Digital Controller

CB103/CB403
CB903

Initial Setting Manual

RKC® RKC INSTRUMENT INC.

IMCB12-E3

Thank you for purchasing the RKC instrument. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place this manual in a convenient location for easy reference.

SYMBOLS

WARNING : This mark indicates precautions that must be taken if there is danger of electric shock, fire, etc., which could result in loss of life or injury.

CAUTION : This mark indicates that if these precautions and operating procedures are not taken, damage to the instrument may result.

 : This mark indicates that all precautions should be taken for safe usage.

 : This mark indicates important information on installation, handling and operating procedures.

 : This mark indicates supplemental information on installation, handling and operating procedures.

 : This mark indicates where additional information may be located.

⚠ WARNING

- An external protection device must be installed if failure of this instrument could result in damage to the instrument, equipment or injury to personnel.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to instrument and equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to instrument and equipment.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Do not touch high-voltage connections such as power supply terminals, etc. to avoid electric shock.
- RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction can occur and warranty is void under these conditions.

CAUTION

- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take adequate measures.
- This instrument is protected from electric shock by reinforced insulation. Provide reinforced insulation between the wire for the input signal and the wires for instrument power supply, source of power and loads.
- Be sure to provide an appropriate surge control circuit respectively for the following:
  - If input/output or signal lines within the building are longer than 30 meters.
  - If input/output or signal lines leave the building, regardless the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock by operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- All wiring must be in accordance with local codes and regulations.
- All wiring must be completed before power is turned on to prevent electric shock, instrument failure, or incorrect action.
  The power must be turned off before repairing work for input break and output failure including replacement of sensor, contactor or SSR, and all wiring must be completed before power is turned on again.
- To prevent instrument damage or failure, protect the power line and the input/output lines from high currents with a protection device such as fuse, circuit breaker, etc.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dispensation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the instrument.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push front panel with a hard object.
- Do not connect modular connectors to telephone line.

NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for purpose of illustration.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.

CONTENTS

MEMO

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

The ▭ section in each picture is dimly lit.

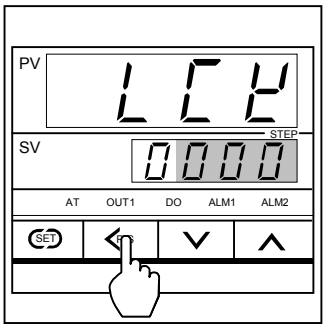
1. Turn on the power to this instrument. Thus, the input type, input range and PV/SV display mode change in this order.

2. Press the SET key for two seconds 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 **CB103/CB403/ CB903 (IMCB11-E□)**.

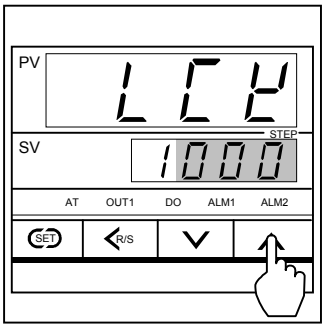
3. Press the SET key to change to the set data lock function display (*LCK*).

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



Set data lock function display

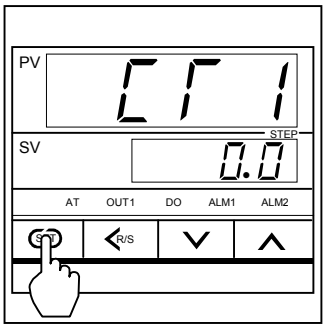
5. Press the UP key to change *0* to *1* in the thousands digit.



Set data lock function display

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

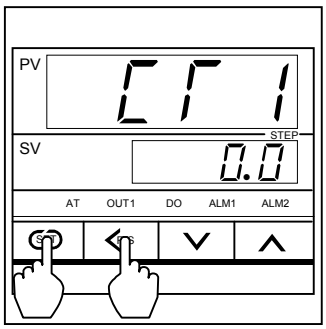
6. Press the SET key to change to the next parameter. Thus, the data in initialization mode is unlocked.



