA	LVD		EN 61010-1
	UKCA	EMC		EN 61326-1 (For use in industrial locations)
	UKCA	RoHS		EN IEC63000
	KC	Korean Radio Act	R-R-A2B-A154	
Overvoltage category	II (IEC 60364-4-443, IEC 60664-1)			
Allowable pollution degree	2			
Insulation resistance	20 MΩ min. (Power terminals, and between power terminals and isolated I/O terminals) (with a 500 V DC insulation resistance tester)			
Dielectric strength	AC models: 1500 V AC for 1 min (between power terminals and I/O terminals isolated from the power terminals) DC models: 500 V AC for 1 min (between power terminals and I/O terminals isolated from the power terminals)			
Power-on inrush current	AC models: 18 A max. for 3 ms max. DC models: 20 A max. for 10 ms max.			
Case material, color	Modified PPE, black			
Front panel material	Polycarbonate resin			

* During EMC testing, the indication or output may fluctuate by the equivalent of ±10 % FS.

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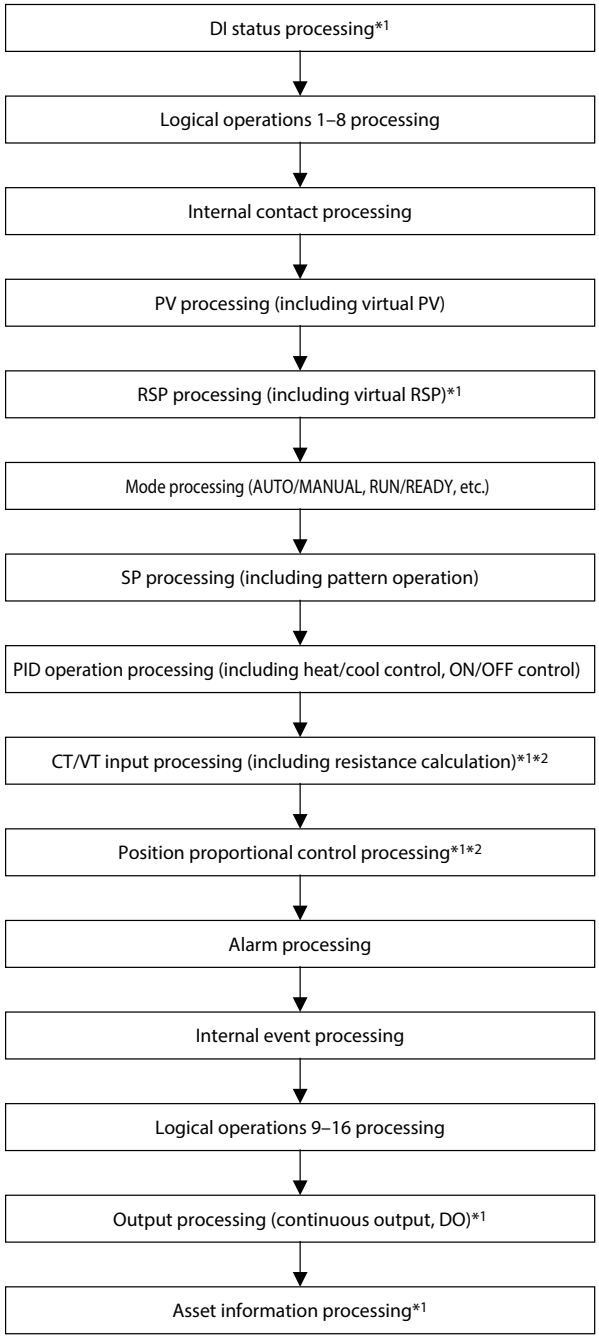
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Appendix

■ Processing order

The order of processing that is executed for each sampling cycle is shown below.



*1. Executed only if the model has the corresponding function.

*2. Regardless of the sampling cycle setting, the update cycle is always 100 ms.

