Temperature Controller

SA200

Initial Setting Manual

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.
- 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.
- 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.

NOTICE

- This manual is written for RKC service engineers or qualified technicians. This manual is also prepared especially for readers who already have a fundamental knowledge of electricity, control, computer and communication.
- 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.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- 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. MODE TRANSFER

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 Engineering Mode

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

2. Press the SET key for two seconds change the instrument to parameter setting mode.
   ☞ For details on parameter setting mode, see **SA200 Instruction Manual (IMR01D01-E□)**.

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

4. Press the <R/S key to blink the thousands digit on the set value (SV) display.
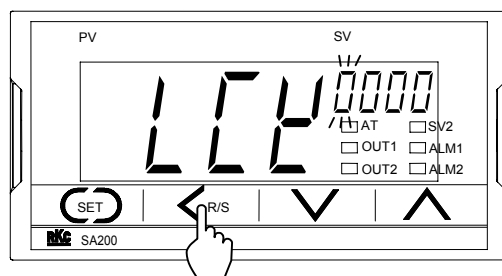
Set data lock function display

5. Press the UP key to change *0* to *1* in the thousands digit.
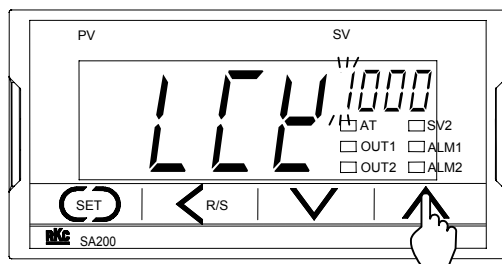
Set data lock function display

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

6. Press the SET key to change to the next parameter. Thus, the data in engineering mode is unlocked.
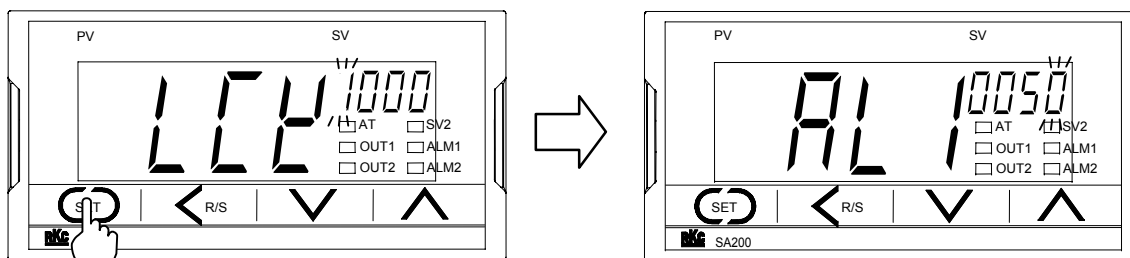
Set data lock function display

AL1 setting display

📖 The parameter to be displayed varies depending on the specification.

7. Press the SET key for two seconds to change to the PV/SV display mode.

8. Press the <R/S key for one second to change the operation mode from RUN mode to STOP mode.
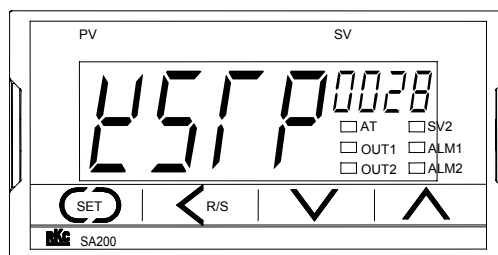
STOP mode display

📖 **Before the setting is changed in engineering mode, it is necessary to set the operation mode to the STOP mode.**

📖 **If "Set value" is set to 0002 (no selection from RUN to STOP by the front key can be made) by SPCH (STOP display selection) corresponding to *F10* (P. 12), perform the operation in item "*9.*" instead of performing the operation in item "*8.*"**
The operation in item "*9.*" forcibly results in the STOP state.

📖 The parameter to be displayed varies depending on the specification.

9. Press the <R/S key while pressing the SET key for two seconds to change the instrument to engineering mode. Thus, the symbol *F10* for function block is displayed first.
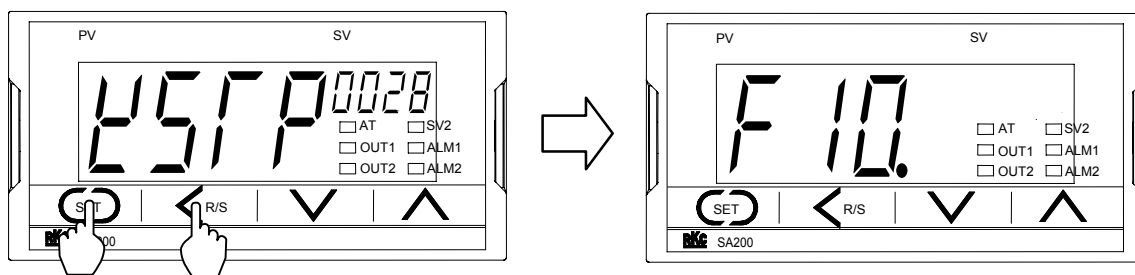
STOP mode display

Function block symbol
displayed engineering mode

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1.2 End of Engineering Mode

1. Transfer to function block symbol display (*F▢▢*) after each parameter is set.

2. Press the <R/S key while pressing the SET key for two seconds transfer to PV/SV display mode.

3. Press the SET key for two seconds 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 (*LCK*).

5. Press the <R/S key to blink the thousands digit on the set value (SV) display .
　☞　See **1.1 Transfer to Engineering Mode (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

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

Set data lock function display　　　　　　　　AL1 setting display

📖 The parameter to be displayed varies depending on the specification.

2. SETTING

2.1 Display Flowcharts in Mode

Display flowcharts in engineering mode are shown in the following. For the details of engineering mode selection, see **1.1 Transfer to Engineering Mode (P. 1).**

■ Display flowcharts

Parameter setting mode ← - - - - - - - - - → PV/SV display mode

Press the SET key for 2 seconds

(Press the <R/S key for 1 second)

Set the STOP mode.

