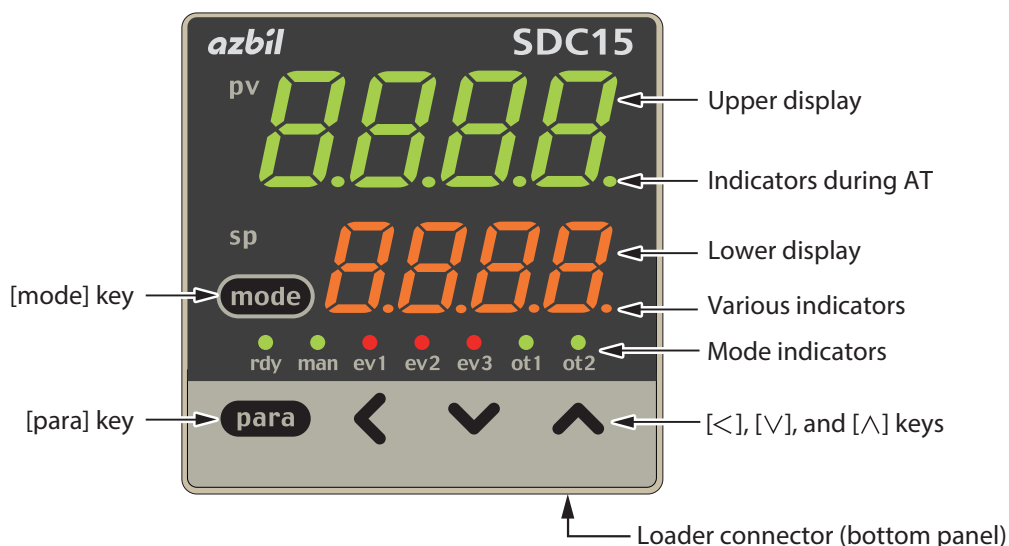# azbil

Quick Reference Guide for Model C15

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 model C15 is needed, refer to the user's manuals: CP-SP-1147E for basic operation and CP-SP-1148E for installation and configuration.

The most convenient way to configure the C15 is with the Smart Loader Package (model No. SLP-C35J50). Please contact the azbil Group or a distributor for more information.
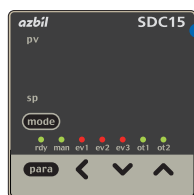

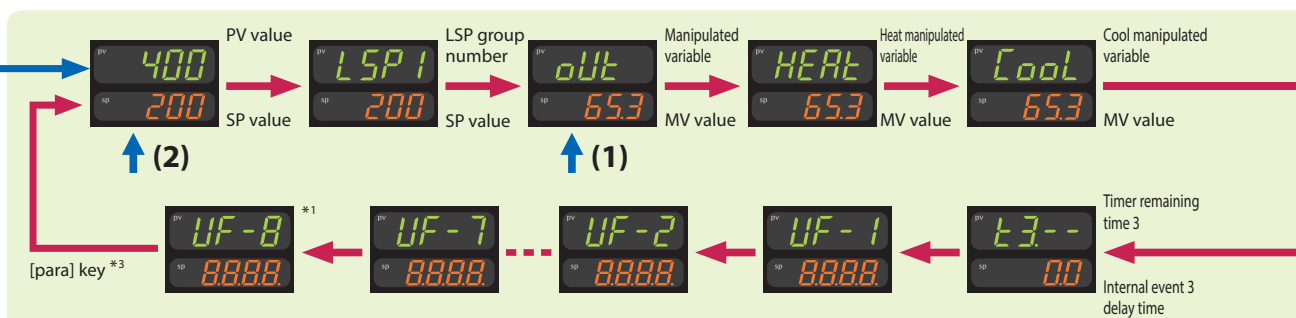|	
Upper display	This display shows either the PV value or the display value and set value for each displayed item. If an alarm is triggered, the normal display and alarm code are displayed alternately. During auto tuning (AT), the rightmost decimal point flashes twice repeatedly.
Lower display	This display shows either the SP/MV/CT or the display value and set value for each displayed item. The rightmost decimal point lights up or flashes to show RUN/READY mode or communications status, depending on the setting.
Mode indicators	rdy: Lights when READY (RUN mode if not lit) man: Lights when MANUAL (AUTO mode if not lit) ev1, ev2, ev3: Lights when event relays are ON ot1, ot2: Lights when the control output is ON (always lit when the current output is used)
[mode] key	• When this key is pressed and held for more than 1 second in the operation display mode, any of the following operations from 0 to 7 which have been set previously can be executed: 　0 : Mode key does not operate (Initial value) 　1 : AUTO/MANUAL mode selection 　2 : RUN/READY mode selection 　3 : AT (Auto Tuning) start/stop selection 　4 : LSP (Local SP) group selection 　5 : Release all DO (Digital Output) latches 　6 : Mode key does not operate 　7 : ON/OFF selection of communication DI1 • When pressing the [mode] key in the setup display mode, the display is changed to the operation display
[para] key	• This key is used to change the display item. • When this key is kept pressed for 2 s. or longer in the operation display mode, the display is then changed to the setup display
[<], [∨] , [∧] keys	Theses keys are used to increase or decrease the numeric value, or to shift the digit.
Loader connector	The Smart Loader connector is on the bottom of the C15. Use the dedicated cable that is included with the Smart Loader Package to connect the controller to a PC.

: Initial value

When the power is turned ON

SDC15

Upper and lower displays remain off for 6s after power ON. Each mode indicator lights sequentially, and then the operation display appears.

PV value
SP value

400
200
(2)

LSP group number
SP value

LSP1
200

Manipulated variable
MV value

oUt
65.3
(1)

Heat manipulated variable
MV value

HEAt
65.3

Cool manipulated variable
MV value

CooL
65.3

Timer remaining time 3
Internal event 3 delay time

t3--
0.0

UF-1
8.8.8.8.

UF-2
8.8.8.8.

UF-7
8.8.8.8.

UF-8 *1
8.8.8.8.