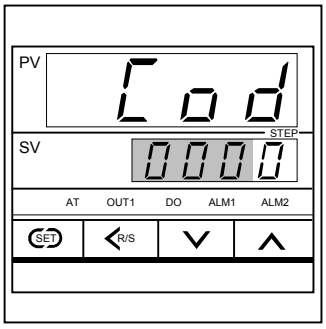
CT1 input value display

The parameter to be displayed varies depending on the specification.

7. Press the <R/S key while pressing the SET key for two seconds to change the instrument to initialization mode. Thus, the symbol (*Cod*) for selecting the initialize code is displayed first.



CT1 input value display



Initialize code selection display of initialization mode

1.2 End of Initialization Mode

If the setting is changed, always check all of the set values (SV setting mode, parameter setting mode).

The [ ] section in each picture is dimly lit.

1. After each parameter is set, keep pressing the <R/S key for two seconds while pressing the SET key to change the present mode to the PV/SV display mode.

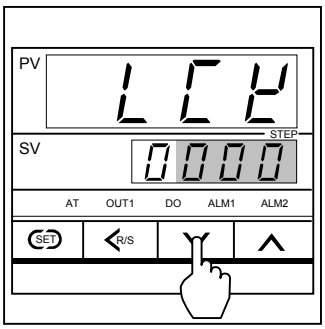
2. Press the SET key for two seconds in the PV/SV display mode state to transfer to parameter setting mode.

3. Press the SET key to transfer to the set data lock function display (*LCK*).

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

☞ See ***4.*** on P. 1.

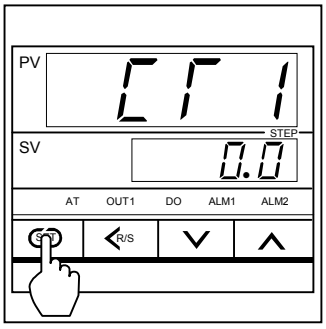
5. Press the DOWN key to set the numeric value corresponding to the thousands digit to *0* from *1*.