Press the <R/S key while pressing the SET key for 2 seconds

Engineering mode

	STOP display screen selection	Monitor display configuration selection	MV display selection	
F 10. (F10)	**SPCH** 0000 (SPCH)	**dCHG** 0000 (dCHG)	**MVd** 0000 (MVd)	Return to the *F10*

	Input type selection	Display unit selection	Decimal point position setting	Setting limiter [high limit]	Setting limiter [low limit]	
F21 (F21)	**InP** 0000 (InP)	**UnIT** 0000 (UnIT)	**PGdP** 0000 (PGdP)	**SLH** 1372 (SLH)	**SLL** 0000 (SLL)	Return to the *F21*

	Selection of output logic calculation	
F30. (F30)	**LoGC** 001 (LoGC)	Return to the *F30*

	Alarm 1 type selection	Alarm 1 hold action	Alarm 1 differential gap	Alarm 1 process abnormality action	
F41 (F41)	**AS1** 0000 (AS1)	**AHo1** 0000 (AHo1)	**AH1** 0002 (AH1)	**AEo1** 0000 (AEo1)	Return to the *F41*

	Alarm 2 type selection	Alarm 2 hold action	Alarm 2 differential gap	Alarm 2 process abnormality action	
F42. (F42)	**AS2** 0000 (AS2)	**AHo2** 0000 (AHo2)	**AH2** 0002 (AH2)	**AEo2** 0000 (AEo2)	Return to the *F42*

	Control action type selection	ON/OFF action differential gap	
F51 (F51)	**oS1** 0001 (oS1)	**oH** 0002 (oH)	Return to the *F51*

	Communication protocol selection	
F61 (F61)	**CMPS** 0000 (CMPS)	Return to the *F61*

	Setting change rate limiter Used/Unused	Setting change rate limiter time	
F71 (F51)	**SVrS** 0000 (SVrS)	**SVrT** 0060 (SVrT)	Return to the *F71*

	ROM version	Integrated operating time	Holding peak ambient temperature	
F91 (F91)	**E227** 0000 (E227)	**WT** 0000 (WT)	**TCJ** (TCJ)	Return to the *F91*

Explaining the arrow mark

→ : Press the SET key

↕ : Press the UP key or DOWN key

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2.2 Example of Changing the Setting

When the display unit shows *InP* (Input type selection) in function block *F21*, the following procedure is for changing the input type from "K" to "J."
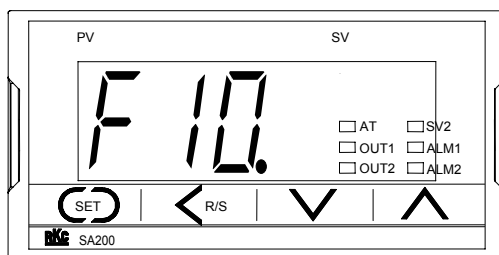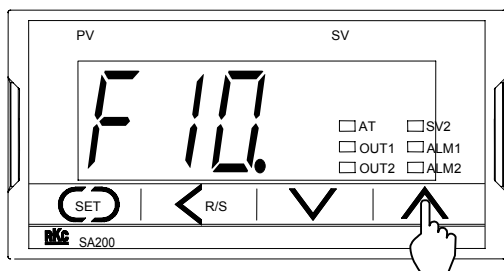
1. Change the instrument to the function block symbol display.
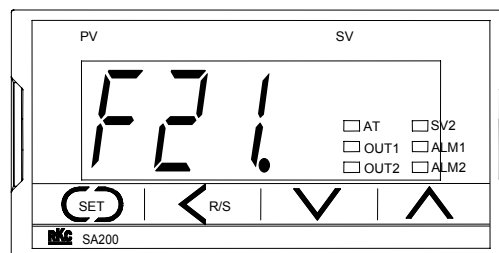☞ See **1.1 Transfer to Engineering Mode (P. 1)**.

Function block symbol display

2. As *InP* belongs to the *F21*, press the UP key to change the display from *F10* to *F21*.

Function block symbol display

Function block symbol display

3. Press the SET key to change to *InP*.
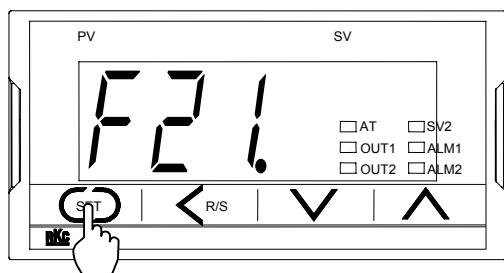
Function block symbol display
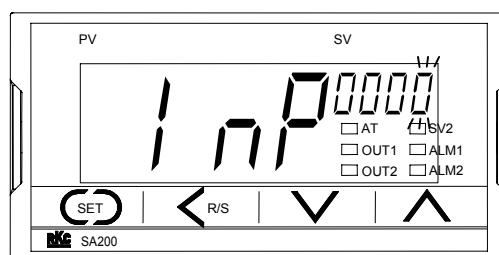
Input type selection

4. Press the UP key to enter *1* in the units digit of the set value (SV) display.
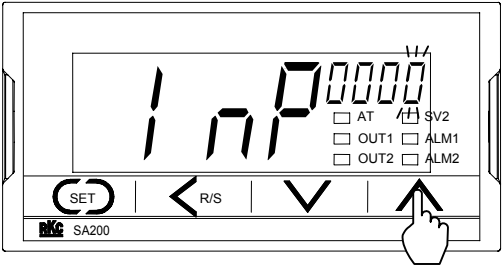
Input type selection
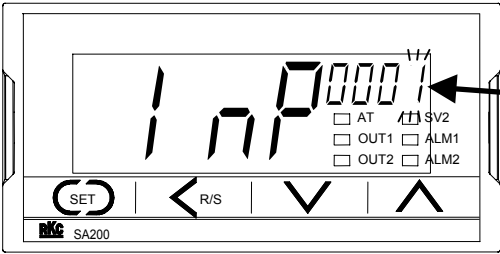
InP (Input type selection)

