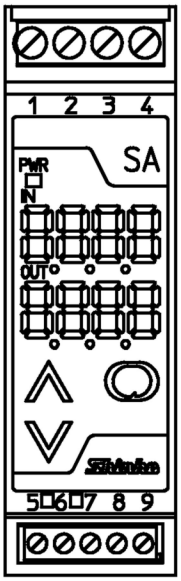
LINEARIZER SAAP (DC CURRENT INPUT)
LINEARIZER SAVP (DC VOLTAGE INPUT)

INSTRUCTION MANUAL



Shinko

Preface

Thank you for purchasing the Linearizer SAAP (DC current input) and SAVP (DC voltage input). This manual contains instructions for the mounting, functions, operations and notes when operating the SAAP or SAVP. 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 SAAP and SAVP 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℃ (23 to 131℉) 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℃ (131℉). Otherwise the life of electronic components (especially electrolytic capacitor) may be shortened.

Note: Avoid setting this instrument directly 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 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.
- For DC voltage and current inputs, do not confuse polarity when wiring.

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	-1	0	1	2	3	4	5	6	7	8	9	℃	℉
Number, ℃/℉	-1	0	1	2	3	4	5	6	7	8	9	℃	℉
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.

--- CONTENTS ---

1. Model

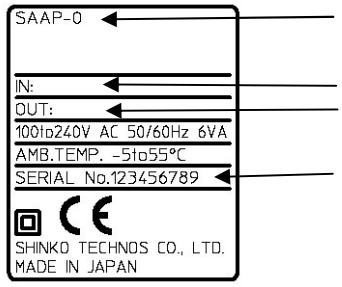
1.1 Model

SA □P – □			Series name: SA
Signal conditioner	A		DC current input linearizer
	V		DC voltage input linearizer
Power supply		0	100 to 240V AC
		1	24V AC/DC

(e.g.) SAAP-0 (DC current input linearizer), Supply voltage: 100 to 240V AC.
Default: Input: 4 to 20mA DC, Output: 4 to 20mA DC
SAVP-0 (DC voltage input linearizer), Supply voltage: 100 to 240V AC.
Default: Input: 1 to 5V DC, Output: 4 to 20mA DC

1.2 How to read the model label

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



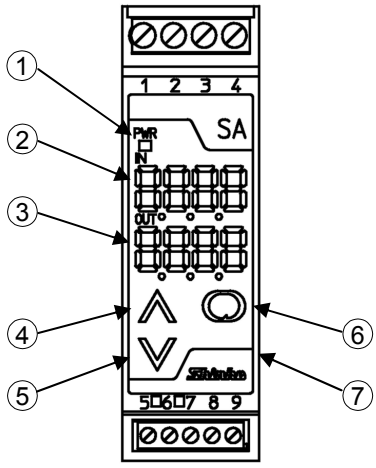
Model (e.g. SAAP-0)

Input (Enter a type selected during Input type selection.)
Output (Enter a type selected during Output type selection.)

Serial number

(Fig. 1.2-1)

2. Name and functions of sections



(Fig.2.1)

①**Power indicator** (Green)
Lights when the power to the instrument is turned on.

②**Input display** (Red)
Indicates the input value during Run mode.
Indicates setting (or adjustment) characters in the Setup, Adjustment and Linearization setting mode.

③**Output display** (Green)
Indicates the output value (%) during Run mode.
Indicates the set (or adjusted) value in the Setup, Adjustment and Linearization setting mode.

④**Up key** (∧)
Increases the numeric value, or switches the selection items.

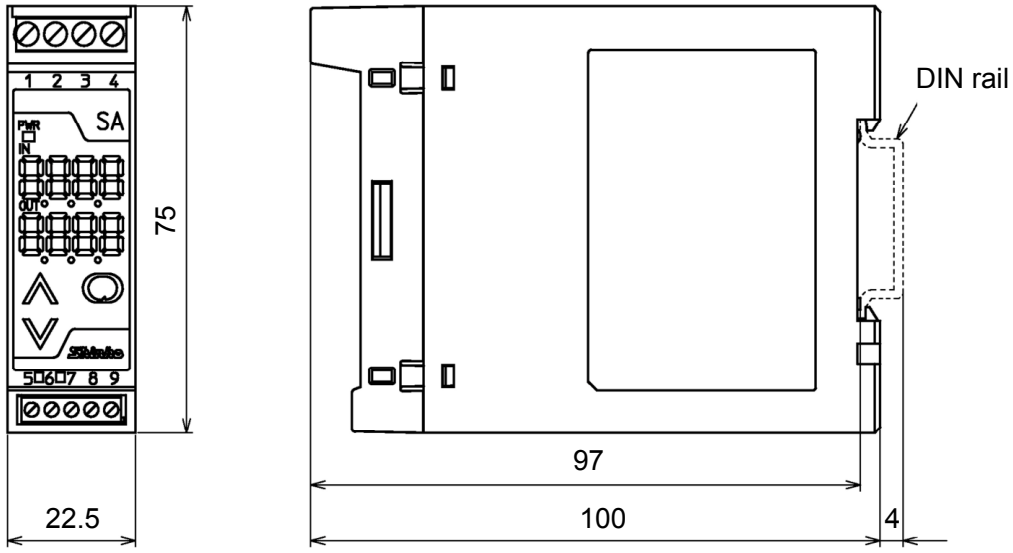
⑤**Down key** (∨)
Decreases the numeric value, or switches the selection items.

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 Adjustment mode.

⑦**Sub-mode key** (Unmarked)
If the Mode key is pressed while holding down this key, the unit proceeds to the Setup mode.
By holding down this key for approx. 5 seconds, the unit proceeds to the Linearization setting mode.

