Digital Controller

CB100/CB400
CB500/CB700
CB900

Initial Setting Manual

RKC INSTRUMENT INC.

IMCB04-E2

CAUTIONS

- This manual is subject to change without prior notice.
- Examples of figures, diagrams and numeric values used in this manual are for a better understanding of the text, but not for assuring the resultant operation.
- This manual is may not be reproduced or copied in whole or in part without RKC's prior consent.
- This instrument and manual are manufactured, prepared, then shipped under strict quality control. However, if any defect is found, please contact your nearest RKC sales office or agent from which you bought the system.
- RKC assumes no responsibility for any of the following damage which the user or third party may suffer.
  (1) Damage incurred as a result of using this product.
  (2) Damage caused by product failure which cannot be predicted by RKC.
  (3) Other indirect damage.

INTRODUCTION

Before using this instrument, please carefully read this manual for its correct use. In addition, after reading the manual keep it available easily anytime.

USERS OF THIS MANUAL

This manual is written mainly for personnel who have a fundamental knowledge of electricity as well as control. This manual is also written for RKC service engineers or qualified technicians.

⚠ WARNING

WIRING PRECAUTIONS

- If failure or error of this instrument could result in a critical accident of the system, install an external protection circuit to prevent such an accident.
- In order to prevent instrument damage or failure, protect the power line and the input/output lines from high currents by using fuses with appropriate ratings.

POWER SUPPLY

- In order to prevent instrument damage or failure, supply power of the specified rating.
- In order to prevent electric shock or instrument failure, do not turn on the power supply until all of the wiring is completed.

NEVER USE THE INSTRUMENT NEAR FLAMMABLE GASES.

In order to prevent fire, explosion or instrument damage, never use this instrument at a location where flammable or explosive gases or vapor exist.

NEVER TOUCH THE INSIDE OF THE INSTRUMENT.

In order to prevent electric shock or burns, never touch the inside of the instrument. Only RKC service engineers can touch the inside of the instrument to check the circuit or to replace parts. High voltage and high temperature sections inside the instrument are extremely dangerous.

NEVER MODIFY THE INSTRUMENT.

In order to prevent accident or instrument failure, never modify the instrument.

MAINTENANCE

- In order to prevent electric shock, burns or instrument failure, only RKC service engineers may replace parts.
- In order to use this instrument continuously and safely, conduct periodic maintenance. Some parts used in this instrument have a limited service life and may deteriorate over time.

INSTRUMENT SAFETY CAUTIONS

- This instrument is designed to be mounted on instrumentation panels. It is therefore manufactured as part of the final product to facilitate wiring. This means that unauthorized personnel can easily access the high-voltage sections in this instrument such as power terminals, etc. Therefore, when this instrument is installed on the final product, the user should take the necessary measures for the final product to ensure that unauthorized personnel cannot access the high-voltage sections, etc.
- In order to use this instrument correctly and safely, always observe the cautions described in this manual when performing operations and maintenance. RKC assumes no responsibility for any injury or accident resulting from not following these cautions.

NOTES ON INDICATIONS

The following indications are used in this manual to ensure the safe, correct use of the **CB100/CB400/CB500/CB700/CB900.**

SIGNAL WORDS

WARNING : Where there are possible dangers such as electric shock, fire (burns), etc. Which could cause loss of life or injury, precautions to avoid such dangers are

CAUTION : These describe precautions to be taken in case unit damage may result if operating procedures are not strictly followed.

NOTE : Extra noted or precautions are added to operating procedures and explanations.

SYMBOL MARKS

⚠ : This mark is used when great care is needed especially for safety.

✻ : This mark is used to add extra notes, precautions or supplementary explanations to table and figures.

CAUTIONS PRIOR TO USE

- This instrument is intended to be used under the following environmental conditions. (**IEC1010**) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
- To the instrument with power supply of 24V, please be sure to supply the power from SELV circuit.
- Before cleaning the instrument, check that the power is turned off.
- Remove stains on the display unit using a soft cloth or tissue paper.
- As the display unit is easily scratched, do not scrub or touch it with a hard object.
- The stains on the housing shall be wiped off by the cloth which is dipped into the neutral cleanser diluted by water and wrung tightly, and finish it by a dried cloth.

CE CONFORMED INSTRUMENT CAUTIONS

- This instrument is protected from electric shock by reinforced insulation. So please arrange reinforced insulation to the wire for input signal against the wires for instrument power supply, source of power and loads as far as possible.
- **EN55022, EN50082-2** and **EN61010-1** are applicable to this instrument.

⚠ **WARNING**

This is a Class A (EN55022) instrument. In a domestic environment this instrument may cause radio interference, in which case the user is required to take adequate measures.

Name and number of this instruction manual :

Name : **Digital Controllers CB100/CB400/CB500/CB700/CB900 Initial Setting Manual**

Manual number : **IMCB04-E2**

■ **Revisions**

Date of revision	Manual number	Reason for revision
May 29, 1998	**IMCB04-E1**	**The first edition issue**
October 9, 1998	**IMCB04-E2**	**Changed items : Key operation time, page format**

CONTENTS

1. TRANSFER TO MODE

Initialization is to set parameters relating to instrument specifications (input type, input range, alarm type, etc.) and those relating to instrument characteristics (setting limiter, alarm differential gap, etc.).

1.1 Transfer to initialization mode

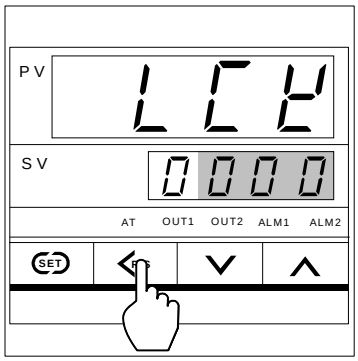
① Turn on the power to this instrument. Thus, the input type, input range and PV/SV display mode change in this order.

② Press the SET key for 2 sec with the instrument set to PV/SV display mode to change the instrument to parameter setting mode.
*For details on parameter setting mode, see the instruction manual for CB100 [IMCB01-E□] or CB400/CB500/CB700/CB900 [IMCB02-E□].

③ Press the SET key to change to the set data lock function display screen.

④ Press the <R/S key to light brightly the thousands digit on the set value (SV) display unit.

Set data lock function display



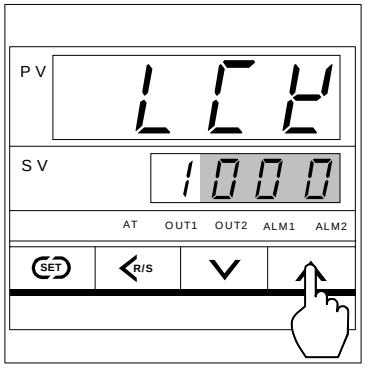
As the units digit light brightly first, press the <R/S key to light brightly the thousands digit.

