

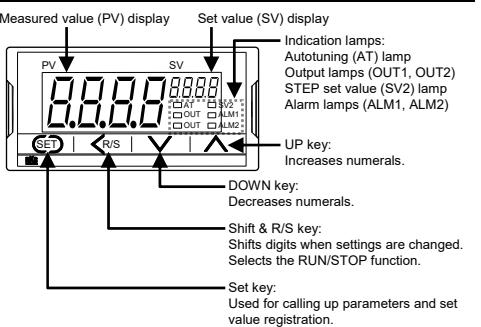


Temperature Controller Quick Operation SA200/SA201 Manual

IMR01D13-E1 All Rights Reserved, Copyright © 2022, RKC INSTRUMENT INC.
Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference. This manual describes basic key operations of the SA200/SA201.

For detailed handling procedures and key operations, refer to separate **SA200/SA201 Instruction Manual (IMR01D14-E1)**. If you purchased a product with Z-number (Z-□□□) specifications, please also download the Z-number specification manual.
The manual can be downloaded from the official RKC website: <https://www.rkinst.co.jp/english/download-center/>

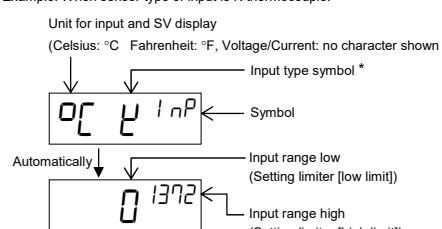
1. FRONT KEY DESCRIPTION



Input Type and Input Range Display

When the instrument is powered on, it immediately confirms the input type and input range.

Example: When sensor type of input is K thermocouple.



* Input Type Symbol Table

Symbol	J	Jr	S	b	E	T	n	P	U	L	JP	PF	H
Thermocouple (TC)	K	J	R	S	B	E	T	N	PL II	W5Re/W26Re	U	I	JPt Pt Current

PV/SV Display Mode

The controller will display the Measured value (PV) and the Set value (SV).

- If the STEP function is provided, the SV display will show the Set value (SV1) or STEP set value (SV2) depending on whether the Contact input is opened or closed.
- The controller can be switched to RUN mode or STOP mode.

SV Setting Mode

The blinking digit on the SV display indicates which digit can be set.

Setting range: Within input range
Factory set value: TC/RTD inputs 0.0 °C [°F]
Voltage/Current inputs 0.0 %

If the STEP function is provided, the following parameter symbols are displayed on the PV.

Set value (SV1): 1

STEP set value (SV2): 5R2

2.2 Changing Parameter Settings

Procedures to change parameter settings are shown below.

To store a new value for the parameter, always press the SET key.
The display changes to the next parameter and the new value will be stored.
- A new value will not be stored without pressing SET key after the new value is displayed on the display.
- After a new value has been displayed by using the UP and DOWN keys, the SET key must be pressed within one minute, or the new value is not stored and the display will return to the PV/SV display mode.

When the set data is locked, the digits on the SV display are brightly lit and the set value cannot be changed. The locked parameters are released at "Set data lock (LCK)" in the Parameter setting mode.

Change the Set value (SV)

Example: Change the Set value (SV) from 0 °C to 50 °C

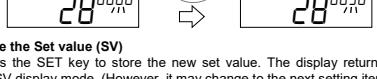
1. Select the SV setting mode
Press the SET key at PV/SV display mode until SV display mode is displayed.



2. Shift the blinking digit
Press the <R/S key to blink the tens digit. The blinking digit indicates which digit can be set.



3. Change the Set value (SV)
Press the UP key to change the number to 5.



4. Store the Set value (SV)
Press the SET key to store the new set value. The display returns to the PV/SV display mode. (However, it may change to the next setting item)



3.3 Set Data Lock (LCK)

The set data lock restricts parameter setting changes by key operation. This function prevents the operator from making errors during operation.

Set value	Parameters which can be changed
0000	All parameters [Factory set value]*
0001	SV, Alarms (ALM1, ALM2)
0010	All parameters except for Alarms (ALM1, ALM2)*
0100	All parameters except for SV*
0011	SV
0101	Alarms (ALM1, ALM2)
0110	All parameters except for SV and Alarms (ALM1, ALM2)*
0111	No parameters (All locked)

* However, the parameters of the Engineering mode cannot be changed.

Set Data Lock can be changed in both RUN and STOP mode.
Parameters protected by Set Data Lock function are still displayed for monitoring.

3.4 Autotuning (AT)

Autotuning (AT) automatically measures, computes and sets the optimum PID and LBA constants. The following conditions are necessary to carry out AT and the conditions which will cause the AT to stop.

