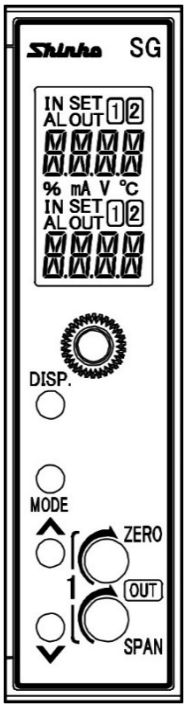
2-INPUT MATH FUNCTION TRANSMITTER

SGZ

INSTRUCTION MANUAL



Shinko

Preface

Thank you for purchasing our SGZ, 2-Input Math Function Transmitter. This manual contains instructions for the mounting, functions, operations and notes when operating the SGZ. 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.
- 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 within a control panel. 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 result in serious consequences, 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 electrical shock or fire, only Shinko or qualified service personnel may handle the inner assembly.
- To prevent an electrical shock, fire, or damage to instrument, parts replacement may only be undertaken by Shinko or 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 purpose-of-use consultation with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protective 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. Proper periodic maintenance is also 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.

■ 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 -10 to 55℃ (14 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, chemicals or the vapors of these substances can come into direct contact with the unit.
- When installing this unit within a control panel, please note that ambient temperature of this unit – not the ambient temperature of the control panel – 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.

■ Wiring Precautions

⚠ Caution

- Do not leave bits of wire in the instrument, because they could cause a fire and malfunction.
- When wiring, use a crimping pliers and a solderless terminal with an insulation sleeve in which an M3 screw fits.
- 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 does not have a built-in power switch, circuit breaker and fuse. It is necessary to install a power switch, circuit breaker and fuse near the instrument. (Recommended fuse: Time-lag fuse, rated voltage 250 V AC, rated current 2 A)
- For wiring of the AC power source, be sure to use terminals as described in this manual.
  If the AC power source is connected to incorrect terminals, the unit will be burnt out.
- Do not apply a commercial power source to the sensor which is connected to the input terminal nor allow the power source to come into contact with the sensor.
- When using DC voltage and current input, do not confuse polarity when wiring.
- Keep the input/output wires and power lines separate.

■ Operation and Maintenance Precautions

⚠ Caution

- Do not touch live terminals. This may cause an electrical shock or problems in operation.
- Turn the power supply to the instrument OFF when retightening the terminal or cleaning. Working on or touching the terminal with the power switched ON may result in severe injury or death due to electrical 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, be careful not to put pressure on, scratch or strike it with a hard object.

Characters used in this manual [: No character is indicated (unlit).]

Indication	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Number, ℃/℉													
Indication	A	b	C	d	E	F	G	H	I	J	K	L	M
Alphabet													
Indication	N	o	P	Q	R	S	t	U	V	W	X	Y	Z
Alphabet													

Contents

1. Model

1.1 Model

SGZ - □ □ □ – 0 - □

- Option
  - 0: No option needed
  - 1: Multi-rotation trimmer
  - 2: Moisture-proof treatment
  - 3: Multi-rotation trimmer + Moisture-proof treatment
- Power supply
  - 0: 100 to 240 V AC
- Output*2
- Input 1, Input 2*1
  (Input 2 is the same as Input 1.)
- Series name

***1: Input 1, Input 2**

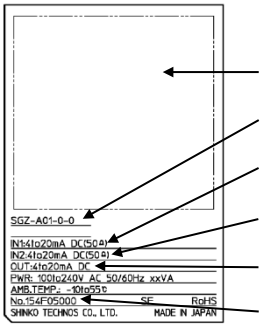
Code	Input Type		Code	Input Type	
A0	Direct current	4 to 20 mA (Built-in 50 Ω shunt resistor)	V0	DC voltage	0 to 10 mV (1MΩ input resistance)
A1		4 to 20 mA (250 Ω shunt resistor)	V1		0 to 50 mV (1MΩ input resistance)
A2		4 to 20 mA (50 Ω shunt resistor)	V2		0 to 60 mV (1MΩ input resistance)
A3		0 to 20 mA (250 Ω shunt resistor)	V3		0 to 100 mV (1MΩ input resistance)
A4		0 to 16 mA (62.5 Ω shunt resistor)	V4		0 to 1 V (1MΩ input resistance)
A5		2 to 10 mA (250 Ω shunt resistor)	V5		0 to 5 V (1MΩ input resistance)
A6		0 to 10 mA (100 Ω shunt resistor)	V6		1 to 5 V (1MΩ input resistance)
A7		1 to 5 mA (100 Ω shunt resistor)	V7		-5 to 5 V (1MΩ input resistance)
A8		0 to 1 mA (1000 Ω shunt resistor)	V8		0 to 10 V (1MΩ input resistance)
A9		10 to 50 mA (10 Ω shunt resistor)	V9		-10 to 10 V (1MΩ input resistance)

***2: Output**

Code	Output Type		Code	Output Type	
1	**Current output**	4 to 20 mA	A	**Voltage output**	0 to 10 mV
2		0 to 20 mA	B		0 to 100 mV
3		0 to 16 mA	C		0 to 1 V
4		2 to 10 mA	D		0 to 5 V
5		0 to 10 mA	E		1 to 5 V
			F		0 to 10 V
			G		-5 to 5 V

1.2 How to Read the Model Label

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



Terminal arrangement

Model (e.g. SGZ-A01-0-0)

Input 1 (Enter a type selected in [Input type].)

Input 2 (Enter the same type as Input 1.)

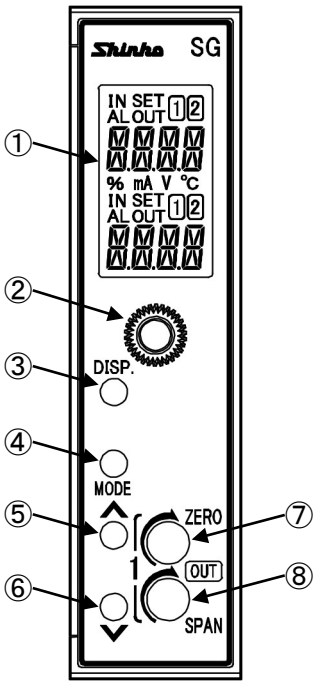
Output (Enter a type selected in [Output type].)

Serial number

(Fig. 1.2-1)

2. Name and Functions

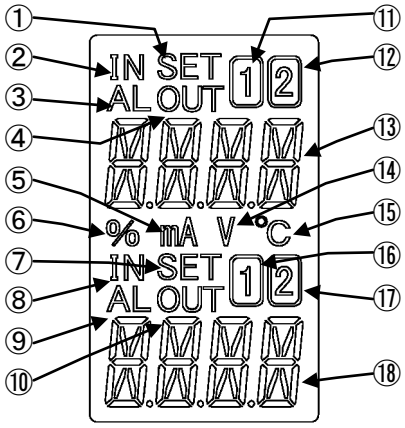
2.1 Front Panel



(Fig. 2.1-1)

①	**Display section**	Indicates setting contents, input value, output value, etc.
②	**Mounting screw**	Used for fixing the instrument to the socket or removal from it.
③	**DISP key**	Switches the displays, and moves to the next setting item. Releases the lock status of the DISP key by pressing for 3 seconds.
④	**MODE key**	Selects either setting mode or display mode. Shifts the digit for the Custom display. Enters setting mode by pressing and holding for 5 seconds.
⑤	**UP key**	Increases the numerical value. Contents of Multi-Display A and B can be switched alternately when Default Display is RUN display mode 1, 2, 3, 4, 5, 6 and 7.
⑥	**DOWN key**	Decreases the numerical value. Enters Manual mode by pressing for 3 seconds.
⑦	**Output Zero**	Adjusts the value of Output Zero.
⑧	**Output Span**	Adjusts the value of Output Span.

