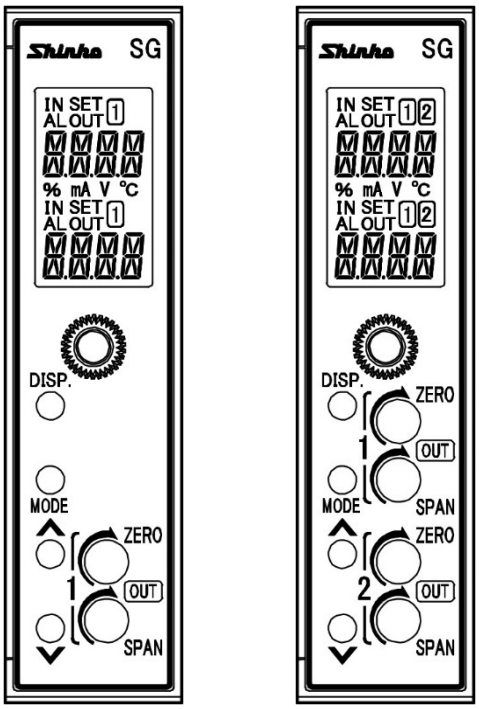
THERMOCOUPLE TRANSMITTER

SGT
SGTW
SGTL

INSTRUCTION MANUAL



Shinko

Preface

Thank you for purchasing our SGT, SGTW or SGTL, Thermocouple Transmitter. This manual contains instructions for the mounting, functions, operations and notes when operating the SGT, SGTW or SGTL. 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 or 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.
- Use a thermocouple and compensating lead wire according to the sensor input specifications of this instrument.
- Keep the input/output wires and power line 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).]

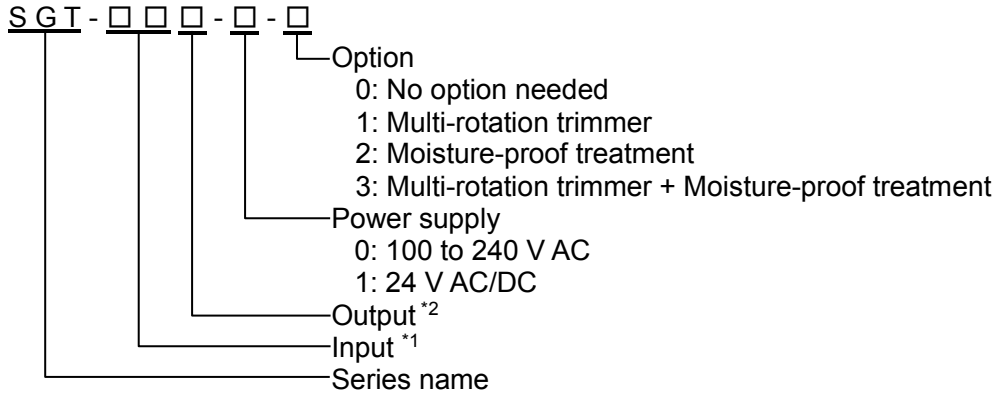
Indication	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Number, ℃/℉	-1	0	1	2	3	4	5	6	7	8	9	°C	°F
Indication	A	b	C	d	E	F	G	H	I	J	K	L	M
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Indication	N	o	P	Q	R	S	T	U	V	W	X	Y	Z
Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Contents

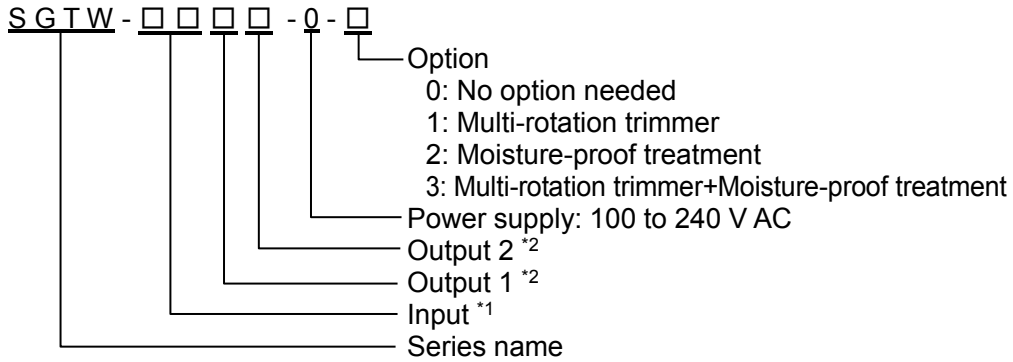
1. Model

1.1 Model

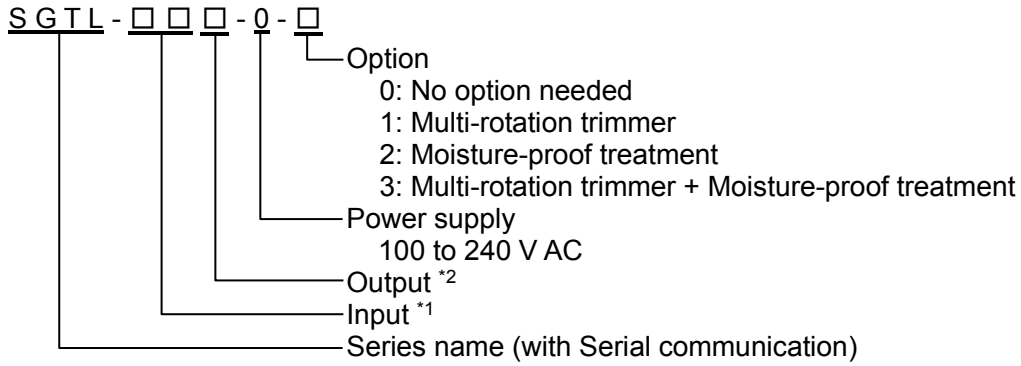
SGT



SGTW



SGTL



***1: Input**

Code	Input Type	
K0	K thermocouple	-200 to 1370 °C (-328 to 2498 °F)
K1		-200 to 200 °C (-328 to 392 °F)
K2		0 to 400 °C (32 to 752 °F)
J0	J thermocouple	-200 to 1000 °C (-328 to 1832 °F)
J1		-200 to 200 °C (-328 to 392 °F)
J2		0 to 400 °C (32 to 752 °F)
R	R thermocouple	-50 to 1760 °C (-58 to 3200 °F)
S	S thermocouple	-50 to 1760 °C (-58 to 3200 °F)
B	B thermocouple	0 to 1820 °C (32 to 3308 °F)
E	E thermocouple	-200 to 800 °C (-328 to 1472 °F)
T0	T thermocouple	-200 to 400 °C (-328 to 752 °F)
T1		-100 to 100 °C (-148 to 212 °F)
N	N thermocouple	-200 to 1300 °C (-328 to 2372 °F)
PL	PL-Ⅱ thermocouple	0 to 1390 °C (32 to 2534 °F)
W5	W5Re/W26Re thermocouple	0 to 2315 °C (32 to 4199 °F)
W3	W3Re/W25Re thermocouple	0 to 2315 °C (32 to 4199 °F)

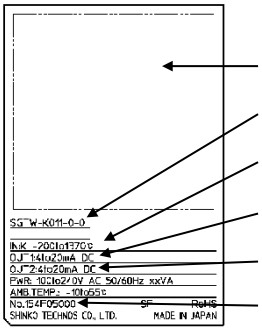
***2: Output, Output 1, Output 2**

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*

* Not available for SGTW.