[para] key *3

2-second press + hold of [para] key

[mode]   [SP]   [Event]   [PID]   [Parameter]   [Extended tuning]

(A)

(AUTO)

A--m̄
AUto

For change from MANUAL to AUTO
to (2)

(MANUAL)

A--m̄
m̄An

For change from AUTO to MANUAL
to (1)

r--r
At
doLt
C.dl1

[para] key *3

SP-1
SP-2
SP-3
SP-4

E1
E1.Sb
E1.HY
E1.on
E1.oF

E5
E5.Sb
E5.HY
E5.on
E5.oF

P-1
1-1
d-1
rE-1
oL-1
oH-1
P-1C
1-1C
d-1C
oL.1C
oH.1C

CtrL
At.oL
At.oH
dIFF
oFF5
FL
rA
bI
CYU
CY
CYU2
CY2
tP.tY
SPU
SPd

At.tY
JFbd
SPL9
At-P
At-1
At-d
Ctr.A
JF.ou
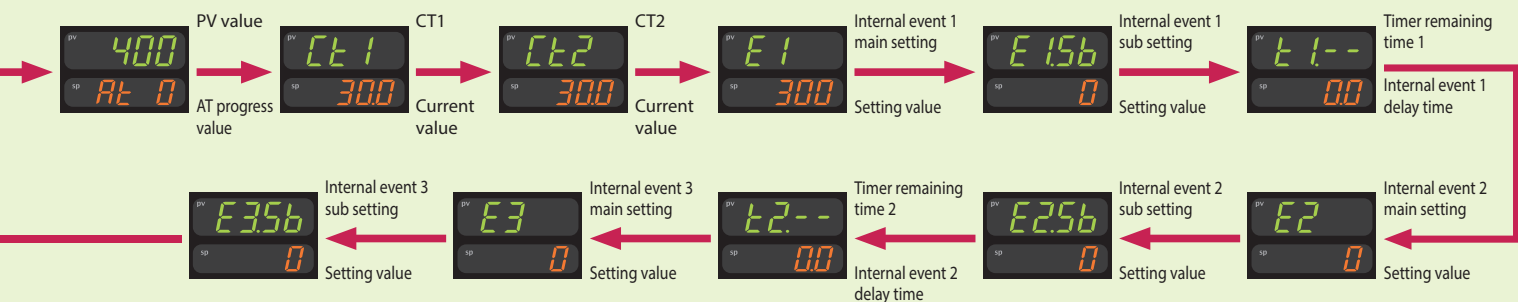**St.SA**
St.Sb
St.Hb
St.Ud
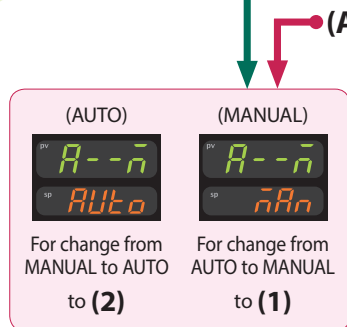
[para] key

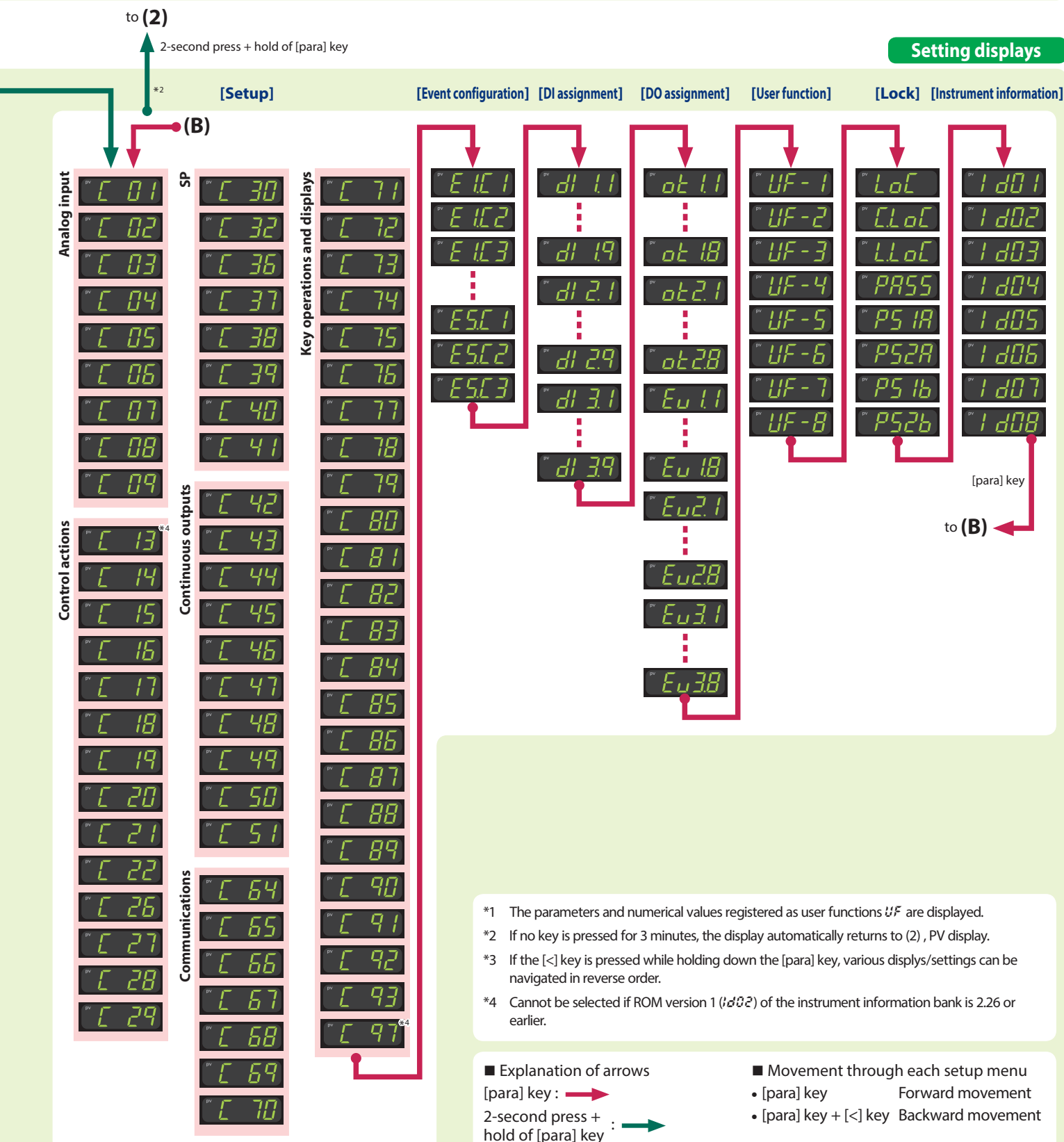2-second press + hold of [para] key

to (A)

○ **Some items are not displayed depending on the availability of optional functions, model number, display setup (C73 to C78) and display level (C79).**

○ **Pressing [para] key while changing settings has the effect of canceling and moving to the next item.**

