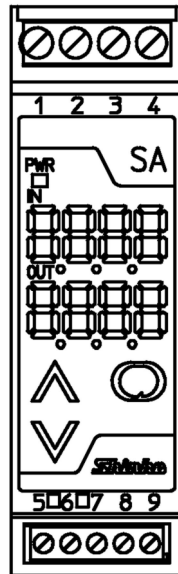


ALARM DETECTOR

SA□A SERIES

INSTRUCTION MANUAL



Shinbo

Preface

Thank you for purchasing the Alarm Detector SA□A series.


This manual contains instructions for the mounting, functions, operations and notes when operating the SA□A series. To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- Specifications of the SA□A series and the contents of this instruction manual are subject to change without notice.
- Care has been taken to ensure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- This instrument is designed to be installed on a DIN rail. If it is not, measures must be taken to ensure that the operator does not touch power terminals or other high voltage sections.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos CO., LTD. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damage.

SAFETY PRECAUTIONS (Be sure to read these precautions before using our products.)

The safety precautions are classified into categories: “Warning” and “Caution”.

Depending on circumstances, procedures indicated by  Caution may cause serious results, so be sure to follow the directions for usage.



Warning

Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.



Caution

Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.



Warning

- To prevent an electric shock or fire, only Shinko or other qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to the instrument, parts replacement may only be undertaken by Shinko or other qualified service personnel.



Safety precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after consulting purpose of use with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protection equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Caution with respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.

In the case of resale, ensure that this instrument is not illegally exported.

1. Installation precautions



Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category II, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- No mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of -5 to 55°C (23 to 131°F) that does not change rapidly, and no icing
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit
- When installing this unit within a control panel, take note that ambient temperature of this unit must not exceed 55°C (131°F). Otherwise the life of electronic components (especially electrolytic capacitor) may be shortened.

Note • Do not install this instrument on or near flammable material even though the case of this instrument is made of flame-resistant resin.

2. Wiring precautions



Caution

- Do not leave bits of wire in the instrument, because they could cause a fire and malfunction.
- When wiring terminals, use ferrules with an insulation sleeve and crimping pliers made by Phoenix Contact GMBH & CO. applicable to terminals.
- Tighten the terminal screw using the specified torque.
If excessive force is applied to the screw when tightening, the screw or case may be damaged.
- This instrument has no built-in power switch, circuit breaker or fuse. It is necessary to install them near the instrument.
(Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- For wiring of AC power source, be sure to use exclusive terminals as described in this manual. If AC power source is connected to incorrect terminals, the unit will burn out.
- For a 24V DC power source, do not confuse polarity when wiring.
- Do not apply a commercial power source to the sensor connected to the input terminal nor allow the power source to come into contact with the sensor, as the input circuit may burn out.
- Use a thermocouple, compensating lead wire and 3-wire system RTD according to the sensor input specifications of this unit.
- When using DC voltage and current input, do not confuse polarity when wiring.
- Keep the input wire (TC, RTD, etc.), power line and load wire away from one another.

3. Operation and maintenance precautions



Caution

- Do not touch live terminals. This may cause electric shock or problems in operation.
- Turn the power supply to the instrument OFF when retightening the terminal and cleaning. Working or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.
- Use a soft, dry cloth when cleaning the instrument.
(Alcohol based substances may tarnish or deface the unit.)
- As the display section is vulnerable, do not strike or scratch it with a hard object or press hard on it.

Characters used in this manual

Indication	-	0	1	2	3	4	5	6	7	8	9	°C	°F
Number, °C/°F	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Indication	A	B	C	D	E	F	G	H	I	J	K	L	M
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Indication	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

□ means that no character is indicated (unlit) on the display.

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1. Model

1.1 Model

SA□A series

SA □A - □□ □ □ - □		Series name: SA□A
Alarm detector type	E	Thermocouple
	R	RTD
	A	DC current (*1)
	V	DC voltage
Input	xx	Input code (*2)
Alarm 1 output (*3)	0	No alarm action
	1	High limit alarm
	2	Low limit alarm
	3	High limit alarm with standby
	4	Low limit alarm with standby
Alarm 2 output (*3)	0	No alarm action
	1	High limit alarm
	2	Low limit alarm
	3	High limit alarm with standby
	4	Low limit alarm with standby
Power supply	0	100 to 240V AC
	1	24V AC/DC

(*1) For SAAA (DC current alarm detector), a shunt resistor (sold separately) is required.
See (Table 4.3.3-1) on page 10.

(*2) For the input, refer to Input codes (Table 1.1-1) to (Table 1.1-4).

(*3) Alarm 1 and 2 output types can be selected from No alarm action, High limit alarm, Low limit alarm, High limit alarm with standby and Low limit alarm with standby by keypad operation.

(e.g.) S A E A - 0 1 1 1-0

—	Alarm detector type	: Thermocouple
—	Input	: K, -200 to 1370°C
—	Alarm 1	: High limit alarm
—	Alarm 2	: High limit alarm
—	Power supply	: 100 to 240V AC

(Table 1.1-1)

Input code [SAEA (Thermocouple)]

Thermocouple	Scale range	Thermocouple	Scale range
01 K	-200 to 1370°C	51 K	-328 to 2498°F
02 K	-199.9 to 400.0°C	52 K	-199.9 to 752.0°F
03 J	-200 to 1000°C	53 J	-328 to 1832°F
04 R	-50 to 1760°C	54 R	-58 to 3200°F
05 S	-50 to 1760°C	55 S	-58 to 3200°F
06 B	0 to 1820°C	56 B	32 to 3308°F
07 E	-200 to 800°C	57 E	-328 to 1472°F
08 T	-199.9 to 400.0°C	58 T	-199.9 to 752.0°F
09 N	-200 to 1300°C	59 N	-328 to 2372°F
10 PL-II	0 to 1390°C	60 PL-II	32 to 2534°F
11 W5Re/W26Re	0 to 2315°C	61 W5Re/W26Re	32 to 4199°F
12 W3Re/W25Re	0 to 2315°C	62 W3Re/W25Re	32 to 4199°F

(Table 1.1-2)

Input code [SARA (RTD)]

RTD		Scale range	RTD		Scale range
01	Pt100	-50.0 to 100.0°C	51	Pt100	-58.0 to 212.0°F
02	Pt100	-50.0 to 300.0°C	52	Pt100	-58.0 to 572.0°F
03	Pt100	-200 to 850°C	53	Pt100	-328 to 1562°F
04	JPt100	-50.0 to 100.0°C	54	JPt100	-58.0 to 212.0°F
05	JPt100	-50.0 to 300.0°C	55	JPt100	-58.0 to 572.0°F
06	JPt100	-200 to 500°C	56	JPt100	-328 to 932°F

(Table 1.1-3)

Input code [SAAA (DC current)]

DC current	Scale range
01 4 to 20mA DC	-1999 to 9999
02 0 to 20mA DC	
03 2 to 10mA DC	
04 0 to 10mA DC	
05 0 to 16mA DC	
06 1 to 5mA DC	
07 0 to 1mA DC	

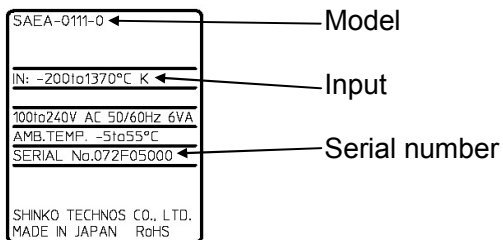
(Table 1.1-4)

Input code [SAVA (DC voltage)]

