# Instruction Manual

## Digital Meter Relay Model 4258

I-01620

## 1. Preface

- Please take care that this instruction manual is certainly delivered to the person in charge of operating this instrument.
- Unpack the product and confirm that the following items are included.
  (1) 4258 main unit (2) Instruction manual (3) Stickers of units
  (4) Sticker to indicate comparison system (models provided with HI, GO, and LO only)
  (5) A connector is attached when the meter relay is provided with an optional data output.
- Cautions for use
  For safety use, please observe the following cautions.

### ⚠ CAUTION

- **No power on-off switch is provided on the model 4258 so it immediately starts to work when connected to the power source. The rated data of this instrument is, however, defined with the pre-heating for 15 minutes or more.**
- **When the model 4258 is mounted into a system cabinet, take care for ventilation so that the inside temperature will not exceed 50°C.**
- **Do not use the instrument in such places as follows as it may cause break-down or malfunction of the instrument.**
  **Places where: - 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.**
  **- Where there is constant vibration or shock.**

## 2. Standard Specifications

### ■Model Designation

**Model Name** 4258 -□-□-□-□-□
*1 2 3 4 5*

**【1】Power Supply Voltage**

| Code | Power Source Voltage |
|---|---|
| A | AC100~240V |
| B | DC12~24V |

**【2】data Output**

| Code | Specifications | Output Impedance | Tolerable Load Resistor |
|---|---|---|---|
| Blank | No output | ———— | ———— |
| 03 | Analog output DC±1V | 0.1Ω or less | 200Ω or more |
| 04 | Analog output DC±5V | 0.1Ω or less | 1kΩ or more |
| 05 | Analog output DC±10V | 0.1Ω or less | 2kΩ or more |
| 09 | Analog output DC1~5V | 0.1Ω or less | 1kΩ or more |
| 23 | Analog output DC±1mA | 5MΩ or more | 0~10kΩ |
| 24 | Analog output DC±5mA | 5MΩ or less | 0~2kΩ |
| 29 | Analog output DC4~20mA | 5MΩ or less | 0~600Ω |
| BP | BCD output (TTL level, positive logic) | ———— | ———— |
| BN | BCD output (TTL level, negative logic) | ———— | ———— |
| DN | BCD output (transistor output, sink type) | ———— | ———— |
| E1 | RS-485 output | ———— | ———— |

**【3】Alarm Output**

| Code | Specifications |
|---|---|
| Blank | Relay contact output |
| TN | Open collector output (NPN) |

**【5】Display Color**

| Code | Description |
|---|---|
| Blank | Red LED |
| G | Green LED |

**【4】Comparison System**

| Code | Description |
|---|---|
| Blank | HI, GO, LO ※ |
| H | HI, GO , — |
| L | —, GO, LO |

※HH, GO, H (Higher High, High limit)
can be changed to L, GO, LL (Low, Lower Low limit).

## ■Measuring Input

● Thermocouple

| Type of T/C | Measuring Range | Display Range |
|---|---|---|
| R | 100~1768°C | -50~1800°C |
| K | -200~1372°C | -270~1400°C |
| E | -200~1000°C | -270~1050°C |
| J | -200~1200°C | -210~1250°C |
| T | -200~400°C | -270~420°C |
| B | 600~1800°C | -20~1820°C |
| N | -200~1300°C | -230~1350°C |

Accuracy: ±(0.3% of rdg +1°C)
Defined in the measuring range, at 23°C±5°C.
Cold junction compensation: ±1°C, defined at operating temperature 0~50°C.
Calibration is made with standard thermo-electricity input (mV) in accordance with JIS C-1602 1995.
Temperature coefficient: ±300ppm/°C, defined at operating temperature 0~50°C.

● Resistance thermo bulb

| Type of sensor | Measuring Range | Display Range |
|---|---|---|
| Pt100Ω(JIS'97) | -200.0~850.0°C | -200.0~870.0°C |
| JPt100Ω(JIS'81) | -200.0~645.0°C | -200.0~660.0°C |

Accuracy: ±(0.2% of rdg +0.3°C)
Defined in the measuring range, at 23°C±5°C.
Calibration is made with standard resistance values in accordance with JIS C-1604 1997.
Temperature coefficient: ±200ppm/°C, defined at operating temperature 0~50°C.

## ■General Specifications

| | | |
|---|---|---|
| Display | : | 0~9999 red or green LED (character height 14.2mm) with zero-suppress function. |
| Input sensor | : | Selectable |
| °C/°F display | : | Selectable by the front panel switch. (°F display) = (°C display ) × 9/5+32<br>The display to exceed 9999 is the over-range. |
| Over-range indication | : | When exceeded the displayable range, the minimum or maximum value of the displayable range blinks. |
| Burnout | : | Resistance thermo bulb input : Blinking with maximum value of display range<br>Thermocouple input: Blinking with minimum or maximum value of display range (programmable) |
| Resolution | : | Thermocouple input: 1°C<br>Resistance thermo bulb input: 0.1°C |
| External resistance | : | Thermocouple input: 500Ω or less. |
| Wire resistance | | Resistance thermo bulb input: 5Ω or less per one lead wire. |
| Sampling rate | : | Approx. 5 times/sec. |
| Display Cycle | : | Function to select either cycle of 200ms, 400ms, 1s, 2s, 4s, or 5s is provided. |
| Input Type | : | Single ended. |
| A/D Conversion | : | Δ-Σ conversion system. |
| Peak/Bottom Memory, Amplitude Display | : | Display of max., min. or amplitude between them is possible.<br>Selectable by switch on front panel. |
| Averaging Function | : | Average of display data is calculated in fixed duration or in moving. |
| Noise Rejection | : | Normal mode (NMR) 50dB or more<br>Common mode (CMR) 110dB or more<br>Power source line penetrating noise 1000V |
| Comparison Digits | : | 4 digits for numeral and 1 digit for polarity. |
| Output Selection | : | Comparison output is selectable by switch setting for actual value, peak memory value, bottom memory value or amplitude. |
| Comparator System | : | Independent setting for 2 points. Arbitrary setting for 2 high limits and 2 low limits.<br>(for the models with HI, GO, LO specifications only)<br>CPU comparison judgement system<br>Function to switch over equal GO judgement or equal NG judgement is provided. |
| Setting Method | : | Digital switch setting. |
| Hysteresis Width Setting | : | 1~999 Common setting for 2 comparison outputs. |
| Comparator Display | : | LED display.<br>HI (red), GO (green), LO (yellow) |
| Comparator Output | : | Relay contact output: One 1a contact each for HI, GO, LO<br>Contact capacity AC125V 0.5A resistive load.<br>AC250V 0.1A resistive load.<br>Open collector output (NPN): HI, GO, LO<br>Output rate DC30V 30mA (Max) |