Display	Label
400 / At 0	PV value / AT progress value
Ct1 / 30.0	CT1 / Current value
Ct2 / 30.0	CT2 / Current value
E1 / 300	Internal event 1 main setting / Setting value
E1.Sb / 0	Internal event 1 sub setting / Setting value
t1-- / 0.0	Timer remaining time 1 / Internal event 1 delay time
E2 / 0	Internal event 2 main setting / Setting value
E2.Sb / 0	Internal event 2 sub setting / Setting value
t2-- / 0.0	Timer remaining time 2 / Internal event 2 delay time
E3 / 0	Internal event 3 main setting / Setting value
E3.Sb / 0	Internal event 3 sub setting / Setting value

to **(2)**

2-second press + hold of [para] key

*2

Setting displays

(B)

[Setup]   **[Event configuration]** **[DI assignment]**   **[DO assignment]**   **[User function]**   **[Lock]** **[Instrument information]**

Analog input: C01, C02, C03, C04, C05, C06, C07, C08, C09

Control actions: C13 *4, C14, C15, C16, C17, C18, C19, C20, C21, C22, C26, C27, C28, C29

SP: C30, C32, C36, C37, C38, C39, C40, C41

Continuous outputs: C42, C43, C44, C45, C46, C47, C48, C49, C50, C51

Communications: C64, C65, C66, C67, C68, C69, C70

Key operations and displays: C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C97 *4

[Event configuration]: E1.C1, E1.C2, E1.C3 ... E5.C1, E5.C2, E5.C3

[DI assignment]: di 1.1 ... di 1.9, di 2.1 ... di 2.9, di 3.1 ... di 3.9

[DO assignment]: ot 1.1 ... ot 1.8, ot 2.1 ... ot 2.8, Eu 1.1 ... Eu 1.8, Eu 2.1 ... Eu 2.8, Eu 3.1 ... Eu 3.8

[User function]: UF-1, UF-2, UF-3, UF-4, UF-5, UF-6, UF-7, UF-8

[Lock]: LoC, C.LoC, L.LoC, PASS, PS1A, PS2A, PS1b, PS2b

[Instrument information]: Id01, Id02, Id03, Id04, Id05, Id06, Id07, Id08

[para] key

to **(B)**

*1 The parameters and numerical values registered as user functions UF are displayed.

*2 If no key is pressed for 3 minutes, the display automatically returns to (2), PV display.

*3 If the [<] key is pressed while holding down the [para] key, various displys/settings can be navigated in reverse order.

*4 Cannot be selected if ROM version 1 (Id02) of the instrument information bank is 2.26 or earlier.

■ Explanation of arrows
[para] key : →
2-second press + hold of [para] key : →

■ Movement through each setup menu
• [para] key   Forward movement
• [para] key + [<] key Backward movement

3

Operation examples

Red letters : Items before operation
Blue letters : Items during operation

Setup of PV input range type

1	Start from the operation display (if necessary press [mode] once to get the operation display). *If the sensor has not been wired or is disconnected, an alarm for abnormal PV input (any one from AL01 to AL11) may appear on the upper display.*	2	Press and hold [para] for more than 2s to get the parameter setup display. A--n is shown on the upper display. *In case of ON/OFF control, r--r appears on the upper display.*
3	Press and hold [para] for more than 2s again to get the setup setting display. The current set value for C01 (PV input range type) is displayed.	4	When the [<], [∨] or [∧] key is pressed, the rightmost digit on the lower display flashes. If no key is pressed for more than 2s after changing to the desired value in the PV input range list, the display changes from flashing to continuously lit, and the displayed value is now set.

Setup of event operation type

In this example, the event 1 operation type is set to deviation high limit.

1	Start from the operation display (if necessary press [mode] once to get the operation display).	2	Press and hold [para] for more than 2s to get the parameter setup display. A--n is shown on the upper display.
3	Press and hold [para] for more than 2s again to get the setup setting display. The current set value for C01 (PV input range type) is displayed.	4	Press [para] repeatedly to get E1.C1 on the upper display. 0 is displayed on the lower display. *0 on the lower display indicates that the event operation type is set to "none."*
5	When the [∨] or [∧] key is pressed, the rightmost digit on the lower display flashes. Change the flashing digit to 4 by pressing [∨] or [∧]. If no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit. *4 on the lower display indicates that the event operation type is set for deviation high limit.*		

Similarly, use E2.C1 to set the event 2 operation type, and use E3.C1 for event 3.

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	Start from the operation display (if necessary press [mode] once to get the operation display).	2	Press and hold [para] for more than 2s to get the parameter setup display. A--n is shown on the upper display.
3	Press [para] twice. The upper display says At and the lower display says At.oF. *If the control method is ON/OFF control and if Bit 3 (AT stop/start display) of the mode display setup (C73) is set to "disabled: 0," nothing is displayed.*	4	When [∨] or [∧] is pressed, At.oF flashes. *Flashing occurs only in RUN and AUTO modes, if there is no PV input abnormality. Also, if "AT stop/start" is selected for DI assignment, the display does not blink and no change can be made.*
5	[Press [∧] once. The lower display starts to flash At.on.	6	If no key is pressed for more than 2s, At.on remains steadily lit and AT begins. During AT, the rightmost decimal point flashes twice repeatedly. (When AT is done, the light goes off and the new PID values go into effect.)

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 values.
AT can also be stopped by changing the setting from At.on to At.oF (return to step 3 above).

Setup of SP value

1	Start from the operation display (if necessary press [mode] once to get the operation display).	2	Check that the operation display is displaying the SP. (If not, press [para] repeatedly until the SP is displayed.)
3	When the [<], [∨] or [∧] key is pressed, the rightmost digit on the lower display flashes and the SP can be changed to the desired value. In this case, the flashing of the numerical value implies that it is not yet set. A numerical setting that is being changed flashes the same way. *If an SP limit is in effect, the numerical value cannot be changed to a value above the limit. The SP limit must be changed first.*	4	If no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit. *If the [mode] key is pressed when the display is flashing, the status returns to that of step 1.*

For step numbers indicated in red like **4**, the following precaution applies:

- If the key lock is set, the numerical value does not flash, and the value cannot be changed.
  To change a numerical value, cancel the key lock first.

RUN/READY mode selection
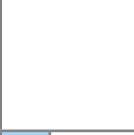
1 Start from the operation display (if necessary press [mode] once to get the operation display).

2 Press and hold [para] for more than 2s to get the parameter setup display. *A--n* is shown on the upper display.

> In case of ON/OFF control, *r--r* appears on the upper display.

3 Press the [para] key once. The upper display says *r--r* and the lower display says *rdY* (or *rUn*).

> The current mode is indicated by *rUn* for RUN mode or *rdY* for READY mode.

4 When [∨] or [∧] is pressed, the lower display flashes.

> If the DI assignment is set to "RUN/READY selection," the display does not flash and no change can be made.