3. Mounting

3.1 External dimensions (Scale: mm)



(Fig. 3.1-1)

3.2 Mounting and removal to/from the DIN rail

⚠ Caution

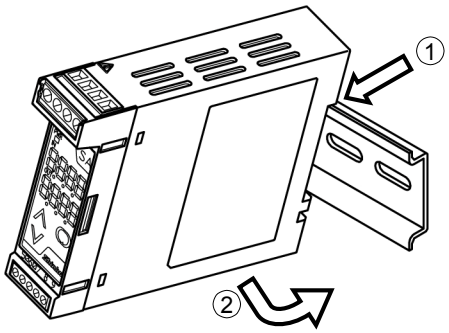
- **Mount the DIN rail horizontally.**
- **To remove this instrument, a flat blade screwdriver is required for pulling down the lever.**
  Never turn the screwdriver when inserting it into the release lever.
  If excessive power is applied to the lever, it may break.
- **Be sure to use commercially available 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)

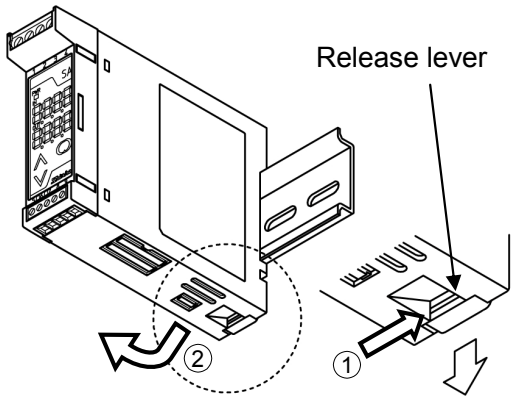
- Hook ① of the instrument on the upper side of the DIN rail.
- Making ① part of the instrument as a support, fit the lower part ② of the instrument to the DIN rail.
  The unit will be completely fixed to the DIN rail when a “Click” sound is heard.



(Fig. 3.2-1)

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

- Insert a flat blade screwdriver into the release lever (①).
- Remove the instrument from the DIN rail by pulling down the lever (②).



(Fig. 3.2-2)

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.

⚠ Caution

- **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.**

4.1 Recommended ferrules

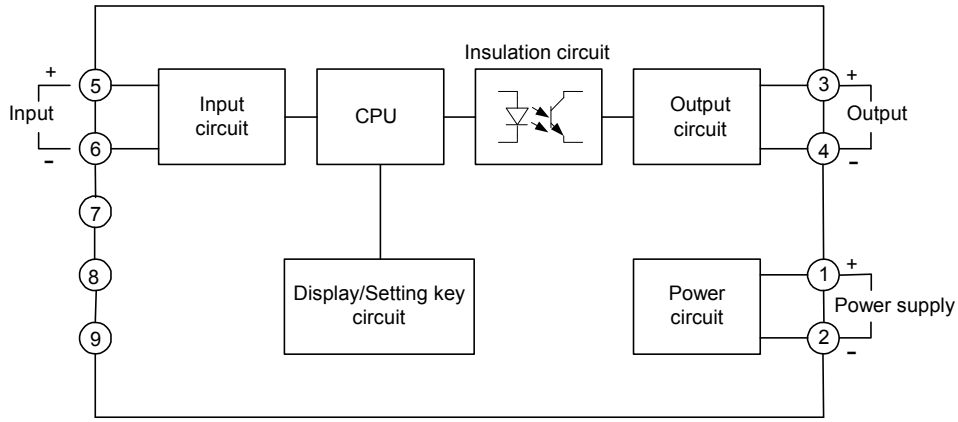
When using ferrules, use the following recommended ferrules and crimping pliers made by Phoenix Contact GMBH &CO. See (Table 4.1-1).
Take note that screw size and tightening torque differ depending on the terminal number.

(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 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		
		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	
		AI 0.34-8 TQ	0.25 to 0.34mm^2		
		AI 0.5-8 WH	0.34 to 0.5mm^2		

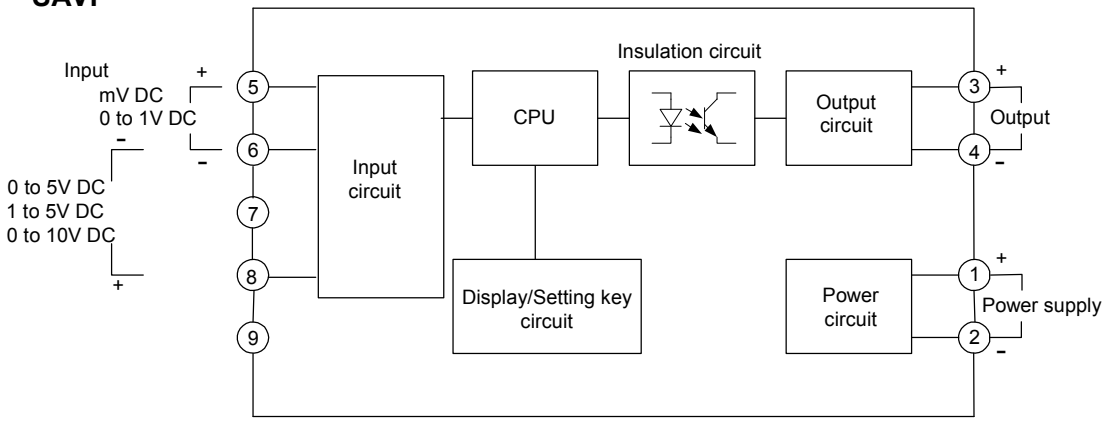
4.2 Terminal arrangement and circuit configuration

SAAP



(Fig. 4.2-1)

SAVP



(Fig. 4.2-2)

4.3 Wiring of terminals

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 the output wiring.

4.3.3 Input wiring

SAAP: Use terminals ⑤(+), ⑥(-) for input wiring and shunt resistor (sold separately) connection (Table 4.3.3-1).

SAVP: Terminals for wiring differs depending on the input specifications. Refer to (Fig. 4.2-2).

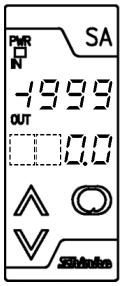
(Table 4.3.3-1)

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

Power ON Warm-up indication (Approx. 3sec.)

Run mode



● **Input, Output display**
The Input display indicates setting (or adjustment) characters, and the Output display indicates the default value.

Hold down the ◎ key for approx. 3sec.

Press the ◎ key while holding down the Sub-mode key.

Adjustment mode

IN oZr 1 OUT 0.00	Output zero adjustment
Press the ◎ key.	
IN oSP 1 OUT 0.00	Output span adjustment
Press the ◎ key.	