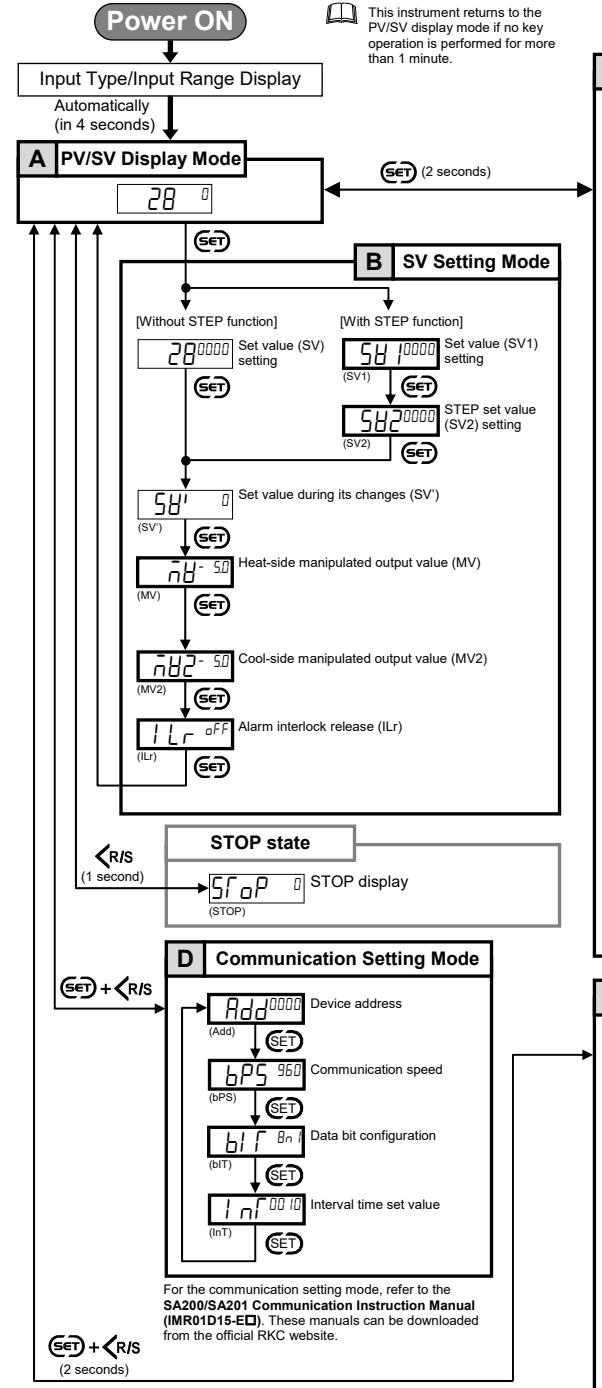
NOTE

Caution for using the Autotuning (AT)
When a temperature change (Up and/or Down) is 1 °C or less per minute during AT, AT may not be finished normally. In that case, adjust the PID values manually. Manual setting of PID values may also be necessary if the set value is around the ambient temperature or is close to the maximum temperature achieved by the load.

This instrument has one each of Integral time (I) and Derivative time (D). In the case of Heat/Cool PID control, these parameters are used on both heating and cooling sides.

2. OPERATION

2.1 Call Procedure for Each Mode and How to Switch Parameters



The setting range is from -1999 to +9999 regardless of the position of the decimal point.
Refer to the back side for the details of the parameters.

Some parameter symbols may not be displayed depending on the specification. Those parameter screens are shown in a bold frame.

88880000 Bold frame

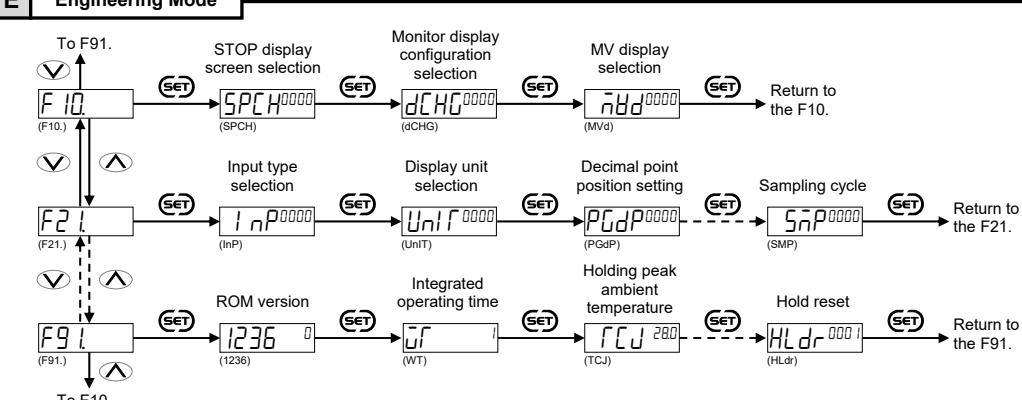
C Parameter Setting Mode



D Communication Setting Mode

For the procedure to call the engineering mode, refer to "6. GO TO ENGINEERING MODE" on the back side.