5 When [∨] or [∧] is pressed, *rUn* (or *rdY*) on the lower display flashes.

6 If no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit.

Setup of PID value

1 Start from the operation display (if necessary press [mode] once to get the operation display).

2 Press and hold [para] for more than 2s to get the parameter setup display. *A--n* is shown on the upper display.

3 Press [para] repeatedly to get *P-1* (for proportional band) on the upper display. The value set for *P-1* is displayed on the lower display.

> If the control method is "ON/OFF control," nothing is displayed.

4 When [<], [∨] or [∧] is pressed, the rightmost digit on the lower display flashes, and can be changed to the desired value for the proportional band.
In this case, the flashing of the numerical value implies that it is not yet set. A numerical setting that is being changed flashes the same way.

> The proportional band can be set in a range from 0.1 to 999.9%.

5 If no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit.

> If the [mode] key is pressed when the display is flashing, the status returns to that of step 1.

Similarly, use *I-1* to set the integral time (0 to 9999s), and *d-1* to set the derivative time (0 to 9999s).

Setup of event value

1 Start from the operation display (if necessary press [mode] once to get the operation display).

2 Press and hold [para] for more than 2s to get the parameter setup display. *A--n* is shown on the upper display.

3 Press [para] repeatedly to get *E1* on the upper display. The lower display says *0*.

> *0* on the lower display indicates that the event main set value is "zero."

4 When [<], [∨] or [∧] is pressed, the rightmost digit on the lower display flashes, and can be changed to the desired value for the event.
In this case, the flashing of the numerical value implies that it is not yet set.
A numerical setting that is being changed flashes the same way.

5 If no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit.

> If the [mode] key is pressed when the display is flashing, the status returns to that of step 1.

Similarly, use *E2* to set a value for event 2, and *E3* to set a value for event 3.

6 To set hysteresis as well, press [para] once (or twice, depending on the settings) to display *E1.HY* on the upper display.
The lower display says *5*.

> *5* on the lower display indicates that the current set value for event hysteresis is 5.

7 When [<], [∨] or [∧] is pressed, the rightmost digit on the lower display flashes, and can be changed to the desired value for hysteresis.
If no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit.

Similarly, use *E2.HY* to set a hysteresis value for event 2, and *E3.HY* to set a hysteresis value for event 3.

Memo

List of parameters

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

List of operation displays

Display — Upper display: PV / Lower display: SP	Item	Contents	Initial value	Setting value
PV / SP	SP (Target value)	SP low limit to SP high limit	0	
`LSP1` (Display example) LSP	LSP No. (1st digit: Value at the right end digit)	1 to LSP system group (Max. 4)	1	
`oUt` MV	MV (Manipulated Variable)	-10.0 to +110.0% Setting is enabled in MANUAL mode (Numeric value flashed)	–	
`HERt` Numeric value	Heat MV (Manipulated Variable)	Setting is disabled. -10.0 to +110.0%	–	
`CooL` Numeric value	Cool MV (Manipulated Variable)	-10.0 to +110.0%	–	
PV `Rt1` (Display example)	AT progress display (1st digit=Numeric value at right end digit)	Setting is disabled.	–	
`Ct1` Numeric value	CT current value 1	Setting is disabled.	–	
`Ct2` Numeric value	CT current value 2	Setting is disabled.	–	
`E1` Numeric value	Internal Event 1 main setting	-1999 to +9999U or 0 to 9999U	0	
`E1.Sb` Numeric value	Internal Event 1 sub setting		0	
`t1.--` (Display example) Numeric value	Timer remaining time 1	Setting is disabled. Upper display: The distinction by ON delay or OFF delay is displayed at the side location of "t1".	–	
`E2` Numeric value	Internal Event 2 main setting	Same as Internal Event 1 main setting	0	
`E2.Sb` Numeric value	Internal Event 2 sub setting	Same as Internal Event 1 sub setting	0	
`t2.--` (Display example) Numeric value	Timer remaining time 2	Same as Timer remaining time 1	–	
`E3` Numeric value	Internal Event 3 main setting	Same as Internal Event 1 main setting	0	
`E3.Sb` Numeric value	Internal Event 3 sub setting	Same as Internal Event 1 sub setting	0	
`t3.--` (Display example) Numeric value	Timer remaining time 3	Same as Timer remaining time 1	–	

List of parameter setting displays

`nodE` [Mode bank]

Display	Item	Contents	Initial value	Setting value
`A--n`	AUTO/MANUAL	`RUto`: AUTO mode `nRn`: MANUAL mode	AUTO	
`r--r`	RUN/READY	`rUn`: RUN mode `rdY`: READY mode	RUN	
`Rt`	AT stop/start	`Rt.oF`: AT stop `Rt.on`: AT start	AT stop	
`do.Lt`	Release all DO latches	`Lt.on`: Latch continue `Lt.oF`: Latch release	Latch continue	
`C.di1`	Communication DI1	`di.oF`: OFF `di.on`: ON	OFF	

`SP` [SP bank]

Display	Item	Contents	Initial value	Setting value
`SP-1` to `SP-4`	SP (for LSP1 to 4)	SP low limit to SP high limit	0	

`Ev` [Event bank]

Display	Item	Contents	Initial value	Setting value
`E1` to `E5`	Internal Event 1 to 5 main setting	-1999 to +9999 or 0 to 9999 *	0	
`E1.Sb` to `E5.Sb`	Internal Event 1 to 5 sub setting		0	
`E1.HY` to `E5.HY`	Internal Event 1 to 5 hysteresis	0 to 9999 *	5	
`E1.on` to `E5.on`	Internal Event 1 to 5 ON delay time	0.0 to 999.9 or 0 to 9999	0	
`E1.oF` to `E5.oF`	Internal Event 1 to 5 OFF delay time		0	

* The decimal point position varies by meeting the internal event operation type.