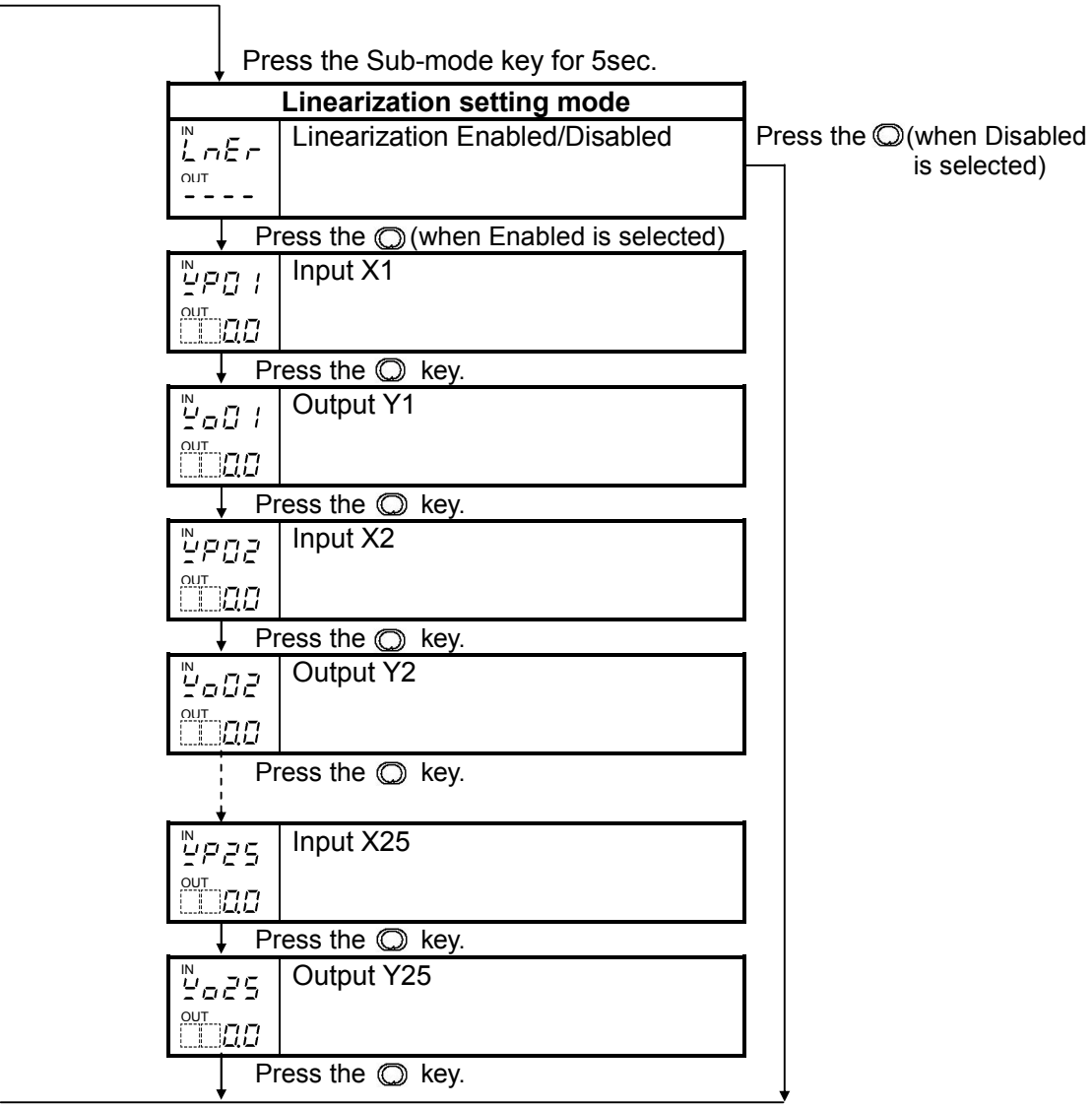
Setup mode

IN Lock OUT ----	Set value lock
Press the ◎ key.	
IN dcA OUT 420A	Input type (SAAP)
IN dcb OUT 15b	(SAVP)
Press the ◎ key.	
IN dP OUT 0	Decimal point place
Press the ◎ key.	
IN 0rLL OUT 1999	Output 0% value
Press the ◎ key.	
IN 0rLH OUT 9999	Output 100% value
Press the ◎ key.	
IN FILr OUT 0.0	Filter time constant
Press the ◎ key.	

IN So OUT 0	Sensor correction
Press the ◎ key.	
IN oUtP OUT 420A	Output type
Press the ◎ key.	
IN oUtr OUT norL	Output Normal/Reverse
Press the ◎ key.	
IN diSP OUT dUAL	Display selection
Press the ◎ key.	
IN tiME OUT 00.00	Indication time
Press the ◎ key.	

● **Key operation**

- ↓ : This means that if the key is pressed, the set value is saved, and the instrument proceeds to the next setting item.
- Set the value with the ∧ or ∨ key, and register it with the key.
- If the key is pressed for approx. 3sec, the instrument reverts to the Run mode from any mode.
- To return from Adjustment to Run mode, press the key for approx. 3sec. From any setting item in Adjustment mode, it is possible to return to Run mode.



6. Setup

Setup should occur before using this unit, to set the Input type, Output 0% value, Output 100% value, Output type, Linearization Enabled/Disabled, etc. according to the users' conditions.

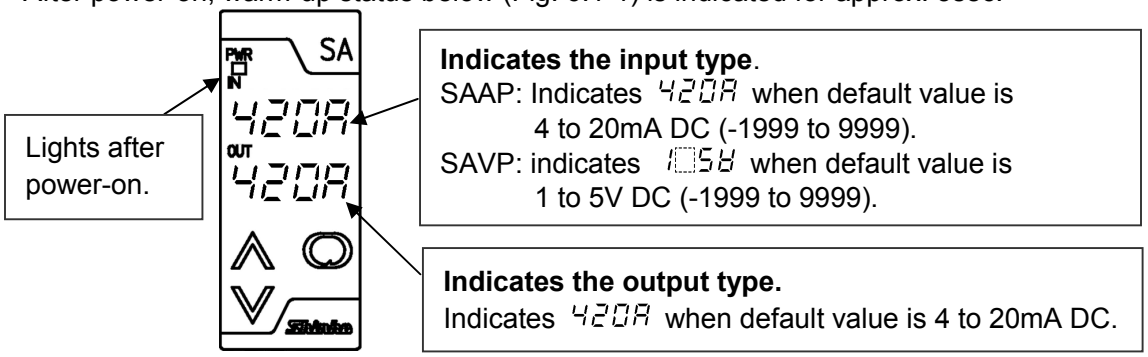
If the users' specifications are the same as the default value of the instrument, or if setup has already been completed, it is not necessary to set up the instrument. Proceed to Section "7. Adjustment".