1.2 How to Read the Model Label

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



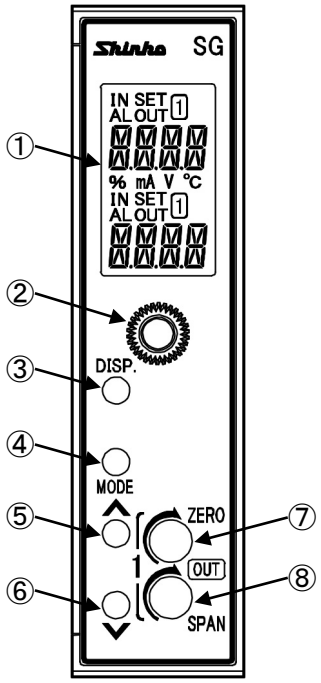
Terminal arrangement
Model (e.g. SGTW-K011-0-0)
Input (Enter a type selected in [Input type].)
Output 1 (Enter a type selected in [Output 1 type].)
Output 2 (Enter a type selected in [Output 2 type].)
Serial number

(Fig. 1.2-1)

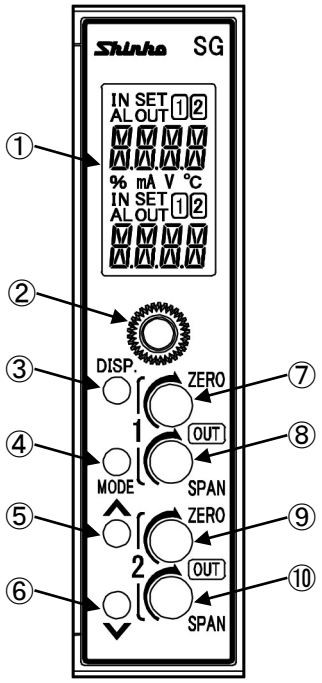
2. Name and Functions

2.1 Front Panel

SGT, SGTL



SGTW



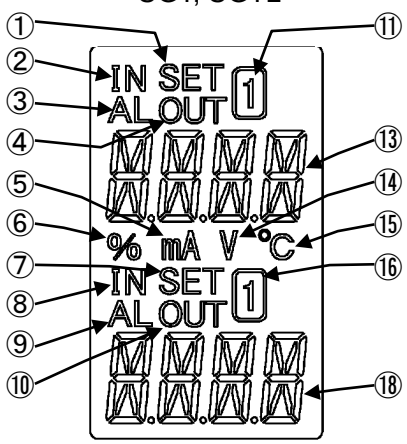
(Fig. 2.1-1)

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. In Manual mode, Output 1 and Output 2 setting can be switched. Releases the lock status of the DISP key by pressing for 3 seconds.
④	**MODE key**	Selects either a setting mode or a display mode. Shifts the digit for the Custom display. Enters the 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 changed alternately when Default Display is RUN display mode 1, 2*, 3, 4*, 5 and 6*.
⑥	**DOWN key**	Decreases the numerical value. Enters Manual mode by pressing for 3 seconds.
⑦	**Output 1 Zero**	Adjusts the value of Output 1 Zero.
⑧	**Output 1 Span**	Adjusts the value of Output 1 Span.
⑨	**Output 2 Zero***	Adjusts the value of Output 2 Zero.
⑩	**Output 2 Span***	Adjusts the value of Output 2 Span.

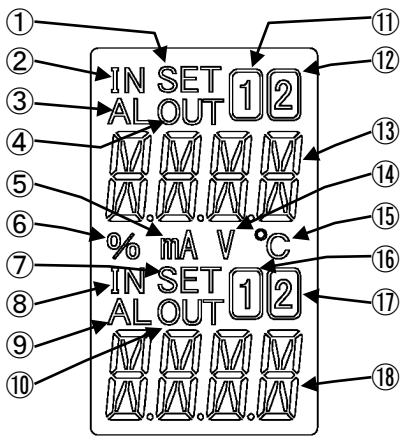
* Only for the SGTW.

2.2 Display Section

SGT, SGTL



SGTW



(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.
③	**Alarm indicator A**	Lights up if an input error or input burnout 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 when % is selected in [Indication unit].
⑦	**Setting display indicator B**	Lights up for the setting display. For the SGTW, lights up for the setting display or in Manual mode.
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 burnout 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 when Multi-Display A indicates an input value, Output 1 value, Input setting display or Output 1 setting display. Is turned OFF when Multi-Display A indicates custom characters.
⑫	**2 indicator A**	Lights up when Multi-Display A indicates Output 2 value or Output 2 setting display. Is turned OFF when Multi-Display A indicates custom characters.
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 an input value, Output 1 value, Input setting display or Output 1 setting display. Is turned OFF when Multi-Display B indicates custom characters.
⑰	**2 indicator B**	Lights up when Multi-Display B indicates Output 2 value or Output 2 setting display. Is turned OFF when Multi-Display B indicates custom characters.

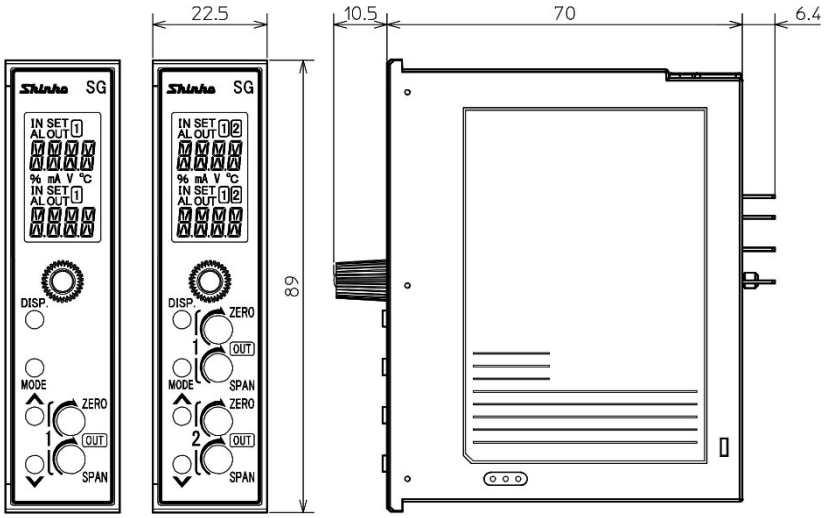
⑱	**Multi-Display B**	Indicates the following in accordance with the display indication: Input value, output value, custom characters, setting value