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■ Event operation type and available functions

As shown in the table below, the functions available vary depending on the operation type of the internal event.

Operation type	Operation type settings	Standby*1	Event state in READY mode*2
No event	0	—	—
PV high limit	1	✓	✓
PV low limit	2	✓	✓
PV high and low limits	3	✓	✓
Deviation high limit	4	✓	✓
Deviation low limit	5	✓	✓
Deviation high and low limits	6	✓	✓
Deviation high limit (final SP reference)	7	✓	✓
Deviation low limit (final SP reference)	8	✓	✓
Deviation high and low limits (final SP reference)	9	✓	✓
SP high limit	10	✓	✓
SP low limit	11	✓	✓
SP high and low limits	12	✓	✓
MV high limit	13	✓	✓
MV low limit	14	✓	✓
MV high and low limits	15	✓	✓
MFB opening high and low limits	16	✓	✓
Loop diagnosis 1	20	✓	✓
Loop diagnosis 2	21	✓	✓
Loop diagnosis 3	22	✓	✓
High limit of standard numerical code	26	—	—
Low limit of standard numerical code	27	—	—
High and low limits of standard numerical code	28	—	—
PV change rate	29	✓	✓
High limit of PV change rate	55	✓	✓
Low limit of PV change rate	56	✓	✓
High limit of the change rate of standard numerical code	57	—	—
Low limit of the change rate of standard numerical code	58	—	—
Alarm (status)	61	—	✓
READY (status)	62	—	✓
MANUAL (status)	63	—	✓
RSP (status)	64	—	✓
AT in progress (status)	65	—	✓
SP ramp in progress (status)	66	—	✓
Control direct action (status)	67	—	✓
Timer (status)	70	—	✓
Estimating MFB (status)	71	—	✓

*1. ✓: The operation indicated by the standby setting is available, —: No standby at any time

*2. ✓: The operation indicated by the event state in READY mode setting is available, —: Continues at any time

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■ Standard bit numbers and standard numerical codes

● List of standard bit numbers

Specify standard bits by standard bit numbers.

The range of standard bit numbers is 1024–2047.

Numbers that are not in the table below are reserved by the system. Do not use reserved numbers for settings.

Standard bit No.	Standard bit name	Description	Remarks
1024	Always 0 (OFF)	0: OFF (fixed value)	
1025	Always 1 (ON)	1: ON (fixed value)	
1088	Internal event 1	0: OFF 1: ON	
1089	Internal event 2		
1090	Internal event 3		
1091	Internal event 4		
1092	Internal event 5		
1093	Internal event 6		
1094	Internal event 7		
1095	Internal event 8		
1104	Internal event 1 standby	0: No standby 1: Standby	
1105	Internal event 2 standby		
1106	Internal event 3 standby		
1107	Internal event 4 standby		
1108	Internal event 5 standby		
1109	Internal event 6 standby		
1110	Internal event 7 standby		
1111	Internal event 8 standby		
1120	CT1 heater burnout detection	0: No burnout 1: Burnout detected	
1121	CT2 heater burnout detection		
1128	CT1 overcurrent detection	0: No overcurrent 1: Overcurrent detected	
1129	CT2 overcurrent detection		
1136	CT1 short-circuit detection	0: No short-circuit 1: Short-circuit detected	
1137	CT2 short-circuit detection		
1152	DI 1 terminal status	0: OFF 1: ON	
1153	DI 2 terminal status		
1154	DI 3 terminal status		
1155	DI 4 terminal status		
1168	OR of all DI states	0: All DIs are OFF 1: One or more DIs are ON	This function was added in ROM version 1.03.
1184	Internal contact 1 status	0: OFF 1: ON	
1185	Internal contact 2 status		
1186	Internal contact 3 status		
1187	Internal contact 4 status		
1188	Internal contact 5 status		
1189	Internal contact 6 status		
1190	Internal contact 7 status		
1191	Internal contact 8 status		