2.2 Display Section



(Fig. 2.2-1)

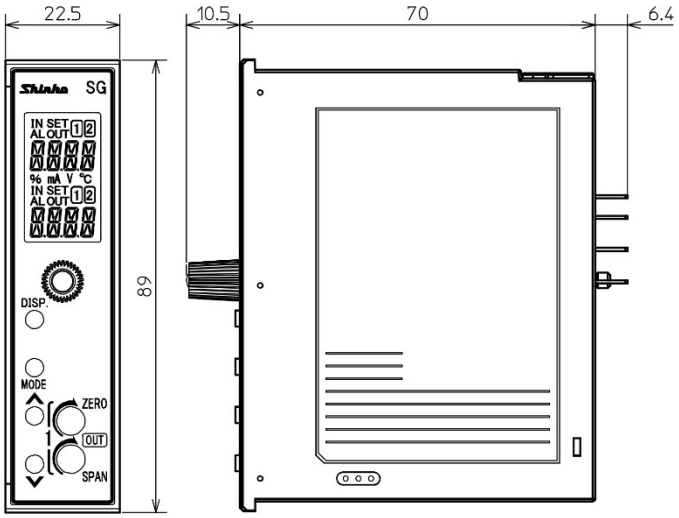
①	**Setting display indicator A**	Lights up in Manual mode.
②	**Input indicator A**	Lights up when Multi-Display A indicates an input value or input math function value.
③	**Alarm indicator A**	Lights up if an input error or input disconnection occurs while Multi-Display A indicates an input value.
④	**Output indicator A**	Lights up when Multi-Display A indicates an output value.
⑤	**mA indicator**	Lights up when mA is selected in [Indication unit].
⑥	**% indicator**	Lights up in Manual mode, or when % is selected in [Indication unit].
⑦	**Setting display indicator B**	Lights up for the Setting display.
⑧	**Input indicator B**	Lights up when Multi-Display B indicates an input value.
⑨	**Alarm indicator B**	Lights up if an input error or input disconnection occurs while Multi-Display B indicates an input value.
⑩	**Output indicator B**	Lights up when Multi-Display B indicates an output value.
⑪	**1 indicator A**	Lights up in Manual mode, or when Multi-Display A indicates Input 1 value, output value or input math function value.
⑫	**2 indicator A**	Lights up when Multi-Display A indicates Input 2 value or input math function value.
⑬	**Multi-Display A**	Indicates the following in accordance with the display indication: Input value, output value, custom characters, setting item
⑭	**V indicator**	Lights up when V is selected in [Indication unit].
⑮	**°C indicator**	Lights up when °C is selected in [Indication unit].
⑯	**1 indicator B**	Lights up when Multi-Display B indicates Input 1 value or output value.
⑰	**2 indicator B**	Lights up when Multi-Display B indicates Input 2 value.
⑱	**Multi-Display B**	Indicates the following in accordance with the display indication: Input value, output value, custom characters, setting value

Output indicators A and B, Alarm indicators A and B: Red

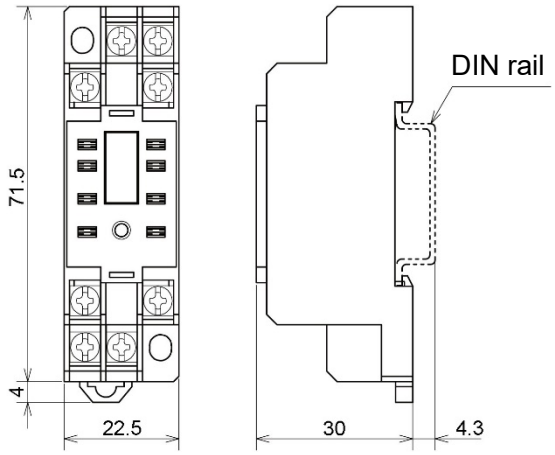
Other indicators: White

3. Mounting

3.1 External Dimensions (Scale: mm)



8P socket



(Fig. 3.1-1)

3.2 Mounting to, and Removal from the DIN Rail

⚠ Caution

- Mount the DIN rail horizontally.
- To remove the socket, a flat blade screwdriver is required.
  Never turn the screwdriver when inserting it into the Lock lever. If excessive power is applied to the lever, it may break.
- If the instrument is mounted in a position susceptible to vibration or shock, mount commercially available fastening plates at both ends of the instrument.

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)

① Separate the instrument from the socket by loosening the mounting screw on the front panel

② Make sure the lock lever of the socket is located in the lower part of the socket. Hook the upper side of the socket onto the DIN rail, then fit the lower part of the socket onto the DIN rail (A clicking sound should be heard when done properly).

⚠ Caution

- Before inserting the instrument to the socket, make sure the cable is wired properly. (Refer to “4. Wiring”.)
- When inserting or removing the socket, make sure the socket is oriented vertically. If force is applied in any other direction than vertically, a malfunction may occur.
- If the mounting screw is fastened too tightly, a malfunction may occur.

③ Insert the SGZ into the socket.

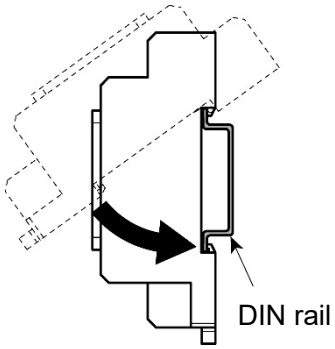
④ Fasten the mounting screw by turning it clockwise, to secure the SGZ onto the socket. Tighten the screw lightly.

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

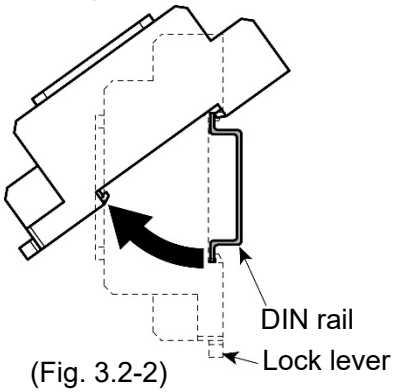
① Turn the power to the instrument OFF.

② Separate the instrument from the socket by loosening the mounting screw on the front panel.

③ Insert a flat blade screwdriver into the Lock lever (lower part of the socket), and remove the socket from the DIN rail while pulling the lever down.