`Pid` [PID bank]

Display	Item	Contents	Initial value	Setting value
`P-1`	Proportional band (PID1)	0.1 to 999.9%	5.0	
`I-1`	Integration time (PID1)	0 to 9999s (No integration control action when set at "0")	120	
`d-1`	Derivative time (PID1)	0 to 9999s (No derivative control action when set at "0")	30	
`rE-1`	Manual reset (PID1)	-10.0 to +110.0%	50.0	
`oL-1`	MV low limit (PID1)	-10.0 to +110.0%	0.0	
`oH-1`	MV high limit (PID1)	-10.0 to +110.0%	100.0	
`P-1C`	Cool-side proportional band (PID1)	0.1 to 999.9%	5.0	
`I-1C`	Cool-side integration time (PID1)	0 to 9999s (No integration control action when set at "0")	120	
`d-1C`	Cool-side derivative time (PID1)	0 to 9999s (No derivative control action when set at "0")	30	
`oL.1C`	Cool-side MV low limit (PID1)	-10.0 to +110.0%	0.0	
`oH.1C`	Cool-side MV high limit (PID1)	-10.0 to +110.0%	100.0	

`PArA` [Parameter bank]

	Display	Item	Contents	Initial value	Setting value
Control	`CtrL`	Control method	0: ON/OFF control 1: Fixed PID 2: ST(Self-tuning)	0 or 1	
	`Rt.oL`	MV low limit at AT	-10.0 to +110.0%	0.0	
	`Rt.oH`	MV high limit at AT	-10.0 to +110.0%	100.0	
	`diFF`	ON/OFF control differential	0 to 9999U	5	
	`oFFS`	ON/OFF control operating point offset	-1999 to +9999U	0	
PV	`FL`	PV filter	0.0 to 120.0s	0.0	
	`rR`	PV ratio	0.001 to 9.999	1.000	
	`bI`	PV bias	-1999 to +9999U	0	
Time proportional output	`CYU`	Time proportional cycle unit 1	0 to 3 *1	0	
	`CY`	Time proportional cycle 1	5 to 120s or 1 to 120s *2	10 or 2	
	`CYU2`	Time proportional cycle unit 2	0 to 3 *1	0	
	`CY2`	Time proportional cycle 2	5 to 120s or 1 to 120s *2	10 or 2	
	`tP.tY`	Time proportional cycle mode	0: Controllability aiming type 1: Operation end service life aiming type (Only ON/OFF operation within Time proportional cycle)	0 or 1	
SP	`SPU`	SP up ramp (U/min)	0.0 to 999.9U(No ramp when set at "0.0U")	0.0	
	`SPd`	SP down ramp (U/min)		0.0	

*1 0: Unit of "1s" 1: Fixed at 0.5s 2: Fixed at 0.2s 3: Fixed at 0.1s   U: Unit Maximum unit of Industrial volume in PV range (°C, Pa,L/min, etc.)
*2 5 to 120s when output includes the relay output

`Et` [Extended tuning bank]

Display	Item	Contents	Initial value	Setting value
`Rt.tY`	AT type	0: Normal 1: Immediate response 2: Stable *1	1	
`JF.bd`	Just-FiTTER setting band	0.00 to 10.00	0.30	
`SP.LG`	SP lag constant	0.0 to 999.9	0.0	
`Rt-P`	AT Proportional Band adjust	0.00 to 99.99	1.00	
`Rt-I`	AT Integral time adjust	0.00 to 99.99	1.00	
`Rt-d`	AT Derivative time adjust	0.00 to 99.99	1.00	
`Ctr.R`	Control algorithm	0: PID(Conventional PID) 1: Ra-PID(High-performance PID)	0	
`JF.ou`	Just-FiTTER assistance coefficient	0 to 100	0	
`St.SR`	ST step execution resolution band	0.0 to 99.99	10.0	
`St.Sb`	ST step setting band	0.0 to 10.00	0.50	
`St.Hb`	ST hunting setting band	0.0 to 10.00	1.00	
`St.Ud`	ST step ramp change	0: ST is executed when the PV moves up or down. 1: ST is executed only when the PV moves up.	0	

*1 Normal = Standard control characteristics, Immediate response = Control characteristics that respond immediately to external disturbance, Stable = Control characteristics having less up/down fluctuation of PV

List of setup setting displays

`SEtUP` [Setup bank]