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Standard bit No.	Standard bit name	Description	Remarks
1264	ON/OFF control MV status	0: MV = 0.0 % (OFF) 1: MV = 100.0 % (ON)	If the control method is set to 0 (ON/OFF control), 0 is set when MV = 0.0 % and 1 is set when MV = 100.0 %. If the control method is set to 1 (PID control), it is always 0.
1280	OUT 1 terminal status	0: OFF 1: ON	The setting changes if R (relay output), V (voltage pulse output), or R1 (motor drive relay output) is specified by the model number (digits ❺ and ❻). It is always OFF for other models.
1281	OUT 2 terminal status		
1282	EV1 terminal status		
1283	EV2 terminal status		
1284	EV3 terminal status		
1360	Segment event 1	0: OFF 1: ON	
1361	Segment event 2		
1362	Segment event 3		
1363	Segment event 4		
1364	Segment event 5		
1365	Segment event 6		
1366	Segment event 7		
1367	Segment event 8		
1368	Segment event 9		
1369	Segment event 10		
1370	Segment event 11		
1371	Segment event 12		
1372	Segment event 13		
1373	Segment event 14		
1374	Segment event 15		
1375	Segment event 16		
1408	User-defined bit 1	0: OFF 1: ON	
1409	User-defined bit 2		
1410	User-defined bit 3		
1411	User-defined bit 4		
1412	User-defined bit 5		
1413	User-defined bit 6		
1414	User-defined bit 7		
1415	User-defined bit 8		
1416	User-defined bit 9		
1417	User-defined bit 10		
1418	User-defined bit 11		
1419	User-defined bit 12		
1420	User-defined bit 13		
1421	User-defined bit 14		
1422	User-defined bit 15		
1423	User-defined bit 16		

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Standard bit No.	Standard bit name	Description	Remarks
1440	Result of logical operation 1	0: OFF 1: ON	
1441	Result of logical operation 2		
1442	Result of logical operation 3		
1443	Result of logical operation 4		
1444	Result of logical operation 5		
1445	Result of logical operation 6		
1446	Result of logical operation 7		
1447	Result of logical operation 8		
1448	Result of logical operation 9		
1449	Result of logical operation 10		
1450	Result of logical operation 11		
1451	Result of logical operation 12		
1452	Result of logical operation 13		
1453	Result of logical operation 14		
1454	Result of logical operation 15		
1455	Result of logical operation 16		
1536	[∧] key status	0: OFF 1: ON	
1537	[∨] key status		
1538	[<] key status		
1539	[>] key status		
1540	[ENT] key status		
1541	[MENU] key status		
1542	[FUNC] key status		
1545	RS-485 status (1 message received normally)	0: No message received normally 1: Message received normally	Mainly used to confirm normal reception on the UF indicator. Do not assign this bit to relay output. During RS-485 communication, this bit is frequently switched ON and OFF, which would cause a relay to reach its on/off service life limit.
1546	RS-485 status (1 message sent normally)	0: No message sent normally 1: Message sent normally	Mainly used to confirm normal transmission on the UF indicator. Do not assign this bit to relay output. During RS-485 communication, this bit is frequently switched ON and OFF, which would cause a relay to reach its on/off service life limit.
1552	Fixed value output status	0: OFF 1: ON	
1568	RUN/READY status	0: RUN mode 1: READY mode	
1584	AUTO/MANUAL status	0: AUTO mode 1: MANUAL mode	
1600	AT stopped/AT started	0: AT stopped 1: AT started	