DC voltage	Scale range
01 0 to 100mV DC	-1999 to 9999
02 0 to 1V DC	
03 0 to 5V DC	
04 1 to 5V DC	
05 0 to 10V DC	

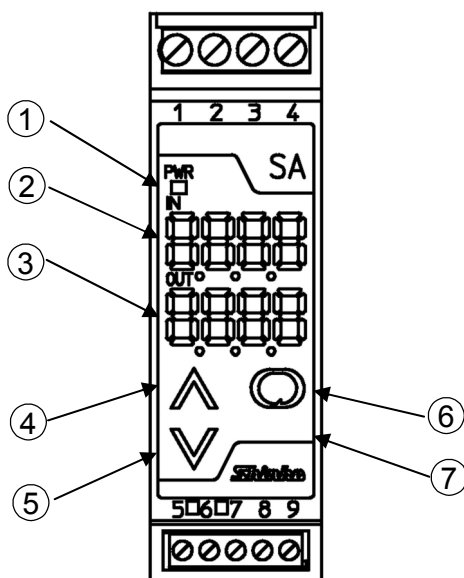
1.2 How to read the model label

The model label is attached to left side of the case.



(Fig. 1.2-1)

2. Name and functions of sections



(Fig.2.1)

- Power indicator (Green)**
Lights when the power to the instrument is turned on.
- Input display (Red)**
Indicates the input value during Run mode. Indicates setting characters during the Setup and Alarm setting mode.
- Set value display (Green)**
During Run mode, indicates an indication type (Alarm 1 or 2 value) selected during Display selection. Indicates the following characters for alarm output.

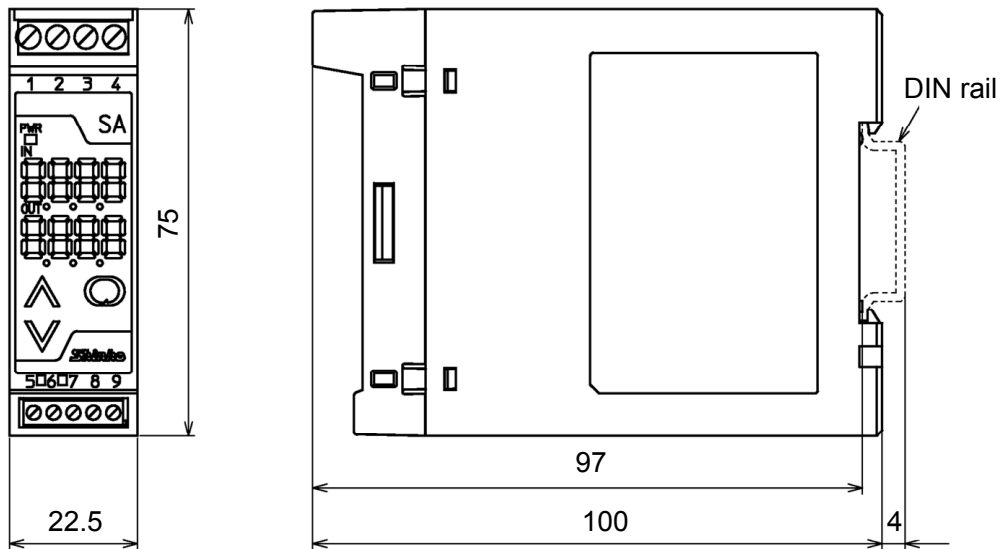
Alarm output	Set value display
Alarm 1 output ON	0 100
Alarm 2 output ON	00 02
Alarm 1, 2 output ON	0 102

Indicates set values during the Setup and Alarm setting mode.

- ④ **Up key** (▲)
Increases the numeric value, or switches the selection items.
- ⑤ **Down key** (▼)
Decreases the numeric value, or switches the selection items.
- ⑥ **Mode key** (○)
Switches the setting mode, and registers the set (or selected) value.
By holding down this key for approx. 3 seconds, the unit proceeds to the Alarm setting mode.
- ⑦ **Sub-mode key (Unmarked)**
If the Mode key is pressed while holding down this key, the unit proceeds to the Setup mode.

3. Mounting

3.1 External dimensions (Scale: mm)



(Fig. 3.1-1)

3.2 Mounting and removal to/from the DIN rail



Caution

- Mount the DIN rail horizontally.
- To remove this instrument, a flat blade screwdriver is required for pulling down the lever.
Never turn the screwdriver when inserting it into the release lever.
If excessive power is applied to the lever, it may break.
- Be sure to use commercially available fastening plates at both ends of the unit if it is in a position susceptible to vibration or shock.

Recommended fastening plate

Manufacturer	Model
Omron Corporation	End plate PFP-M
IDEC Corporation	Fastening plate BNL6
Panasonic Electric Works Co., Ltd.	Fastening plate ATA4806

Mounting to the DIN rail (Fig. 3.2-1)

First, hook ① of the instrument on the upper side of the DIN rail.

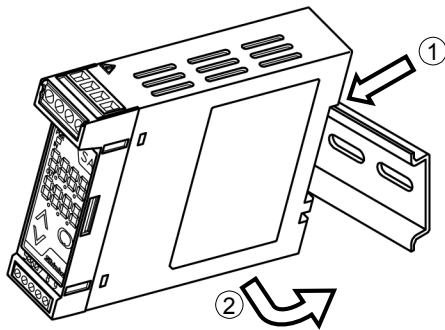
Second, making ① part of the instrument as a support, fit the lower part ② of the instrument to the DIN rail.

The unit will be completely fixed to the DIN rail when a “Click” sound is heard.

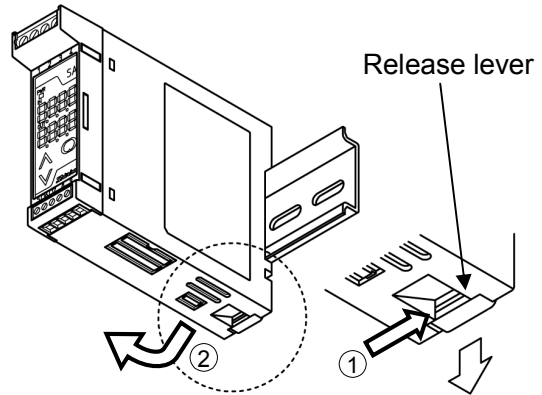
Removal from the DIN rail (Fig.3.2-2)

First, insert a flat blade screwdriver into the release lever (①).

Second, remove the instrument from the DIN rail by pulling down the lever (②).



(Fig. 3.2-1) Mounting



(Fig. 3.2-2) Removal

4. Wiring



Warning

Turn the power supply to the instrument off before wiring.

Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.

4.1 Recommended ferrules

When using ferrules, use the following recommended ferrules and crimping pliers made by Phoenix Contact GMBH &CO. See (Table 4.1-1).