	Display	Item	Contents	Initial value	Setting value
Analog input	`C01`	PV input range type	For details, refer to the PV Input Range Table	Depending on Model No.	
	`C02`	Temperature unit	0: Celsius (°C) 1: Fahrenheit (°F)	0	
	`C03`	Cold junction compensation	0: Performed (internal) 1: Not performed (external)	0	
	`C04`	Decimal point position	0: No decimal point 1 to 3: 1 to 3 digits below decimal point *1	0	
	`C05`	PV range low limit	When the PV input type is DC voltage/DC current, -1999 to +9999U	0	
	`C06`	PV range high limit		1000	
	`C07`	SP low limit	PV input range low limit to PV input range high limit	–	
	`C08`	SP high limit		–	
	`C09`	PV square root extraction dropout	0.0 to 100.0% (PV square root extraction is not performed when set at "0.0".)	0.0	
Control action	`C13`	PID calculation adjustment function *2	0: Enabled 1: Disabled	0	
	`C14`	Control action (Direct/Reverse)	0: Heat control (Reverse action) 1: Cool control (Direct action)	0	
	`C15`	Output operation at PV alarm	0: Control calculation is continued. 1: Output at PV alarm is output.	0	
	`C16`	Output at PV alarm	-10.0 to +110.0%	0.0	
	`C17`	Output at READY (Heat)	-10.0 to +110.0%	0.0	
	`C18`	Output at READY (Cool)	-10.0 to +110.0%	0.0	
	`C19`	Output operation at changing AUTO/MANUAL	0: Bumpless transfer 1: Preset	0	
	`C20`	Preset MANUAL value	-10.0 to +110.0%	0.0 or 50.0	
	`C21`	Initial output type (mode) of PID control	0: Auto 1: Not initialized 2: Initialized	0	
	`C22`	Initial output of PID control	-10.0 to +110.0%	0.0 or 50.0	
	`C26`	Heat/Cool control	0: Not used 1: Used	0	
	`C27`	Heat/Cool	0: Normal 1: Energy saving	0	
	`C28`	Heat/Cool control dead zone	-100.0 to +100.0%	0.0	
	`C29`	Heat/Cool change point	-10.0 to +110.0%	50.0	
SP	`C30`	LSP system group	1 to 4	1	
	`C32`	SP ramp unit	0: 0.1U/s 1: 1U/min 2: 0.1U/h	1	
	`C36`	CT1 operation type	0: Heater burnout detection 1: Current value measurement	0	
	`C37`	CT1 output	0 to 1: Control output 1 to 2, 2 to 4: Event output 1 to 3	0	
	`C38`	CT1 measurement wait time	30 to 300ms	30	
	`C39`	CT2 operation type	Same as CT1	0	
	`C40`	CT2 output	Same as CT1	0	
	`C41`	CT2 measurement wait time	Same as CT1	30	
Continuous output	`C42`	Control output 1 range	1: 4 to 20mA 2: 0 to 20mA	1	
	`C43`	Control output 1 type	0: MV 1: Heat MV 2: Cool MV 3: PV 4: PV before ratio, bias, and filter 5: SP 6: Deviation 7: CT1 current value 8: CT2 current value 10: SP+MV 11: PV+MV	0	
	`C44`	Control output 1 scaling low limit	-1999 to +9999U	0.0	
	`C45`	Control output 1 scaling high limit		100.0	
	`C46`	Control output 1 MV scaling bandwidth	0 to 9999 (Valid when control output 1 type is 10 or 11)	200	
	`C47`	Control output 2 range	Same as control output 1	1	
	`C48`	Control output 2 type	Same as control output 1	3	
	`C49`	Control output 2 scaling low limit	Same as control output 1	0	
	`C50`	Control output 2 scaling high limit	Same as control output 1	1000	
	`C51`	Control output 2 MV scaling bandwidth	Same as control output 1	200	
Communication	`C64`	Communication type	0: CPL 1: Modbus (ASCII format) 2: Modbus (RTU format)	0	
	`C65`	Station address	0 to 127 (Communication is disabled when set at "0".)	0	
	`C66`	Transmission speed (bps)	0: 4800 1: 9600 2: 19200 3: 38400	2	
	`C67`	Data format (Data length)	0: 7 bits 1: 8 bits	1	
	`C68`	Data format (Parity)	0: Even parity 1: Odd parity 2: No parity	0	
	`C69`	Data format (Stop bit)	0: 1 bit 1: 2 bits	0	
	`C70`	Communication minimum response time	1 to 250ms	3	
Key operation · display	`C71`	Key operation type	0: Standard type 1: Special type	0	
	`C72`	[mode] key function	0: Invalid 1: AUTO/MANUAL selection 2: RUN/READY selection 3: AT Stop/Start 4: LSP group selection 5: Release all DO latches 6: Invalid 7: Communication DI1 selection 8: Invalid	0	
	`C73`	MODE display setup (Sum of the weighting)	Bit 0: AUTO/MANUAL display (Enabled: +1) Bit 1: RUN/READY display (Enabled:+2) Bit 2: AT Stop/Start display (Enabled: +8) Bit 4: Release all DO latches display (Enabled: +16) Bit 5: Communication DI1 ON/OFF display (Enabled: +32) Other invalid setting, 0, +4, +64, +128	255	
	`C74`	PV/SP display setup (Sum of the weighting)	Bit 0: PV display (Enabled: +1) Bit 1: SP display (Enabled: +2) Bit 2: LSP group number display (Enabled: +4) Other invalid setting, 0, +8	15	
	`C75`	MV display setup (Sum of the weighting)	Bit 0: MV display (Enabled: +1) Bit 1: Heat MV/cool MV display (Enabled: +2) Bit 3: AT progress display (Enabled: +8) Other invalid setting: 0, +4	15	
	`C76`	EV display setup (Operation display)	0: Not displayed 1: Set value of Internal event 1 is displayed 2: Set values of Internal event 1 to 2 are displayed 3: Set values of Internal event 1 to 3 are displayed	0	
	`C77`	Event remaining time display setup (Operation display)	0: Not displayed 1: Internal event 1 is displayed 2: Internal event 1 to 2 is displayed 3: Internal event 1 to 3 is displayed	0	
	`C78`	CT input current value display setup (Operation display)	0: Not displayed 1: CT1 current value is displayed 2: CT1 to 2 current values are displayed	0	

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- Items marked ● in the tables are displayed in standard and/or high function configuration.
- To change a user level, refer to **Changing the user level** in the lower right part of this page.

	Display		Item	Contents	Initial value	Setting value
Key operation · display	C79		User level	0: Simple configuration 1: Standard configuration 2: High function configuration	0	
	C80	●	LED monitor	0: Not used 1: Flashing while data is sending through RS-485 communication. 2: Flashing while data is receiving through RS-485 communication. 3: Logical OR of all DI statuses 4: Flashing in READY mode	0	
	C90	●	Number of CT1 turns	0: 800 turns 1 to 40: CT turns divided by 100	8	
	C91	●	Number of CT1 power wire loops	0: 1 time 1 to 6: Number of times	1	
	C92	●	Number of CT2 turns	0: 800 turns 1 to 40: CT turns divided by 100	8	
	C93	●	Number of CT2 power wire loops	0: 1 time 1 to 6: Number of times	1	
	C97		PV input failure (under range) type *2	0: -10 %FS 1: -5 mV (This setting is applicable if C01 (PV input range type) is set for sensor type B (No.17) or PR40-20 (No. 23))	0	

*1 Cannot be set for a thermocouple if ROM version 1 (Id02) of the instrument information bank is 2.26 or earlier.
*2 Cannot be selected if ROM version 1 (Id02) of the instrument information bank is 2.26 or earlier.

EuCF [Event configuration bank]

Display	Item		Contents	Initial value	Setting value
E1.C1 to E5.C1	Internal event 1 to 5 Configuration 1		Refer to event type (see page 8)	0	
E1.C2 to E5.C2	Internal event 1 to 5 Configuration 2		The digits are determined to 1st, 2nd, 3rd, and 4th digit from the right end.		
	1st digit: Direct/Reverse		0: Direct 1: Reverse	0	
	2nd digit: Standby		0: None 1: Standby 2: Standby + Standby at SP change	0	
	3rd digit: EVENT state at READY		0: Continue 1: Forced OFF	0	
	4th digit: Undefined		0	0	
E1.C3 to E5.C3	●	Internal event 1 to 5 Configuration 3	The digits are determined to 1st, 2nd, 3rd, and 4th digit from the right end.		
	1st digit: Alarm OR		0: None 1: Alarm direct + OR operation 2: Alarm direct + AND operation 3: Alarm reverse + OR operation 4: Alarm reverse + AND operation	0	
	2nd digit: Special OFF		0: As usual 1: When the event set value (main setting) is 0, the event is "OFF".	0	
	3rd digit: Delay time unit		0: 0.1s 1: 1s 2: 1min	0	
	4th digit: Undefined		0	0	

di [DI assignment bank]