Set data lock function display

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

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



CT1 input value display

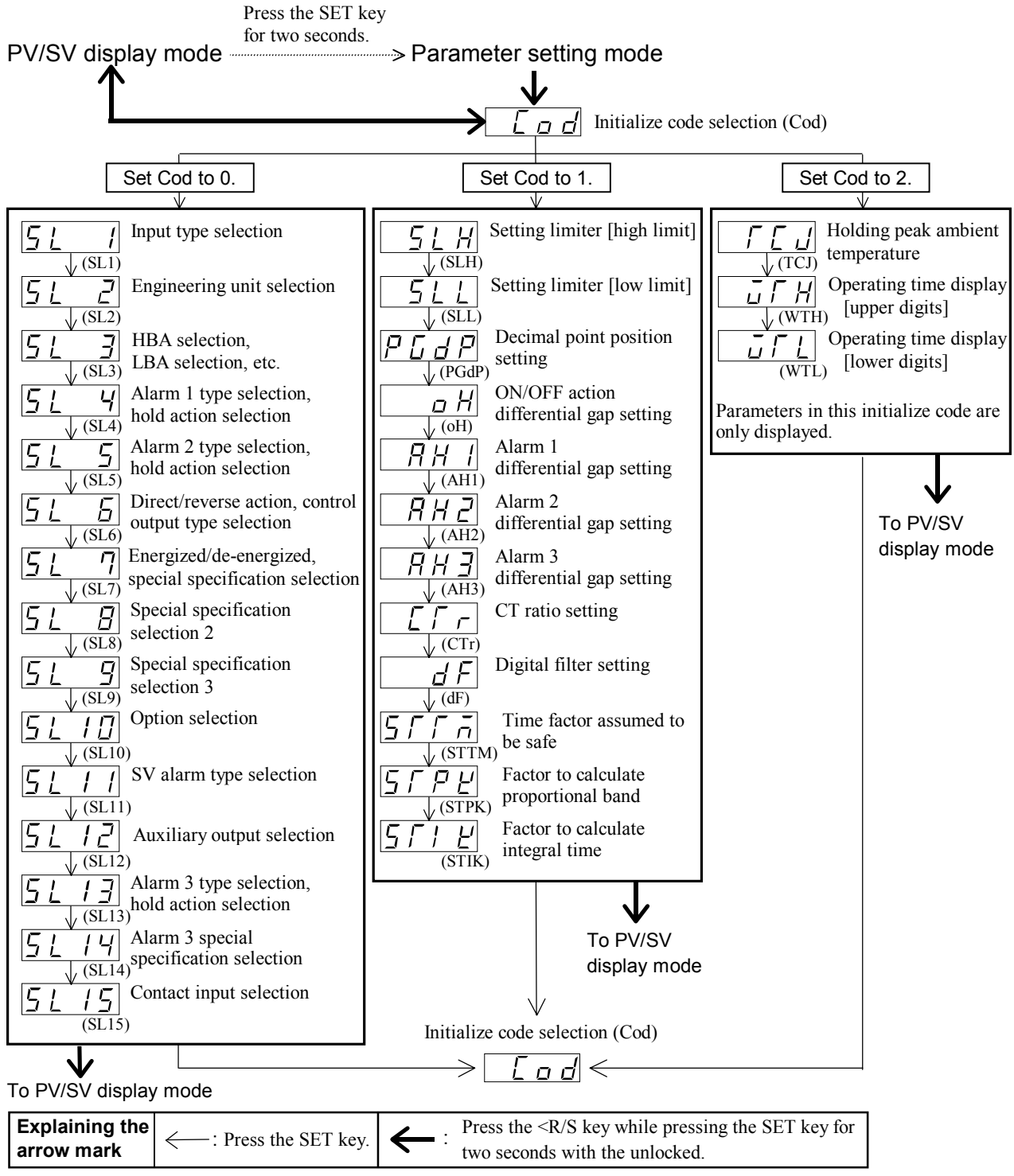
The parameter to be displayed varies depending on the specification.

2. SETTING

2.1 Display Flowcharts in Initialization Mode

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.

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

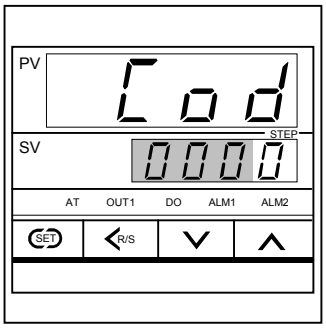


2.2 Procedure for Setting Each Parameter

[Example of changing the setting]
When the display unit shows *SL1* (Input type selection) in initialize code *0*, the following procedure is for changing the input type from K to J.

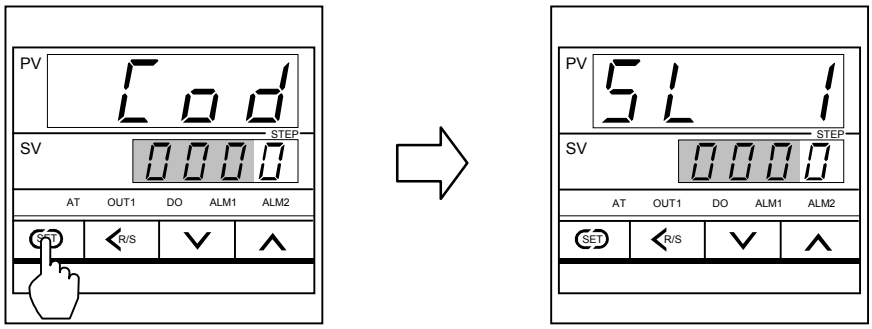
The ▭ section in each picture is dimly lit.

