# Instruction Manual

## Detect Relay Model 2512

I-01528

Please take care that this instruction manual is certainly delivered to the person in charge of operating it. For safety and proper use of this product, please observe the following caution and also read the instruction manuals to follow before the initial operation.

**⚠ CAUTION**

**To prevent electric shock, observe the following cautions:**
- **◆ Never make power line connections with active lines.**
- **◆ Ensure firm and tight connections to the terminals.**
- **◆ Do not touch the power source terminals while the instrument is powered on.**

**Do not use the instrument in such places as follows as it may cause break-down or malfunction of the instrument:**
- **◆ exposed to rain, water drops or direct sunlight.**
- **◆ high temperature or humidity, much dust or corrosive gas.**
- **◆ affected by external noise, radio waves or static electricity.**

### ● Check at Delivery

When the product is delivered to you, please check that its specifications conform to your requirement and that there is no damage in transit. This product is carefully inspected before delivery from factory under our strict quality control program, but if you find any defect or inconvenience, please inform us of the model name, serial number etc. of the product.

### ● Cautions for Use

① This product is a precision instrument, so please take utmost care for its transportation, installation or any other handling of it.
② No power on-off switch is provided on this product, so it immediately starts to work when connected to the power source.
③ In case of fear that the noise or surge is frequently generated on the power source line, a noise preventive solution must be taken.
④ Use this product within the range of its specifications and rates.

### ■ Model Name

2512 -□-□-□
1 2 3

### 1 Measuring Input

● DC Input

| Model | Measuring Range | Input Resistance | Over Load |
|---|---|---|---|
| 2512-02 | ±99.99mV | 10kΩ | DC±10V |
| 2512-03 | ±999.9mV | 100kΩ | DC±100V |
| 2512-04 | 0~5V | 500kΩ | DC±250V |
| 2512-05 | ±9.999V | 1MΩ | DC±250V |
| 2512-06 | ±99.99V | 1MΩ | DC±250V |
| 2512-09 | 1~5V | 1MΩ | DC±250V |
| 2512-00 | DC voltage input other than the above. (In between 100mV and 100V) | | |
| 2512-22 | ±99.99μA | 1kΩ | DC±20mA |
| 2512-23 | ±999.9μA | 100Ω | DC±50mA |
| 2512-24 | ±5.000mA | 20Ω | DC±100mA |
| 2512-25 | ±9.999mA | 10Ω | DC±150mA |
| 2512-26 | ±99.99mA | 1Ω | DC±500mA |
| 2512-27 | ±999.9mA | 0.1Ω | DC±2A |
| 2512-29 | 4~20mA | 12.5Ω | DC±150mA |
| 2512-20 | DC current input other than the above. (In between 100μA and 100mA) | | |

Accuracy : ±(0.1% of FS +1 digit)
Defined at 23°C±5°C.
Temperature coefficient : ±150ppm/°C, defined at the operating temperature range 0~50°C.

### 2 Output Signal

| Code | Specifications |
|---|---|
| 1 | Two relay contact output |
| 2 | Four relay contact output |
| 3 | Two open collector output |
| 4 | Four open collector output |

### 3 Power Supply Voltage

| Code | Power Supply Voltage |
|---|---|
| A | AC100~240V |
| B | DC12~24V |
| C | DC110V |

## ■General Specifications

| | | |
|---|---|---|
| Data display | : | 4 digit, character height 5.5mm |
| | | Display range -9999~9999 |
| | | Over-range display When exceed the 130% of the rated input or the display of 9999, ⊔⊔⊔⊔ is displayed. |
| | | Decimal point display Settable from the front panel. |
| | | With zero-suppress function |
| Function No. display | : | 2 digit, character height 5.5mm |
| Display scaling function | : | Full scale display -9999~9999 |
| | | Offset display -9999~9999 |
| Response time | : | 0.15 sec. or less (90% response, when the moving average function is OFF.) |
| A/D conversion | : | Δ-Σ conversion system. |
| Noise rejection rate | : | Normal mode (NMR) 50dB or more |
| | | Common mode (CMR) 110dB or more |
| | | Power source line penetrating noise 1000V |
| Comparator range | : | -9999~9999 Comparison is made to the display. |
| Comparator system | : | 2 points / 4 points independent setting, arbitrary setting for high and low limit, and comparator output OFF. |
| | | CPU comparator judgement system. |
| Comparator condition | : | Equal NG, equal GO, selectable. |
| Hysteresis width | : | 1~999, 2 points / 4 points independent setting. |
| Alarm display | : | Lit up at the alarm output. |
| Output delay | : | On delay, 0~99 sec. (common for 2 points / 4 points). |
| Power on delay | : | 2~99 sec. (common for 2 points / 4 points). |
| | | No alarm is output for two seconds after the power supply is applied. |
| Excitation at alarm | : | Excitation or non-excitation, selectable. (2 points / 4 points independent setting.) |
| Test mode | : | ON/OFF of every alarm output can be checked with switch operation. |
| Insulation Resistance | : | In between Input – Output DC500V 100MΩ or more |
| | | In between Input/Output – Power Source DC500V 100MΩ or more |
| | | Terminals in a lump – Housing DC500V 100MΩ or more |
| Withstanding Voltage | : | In between Input – Output AC2000V for 1 minute |
| | | In between Input/Output – Power Source AC2000V for 1 minute |
| | | Terminals in a lump – Housing AC2000V for 1 minute |

## ■Mechanical Specifications

| | | |
|---|---|---|
| Structure | : | Plug-in type. |
| Connection | : | Connection by M3 threaded terminal. |
| Isolation | : | 3 port isolation (in between input, output and power source is isolated). |
| Setting | : | Program system with front panel switch. |

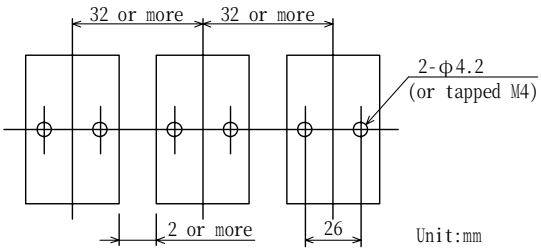
## ■Specifications of Alarm Output

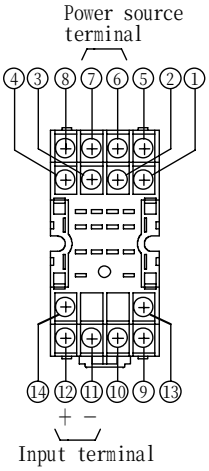
| | | |
|---|---|---|
| Relay contact output | : | "1c" contact output each for 2 points, "1a" contact output each for 4 points. |
| | | Excitation of non-excitation can be set for each relay at the alarm output. |
| | | (Setting with front panel switch.) |
| | | Capacity of relay contact : AC250V 1A (resistive load) |
| | | DC30V 2A (resistive load) |
| | | Electrical life : 100,000 times (with the load, open/close frequency 1,800 times/h) |
| | | Mechanical life : 50,000,000 times (with the load, open/close frequency 18,000 times/h) |
| | | Applicable minimum load : DC5V 10mA |
| Open collector output | : | NPN type (isolated from input circuit). |
| | | Output capacity DC50V 100mA |

## ■Specifications for Installation

| | | |
|---|---|---|
| Power source voltage | : | AC100~240V 50/60Hz |
| | | DC12~24V |
| | | DC110V |
| Tolerance of source voltage | : | AC90~250V |
| | | DC9~32V |
| | | DC90~170V |
| Power consumption | : | For AC power source AC100V approx. 3VA |
| | | AC200V approx. 4.5VA |
| | | For DC power source DC12V approx. 100mA |
| | | DC24V approx. 50mA |
| | | DC110V approx. 12mA |
| Operating temperature | : | 0~50°C |
| Operating humidity | : | 30~90%RH (with no dew condensation) |
| Weight | : | Approx. 180g (including the appropriate socket of approx. 40g) |
| Accessory | : | Appropriate socket (attachable to DIN rail). |

## ■Dimensions for Installation




## ■Installation

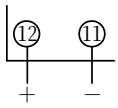
Mount or fix with M4 screws the attached socket on to the DIN rail of 35mm wide.
After completed the wiring work, attach and fix the product with the fixing screws to the socket.
When removing the product from the socket, unfasten the fixing screws and pull out the product from the socket.

