
Temperature Controller

SA100

Initial Setting Manual

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- Company names and product names used in this manual are the trademarks or registered trademarks of the respective companies.

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 basic insulation between the power supply and the input/output. 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.
- Do not connect modular connectors to telephone line.

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.
- 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.
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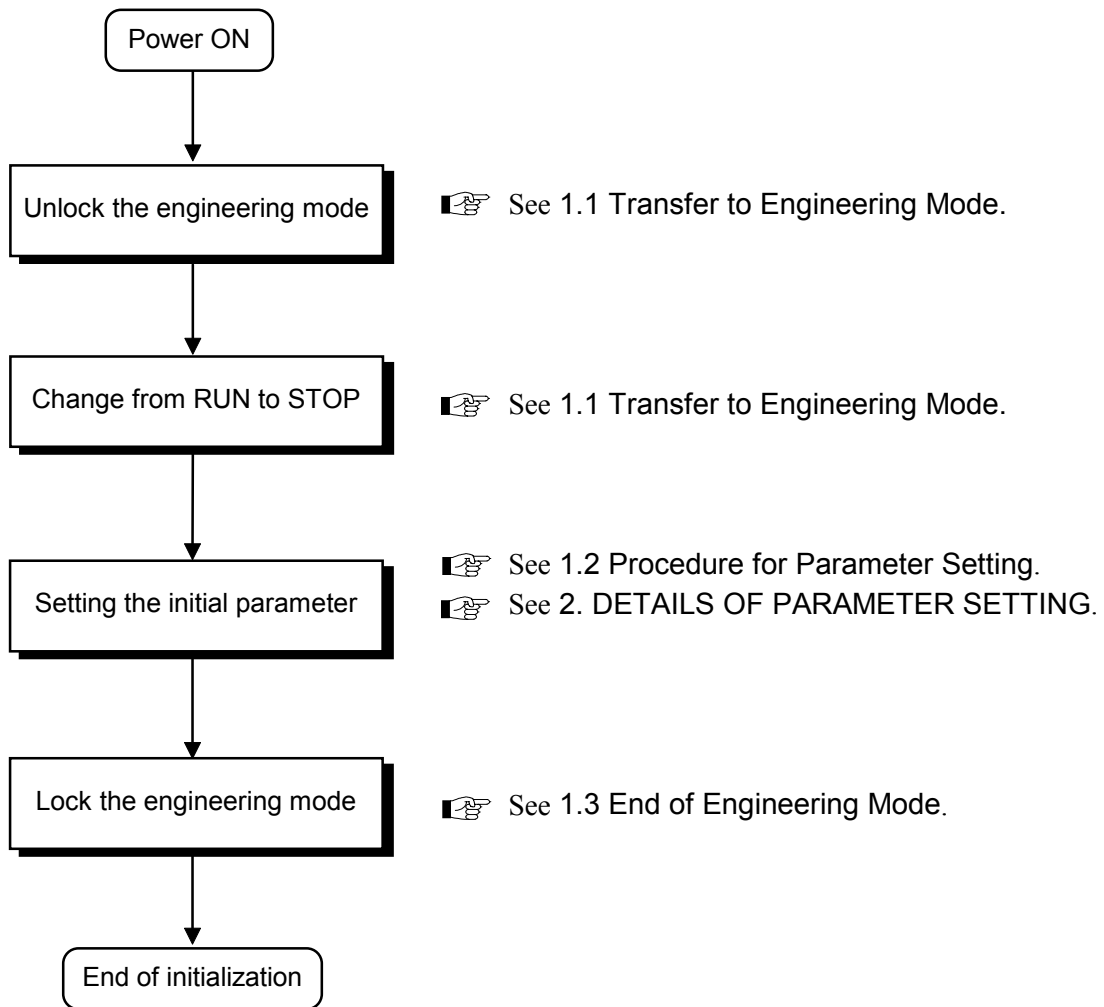
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MEMO

1. PROCEDURE FOR INITIALIZATION


Initialization is to set parameters relating to instrument specifications (input type, input range, alarm type, etc.). Engineering mode that can do this setting.

■ Initialization flowchart



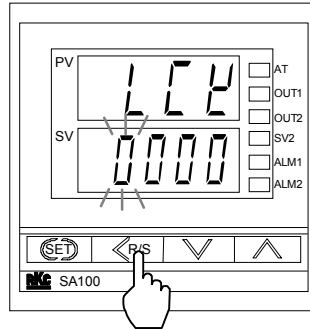
1.1 Transfer to Engineering Mode

1. Press the SET key for 2 seconds with the PV/SV display mode change the instrument to parameter setting mode.

 For details on parameter setting mode, see **SA100 Instruction Manual (IMR01J01-E□)**.

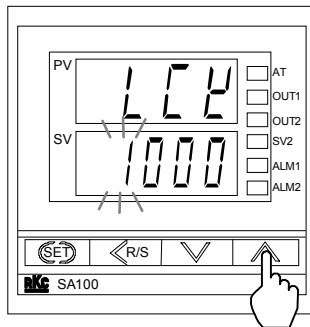
2. Press the SET key to change to the set data lock function display (LCK).