(Fig. 3.2-1)



(Fig. 3.2-2)

4. Wiring

⚠ Warning

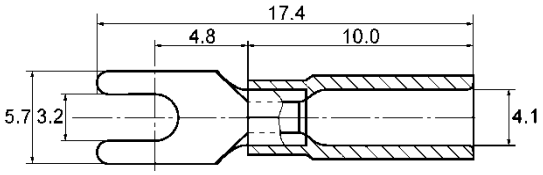
Turn the power supply to the instrument off before wiring or checking. Working on or touching the terminal with the power switched on may result in severe injury or death due to electrical shock.

4.1 Lead Wire Solderless Terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. **The torque should be 0.63 N•m.**

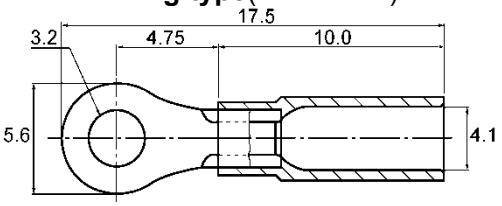
Solderless Terminal	Manufacturer	Model
Y-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25Y-3
	Japan Solderless Terminal MFG Co., Ltd.	VD1.25-B3A
Ring-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25-3
	Japan Solderless Terminal MFG Co., Ltd.	V1.25-3

Y-type(Scale: mm)



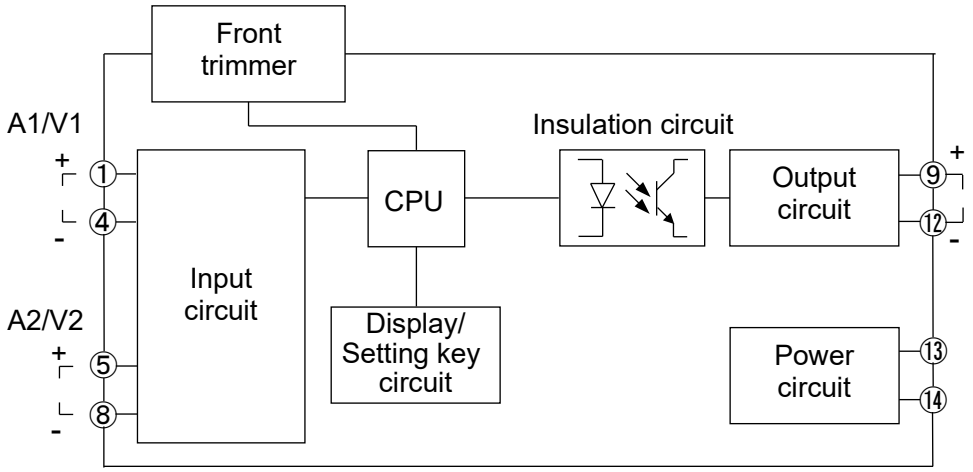
(Fig. 4.1-1)

Ring-type(Scale: mm)



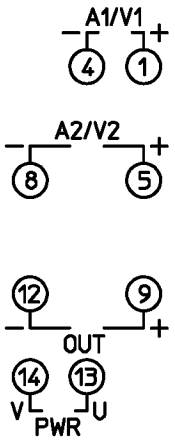
(Fig. 4.1-2)

4.2 Circuit Configuration



(Fig. 4.2-1)

4.3 Terminal Arrangement



(Fig. 4.3-1)

PWR	Power supply voltage 100 to 240 V AC
OUT	Output
A1, A2	Direct current input
V1, V2	DC voltage input

4.4 Wiring

⚠ Warning

- If the AC power source is connected to incorrect terminals, the instrument will be burnt out.

(1) Power Source Wiring

Use terminals ⑬, ⑭ for the power supply to the instrument.

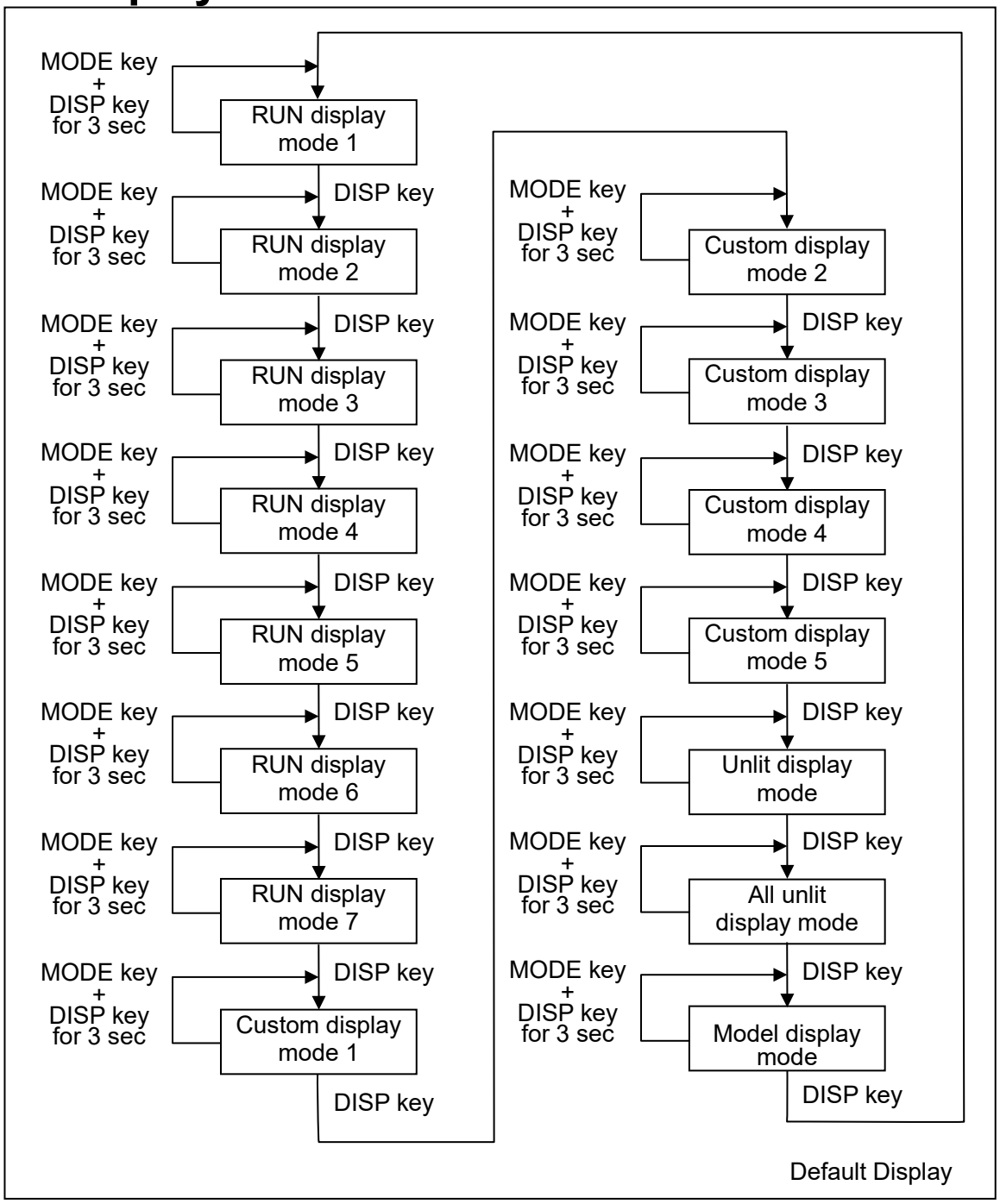
(2) Output Wiring

Use terminals ⑨(+), ⑫(-) for the output wiring.