Optimum fixing torque:
Socket's fixing screws : 1.1~1.5N･m
Product's fixing screws : 0.1~0.14N･m

## ■Connection

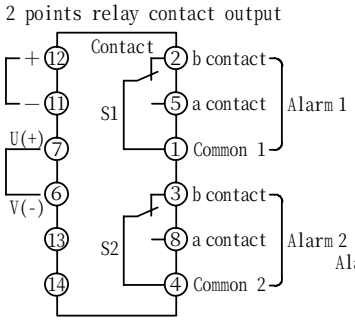
The terminals of the measuring input, alarm output and power supply of this product is M3 screw.
Make firm and correct connections by using crimp type terminal or equivalent.
Optimum torque of the terminal screws : 0.46~0.62N･m

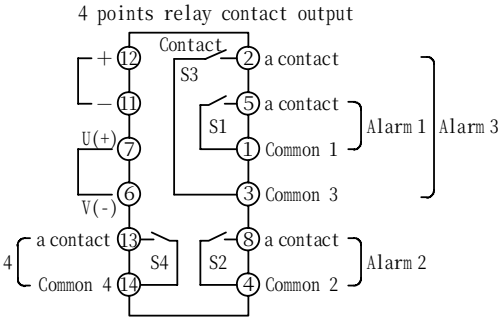
●Measuring input terminal (INPUT) ⑪, ⑫
Make the connection with correct polarity.
Keep the distance for the cabling between the measuring input line and the power source line or output line.
If the measuring input line and the power source line or output line are cabled in parallel, it may cause malfunction.



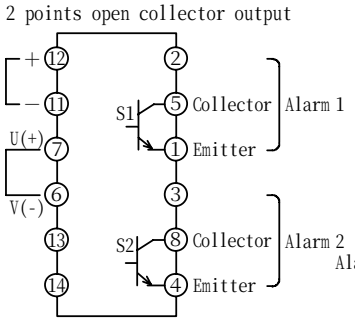

●Alarm output terminal (OUTPUT) ①, ②, ③, ④, ⑤, ⑧, ⑬, ⑭

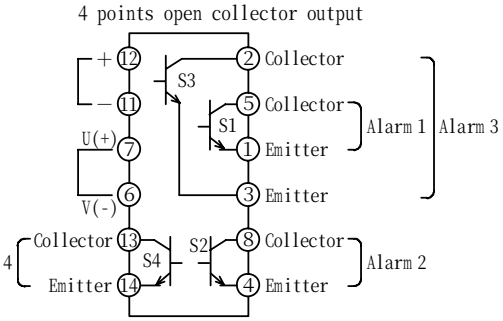
① Relay contact output
Make the writing with the cable to meet the contact capacity.
In case that the relay control of the capacity higher than the contact is necessary, please provide and auxiliary relay externally.




② Open collector output
Make the writing with the cable to meet the contact capacity.
When the alarm is output, the transistor works and ON is made in between C-E.
It is isolated from the input circuit.



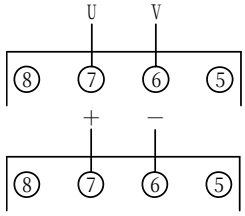




Socket's terminal numbers (For the terminal arrangement, please refer to the article of "Installation".)

●Power supply terminal (POWER SUPPLY) ⑥, ⑦

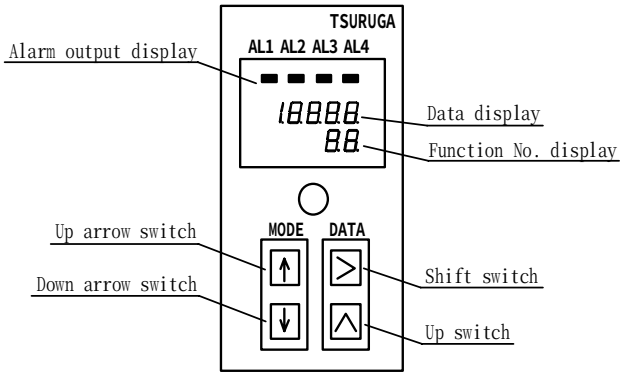
① AC power supply specifications
Make the connection to the power supply terminal.

②DC power supply specifications
Make the connection to the power supply terminal with the polarity.

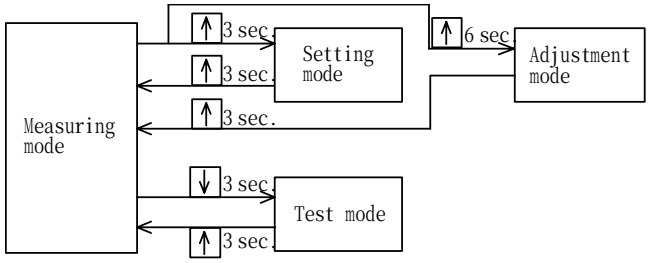


## ■Explanation and Setting of Each Function

●Name of Parts




●Flow of Mode




●Function of Switch

| Name of switch | Measuring mode | Setting mode | Adjustment mode | Test mode |
|---|---|---|---|---|
| ↑ Up arrow switch | Continuous press for 3 sec. to enter setting mode | Selection of item (Right order) | MAX adjustment | |
| ↓ Down arrow switch | Continuous press for 3 sec. to enter test mode | Selection of item (Reverse order) | ZERO adjustment | |
| > Shift switch | | Change of setting Change of digit | Count down | Selection of output |
| ∧ Up switch | | Change of value | Count up | Change of output ON/OFF |

●Table of Functions

| | Function No. | Function to be set | Adjustable range | Initial setting | |
|---|---|---|---|---|---|
| **Setting Mode** | | | | | |
| Display Setting | 01 | Read out / write in | 0: Read out<br>1: Changeable / Writable | 0 | |
| | 02 | Status display | 00: Normal<br>E1: A/D error<br>E2: EEPROM error | | |
| | 03 | Offset | -9999~9999 | 0000 | |
| | 04 | Full scale | -9999~9999 | 9999 | |
| | 05 | Decimal point | 0<br>0.0<br>0.00<br>0.000 | 0 | |
| | 06 | Turn off function | 0: Normally lit up<br>1~99 minutes | 10 minutes | |
| | | | | | |
| Calcu-lation Setting | 11 | Moving average | oFF, 4 times, 8 times, 16 times, 32 times | oFF | |
| | 12 | Offset fixation | oFF, on | oFF | |
| | | | | | |
| Alarm Setting | 21 | Alarm 1 Alarm value | ±9999 | 2000 | 2000 |
| | 22 | Alarm 2 Alarm value | | 8000 | 3000 |
| | 23 | Alarm 3 Alarm value | | − | 7000 |
| | 24 | Alarm 4 Alarm value | | − | 5000 |
| | 25 | Alarm 1 Comparison type | High: High limit<br>Lo: Low limit<br>oFF: No comparison is made | Lo | Lo |
| | 26 | Alarm 2 Comparison type | | Hi | Lo |
| | 27 | Alarm 3 Comparison type | | − | Hi |
| | 28 | Alarm 4 Comparison type | | − | Hi |
| | | | | | |
| | 31 | Alarm 1 Hysteresis | 1~999 | 10 | |
| | 32 | Alarm 2 Hysteresis | | | |
| | 33 | Alarm 3 Hysteresis | | | |
| | 34 | Alarm 4 Hysteresis | | | |
| | 35 | Output delay | 0~99 sec. | 00 | |
| | 36 | Power on delay | 2~99 sec. | 02 | |
| | 37 | Comparator conditions | Equal nG/Go | Equal nG | |
| | | | | | |
| | 41 | Alarm 1 Excitation type | on: Excited<br>oFF: Non-excited | on | |
| | 42 | Alarm 2 Excitation type | | | |
| | 43 | Alarm 3 Excitation type | | | |
| | 44 | Alarm 4 Excitation type | | | |
| | | | | | |
| **Test Mode** | | | | | |
| | 91 | Test mode | AL1~4 is arbitrarily ON/OFF | | |
| | | | | | |
| **Adjustment Mode** | | | | | |
| | A0 | ZERO adjustment | | | |
| | A1 | MAX adjustment | | | |

● Explanation of Functions

○ Setting mode

Function No.01 : Read out / write in of the setting
To confirm the setting content of the setting mode, select 0.
To change the setting content, select 1.

Function No.02 : Status display.
Faulty symptom of the internal circuit is displayed.
When the error is indicated, a certain problem of the product is considered.
Please refer to us for the possible cause of the problem or repair.

Function No.03 : Display scaling, offset
Offset value for the input can be arbitrarily set within the range −9999~+9999.
Offset value: When the measuring input is ± input 0mV (mA)
When the measuring input is 1~5V 1V
When the measuring input is 4~20mA 4mA

Function No.04 : Display scaling, full scale
Display to the max. value of the measuring input can be arbitrarily set within the range −9999~+9999.