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

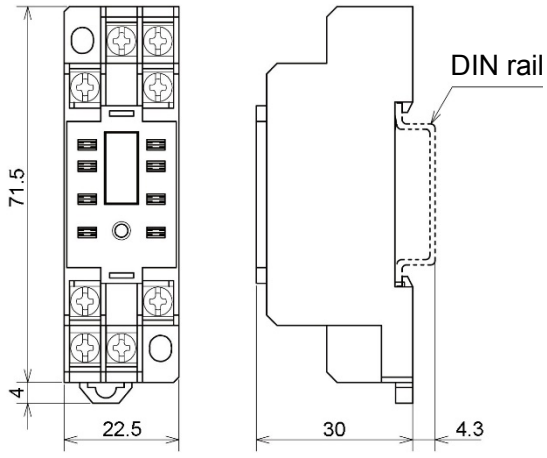
Other indicators: White

3. Mounting

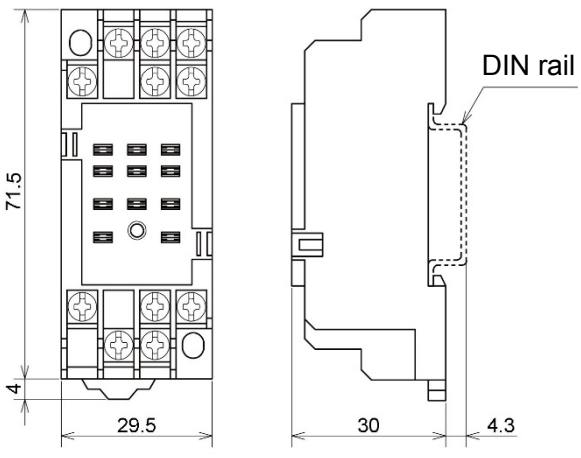
3.1 External Dimensions (Scale: mm)



8P socket (SGT, SGTL)



11P socket (SGTW)



(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 SGT into the socket.

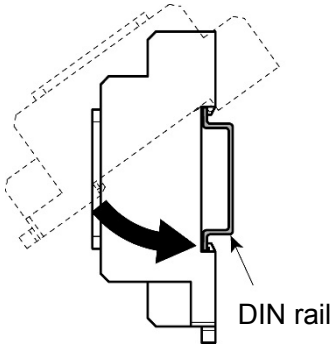
④ Fasten the mounting screw by turning it clockwise, to secure the SGT onto the socket. Tighten the screw lightly.

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

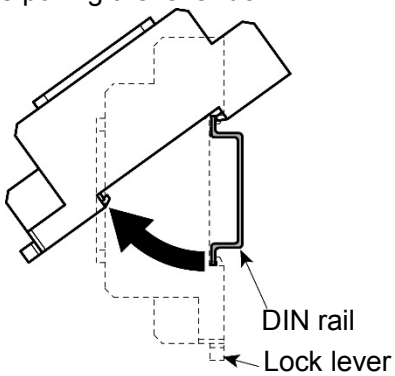
① Turn the power to the instrument OFF.

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

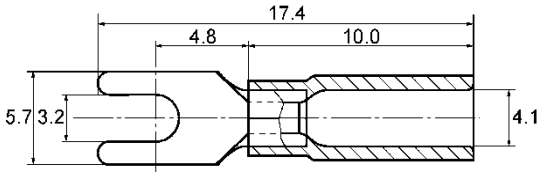
Turn the power supply to the instrument off before wiring or checking. Working on or touching the terminal with the power switched on may result in severe injury or death due to electrical shock.

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.**

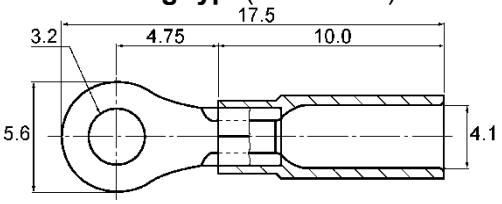
Solderless Terminal	Manufacturer	Model
Y-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25Y-3
	Japan Solderless Terminal MFG Co., Ltd.	VD1.25-B3A
Ring-type	Nichifu Terminal Industries Co., Ltd.	TMEV1.25-3
	Japan Solderless Terminal MFG Co., Ltd.	V1.25-3

Y-type(Scale: mm)



(Fig. 4.1-1)

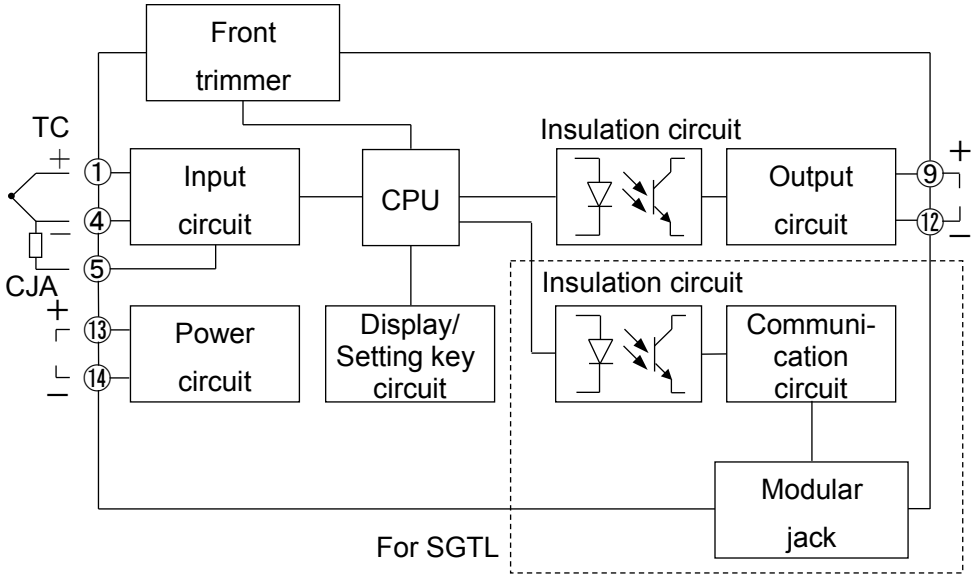
Ring-type(Scale: mm)



(Fig. 4.1-2)

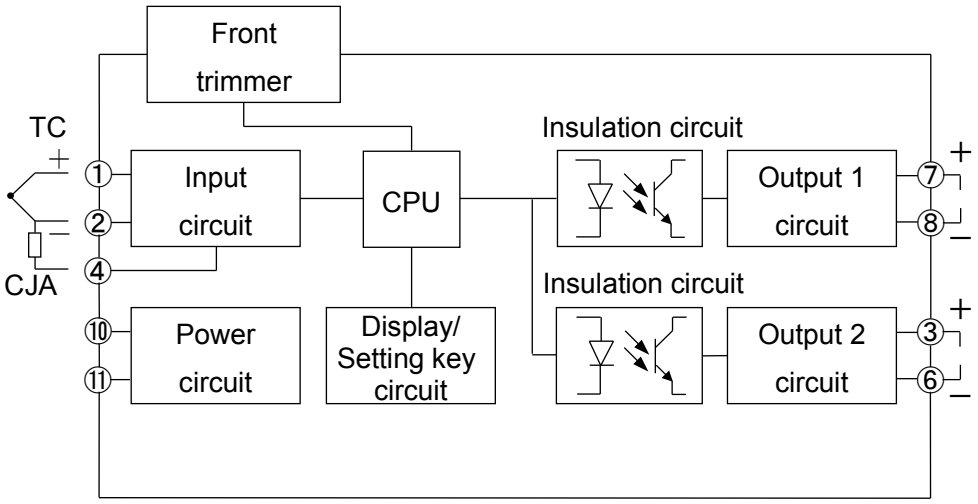
4.2 Circuit Configuration

SGT, SGTL



(Fig. 4.2-1)