Output saturated voltage DC1.6V or less

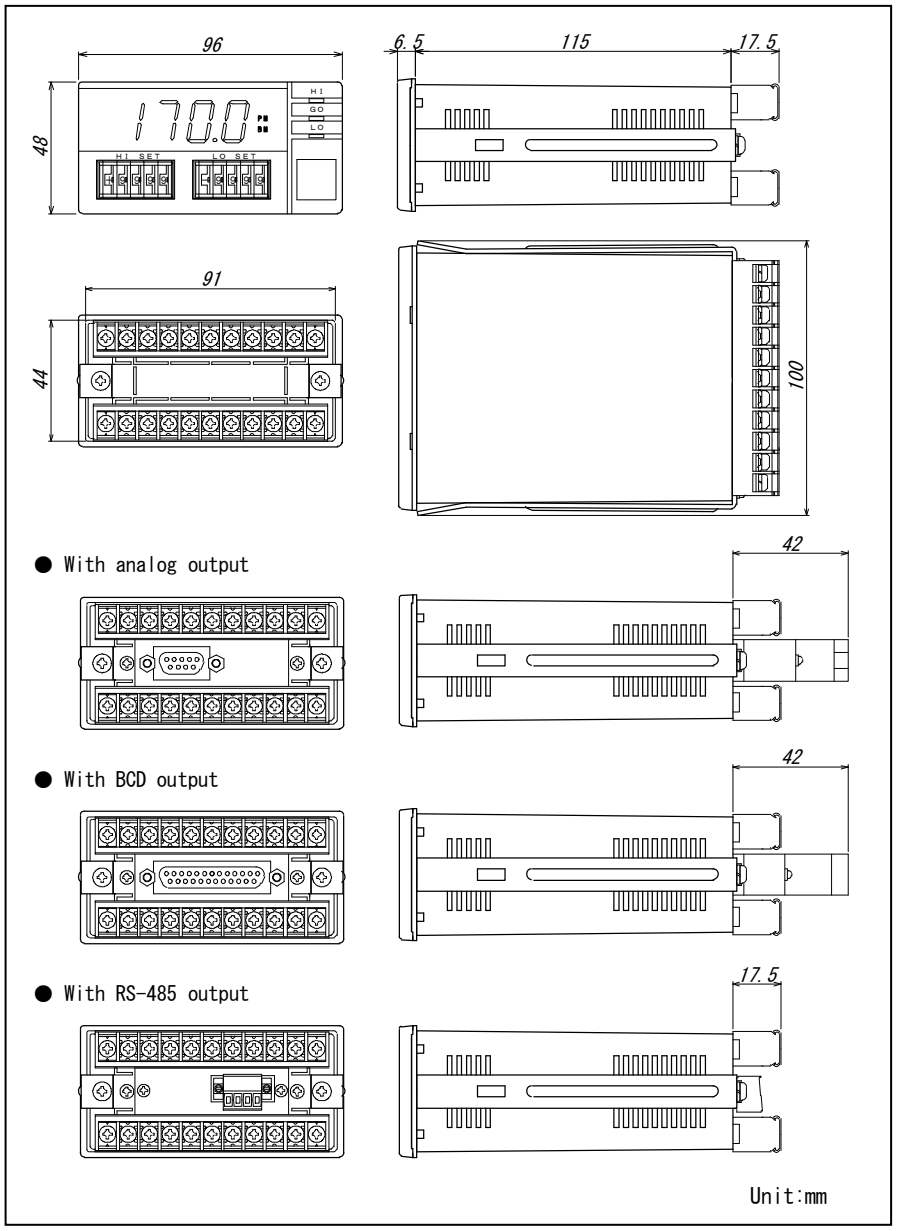
| | | |
|---|---|---|
| Output Delay | : | ON delay.<br>0~60 sec., resolution 1 sec., adjustable to arbitrary value by the front panel switch. |
| Hold Function | : | Measured data, peak/bottom memory value, amplitude and comparator output are held.<br>Not isolated from the input. |
| Reset Function | : | Resets (makes OFF) the alarm output. Not isolated from the input. |
| Insulation Resistance | : | DC500V 100MΩ or more. |
| Withstanding Voltage | : | Input output terminals - Case : AC1500V each for 1 min.<br>Power supply terminals - Case : AC1500V each for 1 min.<br>Power supply terminals - Input output terminals : AC1500V each for 1 min. |
| Power Source Voltage | : | AC100~240V 50/60Hz<br>DC12~24V |
| Tolerance of Source Voltage | : | AC90~250V<br>DC9~32V |
| Power Consumption | : | Approx. 5VA at AC100V input, approx. 7VA at AC200V input.<br>Approx. 200mA at DC12V input, approx. 100mA at DC24V input. |
| Operating Temperature | : | 0~50°C |
| Storage Temperature | : | -20~70°C |
| Weight | : | Approx. 450g |
| Mounting Method | : | Fastening from rear of the panel by metal brackets. |

## ■Unit Labels (attached)

°F (sticker of °C is adhered on the product.)

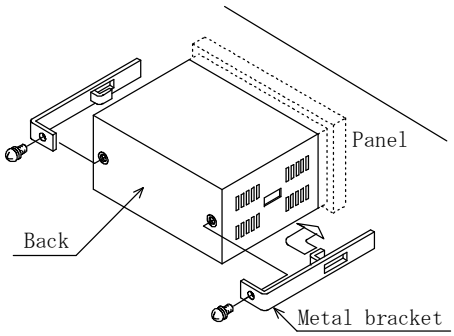
**Note**: Actual characters of the units printed on the stickers may be different from the above characters.

## ■Dimensions



## ■Installation

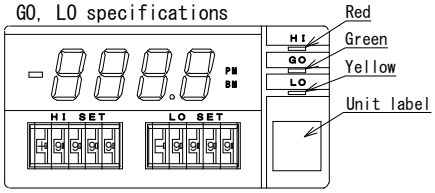
Remove the metal brackets at both sides, insert the instrument from the front and fix it by the brackets.



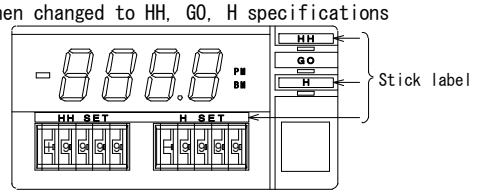

Panel cut-out dimension: $92^{+0.8}_{0}$ × $45^{+0.6}_{0}$ mm
Allowable panel thickness: 0.6~6mm
**Note:** Recommended thickness for the panel of aluminum is 1.5mm or more to avoid deformation of the panel.
Optimum torque of fixing screws: 0.25~0.39N･m

## ■Front Panel View of Each Comparator System

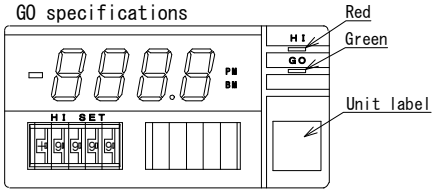
HI, GO, LO specifications



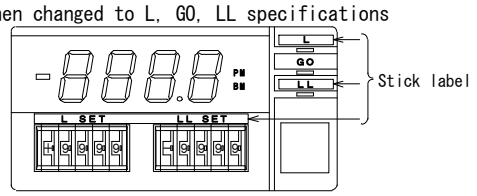

When changed to HH, GO, H specifications



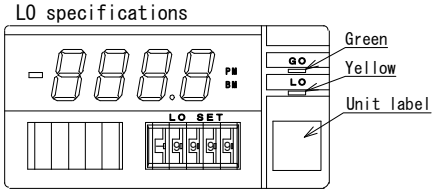

HI, GO specifications




When changed to L, GO, LL specifications




GO, LO specifications




○ In case that the comparator system is changed for the HI, GO, LO specifications model, stick a label of comparator system attached to the instrument.

# 3. Data Output (Option)

## ■Analog Output Specification

- Measuring input and analog output are isolated.
- Change of output : Either output, current value, peak memory value, bottom memory value or amplitude, is output by switch setting.

Scaling : Arbitrary range is output at the rated output, by switch setting.
Output specific error : ±0.15% of SPAN at 23°C±2°C.
Temperature coefficient : ±200ppm/°C.
Resolution : 1/2000 (minimum resolution is 0.1 °C for both thermocouple and resistance thermo bulb.)
When the output is scaled to 0~200 °C for the thermocouple input, for example, the analog output is given with the resolution of 0.1 °C.
Output cycle : 200ms

## ■BCD Output Specification

- Measuring input and BCD data input/output are isolated.
- Either output, current value, peak memory value, bottom memory value or amplitude, can be selected with remote control.
- Display value and output data are independent of each other.
- Setting of front switch allows to change the output cycle and data as follows:
  1) To output the same data as displayed at display cycle.
  2) To output the measured data at sampling rate. The averaging transaction does not follow.

- **TTL output ( BP: Positive logic, BN: Negative logic)**

Data output : Parallel BCD (1-2-4-8) code, latch output.
TTL level (CMOS compatible), Fo=2
Control output : Over (OVER), polarity (POL), synchronization signal (SYNC)
TTL level (CMOS compatible), Fo=2
(At over: logic 1, at + polarity: logic 1)
Control input : Latch (LATCH)
Data output and control output are held but the display is not held.
Active "L" $I_{IL} \leqq -1$mA, "L"=0~1.5V, "H"=3.5~5V
Memory function
(PEAK MEMORY, BOTTOM MEMORY, MEMORY RESET)
Active "L" $I_{IL} \leqq -1$mA, "L"=0~1.5V, "H"=3.5~5V
Data enable (OUTPUT ENABLE)
Active "H" $I_{IL} \leqq -1$mA, "L"=0~1.5V, "H"=3.5~5V

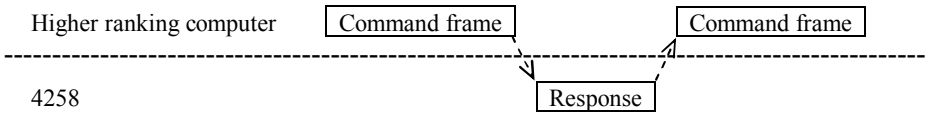
- **Transistor output ( DN: Sink type)**

Output capacity : DC30V 30mA MAX
Data output : Parallel BCD (1-2-4-8) code, latch output.
Transistor ON with "1", transistor OFF with "0".
Control output : Over (OVER), polarity (POL), synchronization signal (SYNC)
Transistor "ON" with over display
Transistor "ON" with + polarity
Transistor "ON" for 10ms synchronized with the measured data conversion.
Control input : Latch (LATCH)
Data output and control output are held but the display is not held.
Memory function
(PEAK MEMORY, BOTTOM MEMORY, MEMORY RESET)
Active "ON"
Data enable (OUTPUT ENABLE)
Active "OFF"

## ■RS-485

- Measuring input is isolated.