(3) Input Wiring

Use terminals ①(+), ④(-), and ⑤(+), ⑧(-) for input wiring.

5. Display Mode



Default Display: If the MODE and DISP key (in that order) are pressed together for approx. 3 seconds in any display mode, the display mode will become the Default Display.
Once the Default Display is set, the DISP key will be in lock status.
If the DISP key is pressed for approx. 3 seconds on the Default Display, the key lock status will be cancelled.
If the DISP key is pressed while the DISP key is in lock status, Multi-Display A indicates LOCK.

RUN display mode 1: Multi-Display A indicates Input 1 value, and Multi-Display B indicates the output value.
Alarm indicator A and B light up if they are under the conditions of lighting.

RUN display mode 2: Multi-Display A indicates Input 2 value, and Multi-Display B indicates the output value.
Alarm indicator A and B light up if they are under the conditions of lighting.

RUN display mode 3: Multi-Display A indicates Input 1 value, and Multi-Display B indicates Input 2 value.
Alarm indicator A and B light up if they are under the conditions of lighting.

RUN display mode 4: Multi-Display A indicates Input 1 value, and Multi-Display B is unlit
Alarm indicator A and B light up if they are under the conditions of lighting.

RUN display mode 5: Multi-Display A indicates Input 2 value, and Multi-Display B is unlit
Alarm indicator A and B light up if they are under the conditions of lighting.

RUN display mode 6: Multi-Display A is unlit, and Multi-Display B indicates the output value.
Alarm indicator A and B light up if they are under the conditions of lighting.

RUN display mode 7: Multi-Display A indicates Input math function value, and Multi-Display B indicates the output value.
Alarm indicator A and B light up if they are under the conditions of lighting.

Custom display mode 1: Multi-Display A indicates characters set in [Multi-Display A].
Multi-Display B indicates characters set in [Multi-Display B].
Alarm indicator A lights up if it is under the conditions of lighting.

Custom display mode 2: Multi-Display A indicates Input 1 value.
Multi-Display B indicates characters set in [Multi-Display B].
Alarm indicator A lights up if it is under the conditions of lighting.

Custom display mode 3: Multi-Display A indicates Input 2 value.
Multi-Display B indicates characters set in [Multi-Display B].
Alarm indicator A lights up if it is under the conditions of lighting.

Custom display mode 4: Multi-Display A indicates the output value.
Multi-Display B indicates characters set in [Multi-Display B].
Alarm indicator A lights up if it is under the conditions of lighting.

Custom display mode 5: Multi-Display A indicates the input math function value.
Multi-Display B indicates characters set in [Multi-Display B].
Alarm indicator A lights up if it is under the conditions of lighting.

Unlit display mode: Multi-Display A and B are unlit, and the Input indicator A lights up.
Alarm indicator A lights up if it is under the conditions of lighting.

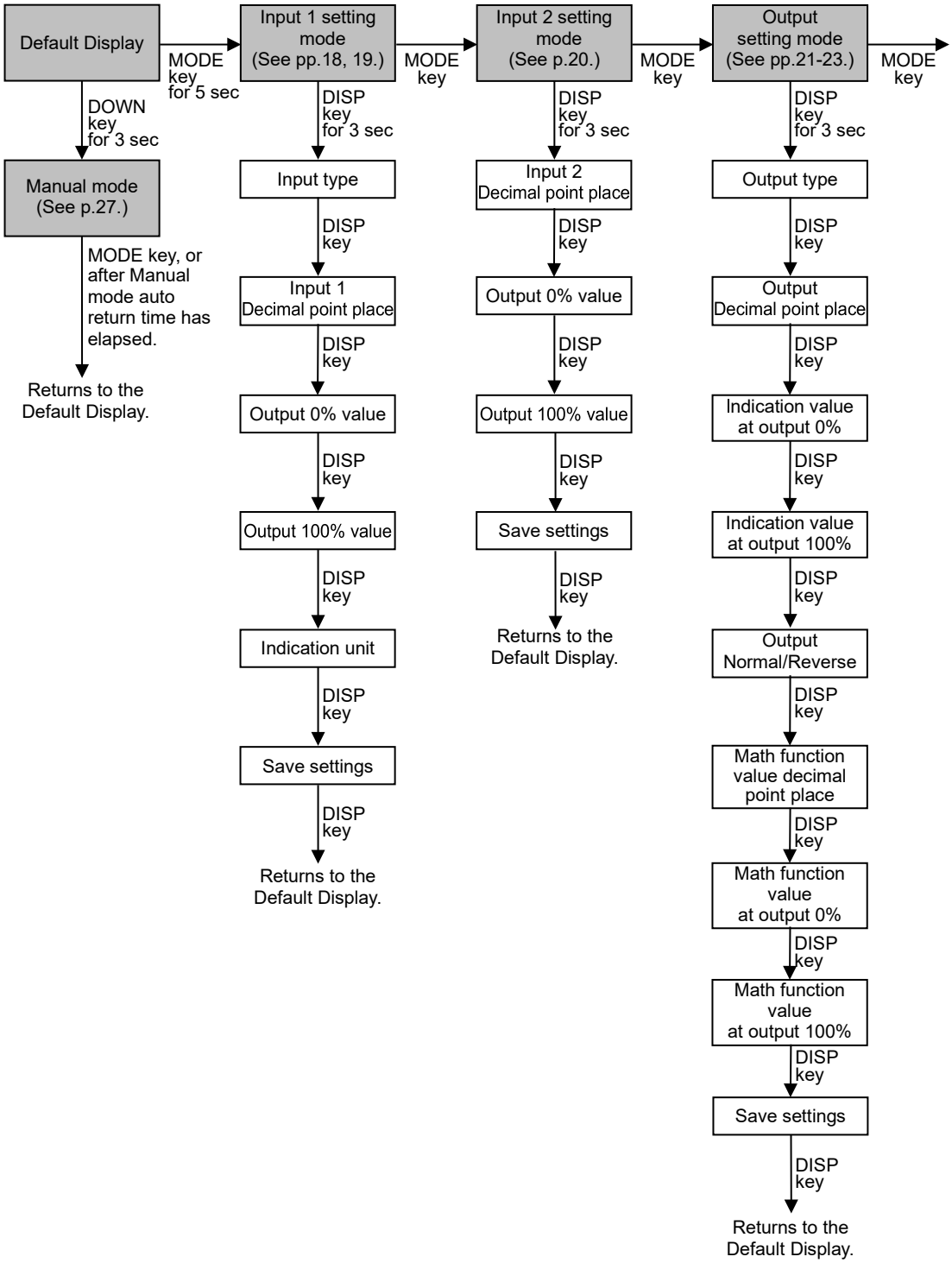
All unlit display mode: All displays and indicators are unlit.
Alarm indicator A and B do not light up even if they are under the conditions of lighting.