Bright lighting :

Dim lighting :

⑤ Press the UP key to change "0" to "1" in the thousands digit.

Set data lock function display

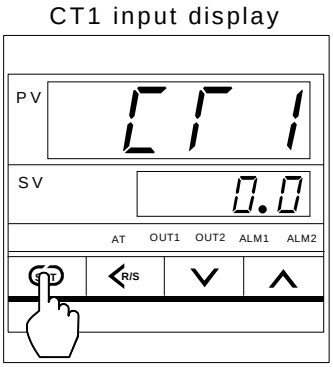


Set value
0 : Initialization mode locked
1 : Initialization mode unlocked

Bright lighting :

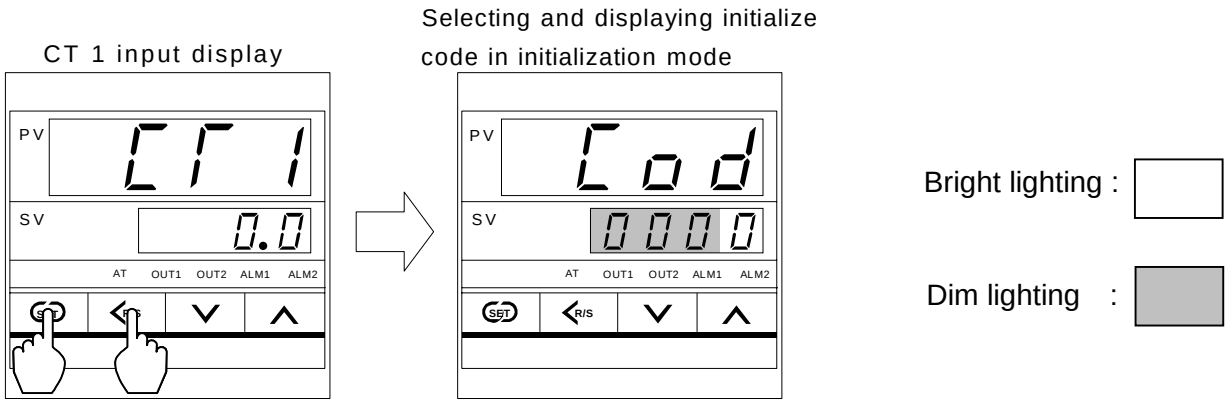
Dim lighting :

⑥ Press the SET key to change to the next parameter. Thus, the data in initialization mode is unlocked.



*In the above figure, the CT1 input is displayed. However, the parameter to be displayed varies depending on the specification.

⑦ Keep pressing both the SET and <R/S keys for 2 sec to change the instrument to initialization mode.
Thus, the symbol (Cod) for selecting the initialize code is displayed first.



1.2 End of initialization mode

① Transfer to "Initialize code selection" after each parameter is set.

② Simultaneously keep pressing both the SET and <R/S keys for 2 sec in the "Initialize code selection" state to transfer to "PV/SV display mode."

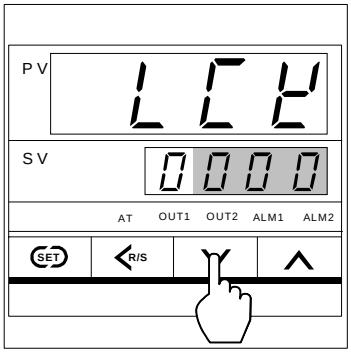
③ Press the SET key for 2 sec in the "PV/SV display mode" state to transfer to parameter setting mode.

④ Press the SET key to transfer to the set data lock function display.

⑤ Press the <R/S key to brightly light the thousands digit on the set value (SV) display unit.
(See ④ on P.1.)

⑥ Press the DOWN key to set the numeric value corresponding to the thousands digit to "0" from "1."

Set data lock function display



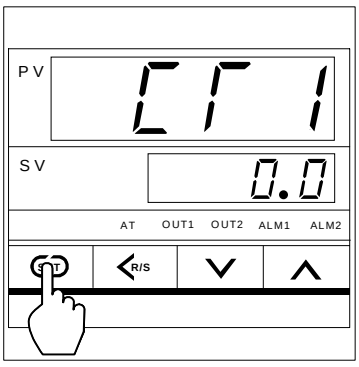
Set value
0 : Initialization mode locked
1 : Initialization mode unlocked

Bright lighting :

Dim lighting :

⑦ Press the SET key to transfer to the next parameter. As a result, the "Initialization mode lock state" setting becomes effective.

CT1 input display



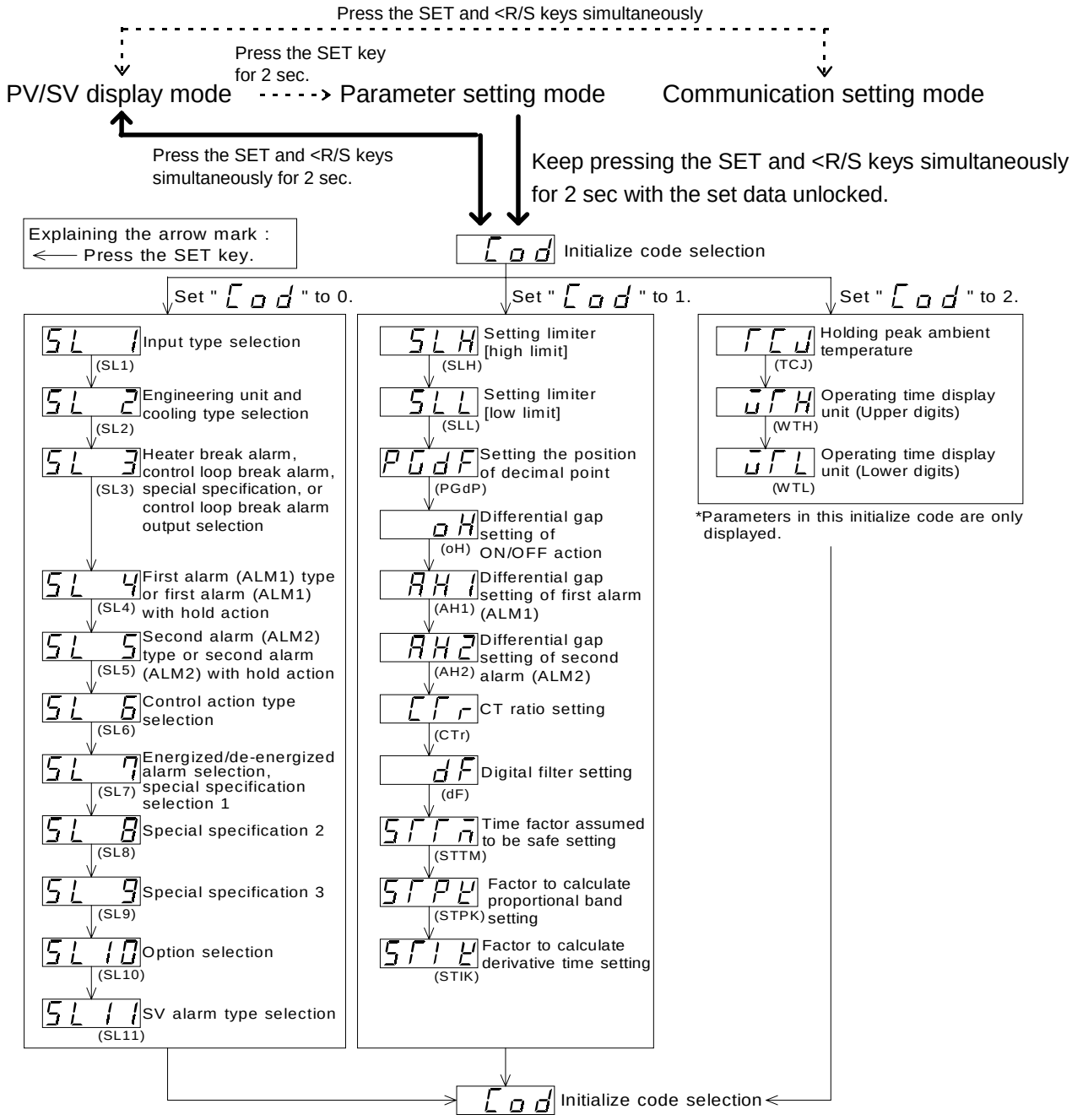
*In the above figure, the CT1 input is displayed. However, the parameter to be displayed varies depending on the specification.