Function No.05 : Decimal point
Decimal point can be set at an arbitrary position.

Function No.06 : Turn off function
In the measuring mode, this function allows turn off of the data display at the preset time from the finish of switch operation.
When 01〜99 minutes is set, the display is turned off from the beginning when powered on. When the switch is operated, the display lights up.
When the alarm output becomes ON while the display is turned off, the display lights up and afterwards when the alarm output is turned OFF, the display turns off at the preset time.

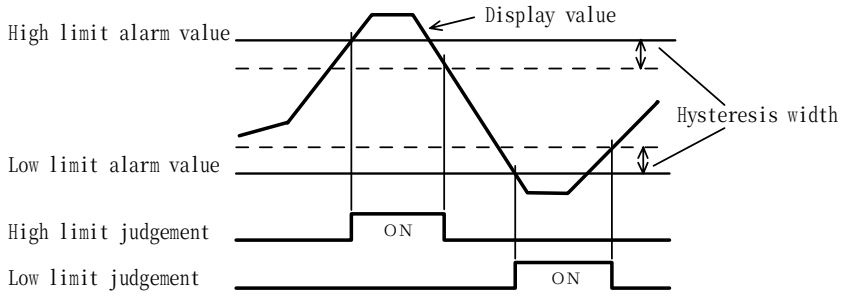
Function No.11 : Moving average
Times for moving average can be set to 4, 8, 16, 32 or nil.

Function No.12 : Offset fixation
Display of the input value less than the offset value can be fixed to the offset value (function No.3).

Function No.21, 22, 23, 24: Alarm value of alarm 1, 2, 3, 4
Comparison value for the alarm output can be set.

Function No. 25, 26, 27, 28: Comparison type of alarm 1, 2, 3, 4
“Comparison with high limit, low limit or no comparison” can be selected individually for each alarm output.

Function No. 31, 32, 33, 34: Hysteresis
Hysteresis width can be set individually for each alarm output.




Function No.35 : Output delay
The output delay is an ON delay. The output of high or low limit judgement outgoes after the delay time has passed. The output delay time is common for the alarm 1 to 4.

Function No.36 : Power on delay
During the preset time from powering on of the product, the alarm 1 to 4 are not output.
For two seconds from powering on of the product, no alarm is output as it is the initialization time of the internal circuit.

Function No.37 : Comparison condition
The comparison condition of the alarm 1 to 4 can be changed to Equal NG or Equal GO.
In case of equal NG:
Display value≧High limit value・・・・・HI
Display value≦Low limit value・・・・・LO
In case of equal GO:
Display value＞High limit value・・・・・HI
Display value＜Low limit value・・・・・LO

Function No. 41, 42, 43, 44: Excitation system of alarm 1, 2, 3, 4
on (excited) ・・・・・・・・・ At alarm, “a” contact of the relay output or the open collector output turns ON.
oFF (non-excited) ・・・・ At alarm, “a” contact of the relay output or the open collector output turns OFF.
**Note**: In case of two alarm output type, the function No.23, 24, 27, 28, 33, 34, 43 or 44 is not provided.

○ Setting method

- When the [↑] switch is pressed for 3 seconds in measuring mode, the mode changes to the setting mode.
- The change of function No. is made with [↑] switch (up) and [↓] switch (down).

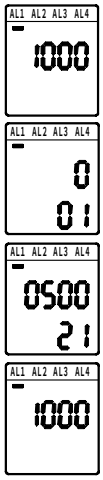
01 ⇄ 02 ⇄ 03 ⇄ 04 ⇄ 05 ⇄ 06 ⇄ ···· ⇄ 43 ⇄ 44 ⇄ 01

- For the content corresponding to the function No., refer to the table of functions.
- The measurement is continued during the setting mode. The comparator works with the content set immediately before entering the setting mode, and output the alarm. When the setting mode is finished, the comparator works with the new content having been set.
- When no switch operation is made for about 5 minutes during the setting mode, the product automatically returns to the measuring mode. In this case, the altered setting content is not memorized.

| |
|---|
| In order to read out and confirm the setting content, make the data of function No.01 to 0.<br>When the setting content is altered, make the data of function No.01 to 1. |

○ [Setting examples] (When the setting content is confirmed.)

Example: To confirm the alarm value of the alarm 1.




Measuring mode

Press [↑] continuously for about 3 seconds.

Enters into read-out/write-in function.

Press [↑] for a few times to make the function No. to 21.

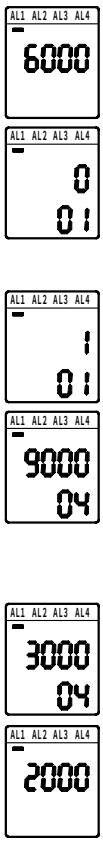
Set value of the alarm 1 is 500.

Press [↑] continuously for about 3 seconds.

Confirmation of the alarm value of alarm 1 finishes and returns to the measuring mode.

○ [Setting examples] (When the setting content is changed.)

Example 1: To change the full scale from 9000 to 3000.




Measuring mode

Press [↑] continuously for about 3 seconds.

Enters into read-out/write-in function.

Press [>], then the data display 0 blinks.

Press [∧], then the data display changes to 1 and the change of setting data is enabled.

Press [↑] for 3 times to make the function No. to 04.

Full scale 9000 is set.

Press [>], then the change of full scale setting is enabled.

Select the digit to change with [>] (the selected digit blinks).

Change the value with [∧].

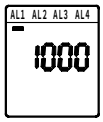
Full scale is set to 3000.

Press [↑] continuously for about 3 seconds.

Change of the full scale finishes and returns to the measuring mode.

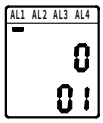
○ Setting examples

Example 2: To change the comparison system of alarm 2 from high limit to low limit.




Measuring mode

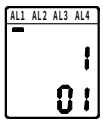
Press [↑] continuously for about 3 seconds.




Enters into read-out/write-in function.

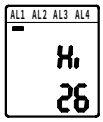
Press [>], then the data display 0 blinks.

Press [∧] and make the data display to 1.




Change of data is enabled.

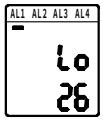
Press [↑] for a few times to make the function No. to 26.




Comparison system of alarm 2 is set to Hi.

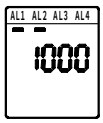
Press [>], then Hi blinks.

Press [∧] to make it to Lo




Comparison system of alarm 2 is set to Lo.

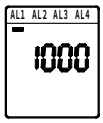
Press [↑] continuously for about 3 seconds.




Change of the comparison system of alarm 2 finishes and returns to the measuring mode.

● Test mode

It is possible to test the output condition of the alarm output without applying the input.




Measuring mode

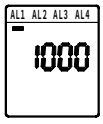
Press [↓] continuously for about 3 seconds.


Enters into test mode.

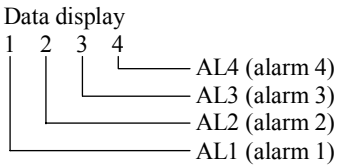
Select the alarm 1~4 with [>].
(The selected digit blinks).
Change ON/OFF of the alarm output with [∧].
Alarm display is lit up at ON or turns off at OFF.


Status that the alarm 2 is ON.

Press [↑] continuously for about 3 seconds.