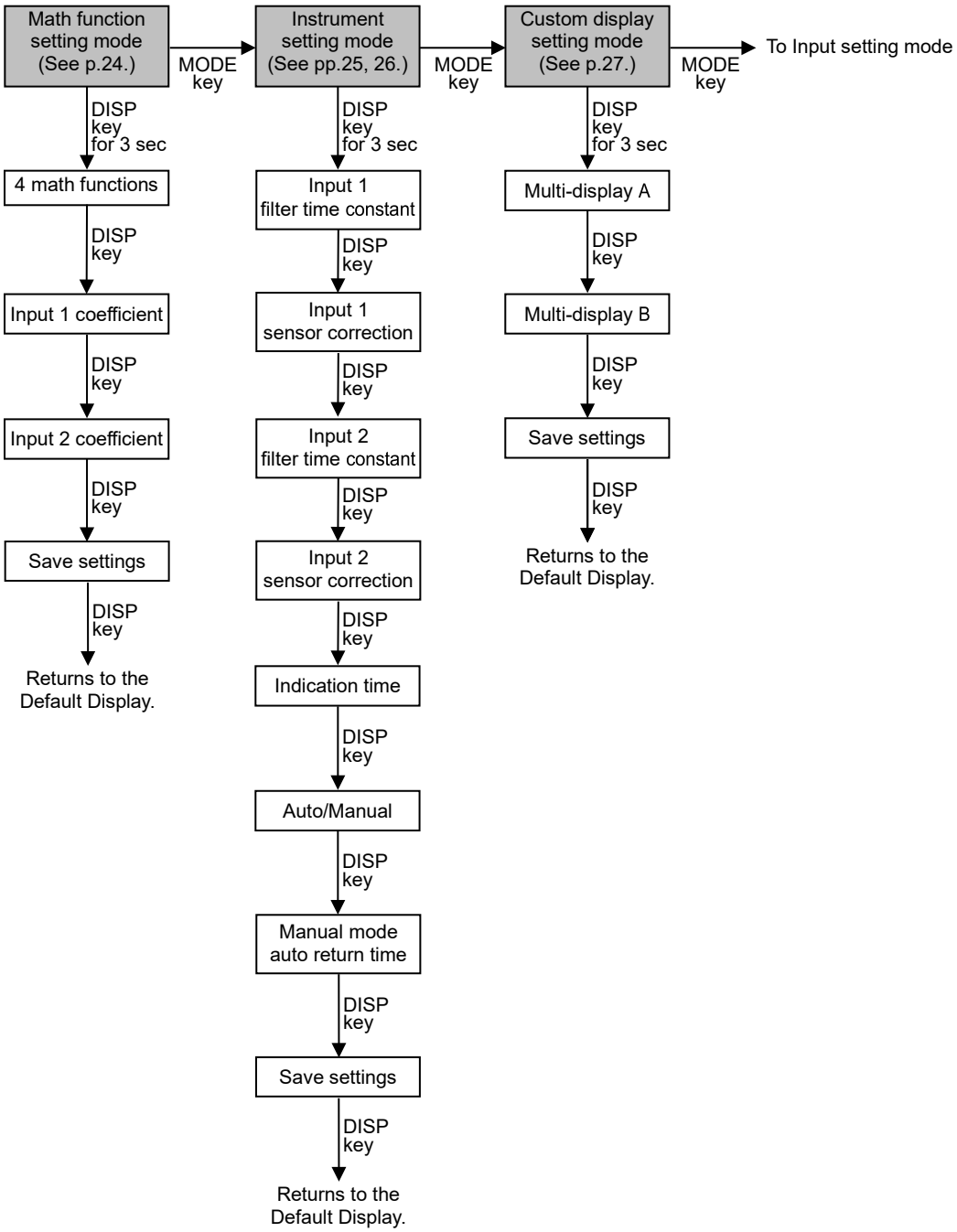
Model display mode: Multi-Display A indicates a model name, and Multi-Display B indicates an input code and output code.
Alarm indicator A lights up if it is under the conditions of lighting.

6. Setting Mode

6.1 Display Transition in Setting Mode

• If the MODE key is pressed and held down for approx. 5 seconds in each setting mode, the unit will move to the Default Display.




Math function setting mode (See p.24.)
MODE key
Instrument setting mode (See pp.25, 26.)
MODE key
Custom display setting mode (See p.27.)
MODE key
To Input setting mode
DISP key for 3 sec
4 math functions
DISP key
Input 1 coefficient
DISP key
Input 2 coefficient
DISP key
Save settings
DISP key
Returns to the Default Display.
DISP key for 3 sec
Input 1 filter time constant
DISP key
Input 1 sensor correction
DISP key
Input 2 filter time constant
DISP key
Input 2 sensor correction
DISP key
Indication time
DISP key
Auto/Manual
DISP key
Manual mode auto return time
DISP key
Save settings
DISP key
Returns to the Default Display.
DISP key for 3 sec
Multi-display A
DISP key
Multi-display B
DISP key
Save settings
DISP key
Returns to the Default Display.

6.2 Input 1 Setting Mode

Input Type

Selects an input type.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
4 to 20 mA Built-in 50 Ω shunt resistor	SENS	420A	4 to 20 mA Built-in 50 Ω shunt resistor SENS 420A
4 to 20 mA Externally mounted 250 Ω shunt resistor		420A	
4 to 20 mA Externally mounted 50 Ω shunt resistor		420A	
0 to 20 mA		020A	
0 to 16 mA		016A	
2 to 10 mA		210A	
0 to 10 mA		010A	
1 to 5 mA		105A	
0 to 1 mA		001A	
10 to 50 mA		050A	
0 to 10 mV		010MV	
0 to 50 mV		050MV	
0 to 60 mV		060MV	
0 to 100 mV		0100MV	
0 to 1 V		001V	
0 to 5 V		005V	
1 to 5 V		105V	
-5 to 5 V		-05V	
0 to 10 V		010V	
-10 to 10 V		-10V	

Input 1 Decimal Point Place

Selects the decimal point place when Input 1 value is indicated.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
No decimal point	dPNT	0	2 digits after decimal point * dPNT 0.00
1 digit after decimal point		0.0	
2 digits after decimal point		0.00	
3 digits after decimal point		0.000	

* If the following input is selected in [Input type], ‘1 digit after decimal point’ will be the factory default:

0 to 10 mV, 0 to 50 mV, 0 to 60 mV, 0 to 100 mV, -5 to 5 V, -10 to 10 V

Output 0% Value

Sets an input value (indicated on the display) at the time of output 0%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Input low limit to Output 100% value	SEEE	Set value	4.00* SEEE 4.00

* If '-5 to 5 V' range is selected in [Input type], the factory default value will be -5.0.

Output 100% Value

Sets an input value (indicated on the display) at the time of output 100%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Output 0% value to Input high limit	SEEH	Set value	20.00* SEEH 20.00

* If '-5 to 5 V' range is selected in [Input type], the factory default value will be 5.0.