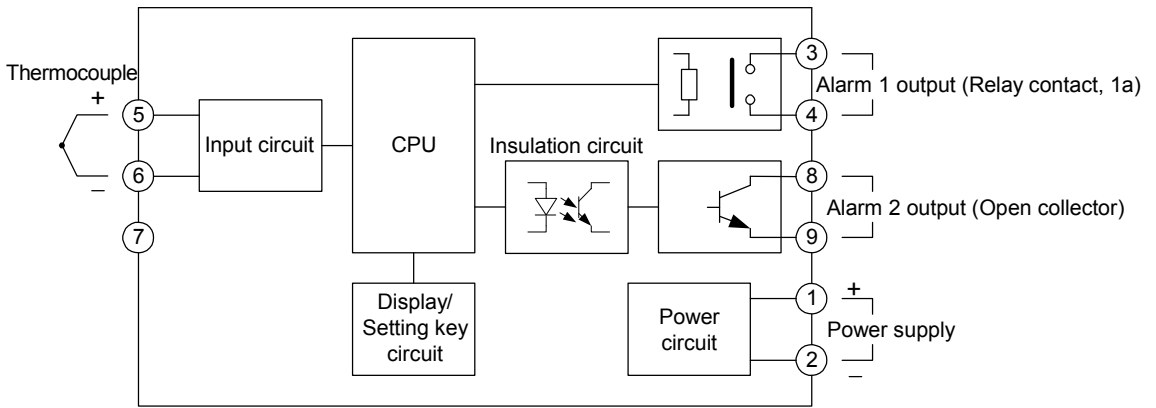
Take note that screw size and tightening torque differ depending on the terminal number.

(Table 4.1-1)

Terminal number	Terminal screw	Ferrules with insulation sleeve	Conductor cross sections	Tightening torque	Crimping pliers
1 to 4	M2.6	AI 0.25-8 YE	0.2 to 0.25mm ²	0.5 to 0.6N•m	CRIMPFOX ZA 3
		AI 0.34-8 TQ	0.25 to 0.34mm ²		
		AI 0.5-8 WH	0.34 to 0.5mm ²		
		AI 0.75-8 GY	0.5 to 0.75mm ²		
		AI 1.0-8 RD	0.75 to 1.0mm ²		
		AI 1.5-8 BK	1.0 to 1.5mm ²		
5 to 9	M2.0	AI 0.25-8 YE	0.2 to 0.25mm ²	0.22 to 0.25N•m	CRIMPFOX UD 6
		AI 0.34-8 TQ	0.25 to 0.34mm ²		
		AI 0.5-8 WH	0.34 to 0.5mm ²		

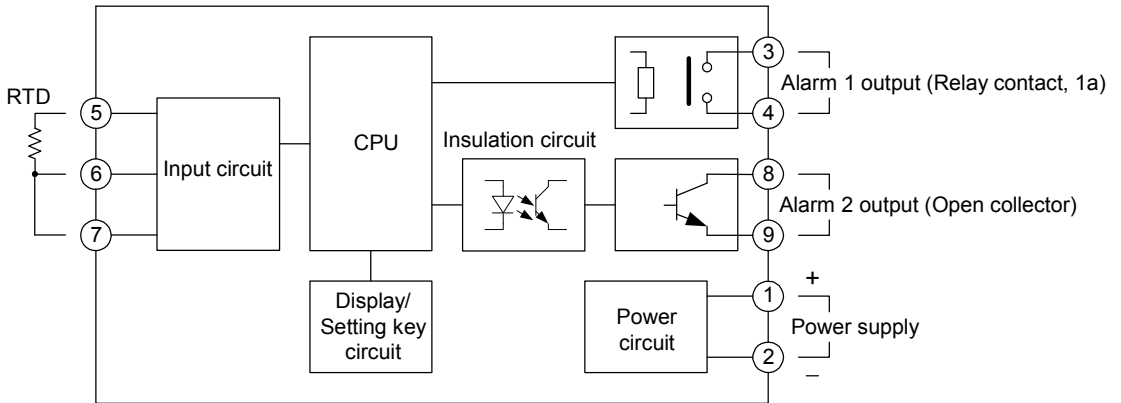
4.2 Terminal arrangement and circuit configuration

SAEA



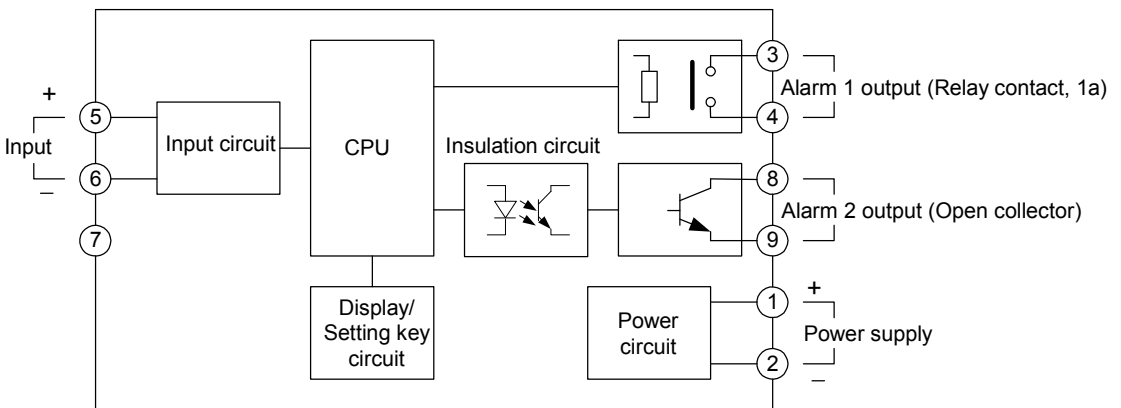
(Fig. 4.2-1)

SARA



(Fig. 4.2-2)

SAAA, SAVA



(Fig. 4.2-3)

4.3 Wiring of terminals



Warning

- For 100 to 240V AC, if AC power source is connected to incorrect terminals, this instrument will burn out.
- For a 24V DC power source, do not confuse polarity when wiring.

4.3.1 Power source wiring

Use terminals ①(+) and ②(-) for the power supply to the instrument.

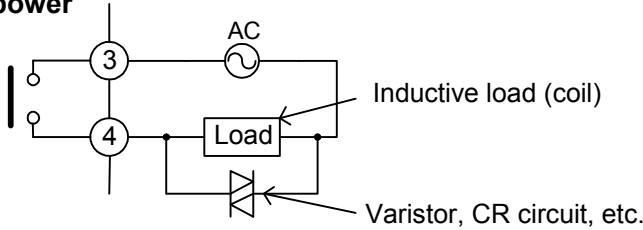
4.3.2 Output wiring

Use terminals ③(+) and ④(-) for Alarm output 1.

Use terminals ⑧(+) and ⑨(-) for Alarm output 2.

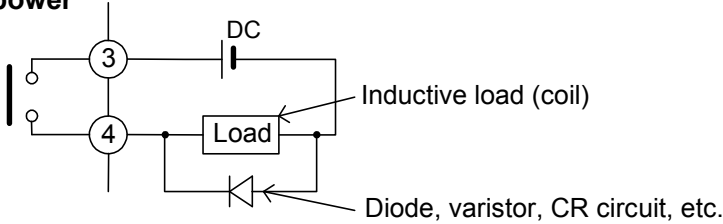
- **Alarm 1 output: Take measures for relay protection and noise prevention as shown below.**

• AC power



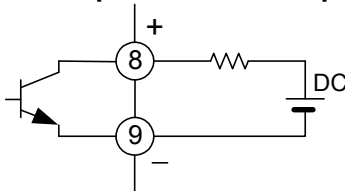
(Fig. 4.3.2-1)

• DC power



(Fig. 4.3.2-2)

- **Alarm 2 open collector output connection example**



(Fig. 4.3.2-3)

4.3.3 Input wiring

Terminals for wiring differs depending on the input specifications.