E Engineering Mode



2. Shift the blinking digit

Press the <R/S key to blink the tens digit. The blinking digit indicates which digit can be set.



3. Change the Alarm set value

Press the UP key to change the number to 0. The digit is shifted to the higher digit and the number at the hundreds digit becomes "1".



4. Store the Alarm set value

Press the SET key to store the new set value. The display changes to the next parameter.



■ Change the Set value (SV) and Alarm set value

The changing procedures are the same as those of example 2 to 4, in the "■ Change the Set value (SV)". Pressing the SET key after the setting end shifts to the next parameter. When no parameter setting is required, return the instrument to the PV/SV display mode.

3. OPERATION

3.1 Operating Precautions

- All mounting and wiring must be completed before the power is turned on.
- The settings for the SV and all parameters should be appropriate for the controlled object.
- A power supply switch is not furnished with this instrument. It is ready to operate as soon as the power is turned on. [Factory set value: RUN (operation start)]

NOTE

Connect the input signal wiring and turn the power on. If the input signal wiring is not complete prior to turning the power on, the instrument determines that burnout has occurred.

A power failure of 20 ms or less will not affect the control action. When a power failure of more than 20 ms occurs, the instrument assumes that the power has been turned off. When power returns, the controller will retain the conditions that existed prior to shut down.

The alarm hold action is activated when the power is turned on or when the SV is changed, including an SV change made with the STEP function.

6.2 RUN/STOP

RUN/STOP can be selected by contact input (optional) other than the key operation. In addition, at STOP the key operation and contact state are displayed on the PV display. Relationships between key operation, RUN/STOP and the characters to indicate the STOP state are shown in the following.

	RUN/STOP with Contact Input ¹	RUN (Contact closed) STOP (Contact open)
RUN/STOP with Key Operation	RUN (Contact closed) STOP is displayed	dSP (dSP) is displayed
STOP with Key Operation	STOP is displayed	dSP (dSP) is displayed

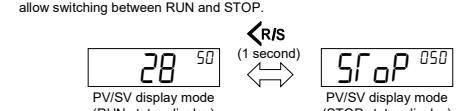
¹Contact input: Terminal No.10, 12

²Characters in parentheses are those shown on the PV display:
dSP: Only contact input is in the STOP mode
dSP: Only key operation is in the STOP mode
dSP: Both key operation and contact input are in the STOP mode

- Conditions when changed to STOP mode:
 - Control, Alarm: Control OFF, Alarm OFF
 - Output: OUT1 output OFF (OPEN), OUT2 output OFF (OPEN)
 - Autotuning (AT): The AT is canceled (The PID constants are not updated)

■ RUN/STOP transfer by key operation

Each press of the <R/S key for one second in the PV/SV display mode will allow switching between RUN and STOP.



■ RUN/STOP transfer by contact input

RUN/STOP can be selected according to the open or closed state of the terminals 10 and 12.

Contact Input	Terminal No.	RUN	STOP
10 11 12 DI1 DI2	10-12	Contact closed	Contact open

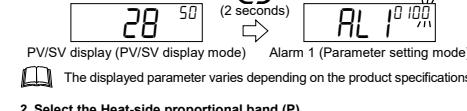
When the "alarm interlock release" is assigned to DI2, RUN/STOP cannot be transferred by contact input.

4. SWITCHING TO THE ON/OFF ACTION

To switch to the ON/OFF action, set the Proportional band to zero (0).

■ Setting procedures

- Select the Parameter setting mode
Press and hold the SET key for 2 seconds in the PV/SV display mode state to transfer to Parameter setting mode.



The displayed parameter varies depending on the product specifications.

- Select the Heat-side proportional band (P)
Press the SET key until the Heat-side proportional band (P) is displayed.