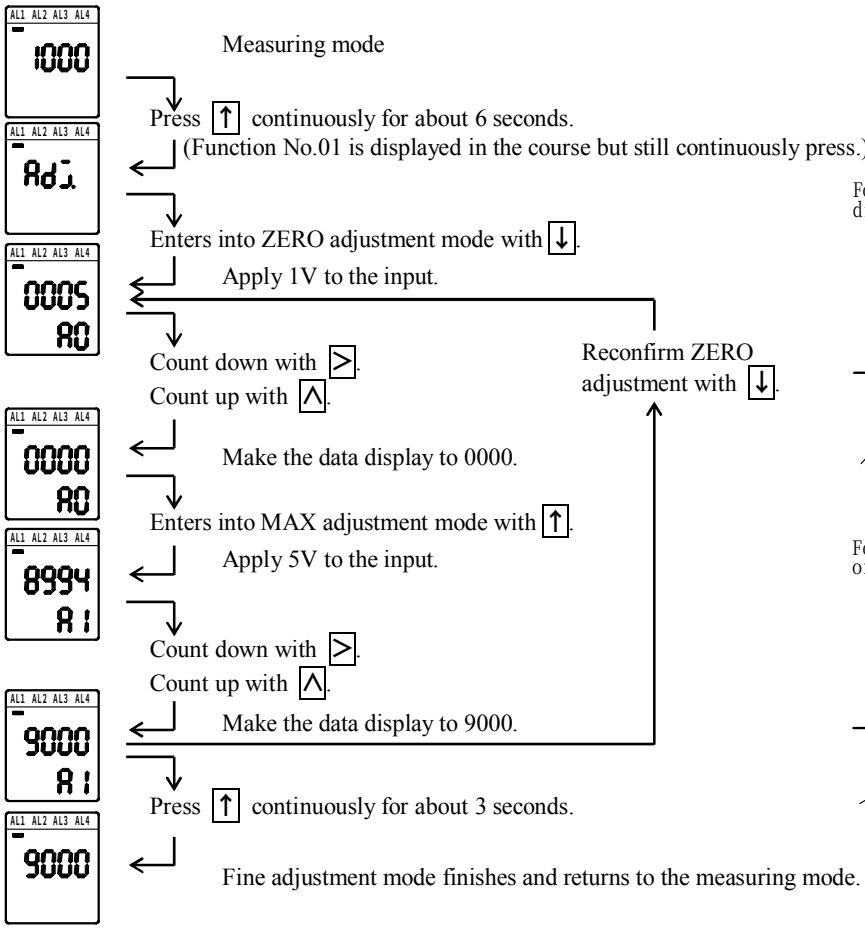

Test mode finishes and returns to the measuring mode.



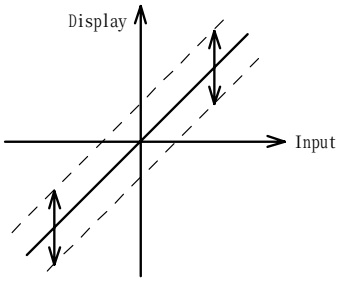

- When the alarm display is lit up, the status is that the alarm is outgoing.
- In the test mode, the setting of excitation system of the function No.41 to 44 is reflected.
- In case of two alarm output type, there is no setting of AL3 or AL4.

● Adjustment mode

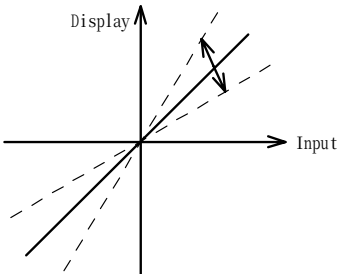
A fine adjustment of the ZERO and MAX value of calibration data can be made with the real input.
Example: In case of measuring input 1~5V, display scaling 0~9000.




For ZERO adjustment, the display value moves in parallel.

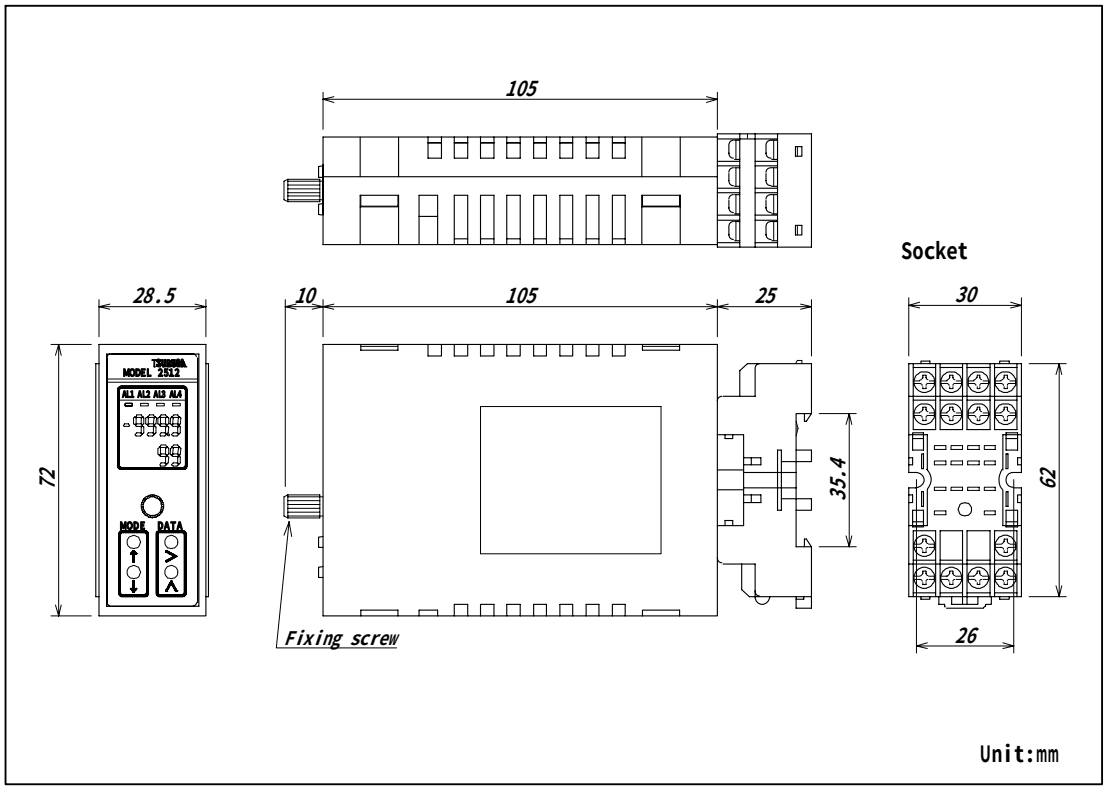



For MAX adjustment, the inclination of display value changes.




**Note**: When the width of scaling is narrow, it takes some time to up or down count.
Press continuously for a while.

## ■Dimensions



## ■Maintenance

Store the product within the range of specified storage temperature (-20~70 °C).

## ■Calibration Method

To maintain the accuracy over the long time, the calibration at an interval of about one year is recommended.
For the calibration method, please refer to the article of adjustment mode.

# Instruction Manual

## Detect Relay Model 2522／2532

I-01655

Please take care that this instruction manual is certainly delivered to the person in charge of operating it. For safety and proper use of this product, please observe the following caution and also read the instruction manuals to follow before the initial operation.

**⚠ CAUTION**

**To prevent electric shock, observe the following cautions:**
- **◆ Never make power line connections with active lines.**
- **◆ Ensure firm and tight connections to the terminals.**
- **◆ Do not touch the power source terminals while the instrument is powered on.**

**Do not use the instrument in such places as follows as it may cause break-down or malfunction of the instrument:**
- **◆ exposed to rain, water drops or direct sunlight.**
- **◆ high temperature or humidity, much dust or corrosive gas.**
- **◆ affected by external noise, radio waves or static electricity.**

### ● Check at Delivery

When the product is delivered to you, please check that its specifications conform to your requirement and that there is no damage in transit. This product is carefully inspected before delivery from factory under our strict quality control program, but if you find any defect or inconvenience, please inform us of the model name, serial number etc. of the product.

### ● Cautions for Use

① This product is a precision instrument, so please take utmost care for its transportation, installation or any other handling of it.
② No power on-off switch is provided on this product, so it immediately starts to work when connected to the power source.
③ In case of fear that the noise or surge is frequently generated on the power source line, a noise preventive solution must be taken.
④ Use this product within the range of its specifications and rates.

### ■ Model Name

25□2 -□-□
1 2 3

### 1 Measuring Input

● Thermocouple thermometer

| Code | Temperature Sensor | Measuring Range | Display Range |
|---|---|---|---|
| 2 | R | 100～1768℃ | -50～1800℃ |
| | K | -200～1372℃ | -270～1400℃ |
| | E | -200～1000℃ | -270～1050℃ |
| | J | -200～1200℃ | -210～1250℃ |
| | T | -200～400℃ | -270～420℃ |
| | B | 600～1800℃ | -20～1820℃ |
| | N | -200～1300℃ | -230～1350℃ |
| | S | 0～1768℃ | -50～1800℃ |
| | WRe5-26 | 0～2320℃ | -20～2350℃ |

Accuracy : ±(0.1% of FS +1 digit)
Defined at 23°C±5°C, in the measuring range.
Cold junction compensation : ±1°C
Defined at the operating temperature range 0~50°C.
Calibration is with each referential thermo-electricity power of JIS C-1602$_{-1995}$.
Temperature coefficient : ±150ppm/°C
Defined at the operating temperature range 0~50°C.

● Resistance thermometer

| Code | Temperature Sensor | Measuring Range | Display Range |
|---|---|---|---|
| 3 | Pt100Ω (JIS'97) | -200～850℃ | -200～870℃ |
| | JPt100Ω (JIS'81) | -200～649℃ | -200～660℃ |
| | Pt50Ω (JIS'81) | -200～649℃ | -200～660℃ |
| | Ni508.4Ω | -200～280℃ | -50～300℃ |

Accuracy : ±(0.1% of FS +1 digit)
Defined at 23°C±5°C, in the measuring range.
Calibration is with the values of each referential resistor element of JIS C-1604$_{-1997}$.
Temperature coefficient : ±150ppm/°C
Defined at the operating temperature range 0~50°C.