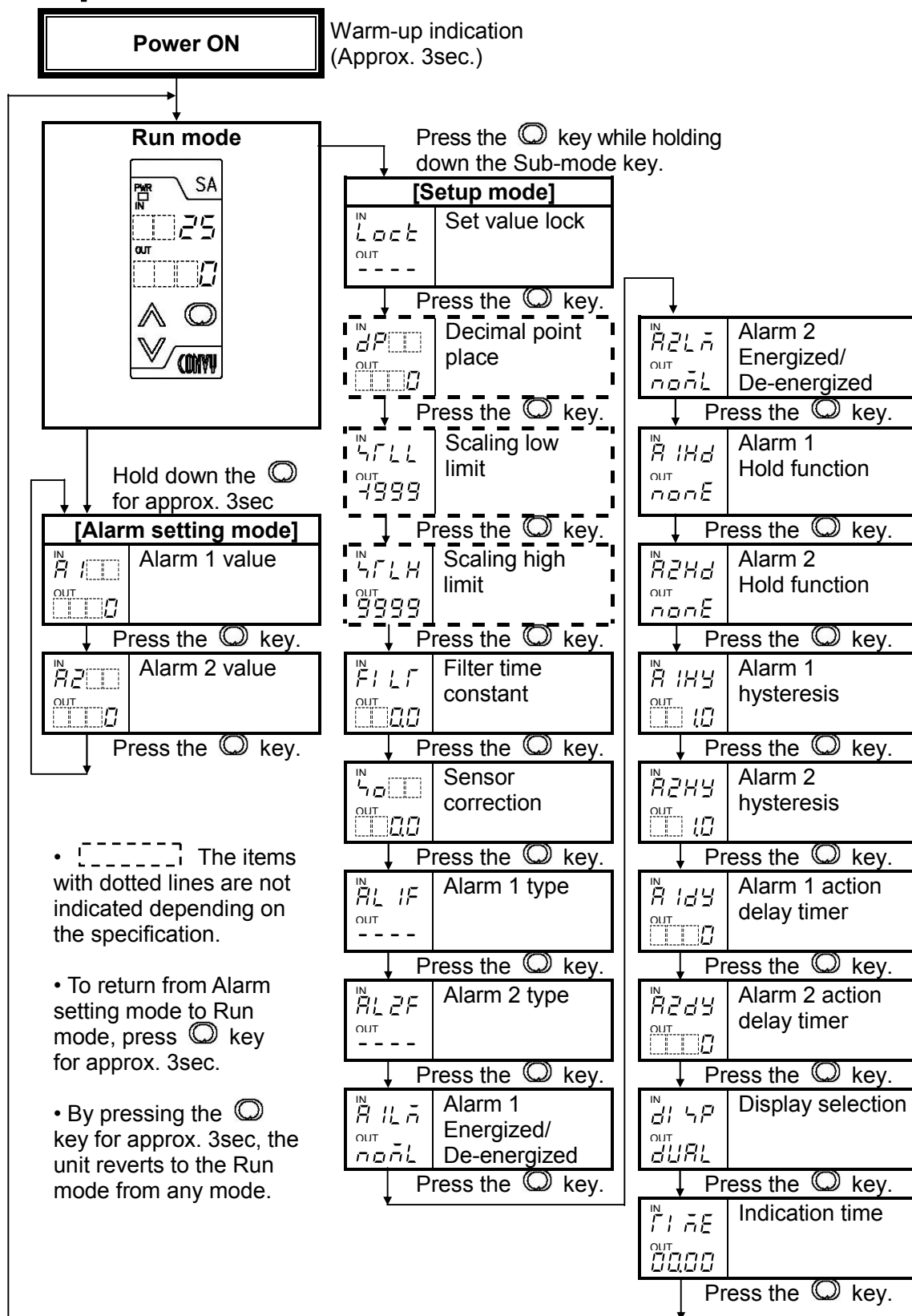
Refer to (Fig. 4.2-1), (Fig. 4.2-2) and (Fig. 4.2-3) on page 9.

SAAA: Use terminals ⑤(+), ⑥(-) for input wiring and shunt resistor (sold separately) connection.

(Table 4.3.3-1)

Input	Shunt resistor	
	Model	Specification
4 to 20mA DC, 0 to 20mA DC, 0 to 16mA DC	RES-S02-050	50Ω ±0.1%
2 to 10mA DC, 0 to 10mA DC	RES-S02-100	100Ω ±0.1%
1 to 5mA DC	RES-S02-200	200Ω ±0.1%
0 to 1mA DC	RES-S02-01K	1kΩ ±0.1%

5. Operation flowchart



6. Setup

Setup should occur before using this unit, to set the Alarm type, Alarm action Energized/De-energized, Alarm action delay timer, etc. according to the users' conditions.

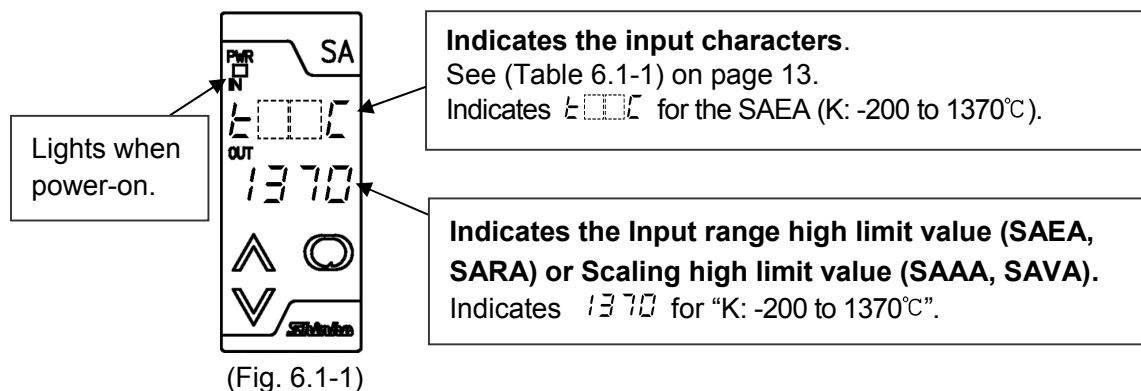
If the users' specifications are the same as the default value of the instrument, or if setup has already been completed, it is not necessary to set up the instrument. Proceed to Section "7. Alarm setting".

(Table 6-1)

Setting item	Default value
Set value lock	Unlock
Decimal point place	No decimal point (Only for SAAA, SAVV)
Scaling high limit	-1999 (Only for SAAA, SAVV)
Scaling low limit	9999 (Only for SAAA, SAVV)
Filter time constant	0.0sec
Sensor correction	0.0°C(°F) (SAEA, SARA)
	0 (SAAA, SAVV)
Alarm 1 type	No alarm action
Alarm 2 type	No alarm action
Alarm 1 action Energized/De-energized	Energized
Alarm 2 action Energized/De-energized	Energized
Alarm 1 Hold function	Alarm Not holding
Alarm 2 Hold function	Alarm Not holding
Alarm 1 hysteresis	1.0°C(°F) (SAEA, SARA)
	1.0% (SAAA, SAVV)
Alarm 2 hysteresis	1.0°C(°F) (SAEA, SARA)
	1.0% (SAAA, SAVV)
Alarm 1 action delay timer	0sec
Alarm 2 action delay timer	0sec
Display selection	Input/Alarm 1 value indication
Indication time	00.00 (Continuous)

6.1 Indication after power-on

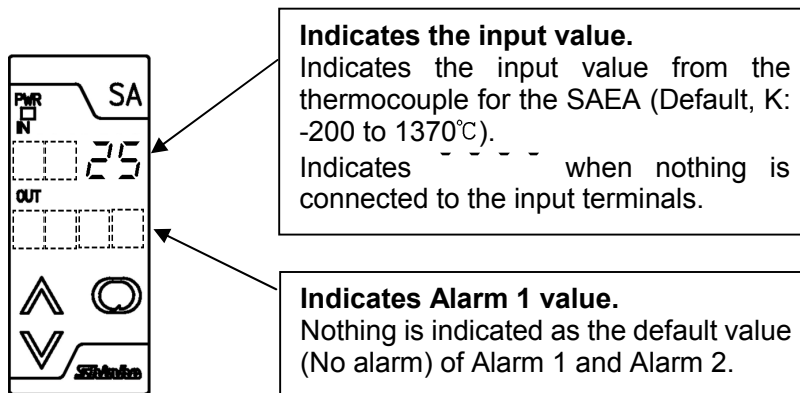
After power-on, warm-up status below (Fig. 6.1-1) is indicated for approx. 3sec.