3. Press the <R/S key to flash the most significant digit on the set value (SV) display.



Set data lock function display

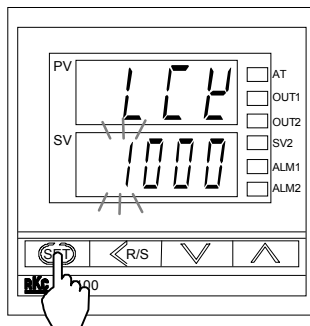
4. Press the UP key to change 0 to 1 in the most significant digit.



Set data lock function display

Set value
0000: lock
1000: Unlock


5. Press the SET key to unlock the engineering mode. The display changes to the first parameter in parameter setting mode.



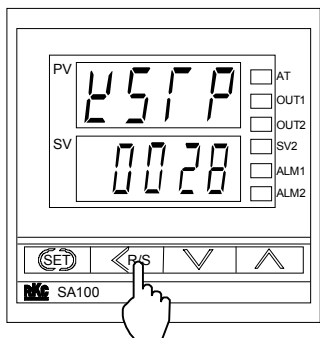
Set data lock function display



Alarm 1 setting display

 The parameter to be displayed varies depending on the specification.

6. Press the SET key for 2 seconds to change to the PV/SV display mode from the parameter setting mode.
7. Press the <R/S key for 1 second to change the operation mode from RUN mode to STOP mode.



STOP mode display



The parameter to be displayed varies depending on the RUN/STOP transfer type.

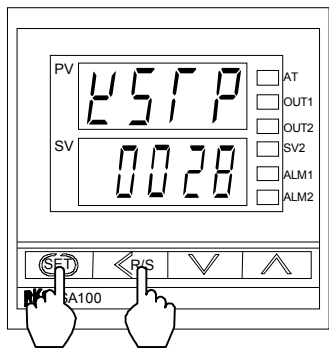


Before the setting is changed in engineering mode, it is necessary to set the operation mode to the STOP mode.

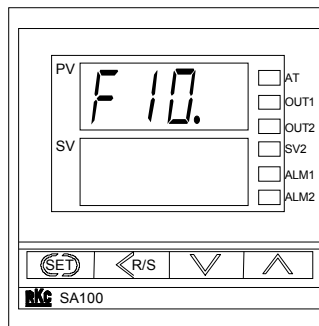


If “Set value” is set to 0002 (no selection from RUN to STOP by the front key can be made) by SPCH (STOP display selection) corresponding to function block F10 (P. 12), perform the operation in item 8. instead of performing the operation in item 7. The operation in item 8. forcibly results in the STOP state.

8. Press the R/S key for 2 seconds while pressing the SET key to change to the engineering mode. The display changes to the function block F10.