### 2 Output Signal

| Code | Specifications |
|---|---|
| 1 | Two relay contact output |
| 2 | Four relay contact output |
| 3 | Two open collector output |
| 4 | Four open collector output |

### 3 Power Supply Voltage

| Code | Power Supply Voltage |
|---|---|
| A | AC100~240V |
| B | DC12~24V |
| C | DC110V |

## ■General Specifications

| | | |
|---|---|---|
| Data display | : | 4 digit, character height 5.5mm, resolution 1℃<br>Over-range display When exceed the display range, ⊔⊔⊔⊔ or -⊔⊔⊔⊔ is lit up.<br>With zero-suppress function |
| Function No. display | : | 2 digit, character height 5.5mm |
| Open circuit of input | : | Indicated with lighting of ⊔⊔⊔⊔. Alterable to -⊔⊔⊔⊔ for the thermocouple thermometer. |
| External resistance | : | Thermocouple thermometer 500Ω or less<br>Resistance thermometer 5Ω or less per lead wire |
| Overload | : | DC±3.3V |
| Sampling rate | : | Approx. 2.5 times/sec. |
| Response time | : | Thermocouple thermometer 0.8 sec. or less<br>Resistance thermometer 1.2 sec. or less<br>(90% response, when the moving average function is OFF.) |
| A/D conversion | : | ⊿-Σ conversion system. |
| Noise rejection rate | : | Normal mode (NMR) 50dB or more<br>Common mode (CMR) 110dB or more<br>Power source line penetrating noise 1000V |
| Comparator range | : | -9999~9999 Comparison is made to the display. |
| Comparator system | : | 2 points / 4 points independent setting, arbitrary setting for high and low limit, and comparator output OFF.<br>CPU comparator judgement system. |
| Comparator condition | : | Equal NG, equal GO, selectable. |
| Hysteresis width | : | 1~999 (2 points / 4 points independent setting). |
| Alarm display | : | Lit up at the alarm output. |
| Output delay | : | On delay, 0~99 sec. (common for 2 points / 4 points). |
| Power on delay | : | 2~99 sec. (common for 2 points / 4 points). No alarm is output for 2 sec. after the power supply is applied. |
| Excitation at alarm | : | Excitation or non-excitation, selectable (2 points / 4 points independent setting). |
| Test mode | : | ON/OFF of every alarm output can be checked with switch operation. |
| Insulation Resistance | : | In between Input – Output DC500V 100MΩ or more<br>In between Input/Output – Power Source DC500V 100MΩ or more<br>Terminals in a lump – Housing DC500V 100MΩ or more |
| Withstanding Voltage | : | In between Input – Output AC2000V for 1 minute<br>In between Input/Output – Power Source AC2000V for 1 minute<br>Terminals in a lump – Housing AC2000V for 1 minute |

## ■Mechanical Specifications

| | | |
|---|---|---|
| Structure | : | Plug-in type. |
| Connection | : | Connection by M3 threaded terminal. |
| Isolation | : | 3 port isolation (in between input, output and power source is isolated). |
| Setting | : | Program system with front panel switch. |

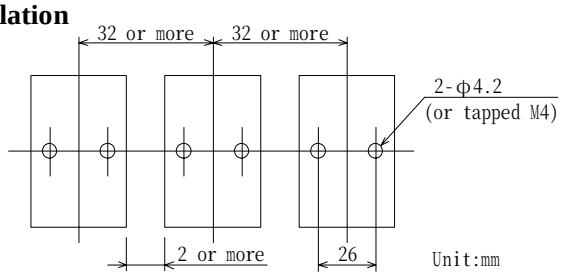
## ■Specifications of Alarm Output

| | | |
|---|---|---|
| Relay contact output | : | "1c" contact output each for 2 points, "1a" contact output each for 4 points.<br>Excitation of non-excitation can be set for each relay at the alarm output.<br>(Setting with front panel switch.)<br>Capacity of relay contact : AC250V 1A (resistive load)<br>DC30V 2A (resistive load)<br>Electrical life : 100,000 times (with the load, open/close frequency 1,200 times/h)<br>Mechanical life : 20,000,000 times (no load, open/close frequency 10,800 times/h)<br>Applicable minimum load : DC5V 10mA |
| Open collector output | : | NPN type (isolated from input circuit).<br>Output capacity DC50V 100mA |

## ■Specifications for Installation

| | | |
|---|---|---|
| Power supply | : | AC100~240V 50/60Hz<br>DC12~24V<br>DC110V |
| Tolerable range of supply | : | AC90~250V<br>DC9~32V<br>DC90~170V |
| Power consumption | : | For AC power source AC100V approx. 3.5VA<br>AC200V approx. 5.5VA<br>For DC power source DC12V approx. 130mA<br>DC24V approx. 65mA<br>DC110V approx. 14mA |
| Operating temperature | : | 0~50℃ |
| Operating humidity | : | 30~90%RH (with no dew condensation) |
| Weight | : | Approx. 180g (including the appropriate socket of approx. 40g) |
| Accessory | : | Appropriate socket (attachable to DIN rail).<br>CJS (for thermocouple thermometer only) |

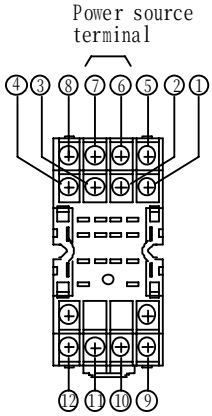
## ■Dimensions for Installation




## ■Installation

Mount or fix with M4 screws the attached socket on to the DIN rail of 35mm wide.
After completed the wiring work, attach and fix the product with the fixing screws to the socket.
When removing the product from the socket, unfasten the fixing screws and pullout the product from the socket.

Optimum fixing torque:
Socket's fixing screws : 1.1~1.5N･m
Product's fixing screws : 0.1~0.14N･m



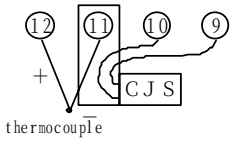

## ■Connection

The terminals of the measuring input, alarm output and power supply of this product is M3 screw.
Make firm and correct connections by using crimp type terminal or equivalent.
Optimum torque of the terminal screws : 0.46~0.62N･m

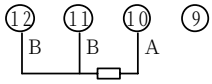
●Measuring input terminal (INPUT) ⑨, ⑩, ⑪, ⑫
○Thermocouple thermometer
Make the connection of thermocouple with correct polarity.
The CJS (sensor for cold junction compensation) has no interchangeability.
Ensure to use the CJS and the main unit of the same manufacturing number.
○Resistance thermometer
Connect the 3-wire resistance bulb thermometer.

**Note**: Keep the distance for the cabling between the measuring input line and the power source line or output line.
If the measuring input line and the power source line or output line are cabled in parallel, it may cause malfunction.

Thermocouple thermometer




Resistance thermometer



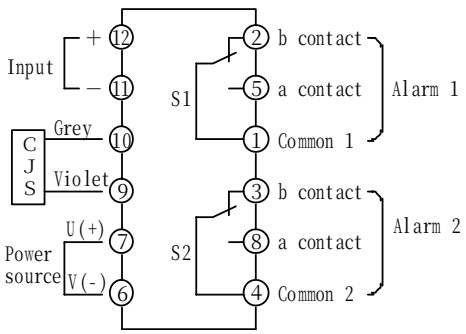

●Alarm output terminal (OUTPUT) ①, ②, ③, ④, ⑤, ⑧

① Relay contact output
Make the writing with the cable to meet the contact capacity.
In case that the relay control of the capacity higher than the contact is necessary, please provide and auxiliary relay externally.

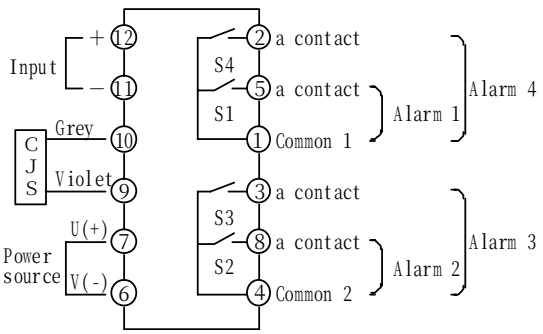
② Open collector output
Make the writing with the cable to meet the contact capacity.
When the alarm is output, the transistor works and ON is made in between C-E.
It is isolated from the input circuit.