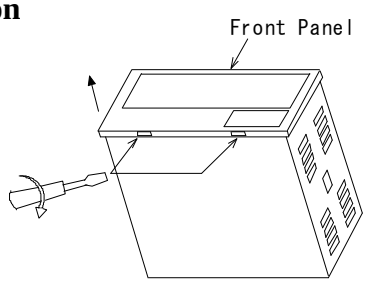
Synchronization system : Start-stop synchronous system.
Communication system : Two wire duplex transmission system.
Transmission speed : 9600bps
Data length : 7bit
Stop bit : 1bit
Error detection : Vertical parity, even numeral parity
Data : Compatible with JIS 8 units code.
Control character : STX (02H) start of text
ETX (03H) end of text
Connectable units : Max. 32 units including higher ranking computer.
Line length : Max. 500m
Cable to use – Shielded twisted pair cable (AWG28 or higher).
Units numbering : 00~99, Setting of unit number for each unit (it must not be duplicated).
Terminator : Change-over by jumper on terminal block. Termination with 200Ω.
Transmission procedure : No procedure.
Higher ranking computer sends a command frame and 4258 transmits the response corresponding to the command frame.



## 4. Setting of Each Function

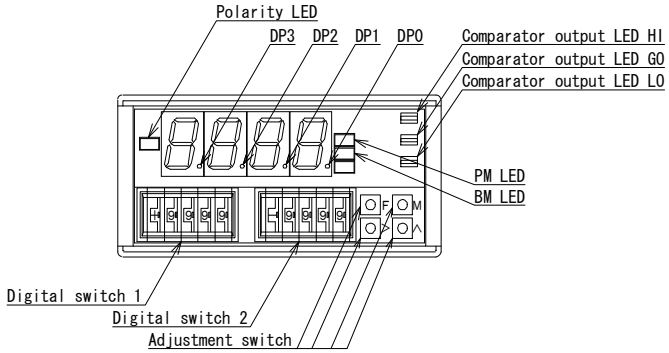
### ■Removal of Front Panel

Insert (-) screwdriver into the dips at the low end of instrument and remove the front panel.




Wrench the panel open with (-) screwdriver.

### ■Layout of Front Panel Inside




● **Function of Each Switch**

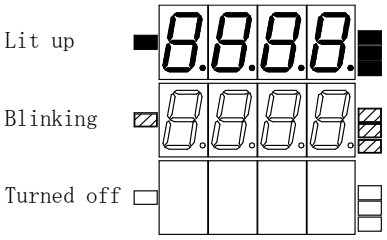
Function Switch [F] : Change of mode between measuring and setting.
Change of function group in setting mode.

Mode Switch [M] : Change of memory display in measurement mode.
Change of setting parameters in setting mode.

Shift Switch [>] : Setting of value of each function and change.

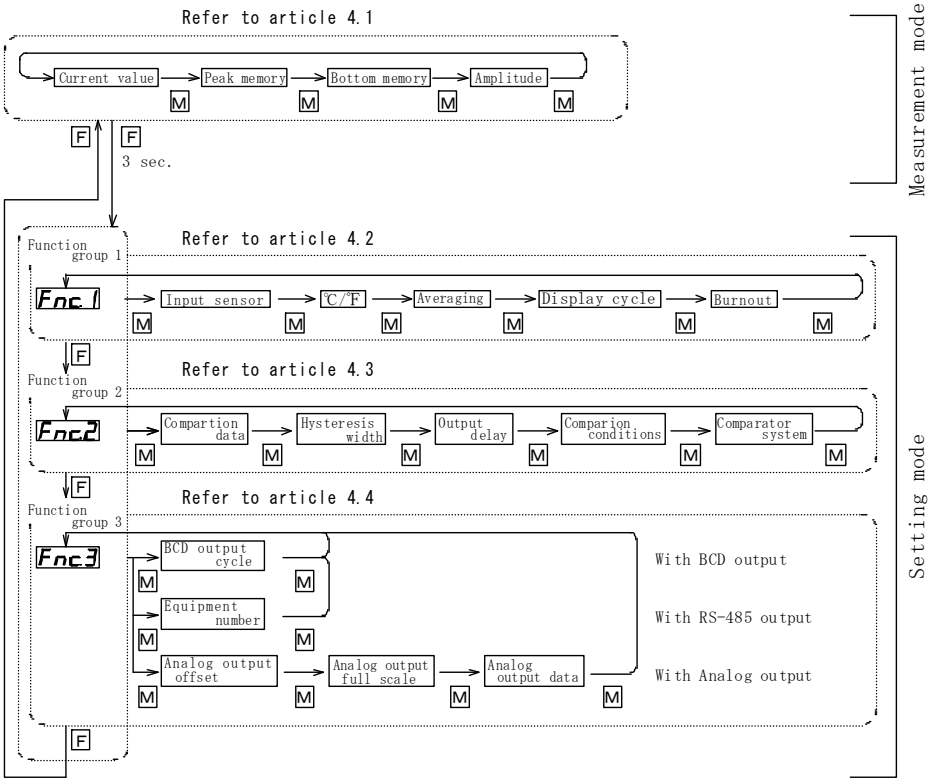
Up Switch [∧] : Setting of value of each function and change.
(When ∧ and > are simultaneously pressed for 3 seconds ore more in measuring mode, it resets the memory.)

● **Status of LED**



## ■Outline of Setting

Functions such as change of input sensor, averaging etc. are divided into 3 groups.
Depending upon the function to set, select the setting from among the following outline.
**Note)** During the setting mode, comparator output just before entering the setting is held.

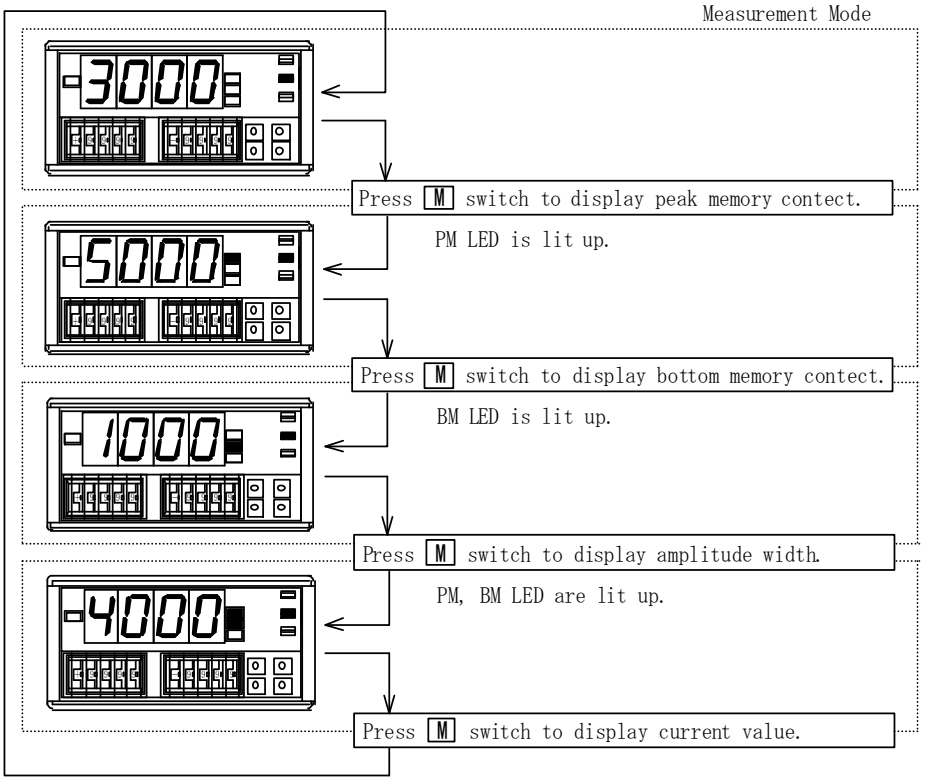



- To change each setting, press [>] switch.
- When returning from setting mode to measuring mode, the setting is memorized in the EEPROM. Display is then turned off once.
- Comparator system can not be set in case of single point setting of HI, GO or GO, LO.
- When the average calculation is moving average, the display cycle is fixed to 200ms and it can not be changed.
- For the models without data output, there is no setting of function group 3.
- When the input sensor Pt100Ω or JPt100Ω (resistance thermometer) is selected, there is no setting of burnout.