STOP mode display



Function block F10 display
Engineering mode

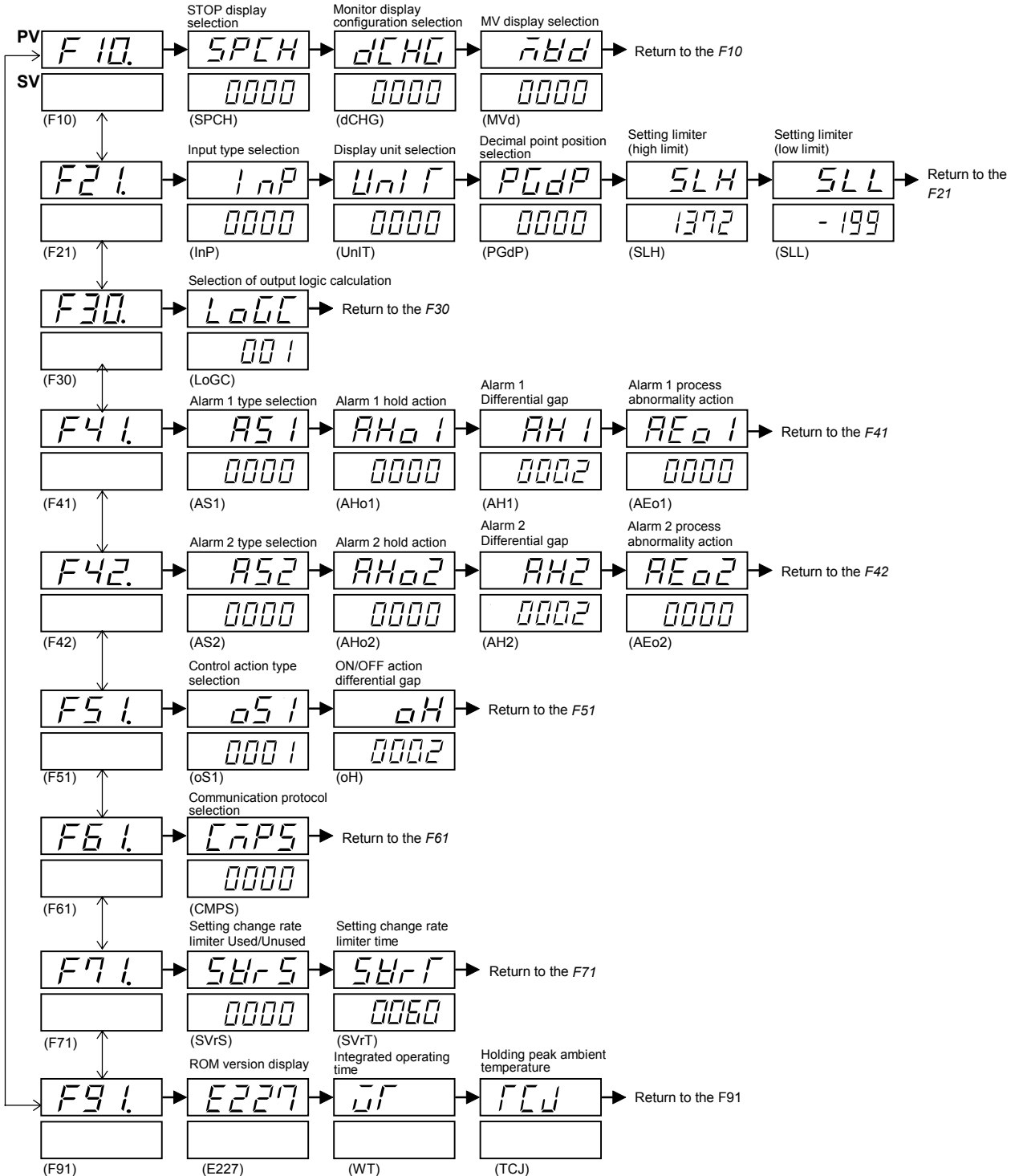
1.2 Procedure for Parameter Setting

■ Flowchart of displaying parameter items

Display flowcharts in engineering mode are shown in the following.

→ : Press the SET key.

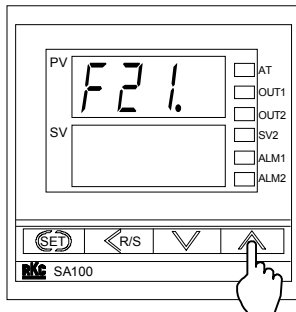
↕ : Press the UP or DOWN key.



■ **Example of changing the setting**

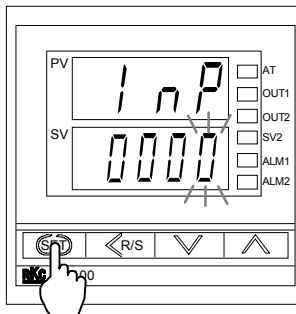
The following procedure is for changing the input type from “K” to “J.”

1. Press the UP key to change the display to *F21*.



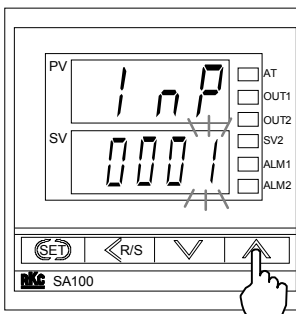
Function block display

2. Press the SET key to change to input type selection (*InP*).



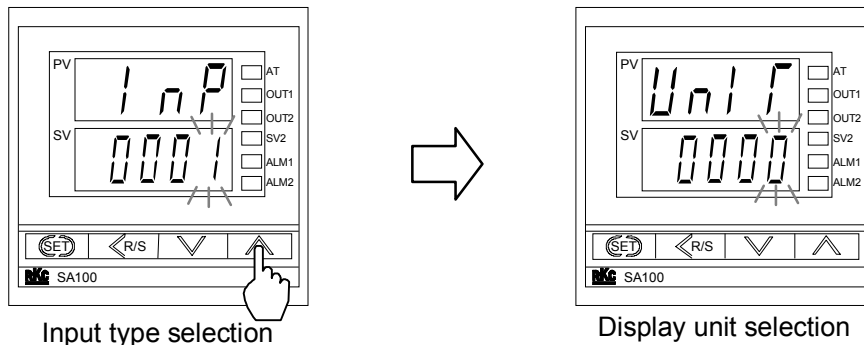
Input type selection

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



Input type selection

4. Press the SET key to register the value thus set. The display changes to the next parameter.

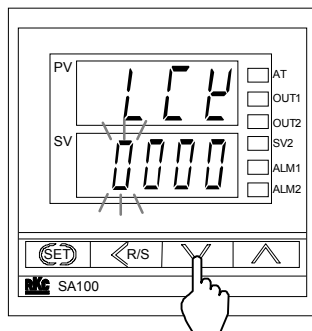


Input type selection

Display unit selection

1.3 End of Engineering Mode

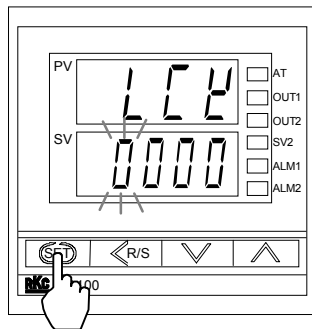
1. Transfer to function block symbol display ($F\Box\Box$) after each parameter is set.
2. Press the <R/S key while pressing the SET key for 2 seconds to change to the PV/SV display mode from the engineering mode.
3. Press the SET key for 2 seconds with the PV/SV display mode change the instrument to parameter setting mode.
4. Press the SET key to change to the set data lock function display (LCK).
5. Press the <R/S key to flash the most significant digit on the set value (SV) display.
6. Press the DOWN key to change 1 to 0 in the most significant digit.