Indication Unit

Selects the unit for indication.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
No unit	UNIE	NONE	No unit UNIE NONE
%		PER	
mA		MA	
V		VOLT	
°C		DEG	

Save Settings

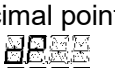
Selects whether the settings are saved (registered) or not.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Save	SAVE	YES	Save SAVE YES
Not save		NO	

6.3 Input 2 Setting Mode

Input 2 Decimal Point Place

Selects the decimal point place when Input 2 value is indicated.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
No decimal point			2 digits after decimal point * 
1 digit after decimal point			
2 digits after decimal point			
3 digits after decimal point			

* If the following input is selected in [Input type], “1 digit after decimal point” will be the factory default:

0 to 10 mV, 0 to 50 mV, 0 to 60 mV, 0 to 100 mV, -5 to 5 V, -10 to 10 V

Output 0% Value

Sets an input value (indicated on the display) at the time of output 0%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Input low limit to Output 100% value		Set value	4.00* 

* If ‘-5 to 5 V’ range is selected in [Input type], the factory default value will be -5.0.

Output 100% Value

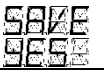
Sets an input value (indicated on the display) at the time of output 100%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Output 0% value to Input high limit		Set value	20.00* 

* If ‘-5 to 5 V’ range is selected in [Input type], the factory default value will be 5.0.

Save Settings

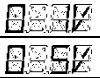
Selects whether the settings are saved (registered) or not.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Save			Save 
Not save			

6.4 Output Setting Mode

Output Type

Selects the output type.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
4 to 20 mA			4 to 20 mA 
0 to 20 mA			
0 to 16 mA			
2 to 10 mA			
0 to 10 mA			
0 to 10 mV			
0 to 100 mV			
0 to 1 V			
0 to 5 V			
1 to 5 V			
0 to 10 V			
-5 to 5 V			

Output Decimal Point Place

Selects the decimal point place when the output is indicated.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
No decimal point			2 digits after decimal point * 
1 digit after decimal point			
2 digits after decimal point			
3 digits after decimal point			

* If the following output is selected in [Output type], the factory default will be "1 digit after decimal point".
0 to 10 mV, 0 to 100 mV, -5 to 5 V

Indication Value at Output 0%

Sets an indication value at the time of output 0%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
-1999 to Indication value at output 100%		Set value	4.00 

Indication Value at Output 100%

Sets an indication value at the time of output 100%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Indication value at output 0% to 9999		Set value	20.00 

Output Normal/Reverse

Selects either Normal mode or Reverse mode for output status.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Normal			Normal 
Reverse			

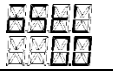
Math Function Value Decimal Point Place

Selects the decimal point place when the math function value is indicated.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
No decimal point			1 digit after decimal point 
1 digit after decimal point			
2 digits after decimal point			
3 digits after decimal point			

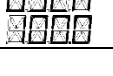
Math Function Value at Output 0%

Sets the math function value (from math function results) at the time of Output 0%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
-1999 to Math function value at Output 100%		Set value	0.0 

Math Function Value at Output 100%

Sets the math function value (from math function results) at the time of Output 100%.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Math function value at Output 0% to 9999		Set value	100.0 

Save Settings

Selects whether the settings are saved (registered) or not.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Save			Save 
Not save			

6.5 Math Function Setting Mode

4 Math Functions

Selects one from the following:
Addition, Subtraction, Multiplication, Division

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Addition	CALC	PLUS	Subtraction CALC MINS
Subtraction		MINS	
Multiplication		MPLY	
Division		DIVD	

Input 1 Coefficient

Sets Input 1 coefficient.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
0.001 to 2.000	ANK1	Set value	1.000 ANK1 1000

Input 2 Coefficient

Sets Input 2 coefficient.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
0.001 to 2.000	ANK2	Set value	1.000 ANK2 1000

Save Settings

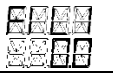
Selects whether the settings are saved (registered) or not.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Save	SAVE	YES	Save SAVE YES
Not save		NO	

6.6 Instrument Setting Mode

Input 1 Filter Time Constant

Sets Input 1 filter time constant.
Input fluctuation due to noise can be decreased.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
0.0 to 10.0 seconds		Set value	0.0 sec 

Input 1 Sensor Correction

Sets Input 1 sensor correction value.
Input value = Current input value + (Sensor correction value)

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
-1000 to 1000*		Set value	0 

* The placement of the decimal point follows the selection.

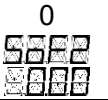
Input 2 Filter Time Constant

Sets Input 2 filter time constant.
Input fluctuation due to noise can be decreased.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
0.0 to 10.0 seconds		Set value	0.0 sec 

Input 2 Sensor Correction

Sets Input 2 sensor correction value.
Input value = Current input value + (Sensor correction value)

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
-1000 to 1000*		Set value	0 

* The placement of the decimal point follows the selection.

Indication Time

Sets duration from no operation until indication (of Multi-Display A, Multi-Display B, and each action indicator) turns off.
They remain lit during setting mode or in the event of an input error or input disconnection.
When set to 00.00, they remain lit.
After indication time has elapsed, if any key is pressed while they are unlit, they will light up again.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
00 : 00 to 60 : 00 (Minutes : Seconds) 00 : 00 ..... Continuous 00 : 01 to 60 : 00... Indication time		Set value	30 : 00 (Minutes : Seconds) 

Auto/Manual

If AUTO is selected, the output value will be output corresponding to the input value.
When MANUAL is selected, the unit can enter Manual mode. The output value set in Manual mode will be output.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Auto			Manual 
Manual			

Manual Mode Auto Return Time

Sets duration from manual mode until the unit automatically returns to Default Display.
If set to 0 (zero), auto return will not occur.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
0 to 60 minutes		Set value	30 minutes 

Save Settings

Selects whether the settings are saved (registered) or not.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Save			Save 
Not save			

6.7 Custom Display Setting Mode

Customizes characters to be indicated on the Multi-Display A and B (*).
Use alphanumeric characters and symbols.

(e.g.) FLOW, TEMP, No.1, No.2

(*) Number of characters which can be indicated differs depending on the display mode.
Refer to Section 5. Display Mode. (pp.13 to 15)

- If Custom display mode 1 is selected:
  Up to 8 characters can be displayed in total for both Multi-Display A and B.
- If any of Custom display mode 2 to 5 is selected:
  Up to 4 characters can be displayed on the Multi-Display B.

Can be set from the thousands digit of the display.
Digits can be selected with the MODE key.

Multi-Display A

Characters for the Multi-Display A can be customized.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
A to Z, 0 to 9, /, –, . , (Blank)		Set value	AAAA 

Multi-Display B

Characters for the Multi-Display B can be customized.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
A to Z, 0 to 9, /, –, . , (Blank)		Set value	AAAA 

Save Settings

Selects whether the settings are saved (registered) or not.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Save			Save 
Not save			

6.8 Manual Mode

If MANUAL is selected in [Auto/Manual] in Instrument setting mode, press the DOWN key for 3 seconds on the Default Display. Then the unit will enter Manual mode.
At this time, Multi-Display A flashes the output value,
The output value can be set by the UP or DOWN key. The output value is lit while setting.
By pressing the MODE key in Manual mode, or after Manual mode auto return time has elapsed, the unit returns to the Default Display, and outputs the value corresponding to the input value.