## 4.1 Change of display, memory

### 4.1.1 Change of display

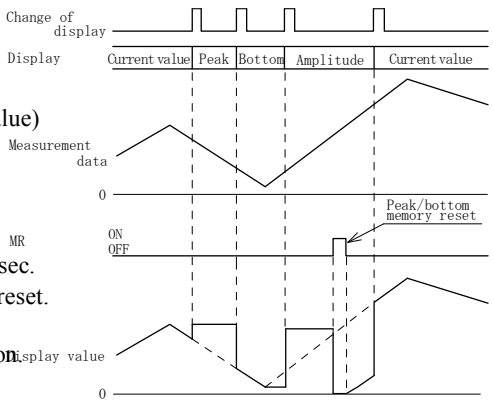
It is possible to select a data to display.



### 4.1.2 Explanation of memory function

- Peak/bottom memory, amplitude function
  Max. value (peak value), min. value (bottom) can be memorized and displayed. An amplitude (max. - min. value) can also be displayed.

- Reset of peak/bottom memory
- Reset from the panel front:
  When [∧] and [>] are simultaneously pressed for 3 sec. or more, the display is turned off once and the memory is reset.
- Reset from the memory reset terminal (MR):
  Refer to the lower terminal arrangement and its explanation.
- Reset by power OFF:
  When the power is turned OFF, the peak/bottom memory values are reset.

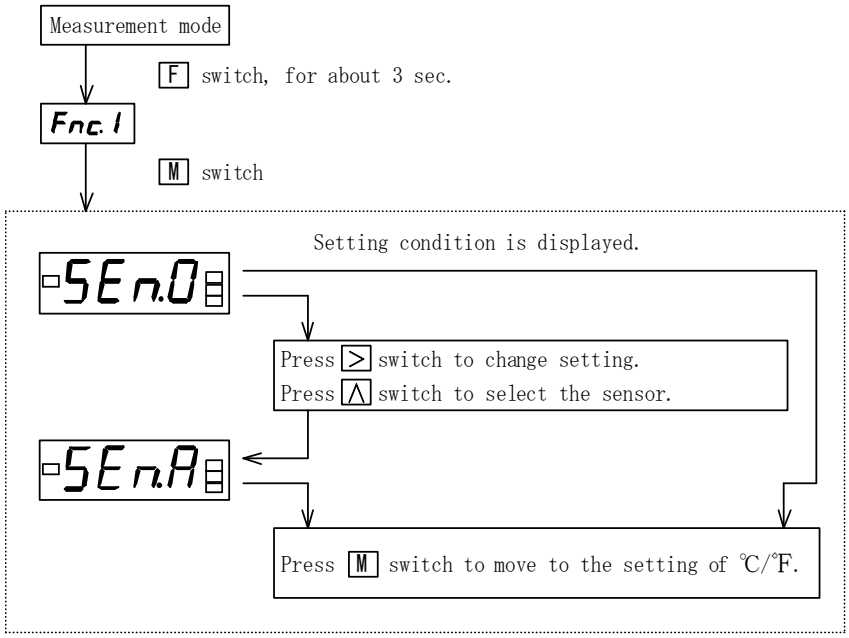



When the MR input terminal is ON, the memory data is continuously updated, so the current value is displayed and output. In case of amplitude, however, it is current value – current value, making 0 display.

## 4.2 Setting of function group 1

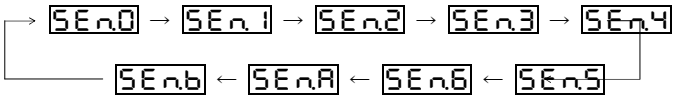
### 4.2.1 Selection of input sensor

- Input sensor is selectable
  Example: Change K sensor to Pt100Ω



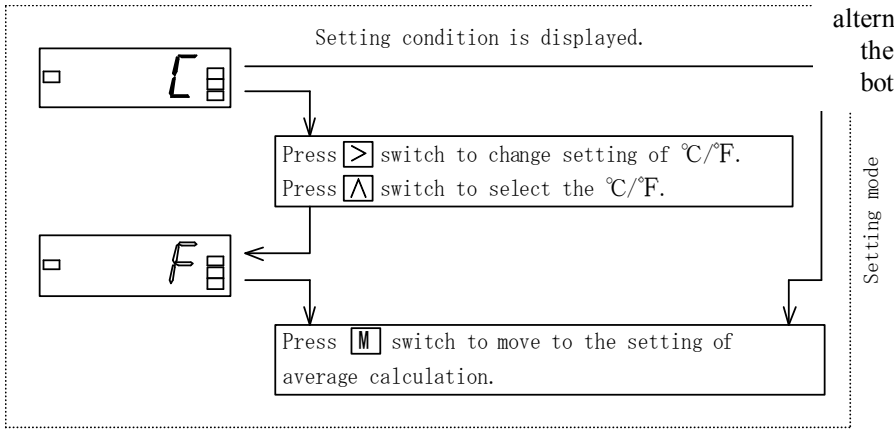

- When the input sensor is changed,
  the peak memory value and bottom memory value are reset to

| Display | Sensor |
|---|---|
| SEn0 | K |
| SEn1 | J |
| SEn2 | R |
| SEn3 | E |
| SEn4 | T |
| SEn5 | B |
| SEn6 | N |
| SEnA | Pt100Ω |
| SEnb | JPt100Ω |




### 4.2.2 Change of °C/°F

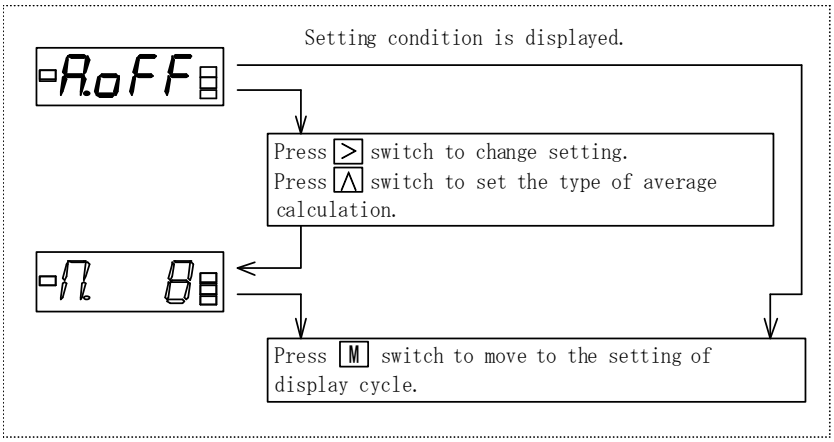
- °C display or °F display can be set
  Example: Change °C display to °F display




- When the °C and °F is alternated,
  the peak memory value and bottom memory value are reset

### 4.2.3 Average calculation

● Average calculation is made either in fixed duration (fixed sample data during display cycle time) or in moving (continuously updated sample data).
Example: No average calculation is changed to moving average of 8 sample data.