2. PROCEDURE FOR SETTING

If the instrument is changed to initialization mode, the symbol (Cod) for selecting the initialize code is displayed first. (Initializing items are classified into 3 initialize code groups in initialization mode.)
Enter the initialize code corresponding to the parameter to be changed, and then select the parameter to be changed by pressing the SET key. The measured value (PV) display unit shows the characters corresponding to the parameter, and the set value (SV) display unit shows the value corresponding to that parameter. Display flowcharts in initialization mode are shown in the following.

2.1 Display flowcharts in initialization mode

CAUTION There are parameters which are not displayed depending on the specification.



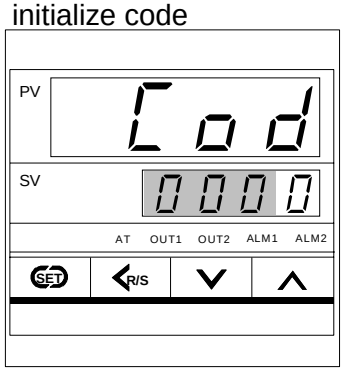
2.2 Procedure for setting each parameter

[Example of changing the setting]

When the display unit shows "Engineering unit and cooling type selection (SL2)" in initialize code "0," the following procedure is for changing the temperature unit from "°F" to "°C" or the cooling method from "Water cooling" to "Air cooling."

① Change the instrument to the initialize code selection display.
(See "1.1 Transfer to initialization mode" on page 1.)

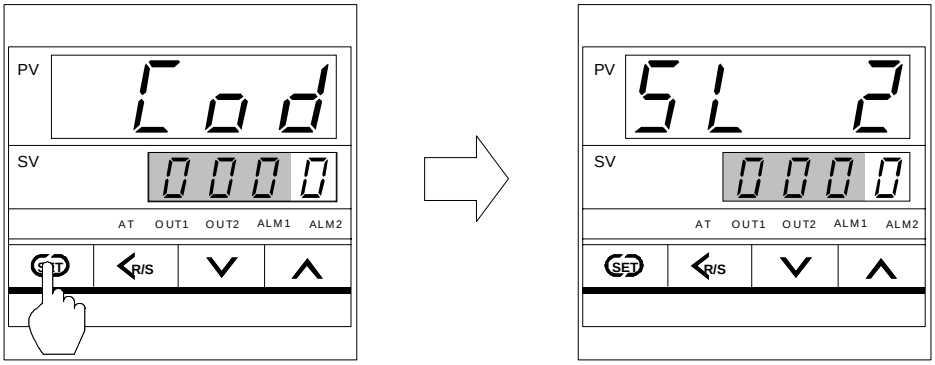
Selecting and displaying initialize code



② As "Engineering unit and cooling type selection (SL2)" belongs to the group of initialize code "0," do not change the initialize code (the units digit) but press the SET key to change to "Engineering unit and cooling type selection (SL2)."

Selecting and displaying initialize code

Engineering unit (°C,°F) and cooling type selection



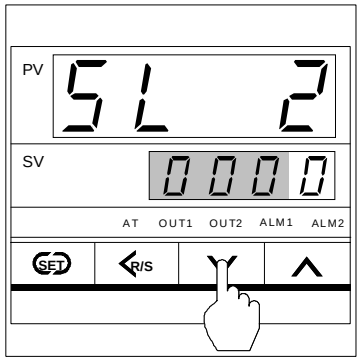
NOTE Please read this NOTE without fail.

When the initialize code is set to "1" or "2," enter "1" or "2" in the units digit of the set value (SV) display unit by pressing the UP or DOWN key.

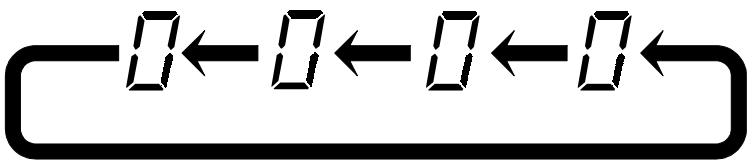
③ Press the DOWN key to enter "0" in the units digit of the set value (SV) display unit.

Set value :
0 : °C
1 : °F

Engineering unit (°C,°F)
and cooling type selection



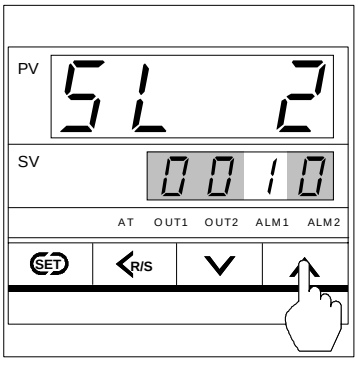
④ Press the <R/S key to move the brightly lit digit of the set value (SV) display unit to the tens digit. The brightly lit digit moves as follows every time the <R/S key is pressed.



⑤ Press the UP key to enter "1" in the tens digit of the set value (SV) display unit.