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Standard bit No.	Standard bit name	Description	Remarks
1608	Auto tuning error	0: No abnormal AT end 1: AT ended abnormally	
1616	LSP/RSP status	0: LSP mode 1: RSP mode	
1632	SPOS correction status	0: Stopped 1: Correcting	
1640	DROS correction status		
1648	SP up ramp in progress	0: SP ramp-up is not in progress. 1: SP ramp-up is in progress.	
1656	SP down ramp in progress	0: SP ramp-down is not in progress. 1: SP ramp-down is in progress.	
1660	During SP ramp	0: SP ramp-up and ramp-down are not in progress. 1: SP ramp-up or ramp-down is in progress.	This function was added in ROM version 1.03.
1664	Pattern SP increase change limit status	0: Pattern SP increase change limit is not being enforced. 1: Pattern SP increase change limit is being enforced.	
1672	Pattern SP decrease change limit status	0: Pattern SP decrease change limit is not being enforced. 1: Pattern SP decrease change limit is being enforced.	
1680	Pattern operation momentary power outage recovery	0: None 1: Power restored after momentary outage	
1704	Outputting FF-FITTER FF MV	0: FF MV not currently output 1: FF MV currently output	
1712	Constant value operation / pattern operation status	0: Constant value operation mode 1: Pattern operation mode	
1720	HOLD state	0: Not in pattern operation HOLD mode 1: In pattern operation HOLD mode	
1728	END state	0: Not in pattern operation END mode 1: In pattern operation END mode	
1736	G.SOAK state	0: Not in pattern operation G.SOAK wait period 1: In pattern operation G.SOAK wait period	

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Standard bit No.	Standard bit name	Description	Remarks
1744	PLC link error 1	0: No error 1: Error	● Conditions to turn ON: • Communication timeout between the PLC and this device • Error in this device • Abnormal code included in reply from PLC ● Conditions to turn OFF: • "1" written to Common information or Clear monitor information • The product started up.
1745	PLC link error 2		
1746	PLC link error 3		
1747	PLC link error 4		
1760	Reception monitoring access error 1	0: No error 1: Error	● Conditions to turn ON: • No instruction messages received at the monitored address for the monitoring time or longer ● Conditions to turn OFF: • Instruction messages received at the monitored address within the monitoring time • The product started up.
1761	Reception monitoring access error 2		
1762	Reception monitoring access error 3		
1763	Reception monitoring access error 4		
1776	Reception monitoring access error 1 (latched)	0: No error 1: Error	● Conditions to turn ON: • No instruction messages received at the monitored address for the monitoring time or longer ● Conditions to turn OFF: • "1" written to Latch clear·and instruction message received at the monitored address within the monitoring time • The product started up.
1777	Reception monitoring access error 2 (latched)		
1778	Reception monitoring access error 3 (latched)		
1779	Reception monitoring access error 4 (latched)		
1784	PLC link operation stopped/ executed	0: Stopped 1: Currently executing	
1792	Collective result of all alarms (OR of all displayed alarms)	0: No alarm 1: Alarm	The collective result of all alarms does not include the loader cable error (AL50).
1793	PV alarm (AL01/AL02)	0: AL01 and AL02 are OFF 1: AL01 or AL02 is ON	This function was added in ROM version 1.03.

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Standard bit No.	Standard bit name	Description	Remarks
1808	PV input error (over range) (AL01)	0: No alarm 1: Alarm	
1809	PV input error (under range) (AL02)		
1810	Reference junction compensation (cold junction compensation) error (AL03)		
1812	RSP input error (over range) (AL05)		
1813	RSP input error (under range) (AL06)		
1814	MFB input error (AL07)		
1817	Motor adjustment error (AL10)		
1818	CT1/CT input error (AL11)		
1819	CT2/VT input error (AL12)		
1857	Loader cable error (AL50)		
1858	PLC link error (AL51)		
1877	PV A/D conversion error		
1878	RSP A/D conversion error (AL71)		
1879	MFB A/D conversion error (AL72)		
1881	Nonvolatile memory error (AL74)		
1887	Nonvolatile memory not initialized error (AL80)		
1888	Settings area error (AL81)		
1889	Adjustment value area error (AL82)		
1890	Internal system error (AL83)		
1891	Settings initialization error (AL84)	0: No alarm 1: Alarm	
1902	Settings error (AL95)		
1903	Adjustment value error (AL96)		
1904	Extended data memory error (AL97)		
1906	Internal program error (AL99)		
1920	Estimating MFB	0: Not being estimated. 1: Being estimated.	
1924	Adjusting MFB	0: Not being adjusted. 1: Being adjusted.	
1928	Position proportional output to OPEN	0: ON 1: OFF	
1932	Position proportional output to CLOSE		
1952	CT1 current when output ON was measured	0: Not measured 1: Measured	
1953	CT2 current when output ON / VT voltage was measured		
1960	CT1 current when output OFF was measured	0: Not measured 1: Measured	
1961	CT2 current when output OFF was measured		
1968	Loader connector cable connection status	0: Not connected 1: Connected	