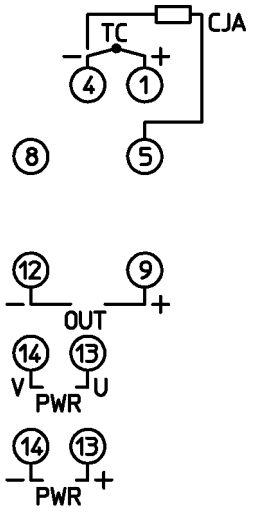
SGTW


Front
trimmer
TC
+
−
CJA
①
②
④
⑩
⑪
Input
circuit
CPU
Power
circuit
Display/
Setting key
circuit
Insulation circuit
Insulation circuit
Output 1
circuit
Output 2
circuit
⑦
⑧
③
⑥
+
−
+
−

(Fig. 4.2-2)

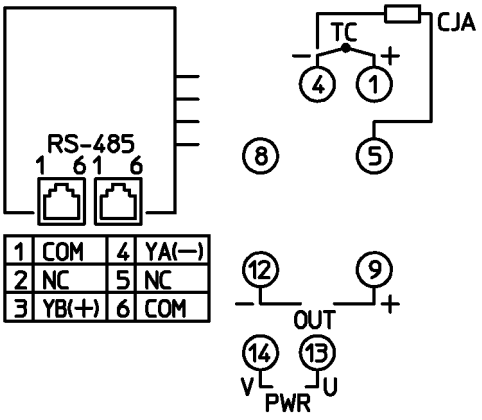
4.3 Terminal Arrangement

SGT



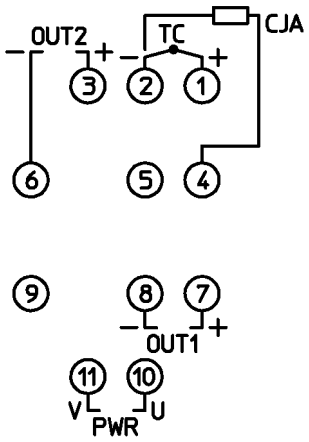
(Fig. 4.3-1)

SGTL



(Fig. 4.3-2)

SGTW



(Fig. 4.3-3)

PWR	Power supply 100 to 240 V AC or 24 V AC/DC (for SGT)
OUT (OUT1)	Output or Output 1 (for SGTW)
OUT2	Output 2 (for SGTW)
TC	Thermocouple input
CJA	Cold junction compensator input
RS-485	Serial communication (for SGTL)

4.4 Wiring

⚠ Warning

- For 100 to 240 V AC, if the AC power source is connected to incorrect terminals, the instrument will be burnt out.

(1) Power Source Wiring

SGT: Use terminals ⑬, ⑭ for the power supply to the instrument.
For 24 V DC, use terminals ⑬(+), ⑭(-) for the power supply to the instrument.

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

SGTW: Use terminals ⑩, ⑪ for the power supply to the instrument.

(2) Output Wiring

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

SGTW: Output 1: Use terminals ⑦(+), ⑧(-) for Output 1 wiring.
Output 2: Use terminals ③(+), ⑥(-) for Output 2 wiring.

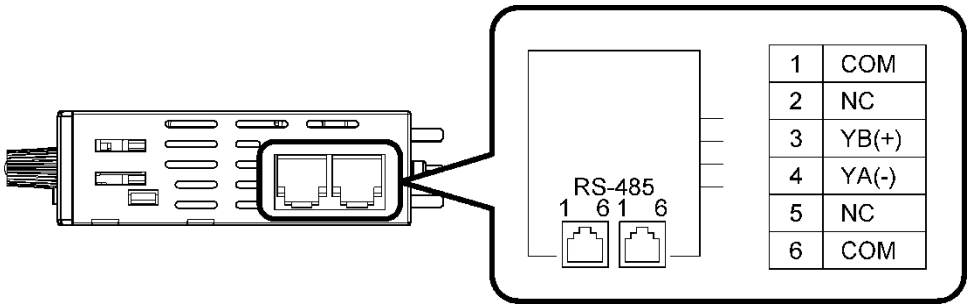
(3) Input Wiring

SGT, SGTL: Use terminals ①, ④, ⑤ for Input wiring.
Connect the CJA (Cold junction compensator) between terminals ④ and ⑤.

SGTW: Use terminals ①, ②, ④ for Input wiring.
Connect the CJA (Cold junction compensator) between terminals ② and ④.