(Table 6-1)

Setting item	Default value	
Set value lock	Unlock	
Input type	SAAP	4 to 20mA DC (-1999 to 9999)
	SAVP	1 to 5V DC (-1999 to 9999)
Decimal point place	No decimal point	
Output 0% value	-1999	
Output 100% value	9999	
Filter time constant	0.0 seconds	
Sensor correction	0	
Output type	4 to 20mA DC	
Output Normal/Reverse	Normal	
Display selection	Input/Output indication	
Indication time	00.00 (Continuous)	
Linearization Enabled/Disabled	Linearization Disabled	

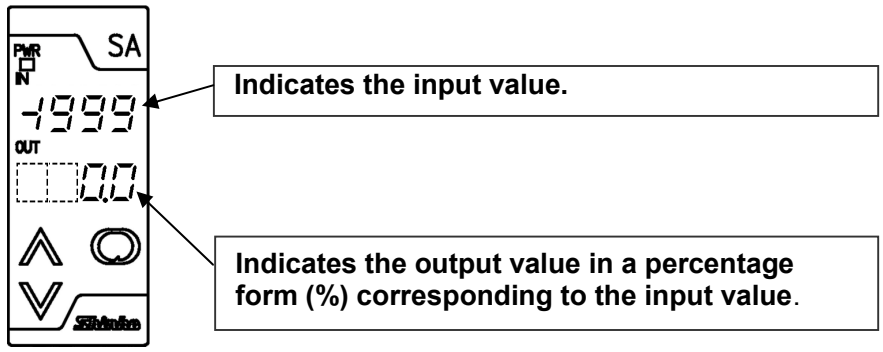
6.1 Indication after power-on

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



(Fig. 6.1-1)

After that, the unit switches to the Run mode as shown below.

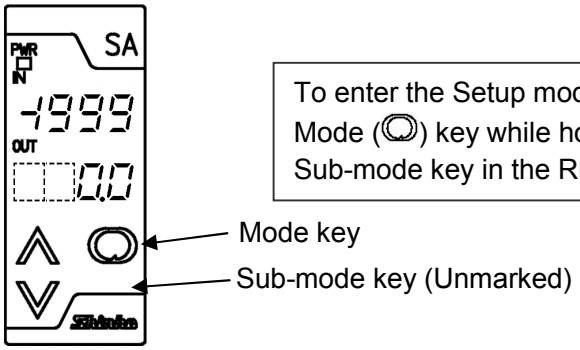


(Fig. 6.1-2)

6.2 Basic operation of setup

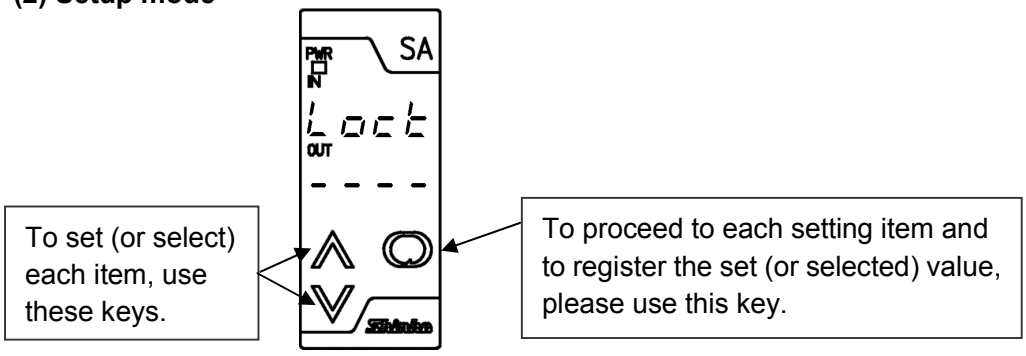
Setup is conducted in the Setup mode.
To enter the Setup mode, press the ◎ key while holding down the Sub-mode key in the Run mode. (Fig. 6.2-1)
To set (select) each item, use the ∧ or ∨ key, and register the value with the ◎ key. (Fig. 6.2-2)

(1) Run mode



(Fig. 6.2-1)

(2) Setup mode



(Fig. 6.2-2)

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 Lock OUT - - - -	**Set value lock**	Unlock
	Locks the set values to prevent setting errors. Selection item: - - - -: Unlock Lock: Lock (None of the set values and adjusted values can be changed.)	
IN dcA□ OUT 420A	**Input type (SAAP)**	4 to 20mA DC, -1999 to 9999
	Selects the input type. Selection item: 420A: 4 to 20mA DC -1999 to 9999 020A: 0 to 20mA DC -1999 to 9999 0 16A: 0 to 16mA DC -1999 to 9999 2 10A: 2 to 10mA DC -1999 to 9999 0 10A: 0 to 10mA DC -1999 to 9999 1□5A: 1 to 5mA DC -1999 to 9999 0□ 1A: 0 to 1mA DC -1999 to 9999	

IN dcV□ OUT 1□5V	**Input type (SAVP)**	1 to 5V DC, -1999 to 9999
	Selects the input type. Selection item: 0 1mV: 0 to 10mV DC -1999 to 9999 -1mV: -10 to 10mV DC -1999 to 9999 05mV: 0 to 50mV DC -1999 to 9999 06mV: 0 to 60mV DC -1999 to 9999 00.1V: 0 to 100mV DC -1999 to 9999 0□ 1V: 0 to 1V DC -1999 to 9999 0□5V: 0 to 5V DC -1999 to 9999 1□5V: 1 to 5V DC -1999 to 9999 0 10V: 0 to 10V DC -1999 to 9999	
IN dP□□ OUT □□□0	**Decimal point place**	No decimal point
	Selects the decimal point place. Selection item: □□□0: No decimal point □□0.0: 1 digit after decimal point □0.00: 2 digits after decimal point 0.000: 3 digits after decimal point	
IN rLL OUT -999	**Output 0% value**	-1999
	Sets the value (indicated on the Input display) at 0% output. Setting range: -1999 to Output 100% value (The placement of the decimal point follows the selection)	
IN rLH OUT 9999	**Output 100% value**	9999
	Sets the value (indicated on the Input display) at 100% output. Setting range: Output 0% value to 9999 (The placement of the decimal point follows the selection)	
IN FILr OUT □□0.0	**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 So□□ OUT □□□0	**Sensor correction**	0
	Sets the sensor correction value. Input value = Current input value + Sensor correction value Setting range: -1000 to 1000 (The placement of the decimal point follows the selection)	
IN oUtP OUT 420A	**Output type**	4 to 20mA DC
	Selects the output type. Selection item: 420A: 4 to 20mA DC 020A: 0 to 20mA DC 0 12A: 0 to 12mA DC 0 10A: 0 to 10mA DC 1□5A: 1 to 5mA DC 0□ 1V: 0 to 1V DC 0□5V: 0 to 5V DC 1□5V: 1 to 5V DC 0 10V: 0 to 10V DC	
IN oUtr OUT norL	**Output Normal/Reverse**	Normal
	Selects either Normal mode (0.0 to 100.0%) or Reverse mode (100.0 to 0.0%) for output status. Selection item: norL: Normal rEVr: Reverse	