1. Change the instrument to the initialize code selection display.
☞ See **1.1 Transfer to Initialization Mode** on page 1.



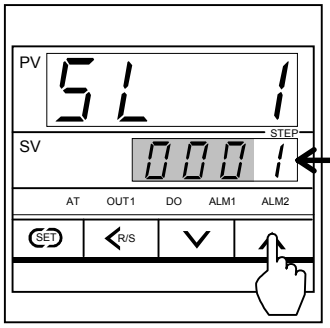
Initialize code selection display

2. As *SL1* 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 *SL1*.



Initialize code selection display　　Input type selection

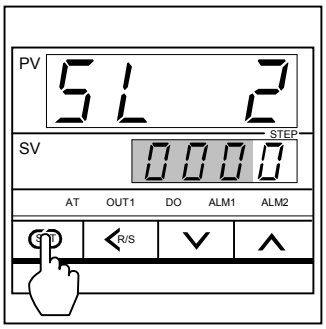
3. Press the UP key to enter *1* in the units digit of the set value (SV) display unit.



Set value	Input type
0 0 0 0	K
0 0 0 1	J
0 0 1 0	L

Input type selection

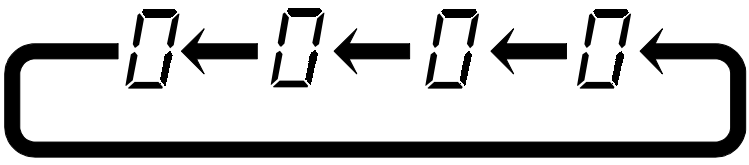
4. Press the SET key to change to the next parameter. Thus, the set value is registered.



Engineering unit selection

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

If the set value corresponds to any digit other than the units digit, press the shift key to move the brightly lit digit. The brightly lit digit moves as follows every time the shift key is pressed.



2.3 List of Parameters in Initialize Code 0 (Cod = 0)

(1) SL1 (Input type selection)

Conduct the setting so that it matches the instrument specification (input type). If the setting is changed, always check all of the set values (SV setting mode, parameter setting mode).

Factory set value varies depending on the input type.

Set value				Input type	
0	0	0	0	K	TC input *1
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 *1
1	1	0	1	JPt100 Ω (JIS)	
1	1	1	0	0 to 5 V DC	Voltage input *1
1	1	1	0	0 to 10 V DC *2	
1	1	1	1	1 to 5 V DC	
1	1	1	0	0 to 20 mA DC	Current input *1, *3
1	1	1	1	4 to 20 mA DC	

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

*2 For the 0 to 10 V DC (Z-1010 specification), the input type cannot be changed as the hardware differs.

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

(2) SL2 (Engineering unit selection)

The tens, hundreds and thousands digits are not used. As malfunction may result, do not change these digits.

Factory set value varies depending on the instrument specification.

Set value				Description
			0	°C
			1	°F
0	0	0		000□ Fixed

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

Cannot be used the heater break alarm (HBA) for the following instruments.
- Instrument without the alarm 2 (ALM2) output.
- Instrument of the process alarm, deviation alarm, band alarm, SV alarm or control loop break alarm (LBA) is used as the alarm 2 (ALM2).
- Instrument whose control output is the current output type.

Cannot be used the control loop break alarm (LBA) for the following instruments.
- Instrument without both the alarm 1 (ALM1) output and the alarm 2 (ALM2) output.
- Instrument of the process alarm, deviation alarm or band alarm is used as the alarm 1 (ALM1).
- Instrument of the process alarm, deviation alarm, band alarm or heater break alarm (HBA) is used as the alarm 2 (ALM2).

Cannot be output the control loop break alarm (LBA) from the alarm 1 (ALM1) for the following instruments.
- Instrument without the alarm 1 (ALM1) output.
- Instrument of the process alarm, deviation alarm, band alarm or SV alarm is used as the alarm 1 (ALM1).