(Table 6.1-1)

Input	Input display	
	°C	°F
K	$E\Box\Box\Box C$: -200 to 1370°C	$E\Box\Box\Box F$: -328 to 2498°F
K	$E\Box.\Box C$: -199.9 to 400.0°C	$E\Box.\Box F$: -199.9 to 752.0°F
J	$J\Box\Box\Box C$: -200 to 1000°C	$J\Box\Box\Box F$: -328 to 1832°F
R	$r\Box\Box\Box C$: -50 to 1760°C	$r\Box\Box\Box F$: -58 to 3200°F
S	$S\Box\Box\Box C$: -50 to 1760°C	$S\Box\Box\Box F$: -58 to 3200°F
B	$b\Box\Box\Box C$: 0 to 1820°C	$b\Box\Box\Box F$: 32 to 3308°F
E	$E\Box\Box\Box C$: -200 to 800°C	$E\Box\Box\Box F$: -328 to 1472°F
T	$T\Box\Box\Box C$: -199.9 to 400.0°C	$T\Box\Box\Box F$: -199.9 to 752.0°F
N	$n\Box\Box\Box C$: -200 to 1300°C	$n\Box\Box\Box F$: -328 to 2372°F
PL-II	$PL\Box\Box C$: 0 to 1390°C	$PL\Box\Box F$: 32 to 2534°F
W5Re/W26Re	$w\Box\Box\Box C$: 0 to 2315°C	$w\Box\Box\Box F$: 32 to 4199°F
W3Re/W25Re	$d\Box\Box\Box C$: 0 to 2315°C	$d\Box\Box\Box F$: 32 to 4199°F
Pt100	$P\Box\Box\Box C$: -50.0 to 100.0°C	$P\Box\Box\Box F$: -58.0 to 212.0°F
Pt100	$P\Box\Box\Box C$: -50.0 to 300.0°C	$P\Box\Box\Box F$: -58.0 to 572.0°F
Pt100	$P\Box\Box\Box C$: -200 to 850°C	$P\Box\Box\Box F$: -328 to 1562°F
JPt100	$J\Box\Box\Box C$: -50.0 to 100.0°C	$J\Box\Box\Box F$: -58.0 to 212.0°F
JPt100	$J\Box\Box\Box C$: -50.0 to 300.0°C	$J\Box\Box\Box F$: -58.0 to 572.0°F
JPt100	$J\Box\Box\Box C$: -200 to 500°C	$J\Box\Box\Box F$: -328 to 932°F
4 to 20mA DC	$4\Box\Box\Box A$: -1999 to 9999	
0 to 20mA DC	$0\Box\Box\Box A$: -1999 to 9999	
2 to 10mA DC	$2\Box\Box\Box A$: -1999 to 9999	
0 to 10mA DC	$0\Box\Box\Box A$: -1999 to 9999	
0 to 16mA DC	$0\Box\Box\Box A$: -1999 to 9999	
1 to 5mA DC	$1\Box\Box\Box A$: -1999 to 9999	
0 to 1mA DC	$0\Box\Box\Box A$: -1999 to 9999	
0 to 100mV DC	$0\Box\Box\Box V$: -1999 to 9999	
0 to 1V DC	$0\Box\Box\Box V$: -1999 to 9999	
0 to 5V DC	$0\Box\Box\Box V$: -1999 to 9999	
1 to 5V DC	$1\Box\Box\Box V$: -1999 to 9999	
0 to 10V DC	$0\Box\Box\Box V$: -1999 to 9999	


After that, the unit proceeds to the Run mode as shown in (Fig. 6.1-2).



(Fig. 6.1-2)

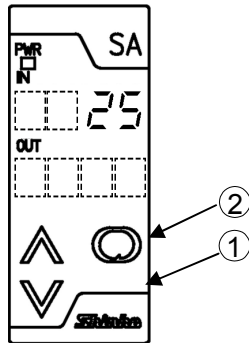
6.2 Basic operation of setup

Setup is conducted in the Setup mode.


To enter the Setup mode, press the  key while holding down the Sub-mode key in the Run mode. (Fig. 6.2-1)

To set (select) each item, use the  or  key, and register the value with the  key. (Fig. 6.2-2)

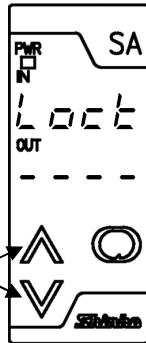
(1) Run mode



(Fig. 6.2-1)

To enter the Setup mode, press the  key ② while holding down the Sub-mode key ① in the Run mode.

(2) Setup mode



(Fig. 6.2-2)

To set (or select) each item, use these keys.





To proceed to each setting item and to register the set (selected) value, use this key.

6.3 Setup of the unit

The following shows all setup items. Set up the unit referring to the explanation of each item.

Display	Name, Function, Setting range	Default value
IN <i>Lock</i> OUT ----	Set value lock Locks the set values to prevent setting errors. ----: Unlock <i>Lock</i> : Lock (None of the set values and adjusted values can be changed.)	Unlock
IN <i>dP</i> OUT .000	Decimal point place • Selects the decimal point place. • Available for the SAAA, SAV A. .000: No decimal point .000: 1 digit after decimal point .000: 2 digits after decimal point .000: 3 digits after decimal point	No decimal point
IN <i>47LL</i> OUT <i>-1999</i>	Scaling low limit value Sets Scaling low limit value (A value indicated on the Input display when rated low limit value is entered). Available only for SAAA, SAV A. Setting range: -1999 to Scaling high limit value	-1999

IN 4FLH OUT 9999	Scaling high limit value	9999
Sets Scaling high limit value (A value indicated on the Input display when rated high limit value is entered). Available only for SAAA, SAVA. Setting range: Scaling low limit value to 9999		
IN FILF OUT 000	Filter time constant	0.0 seconds
Sets the filter time constant. Reduces input fluctuation caused by noise. Setting range: 0.0 to 10.0 seconds		
IN 400 OUT 000	Sensor correction	0.0°C(°F): SAEA, SARA 0 : SAAA, SAVA
Sets the sensor correction value. Input value = Current input value + (Sensor correction value) Setting range: SAEA, SARA: -100.0 to 100.0°C(°F) SAAA, SAVA: -1000 to 1000 (The placement of the decimal point follows the selection.)		
IN AL1F OUT ----	Alarm 1 type	No alarm action
Selects Alarm 1 type. If alarm type is changed, Alarm 1 value reverts to 0 (0.0). ---- : No alarm action H00 : High limit alarm L00 : Low limit alarm H00̄ : High limit alarm with standby L00̄ : Low limit alarm with standby		
IN AL2F OUT ----	Alarm 2 type	No alarm action
Selects Alarm 2 type. If alarm type is changed, Alarm 2 value reverts to 0 (0.0). ---- : No alarm action H00 : High limit alarm L00 : Low limit alarm H00̄ : High limit alarm with standby L00̄ : Low limit alarm with standby		
IN AL1̄ OUT noñL	Alarm 1 action Energized/De-energized	Energized
Selects Alarm 1 action Energized/De-energized. Not available if No alarm action is selected during Alarm 1 type selection. Selection item: noñL: Energized rEHL: De-energized		
IN AL2̄ OUT noñL	Alarm 2 action Energized/De-energized	Energized
Selects Alarm 2 action Energized/De-energized. Not available if No alarm action is selected during Alarm 2 type selection. Selection item: noñL: Energized rEHL: De-energized		