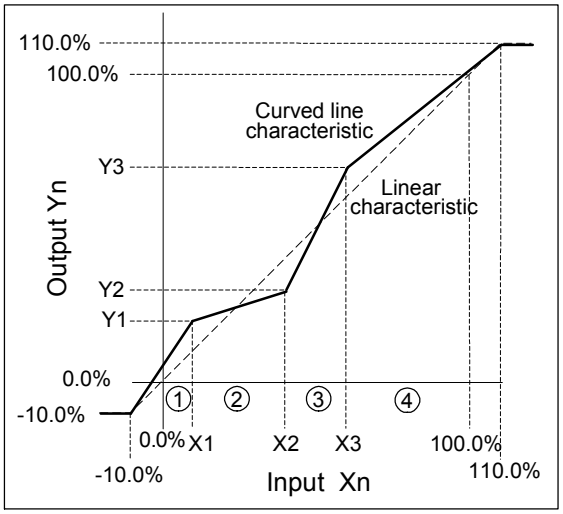
IN dI SP OUT dUAL	**Display selection**	Input/Output indication
	Selects an indication type on the display. Selection item: dUAL : Input/Output indication In□□: Input indication oUT□: Output indication nonE: No indication (Only power indicator is lit.)	
IN TIME OUT 00.00	**Indication time**	00.00 (Continuous)
	Sets the indication time of the display after the final key operation. Not available if No indication (Only the power indicator is lit) is selected during Display selection After the indication time has elapsed, the displays go off (Only the power indicator is lit.). If power is turned on again, or if any of the keys ∧, ∨, ◎ and the Sub-mode key is pressed while displays are unlit, the displays will light again. Setting range: 00.00: Continuous indication 00.01 (1 second) to 60.00 (60 minutes) [Minute.Second]	

6.4 Linearization function

If Linearization Enabled is selected during Linearization Enabled/Disabled selection mode, a maximum of 25 points of curved line characteristic can be programmed.
One point consists of one pair of input Xn (%) and output Yn (%). (n: Numbers from 1 to 25).
Set necessary points from the smallest input value (X1, Y1), (X2, Y2) … (X25, Y25) in numeric order.

(Setting example)

n	Xn (%)	Yn (%)
1	10.0	20.0
2	40.0	30.0
3	60.0	70.0



(Fig. 6.4-1)

Action explanation

① If input is lower than X1(10.0%), outputs linearly between -10.0% and Y1(20.0%).

② If input is between X1(10.0%) and X2(40.0%), outputs linearly between Y1(20.0%) and Y2(30.0%).

③ If input is between X2(40.0%) and X3(60.0%), outputs linearly between Y2(30.0%) and Y3(70.0%).

④ For other inputs, outputs linearly as steps ② and ③ depending on points.
For other inputs after X3(60.0%), outputs linearly between Y3(70.0%) and 110.0%.

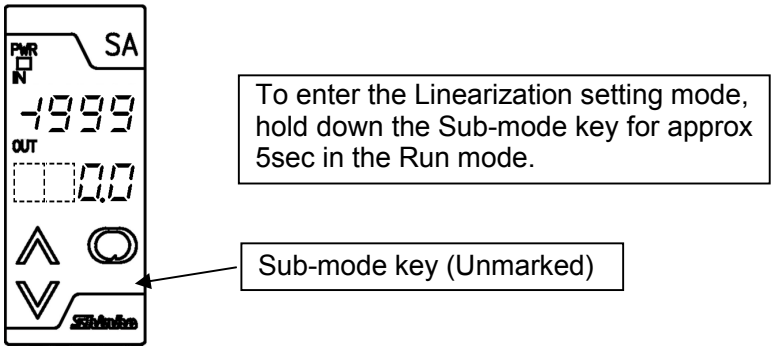
- In the case of Xn=Xn+1 or Xn>Xn+1: Settings after Xn+1 will be invalidated, and will output linearly between Yn and 110%.
  (e.g.) In the above example, if X3 is set to 40.0%, then X2=X3. Therefore, settings after X3 will be invalidated, and will output linearly between Y2(30.0%) and 110.0%.
- If X1 and X2 are set to 0.0%, this is considered as no setting, and will output linearly between -10.0% and 110.0% [the same as the linear characteristic in (Fig.6.4-1)].
  (e.g.) In the case of X1(0.0%), Y1(20.0%), X2(0.0%) Y2(30.0%), this is considered as no setting, and will output linearly between -10.0% and 110.0%.

6.5 Basic operation of Linearization

Set the Linearization function in the Linearization setting mode.
To enter the Linearization setting mode, hold down the Sub-mode key for approx. 5sec in the Run mode. (Fig. 6.5-1)

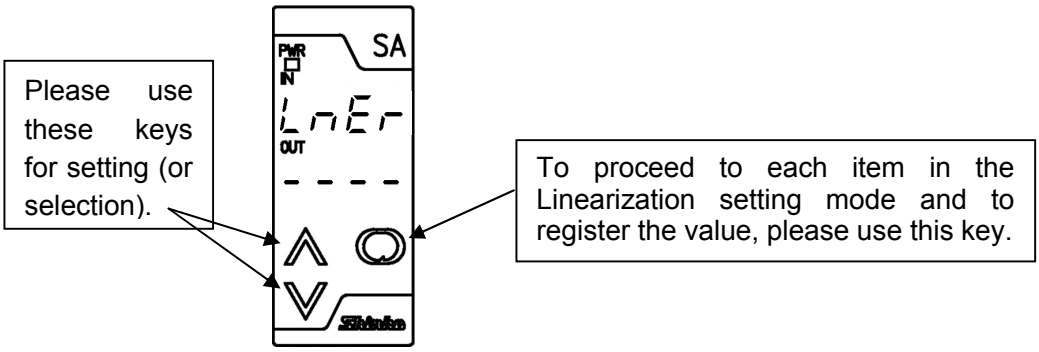
To set (or select) values, use the ∧ or ∨ key, and register the value with the ○ key. (Fig. 6.5-2)

(1) Run mode



(Fig. 6.5-1)

(2) Linearization setting mode



(Fig. 6.5-2)

6.6 Linearization setting mode

The following shows all items for Linearization function setting. Refer to the explanation of each item.