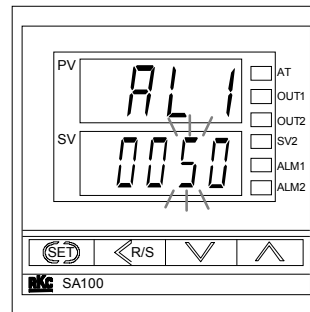
Set data lock function display

Set value
0000: Lock
0001: Unlock

7. Press the SET key to lock the engineering mode. The display changes to the first parameter in parameter setting mode.



Set data lock function display



Alarm 1 setting display



The parameter to be displayed varies depending on the specification.

8. Press the SET key for 2 seconds to change the parameter setting mode to the PV/SV display mode. Thus, the initialization ends.



2. DETAILS OF PARAMETER SETTING

■ Parameter list

Function block		Parameter		Page
F10. (F10.)	Display function	STOP display selection	SPCH (SPCH)	P. 12
		Monitor display configuration selection	dCHG (dCHG)	
		MV display selection	MVd (MVd)	P. 13
F21. (F21.)	Input specification	Input type selection	InP (InP)	P. 14
		Display unit selection	UnIT (UnIT)	
		Decimal point position selection	PGdP (PGdP)	
		Setting limiter (high limit)	SLH (SLH)	P.15
		Setting limiter (low limit)	SLL (SLL)	
F30. (F30.)	Output function	Selection of output logic calculation	LoGC (LoGC)	P. 16
F41. (F41.)	Alarm 1 function	Alarm 1 type selection	AS1 (AS1)	P. 18
		Alarm 1 hold action	AHo1 (AHo1)	
		Alarm 1 differential gap	AH1 (AH1)	
		Alarm 1 process abnormality action	AEo1 (AEo1)	P. 19
F42. (F42.)	Alarm 2 function	Alarm 2 type selection	AS2 (AS2)	P. 18
		Alarm 2 hold action	AHo2 (AHo2)	
		Alarm 2 differential gap	AH2 (AH2)	
		Alarm 2 process abnormality action	AEo2 (AEo2)	P. 19
F51. (F51.)	Control action	Control action type selection	oS1 (oS1)	
		ON/OFF action differential gap	oH (oH)	
F61. (F61.)	Communication function	Communication protocol selection	CMPS (CMPS)	P. 20
F71. (F71.)	Setting change rate limiter setting	Setting change rate limiter Used/Unused	SVrS (SVrS)	
		Setting change rate limiter time	SVrT (SVrT)	
F91. (F91.)	Displayed for maintenance information	ROM version	E227 (E227)	P. 21
		Integrated operating time	WT (WT)	
		Holding peak ambient temperature	TCJ (TCJ)	

2.1 Attention Items in Setting

If any of the following parameter 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 changed parameter of input type selection or engineering unit setting

When change a input type and unit, all the set value of a list shown below is initialized. Set it in value to use once again.

Mode	Description	Default value	
		Temperature input	Voltage/current input
Engineering mode	Decimal point position	0 (Without decimal point)	1
	Setting limiter [high limit]	Maximum settable value	100.0
	Setting limiter [low limit]	Minimum settable value	0.0
	Alarm 1 hold action selection	0 (Without alarm hold action)	
	Alarm 1 differential gap	2 °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]	0.2 % of span
	Alarm 2 process abnormality action	Alarm 2 not provided: 0 (Normal) Alarm 2 provided: 1 (Forcibly turned on)	
	ON/OFF action differential gap	2 °C [°F]	0.2 % of span
Parameter setting mode	Alarm 1 set value	50 °C [°F]	5.0 % of span
	Alarm 2 set value		
	Control loop break alarm	8.0 minutes	
	Control loop break alarm deadband	0 °C [°F]	0.0
	Heat-side proportional band	30 °C [°F]	3.0 % of span
	Integral time	240 seconds	
	Derivative time	60 seconds	
	Anti-reset windup	100 %	
	Deadband	0 °C [°F]	0.0
	Cool-side proportional band	100 % of heat-side proportional band	
	PV bias	0 °C [°F]	0.0
	Digital filter	0 second (off)	
	Analog output scale high	Maximum settable value	100.0
	Analog output scale low	Minimum settable value	0.0
PV/SV display mode, SV setting mode	Set value (SV)	STEP function not provided	0 °C [°F]
	Set value (SV1)	STEP function provided	0 °C [°F]
	Set value (SV2)		0 °C [°F]

■ When changed parameter of decimal point position setting

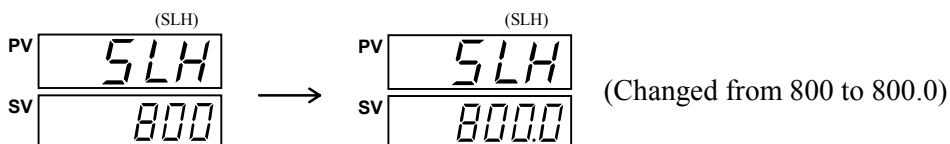
When change a decimal point position, it is converted into about set value of a list shown below automatically. Set it in value to use once again.