IN A1Hd OUT <i>nonE</i>	Alarm 1 Hold function	Alarm Not holding
	Selects Alarm 1 Hold function “Holding” or “Not holding”. If Alarm 1 Holding is selected, Alarm 1 output ON status is held until power is turned off. Not available if No alarm action is selected during A1 type selection. Selection item: <i>nonE</i> : Alarm Not holding <i>Hold</i> : Alarm Holding	
IN A2Hd OUT <i>nonE</i>	Alarm 2 Hold function	Alarm Not holding
	Selects Alarm 2 Hold function “Holding” or “Not holding”. If Alarm 2 Holding is selected, Alarm 2 output ON status is held until power is turned off. Not available if No alarm action is selected during A2 type selection. Selection item: <i>nonE</i> : Alarm Not holding <i>Hold</i> : Alarm Holding	
IN A1Hy OUT 	Alarm 1 hysteresis	1.0°C(°F) (SAEA, SARA) 1.0% (SAAA, SAVA)
	Sets Alarm 1 hysteresis. Not available if No alarm action is selected during A1 type selection. Selection item: SAEA, SARA: 0.1 to 100.0°C(°F) SAAA, SAVA: 0.1 to 100.0%FS (The placement of the decimal point follows the selection)	
IN A2Hy OUT 	Alarm 2 hysteresis	1.0°C(°F) (SAEA, SARA) 1.0% (SAAA, SAVA)
	Sets Alarm 2 hysteresis. Not available if No alarm action is selected during A2 type selection. Selection item: SAEA, SARA: 0.1 to 100.0°C(°F) SAAA, SAVA: 0.1 to 100.0%FS (The placement of the decimal point follows the selection)	
IN A1dY OUT 	Alarm 1 action delay timer	0sec
	Sets Alarm 1 action delay timer. When setting time has elapsed after the input enters the alarm output range, Alarm 1 is activated. Not available if No alarm action is selected during A1 type selection. Setting range: 0 to 9999sec	
IN A2dY OUT 	Alarm 2 action delay timer	0sec
	Sets Alarm 2 action delay timer. When setting time has elapsed after the input enters the alarm output range, Alarm 2 is activated. Not available if No alarm action is selected during A2 type selection. Setting range: 0 to 9999sec	




<p>IN dl 4P</p> <p>OUT dURL</p>	<p>Display selection</p>	<p>Input/Alarm 1 value indication</p>
	<p>Selects an indication type on the display.</p> <p><i>dURL</i>: Input/Alarm 1 value indication</p> <p><i>dURL2</i>: Input/Alarm 2 value indication</p> <p><i>l n□□</i>: Input indication</p> <p><i>none</i>: No indication (Only the power indicator is lit.)</p>	
<p>IN r1 rE</p> <p>OUT 0000</p>	<p>Indication time</p>	<p>00.00 (Continuous)</p>
	<p>Sets the indication time after the final key operation.</p> <p>Not available if No indication (Only the power indicator is lit) is selected during Display selection.</p> <p>After the indication time has elapsed, the displays go off (Only the power indicator is lit.).</p> <p>If power is turned on again, or if any of the keys \wedge, \vee, \odot and the Sub-mode key is pressed while displays are unlit, the displays will light again.</p> <p>Setting range:</p> <p>00.00: Continuous</p> <p>00.01 (1 second) to 60.00 (60 minutes) [Minute.Second]</p>	

7. Alarm setting

7.1 Basic operation of alarm setting

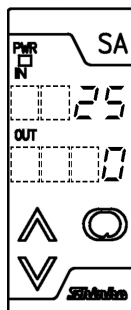
Alarm setting is conducted in the Alarm setting mode.


To enter the Alarm setting mode, hold down the  key for approx. 3 seconds in the Run mode. (Fig. 7.1-1)

For alarm setting, use the  or  key, and register the value with the  key. (Fig. 7.1-2)

To revert to the Run mode, press the  key again for approximately 3 seconds.

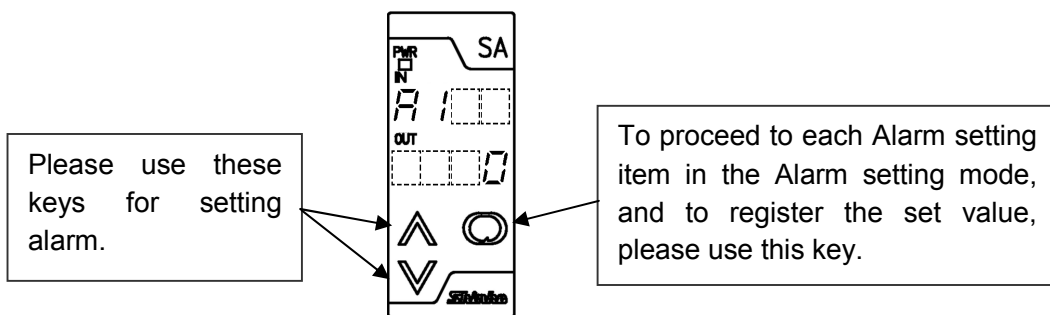
(1) Run mode



To enter Alarm setting mode, please hold down the  key for approx. 3 seconds.

(Fig. 7.1-1)

(2) Alarm setting mode



Please use these keys for setting alarm.



To proceed to each Alarm setting item in the Alarm setting mode, and to register the set value, please use this key.

(Fig. 7.1-2)

7.2 Alarm setting

The following shows all alarm setting items.

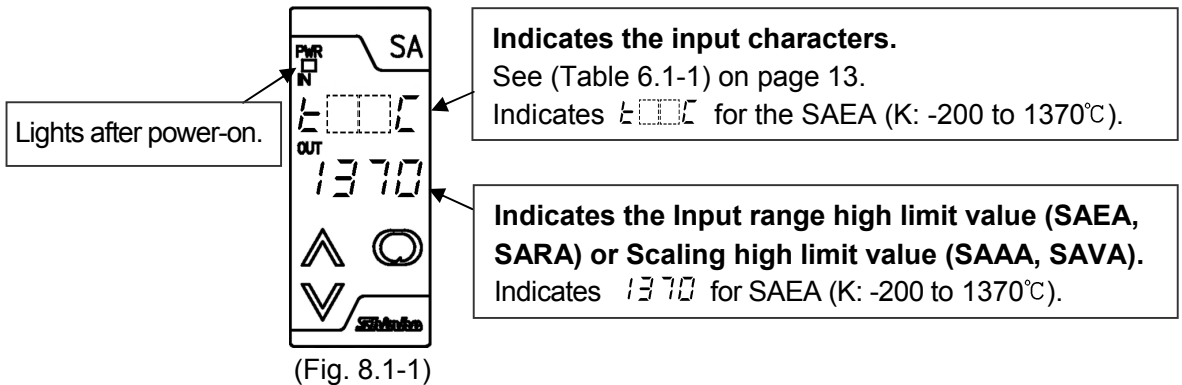
Set alarm values referring to explanation of each item below.