Display	Name, function, Setting range	Default value
IN LnEr OUT - - - -	**Linearization Enabled/Disabled**	Linearization Disabled
	Selects Linearization function Enabled or Disabled. Selection item: - - - - : Linearization Disabled USE□ : Linearization Enabled	
If Linearization Disabled is selected during the Linearization Enabled/Disabled selection, the following items will not appear. The unit reverts to the Run mode.		
IN XP01 OUT □□0.0	**Input X1**	0.0%
	Sets Input X1. Setting range: -10.0 to 110.0%	
IN Yo01 OUT □□0.0	**Output Y1**	0.0%
	Sets Output Y1 corresponding to Input X1. Setting range:-10.0 to 110.0%	

IN XP02 OUT 0.0	**Input X2**	0.0%
	Sets Input X2. Setting range:-10.0 to 110.0%	
IN Yo02 OUT 0.0	**Output Y2**	0.0%
	Sets Output Y2 corresponding to Input X2. Setting range:-10.0 to 110.0%	
⋮	⋮	⋮
IN XP25 OUT 0.0	**Input X25**	0.0%
	Sets Input X25. Setting range:-10.0 to 110.0%	
IN Yo25 OUT 0.0	**Output Y25**	0.0%
	Sets Output Y25 corresponding to Input X25. Setting range:-10.0 to 110.0%	

7. Adjustment

Performs the output zero and span adjustments.
Connect an mV generator to the input terminals of this instrument.
Connect a digital multimeter to output terminals.

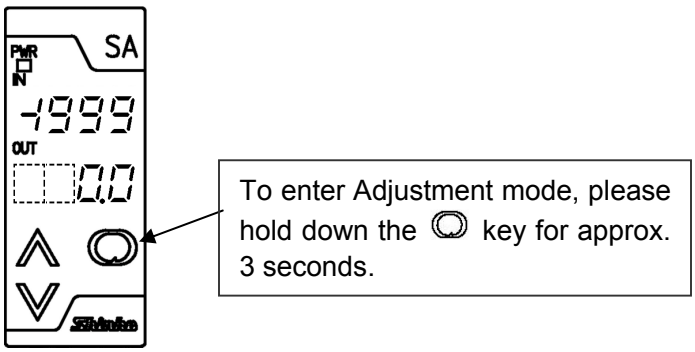
7.1 Basic operation of adjustment

Adjustment can be conducted in the Adjustment mode.
To enter Adjustment mode, hold down the ◎ key for approx. 3 seconds in the Run mode. (Fig. 7.1-1)

For output adjustment, use the ∧ or ∨ key, and register the value with the ◎ key. (Fig. 7.1-2)

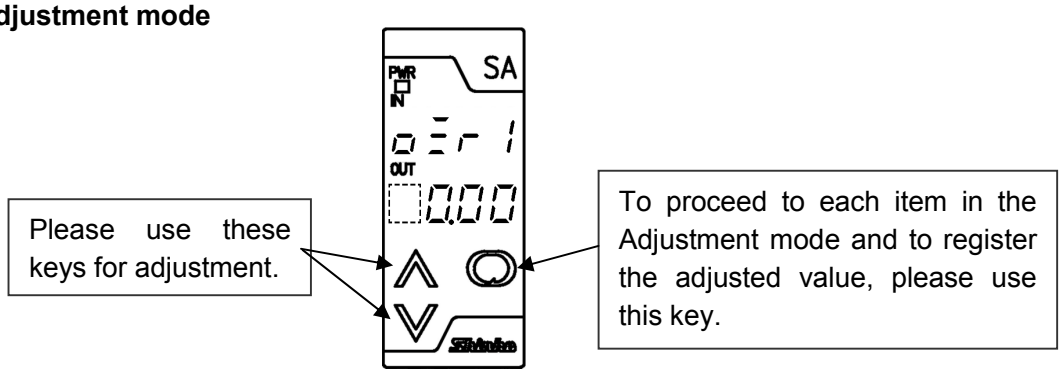
To revert to the Run mode, press the ◎ key again for approximately 3 seconds.

(1) Run mode



(Fig. 7.1-1)

(2) Adjustment mode



(Fig. 7.1-2)

7.2 Adjustment

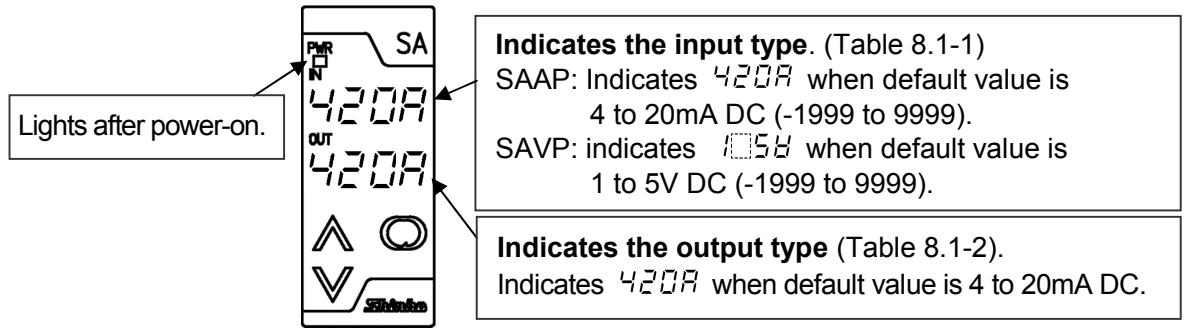
The following shows all adjustment items. Adjust values referring to explanation of each item below.