Relation between display cycle and the numbers of data sampling of per-display-cycle averaging:

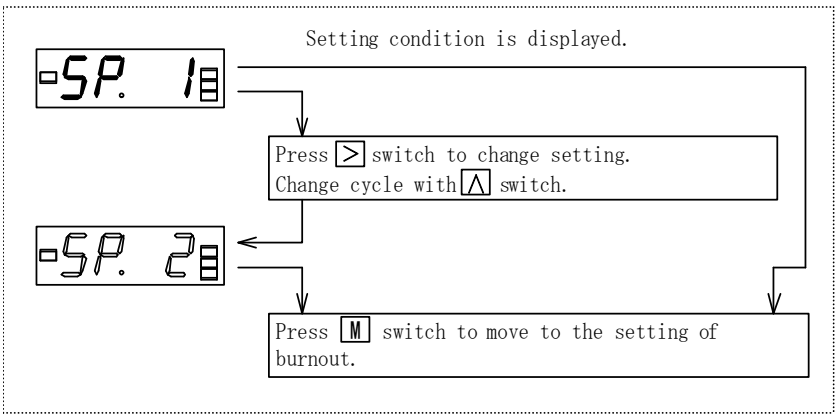
| Display cycle | Numbers of data |
|---|---|
| SP.1 | No averaging |
| SP.2 | 2 times |
| SP.3 | 5 times |
| SP.4 | 10 times |
| SP.5 | 20 times |
| SP.6 | 25 times |

Content of averaging

| Display | Content |
|---|---|
| A.oFF | No averaging |
| A. on | Per-display-cycle Av. |
| M. 2 | Moving Av., 2 times |
| M. 4 | Moving Av., 4 times |
| M. 8 | Moving Av., 8 times |
| M. 16 | Moving Av., 16 times |
| M. 32 | Moving Av., 32 times |

### 4.2.4 Display cycle

● Display cycle of the display data can be slowed.
Sampling rate of the measurement does not vary even if the display cycle is slowed.
Example: Display cycle is changed from 200ms to 400ms.



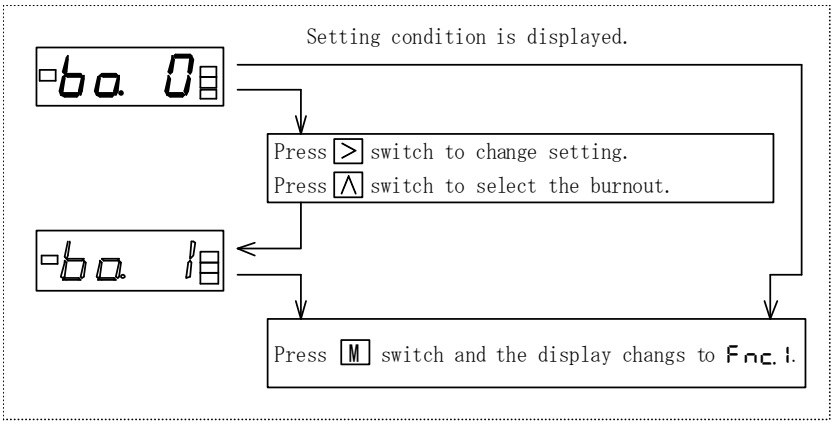

| Display | Display Cycle |
|---|---|
| SP.1 | 200ms |
| SP.2 | 400ms |
| SP.3 | 1 s |
| SP.4 | 2 s |
| SP.5 | 4 s |
| SP.6 | 5 s |


(Note) In case that the input sensor is Pt100Ω or JPt100Ω, it changes to Fnc. 1.

When the average calculation is of moving average, SP.M is displayed.
If a change of setting is tried in this case, Err is displayed and returns to SP.M display.

### 4.2.5 Burnout

● In case that the sensor is K thermocouple, plus burnout or minus burnout can be set.
Example: Change plus burnout to minus burnout

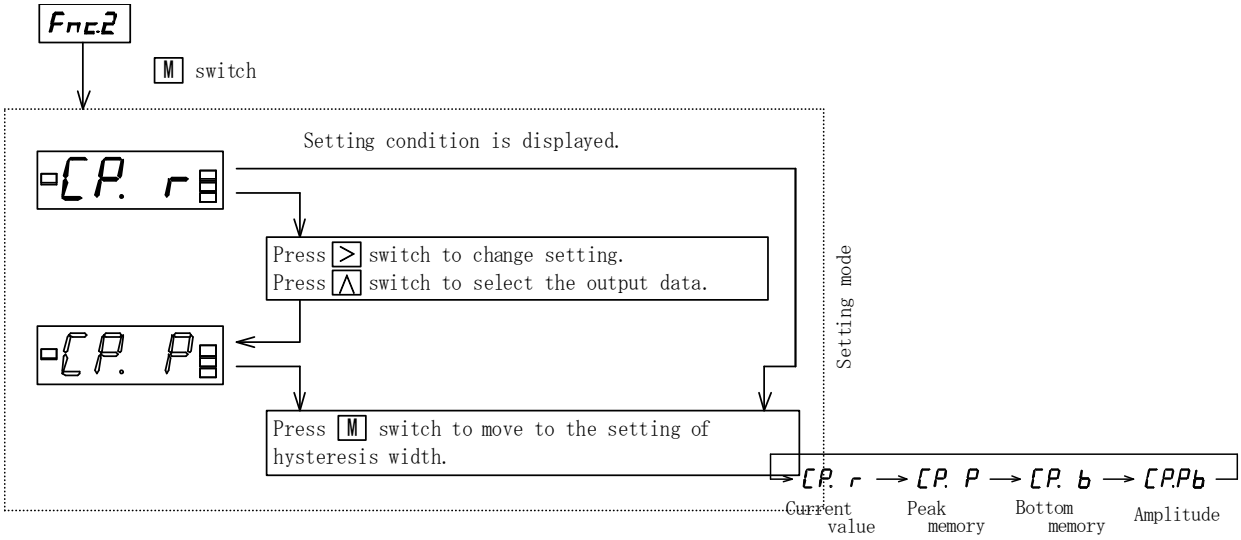



bo. 0 : plus burnout
bo. 1 : minus burnout

## 4.3 Setting of function group 2

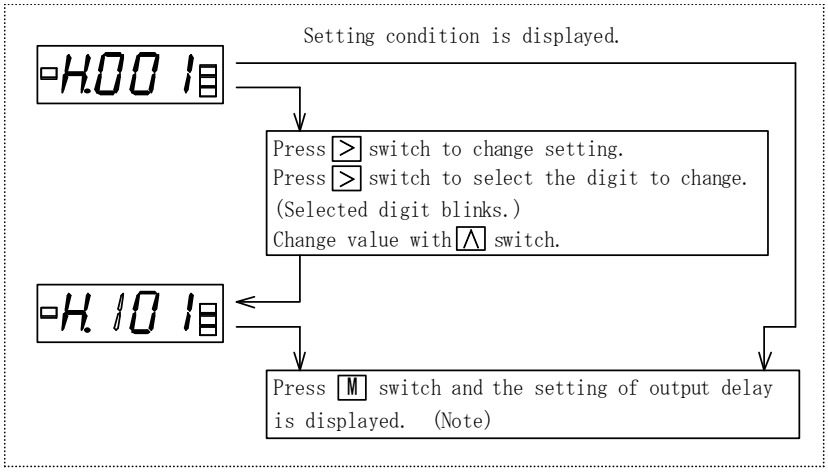
### 4.3.1 Comparison data

● Data to compare can be selected from actual value, peak memory value, bottom memory value or amplitude.
Example: Data to compare for alarm setting is changed from actual value to peak memory value.




### 4.3.2 Hysteresis width

● Width of hysteresis can be set (common for two points).
Adjustable rage: 1~999
Example: Set value of hysteresis width is changed from 1 to 101.

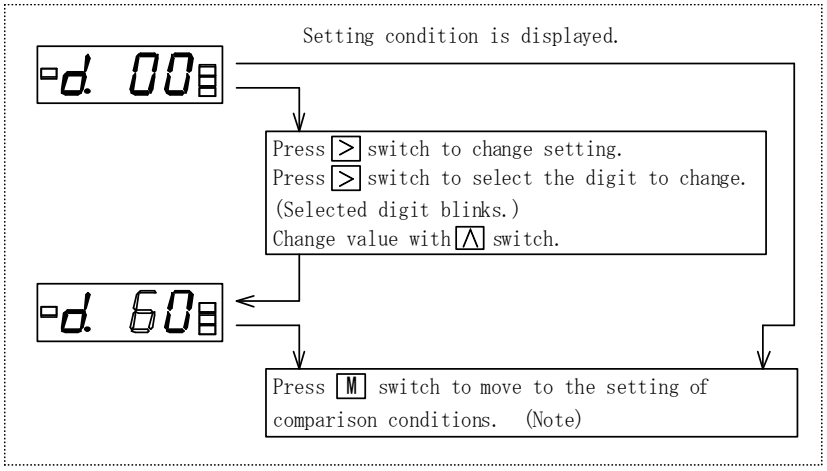



∧ switch:
0→1→2→3→……..→9→0

**Note:** It is not possible to set the value 0. If the value 0 is set, it is not allowed to exit from the setting mode.

### 4.3.3 Output delay

● Output delay can be set (common for two points).
Adjustable rage: 0~60 sec. (resolution 1 sec.)
Example: On delay time of comparator output is changed from 0 sec. to 60 sec.