Display	Name, Function, Setting range	Default value
	Alarm 1 value	0(0.0)°C(°F)(SAEA, SARA) 0(SAAA, SAVVA)
	Sets Alarm 1 action point. Setting range: SAEA, SARA : Input range low limit value to Input range high limit value SAAA, SAVVA : Scaling low limit value to Scaling high limit value (The placement of the decimal point follows the selection)	
	Alarm 2 value	0(0.0)°C(°F)(SAEA, SARA) 0(SAAA, SAVVA)
	Sets Alarm 2 action point. Setting range: SAEA, SARA : Input range low limit value to Input range high limit value SAAA, SAVVA : Scaling low limit value to Scaling high limit value (The placement of the decimal point follows the selection)	

8. Operation

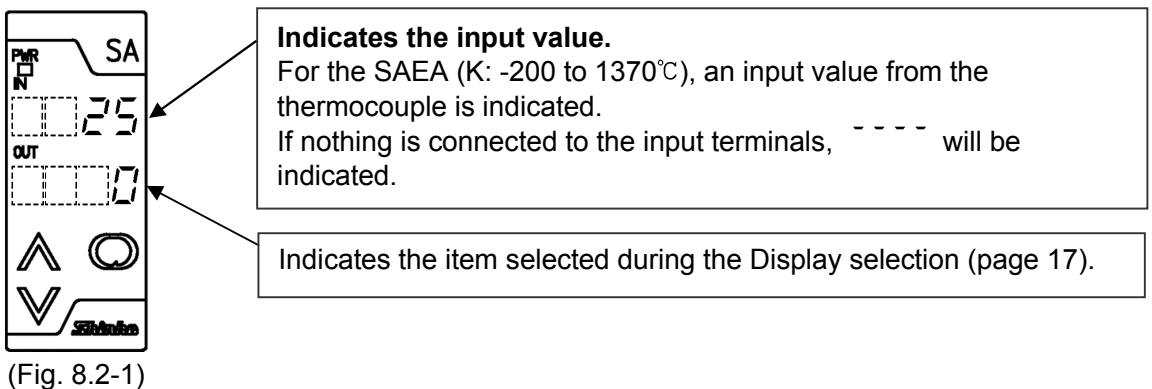
8.1 Indication after power-on

After power-on, the following warm-up status is indicated for 3 seconds (Fig. 8.1-1).



8.2 Operation

The unit enters the Run mode after 3-second warm-up as shown in (Fig. 8.2-1).



- **Indication when alarm output is on**

When alarm output is on, the following characters are indicated.

Alarm 1 output is ON : "A1" is indicated on the Set value display.

Alarm 2 output is ON : "A2" is indicated on the Set value display.

Alarm 1, 2 outputs are ON: "A1 A2" is indicated on the Set value display.

- **Underrange, Overrange and Sensor burnout indication**

Even if any selection is made during the Display selection, the following indications appear.

Underrange: "-----" flashes on the Input display.

Overrange : "-----" flashes on the Input display.

- **Indication time setting**

If indication time is set, the displays will go off (Only the power indicator is lit.) after the indication time has elapsed.

If power is turned on again, or if any of the keys \wedge , \vee , \odot and the Sub-mode key is pressed while displays are unlit, the displays will light again.

9. Specifications

Input specifications

SAEA

Input resistance: 1M Ω or more

External resistance: 100 Ω or less, However, B: 40 Ω or less

Burnout: Upscale

Input: Thermocouple

Thermocouple	Input range	
K	-200 to 1370 $^{\circ}$ C	-328 to 2498 $^{\circ}$ F
K	-199.9 to 400.0 $^{\circ}$ C	-199.9 to 752.0 $^{\circ}$ F
J	-200 to 1000 $^{\circ}$ C	-328 to 1832 $^{\circ}$ F
R	-50 to 1760 $^{\circ}$ C	-58 to 3200 $^{\circ}$ F
S	-50 to 1760 $^{\circ}$ C	-58 to 3200 $^{\circ}$ F
B	0 to 1820 $^{\circ}$ C	32 to 3308 $^{\circ}$ F
E	-200 to 800 $^{\circ}$ C	-328 to 1472 $^{\circ}$ F
T	-199.9 to 400.0 $^{\circ}$ C	-199.9 to 752.0 $^{\circ}$ F
N	-200 to 1300 $^{\circ}$ C	-328 to 2372 $^{\circ}$ F
PL-II	0 to 1390 $^{\circ}$ C	32 to 2534 $^{\circ}$ F
W5Re/W26Re	0 to 2315 $^{\circ}$ C	32 to 4199 $^{\circ}$ F
W3Re/W25Re	0 to 2315 $^{\circ}$ C	32 to 4199 $^{\circ}$ F

SARA

Input detection current: Approx. 0.2mA

Allowable lead wire resistance: 10 Ω or less per wire

Burnout: Upscale

Input: RTD (3-wire system)

RTD	Input range	
Pt100	-50.0 to 100.0 $^{\circ}$ C	-58.0 to 212.0 $^{\circ}$ F
Pt100	-50.0 to 300.0 $^{\circ}$ C	-58.0 to 572.0 $^{\circ}$ F
Pt100	-200 to 850 $^{\circ}$ C	-328 to 1562 $^{\circ}$ F
JPt100	-50.0 to 100.0 $^{\circ}$ C	-58.0 to 212.0 $^{\circ}$ F
JPt100	-50.0 to 300.0 $^{\circ}$ C	-58.0 to 572.0 $^{\circ}$ F
JPt100	-200 to 500 $^{\circ}$ C	-328 to 932 $^{\circ}$ F

SAAA

Input	Shunt resistor
4 to 20mA DC	50Ω
0 to 20mA DC	
0 to 16mA DC	
2 to 10mA DC	100Ω
0 to 10mA DC	
1 to 5mA DC	200Ω
0 to 1mA DC	1kΩ

Connect shunt resistor (sold separately) between input terminals.

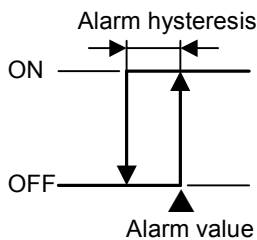
SAVA

Input	Input resistance	Allowable signal source resistance
0 to 100mV DC	1MΩ	200Ω or less
0 to 1V DC		
0 to 5V DC	100kΩ	100Ω or less
1 to 5V DC		
0 to 10V DC		

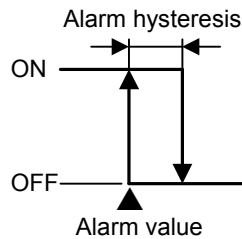
Output specifications

2-point alarm output can be selected during Alarm 1 (2) type selection by keypad operation.