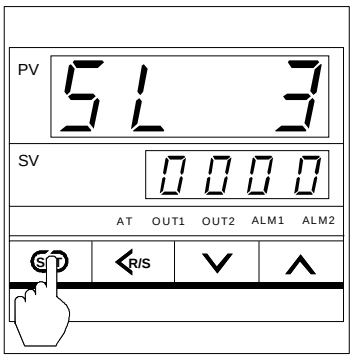
Set value :
0 : Air cooling
1 : Water cooling

Engineering unit (°C,°F)
and cooling type selection

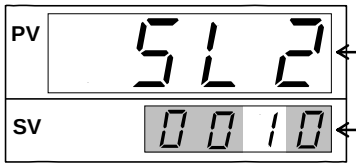


⑥ Press the SET key to change to the next parameter. Thus, the set value is registered.

Heater break alarm(HBA),
control loop break alarm(LBA),
special specification, or
control loop break alarm (LBA)
output selection



Parameter display position



Measured value (PV) display unit shows parameter No.

Input the numerical value in the set value (SV)

*Note that the relevant digit used differs depending on the

Set value	
0	
1	

The figure at the above is for selects the "Water cooling" in "SL2 (Engineering unit and cooling type selection)".

The details of parameters in each initialize code group are described in the following.

2.3 Details of parameters in initialize code 0 (Cod = 0)

(1) SL1 (Input type selection)

CAUTION

Conduct the setting so that it matches the instrument specification (input type). If the setting is changed, always re-set the setting limits (SLH and SLL). (See P.17, 18)

Factory set value varies depending on the input type.

Set value				Input type	
0	0	0	0	K	Thermocouple input (TC) *2
0	0	0	1	J	
0	0	1	0	L	
0	0	1	1	E	
0	1	0	0	N	
0	1	1	1	R	
1	0	0	0	S	
1	0	0	1	B	
1	0	1	0	W5Re/W26Re	
1	0	1	1	PL II	
0	1	0	1	T	
0	1	1	0	U	
1	1	0	0	Pt100 Ω (JIS/IEC)	RTD input *2
1	1	0	1	JPt100 Ω (JIS)	
1	1	1	0	0 to 5 V DC	Voltage input *2
1	1	1	1	1 to 5 V DC	
1	1	1	0	0 to 20 mA DC	Current input *1, *2
1	1	1	1	4 to 20 mA DC	

*1 : For the current input specification, a resistor of 250 Ω must be connected between the input terminals.

*2 : No input type (TC/RTD input to voltage/current input or voltage/current input to TC/RTD input) cannot be changed.

(2) SL2 (Engineering unit and cooling type selection)

CAUTIONS

- For the voltage and current input types, the engineering unit setting of °C or °F is ignored.
- When control action is of the type D (PID action with autotuning [direct action]) or type F (PID action with autotuning [reverse action]), "Cooling type selection" setting is ignored.
- Any digits other than the tens digit are not used. As malfunction may result, do not change any of these digits.

Factory set value varies depending on the instrument specification.

Set value	Description	
0	°C	Engineering unit selection
1	°F	
0	Air cooling (A type) *1	Cooling type selection
1	Water cooling (W type) *2	
0 0	Fixed	

*1 : A type : Heat/cool PID action with autotuning (Air cooling)

*2 : W type : Heat/cool PID action with autotuning (Water cooling)

(3) SL3 (Heater break alarm [HBA], control loop break alarm [LBA], special specification, or control loop break alarm [LBA] output selection)

CAUTIONS

- "With heater break alarm (HBA) function" setting is ignored for the following instruments.
  - Instrument with deviation or process alarm as the second alarm (ALM2).
  - Instrument whose control output is the current output type.

- "With control loop break alarm (LBA) function" setting is ignored for the following instruments.
  - When "Control loop break alarm (LBA)," and "Input alarm" or "Deviation alarm" are simultaneously selected as "First alarm (ALM1)" or "Second alarm (ALM2)."
  - When "Control loop break alarm (LBA)" is selected as "2nd alarm" with "Heater break alarm (HBA)" provided.
  - Instrument whose control action is the W type (Heat/Cool PID action with autotuning [Water cooling]) or A type (Heat/cool PID action with autotuning [Air cooling]).
  - "SL3" setting displays are only "0" and "1."

Factory set value varies depending on the instrument specification.

Set value				Description	
			0	Heater break alarm (HBA) not provided	Heater break alarm (HBA) selection
			1	Heater break alarm (HBA) provided	
		0		Control loop break alarm (LBA) not provided	Control loop break alarm (LBA) selection
		1		Control loop break alarm (LBA) provided	
	0			Z-132 specification not provided *1	Special specification selection
	1			Z-132 specification provided *2	
0				LBA is output from "First alarm"	Selection of control loop break alarm (LBA) output terminals
1				LBA is output from "Second alarm"	

*1 : Normal HBA action.

*2 : HBA occurs 3 sec after the burnout function is activated.

(4) SL4 (First alarm [ALM1] type or first alarm [ALM1] with hold action selection)

CAUTION

The following instrument is set to "0000."

- Instrument without the first alarm (ALM1).
- Instrument which outputs control loop break alarm (LBA) from the first alarm side. (SL3 setting details : For "0010")

Factory set value varies depending on the instrument specification.

Set value				Description	
	0	0	0	First alarm (ALM1) not provided	First alarm (ALM1) type selection
	0	0	1	Deviation high alarm	
	0	1	0	Deviation high/low alarm	
	0	1	1	Process high alarm	
	1	0	1	Deviation low alarm	
	1	1	0	Band alarm	
	1	1	1	Process low alarm	
0				Without alarm hold action	First alarm (ALM1) with hold action selection
1				With alarm hold action	

(5) SL5 (Second alarm [ALM2] type or second alarm [ALM2] with hold action selection)

CAUTION

The following instrument is set to "0000."

- Instrument without the second alarm (ALM2).
- Instrument with the heater break alarm (HBA).
- Instrument which outputs control loop break alarm (LBA) from the second alarm side. (SL3 setting details : For "1010")

Factory set value varies depending on the instrument specification.

Set value				Description	
	0	0	0	Second alarm (ALM2) not provided	Second alarm (ALM2) type selection
	0	0	1	Deviation high alarm	
	0	1	0	Deviation high/low alarm	
	0	1	1	Process high alarm	
	1	0	1	Deviation low alarm	
	1	1	0	Band alarm	
	1	1	1	Process low alarm	
0				Without alarm hold action	Second alarm (ALM2) with hold action selection
1				With alarm hold action	

(6) SL6 (Control action type selection)

CAUTIONS

- Conduct setting so as to meet the instrument specification. An incorrect setting may cause a malfunction.
- When control action is of the type D or F, "Control action type selection (Cool-side)" setting is ignored.

Factory set value varies depending on the instrument specification.