5. ERROR DISPLAYS

■ Self-diagnostic error

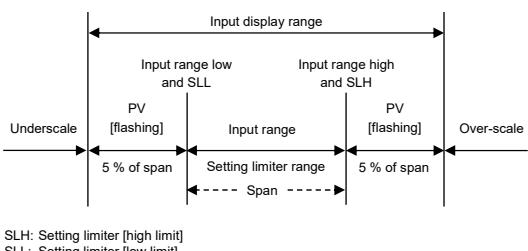
Error No.	Description	Operation at error	Solution
1	Adjustment data error	Display: Error display (Err) once.	Turn off the power once.
2	EEPROM error	Control output: All output are OFF	If an error occurs after the power is turned on again, please contact RKC sales office or the agent.
4	A/D conversion error	Alarm output: All output are OFF	
8	RAM check error		
128	Watchdog timer error		

Example: When the adjustment data error (1) and A/D conversion error (4) occurs simultaneously

Err 5 → The error codes are shown in the SV display. When two or more errors occur simultaneously, the total summation of these error codes is displayed.

■ Over-scale and Underscale

Display	Description	Solution
Measured value (PV) is flashing	PV is outside of input range.	WARNING To prevent electric shock, always turn off the power before replacing the sensor.
oooo flashing	Over-scale: PV is above the high input display range limit.	Check Input type, Input range and connecting state of sensor. Confirm that the sensor or wire is not broken.
uuuu flashing	Underscale: PV is below the low input display range limit.	



8. PARAMETER LIST

Some parameters may not be displayed depending on the conditions. These parameters are displayed when you specify them when ordering or when you have made settings to use the function. Parameters with * in the name will be displayed only when all the display conditions are satisfied.

A. PV/SV Display Mode

No.	Symbol	Name	Display range	Factory set value
1	—	Measured value (PV) display	Within input range, 1, 2	—
2	—	Set value (SV) display	Within input range, 1, 3	—

1 Varies with the setting of the Decimal point position.

2 Setting limiter [low limit] – (5 % of span)

Setting limiter [high limit] + (5 % of span)

3 Setting limiter [low limit] to Setting limiter [high limit]

4 Setting limiter [low limit] to Setting limiter [high limit]

5 Setting limiter [low limit] to Setting limiter [high limit]

No.	Symbol	Name	Display or data range	Factory set value
3	—	Set value (SV) setting	Within input range, 1, 2	TC/RTD inputs: 0 (0.0) Voltage/ Current inputs: 0.0
4	SB ² (SV ²)	STEP set value (SV ²) setting *		0.0
5	SB ¹ (SV ¹)	Set value during its changes (SV) [*]	Within input range, 1, 2	—
6	SB ² (MV ²)	Heat-side manipulated output value (MV) [*]	-5.0 to +105.0 %	—
7	SB ² (MV ²)	Cool-side manipulated output value (MV) [*]	-5.0 to +105.0 %	—
8	I L _r (I _{Lr})	Alarm interlock release (I _{Lr})	on: Alarm interlock state off: Alarm interlock release	—