Cannot be output the control loop break alarm (LBA) from the alarm 2 (ALM2) for the following instruments.
- Instrument without the alarm 2 (ALM2) output.
- Instrument of the process alarm, deviation alarm, band alarm, SV alarm or heater break alarm (HBA) is used as the alarm 2 (ALM2).
- Instrument with the Z-168 specification.

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 *1	
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 *2	Special specification selection
1	Z-132 specification provided *3	
0	LBA is output from first alarm	Selection of control loop break alarm (LBA) output terminals
1	LBA is output from second alarm	

*1 When be shipped with “heater break alarm (HBA) provided,” “Z-132 specification provided” is set.

*2 Normal HBA action.

*3 If heater break or welding continues for more than 3 seconds, a heater break alarm (HBA) will occur.

(4) SL4 (Alarm 1 [ALM1] type selection, hold action selection)

The following instrument is set to 0000.
- Instrument without the alarm 1 (ALM1) output.
- Instrument of the SV alarm or control loop break alarm (LBA) is used as the alarm 1 (ALM1).

Factory set value varies depending on the instrument specification.

Set value				Description	
	0	0	0	Alarm 1 (ALM1) not provided	Alarm 1 (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	Alarm 1 (ALM1) hold action selection
1				With alarm hold action	

(5) SL5 (Alarm 2 [ALM2] type selection, hold action selection)

The following instrument is set to 0000.
- Instrument without the alarm 2 (ALM2) output.
- Instrument of the SV alarm, heater break alarm (HBA) or control loop break alarm (LBA) is used as the alarm 2 (ALM2).
- Instrument with the Z-168 specification.

Factory set value varies depending on the instrument specification.

Set value				Description	
	0	0	0	Alarm 2 (ALM2) not provided	Alarm 2 (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	Alarm 2 (ALM2) hold action selection
1				With alarm hold action	

(6) SL6 (Direct/reverse action selection, control output type selection)

Conduct setting so as to meet the instrument specification. An incorrect setting may cause a malfunction.

The tens and thousands digits are not used. As malfunction may result, do not change these digits.

Factory set value varies depending on the instrument specification.

Set value				Description		
			0	Direct action (D type)	*1	Direct/reverse action selection
			1	Reverse action (F type)	*2	
	0			Time proportioning output (M, V, G, T output)	*3	Control output type selection
	1			Continuous output (Current output : 4 to 20 mA DC)		
0		0		0□0□ Fixed		

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

*2 F type: PID action with autotuning (Reverse action)

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

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

The following instrument is set to 0000.
Instrument without both the alarm 1 (ALM1) output and the alarm 2 (ALM2) output.

Factory set value varies depending on the instrument specification.

Set value				Description		
			0	First alarm energized alarm		First alarm energized/ de-energized alarm selection
			1	First alarm de-energized alarm		
		0		Alarm 2 energized alarm		Alarm 2 energized/ de-energized alarm selection
		1		Alarm 2 de-energized alarm		
	0			Alarm 1 Z-124 specification not provided	*1	Alarm 1 special specification selection
	1			Alarm 1 Z-124 specification provided	*2	
0				Alarm 2 Z-124 specification not provided	*1	Alarm 2 special specification selection
1				Alarm 2 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)

The units, hundreds and thousands digits are not used. As malfunction may result, do not change these digits.

Factory set value varies depending on the instrument specification.

Set value				Description		
		0		Z-185 specification not provided	*1	Special specification selection
		1		Z-185 specification provided	*2	
0	0		0	00□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 off when the burnout function is activated.

(9) SL9 (Special specification selection 3)

Any item set in the Z-168 specification has priority over that set in SL3 (heater break alarm selection).

The hundreds and thousands digits are not used. As malfunction may result, do not change these digits.

Factory set value varies depending on the instrument specification.