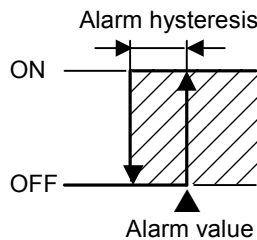
[High limit alarm]



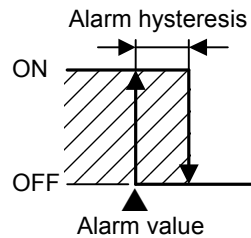
[Low limit alarm]



[High limit alarm with standby]



[Low limit alarm with standby]



- Alarm action ON/OFF action
 - Alarm hysteresis: SAEA, SARA: 0.1 to 100.0°C(°F)
 - SAAA, SAVA: 0.1 to 100.0%FS
 - Alarm action delay timer : 0 to 9999sec
 - Alarm action Energized/De-energized: Selectable
 - Alarm Hold function : Selectable
- Alarm 1 output Relay contact 1a
 - Control capacity: 3A 250V AC (resistive load)
 - 1A 250V AC (inductive load, cosφ=0.4)
 - Electrical life: 100,000 cycles
- Alarm 2 output Open collector
 - Control capacity: 0.1A 24V DC

Performance

Accuracy

SAEA Within $\pm 0.2\%$ of each input span
R, S input, -50 to 200°C (-58 to 392°F): Within $\pm 6^{\circ}\text{C}$ (12°F)
B input, 0 to 300°C (32 to 572°F): Accuracy is not guaranteed.
K, J, E, T, N input, 0°C (32°F) or less: Within $\pm 0.4\%$ of each input span

SARA Within $\pm 0.1\%$ of each input span

SAAA, SAVA Within $\pm 0.2\%$

Display accuracy Within Input accuracy ± 1 digit

Cold junction compensation accuracy: Within $\pm 1^{\circ}\text{C}$ at -5 to 55°C (SAEA)

Temperature coefficient $\pm 0.015\%/^{\circ}\text{C}$

Response time 1 second or less

Insulation resistance Input – Output – Power: $10\text{M}\Omega$ or more, at 500V DC

Dielectric strength Input – Alarm 1 output – Alarm 2 output – Power: 1.5kV AC for 1 minute

General structure

Case Flame-resistant resin, Color: Light gray

Front panel Membrane sheet

Setting Setting by the front keypad

Displays Input display : 7 segments Red LED display 4 digits
Character size: $7.4 \times 4.0\text{mm}$ (H x W)

Set value display: 7 segments Green LED display 4 digits
Character size: $7.4 \times 4.0\text{mm}$ (H x W)

Power indicator: Green LED

Installation specifications

Power supply 100 to 240V AC 50/60Hz, 24V AC/DC 50/60Hz

Allowable voltage range 85 to 264V AC , 20 to 28V AC/DC

Power consumption Approx. 6VA

Ambient temperature -5 to 55°C (23 to 131°F)

Ambient humidity 35 to 85%RH (Non-condensing)

Weight Approx. 120g

Mounting DIN rail mounting

External dimensions $W22.5 \times H75 \times D100\text{mm}$

Attached function

- **Power failure countermeasure:**

The setting data is backed up in the non-volatile IC memory.

- **Self-diagnosis:**

The CPU is monitored by a watchdog timer, and if an abnormal status is found on the CPU, the unit is switched to warm-up status with all outputs off.

- **Cold junction compensation:**

Available only for the SAEA.

This detects the temperature at the connecting terminal between the thermocouple and the instrument, and always maintains it at the same status as if the reference junction is at 0°C (32°F).

10. Troubleshooting

10.1 Indication

Problem	Presumed cause and solution
The Input display is flashing " _ _ _ _ " or " _ _ _ _ ".	<ul style="list-style-type: none"> • The sensor may be burnt out. Change each sensor. • Check whether the sensor is securely connected to the input terminals of the instrument. Ensure that the sensor terminals are securely connected to the input terminals of the instrument. • Check the input signal source. • Check whether polarity of thermocouple or compensating lead wire is correct. Check whether codes (A, B, B) of the RTD agree with the instrument terminals. Ensure that they are wired properly.
The indication of the Input display is abnormal or unstable.	<ul style="list-style-type: none"> • Check whether the sensor and input specifications of the unit are correct. Ensure that sensor type and input specifications of the unit matches. • Check whether the sensor correction value is suitable. Set it to a suitable value. • AC leaks into the sensor circuit. Use an ungrounded type sensor. • There may be equipment that interferes with or makes noise near the unit. Keep equipment that interferes with or makes noise away from the unit.

10.2 Key operation

Problem	Presumed cause and solution
Setting is impossible.	<ul style="list-style-type: none"> • "Lock" is selected during Set value lock selection. Select "Unlock".

10.3 Operation

Problem	Presumed cause and solution
Input value does not change.	<ul style="list-style-type: none"> • The sensor may be out of order. Change the sensor. • Check whether input and output wires are securely connected to the I/O terminals of the instrument. Ensure that input and output wires are securely connected to the I/O terminals. • Check whether the wiring of input and output is correct.
Alarm output is not turned ON.	<ul style="list-style-type: none"> • Check if set values such as Alarm value, Alarm type, Alarm action Energized/De-energized, Alarm hysteresis and Alarm action delay timer have been set suitably. Set them to suitable values.
Alarm output is not turned OFF.	<ul style="list-style-type: none"> • Check if set values such as Alarm value, Alarm type, Alarm action Energized/De-energized, Alarm hysteresis and Alarm action delay timer have been set suitably. Set them to suitable values. • Check if Alarm Hold function is working. To turn the alarm output OFF while alarm Hold function is working, turn the power OFF.

11. Character table

All setting items are indicated in the following tables, however, some items will not be indicated depending on the specifications.

Setup mode

Display	Setting item	Default value	Data
Lock	Set value lock	Unlock	
DP	Decimal point place	No decimal point (Only for SAAA,SAVA)	
4FL	Scaling low limit value	-1999 (Only for SAAA,SAVA)	
4FH	Scaling high limit value	9999 (Only for SAAA,SAVA)	
FILT	Filter time constant	0.0 sec	
Co	Sensor correction	0.0°C (SAEA, SARA) 0 (SAAA,SAVA)	
AL1F	Alarm 1 type	No alarm action	
AL2F	Alarm 2 type	No alarm action	
AL1A	Alarm 1 action Energized/De-energized	Energized	
AL2A	Alarm 2 action Energized/De-energized	Energized	
AL1H	Alarm 1 Hold function	Alarm Not holding	
AL2H	Alarm 2 Hold function	Alarm Not holding	
AL1H	Alarm 1 hysteresis	1.0°C(°F) (SAEA, SARA) 1.0% (SAAA, SAVVA)	
AL2H	Alarm 2 hysteresis	1.0°C(°F) (SAEA, SARA) 1.0% (SAAA, SAVVA)	
AL1d	Alarm 1 action delay timer	0sec	
AL2d	Alarm 2 action delay timer	0sec	
di SP	Display selection	Input/Alarm 1 value indication	
Time	Indication time	00.00 (Continuous)	

Alarm setting mode

Display	Setting item	Default value	Data
AL1	Alarm 1 value	0 or 0.0°C(°F) (SAEA, SARA) 0 (SAAA, SAVVA)	
AL2	Alarm 2 value	0 or 0.0°C(°F) (SAEA, SARA) 0 (SAAA, SAVVA)	

***** Inquiry *****

For any inquiry about this unit, please contact the vendor where you purchased the unit or our agency after checking the following.

(e.g.)

- Model SA□A-□□□□-□
- Serial number No. xxxxxx

In addition to the above, please let us know the details of malfunction, if any, and the operating conditions.

SHINKO TECHNOS CO.,LTD. OVERSEAS DIVISION

Reg. Office : 2-5-1, Senbahigashi, Minoo, Osaka, Japan

URL : <http://www.shinko-technos.co.jp>

Tel : 81-72-727-6100

E-mail : overseas@shinko-technos.co.jp

Fax: 81-72-727-7006

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