Display	Name, Function, Setting range	Default value
IN oZr 1 OUT 0.00	**Output zero adjustment**	0.00%
	Adjusts output zero. Input the value corresponding to 0% output, then adjust the value with the ∧ or ∨ key while viewing the output value (on the digital multimeter). **When the output range lower limit is zero, (even if zero adjustment results in a negative value), the output value will not be negative.** Setting range: -5.00 to 5.00% Effective range of adjustment differs depending on the output types. 4 to 20mA DC: -5 to 5% 0 to 1V DC : 0 to 5% 0 to 20mA DC: 0 to 5% 0 to 5V DC : 0 to 5% 0 to 12mA DC: 0 to 5% 1 to 5V DC : -5 to 5% 0 to 10mA DC: 0 to 5% 0 to 10V DC: 0 to 5% 1 to 5mA DC : -5 to 5%	
IN oSP 1 OUT 0.00	**Output span adjustment**	0.00%
	Adjusts output span. Input the value corresponding to 100% output, then adjust the value with the ∧ or ∨ key while viewing the output value (on the digital multimeter). Setting range: -5.00 to 5.00% Effective range of adjustment is 95 to 105%.	

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).



(Fig. 8.1-1)

(Table 8.1-1)

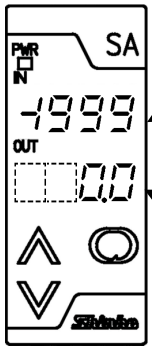
Input	Input display
4 to 20mA DC	4 20A: -1999 to 9999
0 to 20mA DC	0 20A: -1999 to 9999
0 to 16mA DC	0 16A: -1999 to 9999
2 to 10mA DC	2 10A: -1999 to 9999
0 to 10mA DC	0 10A: -1999 to 9999
1 to 5mA DC	1 5A: -1999 to 9999
0 to 1mA DC	0 1A: -1999 to 9999
0 to 10mV DC	0 10V: -1999 to 9999
-10 to 10mV DC	-1 10V: -1999 to 9999
0 to 50mV DC	05 0V: -1999 to 9999
0 to 60mV DC	06 0V: -1999 to 9999
0 to 100mV DC	00.1V: -1999 to 9999
0 to 1V DC	0 1V: -1999 to 9999
0 to 5V DC	0 5V: -1999 to 9999
1 to 5V DC	1 5V: -1999 to 9999
0 to 10V DC	0 10V: -1999 to 9999

(Table 8.1-2)

Output	Output display
4 to 20mA DC	4 20A
0 to 20mA DC	0 20A
0 to 12mA DC	0 12A
0 to 10mA DC	0 10A
1 to 5mA DC	1 5A
0 to 1V DC	0 1V
0 to 5V DC	0 5V
1 to 5V DC	1 5V
0 to 10V DC	0 10V

8.2 Operation

The unit enters the Run mode as shown in (Fig. 8.2-1). The input signal selected during Input type selection is converted to the output selected during Output type selection.



Indicates the input value.

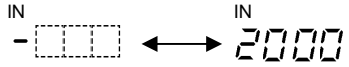
Indicates the output value in a percentage form (%).
Output value corresponding to the input value is indicated in a percentage form (%).

(Fig. 8.2-1)

- **Indication when input value is -2000 or less**

  For the indication of -2000 or less (up to –10% output), the input value and the minus (-) sign are indicated alternately.

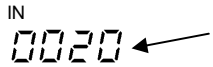
  (e.g.) Indication of -2000



- **Indication when input value is 10000 or more**

  For the indication of 10000 or more (up to 110% output), the lower 4 digits of input value are flashing.

  (e.g.) Indication of 10020



Flashes.

- **Underrange, Overrange and Sensor burnout alarm 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 after the indication time has elapsed. (Only the power indicator is lit.)

  If power is turned on again, or if any of the keys ∧, ∨, ○ and the Sub-mode key is pressed while displays are unlit, the displays will light again.

8.2.1 When using this unit as a standard linearizer

Set the filter time constant to 0.0 seconds, and
set the Output Normal/Reverse selection to “Normal”.

8.2.2 When using the Reverse function

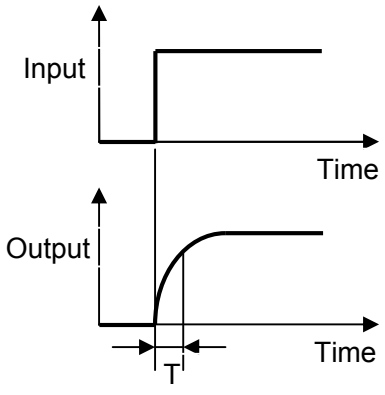
This function reverses the output (100 to 0%) that corresponds to the input (0 to 100%).

Set the Output Normal/Reverse selection to “Reverse”.

8.2.3 When using the first order lag filter function

The value is outputted by performing the first order lag computation using the filter time constant “T”. (Fig. 8.2.3-1)

Set the filter time constant to a random value (0.0 to 10.0 seconds).



(Fig. 8.2.3-1)

9. Specifications

Input specifications

SAAP

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 a shunt resistor (sold separately) between input terminals.
See (Table 4.3.3-1) on page 9.

SAVP

Input	Input resistance	Allowable signal source resistance
0 to 10mV DC	1MΩ	20Ω or less
-10 to 10mV DC		40Ω or less
0 to 50mV DC		200Ω or less
0 to 60mV DC		
0 to 100mV DC		
0 to 1V DC		2kΩ or less
0 to 5V DC		1kΩ or less
1 to 5V DC		
0 to 10V DC		

Output specifications

DC current

Output	Allowable load resistance	Zero adjustment range	Span adjustment range
4 to 20mA DC	700Ω or less	-5 to 5%	95 to 105%
0 to 20mA DC	700Ω or less	0 to 5%	95 to 105%
0 to 12mA DC	1.2kΩ or less	0 to 5%	95 to 105%
0 to 10mA DC	1.2kΩ or less	0 to 5%	95 to 105%
1 to 5mA DC	2.4kΩ or less	-5 to 5%	95 to 105%

DC voltage

Output	Allowable load resistance	Zero adjustment range	Span adjustment range
0 to 1V DC	100Ω or more	0 to 5%	95 to 105%
0 to 5V DC	500Ω or more	0 to 5%	95 to 105%
1 to 5V DC	500Ω or more	-5 to 5%	95 to 105%
0 to 10V DC	1kΩ or more	0 to 5%	95 to 105%

When the output range lower limit is zero, (even if zero adjustment results in a negative value), the output value will not be negative.