7. Adjustment

Performs the output zero and span adjustments.
For this instrument, the output adjustment has already been completed when shipped.
If the instrument is used with the ordered Input/Output spec, the adjustment is not required.
However, for calibration, or for the fine adjustment of the SGZ to which any equipment is connected, perform the adjustment.

Connect a current voltage generator to the input terminals of this instrument.
Connect a digital multimeter to the output terminals.

7.1 Basic Operation of Adjustment

For adjustment, use the following trimmers on the front panel.
Output Zero: Adjusts the value of Output Zero.
Output Span: Adjusts the value of Output Span.

7.2 Adjustment

Perform adjustment as follows.

7.2.1 Output Adjustment

The following outlines the procedure for output adjustment.

① Enter the value corresponding to output 0%, and adjust the value using the 'Output Zero' trimmer while viewing the output value (on the digital multimeter).
② Enter the value corresponding to output 100%, and adjust the value using the 'Output Span' trimmer while viewing the output value (on the digital multimeter).
③ Enter the value corresponding to output 0% again, and confirm the output value (on the digital multimeter).
④ If the value corresponding to output 0% is not at 0%, repeat steps ① to ③ again.

8. Operation

8.1 Indication after Power-on

After the power is turned on, the instrument is switched to warm-up status for 3 seconds. Multi-Display A indicates the model name, and Multi-Display B indicates the input code and output code.

(e.g.) SGZ-A01-0-0
Multi-Display A: 
Multi-Display B: 

For the output, a value corresponding to input 0% will be output.

8.2 Operation

After warm-up indication, the unit enters display mode.
The input signal selected in [Input type] will be converted to the output selected in [Output type].

8.2.1 Input Indication Range

The input value is indicated within the following range:

[Input range low limit – (Input span) x 10%] to
[Input range high limit + (Input span) x 10%]

For a value lower than (and including) -2000, the input value and the minus (-) sign will be indicated alternately. For a value higher than (and including) 10000, the lower 4 digits will flash. (The placement of the decimal point follows the selection.)
When the input value exceeds the indication range:  will flash.
When the input value drops below the indication range:  will flash.

8.2.2 Output Indication Range

The output value is indicated within the following range:

[Indication value at output 0% – (Indication value at output 100% – Indication value at output 0%) ×10%] to
[Indication value at output 100% + (Indication value at output 100% – Indication value at output 0%) ×10%]

For a value lower than (and including) -2000, the output value and the minus (-) sign will be indicated alternately. For a value higher than (and including) 10000, the lower 4 digits will flash. (The placement of the decimal point follows the selection.)

8.2.3 Input Disconnection Status

If input is disconnected, the input status will be as follows.

Input Range	Input Status
4 to 20 mA Built-in 50 Ω shunt resistor	Equals 0 mA input.
4 to 20 mA Externally mounted 250 Ω shunt resistor	Equals 0 mA input.
4 to 20 mA Externally mounted 50 Ω shunt resistor	Equals 0 mA input.

Input Range	Input Status
0 to 20 mA	Equals 0 mA input.
0 to 16 mA	Equals 0 mA input.
2 to 10 mA	Equals 0 mA input.
0 to 10 mA	Equals 0 mA input.
1 to 5 mA	Equals 0 mA input.
0 to 1 mA	Equals 0 mA input.
10 to 50 mA	Equals 0 mA input.
0 to 10 mV	Overscale *
0 to 50 mV	Overscale *
0 to 60 mV	Overscale *
0 to 100 mV	Overscale *
0 to 1 V	Overscale *
0 to 5 V	Equals 0 V input.
1 to 5 V	Equals 0 V input.
-5 to 5 V	Equals 0 V input.
0 to 10 V	Equals 0 V input.
-10 to 10 V	Equals 0 V input.

* For the overscale status, the Alarm indicator lights up, and  will flash as an input value.

8.2.4 Indication Time Setting

After preset indication time has elapsed, Multi-Display A, Multi-Display B and each action indicator are turned OFF.
They will light up again if any key is pressed.
They remain lit during setting mode, or in the event of an input error or input disconnection.
If the indication time is set to 00:00, they will remain lit.

8.2.5 Four Math Functions

Input 1 and Input 2 are calculated using 4 math functions, and produce an output value.
However, sensor correction value is added to both Input 1 and Input 2.

■ **Adder**

If Addition is selected in [4 math functions], the sum of the Inputs (Input 1 + Input 2) will be output. Refer to the addition equation below.

Output value = Input 1 value x K_1 + Input 2 value x K_2
K_1 : Input 1 coefficient 0.001 to 2.000
K_2 : Input 2 coefficient 0.001 to 2.000

- Input 1 value, Input 2 value: 0.0 to 100.0%
- Even if the output value results are below -10.0%, the output value is forcibly limited to -10.0%.
  Even if the output value results are above 110%, the output value is forcibly limited to 110.0%.

■ **Subtractor**

If Subtraction is selected in [4 math functions], the difference of the inputs (Input 1 – Input 2) will be output. Refer to the subtraction equation below.

Output value = Input 1 value x K_1 – Input 2 value x K_2
K_1 : Input 1 coefficient 0.001 to 2.000
K_2 : Input 2 coefficient 0.001 to 2.000

- Input 1 value, Input 2 value: 0.0 to 100.0%
- Even if the output value results are below -10.0%, the output value is forcibly limited to -10.0%.
  Even if the output value results are above 110%, the output value is forcibly limited to 110.0%.

■ **Multiplier**

If Multiplication is selected in [4 math functions], the product of the inputs (Input 1 x Input 2) will be output. Refer to the multiplication equation below.

Output value = Input 1 value x K_1 x Input 2 value x K_2
K_1 : Input 1 coefficient 0.001 to 2.000
K_2 : Input 2 coefficient 0.001 to 2.000

- Input 1 value, Input 2 value: 0.0 to 100.0%
- Even if the output value results are below -10.0%, the output value is forcibly limited to -10.0%.
  Even if the output value results are above 110%, the output value is forcibly limited to 110.0%.

■ **Divider**

If Division is selected in [4 math functions], the quotient of the inputs (Input 1 / Input 2) will be output. Refer to the division equation below.

Output value = (Input 1 value x K_1) / (Input 2 value x K_2)
K_1 : Input 1 coefficient 0.001 to 2.000
K_2 : Input 2 coefficient 0.001 to 2.000

- Input 1 value, Input 2 value: 0.0 to 100.0%
- Even if the output value results are below -10.0%, the output value is forcibly limited to -10.0%.
  Even if the output value results are above 110%, the output value is forcibly limited to 110.0%.