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● List of standard numerical codes

Specify standard numerical values with standard numerical codes.

The range of standard numerical codes is 2048–3071.

Numbers that are not in the table below are reserved by the system. Do not use reserved numbers for settings.

Standard numerical code	Meaning of standard numerical code	Description	Remarks
2048	0.0 (fixed value)	0.0 (fixed value)	
2049	1.0 (fixed value)	1.0 (fixed value)	
2112	User-defined value 1 user-defined monitor value	–19999 to +19999	With decimal point
2113	User-defined value 2 user-defined monitor value		
2114	User-defined value 3 user-defined monitor value		
2115	User-defined value 4 user-defined monitor value		
2116	User-defined value 5 user-defined monitor value		
2117	User-defined value 6 user-defined monitor value		
2118	User-defined value 7 user-defined monitor value		
2119	User-defined value 8 user-defined monitor value		
2120	User-defined value 9 user-defined monitor value		
2121	User-defined value 10 user-defined monitor value		
2122	User-defined value 11 user-defined monitor value		
2123	User-defined value 12 user-defined monitor value		
2124	User-defined value 13 user-defined monitor value		
2125	User-defined value 14 user-defined monitor value		
2126	User-defined value 15 user-defined monitor value		
2127	User-defined value 16 user-defined monitor value		
2288	Virtual PV before compensation	–19999 to +19999	With decimal point
2289	Virtual RSP before compensation	–19999 to +19999	With decimal point
2296	Virtual PV	–19999 to +19999	With decimal point
2297	Virtual RSP	–19999 to +19999	With decimal point
2304	PV before compensation	–19999 to +19999	With decimal point
2305	RSP before compensation	–19999 to +19999	With decimal point
2313	PV	–19999 to +19999	With decimal point
2314	RSP	–19999 to +19999	With decimal point
2320	Loop PV	–19999 to +19999	With decimal point
2336	Loop SP	–19999 to +19999	With decimal point
2344	SP after OS	–19999 to +19999	With decimal point
2352	Eventually reached LSP	–19999 to +19999	With decimal point
2360	LSP in use	–19999 to +19999	With decimal point
2368	Eventually reached RSP	–19999 to +19999	With decimal point
2376	RSP in use	–19999 to +19999	With decimal point
2384	Pattern SP in use	–19999 to +19999	With decimal point
2385	Eventually reached pattern SP	–19999 to +19999	With decimal point
2386	Pattern No.	1–8	
2387	Segment No.	1–16	
2388	Number of executed cycles	0–19999 times	
2389	Number of remaining cycles	0–19999 times	
2390	Progress time in pattern	3–19999 s/min/h	With decimal point
2391	Pattern remaining time	2–19999 s/min/h	With decimal point