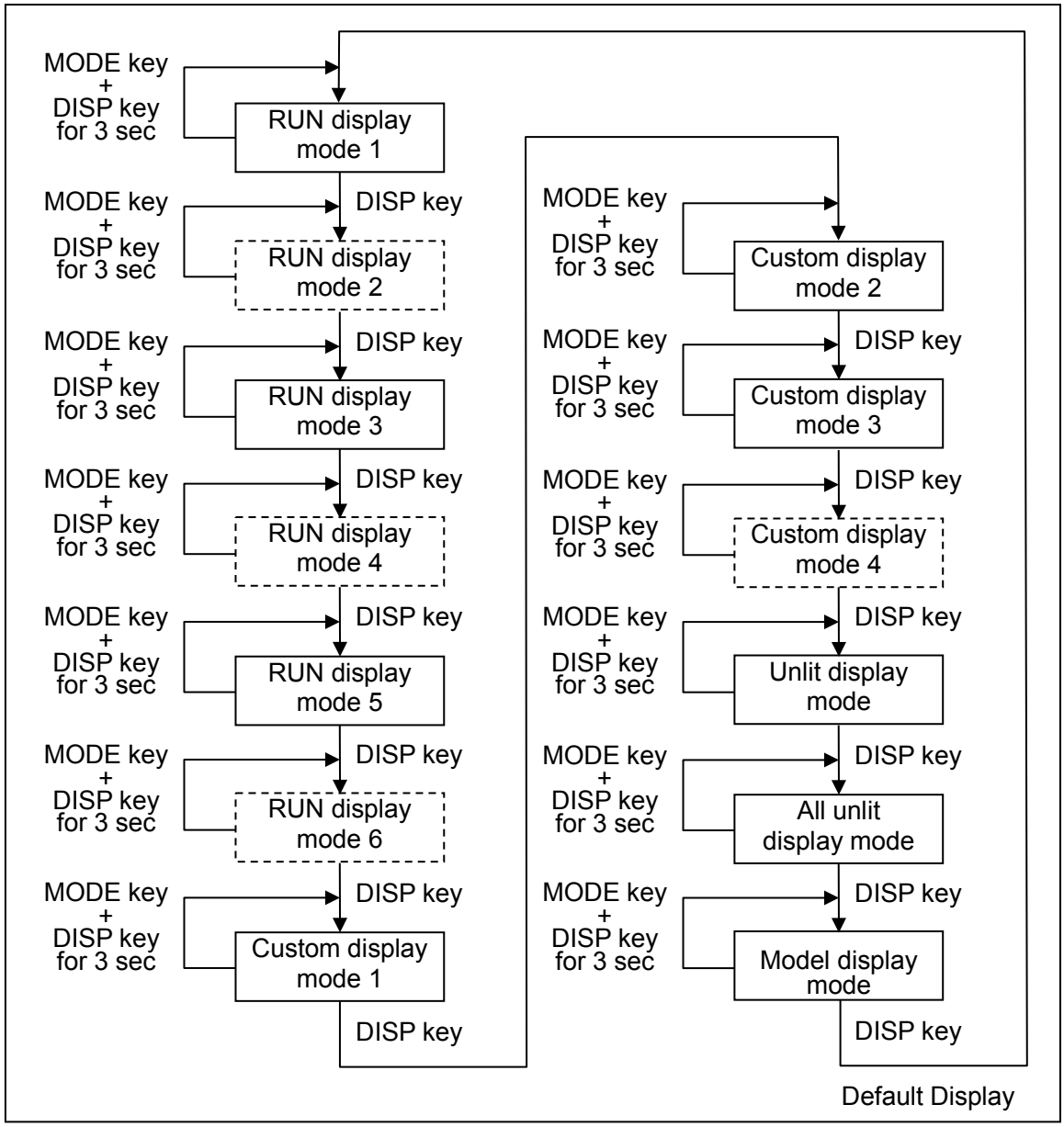
(4) Communication Wiring

For the SGTL, connect the SGTL to SGTL using the provided cable.



(Fig. 4.4-1)

5. Display Mode



- Available only for the SGTW.

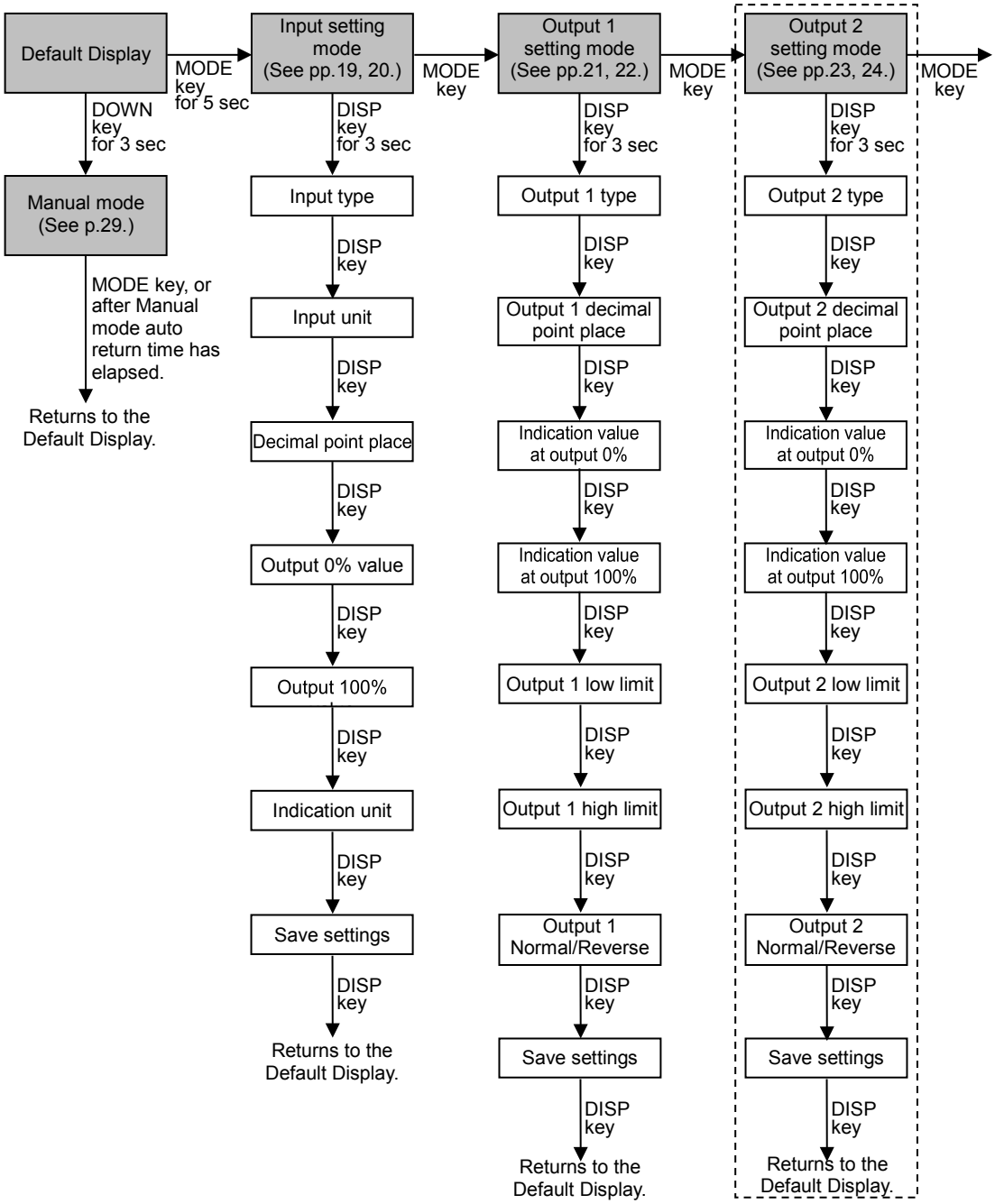
Default Display: If the MODE and DISP key (in that order) are pressed together for approx. 3 seconds in any display mode, the display mode will become the Default Display.
Once the Default Display is set, the DISP key will be in lock status.
If the DISP key is pressed for approx. 3 seconds on the Default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