Performance

Accuracy Input : Within ±0.1%
Output : Within ±0.1%

Display accuracy Within Input accuracy±1 digit

Response time 0.5 seconds (typical) (0 ⟶90%)

Temperature coefficient ±0.015**%/**℃

Insulation resistance Input – Output – Power: 10MΩ or more, at 500V DC

Dielectric strength Input – Output – Power: 2.0kV AC for 1 minute

General structure

Case	Flame-resistant resin, Color: Light gray
Front panel	Membrane sheet
Setting	Setting by the front keypad
Display, indicator	Input display : 7 segments Red LED display 4 digits Character size: 7.4 x 4.0mm (H x W) Output display : 7 segments Green LED display 4 digits Character size: 7.4 x 4.0mm (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℃ (23 to 131℉)
Ambient humidity	35 to 85%RH (Non-condensing)
Weight	Approx. 120g
Mounting	DIN rail mounting
External dimensions	W22.5 x H75 x D100mm

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.

10. Troubleshooting

10.1 Indication

Problem	Presumed cause and solution
Input display is flashing "- - - -" or "- - - -".	• 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.
The indication of the Input display is irregular or unstable.	• Check whether the sensor correcting value is suitable. Set it to a suitable value. • 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 or adjustment is not possible.	• “Lock” has been selected during Set value lock selection. Select “Unlock”.

10.3 Operation

Problem	Presumed cause and solution
Input value does not change.	• The sensor may be out of order. Change the sensor. • Check whether input and output wires are securely connected to the Input/Output terminals of the instrument. Ensure that input and output wires are securely connected to the Input/Output terminals. • Check whether the wiring of input and output is correct.
No output	• Check whether Output 100% and Output 0% value have been set to suitable values. • Check whether Output type and Output Normal/Reverse have been selected correctly during Output type and Output Normal/Reverse selection.

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	
dcA□	Input type (SAAP)	4 to 20mA DC (–1999 to 9999)	
dcb□	Input type (SAVP)	1 to 5V DC (–1999 to 9999)	
dP□□	Decimal point place	No decimal point	
SCLL	Output 0% value	-1999	
SCLH	Output 100% value	9999	
FILT	Filter time constant	0.0 seconds	
So□□	Sensor correction	0	
oUTP	Output type	4 to 20mA DC	
oUTS	Output Normal/Reverse	Normal	
dISP	Display selection	Input/Output indication	
TIME	Indication time	00.00 (Continuous)	

Adjustment mode

Display	Setting item	Default value	Data
oZr 1	Output zero	0.00%	
oSP 1	Output span	0.00%	

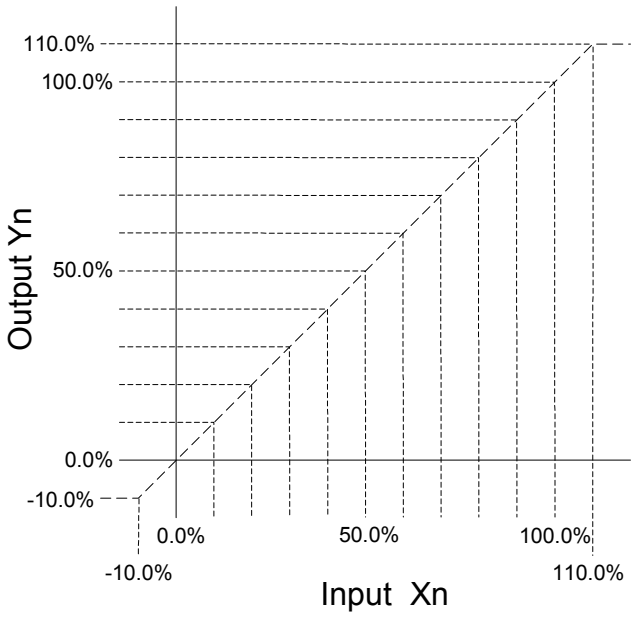
Linearization setting mode

Display	Setting item	Default value	Data
LnEr	Linearization Enabled/Disabled	Linearization Disabled	
XP01	Input X1	0.0%	
Yo01	Output Y1	0.0%	
XP02	Input X2	0.0%	
Yo02	Output Y2	0.0%	
XP03	Input X3	0.0%	
Yo03	Output Y3	0.0%	
XP04	Input X4	0.0%	
Yo04	Output Y4	0.0%	
XP05	Input X5	0.0%	
Yo05	Output Y5	0.0%	
XP06	Input X6	0.0%	
Yo06	Output Y6	0.0%	
XP07	Input X7	0.0%	
Yo07	Output Y7	0.0%	
XP08	Input X8	0.0%	
Yo08	Output Y8	0.0%	
XP09	Input X9	0.0%	
Yo09	Output Y9	0.0%	
XP 10	Input X10	0.0%	
Yo 10	Output Y10	0.0%	
XP 11	Input X11	0.0%	
Yo 11	Output Y11	0.0%	
XP 12	Input X12	0.0%	
Yo 12	Output Y12	0.0%	

YP 13	Input X13	0.0%	
Yo 13	Output Y13	0.0%	
YP 14	Input X14	0.0%	
Yo 14	Output Y14	0.0%	
YP 15	Input X15	0.0%	
Yo 15	Output Y15	0.0%	
YP 16	Input X16	0.0%	
Yo 16	Output Y16	0.0%	
YP 17	Input X17	0.0%	
Yo 17	Output Y17	0.0%	
YP 18	Input X18	0.0%	
Yo 18	Output Y18	0.0%	
YP 19	Input X19	0.0%	
Yo 19	Output Y19	0.0%	
YP20	Input X20	0.0%	
Yo20	Output Y20	0.0%	
YP21	Input X21	0.0%	
Yo21	Output Y21	0.0%	
YP22	Input X22	0.0%	
Yo22	Output Y22	0.0%	
YP23	Input X23	0.0%	
Yo23	Output Y23	0.0%	
YP24	Input X24	0.0%	
Yo24	Output Y24	0.0%	
YP25	Input X25	0.0%	
Yo25	Output Y25	0.0%	

- **Linearization table (photocopiable)**

n	Xn(%)	Yn(%)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		



******* 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□P-□
- 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

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