Set value		Input type
0	0	K
0	1	J
0	2	R

Input type selection

5. Press the SET key to change to the next parameter. Thus, the set value is registered.
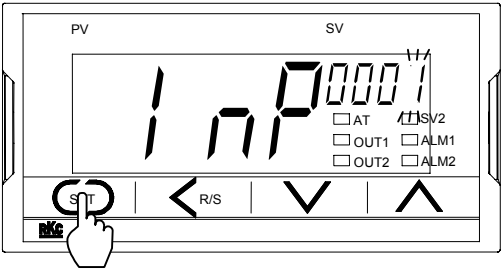
Input type selection
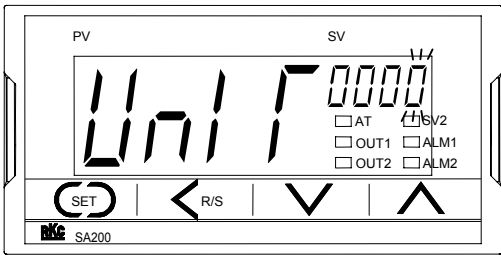
Display unit selection

2.3 Attention Items in Setting

If any of the following settings is changed, the relevant set value is initialized or is automatically converted.

> 📖 **Before changing the set values, always record all of them (SV setting mode, parameter setting mode and engineering mode).**

> 📖 **After changing the set values, always check all of them (SV setting mode, parameter setting mode and engineering mode).**

■ When the input type or engineering unit is changed

The set value is initialized.

| Mode	Description	Default value	
		Temperature input	**Voltage/current inputs**
Engineering mode	Decimal point position (PGdF)	0 (Without decimal point)	1
	Setting limiter [high limit] (SLH)	Maximum settable value	100.0
	Setting limiter [low limit] (SLL)	Minimum settable value	0.0
	Alarm 1 hold action selection (AHo1)	0 (Without alarm hold action)	
	Alarm 1 differential gap (AH1)	2 °C [°F]	0.2 % of span
	Alarm 1 process abnormality action (AEo1)	Alarm 1 not provided or LBA: 0 (Normal) Alarm 1 provided: 1 (Forcibly turned on)	
	Alarm 2 hold action selection (AHo2)	0 (Without alarm hold action)	
	Alarm 2 differential gap (AH2)	2 °C [°F]	0.2 % of span
	Alarm 2 process abnormality action (AEo2)	Alarm 2 not provided: 0 (Normal) Alarm 2 provided: 1 (Forcibly turned on)	
	ON/OFF action differential gap (oH)	2 °C [°F]	0.2 % of span
Parameter setting mode	Alarm 1 set value (ALM1)	50 °C [°F]	5.0 % of span
	Alarm 2 set value (ALM2)		
	Control loop break alarm (LBA)	8.0 minutes	
	LBA deadband (LBD)	0 °C [°F]	0.0
	Heat-side proportional band (P)	30 °C [°F]	3.0 % of span
	Integral time (I)	240 seconds	
	Derivative time (D)	60 seconds	
	Anti-reset windup (ARW)	100 %	
	Deadband (db)	0 °C [°F]	0.0
	Cool-side proportional band (Pc)	100 %	
	PV bias (Pb)	0 °C [°F]	0.0
	Digital filter (dF)	0 second (off)	

Continued from the previous page.

Mode	Description		Default value	
			Temperature input	Voltage/current inputs
Parameter setting mode	Analog output scale high (AHS)		Maximum settable value	100.0
	Analog output scale low (ALS)		Minimum settable value	0.0
	Setting change rate limiter [up] (SVrU)		0 °C [°F]	0.0
	Setting change rate limiter [down] (SVrd)		0 °C [°F]	0.0
PV/SV display mode, SV setting mode	Set value (SV)	STEP function not provided	0 °C [°F]	0.0
	Set value (SV1)	STEP function provided		
	Set value (SV2)			

■ When the setting limiter is changed

If the setting limiter [high limit] (SLH) or setting limiter [low limit] (SLL) is changed as follows, the related set values are changed. (See Table 1)

Only for temperature input:

- If SLH is set to SLH<SLL, it is changed to SLH=SLL.

  Example: If SLL is set to 200 with SLH set to 100, SLH is changed to 200.

- If SLL is set to SLH<SLL, it is changed to SLH=SLL.

  Example: If SLH is set to 100 with SLL set to 200, SLL is changed to 100.

For temperature input, voltage/current inputs:

If the setting is made so that the span becomes narrower, there may be a case where the related set value becomes smaller or *0*.

Table 1

| Mode	Description	
Engineering mode	Alarm 1 differential gap (AH1)	
	Alarm 2 differential gap (AH2)	
	ON/OFF action differential gap (oH)	
Parameter setting mode	Alarm 1 set value (ALM1)	
	Alarm 2 set value (ALM2)	
	LBA Deadband (LBD)	
	Deadband (db)	
	Heat-side proportional band (P)	
	PV bias (Pb)	
	Analog output scale high (AHS)	
	Analog output scale low (ALS)	
	Setting change rate limiter [up] (SVrU)	
	Setting change rate limiter [down] (SVrd)	
PV/SV display mode, SV setting mode	Set value (SV)	STEP function not provided
	Set value (SV1)	STEP function provided
	Set value (SV2)	

■ When the position of the decimal point is changed

The set value is automatically converted.

- After the position of the decimal point is changed, conduct automatic conversion so that the following values may not be changed.