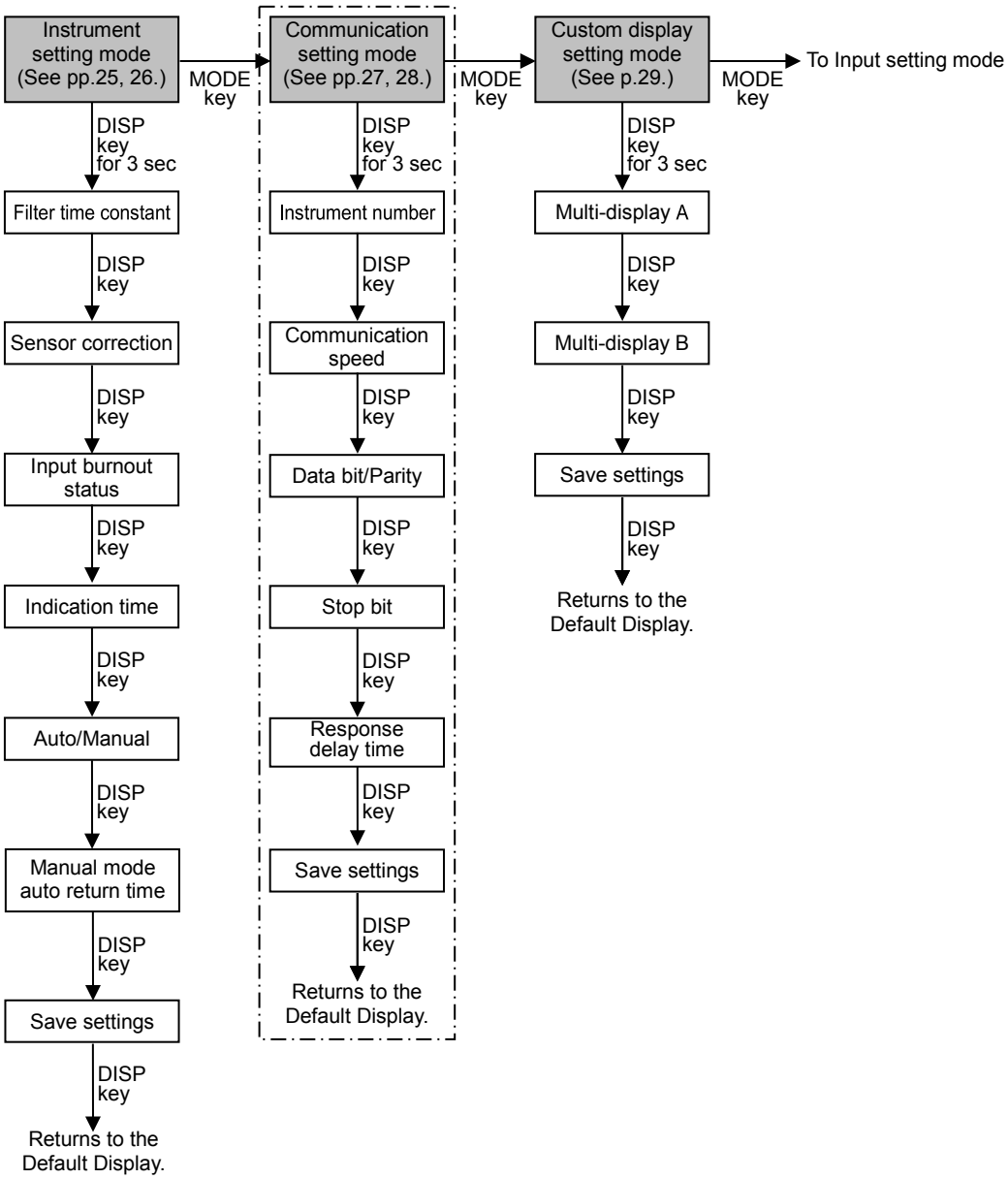
RUN display mode 1:	Multi-Display A indicates the input value, and Multi-Display B indicates Output 1 value.
RUN display mode 2:	Multi-Display A indicates the input value, and Multi-Display B indicates Output 2 value.
RUN display mode 3:	Multi-Display A indicates the input value, and Multi-Display B is unlit.
RUN display mode 4:	Multi-Display A indicates Output 1 value, and Multi-Display B indicates Output 2 value.
RUN display mode 5:	Multi-Display A is unlit, and Multi-Display B indicates Output 1 value.
RUN display mode 6:	Multi-Display A is unlit, and Multi-Display B indicates Output 2 value.
Custom display mode 1:	Multi-Display A indicates characters set in [Multi-Display A]. Multi-Display B indicates characters set in [Multi-Display B].
Custom display mode 2:	Multi-Display A indicates the input value, and Multi-Display B indicates characters set in [Multi-Display B].
Custom display mode 3:	Multi-Display A indicates Output 1 value, and Multi-Display B indicates characters set in [Multi-Display B].
Custom display mode 4:	Multi-Display A indicates Output 2 value, and Multi-Display B indicates characters set in [Multi-Display B].
Unlit display mode:	Multi-Display A and B are unlit, and the Input indicator A lights up. Alarm indicator A and B light up if they are 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.

6. Setting Mode

6.1 Display Transition in Setting Mode

- ┌ ─ ─ ┐ : Available only for the SGTW.
- ┌ ─ ─ ┐ : Available only for the SGTL.
- 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.




Instrument setting mode (See pp.25, 26.)
MODE key
Communication setting mode (See pp.27, 28.)
MODE key
Custom display setting mode (See p.29.)
MODE key
To Input setting mode
DISP key for 3 sec
Filter time constant
DISP key
Sensor correction
DISP key
Input burnout status
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
Instrument number
DISP key
Communication speed
DISP key
Data bit/Parity
DISP key
Stop bit
DISP key
Response delay 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 Setting Mode

Input Type

Selects an input type.

Setting Range		Indication		Factory Default
		Multi-Display A	Multi-Display B	
K	-200 to 1370 °C	SENS	K	K -200 to 1370°C SENS K
K	-200 to 200 °C *1,*2		K2	
K	0 to 400 °C *1		K4	
J	-200 to 1000 °C		J	
J	-200 to 200 °C *1,*2		J2	
J	0 to 400 °C *1		J4	
R	-50 to 1760 °C		R	
S	-50 to 1760 °C		S	
B	0 to 1820 °C		b	
E	-200 to 800 °C		E	
T	-200 to 400 °C		t	
T	-100 to 100 °C *1		t1	
N	-200 to 1300 °C		N	
PL-Ⅱ	0 to 1300 °C		PL2	
W5Re/W26Re	0 to 2315 °C		W5	
W3Re/W25Re	0 to 2315 °C		W3	

*1: 'No decimal point' and '1 digit after decimal point' can be selected in [Decimal point place].

*2: If '1 digit after decimal point' is selected in [Decimal point place], the input low limit value is -199.9.

Input Unit

Selects an input temperature unit °C or °F.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
°C	UNSL	C	°C UNSL C
°F		F	

Decimal Point Place

Selects the decimal point place.

For the following inputs, 'No decimal point' or '1 digit after decimal point' can be selected.

[K -200 to 200 °C], [K 0 to 400 °C], [J -200 to 200 °C], [J 0 to 400 °C], [T -100 to 100 °C]

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

Output 0% Value

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

Values change in accordance with the input unit.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Low limit of each input type to Output 100% value		Set value	-200 

Output 100% Value

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

Values change in accordance with the input unit.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Output 0% value to High limit of each input type		Set value	1370 

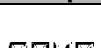
Indication Unit

Selects the unit for indication.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
No unit			No unit 
%			
mA			
V			
°C			

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			

6.3 Output 1 Setting Mode

Output 1 Type

Selects an output 1 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 *			

* Not available for the SGTW.