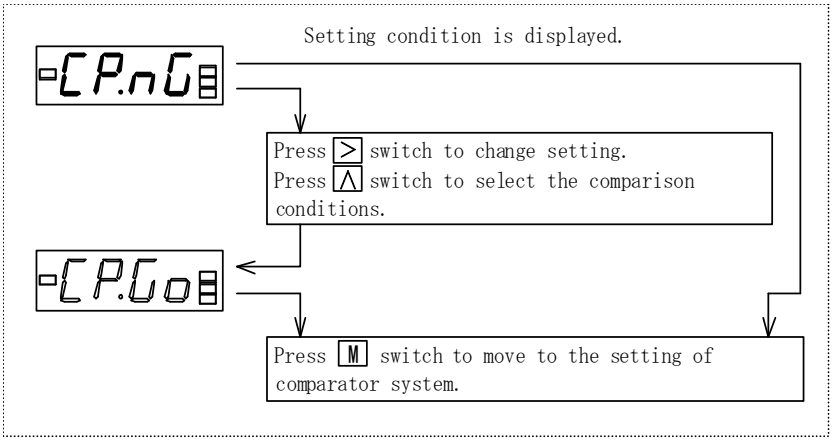

∧ switch:
0→1→2→3→……..→9→0
In case of $10^1$:
0→1→2→……..→6→0

**Note:** It is not possible to set the value more than 60.
If the value more than 60 is set, it is not allowed to exit from the setting mode.

### 4.3.4 Comparison conditions

● Change-over of equal GO/NG

Example: Transaction to be taken when the comparator data and the comparator set value are equal, from NG (alarm output) to GO (no alarm output).



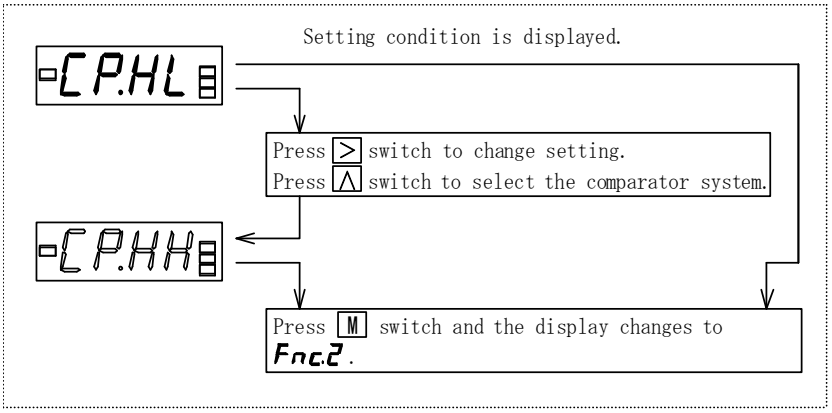

∧ switch:
CP.Go→CP.nG→CP.Go
CP.Go: Equal GO
CP.nG: Equal NG

### 4.3.5 Comparison conditions

● Models of comparator system HI, GO, LO can be changed to have HH, GO, H (Higher High limit, High limit) or L, GO, LL (Low limit, Lower Low limit).

● Models of comparator system HI, GO (High limit only) or GO, LO (Low limit only) do not have this function.

Example: Comparator output is changed from HI, GO, LO to HH, GO, H (High limit, High limit)



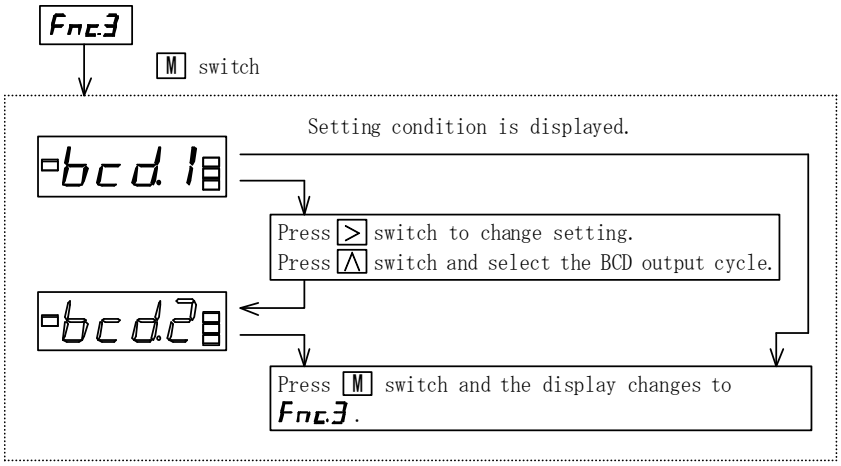

∧ switch, when comparator system is set:
CP.HL→CP.HH→CP.LL→CP.HL
CP.HL: HI, GO, LO action
CP.HH: HH, GO, H action
CP.LL: L, GO, LL action

HH and H, or L and LL, are not bigger or smaller than the other.

## 4.4 Setting of function group 3

### 4.4.1 BCD output cycle (when provided with BCD output)

● It is possible to set to output the BCD data either with display cycle or with sampling rate.




bcd.1: Outputs the BCD data at display cycle.
bcd.2: Outputs the BCD data at sampling rate.

Setting mode

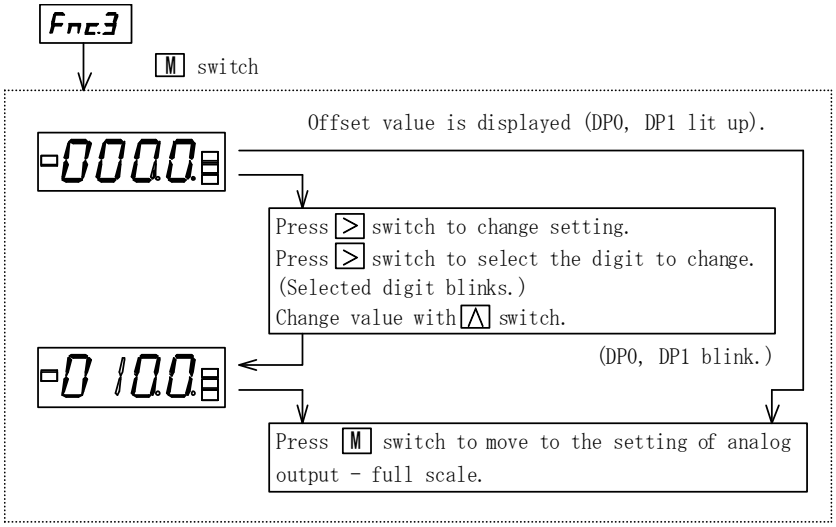
When the BCD output cycle is set to the sampling rate, BCD data is disabled for the following functions:

- Average calculation (BCD data is output as of function OFF).

Note: When the BCD output cycle is set to the sampling rate, the timing of data renewal changes, so the display and the BCD data may not correspond with each other.

### 4.4.2 Analog output – Offset (when provided with analog output)

● Offset can be set to an arbitrary value.
Example: With the rated input 4~20mA, the display at the input 4mA is adjusted from 0 (°C) to 100 (°C).

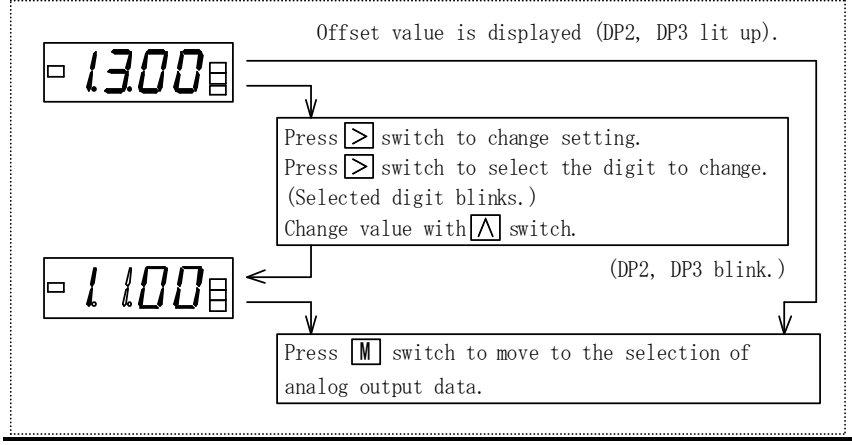



- In case of ±output rate such as DC±10V (DC±1mA), the display at the output of 0V (0mA) is set.
- The setting at out of the display range is possible, but it restricts the output value.
- Although the display of resistance thermometer is in 0.1°C resolution, eliminate the decimal point for the offset setting.
  For example, 100.0 °C is to be set, set it as 1000.