Mode	Description	
Engineering mode	Setting limiter [high limit]	
	Setting limiter [low limit]	
	Alarm 1 differential gap	
	Alarm 2 differential gap	
	ON/OFF action differential gap	
Parameter setting mode	Alarm 1 set value	
	Alarm 2 set value	
	Control loop break alarm deadband	
	Deadband	
	Heat-side proportional band	
	PV bias	
	Analog output scale high	
	Analog output scale low	
PV/SV display, SV setting mode	Set value (SV)	STEP function not provided
	Set value (SV1)	STEP function provided
	Set value (SV2)	

Example and caution of automatic conversion

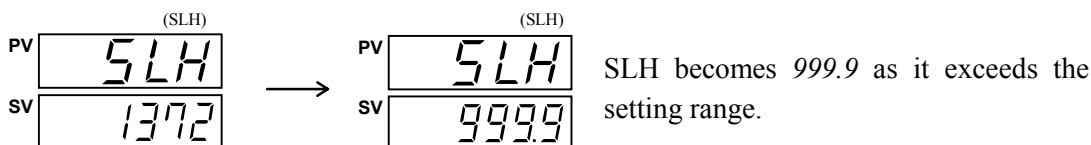
- Decimal point location moves in accordance with it when increases decimal point location.

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



- 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: Suppose set SLH is 1372 °C, if change decimal point position from 0 to 1.

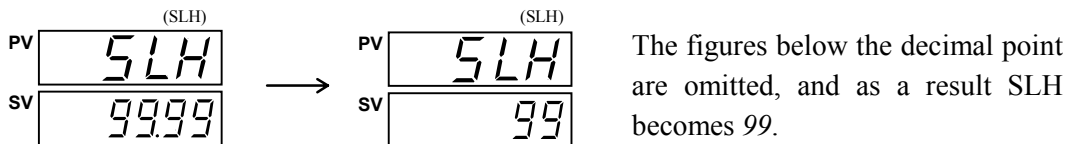


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- If the number of digits below the decimal point is changed in the decreasing direction, the decreased number of digits is omitted.

Example: Suppose set SLH is 99.99, if change decimal point position from 0 to 2.



■ **When changed parameter of setting limiter [high limit/low limit]**

When change setting limiter [high limit/low limit], all the set value of a list shown below is initialized. Set it in value to use once again.

Mode	Description	
Engineering mode	Alarm 1 differential gap	
	Alarm 2 differential gap	
	ON/OFF action differential gap	
Parameter setting mode	Alarm 1 set value	
	Alarm 2 set value	
	Control loop break alarm Deadband	
	Deadband	
	Heat-side proportional band	
	PV bias	
	Analog output scale high	
	Analog output scale low	
	PV/SV display mode, SV setting mode	Set value (SV)
Set value (SV1)		STEP function provided
Set value (SV2)		

Example:

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.

■ When changed parameter of alarm type selection

When change alarm 1 type and alarm 2 type, all the set value of a list shown below is initialized. Set it in value to use once again.

Mode	Description	Default value	
		Temperature input	Voltage/current input
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		

2.2 F10 Display function

(1) STOP display selection (SPCH)

Details of setting		Factory set value
0000	STOP is displayed on the PV display unit. (TYPE 1)	0000
0001	STOP is displayed on the SV display unit. (TYPE 2)	
0002	No selection from RUN to STOP by the front key can be made. *	


* 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.

		(KSTP)		(dSTP)		(SToP)
TYPE 1 (SPCH=0)	PV		PV		PV	
	SV		SV		SV	
TYPE 2 (SPCH=1)	PV		PV		PV	
	SV		SV		SV	
		(KSTP)		(dSTP)		(SToP)

(2) Monitor display configuration selection (dCHG)

Details of setting		Factory set value
0000	PV/SV display	0000
0001	Only PV display	
0002	Only SV display	

 Displays become as follows.

		TYPE 1 (SPCH=0)	TYPE 2 (SPCH=1)
PV/SV display (dCHG=0)	PV		
	SV		
Only PV display (dCHG=1)	PV		
	SV		
Only SV display (dCHG=2)	PV		
	SV		

(3) MV display selection (MVd)

Following parameter does only display. Do not change the setting, as this may cause malfunction.

Details of setting		Factory set value
0000	MV display not provided	0000

2.3 F21 Input Specification**(1) Input type selection (InP)**

Details of setting		Factory set value
0000	K	Factory set value varies depending on the input type.
0001	J	
0002	R	
0003	S	
0004	B	
0005	E	
0006	N	
0007	T	
0008	W5Re/W26Re	
0009	PL II	
0010	U	
0011	L	
0012	Pt100	RTD ¹
0013	JPt100	
0014	0 to 5 V DC	Voltage ¹
0015	1 to 5 V DC	
0016	0 to 10 V DC	
0014	0 to 20 mA DC	Current ^{1,2}
0015	4 to 20 mA DC	

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 2.1 Attention Items in Setting (P. 8).