Engineering mode:	Setting limiter [high limit] (SLH)
	Setting limiter [low limit] (SLL)
	Alarm 1 differential gap (AH1)
	Alarm 2 differential gap (AH2)
	ON/OFF action differential gap (oH)
Parameter setting mode:	Alarm 1 set value (ALM1)
	Alarm 2 set value (ALM2)
	LBA deadband (LBD)
	Heat-side proportional band (T)
	Deadband (dB)
	PV bias (Pb)
	Analog output scale high (AHS)
	Analog output scale low (ALS)
	Setting change rate limiter [up] (SVrU)
	Setting change rate limiter [down] (SVrd)
PV/SV display/SV setting mode:	Set value (SV) [STEP function not provided]
	Set value (SV1)
	Set value (SV2) [STEP function provided]

Example: When the position of the decimal point changed from *0* to *1* with SLH set to 800 °C.

Changed from *800* to *800.0*.
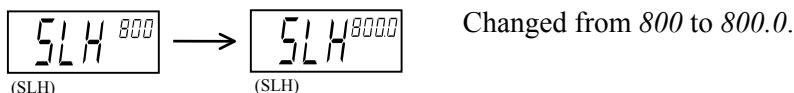
- If the setting range is not between −1999 and +9999 regardless of the position of the decimal point, it is limited by the range from −1999 to +9999.

Example: When SLH is 1372 °C with no decimal position, and the decimal position is changed from *0* to *1* (one decimal position), SLH will become 999.9.
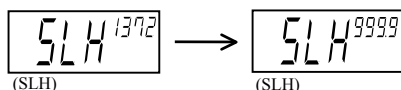
- If the number of digits below the decimal point is changed in the decreasing direction, the decreased number of digits is omitted.

Example: When SHL is 99.99 with two decimal positions, and the decimal position is changed from *2* to *0*, SLH will become 99 by discarding the digits below the decimal point.
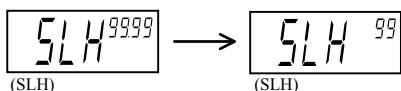
■ When the type of alarm is changed

The set value is initialized.

Mode	Description	Default value	
		Temperature input	**Voltage/current inputs**
Engineering mode	Alarm 1 hold action selection	0 (Without alarm hold action)	
	Alarm 1 differential gap	2 °C [°F] or 2.0 °C [°F]	0.2 % of span
	Alarm 1 process abnormality action	Alarm 1 not provided or LBA: 0 (Normal) Alarm 1 provided: 1 (Forcibly turned on)	
	Alarm 2 hold action selection	0 (Without alarm hold action)	
	Alarm 2 differential gap	2 °C [°F] or 2.0 °C [°F]	0.2 % of span
	Alarm 2 process abnormality action	Alarm 2 not provided: 0 (Normal) Alarm 2 provided: 1 (Forcibly turned on)	
Parameter setting mode	Alarm 1 set value	50 °C [°F] or 50.0 °C [°F]	5.0 % of span
	Alarm 2 set value		

2.4 Details of Each Function Block

2.4.1 F10 (Setting for display screen)

(1) SPCH (STOP display screen selection)

Factory set value: 0000

Set value				Description
			0	STOP is displayed on the PV display unit. (TYPE 1)
			1	STOP is displayed on the SV display unit. (TYPE 2)
			2	No selection from RUN to STOP by the front key can be made. *
0	0	0		"000□" Fixed

* If "Set value" is set to 0002, no selection from RUN to STOP can be made, but selection from STOP to RUN can be made. In addition, RUN/STOP can be selected via communication or by contact input regardless of the SPCH setting.

📖   Displays in the STOP mode become as follows.

(2) dCHG (Monitor display configuration selection)

Factory set value: 0000

Set value				Description
			0	PV/SV display
			1	Only PV display
			2	Only SV display
0	0	0		"000□" Fixed

📖   Displays become as follows.

(3) MVd (MV display selection)

For the SA200 Z-1045 specification, always set "1: MV display provided."

Factory set value: 0000

Set value				Description
			0	MV display not provided
			1	MV display provided
0	0	0		"000□" Fixed

2.4.2 F21 (Setting for input)

(1) InP (Input type selection)

Factory set value varies depending on the input type.

Set value				Input type	
		0	0	K	Thermocouple [1] (TC)
		0	1	J	
		0	2	R	
		0	3	S	
		0	4	B	
		0	5	E	
		0	6	N	
		0	7	T	
		0	8	W5Re/W26Re	
		0	9	PL II	
		1	0	U	
		1	1	L	
		1	2	Pt100	RTD [1]
		1	3	JPt100	
		1	4	0 to 5 V DC	Voltage input [1]
		1	5	1 to 5 V DC	
		1	6	0 to 10 V DC	
		1	4	0 to 20 mA DC	Current input [1, 2]
		1	5	4 to 20 mA DC	
0	0			"00□□" Fixed	

[1] Input type (TC/RTD to voltage/current inputs or voltage/current inputs to TC/RTD) cannot be changed because the hardware is different.

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

☞ See **2.3 Attention Items in Setting (P. 7)**.

(2) UnIT (Display Unit selection)

<div align="right">Factory set value: 0000</div>

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

📖　　The invalidity in case of the voltage/current inputs.

☞　　See **2.3 Attention Items in Setting (P. 7)**.

(3) PGdP (Decimal point position setting)

<div align="right">Factory set value varies depending on the instrument specification.</div>

Set value				Description
			0	No digit below decimal point (□□□□)
			1	1 digit below decimal point (□□□.□)
			2	2 digits below decimal point (□□.□□)
			3	3 digits below decimal point (□.□□□)
0	0	0		"000□" Fixed

☞　　See **2.3 Attention Items in Setting (P. 7)**.

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

Factory set value varies depending on the instrument specification.