Setting mode

### 4.4.3 Analog output – Full scale (when provided with analog output)

● Full scale can be set to an arbitrary value.
Example: With the rated input 4~20mA, the display at the input 20mA is adjusted from 1300 (°C) to 1100 (°C).

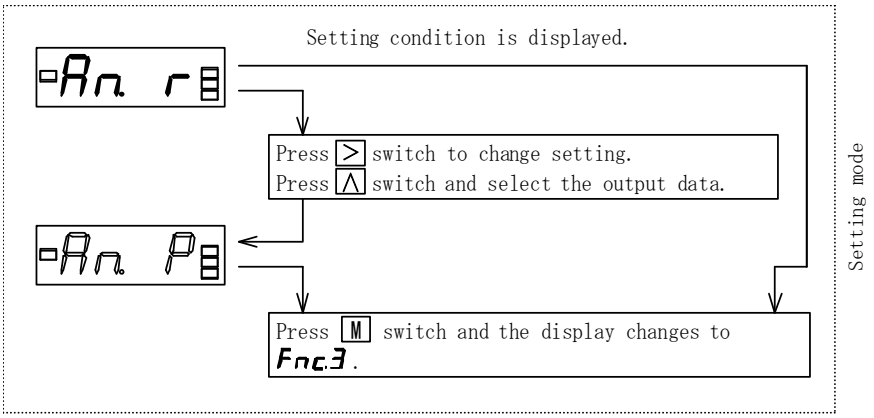


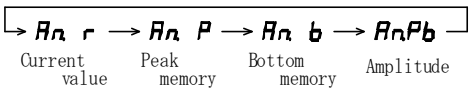

- In case of ±output rate such as DC±10V (DC±1mA), the display at the output of 10V (1mA) is set.
- The setting at out of the display range is possible, but it restricts the output value.
- Offset>full scale (reverse positioning) is also possible.
- In case that the offset and full scale are set to the same value, 0% is output as analog output.
- Although the display of resistance thermometer is in 0.1°C resolution, eliminate the decimal point for the full scale setting.
  For example, 600.0 °C is to be set, set it as 6000.

Setting mode

### 4.4.4 Analog output data (when provided with analog output)

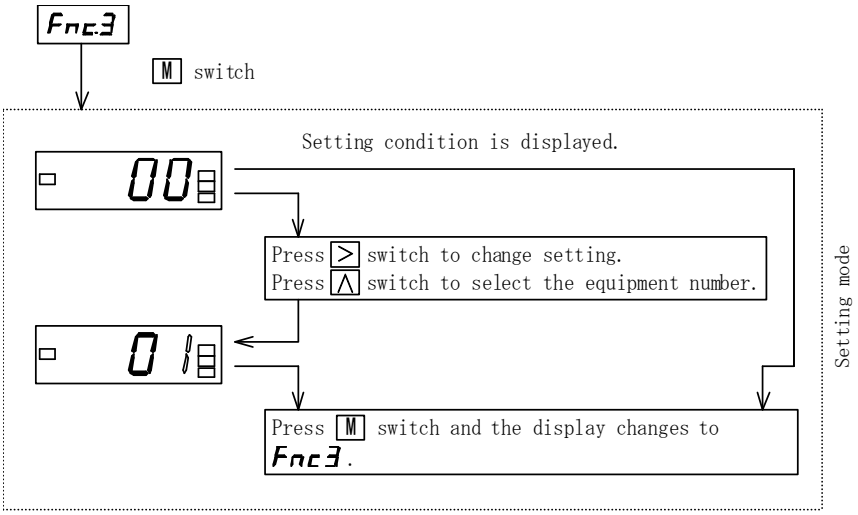
● Analog output data can be selected from actual value, peak memory value, bottom memory value or amplitude.
Example: Analog output data is changed from actual value to memory value.




### 4.4.5 Equipment number

● The equipment number of RS-485 output can be set.
Settable range: 00~99 (no duplication is allowed)
Example: Change the equipment number from 0 to 1.




**■Initial setting at factory before delivery**

| Mode | Function | | Set Value |
|---|---|---|---|
| Measurement display | Change of display | | Display of current value |
| Fnc.1 | Input sensor | | SEn.0 (K) |
| | °C/°F | | C (°C) |
| | Average calculation | | A. on |
| | Display cycle | | SP. 2 |
| | Burnout | | bo. 0 (plus burnout) |
| Fnc.2 | Comparator data | | CP. r |
| | Hysteresis width | | H.001 |
| | Output delay | | d. 00 |
| | Comparison conditions | | CP.nG |
| | Comparator system | | CP.HL ※ |
| Fnc.3 | BCD output cycle | | bcd.1 |
| | Analog | Offset | 000.0 |
| | | Full scale | 0.100 |
| | | Output data | An r |
| | RS-485 | Equipment number | 00 |

※: This function is not provided for the model of either contact (-H or -L) only.

## 5. Terminal Arrangement and Explanation

**⚠ CAUTION**

- **Do not use the meter with wrong wiring as it may cause breakage of meter or equipment connected.**
- **To avoid an electric shock;**
  - **Turn off the power when the wiring work is done.**
  - **Do not do the wiring work in the humid environment or with the wet hands.**
  - **Do not touch the power source terminals while the meter is powered.**

### ■Terminal Arrangement

#### ● Upper Row Terminals

| **Terminal Code** | NC/A | +/B | NC | -/B | S | COM | MR | HOLD | NC |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **Function** | Thermocouple / Resistance Bulb input | | NC | | Shield | Common | Memory Reset | Hold | NC |

#### ● Lower Row Terminals

(Relay contact output) **Note**: ( )=DC power source models

| **Terminal Code** | Ha | Hc | Ga | Gc | La | Lc | RESET | P2(+) | P1(-) |
|---|---|---|---|---|---|---|---|---|---|
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| **Function** | a contact | Common | a contact | Common | a contact | Common | Reset | Power Source | |
| | HI contact output | | GO contact output | | LO contact output | | | | |

- ○ Terminal numbers 14 and 15 of the models of HI, GO comparator output are NC.
- ○ Terminal numbers 10 and 11 of the models of GO, LO comparator output are NC.
- ○ When the comparator system of the model with comparator output HI, GO, LO is changed, stick the attached label of comparator system on to the existing label of the lower row terminals as shown below.

- When changed to HH, GO, H specifications

| | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | ⑰ | ⑱ |
|---|---|---|---|---|---|---|---|---|---|
| Label→ | HHa | HHc | GOa | GOc | Ha | Hc | RESET | P2(+) | P1(-) |

- When changed to L, GO, LL specifications

| | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | ⑰ | ⑱ |
|---|---|---|---|---|---|---|---|---|---|
| Label→ | La | Lc | GOa | GOc | LLa | LLc | RESET | P2(+) | P1(-) |

(Open collector output)

| **Terminal Code** | HI | TCOM | GO | TCOM | LO | TCOM | RESET | P2(+) | P1(-) |
|---|---|---|---|---|---|---|---|---|---|
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| **Function** | Collector | Common | Collector | Common | Collector | Common | Reset | Power Source | |
| | HI output | | GO output | | LO output | | | | |

- ○ Terminal numbers 14 and 15 of the models of HI, GO comparator output are NC.
- ○ Terminal numbers 10 and 11 of the models of GO, LO comparator output are NC.
- ○ When the comparator system of the model with comparator output HI, GO, LO is changed, stick the attached label of comparator system on to the existing label of the lower row terminals as shown below.

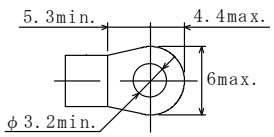
- When changed to HH, GO, H specifications

| | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | ⑰ | ⑱ |
|---|---|---|---|---|---|---|---|---|---|
| Label→ | HH | TCOM | GO | TCOM | H | TCOM | RESET | P2(+) | P1(-) |

- When changed to L, GO, LL specifications

| | ⑩ | ⑪ | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | ⑰ | ⑱ |
|---|---|---|---|---|---|---|---|---|---|
| Label→ | L | TCOM | GO | TCOM | LL | TCOM | RESET | P2(+) | P1(-) |

Terminal screws: M3
Fastening torque: 0.46~0.62N・m
Crimp terminal: As shown on the right.