Output 1 Decimal Point Place

Selects the decimal point place for Output 1.

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			

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 9999		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	
-1999 to 9999		Set value	20.00 

Output 1 Low Limit

Sets Output 1 low limit value.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
-10.0 to Output 1 high limit		Set value	-10.0% 

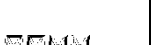
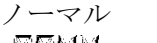
Output 1 High Limit

Sets Output 1 high limit value.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Output 1 low limit to 110.0		Set value	110.0%  

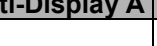
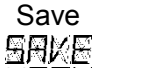
Output 1 Normal/Reverse

Selects either Normal mode or Reverse mode for Output 1 status.

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

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 2 Setting Mode

Available only for the SGTW.

Output 2 Type

Selects an 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			

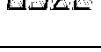
Output 2 Decimal Point Place

Selects the decimal point place for Output 2.

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			

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 9999		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	
-1999 to 9999		Set value	20.00  

Output 2 Low Limit

Sets Output 2 low limit value.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
-10.0 to Output 2 high limit		Set value	-10.0% 

Output 2 High Limit

Sets Output 2 high limit value.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Output 2 low limit to 110.0		Set value	110.0% 

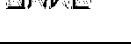
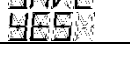
Output 2 Normal/Reverse

Selects either Normal mode or Reverse mode for Output 2 status.

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

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 Instrument Setting Mode

Filter Time Constant

Sets the input 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	FILE	Set value	0.0 sec FILE 0.0

Sensor Correction

Sets 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*	SOFS	Set value	0 SOFS 0

* The placement of the decimal point follows the selection.

Input burnout Status

Selects either overscale or underscale when input is burnt out.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
Overscale	BURN	UP	Overscale BURN UP
Underscale		DOWN	

Indication Time

Sets duration from no operation until indication (of Multi-Display A, Multi-Display B, and each action indicator) turns off.
When set to 00.00, they remain lit.
After indication time has elapsed, and 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	LIME	Set value	30 : 00 (Minutes : Seconds) LIME 30.0

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	MAR5	AUEб	Manual MAR5 MANU
Manual		MANU	

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	MбAE	Set value	30 minutes MбAE 030

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		NбN	

6.6 Communication Setting Mode

Available only for the communication specifications.

Instrument Number

Sets the instrument number.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
1 to 247		Set value	1 

Communication Speed

Selects the communication speed.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
9600 bps			38400 bps 
19200 bps			
38400 bps			

Data bit/Parity

Selects data bit and parity.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
8 bits/No parity			8 bits/Odd 
8 bits/Even			
8 bits/Odd			

Stop Bit

Selects stop bit.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
1 bit			1 bit 
2 bits			

Response Delay Time

Response from the instrument can be delayed after receiving command from the host computer.

Setting Range	Indication		Factory Default
	Multi-Display A	Multi-Display B	
0 to 1000 ms		Set value	10 ms 

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	

6.7 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.15, 16).

- 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 4 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)	USER	Set value	AAAA USER 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)	USRb	Set value	AAAA USRb 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	YES	Save SAVE YES
Not save		NO	

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 indicates Output 1 value, and Multi-Display B indicates Output 2 value.
The output value can be set by the UP or DOWN key. The output value is lit while setting.
Pressing the DISP key switches the output to be set. The output to be set flashes.
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 SGT to which any equipment is connected, perform the adjustment.

Connect an mV generator or Dial resistor 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 1 Zero: Adjusts the value of Output 1 Zero.
Output 1 Span: Adjusts the value of Output 1 Span.
Output 2 Zero: Adjusts the value of Output 2 Zero. (only for SGTW)
Output 2 Span: Adjusts the value of Output 2 Span. (only for SGTW)

7.2 Adjustment

All adjustment items are shown below.
Perform adjustment as follows.

7.2.1 Output 1 Adjustment

The following outlines the procedure for Output 1 adjustment.

① Enter the value corresponding to output 0%, and adjust the value using the 'Output 1 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 1 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.

7.2.2 Output 2 Adjustment

The procedure for Output 2 adjustment is the same as that of Output 1 adjustment.
Use Output 2 Zero and Span trimmers for adjustment.

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 a model name, and Multi-Display B indicates the input code and output code.

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

A value corresponding to input 0% will be output for Output 1 and Output 2.

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 1 type] and [Output 2 type].

8.2.1 Input Indication Range

The measured value is indicated within the following range:

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

However, if a range with a decimal point is selected: For a value lower than -200.0, the input value and the minus (-) sign will be indicated alternately.
If the measured value exceeds the indication range:  will flash.
If the measured value drops below the indication range:  will flash.

8.2.2 Indication Range of Output 1 and Output 2

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%]

However, the high limit value is 9999, and the low limit value is -1999.
(The placement of the decimal point follows the selection.)

8.2.3 Input Burnout Status

Overscale or underscale can be selected in the event of thermocouple input burnout.
If overscale is selected, the output is forcibly limited to 110%.
If underscale is selected, the output is forcibly limited to 0%.
When overscale is selected: If input is burnt out, the Alarm indicator will light up, and  will flash.
When underscale is selected: If input is burnt out, the Alarm indicator will light up, and  will flash.

8.2.4 Indication Time Setting

After the duration set in [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 burnout.
If the indication time is set to 00:00, they remain lit.

9. Specifications

Input Specifications

Thermocouple input

K, J, R, S, B, E, T, N, PL-Ⅱ, W5Re/W26Re, W3Re/W25Re
External resistance: 100 Ω max.
(However, thermocouple B: 40 Ω max.)

Input:

Thermocouple	Input Range *1	Indication Resolution
K	-200 to 1370 °C (-328 to 2498 °F)	1 °C (1 °F)
	-200 to 200 °C*2, *3 (-328 to 392 °F)*2, *3	1 °C (1 °F)*2
	0 to 400 °C*2 (32 to 752 °F)*2	1 °C (1 °F)*2
J	-200 to 1000 °C (-328 to 1832 °F)	1 °C (1 °F)
	-200 to 200 °C*2, *3 (-328 to 392 °F)*2, *3	1 °C (1 °F)*2
	0 to 400 °C*2 (32 to 752 °F)*2	1 °C (1 °F)*2
R	-50 to 1760 °C (-58 to 3200 °F)	1 °C (1 °F)
S	-50 to 1760 °C (-58 to 3200 °F)	1 °C (1 °F)
B	0 to 1820 °C (32 to 3308 °F)	1 °C (1 °F)
E	-200 to 800 °C (-328 to 1472 °F)	1 °C (1 °F)
T	-200 to 400 °C (-328 to 752 °F)	1 °C (1 °F)
	-100 to 100 °C*2 (-148 to 212 °F)*2	1 °C (1 °F)*2
N	-200 to 1300 °C (-328 to 2372 °F)	1 °C (1 °F)
PL-Ⅱ	0 to 1390 °C (32 to 2534 °F)	1 °C (1 °F)
W5Re/W26Re	0 to 2315 °C (32 to 4199 °F)	1 °C (1 °F)
W3Re/W25Re	0 to 2315 °C (32 to 4199 °F)	1 °C (1 °F)

*1: °C or °F can be selected in [Input unit].
*2: 'No decimal point' and '1 digit after decimal point' can be selected.
*3: If '1 digit after decimal point' is selected, the low limit value will be -199.9.