Input type		Setting range
TC	K	−199 to +1372 °C (−326 to +2502 °F)
		−199.9 to +999.9 °C (−199.9 to +999.9 °F)
	J	−199 to +1200 °C (−326 to +2192 °F)
		−199.9 to +999.9 °C (−199.9 to +999.9 °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)
		0 to 999.9 °C (0 to 999.9 °F)
	T	−199 to +400 °C (−326 to +752 °F)
		−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 to +600 °C (−326 to +1112 °F)
		−199.9 to +600.0 °C (−199.9 to +999.9 °F)
	L	0 to 900 °C (0 to 1652 °F)
RTD	Pt100 (JIS/IEC) [1]	−199.9 to +649.0 °C (−199.9 to +999.9 °F)
	JPt100 (JIS)	
Voltage [2]	0 to 5 V DC	−1999 to +9999
	1 to 5 V DC	(programmable scale)
	0 to 10 V DC	
Current [2, 3]	0 to 20 mA DC	−1999 to +9999
	4 to 20 mA DC	(programmable scale)

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

[2] In case of voltage/current inputs, SLH can be set below SLL.

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

☞ Set the setting limiter [high limit] referring to the **Input range table (P. 18)**.

☞ See **2.3 Attention Items in Setting (P. 7)**.

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

Factory set value varies depending on the instrument specification.

Input type		Setting range
TC	K	−199 to +1372 °C (−326 to +2502 °F)
		−199.9 to +999.9 °C (−199.9 to +999.9 °F)
	J	−199 to +1200 °C (−326 to +2192 °F)
		−199.9 to +999.9 °C (−199.9 to +999.9 °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)
		0 to 999.9 °C (0 to 999.9 °F)
	T	−199 to +400 °C (−326 to +752 °F)
		−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 to +600 °C (−326 to +1112 °F)
		−199.9 to +600.0 °C (−199.9 to +999.9 °F)
	L	0 to 900 °C (0 to 1652 °F)
RTD	Pt100 (JIS/IEC) [1]	−199.9 to +649.0 °C (−199.9 to +999.9 °F)
	JPt100 (JIS)	
Voltage [2]	0 to 5 V DC	−1999 to +9999
	1 to 5 V DC	(programmable scale)
	0 to 10 V DC	
Current [2, 3]	0 to 20 mA DC	−1999 to +9999
	4 to 20 mA DC	(programmable scale)

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

[2] In case of voltage/current inputs, SLH can be set below SLL.

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

☞ Set the setting limiter [low limit] referring to the **Input range table (P. 18)**.

☞ See **2.3 Attention Items in Setting (P. 7)**.

■ Input range table

TC

Type	Input range	Code	Type	Input range	Code
K	0 to 200 °C	K01	J	0.0 to 200.0 °C	J22
	0 to 400 °C	K02		0.0 to 600.0 °C	J23
	0 to 600 °C	K03		−199.9 to +600.0 °C	J30
	0 to 800 °C	K04		0 to 800 °F	JA1
	0 to 1000 °C	K05		0 to 1600 °F	JA2
	0 to 1200 °C	K06		0 to 2192 °F	JA3
	0 to 1372 °C	K07		0 to 400 °F	JA6
	0 to 100 °C	K13		0.0 to 800.0 °F	JB6
	0 to 300 °C	K14		−199.9 to +999.9 °F	JB9
	0 to 450 °C	K17	R	0 to 1600 °C *	R01
	0 to 500 °C	K20		0 to 1769 °C *	R02
	−199.9 to +300.0 °C	K08		0 to 1350 °C *	R04
	0.0 to 400.0 °C	K09		0 to 3200 °F *	RA1
	0.0 to 800.0 °C	K10		0 to 3216 °F *	RA2
	0.0 to 200.0 °C	K29	S	0 to 1600 °C *	S01
	0.0 to 600.0 °C	K37		0 to 1769 °C *	S02
	−199.9 to +800.0 °C	K38		0 to 3200 °F *	SA1
	0 to 800 °F	KA1		0 to 3216 °F *	RA2
	0 to 1600 °F	KA2	B	400 to 1800 °C	B01
	0 to 2502 °F	KA3		0 to 1820 °C *	B02
	20 to 70 °F	KA9		800 to 3200 °F	BA1
	0.0 to 800.0 °F	KA4		0 to 3308 °F *	BA2
	−199.9 to +999.9 °F	KB2	E	0 to 800 °C	E01
J	0 to 200 °C	J01		0 to 1000 °C	E02
	0 to 400 °C	J02		0 to 1600 °F	EA1
	0 to 600 °C	I03		0 to 1832 °F	EA2
	0 to 800 °C	J04	N	0 to 1200 °C	N01
	0 to 1000 °C	J05		0 to 1300 °C	N02
	0 to 1200 °C	J06		0.0 to 800.0 °C	N06
	0 to 450 °C	J10		0 to 2300 °F	NA1
	−199.9 to +300.0 °C	J07		0 to 2372 °F	NA2
	0.0 to 400.0 °C	J08		0.0 to 999.9 °F	NA5
	0.0 to 800.0 °C	J09			

* Accuracy is not guaranteed between 0 to 399 °C (0 to 751 °F)

Continued from the previous page.

Type	Input range	Code	Type	Input range	Code
T	−199.9 to +400.0 °C *	T01	U	−199.9 to +600.0 °C *	U01
	−199.9 to +100.0 °C *	T02		−199.9 to +100.0 °C *	U02
	−100.0 to +200.0 °C	T03		0.0 to 400.0 °C	U03
	0.0 to 350.0 °C	T04		−199.9 to +999.9 °F *	UA1
	−199.9 to +752.0 °F *	TA1		−100.0 to +200.0 °F	UA2
	−100.0 to +200.0 °F	TA2		0.0 to 999.9 °F	UA3
	−100.0 to +400.0 °F	TA3	L	0 to 400 °C	L01
	0.0 to 450.0 °F	TA4		0 to 800 °C	L02
	0.0 to 752.0 °F	TA5		0 to 800 °F	LA1
W5Re/ W26Re	0 to 2000 °C	W01		0 to 1600 °F	LA2
	0 to 2320 °C	W02			
	0 to 4000 °F	WA1			
PL II	0 to 1300 °C	A01			
	0 to 1390 °C	A02			
	0 to 1200 °C	A03			
	0 to 2400 °F	AA1			
	0 to 2534 °F	AA2			

* Accuracy is not guaranteed between −199.9 to −100.0 °C (−199.9 to −148.0 °F)