1 Varies with the setting of the Decimal point position.

2 Setting limiter [low limit] to Setting limiter [high limit]

3 Setting limiter [low limit] to Setting limiter [high limit]

4 Setting limiter [low limit] to Setting limiter [high limit]

5 Setting limiter [low limit] to Setting limiter [high limit]

6 However, the parameters of the Engineering mode cannot be changed.

7 Setting limiter [low limit] to Setting limiter [high limit]

8 Setting limiter [low limit] to Setting limiter [high limit]

9 Setting limiter [low limit] to Setting limiter [high limit]

10 Setting limiter [low limit] to Setting limiter [high limit]

11 Setting limiter [low limit] to Setting limiter [high limit]

12 Setting limiter [low limit] to Setting limiter [high limit]

13 Setting limiter [low limit] to Setting limiter [high limit]

14 Setting limiter [low limit] to Setting limiter [high limit]

15 Setting limiter [low limit] to Setting limiter [high limit]

16 Setting limiter [low limit] to Setting limiter [high limit]

17 Setting limiter [low limit] to Setting limiter [high limit]

18 Setting limiter [low limit] to Setting limiter [high limit]

19 Setting limiter [low limit] to Setting limiter [high limit]

20 Setting limiter [low limit] to Setting limiter [high limit]

21 Setting limiter [low limit] to Setting limiter [high limit]

22 Setting limiter [low limit] to Setting limiter [high limit]

23 Setting limiter [low limit] to Setting limiter [high limit]

24 Setting limiter [low limit] to Setting limiter [high limit]

25 Setting limiter [low limit] to Setting limiter [high limit]

26 Setting limiter [low limit] to Setting limiter [high limit]

27 Setting limiter [low limit] to Setting limiter [high limit]

28 Setting limiter [low limit] to Setting limiter [high limit]

29 Setting limiter [low limit] to Setting limiter [high limit]

30 Setting limiter [low limit] to Setting limiter [high limit]

31 Setting limiter [low limit] to Setting limiter [high limit]

32 Setting limiter [low limit] to Setting limiter [high limit]

33 Setting limiter [low limit] to Setting limiter [high limit]

34 Setting limiter [low limit] to Setting limiter [high limit]

35 Setting limiter [low limit] to Setting limiter [high limit]

36 Setting limiter [low limit] to Setting limiter [high limit]

37 Setting limiter [low limit] to Setting limiter [high limit]

38 Setting limiter [low limit] to Setting limiter [high limit]

39 Setting limiter [low limit] to Setting limiter [high limit]

40 Setting limiter [low limit] to Setting limiter [high limit]

41 Setting limiter [low limit] to Setting limiter [high limit]

42 Setting limiter [low limit] to Setting limiter [high limit]

43 Setting limiter [low limit] to Setting limiter [high limit]

44 Setting limiter [low limit] to Setting limiter [high limit]

45 Setting limiter [low limit] to Setting limiter [high limit]

46 Setting limiter [low limit] to Setting limiter [high limit]

47 Setting limiter [low limit] to Setting limiter [high limit]

48 Setting limiter [low limit] to Setting limiter [high limit]

49 Setting limiter [low limit] to Setting limiter [high limit]

50 Setting limiter [low limit] to Setting limiter [high limit]

51 Setting limiter [low limit] to Setting limiter [high limit]

52 Setting limiter [low limit] to Setting limiter [high limit]

53 Setting limiter [low limit] to Setting limiter [high limit]

54 Setting limiter [low limit] to Setting limiter [high limit]

55 Setting limiter [low limit] to Setting limiter [high limit]

56 Setting limiter [low limit] to Setting limiter [high limit]

57 Setting limiter [low limit] to Setting limiter [high limit]

58 Setting limiter [low limit] to Setting limiter [high limit]

59 Setting limiter [low limit] to Setting limiter [high limit]

60 Setting limiter [low limit] to Setting limiter [high limit]

61 Setting limiter [low limit] to Setting limiter [high limit]

62 Setting limiter [low limit] to Setting limiter [high limit]

63 Setting limiter [low limit] to Setting limiter [high limit]

64 Setting limiter [low limit] to Setting limiter [high limit]

65 Setting limiter [low limit] to Setting limiter [high limit]

66 Setting limiter [low limit] to Setting limiter [high limit]

67 Setting limiter [low limit] to Setting limiter [high limit]

68 Setting limiter [low limit] to Setting limiter [high limit]

69 Setting limiter [low limit] to Setting limiter [high limit]

70 Setting limiter [low limit] to Setting limiter [high limit]

71 Setting limiter [low limit] to Setting limiter [high limit]

72 Setting limiter [low limit] to Setting limiter [high limit]

73 Setting limiter [low limit] to Setting limiter [high limit]

74 Setting limiter [low limit] to Setting limiter [high limit]

75 Setting limiter [low limit] to Setting limiter [high limit]

76 Setting limiter [low limit] to Setting limiter [high limit]

77 Setting limiter [low limit] to Setting limiter [high limit]

78 Setting limiter [low limit] to Setting limiter [high limit]

79 Setting limiter [low limit] to Setting limiter [high limit]

80 Setting limiter [low limit] to Setting limiter [high limit]

81 Setting limiter [low limit] to Setting limiter [high limit]

82 Setting limiter [low limit] to Setting limiter [high limit]

83 Setting limiter [low limit] to Setting limiter [high limit]

84 Setting limiter [low limit] to Setting limiter [high limit]

85 Setting limiter [low limit] to Setting limiter [high limit]

86 Setting limiter [low limit] to Setting limiter [high limit]

87 Setting limiter [low limit] to Setting limiter [high limit]

88 Setting limiter [low limit] to Setting limiter [high limit]

89 Setting limiter [low limit] to Setting limiter [high limit]

90 Setting limiter [low limit] to Setting limiter [high limit]

91 Setting limiter [low limit] to Setting limiter [high limit]

92 Setting limiter [low limit] to Setting limiter [high limit]

93 Setting limiter [low limit] to Setting limiter [high limit]

94 Setting limiter [low limit] to Setting limiter [high limit]

95 Setting limiter [low limit] to Setting limiter [high limit]

96 Setting limiter [low limit] to Setting limiter [high limit]

97 Setting limiter [low limit] to Setting limiter [high limit]

98 Setting limiter [low limit] to Setting limiter [high limit]

99 Setting limiter [low limit] to Setting limiter [high limit]

100 Setting limiter [low limit] to Setting limiter [high limit]

101 Setting limiter [low limit] to Setting limiter [high limit]</p