(2) Display unit selection (UnIT)

Details of setting		Factory set value
0000	°C	0000
0001	°F	



The invalidity in case of the voltage/current inputs.



See **2.1 Attention Items in Setting (P. 8)**.

(3) Decimal point position setting (PGdP)

Details of setting		Factory set value
0000	No digit below decimal point (□□□□)	Note 1
0001	1 digit below decimal point (□□□.□)	
0002	2 digits below decimal point (□□.□□)	
0003	3 digits below decimal point (□.□□□)	

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



See **2.1 Attention Items in Setting (P. 8)**.

**(4) Setting limiter [high limit] (SLH)
Setting limiter [low limit] (SLL)**


Details of setting			Factory set value
Thermocouple	K	-199 to +1372 °C (-326 to +2502 °F)	Note 1
		-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 JPt100 (JIS)	-199.9 to +649.0 °C (-199.9 to +999.9 °F)	
Voltage ²	0 to 5 V DC	-1999 to +9999 (programmable scale)	
	1 to 5 V DC		
	0 to 10 V DC		
Current ^{2,3}	0 to 20 mA DC	-1999 to +9999 (programmable scale)	
	4 to 20 mA DC		

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.

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

 Set the setting limiter [high limit] referring to the **4. INPUT RANGE TABLES (P. 26)**.

 See **2.1 Attention Items in Setting (P. 8)**.

2.4 F30 Output Function

(1) Output logic operation selection (LoGC)

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

Details of setting				Factory set value
	OUT1	OUT2	Remarks	
0001	Control output	OR output of alarm 2 (Energized)	PID action+No alarm function * PID action+Alarm 1 * PID action+OR output of Alarm 1, alarm 2 (Energized) *	Note 1
0002	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)	
0003	Control output	Alarm 1 output (De-energized)	PID action+Alarm 1	
0004	Control output	AND output of alarm 1 and alarm 2 (Energized)	PID action+Alarm 1, alarm 2	
0005	Control output	OR output of alarm 1 and alarm 2 (De-energized)		
0006	Control output	AND output of alarm 1 and alarm 2 (De-energized)		
0007	Control output	Not output (The alarm state can be checked via communication or by lamp lighting).	PID action+Alarm 1, alarm 2 or alarm1 only	
0008	Control output	Alarm 1 output (Energized) (Alarm 2 can be checked via communication or by lamp lighting).	PID action+Alarm 1, alarm 2	
0009	Alarm 1 output (Energized)	Alarm 2 output (Energized)	Alarm 1+Alarm 2 (The PID operation can choose only F type.)	
0010	Alarm 1 output (Energized)	Alarm 2 output (De-energized)		
0011	Alarm 1 output (De-energized)	Alarm 2 output (De-energized)		

* Standard output when no output code is specified.

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

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Details of setting				Factory set value
	OUT1	OUT2	Remarks	
0012	Transmission output	Control output	Transmission output+PID action	Note 1
0013	Transmission output	OR output of alarm 1 and alarm 2 (Energized)	Transmission output+Alarm 1, alarm 2	
0014	Transmission output	OR output of alarm 1 and alarm 2 (De-energized)		
0015	Transmission output	AND output of alarm 1 and alarm 2 (Energized)		
0016	Transmission output	AND output of alarm 1 and alarm 2 (De-energized)		
0017	Transmission output	Alarm 1 output (Energized)	Transmission output+Alarm 1	
0018	Transmission output	Alarm 1 output (De-energized)		
0019	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)	

* Cool-side control output: Current output only

Heat-side control output: Relay contact output or voltage pulse output

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



No heat-side or cool-side proportional cycle 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.

2.5 F41 Alarm 1 Function F42 Alarm 2 Function

(1) Alarm type selection (AS1, AS2)


Details of setting		Factory set value
0000	Alarm not provided	Factory set value varies depending on the instrument specification.
0001	SV high alarm	
0002	SV low alarm	
0003	Process high alarm	
0004	Process low alarm	
0005	Deviation high alarm	
0006	Deviation low alarm	
0007	Deviation high/low alarm	
0008	Band alarm	
0009	Control loop break alarm *	

* Control loop break alarm can not be specified in case of heat/cool action. Only alarm 1 can be set.

 See 2.1 Attention Items in Setting (P. 8).

(2) Alarm hold action selection (AHO1, AHO2)

Details of setting		Factory set value
0000	Without alarm hold action	0000
0001	Effective when the power is turned on, or operation is changed from STOP to RUN.	
0002	Effective when the power is turned on, or operation is changed from STOP to RUN or the SV is changed.	

 The alarm hold action function can not be added to the SV alarm and control loop break alarm.