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Standard numerical code	Meaning of standard numerical code	Description	Remarks
2392	Progress time in segment	1–19999 s/min/h	With decimal point
2393	Segment remaining time	0–19999 s/min/h	With decimal point
2394	Segment event (numerical code)	1–16	
2416	MV	–10.0 to +110.0 %	With decimal point
2432	Heat MV	–10.0 to +110.0 %	With decimal point
2440	Cool MV	–10.0 to +110.0 %	With decimal point
2448	FF MV	–10.0 to +110.0 %	With decimal point
2456	Feedback MV	–10.0 to +110.0 %	With decimal point
2464	MFB count value	0–9999	
2468	MFB opening (including estimate)	–10.0 to +110.0 % (0.0–100.0 % during estimation)	With decimal point
2472	MFB opening	–10.0 to +110.0 %	With decimal point
2476	Estimated MFB opening	0.0–100.0 %	With decimal point
2480	Target opening	–10.0 to +110.0 %	With decimal point
2496	CT1 current when output ON	0.0–825.0 A or 0.00–82.50 A	With decimal point
2497	CT2 current when output ON		
2512	CT1 current when output OFF	0.0–825.0 A or 0.00–82.50 A	With decimal point
2513	CT2 current when output OFF		
2528	Deviation (Loop PV – Loop SP)	–19999 to +19999	With decimal point
2548	VT voltage	0.0–1999.9 V	With decimal point
2552	Resistance	0–1999.9 Ω (resistance calculated from the CT current when output is ON and the VT input current)	With decimal point
2576	Displayed loop PV	–19999 to +19999	
2577	Displayed loop SP	–19999 to +19999	
2578	Displayed MV	–10.0 to +110.0 %	
2579	Displayed MFB amount of opening	–10.0 to +110.0% (0.0–100.0 % during estimation)	
2580	Displayed deviation	–19999 to +19999	
2656	Internal event 1 timer remaining time	0–19999 s/min/h	With decimal point
2657	Internal event 2 timer remaining time		
2658	Internal event 3 timer remaining time		
2659	Internal event 4 timer remaining time		
2660	Internal event 5 timer remaining time		
2661	Internal event 6 timer remaining time		
2662	Internal event 7 timer remaining time		
2663	Internal event 8 timer remaining time		
2688	Control output 1 ON/OFF count	0–11000 (actual on/off count divided by 10)	
2689	Control output 2 ON/OFF count		
2690	Event output 1 ON/OFF count		
2691	Event output 2 ON/OFF count		
2692	Event output 3 ON/OFF count		
2704	Operating time (days)	0–19999 days	

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Standard numerical code	Meaning of standard numerical code	Description	Remarks
2705	Nonvolatile memory write count	0–10000 (actual write count divided by 10)	
2736	CT1 time proportioning current	0.0–825.0 A or 0.00–82.50 A	With decimal point
2737	CT2 time proportioning current		
2768	OUT 1 continuous output percent	−10.0 to +110.0 %	With decimal point
2769	OUT 2 continuous output percent		
2770	AUX output: continuous output percent		
2784	OUT 1 time proportional output percent value	0.0–100.0 %	With decimal point
2785	OUT 2 time proportional output percent value		
2786	EV1 time proportional output percent value		
2787	EV2 time proportional output percent value		
2788	EV3 time proportional output percent value		
2832	PLC link communication count	0-65535 times	Conditions to clear: • "1" was written to [Common information / Clear monitor information]. • The product started up.
2833	PLC link failure count		
2834	PLC link scan count		
2835	PLC link scan time	0-65535 ms	
2836	PLC link scan time (max.)		
2837	Max. No. of PLC link nodes	0–31	
2848	PLC link communication count sheet 1	0-65535 times	Conditions to clear: • "1" was written to [Common information / Clear monitor information]. • The product started up.
2849	PLC link failure count sheet 1		
2850	PLC link communication count sheet 2		
2851	PLC link failure count sheet 2		
2852	PLC link communication count sheet 3		
2853	PLC link failure count sheet 3		
2854	PLC link communication count sheet 4		
2855	PLC link failure count sheet 4		

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■ ROM version history

This section describes added functions and changes to specifications for each ROM version.

● ROM version 1.03 (available from May 2025)

● New function

1. Added the [Mode at startup: Run/Ready] parameter.
☞ Mode at startup: Run/Ready (p. 5-18)

2. Added standard bit numbers for “OR of all DI states,” “PV alarm (AL01/AL02),” and “SP ramp in progress.”
☞ ■ Standard bit numbers and standard numerical codes (p. App.-3)

● Functional improvement

(None)

● Program modification

Changed the initial value of some DO settings.