Set value				Description		
			0	Z-168 specification not provided	*1	Special specification selection
			1	Z-168 specification provided	*2	
		0		Z-1018 specification not provided		Display selection when operation stops (STOP).
		1		Z-1018 specification provided	*3	
0	0			00□□ Fixed		

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

*2 Heater break alarm for three-phase heater.

*3 When operation is changed to the STOP state by RUN/STOP selection, a parameter symbol to indicate the STOP state is displayed on the SV display unit.

(10) SL10 (Option selection)

The tens and hundreds digits are not used. As malfunction may result, do not change these digits.

Factory set value varies depending on the instrument specification.

Set value				Description	
			0	RUN/STOP function not provided	RUN/STOP function selection
			1	RUN/STOP function provided	
	0	0		□00□ Fixed	
0				Self-tuning not provided	Self-tuning function selection
1				Self-tuning provided	

(11) SL11 (SV alarm type selection)

The following instrument always set it to *0* : Alarm 1, SV alarm not provided.

- Instrument without the alarm 1 (ALM1) output.
- Instrument of the process alarm, deviation alarm, band alarm or control loop break alarm (LBA) is used as the alarm 1 (ALM1).

The following instrument always set it to *0* : Alarm 2, SV alarm not provided.

- Instrument without the alarm 2 (ALM2) output.
- Instrument of the process alarm, deviation alarm, band alarm, heater break alarm (HBA) or control loop break alarm (LBA) is used as the alarm 2 (ALM2).
- Instrument with the Z-168 specification.

The following conditions must be satisfied in order to effectuate SV alarm.

- SL4 (Alarm 1 [ALM1] type selection, hold action selection) should be set to 0000. The content of the SL4 setting has priority over that of the SL11 setting.
- SL5 (Alarm 2 [ALM2] type selection, hold action selection) should be set to 0000. The content of the SL5 setting has priority over that of the SL11 setting.

Factory set value varies depending on the instrument specification.

Set value				Description	
			0	Alarm 1, SV alarm not provided	Alarm 1, SV alarm selection
			1	Alarm 1, SV alarm provided	
		0		Alarm 1, SV high alarm	Alarm 1, SV alarm type selection
		1		Alarm 1, SV low alarm	
	0			Alarm 2, SV alarm not provided	Alarm 2, SV alarm selection
	1			Alarm 2, SV alarm provided	
0				Alarm 2, SV high alarm	Alarm 2, SV alarm type selection
1				Alarm 2, SV low alarm	

(12) SL12 (Auxiliary output selection)

The auxiliary output can not be used following instruments.
Instrument of the control output type is Trigger output for triac driving.

The hundreds digits is not used. As malfunction may result, do not change this digit.

Factory set value varies depending on the instrument specification.

Set value				Description	
		0	0	Auxiliary output not provided	Auxiliary output selection
		0	1	Alarm 3(ALM3)	
		1	0	Analog output	
		1	1	RUN/STOP state output	
	0			□0□□ Fixed	
0				Output relay ON at RUN state (Close)	Output direction at RUN/STOP state
1				Output relay ON at STOP state (Close)	

(13) SL13 (Alarm 3 [ALM3] type selection, hold action selection)

The following instrument is set to 0000.
Instrument of the alarm 3 (ALM3) is not selected in SL12 (Auxiliary output selection).

Factory set value varies depending on the instrument specification.

Set value				Description	
	0	0	0	Alarm 3 (ALM3) not provided	Alarm 3 (ALM3) 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	Alarm 3 (ALM3) hold action selection
1				With alarm hold action	

(14) SL14 (Alarm 3 [ALM3] special specification selection)

The following instrument is set to 0000.
Instrument of the alarm 3 (ALM3) are not selected in SL12 (Auxiliary output selection).

The tens and thousands digits are not used. As malfunction may result, do not change these digit.

Factory set value varies depending on the instrument specification.