(3) Alarm differential gap setting (AH1, AH2)

Details of setting		Factory set value
Thermocouple	0 (0.0) to span	Note 1
RTD		
Voltage/current		

Note 1 TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]

Voltage/current inputs: 0.2 % of span

(4) Process abnormality action selection (AEo1, AEo2)

Set the alarm action in input abnormality by input break (when the input is over-scaled or underscaled).

Details of setting		Factory set value
0000	Normal processing: The alarm action set by alarm type selection (AS1/AS2) is taken even if the input is abnormal.	Note 1
0001	Forcibly turned on when abnormal: The alarm is forcibly turned on regardless of the alarm action set by alarm type selection (AS1/AS2) when the input is abnormal.	

Note 1 Alarm 1 process abnormality action selection: No alarm 1 or control loop break alarm: 0
 Alarm 1 provided: 1
 Alarm 2 process abnormality action selection: No alarm 2: 0
 Alarm 2 provided: 1



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.

2.6 F51 Control Action**(1) Control action type selection (oS1)**

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

Details of setting		Factory set value
0000	D type: PID action with autotuning (Direct action)	Note 1
0001	F type: PID action with autotuning (Reverse action)	
0002	W type: Heat/cool PID action with autotuning (Water cooling)	
0003	A type: Heat/cool PID action with autotuning (Air cooling)	

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

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

Details of setting		Factory set value
Thermocouple	0 (0.0) to span	Note 1
RTD		
Voltage/current		

Note 1 TC and RTD inputs: 2 °C [°F] or 2.0 °C [°F]
 Voltage/current inputs: 0.2 % of span

2.7 F61 Communication Function

■ Communication protocol selection (CMPS)

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

Details of setting		Factory set value
0000	RKC communication protocol	0000
0001	Modbus protocol	

2.8 F71 Setting Change Rate Limiter Setting

Following parameters does only display. Do not change the setting, as this may cause malfunction.

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

Details of display		Factory set value
0000	Unused	0000

(2) Setting change rate limiter time (SVrT)

Details of display		Factory set value
1 to 3600 seconds		60

2.9 F91 Displayed for Maintenance Information

Only displayed for the F91 function block.

(1) ROM version displayed (E227)

Display the version of loading software.

(2) Integrated operating time (WT)

Display product calculation operating time.

However, as the integral time is increments by I when the power is turned on or off.

Details of display : 0 to 9999

(3) Holding peak ambient temperature (TCJ)


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

Details of display : 0.0 to 999.9

3. INITIALIZE COMMUNICATION DATA

■ RKC communication protocol

The number of digits for data is 6.

 For details on the structure of communication data, see **SA100 Communication Instruction Manual (IMR01J02-E□)**.

Name	Identifier	Description	Factory set value	Attribute
STOP display selection	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	RO *
Monitor display configuration selection	DW	0: PV/SV display 1: Only PV display 2: Only SV display	0	
MV display selection	DV	0: MV display not provided 1: MV display provided	0	
Input type selection	XI	0 to 16 (See P. 13)	Note 1	
Display unit selection	PU	0: °C 1: °F	0	
Decimal point position setting	XU	0 to 3 (See P. 14)	Note 1	
Setting limiter [high limit]	XV	Within input range. See 4. INPUT RANGE TABLES (P. 26)	Note 1	
Setting limiter [low limit]	XW			
Selection of output logic calculation	LO	1 to 19 (See P. 16)	Note 1	
Alarm 1 type selection	XA	0 to 9 (See P. 18)	Note 1	
Alarm 1 differential gap	HA	0 to span	Note 2	
Alarm 1 process abnormality action	OA	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	
Alarm 1 hold action	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	

* 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: 0

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Name	Identifier	Description	Factory set value	Attribute
Alarm 2 type selection	XB	0 to 8 (See P. 18)	Note 1	RO *
Alarm 2 differential gap	HB	0 to span	Note 2	
ALM2 process abnormality action	OB	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	
Alarm 2 hold action	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	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	MH	0 to span	Note 2	
Setting change rate limiter Used/Unused	ZG	0: Unused 1: Used	0	
Setting change rate limiter time	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

■ Modbus protocol

 For details on the structure of communication data, see **SA100 Communication Instruction Manual (IMR01J02-E□)**.

Address	Name	Description	Factory set value	Attribute
30H	STOP display selection	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 *
31H	Monitor display configuration selection	0: PV/SV display 1: Only PV display 2: Only SV display	0	
32H	MV display selection	0: MV display not provided 1: MV display provided	0	
33H	Input type selection	0 to 16 (See P. 13)	Note 1	
34H	Display unit selection	0: °C 1: °F	0	
35H	Decimal point position setting	0 to 3 (See P. 14)	Note 1	
36H	Setting limiter [high limit]	Within input range. See 4. INPUT RANGE TABLES (P. 26)	Note 1	
37H	Setting limiter [low limit]			
38H	Selection of output logic calculation	1 to 19 (See P. 16)	Note 1	
39H	Alarm 1 type selection	0 to 9 (See P. 18)	Note 1	
3AH	Alarm 1 differential gap	0 to span	Note 2	
3BH	Alarm 1 process abnormality action	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	
3CH	Alarm 1 hold action	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	