Set value				Description	
			0	Direct action (D type)	Direct/reverse action selection
			1	Reverse action (F, A and W type)	
		0		PID action with autotuning *1	Control action type selection
		1		Heat/Cool PID action with autotuning *2	
	0			Heat-side time proportioning output (M, V, G and T output) *3	Control output type selection (Heat-side)
	1			Heat-side continuous output (Current 4 to 20 mA DC)	
0				Cool-side PID action with autotuning (M, V and T output) *3	Control output type selection (Cool-side)
1				Cool-side continuous output (Current output 4 to 20 mA DC)	

*1 ··· D type : PID action with autotuning (Direct action)
F type : PID action with autotuning (Reverse action)

*2 ··· A type : Heat/cool PID action with autotuning (Air cooling)
W type : Heat/cool PID action with autotuning (Water cooling)

*3 ··· M output : Relay contact output
G output : Trigger (for triac driving) output
V output : Voltage pulse output
T output : Triac output

(7) SL7 (Energized/de-energized alarm selection, special specification selection 1)

CAUTION

Instrument without the first alarm (ALM1) and second alarm (ALM2) is set to "0000."

- Instrument without the second alarm (ALM1). [SL4 setting details : For "0000"]
- Instrument without the second alarm (ALM2). [SL5 setting details : For "0000"]

Factory set value : "0000"

Set value				Description		
			0	Energized alarm		Energized alarm/De-energized alarm selection (First alarm side)
			1	De-energized alarm		
		0		Energized alarm		Energized alarm/De-energized alarm selection (Second alarm side)
		1		De-energized alarm		
	0			Z-124 specification not provided	*1	Special specification selection (First alarm side)
	1			Z-124 specification provided	*2	
0				Z-124 specification not provided	*1	Special specification selection (Second alarm side)
1				Z-124 specification provided	*2	

*1 : The alarm output is forcibly turned ON when the burnout function is activated.
*2 : No alarm action is taken by the burnout function. (Same as the normal alarm action.)

(8) SL8 (Special specification selection 2)

CAUTION

Any digits other than the tens digit are not used. As malfunction may result, do not change any of other digits.

Factory set value : "0000"

Set value				Description		
		0		Z-185 specification not provided	*1	Special specification selection
		1		Z-185 specification provided	*2	
0	0		0	Fixed		

*1 : Normal control in the direct or reverse action is performed even if the burnout function is activated
or not.
*2 : The control output is forcibly turned ON when the burnout function is activated.

(9) SL9 (Special specification selection 3)

CAUTIONS

- Any item set in the "Z-168" specification has priority over that set in SL3 (heater break alarm selection).
- Any digits other than the units digit are not used. As malfunction may result, do not change any of other digits.

Factory set value : "0000"

Set value				Description		
			0	Z-168 specification not provided	*1	Special specification selection
			1	Z-168 specification provided	*2	
0	0	0		Fixed		

*1 : It becomes the item set in SL3 (heater break alarm selection).

*2 : Heater break alarm for three-phase heater.

(10) SL10 (Option selection)

CAUTIONS

- For the A or W control action type, there is no self-tuning function (0 : self-tuning not provided).
- The tens digits is not used. As malfunction may result, do not change this digit.

Factory set value : "1001"

Set value				Description	
			0	RUN/STOP not provided	Selection of RUN/STOP function
			1	RUN/STOP provided	
		0		Fixed	
	0			Communication function not provided	Selection of communication function
	1			Communication function provided	
0				Self-tuning not provided	Selection of self-tuning function
1				Self-tuning provided	

(11) SL11 (SV alarm type selection)

CAUTIONS

- For the instrument without "First alarm (ALM1)" or "Second alarm (ALM2)," always set it to "0 : first alarm, SV alarm not provided," or "0 : second alarm, SV alarm not provided."

- The following conditions must be satisfied in order to effectuate "SV alarm."
  - When setting the instrument to "First alarm, SV alarm provided"
    "First alarm (ALM1) type or first alarm (ALM1) with hold action selection (SL4)" should be set to "0000."
    The content of the "SL4" setting has priority over that of the "SL11" setting.

  - When setting the instrument to "Second alarm, SV alarm provided"
    "Second alarm (ALM2) type or second alarm (ALM2) with hold action selection (SL5)" should be set to "0000."
    The content of the "SL5" setting has priority over that of the "SL11" setting.

Factory set value : "0000"

Set value				Description	
			0	First alarm, SV alarm not provided	Selection of first alarm, SV alarm
			1	First alarm, SV alarm provided	
		0		First alarm, SV high alarm	Selection of first alarm, SV alarm type
		1		First alarm, SV low alarm	
	0			Second alarm, SV alarm not provided	Selection of second alarm, SV alarm
	1			Second alarm, SV alarm provided	
0				Second alarm, SV high alarm	Selection of second alarm, SV alarm type
1				Second alarm, SV low alarm	

2.4 Details of parameters in initialize code 1 (Cod = 1)

(1) SLH (Setting limiter [high limit])

CAUTIONS

- Set the limiter by referring to "Input range table" (P.19)
- Limiter setting becomes SLH ≧ SLL.

■ Setting method

Press the <R/S key to move the digit, then enter the high limit of the set value (SV) by pressing the UP or DOWN key.
The set value (SV) display unit shows the numeric value.

Factory set value varies depending on the instrument specification.

Input type		Setting range
Thermocouple input (TC)	K	0 to 1372 °C (0 to 2502 °F)
	J	0 to 1200 °C (0 to 2192 °F)
	R	0 to 1769 °C (0 to 3216 °F)
	S	0 to 1769 °C (0 to 3216 °F)
	B	0 to 1820 °C (0 to 3308 °F)
	E	0 to 1000 °C (0 to 1832 °F)
	N	0 to 1300 °C (0 to 2372 °F)
	T	-199.9 to +400.0 °C (-199.9 to +752.0 °F)
	W5Re/W26Re	0 to 2320 °C (0 to 4208 °F)
	PL II	0 to 1390 °C (0 to 2534 °F)
	U	-199.9 to +600.0 °C (-199.9 to +999.9 °F)
	L	0 to 900 °C (0 to 1652 °F)
RTD input	Pt100 Ω (JIS/IEC)*1	-199.9 to +649.0 °C (-199.9 to +999.9 °F)
	JPt100 Ω (JIS)	-199.9 to +649.0 °C (-199.9 to +999.9 °F)
Voltage input	0 to 5V DC	-1999 to +9999 (programmable scale)
	1 to 5V DC	
Current input	0 to 20 mA DC*2	-1999 to +9999 (programmable scale)
	4 to 20 mA DC*2	

*1 : IEC (International Electrotechnical Commission) is equivalent to JIS, DIN and ANSI.

*2 : For the current input specification, a resistor of 250 Ω must be connected between the input terminals.

(2) SLL (Setting limiter [low limit])

CAUTIONS

- Set the limiter by referring to "Input range table." (P.19)
- Limiter setting becomes SLH ≧ SLL.

■ Setting method

Press the <R/S key to move the digit, then enter the low limit value of input range by pressing the UP or DOWN key.
The set value (SV) display unit shows the numeric value.

Factory set value varies depending on the instrument specification.