Display	Item		Contents	Initial value	Setting value
di1.1 to di3.1	Internal contact 1 to 3 Operation type		0: No function 1: LSP group selection (0/+1) 2: LSP group selection (0/+2) 3: LSP group selection (0/+4) 4: Invalid 5: Invalid 6: Invalid 7: RUN/READY selection 8: AUTO/MANUAL selection 9: LSP/RSP selection 10: AT Stop/Start 11: ST disabled/enabled 12: Control action direct/reverse 13: SP Ramp enabled/disabled 14: PV Hold 15: PV Maximum value hold 16: PV Minimum value hold 17: Timer Stop/Start 18: Release all DO latches (Continue/Release) 19: Invalid 20: Invalid	0	
di1.2 to di3.2	●	Internal contact 1 to 3 Input bit operation	0: Not used (Default input) 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)	0	
di1.3 to di3.3	●	Internal contact 1 to 3 Input assignment A	0: Normally opened 1: Normally closed 2: DI1 3: DI2 4 to 9: Undefined 10 to 14: Internal Event 1 to 5	2: Contact 1 3: Contact 2 4: Contact 3	
di1.4 to di3.4	●	Internal contact 1 to 3 Input assignment B	15 to 17: Undefined 18 to 21: Communication DI1 to 4 22: MANUAL 23: READY 24: Undefined 25: AT running 26: During SP ramp 27: Undefined 28: Alarm occurs 29: PV alarm occurs 30: Undefined 31: mode key pressing status 32: Event output 1 status 33: Control output 1 status	0	
di1.5 to di3.5	●	Internal contact 1 to 3 Input assignment C		0	
di1.6 to di3.6	●	Internal contact 1 to 3 Input assignment D		0	
di1.7 to di3.7	●	Internal contact 1 to 3 Polarity A to D	The digits are determined to 1st, 2nd, 3rd and 4th digit from the right end.		
	1st digit: Polarity A		0: Direct 1: Reverse	0	
	2nd digit: Polarity B			0	
	3rd digit: Polarity C			0	
	4th digit: Polarity D			0	
di1.8 to di3.8	●	Internal contact 1 to 3 Polarity	0: Direct 1: Reverse	0	
di1.9 to di3.9	●	Internal contact 1 to 3 Internal event No. assignment	0: Every Internal Event 1 to 5: Internal Event No.	0	

do [DO assignment bank]

Display	Item		Contents	Initial value	Setting value
ot1.1 to ot2.1 Ev1.1 to Ev3.1	●	Control output 1 to 2, event output 1 to 3 Operation type	0: Default output 1 to 2: MV1 to 2 3 to 6: Function 1 to 4	0	
ot1.2 to ot2.2 Ev1.2 to Ev3.2	●	Control output 1 to 2, event output 1 to 3 Output assignment A	0: Normally closed 1: Normally closed 2 to 6: Internal Event 1 to 5 7 to 13: Undefined 14 to 15: MV1 to 2 16 to 17: Undefined 18 to 19: DI1 to 2 20 to 25: Undefined	14: Output 1 15: Output 2 2: Event 1 3: Event 2 4: Event 3	
ot1.3 to ot2.3 Ev1.3 to Ev3.3	●	Control output 1 to 2, event output 1 to 3 Output assignment B	26 to 28: Internal Contact 1 to 3 29 to 33: Undefined 34 to 37: DI1 to 4 38: MANUAL 39: READY 40: Undefined 41: AT running 42: During SP ramp 43: Undefined 44: Alarm occurs 45: PV alarm occurs 46: Undefined 47: Mode key pressing status 48: Event output 1 status 49: Control output 1 status	0	
ot1.4 to ot2.4 Ev1.4 to Ev3.4	●	Control output 1 to 2, event output 1 to 3 Output assignment C		0	
ot1.5 to ot2.5 Ev1.5 to Ev3.5	●	Control output 1 to 2, event output 1 to 3 Output assignment D		0	
ot1.6 to ot2.6 Ev1.6 to Ev3.6	●	Control output 1 to 2, event output 1 to 3 Polarity A to D	The digits are determined to 1st, 2nd, 3rd, and 4 th digit from the right end.		
	1st digit: Polarity A		0: Direct 1: Reverse	0	
	2nd digit: Polarity B			0	
	3rd digit: Polarity C			0	
	4the digit: Polarity D			0	
ot1.7 to ot2.7 Ev1.7 to Ev3.7	●	Control output 1 to 2, event output 1 to 3 Polarity	0: Direct 1: Reverse	0	
ot1.8 to ot2.8 Ev1.8 to Ev3.8	●	Control output 1 to 2, event output 1 to 3 Latch	0: None 1: Latch (Latch at ON) 2: Latch (Latch at OFF except for initialization at power ON)	0	

UF [User function bank]

Display	Item		Contents	Initial value	Setting value
UF-1 to UF-8	●	User function 1 to 8	–	–	

LoC [Lock bank]

Display	Item		Contents	Initial value	Setting value
LoC	Key lock		0: All settings are possible 1: Mode, event, operation display, SP, UF, lock, manual MV, [mode] key can be set 2: Operation display, SP, UF, lock, manual MV, [mode] key can be set 3: UF, lock, manual MV, [mode] key can be set	0	
C.LoC	●	Communication lock	0: read/write enabled 1: read/write disabled	0	
L.LoC	●	Loader lock	0: read/write enabled 1: read/write disabled	0	
PASS		Password display	0 to 15 (5: Password 1A to 2B display)	0	
PS1A		Password 1A	0000 to FFFF (Hexadecimal value)	0000	
PS2A		Password 2A	0000 to FFFF (Hexadecimal value)	0000	
PS1b		Password 1B	0000 to FFFF (Hexadecimal value)	0000	
PS2b		Password 2B	0000 to FFFF (Hexadecimal value)	0000	

Id [Instrument information bank]

Display	Item		Contents	Initial value	Setting value
Id01	●	ROM ID	0: Fixed	0	
Id02	●	ROM Version 1	XX. XX (2 digits after decimal point)	–	
Id03	●	ROM Version 2	XX. XX (2 digits after decimal point)	–	
Id04	●	Loader information		–	
Id05	●	EST information		–	
Id06	●	Manufacturing date code (year)	Subtract 2000 from the year. Example: "3" means the year 2003.	–	
Id07	●	Manufacturing date code (month, day)	Month + day divided by 100. Example: "12.01" means the 1st day of December.	–	
Id08	●	Serial No.		–	

> **! Precaution for setup**
> - The type of auto tuning can be changed by changing the value of At.tY (AT type) in the extended tuning bank. Set it to match the control characteristics.

Memo

Changing the user level

This controller's user level can be set to 1 of 3 types in setup C79. The number of possible displays and settings decreases according to the user level: high function > standard > simple. All items are displayed when high function is selected.

1 If necessary press [mode] once to change to the operation display. Next, press and hold [para] for more than 2s to get the parameter setup display. A--m or r--r appears on the upper display.

2 Press and hold [para] for more than 2s again to display C01 on the upper display.

3 Press [para] repeatedly to change the upper display to C79 (user level).

4 When [<], [∨] or [∧] is pressed, the lower display flashes and can be changed to the desired numerical value. Then, if no key is pressed for more than 2s, the displayed value is set and the display changes from flashing to continuously lit.