RTD

Type	Input range	Code
Pt100 (JIS/IEC)	−199.9 to +649.0 °C	D01
	−199.9 to +200.0 °C	D02
	−100.0 to +50.0 °C	D03
	−100.0 to +100.0 °C	D04
	−100.0 to +200.0 °C	D05
	0.0 to 50.0 °C	D06
	0.0 to 100.0 °C	D07
	0.0 to 200.0 °C	D08
	0.0 to 300.0 °C	D09
	0.0 to 500.0 °C	D10
	−199.9 to +999.9 °F	DA1
	−199.9 to +400.0 °F	DA2
	−199.9 to +200.0 °F	DA3
	−100.0 to +100.0 °F	DA4
	−100.0 to +300.0 °F	DA5
	0.0 to 100.0 °F	DA6
	0.0 to 200.0 °F	DA7
	0.0 to 400.0 °F	DA8
	0.0 to 500.0 °F	DA9
JPt100 (JIS)	−199.9 to +649.0 °C	P01
	−199.9 to +200.0 °C	P02
	−100.0 to +50.0 °C	P03
	−100.0 to +100.0 °C	P04
	−100.0 to +200.0 °C	P05
	0.0 to 50.0 °C	P06
	0.0 to 100.0 °C	P07
	0.0 to 200.0 °C	P08
	0.0 to 300.0 °C	P09
	0.0 to 500.0 °C	P10

Voltage input

Type	Input range	Code
0 to 5 V DC		401
0 to 10 V DC	0.0 to 100.0	501
1 to 5 V DC		601

Current input

Type	Input range	Code
0 to 20 mA DC *	0.0 to 100.0	701
4 to 20 mA DC *		801

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

2.4.3 F30 (Setting for output)

(1) LoGC (Output logic operation selection)

📖 Match the setting with the instrument specification. Otherwise malfunction may result.

📖 No heat-side or cool-side proportional cycle (T or t) corresponding to a parameter setting mode made may not be displayed depending on the selected output allocation code.
- Not displayed when no control output is selected.
- Not displayed when control output corresponds to current output.

Factory set value varies depending on the instrument specification.

Logic circuit number			OUT1	OUT2	Remarks
	0	1	Control output	*OR* output of Alarm 1 and Alarm 2 (Energized)	PID action+No Alarm function * PID action+Alarm 1 * PID action+*OR* output of Alarm 1, Alarm 2 *
	0	2	Heat-side control output	Cool-side control output (In case of direct action or reverse action, it is OFF).	Heat/cool PID action * (W or A type)
	0	3	Control output	Alarm 1 output (De-energized)	PID action+Alarm 1
	0	4	Control output	*AND* output of Alarm 1 and Alarm 2 (Energized)	PID action+Alarm 1, Alarm 2
	0	5	Control output	*OR* output of Alarm 1 and Alarm 2 (De-energized)	
	0	6	Control output	*AND* output of Alarm 1 and Alarm 2 (De-energized)	
	0	7	Control output	Not output (The Alarm state can be checked via communication or by lamp lighting).	PID action+Alarm 1, Alarm 2 or Alarm 1 only
	0	8	Control output	Alarm 1 output (Energized) (Alarm 2 can be checked via communication or by lamp lighting).	PID action+Alarm 1, Alarm 2

* Standard output when no output code is specified.

Continued from the previous page.

Factory set value varies depending on the instrument specification.

Logic circuit number			OUT1	OUT2	Remarks
	0	9	Alarm 1 output (Energized)	Alarm 2 output (Energized)	Alarm 1+Alarm 2 (The PID operation can choose only F type.)
	1	0	Alarm 1 (Energized)	Alarm 2 output (De-energized)	
	1	1	Alarm 1 output (De-energized)	Alarm 2 output (De-energized)	
	1	2	Transmission output	Control output	Transmission output+PID action (Z-1033 specification)
	1	3	Transmission output	*OR* output of Alarm 1 and Alarm 2 (Energized)	Transmission output+Alarm 1, Alarm 2 (Z-1033 specification)
	1	4	Transmission output	*OR* output of Alarm 1 and Alarm 2 (De-energized)	
	1	5	Transmission output	*AND* output of Alarm 1 and Alarm 2 (Energized)	
	1	6	Transmission output	*AND* output of Alarm 1 and Alarm 2 (De-energized)	
	1	7	Transmission output	Alarm 1 output (Energized)	Transmission output+Alarm 1 (Z-1033 specification)
	1	8	Transmission output	Alarm 1 output (De-energized)	
	1	9	Cool-side control output (In case of direct action or reverse action, it is OFF).	Heat-side control output	Heat/cool PID action * (W or A type) (Z-1033 specification)
0			"0□□" Fixed		

* Cool-side control output: Current output only
  Heat-side control output: Relay contact output or voltage pulse output

2.4.4 F41 (Setting for alarm 1)

(1) AS1 (Alarm 1 type selection)

Factory set value varies depending on the instrument specification.

Set value				Description
			0	Alarm not provided
			1	SV high alarm
			2	SV low alarm
			3	Process high alarm
			4	Process low alarm
			5	Deviation high alarm
			6	Deviation low alarm
			7	Deviation high/low alarm
			8	Band alarm
			9	Control loop break alarm (LBA)
0	0	0		"000□" Fixed

☞ See **2.3 Attention Items in Setting (P. 7)**.

(2) AHo1 (Alarm 1 hold action selection)

Factory set value varies depending on the instrument specification.

Set value				Description
			0	Without alarm hold action
			1	Effective when the power is turned on, or operation is changed from STOP to RUN.
			2	Effective when the power is turned on, or operation is changed from STOP to RUN or the SV is changed.
0	0	0		"000□" Fixed

📖 The alarm hold action function can not be added to the SV alarm.

☞ See **2.3 Attention Items in Setting (P. 7)**.