Input type		Setting range
Thermocouple input (TC)	K	0 to 1372 °C (0 to 2502 °F)
	J	0 to 1200 °C (0 to 2192 °F)
	R	0 to 1769 °C (0 to 3216 °F)
	S	0 to 1769 °C (0 to 3216 °F)
	B	0 to 1820 °C (0 to 3308 °F)
	E	0 to 1000 °C (0 to 1832 °F)
	N	0 to 1300 °C (0 to 2372 °F)
	T	-199.9 to +400.0 °C (-199.9 to +752.0 °F)
	W5Re/W26Re	0 to 2320 °C (0 to 4208 °F)
	PL II	0 to 1390 °C (0 to 2534 °F)
	U	-199.9 to +600.0 °C (-199.9 to +999.9 °F)
	L	0 to 900 °C (0 to 1652 °F)
RTD input	Pt100 Ω (JIS/IEC)*1	-199.9 to +649.0 °C (-199.9 to +999.9 °F)
	JPt100 Ω (JIS)	-199.9 to +649.0 °C (-199.9 to +999.9 °F)
Voltage input	0 to 5 V DC	-1999 to +9999 (programmable scale)
	1 to 5 V DC	
Current input	0 to 20 mA DC*2	-1999 to +9999 (programmable scale)
	4 to 20 mA DC*2	

*1 : IEC (International Electrotechnical Commission) is equivalent to JIS, DIN and ANSI.

*2 : For the current input specification, a resistor of 250 Ω must be connected between the input terminals.

■ Input range table

①Thermocouple input (TC)

Type	Input range	Type	Input range
K	0 to 200 °C	B	400 to 1800 °C
K	0 to 400 °C	B	0 to 1820 °C *1
K	0 to 600 °C	B	800 to 3200 °F
K	0 to 800 °C	B	0 to 3308 °F *1
K	0 to 1000 °C	E	0 to 800 °C
K	0 to 1200 °C	E	0 to 1000 °C
K	0 to 1372 °C	E	0 to 1600 °F
K	0 to 100 °C	E	0 to 1832 °F
K	0 to 300 °C	N	0 to 1200 °C
K	0 to 450 °C	N	0 to 1300 °C
K	0 to 500 °C	N	0 to 2300 °F
K	0 to 800 °F	N	0 to 2372 °F
K	0 to 1600 °F	T	-199.9 to +400.0 °C *2
K	0 to 2502 °F	T	-199.9 to +100.0 °C *2
K	20 to 70 °F	T	-100.0 to +200.0 °C
J	0 to 200 °C	T	0.0 to 350.0 °C
J	0 to 400 °C	T	-199.9 to +752.0 °F *2
J	0 to 600 °C	T	-100.0 to +200.0 °F
J	0 to 800 °C	T	-100.0 to +400.0 °F
J	0 to 1000 °C	T	0.0 to 450.0 °F
J	0 to 1200 °C	T	0.0 to 752.0 °F
J	0 to 450 °C	W5Re/W26Re	0 to 2000 °C
J	0 to 800 °F	W5Re/W26Re	0 to 2320 °C
J	0 to 1600 °F	W5Re/W26Re	0 to 4000 °F
J	0 to 2192 °F	PL II	0 to 1300 °C
J	0 to 400 °F	PL II	0 to 1390 °C
J	0 to 300 °F	PL II	0 to 1200 °C
R	0 to 1600 °C *1	PL II	0 to 2400 °F
R	0 to 1769 °C *1	PL II	0 to 2534 °F
R	0 to 1350 °C *1	U	-199.9 to +600.0 °C *2
R	0 to 3200 °F *1	U	-199.9 to +100.0 °C *2
R	0 to 3216 °F *1	U	0.0 to 400.0 °C *2
S	0 to 1600 °C *1	U	-199.9 to +999.9 °F *2
S	0 to 1769 °C *1	U	-100.0 to +200.0°F *2
S	0 to 3200 °F *1	U	0.0 to 999.9 °F
S	0 to 3216 °F *1	Continued on the next page.	

Type	Input range
L	0 to 400 °C
L	0 to 800 °C
L	0 to 800 °F
L	0 to 1600 °F

*1 ···· 0 to 399 °C/0 to 799 °F : Accuracy is not guaranteed.
*2 ···· -199.9 to -100.0 °C/-199.9 to -158.0 °F : Accuracy is not guaranteed.

②RTD input

Type	Input range
Pt100 (JIS/IEC)	-199.9 to +649.0 °C
Pt100 (JIS/IEC)	-199.9 to +200.0 °C
Pt100 (JIS/IEC)	-100.0 to +50.0 °C
Pt100 (JIS/IEC)	-100.0 to +100.0 °C
Pt100 (JIS/IEC)	-100.0 to +200.0 °C
Pt100 (JIS/IEC)	0.0 to 50.0 °C
Pt100 (JIS/IEC)	0.0 to 100.0 °C
Pt100 (JIS/IEC)	0.0 to 200.0 °C
Pt100 (JIS/IEC)	0.0 to 300.0 °C
Pt100 (JIS/IEC)	0.0 to 500.0 °C
Pt100 (JIS/IEC)	-199.9 to +999.9 °F
Pt100 (JIS/IEC)	-199.9 to +400.0 °F
Pt100 (JIS/IEC)	-199.9 to +200.0 °F
Pt100 (JIS/IEC)	-100.0 to +100.0 °F
Pt100 (JIS/IEC)	-100.0 to +300.0 °F
Pt100 (JIS/IEC)	0.0 to 100.0 °F
Pt100 (JIS/IEC)	0.0 to 200.0 °F
Pt100 (JIS/IEC)	0.0 to 400.0 °F
Pt100 (JIS/IEC)	0.0 to 500.0 °F
JPt100 (JIS)	-199.9 to +649.0 °C
JPt100 (JIS)	-199.9 to +200.0 °C
JPt100 (JIS)	-100.0 to +50.0 °C
JPt100 (JIS)	-100.0 to +100.0 °C
JPt100 (JIS)	-100.0 to +200.0 °C
JPt100 (JIS)	0.0 to 50.0 °C
JPt100 (JIS)	0.0 to 100.0 °C
JPt100 (JIS)	0.0 to 200.0 °C
JPt100 (JIS)	0.0 to 300.0 °C
JPt100 (JIS)	0.0 to 500.0 °C

③Voltage input

Type	Input range
0 to 5 V DC	0.0 to 100.0 %
1 to 5 V DC	

④Current input

Type	Input range
0 to 20 mA DC	0.0 to 100.0 %
4 to 20 mA DC	

*For the current input specification, a resistor of 250 Ω must be connected between the input terminals.

(3) PGdP (Setting the position of decimal point)

CAUTION

- The set position of the decimal point is displayed only for current or voltage input.
- Any digits other than the units digit are not used. As malfunction may result, do not change any of these digits.