0: Simple configuration (initial value)
1: Standard configuration
2: High function configuration

PV input range table

[Thermocouple]

C01 set value	Sensor type	Range (°C)	Range (°F)
1	K	-200 to +1200	-300 to +2200
2	K	0 to 1200	0 to 2200
3	K	0.0 to 800.0	0 to 1500
4	K	0.0 to 600.0	0 to 1100
5	K	0.0 to 400.0	0 to 700
6	K	-200.0 to +400.0	-300 to +700
9	J	0.0 to 800.0	0 to 1500
10	J	0.0 to 600.0	0 to 1100
11	J	-200.0 to +400.0	-300 to +700
13	E	0.0 to 600.0	0 to 1100
14	T	-200.0 to +400.0	-300 to +700
15	R	0 to 1600	0 to 3000
16	S	0 to 1600	0 to 3000
17	B	0 to 1800	0 to 3300
18	N	0 to 1300	0 to 2300
19	PL II	0 to 1300	0 to 2300
20	WRe5-26	0 to 1400	0 to 2400
21	WRe5-26	0 to 2300	0 to 4200
23	PR40-20	0 to 1900	0 to 3400
24	DIN U	-200.0 to +400.0	-300 to +700
25	DIN L	-100.0 to +800.0	-150 to +1500

[RTD]

C01 set value	Sensor type	Range (°C)	Range (°F)
41	Pt100	-200 to +500	-300 to +900
42	JPt100	-200 to +500	-300 to +900
43	Pt100	-200 to +200	-300 to +400
44	JPt100	-200 to +200	-300 to +400
45	Pt100	-100 to +300	-150 to +500
46	JPt100	-100 to +300	-150 to +500
51	Pt100	-50.0 to +200.0	-50 to +400
52	JPt100	-50.0 to +200.0	-50 to +400
53	Pt100	-50.0 to +100.0	-50 to +200
54	JPt100	-50.0 to +100.0	-50 to +200
63	Pt100	0.0 to 200.0	0 to 400
64	JPt100	0.0 to 200.0	0 to 400
67	Pt100	0 to 500	0 to 900
68	JPt100	0 to 500	0 to 900

[DC voltage/DC current]

C01 set value	Input type	Range
84	0 to 1 V	The scaling and decimal point position can be changed variably in a range of –1999 to +9999
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	

Initial value

*1 • Accuracy for No. 17 (B thermocouple) is as follows. 260 °C or less: ±5 %FS. 260–800 °C: ±1 %FS. The PV values under 20 °C are not shown. However, if ROM version 1 (*i802*) of the instrument information bank is 2.04 or earlier, the indicated low limi value is -180 °C.

  • Accuracy for No. 23 (sensor type PR40-20) is as follows. 300 °C or less: undefined. 300–800 °C: ±5 % FS. 800–1900 °C: ±2 % FS. However, if ROM version 1 (*i802*) of the instrument information bank is 2.26 or earlier, No. 23 cannot be selected.

*2 PL II thermocouple is a range, which has been added to the units manufactured from July, 2003.

*3 The decimal point for thermocouples can be displayed if the ROM version is 2.26 or later.

List of alarm codes

	Alarm code	Failure name	Cause	Corrective action
Input failure	AL01	PV input failure (Over-range)	Sensor burnout, incorrect wiring, incorrect PV input type setting	Check the wiring. Set the PV input type again.
	AL02	PV input failure (Under-range)	Sensor burnout, incorrect wiring, incorrect PV input type setting	
	AL03	CJ failure	Terminal temperature is faulty (thermocouple).	Check the ambient temperature.
		PV input failure (RTD)	Sensor burnout, incorrect wiring	Check the wiring.
	AL11	CT input failure (Over-range) (CT input 1 or 2, or both)	A current exceeding the upper limit of the display range was measured. The number of CT turns or the number of CT power wire loops is incorrectly set, or wiring is incorrect.	• Use a CT with the correct number of turns for the display range. • Reset the number of CT turns. • Reset the number of CT power wire loops. • Check the wiring.
Unit failure	AL70	A/D conversion failure	A/D converter is faulty.	Replace the unit.
	AL95	Parameter failure	Power is shut-down while the data is being set, or data is corrupted by noise.	• Restart the unit. • Set the data again (set data for AL95/97 and adjustment data for AL96/98. • Replace the unit.
	AL96	Adjustment data failure	Power is shut-down while the data is being set, or data is corrupted by noise.	
	AL97	Parameter failure (RAM area)	Data is corrupted by noise.	
	AL98	Adjustment data failure (RAM area)	Data is corrupted by noise.	
	AL99	ROM failure	ROM (memory) is faulty.	• Reset the unit. • Replace the unit.

⚠ Handling Precautions

• If ROM version 1 (*i802*) of the instrument information bank is 2.04 or earlier, CT input failure (*AL11*) is not displayed.

Event type

Operation type	Set value	Direct action ●: shows that the ON/OFF is changed at this value. O: shows that the ON/OFF is changed at a point that "1U" is added to this value.	Reverse action ●: shows that the ON/OFF is changed at this value. O: shows that the ON/OFF is changed at a point that "1U" is added to this value.
No event	0	Always OFF	Always OFF
PV high limit	1		
PV low limit	2		
PV high/low limit	3		
Deviation high limit	4		
Deviation low limit	5		
Deviation high/low limit	6		
Deviation high limit (Final SP reference)	7		
Deviation low limit (Final SP reference)	8		
Deviation high/low limit (Final SP reference)	9		
Heater 1 burnout/Over-current	16	CT1 at output ON → OFF before measuring the CT1 current value	CT1 at output ON → OFF before measuring CT1 current value
Heater 1 short-circuit	17	CT1 at output OFF → OFF before measuring CT1 current value	CT1 at output OFF → OFF before measuring CT1 current value
Heater 2 burnout/Over-current	18	CT2 at output ON → OFF before measuring CT2 current value	CT2 at output ON → OFF before measuing CT2 current value
Heater 2 short-circuit	19	CT2 at output OFF → OFF before measuring CT2 current value	CT2 at output OFF → OFF before measuring CT2 current value
Alarm (status)	23	ON if alarm occurs (alarm code AL01 to 99). OFF in other cases.	OFF if alarm occurs (alarm code AL01 to 99). ON in other cases.

 : initial value

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

Event types other than the above:

Operation type	Set value	Operation type	Set value	Operation type	Set value
SP high limit	10	Loop diagnosis 1	20	During AT (status)	27
SP low limit	11	Loop diagnosis 2	21	During SP ramp	28
SP high/low limit	12	Loop diagnosis 3	22	Control action (status)	29
MV high limit	13	READY (status)	24	ST setting standby (status)	30
MV low limit	14	MANUAL (status)	25	Timer (status)	32
MV high/low limit	15				