Set value				Description	
			0	Alarm 3 energized alarm	Alarm 3 energized/ de-energized alarm selection
			1	Alarm 3 de-energized alarm	
	0			Alarm 3 Z-124 specification not provided	Alarm 3 special specification selection
	1			Alarm 3 Z-124 specification provided	
0		0		0□0□ Fixed	

*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.)

(15) SL15 (Contact input selection)

The hundreds digits is not used. As malfunction may result, do not change this digit.

Factory set value varies depending on the instrument specification.

Set value				Description	
			0	Contact input not provided	Contact input selection
			1	Contact input provided	
		0		RUN/STOP	Contact input type selection
		1		STEP (Contact open : SV1 Contact close : SV2)	
	0			□0□□ Fixed	
0				Contact close : RUN Contact open : STOP	Action selection at change the contact input
1				Contact close : STOP Contact open : RUN	

2.4 List of Parameters in Initialize Code 1 (Cod = 1)

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

☞ Set the limiter by referring to **Input range table** (P.17).

■ 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		SLL to 1372 °C (SLL to 2502 °F)
	J		SLL to 1200 °C (SLL to 2192 °F)
	R		SLL to 1769 °C (SLL to 3216 °F)
	S		SLL to 1769 °C (SLL to 3216 °F)
	B		SLL to 1820 °C (SLL to 3308 °F)
	E		SLL to 1000 °C (SLL to 1832 °F)
	N		SLL to 1300 °C (SLL to 2372 °F)
	T		SLL to 400.0 °C (SLL to 752.0 °F)
	W5Re/W26Re		SLL to 2320 °C (SLL to 4208 °F)
	PL II		SLL to 1390 °C (SLL to 2534 °F)
	U		SLL to 600.0 °C (SLL to 999.9 °F)
	L		SLL to 900 °C (SLL to 1652 °F)
RTD input	Pt100 Ω (JIS/IEC)	*1	SLL to 649.0 °C (SLL to 999.9 °F)
	JPt100 Ω (JIS)		SLL to 649.0 °C (SLL to 999.9 °F)
Voltage input	0 to 5 V DC		SLL to 9999 (programmable scale)
	0 to 10 V DC	*2	
	1 to 5 V DC		
Current input	0 to 20 mA DC	*3	SLL to 9999 (programmable scale)
	4 to 20 mA DC	*3	

SLL : Setting limiter [low limit]

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

*2 For the 0 to 10 V DC (Z-1010 specification), the input type cannot be changed as the hardware differs.

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

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

☞ Set the limiter by referring to **Input range table** (P.17).

■ 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 SLH °C (0 to SLH °F)
	J		0 to SLH °C (0 to SLH °F)
	R		0 to SLH °C (0 to SLH °F)
	S		0 to SLH °C (0 to SLH °F)
	B		0 to SLH °C (0 to SLH °F)
	E		0 to SLH °C (0 to SLH °F)
	N		0 to SLH °C (0 to SLH °F)
	T		−199.9 to SLH °C (−199.9 to SLH °F)
	W5Re/W26Re		0 to SLH °C (0 to SLH °F)
	PL II		0 to SLH °C (0 to SLH °F)
	U		−199.9 to SLH °C (−199.9 to SLH °F)
	L		0 to SLH °C (0 to SLH °F)
RTD input	Pt100 Ω (JIS/IEC)	*1	−199.9 to SLH °C (−199.9 to SLH °F)
	JPt100 Ω (JIS)		−199.9 to SLH °C (−199.9 to SLH °F)
Voltage input	0 to 5 V DC		−1999 to SLH (programmable scale)
	0 to 10 V DC	*2	
	1 to 5 V DC		
Current input	0 to 20 mA DC	*3	−1999 to SLH (programmable scale)
	4 to 20 mA DC	*3	

SLH : Setting limiter [high limit]

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

*2 For the 0 to 10 V DC (Z-1010 specification), the input type cannot be changed as the hardware differs.