9. Specifications

Input 1 Specifications

Direct current input

Input Range	Shunt Resistor	Indication Resolution
4 to 20 mA DC	50 Ω*	1
	250 Ω	1
	50 Ω	1
0 to 20 mA DC	250 Ω	1
0 to 16 mA DC	62.5 Ω	1
2 to 10 mA DC	250 Ω	1
0 to 10 mA DC	100 Ω	1
1 to 5 mA DC	100 Ω	1
0 to 1 mA DC	1000 Ω	1
10 to 50 mA DC	10 Ω	1

* Built-in shunt resistor

DC voltage input

Input Range	Input Resistance	Indication Resolution
0 to 10 mV	1 MΩ	1
0 to 50 mV		1
0 to 60 mV		1
0 to 100 mV		1
0 to 1 V		1
0 to 5 V		1
1 to 5 V		1
-5 to 5 V		1
0 to 10 V		1
-10 to 10 V		1

Input 2 Specifications

Same as Input 1 Specifications.

Output Specifications

Direct current

Output Range	Allowable Load Resistance	Zero Adjustment Range	Span Adjustment Range
4 to 20 mA	750 Ω max.	-5 to 5%	95 to 105%
0 to 20 mA*	750 Ω max.		
0 to 16 mA*	900 Ω max.		
2 to 10 mA	1500 Ω max.		
0 to 10 mA*	1500 Ω max.		

* 0 mA or less: Out of base accuracy

DC voltage

Output Range	Allowable Load Resistance	Zero Adjustment Range	Span Adjustment Range
0 to 10 mV*	10 kΩ min.	-5 to 5%	95 to 105%
0 to 100 mV*	100 kΩ min.		
0 to 1 V*	1000 Ω min.		
0 to 5 V*	5000 Ω min.		
1 to 5 V	5000 Ω min.		
0 to 10 V*	10 kΩ min.		
-5 to 5 V	10 kΩ min.		

* 0 V or less: Out of base accuracy

Performance

Base accuracy (at 25°C)	±0.1% of each input span Adder: If K_1 or K_2 exceeds 1.00: ±0.4% of each input span Subtractor: If K_1 or K_2 exceeds 1.00: ±0.4% of each input span Multiplier: If K_1 x K_2 exceeds 1.00: ±0.4% of each input span Divider: $K_1 \div K_2 \leqq 1.00$: ±1.0% of each input span $K_1 \div K_2 > 1.00$: ±2.0% of each input span
Temperature coefficient	±0.015 %/°C 0 to 10 mV output: ±0.02 %/°C
Response time	500 ms max. (0→90%)
Indication update cycle	125 ms
Indication accuracy	Base accuracy±1 digit
Insulation resistance	100 MΩ minimum, at 500 V DC
Dielectric strength	2.0 kV AC for 1 minute

General Structure

Dimensions	22.5 x 89 x 70 mm (W x H x D)
Weight	Approx. 76 g
Mounting	DIN rail
Case	Flame-resistant resin, Color: Black
Front panel	Polycarbonate

Installation Specifications

Power supply	100 to 240 V AC 50/60 Hz
Allowable voltage range	85 to 264 V AC
Power consumption	Approx. 9 VA max.
Ambient temperature	-10 to 55°C (Non-condensing, no icing))
Ambient humidity	35 to 85 %RH (Non-condensing)

Standard 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 occurs, the instrument is switched to warm-up status, turning all outputs OFF.

10. Troubleshooting

10.1 Indication

Problem	Possible Cause	Solution
Multi-Display A or B flashes ▒▒▒▒ or ▒▒▒▒ when it indicates an input value.	The sensor may be disconnected.	Replace with a new sensor.
	Check whether the sensor is securely mounted to the input terminals of this instrument.	Connect the sensor terminals to the instrument input terminals securely.
	Check the input signal source.	Ensure that the input signal source works normally.
Multi-Display A or B is irregular or unstable when it indicates an input value.	Check whether sensor input is correct.	Select the same sensor type as that of currently used sensor.
	Sensor correction value is unsuitable.	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 instrument.	Keep the instrument clear of any potentially disruptive equipment.
Displays and indicators are unlit. If any key is pressed, they will light up.	The Indication Time (p.26) is set to any value other than 00 : 00. (Factory default is 30 : 00.)	To indicate continuously, set the Indication Time (p.26) to “00 : 00”.

10.2 Key Operation

Problem	Possible Cause	Solution
If the DISP key is pressed, Multi-Display A shows ▒▒▒▒, and it is not possible to switch the display modes.	The DISP key is in locked status.	Press the DISP key for approx. 3 seconds to release the key lock.

10.3 Operation

Problem	Possible Cause	Solution
When Multi-Display A or B indicates an input value, the input value does not change.	The sensor may be out of order.	Replace with the new 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 of the instrument.
	Check whether the wiring of input and output are correct.	Wire them correctly.
No output	Selections in [Output type (p.21)] or [Output Nomal/ Reverse (p.22)] may be incorrect.	Make a correct selection in [Output type (p.21)] or [Output Normal/Reverse (p.22)].

11. Character Table

Please use the following factory default values for your reference.

Display mode

Setting Item	Multi-Display A	Multi-Display B	Data
Default display mode	Follows currently indicated display mode.		
RUN display mode 1	Input 1 value	Output value	
RUN display mode 2	Input 2 value	Output value	
RUN display mode 3	Input 1 value	Input 2 value	
RUN display mode 4	Input 1 value	Unlit	
RUN display mode 5	Input 2 value	Unlit	
RUN display mode 6	Unlit	Output value	
RUN display mode 7	Input math function value	Output value	
Custom display mode 1			
Custom display mode 2	Input 1 value		
Custom display mode 3	Input 2 value		
Custom display mode 4	Output value		
Custom display mode 5	Input math function value		
Unlit display mode	Unlit (Input indicator A lit)	Unlit	
All unlit display mode	Unlit	Unlit	
Model display mode	Model	Input, Output codes	

Setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Input 1 setting mode		Unlit	
Input 2 setting mode		Unlit	
Output setting mode		Unlit	
Math function setting mode		Unlit	
Instrument setting mode		Unlit	
Custom display setting mode		Unlit	

Input 1 setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Input type			
Input 1 decimal point place			
Output 0% value			
Output 100% value			
Indication unit			
Save settings			

Input 2 setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Input 2 decimal point place			
Output 0% value			
Output 100% value			
Save settings			

Output setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Output type			
Output decimal point place			
Indication value at output 0%			
Indication value at output 100%			
Output status Normal/Reverse			
Math function value decimal point place			
Math function value at output 0%			
Math function value at output 100%			
Save settings			

Math function setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
4 math functions			
Input 1 coefficient			
Input 2 coefficient			
Save settings			

Instrument setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Input 1 filter time constant			
Input 1 sensor correction			
input 2 filter time constant			
Input 2 sensor correction			
Indication time			
Auto/Manual			
Manual mode auto return time			
Save settings			

Custom display setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Multi-Display A			
Multi-Display B			
Save settings			

***** Inquiries *****

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

[Example]

- Model ---------- SGZ-A01-0-0
- Serial number ---------- 154F05000

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

SHINKO TECHNOS CO., LTD.

OVERSEAS DIVISION

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