☞ ■ Operation type (p. 5-104)、■ ON/OFF output type (p. 5-105)

● ROM version 1.02 (available from August 2024)

● New function

1. New release

● Functional improvement

(None)

● Program modification

(None)

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■ Description of used symbols, terms, and abbreviations

Abbreviations are used in the descriptions, tables, and illustrations of this manual. The main abbreviations are explained below.

Information such as detailed meanings as well as other abbreviations and words can be found on the website of Azbil Corporation.

● Symbol

% FS (% of full scale)

Full scale error

The full scale is the input range of a controller or recorder. The control or display accuracy of a device that has a specified measurement range setting for temperature, flow rate, etc., is expressed with this term. The range of error is obtained by multiplying the range specified for the device by this percentage.

% rdg. (% of reading)

Reading error

The control or display accuracy of a device that has a specified measurement range setting for temperature, flow rate, etc., is expressed with this term. The range of error is obtained by multiplying each reading by this percentage. Compared with % FS, the amount of error is smaller in the lower part of the range.

● A

AT (auto-tuning)

Automatic tuning

A function for automatically calculating the optimum value of the PID control parameters (P, I, D).

● C

CJ (cold junction)

Cold junction compensation

A reference junction compensation in which the temperature of the reference junction is set to 0 °C.

CPL (Controller Peripheral Link)

CPL communication, CPL communication protocol

A type of communication, or a communication protocol, that can be used with Azbil's controllers, etc. Used to connect to a device and read and write its internal data.

CT (current transformer)

Current transformer

Used to detect the current applied to a heater. Heater burnout, relay short circuit, etc., can be monitored.

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● **D**

D (derivative)

D action (derivative action)

A type of control action that gives a controlled variable proportional to the speed at which the process value deviates from the set point. It makes a large correction while the deviation is small. It is not used alone but works in combination with P or PI action.

DI (digital input)

External contact input

Used for switching remote/local, multiple SPs, auto/manual, etc., on controllers or other devices.

DO (digital output)

External output

An ON/OFF signal is output to external devices from control output terminals, relay terminals, and event output terminals.

● **E**

EV (event)

Event output

A function of a controller or recorder that determines process (PV) abnormalities, etc., independently from the main control. A function that outputs abnormalities as alarms is also expressed as events. Used with PV high/low limit alarm, deviation high/low limit alarm, etc. It is also possible to output the mode of a device (ready, manual, etc).

● **I**

I (integral)

I action (integral action)

A control action in which the amount of change in correction is proportional to the integrated value of the deviation. When an offset occurs, integral action works to eliminate the offset by changing the manipulated variable. I action is not used alone, but always with proportional action.

● **L**

LSP (local set point)

Local SP

The SP stored in the device. For the C1M, LSP has the same meaning as SP.

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● **M**

Motor feedback (MFB)

Motor opening

The opening signal sent from the motor controlled by a controller. Available only on the C3 controller with the position proportional control function.

MV (manipulated variable)

MV

A signal sent to an actuator. It is also called control output.

● **O**

OH (output high limit)

MV high limit

The highest MV allowed. It can be set for normal control output, control output for cooling, control output during AT, etc.

OL (output low limit)

MV low limit

The lowest MV allowed. It can be set for normal control output, control output for cooling, control output during AT, etc.

● **P**

P (proportional)

P action (proportional action)

Proportional control. A control method in which the amount of correction is proportional to the amount of deviation. The range of the controlled variable to be corrected is called the proportional band. When only P action is used for control, an offset occurs in which the controlled variable becomes stable at a value equal to or less than the set point.

PID (proportional, integral, and derivative)

PID control

A control method that uses proportional, integral, and derivative action.

PLC (programmable logic controller)

Programmable controller

A sequencer.