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

■ Input range table

Thermocouple 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
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
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.

RTD 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

Voltage input

Type	Input range
0 to 5 V DC	0.0 to 100.0 %
0 to 10 V DC *	
1 to 5 V DC	

* For the 0 to 10 V DC (Z-1010 specification), the input type cannot be changed as the hardware differs.

Current 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 (Decimal point position setting)

The decimal point position setting is displayed only for voltage or current input.

Factory set value: 0001

Set value				Description	
			0	No digit below decimal point	Decimal point position setting
			1	1 digit below decimal point	
			2	2 digit below decimal point	
			3	3 digit below decimal point	
0	0	0		000□ Fixed	

(4) oH (ON/OFF action differential gap setting)

Setting range
TC and RTD inputs : 0 to 100 °C [°F] or 0.0 to 100.0 °C [°F]
Voltage and current inputs : 0.0 to 10.0 % of span

Factory set value
TC and RTD inputs : 2 °C [°F] or 2.0 °C [°F]
Voltage and current inputs : 0.2 %

(5) AH1 (Alarm 1 [ALM1] differential gap setting)

Not displayed when there is no alarm 1 (ALM1).

Setting range
TC and RTD inputs : 0 to 100 °C [°F] or 0.0 to 100.0 °C [°F]
Voltage and current inputs : 0.0 to 10.0 % of span

Factory set value
TC and RTD inputs : 2 °C [°F] or 2.0 °C [°F]
Voltage and current inputs : 0.2 %

(6) AH2 (Alarm 2 [ALM2] differential gap setting) *

📖 Not displayed when there is no alarm 2 (ALM2).

Setting range
TC and RTD inputs : 0 to 100 °C [°F] or 0.0 to 100.0 °C [°F]
Voltage and current inputs : 0.0 to 10.0 % of span

Factory set value
TC and RTD inputs : 2 °C [°F] or 2.0 °C [°F]
Voltage and current inputs : 0.2 %

(7) AH3 (Alarm 3 [ALM3] differential gap setting)

📖 Not displayed when the alarm 3 (ALM3) are not selected in SL12 (Auxiliary output selection).

Setting range
TC and RTD inputs : 0 to 100 °C [°F] or 0.0 to 100.0 °C [°F]
Voltage and current inputs : 0.0 to 10.0 % of span

Factory set value
TC and RTD inputs : 2 °C [°F] or 2.0 °C [°F]
Voltage and current inputs : 0.2 %

(8) CTr (CT ratio setting)

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

📖 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

(9) 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 sec

(10) STTM (Time factor assumed to be safe) *

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

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.

Setting range : 0 to 200
Factory set value : 100

* Displayed when the self-tuning is provided.

(11) STPK (Factor to calculate proportional band) *

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

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.

Setting range : 0 to 200
Factory set value : 67

* Displayed when the self-tuning is provided.

(12) STIK (Factor to calculate integral time) *

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

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.

Setting range : 0 to 200
Factory set value : 16

2.5 List 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. Displayed when input type is TC input.

Display range: −10 to +100 °C
Display resolution: 1 °C

(2) WTH (Operating time [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.

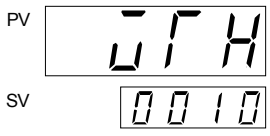
Display range: 0 to 10 (Operating time from 0 to 100000 hours can be displayed for both the upper and lower digits.)
Display resolution: 10,000 hours

(3) WTL (Operating time [lower digits])

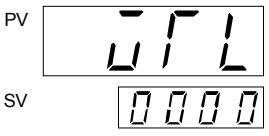
The integrated value (lower 4 digits) of power on time is shown on the set value (SV) display unit.
If the total operating time exceeds 9,999 hours, these digits move to the operating time display unit [upper digits] (WTH).

Display range: 0000 to 9999
Display resolution: 1 hour

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)

MEMO

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