(3) AH1 (Alarm 1 differential gap setting)

Setting range:
TC and RTD inputs, Voltage/current inputs: 0 (0.0) to span

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

☞   See **2.3 Attention Items in Setting (P. 7)**.

(4) AEo1 (Alarm 1 process abnormality action selection)

Set value				Description
			0	Normal processing [1]
			1	Forcibly turned on when abnormal [2]
0	0	0		"000□" Fixed

[1] The alarm action set by AS1 (Alarm 1 type selection) is taken even if the input is abnormal.

[2] The alarm is forcibly turned on regardless of the alarm type set by AS1 (Alarm 1 type selection)
  when the input is abnormal.
  However, for a voltage input of 0 to 5 V DC or 0 to 10 V DC, or a current input of 0 to 20 mA DC,
  as over-scale or underscale does not occur when the input breaks, no alarm is turned on.

📖   It is judged that the input is abnormal when over-scale or underscale occurs.

Factory set value:
Alarm 1 not provided or LBA: 0 (Normal processing)
Alarm 1 provided: 1 (Forcibly turned on when abnormal)

☞   See **2.3 Attention Items in Setting (P. 7)**.

2.4.5 F42 (Setting for alarm 2)

(1) AS2 (Alarm 2 type selection)

Factory set value varies depending on the instrument specification.

Set value				Description
			0	Alarm not provided
			1	SV high alarm
			2	SV low alarm
			3	Process high alarm
			4	Process low alarm
			5	Deviation high alarm
			6	Deviation low alarm
			7	Deviation high/low alarm
			8	Band alarm
0	0	0		"000□" Fixed

☞ See **2.3 Attention Items in Setting (P. 7)**.

(2) AHo2 (Alarm 2 hold action selection)

Factory set value varies depending on the instrument specification.

Set value				Description
			0	Without alarm hold action
			1	Effective when the power is turned on, or operation is changed from STOP to RUN.
			2	Effective when the power is turned on, or operation is changed from STOP to RUN or the SV is changed.
0	0	0		"000□" Fixed

📖 The alarm hold action function can not be added to the SV value alarm.

☞ See **2.3 Attention Items in Setting (P. 7)**.

(3) AH2 (Alarm 2 differential gap setting)

Setting range:

TC and RTD inputs, Voltage/current inputs: 0 (0.0) to span

Factory set value:

TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]

Voltage/current inputs: 0.2 % of span

☞   See **2.3 Attention Items in Setting (P. 7)**.

(4) AEo2 (Alarm 2 process abnormality action selection)

Set value				Description
			0	Normal processing [1]
			1	Forcibly turned on when abnormal [2]
0	0	0		"000□" Fixed

[1] The alarm action set by AS2 (Alarm 2 type selection) is taken even if the input is abnormal.

[2] The alarm is forcibly turned on regardless of the alarm type set by AS2 (Alarm 2 type selection) when the input is abnormal.

  However, for a voltage input of 0 to 5 V DC or 0 to 10 V DC, or a current input of 0 to 20 mA DC, as over-scale or underscale does not occur when the input breaks, no alarm is turned on.

📖   It is judged that the input is abnormal when over-scale or underscale occurs.

Factory set value:

Alarm 2 not provided: 0 (Normal processing)

Alarm 2 provided: 1 (Forcibly turned on when abnormal)

☞   See **2.3 Attention Items in Setting (P. 7)**.

2.4.6 F51 (Setting for control action)

(1) oS1 (Control action type selection)

📖 **Match the setting with the instrument specification. Otherwise malfunction may result.**

Factory set value varies depending on the instrument specification.

Set value				Description
			0	D type: PID action with autotuning (Direct action)
			1	F type: PID action with autotuning (Reverse action)
			2	W type: Heat/cool PID action with autotuning (Water cooling)
			3	A type: Heat/cool PID action with autotuning (Air cooling)
0	0	0		"000□" Fixed

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

Setting range:
TC and RTD inputs, Voltage/current inputs: 0 (0.0) to span

Factory set value:
TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]
Voltage/Current inputs: 0.2 % of span

☞ See **2.3 Attention Items in Setting (P. 7)**.

2.4.7 F61 (Communication protocol selection)

■ CMPS (Communication protocol selection)

📖 **If the protocol is changed, always turn the power on again. Otherwise no communication is made by using the protocol thus changed.**

Factory set value: 0000

Set value				Description
			0	RKC standard protocol
			1	Modbus protocol
0	0	0		"000□" Fixed

2.4.8 F71 (Setting change rate limiter setting)

(1) SVrS (Setting change rate limiter Used/Unused)

For the SA200 Z-1045 specification, always set "1: Used."

Factory set value: 0000

Set value				Description
			0	Unused
			1	Used
0	0	0		"000□" Fixed

(2) SVrT (Setting change rate limiter time)

If the "Setting change rate limiter time Used" is selected, set the unit time of change rate limiter.

Setting range: 1 to 3600 seconds
Factory set value: 60 seconds

2.4.9 F91 (Displayed for maintenance information)

📖   Only displayed for the *F91* function block.

(1) E227 (ROM version displayed)

Display the version of loading software.

(2) WT (Integrated operating time)

Display product calculation operating time.
However, as the integral time is increments by *1* when the power is turned on or off.

Display range: 0 to 9999
Display resolution: 1 hour

(3) 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.

Display range: 0.0 to 999.9
Display resolution: 0.1 °C

3. INITIALIZE COMMUNICATION DATA

■ RKC standard protocol

The number of digits for data is 6.

☞ For details on the structure of communication data, see **SA200 Communication Instruction Manual (IMR01D02-E□)**.