Socket's terminal numbers (For the terminal arrangement, please refer to the article of "Installation".)
○Thermocouple thermometer

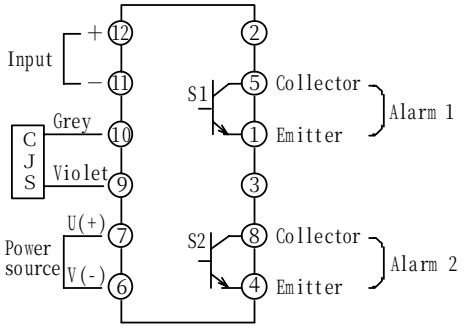
2 points relay contact output



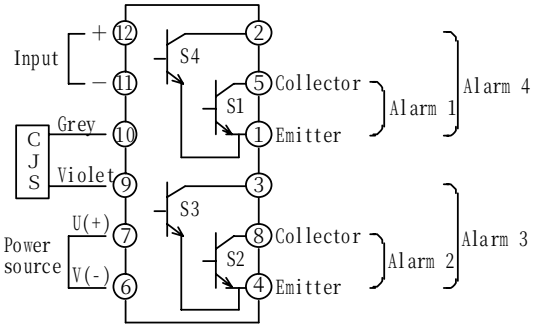

4 points relay contact output



2 points open collector output

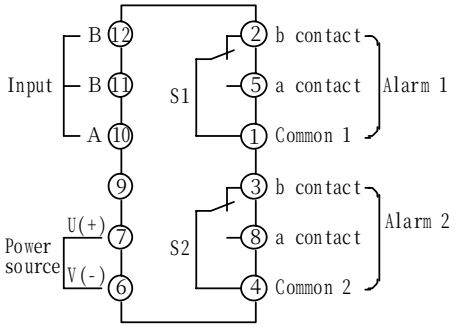



4 points open collector output

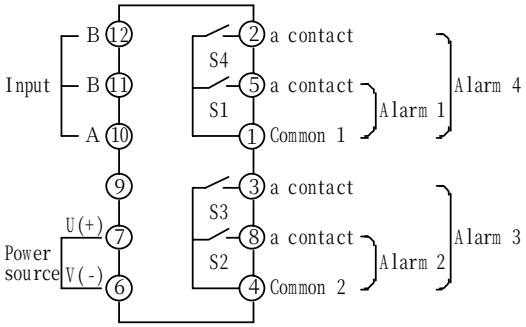



○Resistance thermometer

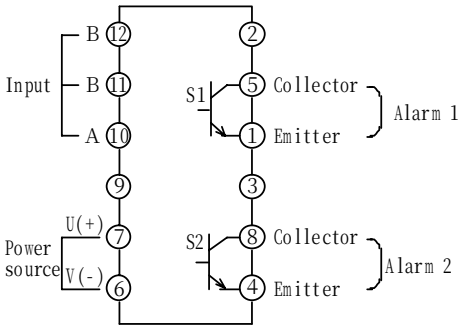
2 points relay contact output



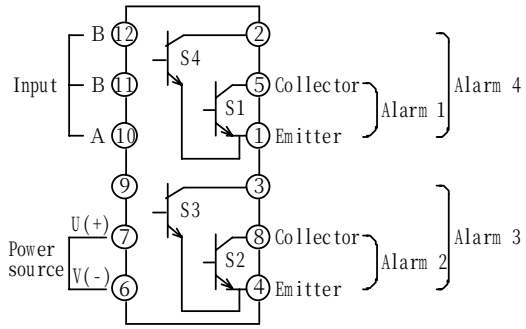

4 points relay contact output




2 points open collector output

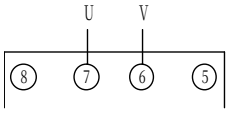



4 points open collector output

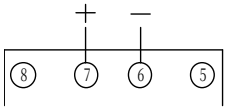



●Power supply terminal (POWER SUPPLY) ⑥, ⑦

① AC power supply specifications
Make the connection to the power supply terminal.

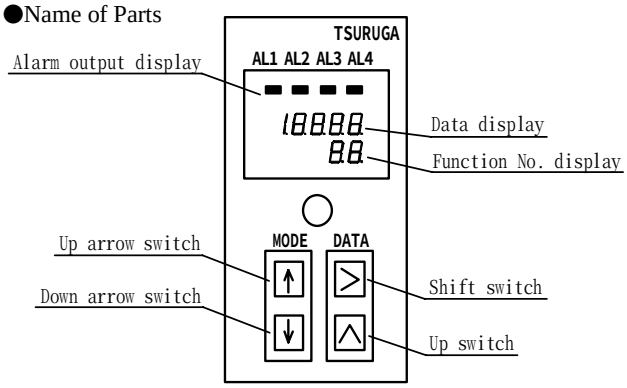



②DC power supply specifications
Make the connection to the power supply terminal with the polarity.

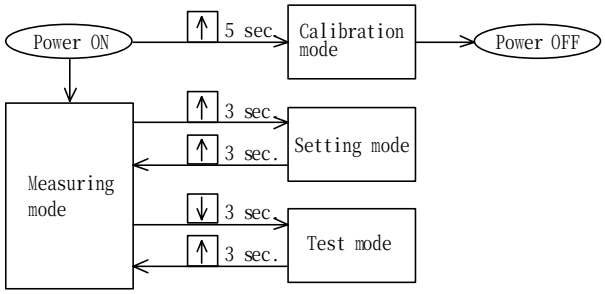


## ■Explanation and Setting of Each Function

●Name of Parts




●Flow of Mode




●Function of Switch

| Name of switch | Measuring mode | Setting mode | Adjustment mode | Test mode |
|---|---|---|---|---|
| ↑ Up arrow switch | Continuous press for 3 sec. to enter setting mode | Selection of item (Right order) | CAL display Display change-over | |
| ↓ Down arrow switch | Continuous press for 3 sec. to enter test mode | Selection of item (Reverse order) | | |
| > Shift switch | | Change of setting Change of digit | ZERO calibration | Selection of output |
| ∧ Up switch | | Change of value | MAX calibration | Change of output ON/OFF |

●Table of Functions

| | Function No. | Function to be set | Adjustable range | Initial setting 2 points | Initial setting 4 points |
|---|---|---|---|---|---|
| **Setting Mode** | | | | | |
| Display Setting | 01 | Read out / write in | 0: Read out<br>1: Changeable / Writable | 0 | |
| | 02 | Status display | 00: Normal<br>E1: A/D error<br>E2: EEPROM error | | |
| | 03 | Setting of sensor | | TC : K<br>RTD : Pt100 | |
| | 04 | Setting of ℃/℉ | C: ℃ F: ℉ | C | |
| | 05 | Setting of burn-out direction | 0 : Plus<br>1 : Minus | 0 | |
| | 06 | Turn off function | 0: Normally lit up<br>1~99 minutes | 10 minutes | |
| | | | | | |
| Calcu-lation Setting | 11 | Moving average | oFF, 4 times, 8 times, 16 times, 32 times | oFF | |
| | | | | | |
| Alarm Setting | 21 | Alarm 1 Alarm value | ±9999 | 0 | 0 |
| | 22 | Alarm 2 Alarm value | | 100 | 20 |
| | 23 | Alarm 3 Alarm value | | — | 80 |
| | 24 | Alarm 4 Alarm value | | — | 100 |
| | 25 | Alarm 1 Comparison type | High : High limit<br>Lo : Low limit<br>OFF : No comparison is made | Lo | Lo |
| | 26 | Alarm 2 Comparison type | | Hi | Lo |
| | 27 | Alarm 3 Comparison type | | — | Hi |
| | 28 | Alarm 4 Comparison type | | — | Hi |
| | | | | | |
| | 31 | Alarm 1 Hysteresis | 001~999 | 010 | |
| | 32 | Alarm 2 Hysteresis | | | |
| | 33 | Alarm 3 Hysteresis | | | |
| | 34 | Alarm 4 Hysteresis | | | |
| | 35 | Output delay | 00~99 sec. | 00 | |
| | 36 | Power on delay | 02~99 sec. | 02 | |
| | 37 | Comparator conditions | Equal nG/G | Equal nG | |
| | | | | | |
| | 41 | Alarm 1 Excitation type | On : Excited<br>OFF : Non-excited | on | |
| | 42 | Alarm 2 Excitation type | | | |
| | 43 | Alarm 3 Excitation type | | | |
| | 44 | Alarm 4 Excitation type | | | |
| | | | | | |
| **Test Mode** | | | | | |
| | 91 | Test mode | AL1~4 is arbitrarily ON/OFF | | |
| | | | | | |
| **Calibration Mode** | | | | | |
| | C0 | ZERO, MAX calibration | | | |
| | C1 ※ | Calibration of cold junction compensation, Gain | | | |
| | C2 ※ | Calibration of cold junction compensation, ZERO | | | |

※Only for the thermocouple thermometer

● Explanation of Functions

○ Setting mode

Function No.01 : Read out / write in of the setting
To confirm the setting content of the setting mode, select 0.
To change the setting content, select 1.