Factory set value : "0001"

Set value	Description	
0 0 0 0	No digit below decimal point	Setting the position of decimal point
0 0 0 1	1 digit below decimal point	
0 0 1 0	2 digits below decimal point	
0 0 1 1	3 digits below decimal point	
0 1 0 0	Fixed	

(4) Oh (Differential gap setting of ON/OFF action)

[Setting range]
①TC and RTD inputs : 0 to 100 or 0.0 to 100.0
②Voltage and current inputs : 0.0 to 10.0 of span

[Factory set value]
①TC and RTD inputs : 2 or 2.0
②Voltage and current inputs : 0.2

(5) AH1 (Differential gap setting of first alarm [ALM1])

CAUTION

Not displayed when there is no first alarm (ALM1).
(SL4 setting : "0000" or SL11 setting : "□□□0.")

[Setting range]
①TC and RTD inputs : 0 to 100 or 0.0 to 100.0
②Voltage and current inputs : 0.0 to 10.0 of span

[Factory set value]
①TC and RTD inputs : 2 or 2.0
②Voltage and current inputs : 0.2

(6) AH2 (Differential gap setting of second alarm [ALM2])

CAUTION

Not displayed when there is no second alarm (ALM2).
(SL5 setting : "0000" or SL11 setting : "□0□□.")

[Setting range]
①TC and RTD inputs : 0 to 100 or 0.0 to 100.0
②Voltage and current inputs : 0.0 to 10.0 of span

[Factory set value]
①TC and RTD inputs : 2 or 2.0
②Voltage and current inputs : 0.2

(7) CTr (CT ratio setting)

Set the number of times that a wire is wound on to the hole of a CT.

CAUTION

Not displayed when there is no heater break alarm (HBA).

Setting range : 0 to 9999
Factory set value : CTL-6-P-N : 800
CTL-12-S56-10L-N : 1000

(8) dF (Digital filter setting)

Setting range : 0 to 100 sec (If "0" is set, the PV digital filter is turned off.)
Factory set value : 1

(9) STTM (Time factor assumed to be safe setting)

*Displayed when the self-tuning is provided.

This is the factor to adjust the reference time of establishing the stabilized state of a measured value. The larger the set value, the longer the time until the measured value is stabilized.

CAUTION

As this factor is so adjusted that the self-tuning result optimum to most controlled-objects is obtained, do not change it.

Setting range : 0 to 200
Factory set value : 100

(10) STPK (Factor to calculate proportional band setting)

*Displayed when the self-tuning is provided.

This is the factor to adjust the proportional band to be calculated by the self-tuning function. The larger the set value, the larger the proportional band thus calculated.

CAUTION

As this factor is so adjusted that the self-tuning result optimum to most controlled-objects is obtained, do not change it.

Setting range : 0 to 200
Factory set value : 67

(11) STIK (Factor to calculate derivative time setting)

*Displayed when the self-tuning is provided.

This is the factor to adjust the integral and derivative times to be calculated by the self-tuning function. The larger the set value, the larger the integral and derivative times thus calculated.

CAUTION

As this factor is so adjusted that the self-tuning result optimum to most controlled-objects is obtained, do not change it.

Setting range : 0 to 200
Factory set value : 16

2.5 Details of parameters in initialize code 2 (Cod=2)

Parameters in initialize code 2 are only displayed.

(1) TCJ (Holding peak ambient temperature)

The maximum ambient temperature on the rear terminal board of the instrument is stored and displayed on the set value (SV) display unit.

Display range : -10.0 to +100 °C
Display resolution : 1 °C

(2) WTH (Operating time display unit [Upper digits])

The integrated value (upper 2 digits) of power ON time is shown on the set value (SV) display unit.
If the total operating time exceeds 100,000 hours, the integrated operating time is reset.

Display range : 0000 to 0010 (Operating time from 0 to 100,000 hours can be displayed for both the upper and lower digits.)
Display resolution : 10,000 hours

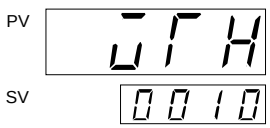
(3) WTL (Operating time display unit [Lower digits])

The integrated value (lower 4 digits) of power ON time is shown on the set value (SV) display unit.
If the total operating time exceeds 9,999 hours, these digits move to the operating time display unit [Upper digits] (WTH).

Display range : 0000 to 9999
Display resolution : 1 hours

■ Example : When the integrated value of operating time equals to 100,000 hours.
The upper 2 digits of 100,000 hours are shown on the operating time display unit [upper digits] (WTH) and the lower 4 digits are shown on the operating time display unit [lower digits].

Operating time display unit (Upper digits)



Operating time display unit (Lower digits)

3. COMMUNICATION INITIALIZE IDENTIFIER

■List of communication initialize identifiers

NOTES

- Note that there are identifiers which cannot be communicated depending on the specification. For details on the structure of communication data, see the instruction manual for "CB100/CB400/ CB500/CB700/CB900 communications" [IMCB03-E□].
- The number of digits is 6 for all data.

ID : Identifier (RO : Read only R/W : Read/write)

Name	ID	Data range	Factory set value	R/W
Initialization mode selection	IO	0 : RO 1 : R/W	0	R/W
Setting necessary code [Cod]	IP	0 to 2	0	R/W
Input type selection [SL1]	XI	0 to 15 See *1	To vary depending on the specification	R/W
Engineering unit and cooling type selection [SL2]	XQ	0 : °C (Air cooling) 1 : °F (Air cooling) 2 : °C (Water cooling) 3 : °F (Water cooling)	To vary depending on the specification	R/W
Heater break alarm (HBA), control loop break alarm (LBA), special specification, or control loop break alarm (LBA) output selection [SL3]	LV	0 : No function provided 1 : HBA provided 2 : LBA provided, LBA is output from "First alarm" 5 : HBA (Z-132 specification) provided 10 : LBA provided, LBA is output from "Second alarm"	To vary depending on the specification	R/W
First alarm (ALM1) type or First alarm (ALM1) with hold action selection [SL4]	XA	0 to 15 See *2	To vary depending on the specification	R/W
Second alarm (ALM2) type or Second alarm (ALM2) with hold action selection [SL5]	XB	0 to 15 See *2	To vary depending on the specification	R/W

Continued on the next page.