Output 1 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*1	10 kΩ min.	-5 to 5%	95 to 105%
0 to 100 mV*1	100 kΩ min.		
0 to 1 V*1	1000 Ω min.		
0 to 5 V*1	5000 Ω min.		
1 to 5 V	5000 Ω min.		
0 to 10 V*1	10 kΩ min.		
-5 to 5 V*2	10 kΩ min.		

*1: 0 V or less: Out of base accuracy
*2: Not available for the SGTW.

Output 2 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.		

* 0 V or less: Out of base accuracy

Performance

Base accuracy (at 25°C)	±0.1% of each input span Thermocouple input When input is 0°C or less: Base accuracy + ±0.1% of each input span When input has a decimal point: Base accuracy + ±0.05% of each input span R, S input, 0 to 200°C (32 to 392°F): ±0.3% of each input span B input, 0 to 300°C (32 to 572°F): Accuracy is not guaranteed.
Cold junction compensation accuracy	±0.5°C (1.0°F) at 20±10°C
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
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 24 V AC/DC 50/60 Hz
Allowable voltage range	100 to 240 V AC: 85 to 264 V AC 24 V AC/DC: 20 to 28 V AC/DC
Power consumption	100 to 240 V AC: Approx. 9 VA max. (SGTL: Approx. 10 VA max.) 24 V AC: Approx. 6 VA max. 24 V DC: Approx. 3 W max.
Ambient temperature	-10 to 55°C (Non-condensing, no icing)
Ambient humidity	35 to 85 %RH (Non-condensing)

Serial Communication (SGTL)

Operation from an external computer	Reading and setting of various set values Reading of the input value and action status Function change。
Communication line	EIA RS-485
Communication method	Half-duplex communication
Communication speed	9600, 19200, 38400 bps (Selectable by keypad) (Factory default: 38400 bps)
Synchronization method	Start-stop synchronization
Communication protocol	Modbus RTU
Start bit	1 bit
Data bit	8 bits
Parity	Even/Odd/No parity (Selectable by keypad) (Factory default: Odd)
Stop bit	1 bit or 2 bits (Selectable by keypad) (Factory default: 1 bit)
Response delay time	Response from the instrument can be delayed after receiving command from the host computer. 0 to 1000 ms (Factory default: 10 ms)

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.
Automatic cold junction temperature compensation	When thermocouple input is selected, 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 location temperature was at 0℃ (32℉). If the cold junction connected to terminals is burnt out, the Multi-Display A indicates  , and the Multi-Display B is turned OFF. At this time, the instrument status will be the same as the selection in [Input burnout status]. (Either overscale or underscale selected in [Input burnout status] will be indicated.)

10. Troubleshooting

10.1 Indication

Problem	Possible Cause	Solution
Multi-Display A or B flashes [illegible] or [illegible] when it indicates an input value.	The sensor may be burnt out.	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.
	Check if polarity of thermo-couple or compensating lead wire is correct.	Wire them correctly.
Multi-Display A or B is irregular or unstable when it indicates an input value.	Check whether sensor input or unit (°C/°F) is correct.	Select the same sensor type and unit (°C/°F) as those 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.25) is set to any value other than 00 : 00. (Factory default is 30 : 00.)	To indicate continuously, set the Indication Time (p.25) to “00 : 00”.

10.2 Key Operation

Problem	Possible Cause	Solution
If the DISP key is pressed, Multi-Display A shows [illegible], 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 1 type (p.21)], [Output 1 Normal/ Reverse (p.22)], [Output 2 type (p.23)] or [Output 2 Normal/Reverse (p.24)] may be incorrect.	Make a correct selection in [Output 1 type (p.21)], [Output 1 Normal/Reverse (p.22)], [Output 2 type (p.23)] or [Output 2 Normal/Reverse (p.24)].

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 value	Output 1 value	
RUN display mode 2*	Input value	Output 2 value	
RUN display mode 3	Input value	Unlit	
RUN display mode 4*	Output 1 value	Output 2 value	
RUN display mode 5	Unlit	Output 1 value	
RUN display mode 6*	Unlit	Output 2 value	
Custom display mode 1	AAAA	AAAA	
Custom display mode 2	Input value	AAAA	
Custom display mode 3	Output 1 value	AAAA	
Custom display mode 4*	Output 2 value	AAAA	
Model display mode	Model	Input, Output codes	

* Available only for the SGTW.

Setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Input setting mode	INP	Unlit	
Output 1 setting mode	OUT1	Unlit	
Output 2 setting mode *	OUT2	Unlit	
Instrument setting mode	INI	Unlit	
Communication setting mode	COMM	Unlit	
Custom display setting mode	CUST	Unlit	

* Available only for the SGTW.

Input setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Input type	SENS	K	
Input unit	UNIT	C	
Decimal point place	DP	0	
Output 0% value	SCLL	-200	
Output 100% value	SCLH	1800	
Indication unit	UNIT	NONE	
Save settings	SAVE	YES	

Output 1 setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Output 1 type	oUT1	4-20A	
Output 1 decimal point place	dP	0000	
Indication value at output 0%	oSZ1	0400	
Indication value at output 100%	oSS1	2000	
Output 1 low limit	oLL1	-100	
Output 1 high limit	oLH1	1100	
Output 1 Normal/Reverse	oFU1	NoML	
Save settings	SAVE	YES	

Output 2 setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Output 2 type	oUT2	4-20A	
Output 2 decimal point place	dP	0000	
Indication value at output 0%	oSZ2	0400	
Indication value at output 100%	oSS2	2000	
Output 2 low limit	oLL2	-100	
Output 2 high limit	oLH2	1100	
Output 2 Normal/Reverse	oFU2	NoML	
Save settings	SAVE	YES	

Instrument setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Filter time constant	FILE	00	
Sensor correction	SoFS	0	
Input burnout status	bURN	UP	
Indication time	tIME	3000	
Auto/Manual	MAnS	MANU	
Manual mode auto return time	MoFt	30	
Save settings	SAVE	YES	

Communication setting mode (SGTL)

Setting Item	Multi-Display A	Multi-Display B	Data
Instrument number	CMNo	0001	
Communication speed	CMSP	38.4	
Data bit/Parity	CMPt	8odd	
Stop bit	CMSt	0001	
Response delay time	CMdt	10	
Save settings	SAVE	YES	

Custom display setting mode

Setting Item	Multi-Display A	Multi-Display B	Data
Multi-Display A	dSPA	AAAA	
Multi-Display B	dSPb	AAAA	
Save settings	SAVE	YES	

***** 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 ---------- SGT-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.

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