Function No.02 : Status display.
Faulty symptom of the internal circuit is displayed.
When the error is indicated, a certain problem of the product is considered.
Please refer to us for the possible cause of the problem or repair.

Function No.03 : Setting of sensor
The sensor to use can be selected.

Function No.04 : Setting of ℃/℉
The unit of temperature display ℃ or ℉ can be selected.

Function No.05 : Setting of burn-out direction (thermocouple thermometer only)
Plus burn-out or minus burn-out can be selected.

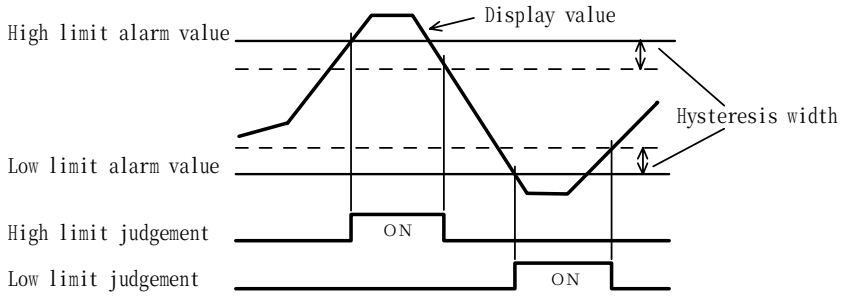
Function No.06 : Turn off function
In the measuring mode, this function allows turn off of the data display at the preset time from the finish of switch operation.
When 01～99 minutes is set, the display is turned off from the beginning when powered on. When the switch is operated, the display lights up.
When the alarm output becomes ON while the display is turned off, the display lights up and afterwards when the alarm output is turned OFF, the display turns off at the preset time.

Function No.11 : Moving average
Times for moving average can be set to 4, 8, 16, 32 or nil.

Function No.21, 22, 23, 24: Alarm value of alarm 1, 2, 3, 4
Comparison value for the alarm output can be set.

Function No. 25, 26, 27, 28: Comparison type of alarm 1, 2, 3, 4
"Comparison with high limit, low limit or no comparison" can be selected individually for each alarm output.

Function No. 31, 32, 33, 34: Hysteresis
Hysteresis width can be set individually for each alarm output.




Function No.35 : Output delay
The output delay is an ON delay. The output of high or low limit judgement outgoes after the delay time has passed. The output delay time is common for the alarm 1 to 4.

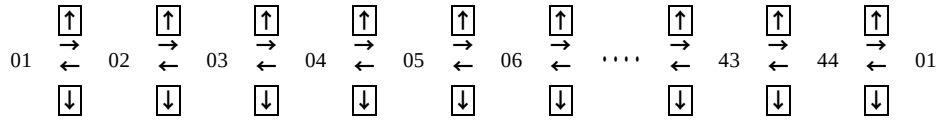
Function No.36 : Power on delay
During the preset time from powering on of the product, the alarm 1 to 4 do not output.
For two seconds from powering on of the product, no alarm is output as it is the initialization time of the internal circuit.

Function No.37 : Comparison condition
The comparison condition of the alarm 1 to 4 can be changed to Equal NG or Equal GO.
In case of equal NG:
Display value≧High limit value・・・・・HI
Display value≦Low limit value・・・・・LO
In case of equal GO:
Display value＞High limit value・・・・・HI
Display value＜Low limit value・・・・・LO

Function No. 41, 42, 43, 44: Excitation system of alarm 1, 2, 3, 4
on (excited) ・・・・・・・・・ At alarm, "a" contact of the relay output or the open collector output turns ON.
oFF (non-excited) ・・・・ At alarm, "a" contact of the relay output or the open collector output turns OFF.
**Note**: In case of two alarm output type, the function No.23, 24, 27, 28, 33, 34, 43 or 44 is not provided.

○ Setting method

- When the [↑] switch is pressed for 3 seconds in measuring mode, the mode changes to the setting mode.
- The change of function No. is made with [↑] switch (up) and [↓] switch (down).




- For the content corresponding to the function No., refer to the table of functions.
- The measurement is continued during the setting mode. The comparator works with the content set immediately before entering the setting mode, and output the alarm. When the setting mode is finished, the comparator works with the new content having been set.
- When no switch operation is made for about 5 minutes during the setting mode, the product automatically returns to the measuring mode. In this case, the altered setting content is not memorized.

| |
|---|
| In order to read out and confirm the setting content, make the data of function No.01 to 0.<br>When the setting content is altered, make the data of function No.01 to 1. |

○ Setting examples (When the setting content is confirmed.)

Example: To confirm the alarm value of the alarm 1.


Measuring mode

Press [↑] continuously for about 3 seconds.

Enters into read-out/write-in function.

Press [↑] for a few times to make the function No. to 21.

Set value of the alarm 1 is 0.

Press [↑] continuously for about 3 seconds.

Confirmation of the alarm value of alarm 1 finishes and returns to the measuring mode.

○ Setting examples (When the setting content is changed.)

Example 1: To change the type of thermocouple sensor from K to J.


Measuring mode

Press [↑] continuously for about 3 seconds.

Enters into read-out/write-in function.

Press [>], then the data display 0 blinks.

Press [∧], then the data display changes to 1 and the change of setting data is enabled.

Press [↑] 2 times to make the function No. to 03.

Sensor No.0 (K sensor) is set.

Press [>], then SEn.0 blinks.

Change the sensor No. to 1 (J) with [∧].

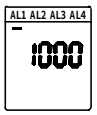
SEn.1 is set.

Press [↑] continuously for about 3 seconds.

Change of the sensor finishes and returns to the measuring mode.

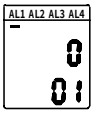
○ Setting examples

Example 2: To change the comparison system of alarm 2 from high limit to low limit.




Measuring mode

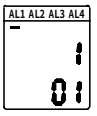
Press ↑ continuously for about 3 seconds.




Enters into read-out/write-in function.

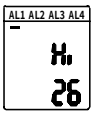
Press >, then the data display 0 blinks.

Press ∧ and make the data display to 1.




Change of data is enabled.

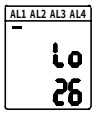
Press ↑ for a few times to make the function No. to 26.




Comparison system of alarm 2 is set to Hi.

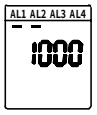
Press >, then Hi blinks.

Press ∧ to make it to Lo.




Comparison system of alarm 2 is set to Lo.

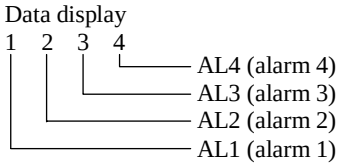
Press ↑ continuously for about 3 seconds.




Change of the comparison system of alarm 2 finishes and returns to the measuring mode.

● Test mode

It is possible to test the output condition of the alarm output without applying the input.





Measuring mode

Press ↓ continuously for about 3 seconds.


Enters into test mode.

Select the alarm 1~4 with >.
(The selected digit blinks).
Change ON/OFF of the alarm output with ∧.
Alarm display is lit up at ON or turns off at OFF.


Status that the alarm 2 is ON.

Press ↑ continuously for about 3 seconds.


Test mode finishes and returns to the measuring mode.

- When the alarm display is lit up, the status is that the alarm is outgoing.
- In the test mode, the setting of excitation system of the function No.41 to 44 is reflected.
- In case of two alarm output type, there is no setting of AL3 or AL4.

● Calibration mode
The temperature display during the calibration is ℃ in resolution of 0.1℃.
(The display of 2000℃ or above for the WRe senor is of the resolution 1℃.)

○ Calibration of thermocouple thermometer
For calibration, provide the standard voltage generator, cold junction circuit (put ice water in thermos bottle) and the standard thermocouple for calibration.