Name	Iden-tifier	Description	Factory set value	Attrib-ute
STOP display screen selection (SPCH)	DX	0: It makes display "STOP" in PV display. 1: It makes display "STOP" in SV display. 2: No selection from RUN to STOP by the front key can be made.	0	
Monitor display configuration selection (dCHG)	DW	0: PV/SV display 1: Only PV display 2: Only SV display	0	
MV display selection (MVd)	DV	0: MV display not provided 1: MV display provided	0	
Input type selection (InP)	XI	0 to 16 (See **P. 14**)	Note 1	
Display unit selection (UnIT)	PU	0: °C 1: °F	0	RO *
Decimal point position setting (PGdP)	XU	0 to 3 (See **P. 15**)	Note 1	
Setting limiter [high limit] (SLH)	XV	See **Input range table (P. 18)**	Note 1	
Setting limiter [low limit] (SLL)	XW			
Selection of output logic calculation (LoGC)	LO	1 to 19 (See **P. 21**)	Note 1	
Alarm 1 type selection (AS1)	XA	0 to 9 (See **P. 23**)	Note 1	
Alarm 1 differential gap (AH1)	HA	0 to span	Note 2	
Alarm 1 process abnormality action (AEo1)	OA	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	

* In STOP mode, it is possible to write (Normal, read only).

Note 1 Factory set value varies depending on the instrument specification.

Note 2 TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F] Voltage/current inputs: 0.2 % of span

Note 3 Alarm 1 not provided: 0
  Alarm 1 provided: 1
  If the alarm 1 type is control loop break alarm (LBA): 0

Continued from the previous page.

Name	Iden-tifier	Description	Factory set value	Attrib-ute
Alarm 1 hold action (AHo1)	WA	0: Without alarm hold action 1: To wait only when STOP changes to RUN at power on. 2: To wait again when STOP changes to RUN at power on or set value (SV) is changed.	Note 1	RO *
Alarm 2 type selection (AS2)	XB	0 to 8 (See **P. 25**)	Note 1	
Alarm 2 differential gap (AH2)	HB	0 to span	Note 2	
ALM2 process abnormality action (AEo2)	OB	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	
Alarm 2 hold action (AHo2)	WB	0: Without alarm hold action 1: To wait only when STOP changes to RUN at power on. 2: To wait again when STOP changes to RUN at power on or set value (SV) is changed.	Note 1	
Control action type selection (oS1)	XE	0: Direct action 1: Reverse action 2: Heat/cool action (Water cooling) 3: Heat/cool action (Air cooling)	Note 1	
ON/OFF action differential gap (oH)	MH	0 to span	Note 2	
Setting change rate limiter Used/Unused (SVrS)	ZG	0: Unused 1: Used	0	
Setting change rate limiter time (SVrT)	TA	1 to 3600 seconds	60	

* In STOP mode, it is possible to write (Normal, read only).

Note 1 Factory set value varies depending on the instrument specification.

Note 2 TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]   Voltage/current inputs: 0.2 % of span

Note 3 Alarm 2 not provided: 0

Alarm 2 provided: 1

If the alarm 2 type is control loop break alarm (LBA): 0

■ MODBUS communication protocol

☞ For details on the structure of communication data, see **SA200 Communication Instruction Manual (IMR01D02-E□)**.

Name	Address	Description	Factory set value	Attrib-ute
STOP display screen selection (SPCH)	30H	0: It makes display "STOP" in PV display. 1: It makes display "STOP" in SV display. 2: No selection from RUN to STOP by the front key can be made.	0	RO *
Monitor display configuration selection (dCHG)	31H	0: PV/SV display 1: Only PV display 2: Only SV display	0	
MV display selection (MVd)	32H	0: MV display not provided 1: MV display provided	0	
Input type selection (InP)	33H	0 to 16 (See **P. 14**)	Note 1	
Display unit selection (UnIT)	34H	0: °C 1: °F	0	
Decimal point position setting (PGdP)	35H	0 to 3 (See **P. 15**)	Note 1	
Setting limiter [high limit] (SLH)	36H	See Input range table (**P. 18**)	Note 1	
Setting limiter [low limit] (SLL)	37H			
Selection of output logic calculation (LoGC)	38H	1 to 19 (See **P. 21**)	Note 1	
Alarm 1 type selection (AS1)	39H	0 to 9 (See **P. 23**)	Note 1	
Alarm 1 differential gap (AH1)	3AH	0 to span	Note 2	
Alarm 1 process abnormality action (AEo1)	3BH	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	

* In STOP mode, it is possible to write (Normal, read only).

Note 1 Factory set value varies depending on the instrument specification.

Note 2 TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]   Voltage/current inputs: 0.2 % of span

Note 3 Alarm 1 not provided: 0
　　　　Alarm 1 provided:　　　1
　　　　If the alarm 1 type is control loop break alarm (LBA): 0

Continued from the previous page.

Name	Address	Description	Factory set value	Attrib-ute
Alarm 1 hold action (AHo1)	3CH	0: Without alarm hold action 1: To wait only when STOP changes to RUN at power on. 2: To wait again when STOP changes to RUN at power on or set value (SV) is changed.	Note 1	RO *
Alarm 2 type selection (AS2)	3DH	0 to 8 (See **P. 25**)	Note 1	
Alarm 2 differential gap (AH2)	3EH	0 to span	Note 2	
Alarm 2 process abnormality action (AEo2)	3FH	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	
Alarm 2 hold action (AHo2)	40H	0: Without alarm hold action 1: To wait only when STOP changes to RUN at power on. 2: To wait again when STOP changes to RUN at power on or set value (SV) is changed.	Note 1	
Control action type selection (oS1)	41H	0: Direct action 1: Reverse action 2: Heat/cool action (Water cooling) 3: Heat/cool action (Air cooling)	Note 1	
ON/OFF action differential gap (oH)	42H	0 to span	Note2	
Setting change rate limiter Used/Unused (SVrS)	43H	0: Unused 1: Used	0	
Setting change rate limiter time (SVrT)	44H	1 to 3600 seconds	60	

* In STOP mode, it is possible to write (Normal, read only).

Note 1 Factory set value varies depending on the instrument specification.

Note 2 TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]   Voltage/current inputs: 0.2 % of span

Note 3 Alarm 2 not provided: 0
Alarm 2 provided: 1
If the alarm 2 type is control loop break alarm (LBA): 0

RKC

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