PV (process value)

Present value, measured value, detected value

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● R

RJ (reference junction)

Reference junction compensation

A thermocouple has two junctions for the purpose of temperature measurement, one at the object being measured and the other connected to the measuring instrument. The junction connected to the measuring instrument is called the reference junction.

RSP (remote set point)

Remote SP

A set point sent from an external device. The C1M/C1A does not have an RSP function. Available only on the C3 controller with RSP input.

RTD (resistance temperature detector)

Resistance temperature detector

An RTD consists of a resistance element composed of unshielded wires made from a material such as platinum, in addition to internal lead wires, a protective tube, terminals, etc. It measures temperature by utilizing the fact that the electrical resistance of the resistance element changes with temperature. The operating temperature range is −200 to +500 °C for platinum resistance temperature detectors.

● S

SCR (silicon controlled rectifier)

A thyristor (power regulator).

It is composed of semiconductor element transistors and is used for heater control in combination with a controller that continuously outputs a current signal for proportional control.

SLP (Smart Loader Package)

Smart Loader Package

Application software that runs on a computer and facilitates configuration and monitoring of Azbil controllers.

SP (set point)

The target value

A set point specified by controllers, etc. It is also called the SV (set value).

SSR (solid-state relay)

Solid state relay

Used for heater control in combination with a controller that outputs voltage pulses.

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ST (self-tuning)

Self-tuning

A function that automatically sets PID values when the set point is changed or a disturbance occurs. Unlike auto-tuning, the controller determines when to activate this function.

● T

T/C (thermocouple)

Thermocouple

Used for temperature measurement. For the purpose of generating thermoelectromotive force, one end from each of two kinds of metal wires are electrically connected. The combinations of metals in commonly used thermocouples include platinum–platinum rhodium (R thermocouple), alumel-chromel (K thermocouple), iron-constantan (J thermocouple), and copper-constantan (T thermocouple).

● U

U (unit)

1 U = 1 °C in the range of the smallest unit of an industrial quantity (°C, Pa, L/min, etc.) of a PV range (−200 to +200 °C). 1 U = 0.1 °C in the range of 0.0 to 200.0 °C.

For DC voltage input with a scaling of 0.00 to 10.00, 1 U = 0.01. 0.1 U is one tenth of 1 U.

UF (user function)

User-defined function

A function for displaying settings and monitoring data specified by the user in the operation display of a controller. Up to 8 items can be specified.

● V

VT (voltage transformer)

Voltage transformer

Used to detect the measurement of AC voltage applied to a heater and heater resistance value. The voltage status can be monitored for heater deterioration diagnosis or other purposes.

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-MEMO-

Revision History of CP-SP-1478E

Date	Rev.	(New) Page No.	Description
Apr. 2025	1		

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

(1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
(2) Failure caused for other reasons than Azbil Corporation's product;
(3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
(4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
(5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
(6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

(1) Regulations and standards or laws that your Equipment is to comply with.
(2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
(3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.
*2. A design that is safe even if the device fails.
*3. Avoidance of device failure by using highly reliable components, etc.
*4. The use of redundancy.

3. Precautions and restrictions on application

3.1 Restrictions on application

Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

*5. Nuclear power quality: compliance with JEAG 4121 required
*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

3.2 Precautions on application

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
(2) For use of specific purposes, such as:
    * Nuclear energy/radiation related facilities
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * Machinery or equipment for space/sea bottom
    * Transportation equipment
      [Railway, aircraft, vessels, vehicle equipment, etc.]
    * Antidisaster/crime-prevention equipment
    * Burning appliances
    * Electrothermal equipment
    * Amusement facilities
    * Facilities/applications associated directly with billing
(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

(1) Installation, adjustment, guidance, and attendance at a test run
(2) Maintenance, inspection, adjustment, and repair
(3) Technical guidance and technical education
(4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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For our products and services for factories and plants, please visit:
URL: https://aa-industrial.azbil.com/jp/en

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