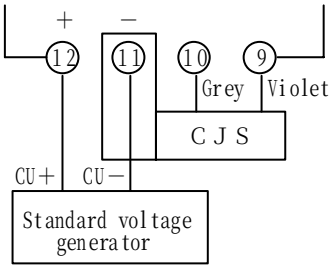



Fig.1

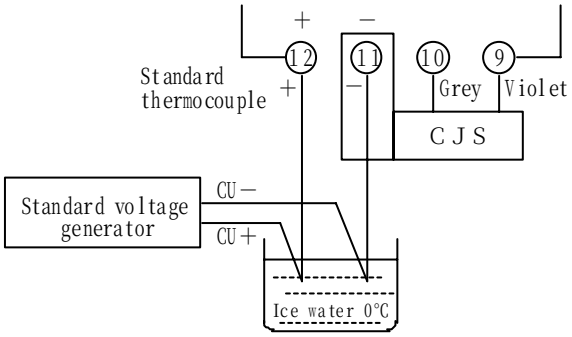



Fig. 2

• Calibration with referential voltage.
Keep pressing [↑], power ON, then it enters the calibration mode.

Powe OFF

Make the connection as Fig.1 shows.
Pressing [↑], power ON to enter the calibration mode.
Press [↑] continuously for about 5 seconds, then it enters the calibration mode.


CAL and sensor No. are displayed.
The sensor No. is the number set in the function No.3 (setting of sensor).

Sensor can be selected with [>].


Enters into ZERO, MAX calibration with [↑].

| No. | Sensor | ZERO | | MAX | |
|---|---|---|---|---|---|
| 0 | K | 0℃ | 0.000mV | 1300℃ | 52.410mV |
| 1 | J | 0℃ | 0.000mV | 1200℃ | 69.553mV |
| 2 | R | 0℃ | 0.000mV | 1700℃ | 20.222mV |
| 3 | E | 0℃ | 0.000mV | 1000℃ | 76.373mV |
| 4 | T | 0℃ | 0.000mV | 400℃ | 20.872mV |
| 5 | B | 0℃ | 0.000mV | 1800℃ | 13.591mV |
| 6 | N | 0℃ | 0.000mV | 1300℃ | 47.513mV |
| 7 | WRe | 0℃ | 0.000mV | 2000℃ | 33.660mV |
| 8 | S | 0℃ | 0.000mV | 1700℃ | 17.947mV |

※1 When calibrated out of the calibration range, Err is indicated.
※2 This item does not appear for the sensor type B.


Function No. C0 and the measured value are displayed.

In case of K thermocouple
Press [>] at the 0.000mV input, then the ZERO value is temporarily memorized.
Press [∧] at the 52.410mV input, then the MAX value is temporarily memorized. ※1


The input voltage is different depending upon the sensor to calibrate.
Refer to the table on the right.

Enters into Gain calibration of the cold junction compensation with [↑]. ※2


Function No. C1 and the measured value are displayed.

Press [∧] at the 500.0mV input, then the set value is temporarily memorized. ※1


Press [↑] two times, then CAL and sensor No. are displayed.


Memorize the calibration values with [∧].
Display blinks at this time.

Power OFF

Continuously perform the ZERO calibration of the cold junction compensation

・ ZERO calibration of the cold junction compensation. (This calibration is not required for the sensor type B.)

Keep pressing [↑], power ON, then it enters the calibration mode.

Power OFF

Make the connection as Fig.2 shows.
Pressing [↑], power ON.
Press [↑] continuously for about 5 seconds, then it enters the calibration mode.

AL1 AL2 AL3 AL4 CAL 0

CAL and sensor No. are displayed.
The sensor No. is the number set in the function No.3 (setting of sensor).

Sensor can be selected with [>].

Press [↑] three times to enter ZERO calibration of the cold junction compensation. ※2

AL1 AL2 AL3 AL4 0005 C2

Function No. C2 and the measured value are displayed.

Press [^] at the 0.0mV input, then the ZERO value is temporarily memorized.

AL1 AL2 AL3 AL4 0000 C2

Press [↑], then CAL and sensor No. are displayed.

AL1 AL2 AL3 AL4 CAL 0

Memorize the calibration value with [^]. Display blinks at this time.

Power OFF

○ Calibration of resistance thermocouple thermometer
For calibration, provide the standard variable resistor.
Keep pressing [↑], power ON, then it enters the calibration mode.

Power OFF

Make the connection as Fig.3 shows.
Pressing [↑], power ON.
Press [↑] continuously for about 5 seconds, then it enters the calibration mode.

AL1 AL2 AL3 AL4 CAL A

CAL and sensor No. are displayed.
The sensor No. is the number set in the function No.3 (setting of sensor).

Sensor can be selected with [>].

| No. | Sensor | ZERO | | MAX | |
|---|---|---|---|---|---|
| A | Pt100Ω | 0℃ | 100.00Ω | 800℃ | 375.70Ω |
| b | JPt100Ω | 0℃ | 100.00Ω | 600℃ | 317.28Ω |
| C | Ni508.4Ω | 0℃ | 508.40Ω | 280℃ | 1440.03Ω |
| d | Pt50Ω | 0℃ | 50.00Ω | 600℃ | 158.64Ω |

※ When calibrated out of the calibration range, Err is indicated.

AL1 AL2 AL3 AL4 CAL A

Enters into ZERO, MAX calibration with [↑].

AL1 AL2 AL3 AL4 0005 C0

Function No. C0 and the measured value are displayed.

In case of Pt100Ω
Press [>] at the 100.00Ω input, then the ZERO value is temporarily memorized.
Press [^] at the 375.70Ω input, then the MAX value is temporarily memorized. ※

AL1 AL2 AL3 AL4 8000 C0

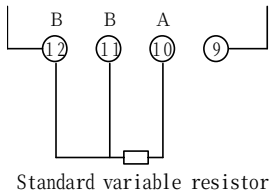
The input resistance is different depending upon the sensor to calibrate. Refer to the table on the right.

Press [↑], then CAL and sensor No. are displayed.

AL1 AL2 AL3 AL4 CAL A

Memorize the calibration value with [^].
Display blinks at this time.

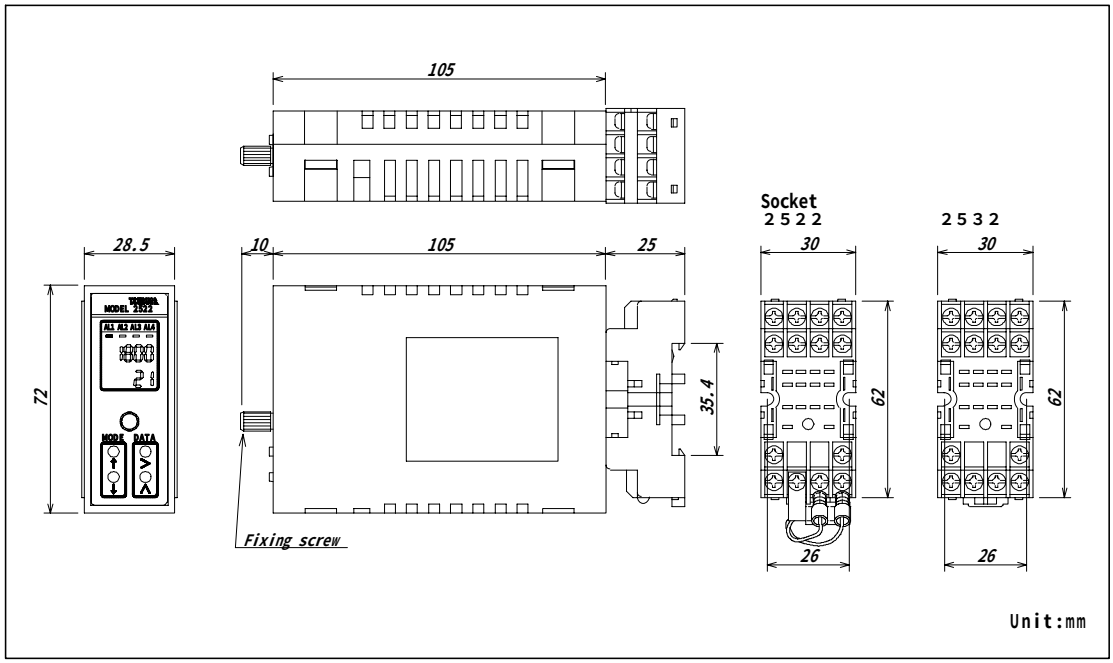
Power OFF



Standard variable resistor

**Fig.3**

## ■Dimensions




## ■Maintenance

Store the product within the range of specified storage temperature ( -20～70℃).

## ■Calibration Method

To maintain the accuracy over the long time, the calibration at an interval of about one year is recommended.
Calibrate the product at 23℃±5℃, 75%RH or less. For the calibration method, please refer to the article of calibration mode.


| Contact Information |
|---|
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