* 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: 0

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Address	Name	Description	Factory set value	Attribute
3DH	Alarm 2 type selection	0 to 8 (See P. 18)	Note 1	RO *
3EH	Alarm 2 differential gap	0 to span	Note 2	
3FH	Alarm 2 process abnormality action	0: Normal processing 1: Forcibly turned on when abnormal	Note 3	
40H	Alarm 2 hold action	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	
41H	Control action type selection	0: Direct action 1: Reverse action 2: Heat/cool action (Water cooling) 3: Heat/cool action (Air cooling)	Note 1	
42H	ON/OFF action differential gap	0 to span	Note2	
43H	Setting change rate limiter Used/Unused	0: Unused 1: Used	0	
44H	Setting change rate limiter time	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

4. INPUT RANGE TABLES

Input Range Table 1

Input type		Input range	Range code
Thermocouple	K	0 to 200 °C	K01
		0 to 400 °C	K02
		0 to 600 °C	K03
		0 to 800 °C	K04
		0 to 1000 °C	K05
		0 to 1200 °C	K06
		0 to 1372 °C	K07
		-199.9 to +300.0 °C	K08
		0.0 to 400.0 °C	K09
		0.0 to 800.0 °C	K10
		0 to 100 °C	K13
		0 to 300 °C	K14
		0 to 450 °C	K17
		0 to 500 °C	K20
		0.0 to 200.0 °C	K29
		0.0 to 600.0 °C	K37
		-199.9 to +800.0 °C	K38
		0 to 800 °F	KA1
		0 to 1600 °F	KA2
		0 to 2502 °F	KA3
		0.0 to 800.0 °F	KA4
	20 to 70 °F	KA9	
	-199.9 to +999.9 °F	KB2	
	J	0 to 200 °C	J01
		0 to 400 °C	J02
		0 to 600 °C	J03
		0 to 800 °C	J04
		0 to 1000 °C	J05
		0 to 1200 °C	J06
		-199.9 to +300.0 °C	J07
		0.0 to 400.0 °C	J08
		0.0 to 800.0 °C	J09
		0 to 450 °C	J10
0.0 to 200.0 °C		J22	
0.0 to 600.0 °C		J23	
-199.9 to +600.0 °C	J30		

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Input type		Input range	Range code
Thermocouple	J	0 to 800 °F	JA1
		0 to 1600 °F	JA2
		0 to 2192 °F	JA3
		0 to 400 °F	JA6
		0 to 300 °F	JA7
		-199.9 to +999.9 °F	JA9
		0.0 to 800.0 °F	JB6
	R	0 to 1600 °C ¹	R01
		0 to 1769 °C ¹	R02
		0 to 1350 °C ¹	R04
		0 to 3200 °F ¹	RA1
		0 to 3216 °F ¹	RA2
	S	0 to 1600 °C ¹	S01
		0 to 1769 °C ¹	S02
		0 to 3200 °F ¹	SA1
		0 to 3216 °F ¹	SA2
	B	400 to 1800 °C	B01
		0 to 1820 °C ¹	B02
		800 to 3200 °F	BA1
		0 to 3308 °F ¹	BA2
	E	0 to 800 °C	E01
		0 to 1000 °C	E02
		0 to 1600 °F	EA1
		0 to 1832 °F	EA2
	N	0 to 1200 °C	N01
		0 to 1300 °C	N02
		0.0 to 800 °C	N06
		0 to 2300 °F	NA1
		0 to 2372 °F	NA2
		0.0 to 999.9 °F	NA5
	T	-199.9 to +400.0 °C ²	T01
		-199.9 to +100.0 °C ²	T02
-100.0 to +200.0 °C		T03	
0.0 to 350.0 °C		T04	
-199.9 to +752.0 °F ²		TA1	
-100.0 to +200.0 °F		TA2	
-100.0 to +400.0 °F		TA3	
0.0 to 450.0 °F		TA4	
0.0 to 752.0 °F		TA5	

¹ Accuracy is not guaranteed between 0 to 399 °C (0 to 751 °F)² Accuracy is not guaranteed between -199.9 to -100.0 °C (-199.9 to -148.0 °F)

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4. INPUT RANGE TABLES

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Input type		Input range	Range code
Thermocouple	W5Re/W26Re	0 to 2000 °C	W01
		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
		U	-199.9 to +600.0 °C *
	-199.9 to +100.0 °C *		U02
	0.0 to 400.0 °C		U03
	-199.9 to +999.9 °F *		UA1
	-100.0 to +200.0 °F		UA2
	0.0 to 999.9 °F		UA3
	L	0 to 400 °C	L01
		0 to 800 °C	L02
		0 to 800 °F	LA1
		0 to 1600 °F	LA2
RTD	Pt100	-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		

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

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Input type		Input range	Range code
RTD	JPt100	-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

Input Range Table 2

Input type		Input range	Range code
Voltage	0 to 5 V DC	0.0 to 100.0 %	401
	0 to 10 V DC		501
	1 to 5 V DC		601
Current	0 to 20 mA DC		701
	4 to 20 mA DC		801



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

MEMO



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