ID : Identifier (RO : Read only R/W : Read/write)

Name	ID	Data range	Factory set value	R/W
Control action type selection [SL6]	CA	0 to 15 See *3	To vary depending on the specification	R/W
Energized/de-energized alarm selection, special specification selection 1 [SL7]	Z1	0 to 15 See *4	0	R/W
Special specification selection 2 [SL8]	Z2	0 : Z-185 specification not provided 2 : Z-185 specification provided	0	R/W
Special specification selection 3 [SL9]	Z3	0 : Z-168 specification provided 1 : Z-168 specification not provided	0	R/W
Option selection [SL10]	DH	0 to 13 See *5	0	R/W
SV alarm type selection [SL11]	XC	0 to 15 See *6	0	R/W
Setting limiter (high limt) [SLH]	XV	See "Input range table" (P.19, 20, 21)	To vary depending on the specification	R/W
Setting limiter (low limit) [SLL]	XW			
Setting the position of decimal point [PGdP]	XU	0 : No digit below decimal point 1 : 1 digit below decimal point 2 : 2 digits below decimal point 3 : 3 digits below decimal point	1	R/W
Differential gap setting of ON/OFF action [oH]	MH	● For TC/RTD inputs : 0 (0.0) to100 (100.0) °C [°F] ● For voltage/current inputs : 0.0 to 10.0% of span	See *7	R/W
Differential gap setting of first alarm (ALM1) [AH1]	HA	● For TC/RTD inputs : 0 (0.0) to100 (100.0) °C [°F] ● For voltage/current inputs : For voltage/current inputs : 0.0 to 10.0% of span	See *7	R/W
Differential gap setting of second alarm (ALM2) [AH2]	HB			
CT ratio setting [CTr]	XR	0 to 9999	See *8	R/W
Digital filter setting [dF]	F1	0 to 100 sec	0	R/W
Time factor assumed to be safe setting [STTM]	GH	0 to 200	100	R/W

Continued on the next page.

ID : Identifier (RO : Read only R/W : Read/write)

Name	ID	Data range	Factory set value	R/W
Factor to calculate proportional band setting [STPK]	PU	0 to 200	67	R/W
Factor to calculate derivative time setting [STIK]	IU	0 to 200	16	R/W
Holding peak ambient temperature [TCJ]	HP	-10 to +100°C	0	RO
Operating time display unit (Upper digits) [WTH]	UT	0 to 10	0	RO
Operating time display unit (Lower digits) [WTL]	UU	0 to 9999	0	RO

*1...

Input type		Set value
Thermocouple input (TC)	K	0
	J	1
	L	2
	E	3
	N	4
	T	5
	U	6
	R	7
	S	8
	B	9
	W5Re/W26Re	10
	PL II	11
RTD input (RTD)	Pt100 Ω (JIS/IEC)	12
	JPt100 Ω (JIS)	13
Voltage input	0 to 5 V DC	14
	1 to 5 V DC	15
Current input	0 to 20 mA DC	14
	4 to 20 mA DC	15

*2... 0 : No alarm 7 : Process low alarm

1 : Deviation high alarm	9 : Deviation high alarm with hold action
2 : Deviation high/low alarm	10 : Deviation high/low alarm with hold action
3 : Process high alarm	11 : Process high alarm with hold action
5 : Deviation low alarm	13 : Deviation low alarm with hold action
6 : Band alarm	15 : Process low alarm with hold action

•Do not set 4, 8, 12 or 14. Malfunction may result.

*3... 0 : PID action with autotuning (Direct action), time proportioning output (relay contact output, voltage pulse output, trigger (for triac driving) output or triac output.
1 : PID action with autotuning (Reverse action), time proportioning output (relay contact output, voltage pulse output, trigger (for triac driving) output or triac output.
3 : Heat/cool PID action with autotuning, heat-side time proportioning output (relay contact output, voltage pulse output, triac output or trigger [for triac driving]) or cool-side time proportioning output (relay contact output, voltage pulse output, triac output).
4 : PID action with autotuning (Direct action) or current output.
5 : PID action with autotuning (Reverse action) or current output.
7 : Heat/cool PID action with autotuning, heat-side current output or cool-side time proportioning output (relay contact output, voltage pulse output, triac output).
11 : Heat/cool PID action with autotuning, heat-side time proportioning output (relay contact output, voltage pulse output, trigger [for triac driving] output or triac output) or cool-side current output.
15 : Heat/cool PID action with autotuning, heat-side current output or cool-side current output.

*4... 0 : First alarm (Energized alarm), second alarm (Energized alarm)
1 : First alarm (De-energized alarm), second alarm (Energized alarm)
2 : First alarm (Energized alarm), second alarm (De-energized alarm)
3 : First alarm (De-energized alarm), second alarm (De-energized alarm)
4 : First alarm (Energized alarm, Z-124 specification provided), second alarm (Energized alarm)
5 : First alarm (De-energized alarm, Z-124 specification provided), second alarm (Energized alarm)
6 : First alarm (Energized alarm, Z-124 specification provided), second alarm (De-energized alarm)
7 : First alarm (De-energized alarm, Z-124 specification provided), second alarm (De-energized alarm)
8 : First alarm (Energized alarm), second alarm (Energized alarm, Z-124 specification provided)
9 : First alarm (De-energized alarm), second alarm (Energized alarm, Z-124 specification provided)
10 : First alarm (Energized alarm), second alarm (De-energized alarm, Z-124 specification provided)
11 : First alarm (De-energized alarm), second alarm (De-energized alarm, Z-124 specification provided)
12 : First alarm (Energized alarm, Z-124 specification provided), second alarm (Energized alarm, Z-124 specification provided)
13 : First alarm (De-energized alarm, Z-124 specification provided), second alarm (Energized alarm, Z-124 specification provided)
14 : First alarm (Energized alarm, Z-124 specification provided), second alarm (De-energized alarm, Z-124 specification provided)
15 : First alarm (De-energized alarm, Z-124 specification provided), second alarm (De-energized alarm Z-124 specification provided)

*5... 0 : None
1 : RUN/STOP function provided
4 : Communication function provided
5 : RUN/STOP function provided, Communication function provided
8 : Self-tuning provided
9 : RUN/STOP function provided, Self-tuning provided
12 : Communication function provided, Self-tuning provided
13 : RUN/STOP function provided, Communication function provided, Self-tuning provided

*6... 0 : None
1 : First alarm (SV high alarm)
3 : First alarm (SV low alarm)
4 : Second alarm (SV high alarm)
5 : First alarm (SV high alarm), second alarm (SV high alarm)
7 : First alarm (SV low alarm), first alarm (SV high alarm)
12 : Second alarm (SV low alarm)
13 : First alarm (SV high alarm), second alarm (SV low alarm)
15 : First alarm (SV low alarm), second alarm (SV low alarm)

*7... TC, RTD input : 2 or 2.0
Voltage, current input : 0.2

*8... CTL-6-P-N : 800
CTL-12-S56-10L-N : 1000

RKC INSTRUMENT INC.

HEAD OFFICE: 16-6, KUGAHARA 5-CHOME, OHTA-KU TOKYO 146-8515 JAPAN
PHONE: 03-3751-9799 (+81 3 3751 9799)
E-mail: info@rkcinst.co.jp
FAX: 03-3751-8585 (+81 3 3751 8585)

IMCB04-E2 **OCT.1998**