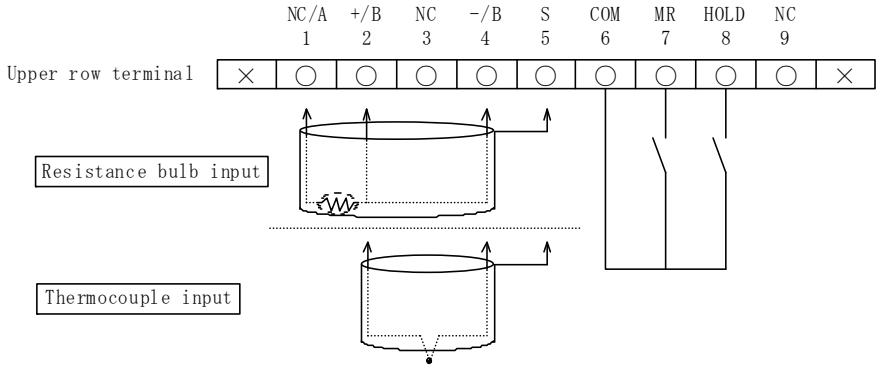


## ■Explanation of Terminals

### ●Measurement Inputs (NC/A, +/B, -/B)

For the thermocouple sensor, make a connection between +/B and -/B terminals with correct polarity.
In case of resistance bulb input, make a connection to NC/A, +/B and -/B terminals.
Be sure to make a separate and independent wiring for the input and power source line.
If the wiring of the input and power source lines are made in parallel closely with each other, it may cause unstable reading.

○ Connection example




### ● Common (COM)

Common terminal for hold, memory reset and reset.

### ● Hold (HOLD)

The measured data are held by making a short-circuit between
Active "L" $I_{IL}$≦1mA, "L"=0~0.8V, "H"=3.5~5V

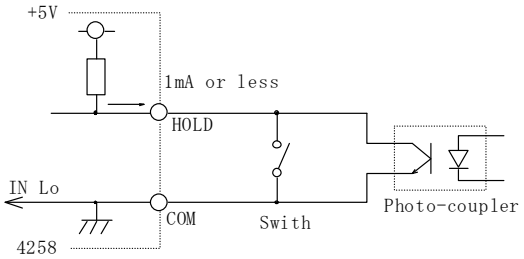
### ● Memory Reset Terminal (MR)

○ By short-circuiting the memory reset terminal to the COM terminal, the peak memory value and bottom memory value are cleared
and a new memory is started.
○ During the short-circuiting of the memory reset terminal, the peak memory value and bottom memory value are current values.
Active "L" $I_{IL}$≦1mA, "L"=0~0.8V, "H"=3.5~5V

### ● Reset Terminal (RESET)

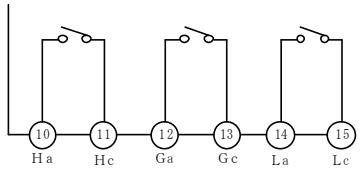
By short-circuiting the reset terminal to the COM terminal, the comparator output is reset.
Active "L" $I_{IL}$≦1mA, "L"=0~0.8V, "H"=3.5~5V

**Note**: COM, HOLD, MR and RESET terminals are not isolated from the input, so, in case of controlling the terminal of each function, it is recommended to use a photo-coupler, relay, switch and so on. Also, in case that the plural numbers of the instruments are controlled, make the control insulating each instrument individually.



## ● Comparator Output

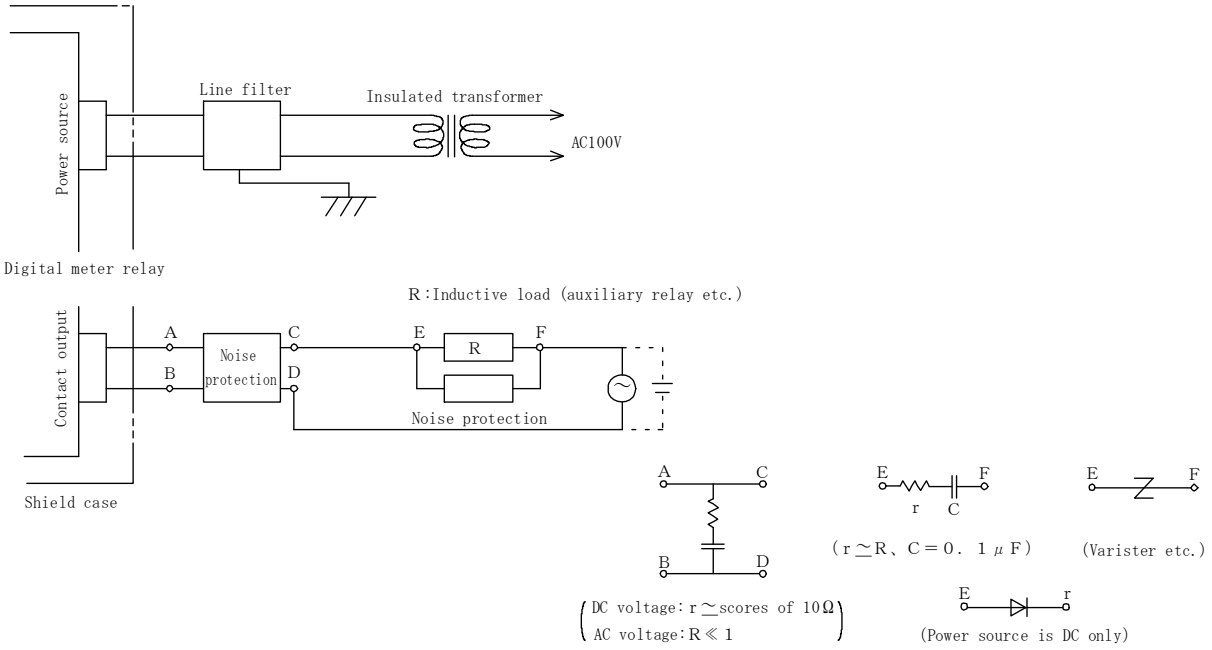
○ Relay contact output (Ha, Hc, Ga, Gc, La, Lc)



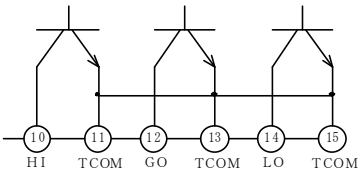

Case of the model with
comparator output HI, GO, LO

Contact capacity AC125V 0.5A (resistive load)
Contact capacity AC250V 0.1A (resistive load)

When an electromagnetic contactor or big size relay is operated with an auxiliary relay connected to the relay output, be sure to take a protective measure to noise.
In case that the noise is frequently generated, it is effective to put the digital meter relay in the shielded case and to insert a power line filter or isolation transformer.
For the protective circuits of contact output, refer to the following figures.




○ Open collector output (HI, TCOM, GO. TCOM, LO, TCOM)




Case of the model with
comparator output HI, GO, LO

Output capacity: DC30V 30mA
Output saturated voltage: DC1.6V or less
Transistor output is isolated from the input terminals.

## ● Power Supply［P1(-), P2(+)］

The power source voltage to be supplied to the instrument is specified on the terminal plate at delivery from factory.
○ AC power source ..... Use the instrument within the range AC90~250V
○ DC power source ..... Use the instrument within the range DC9~32V
Connect + side to P2(+) and - side to P1(-).

**⚠ CAUTION**

- **Do not use the product with the voltage out of the rated range as it may cause breakage of the products.**

## ■Arrangement & Explanation of Middle Row Connector

### ● Analog output

| Function | Pin No. | | Function |
|---|---|---|---|
| NC | 5 | 9 | NC |
| NC | 4 | 8 | NC |
| NC | 3 | 7 | NC |
| NC | 2 | 6 | A. OUT- |
| A. OUT+ | 1 | | |

Connector: Sub D 9P plug type.
Type XM2C-0912

o Voltage or current signal corresponding to the input signal is output at the analog output A.OUT+ and A.OUT-.
The analog output is isolated from the measuring input and HOLD terminal.
Make a connection confirming the polarity.

### ● BCD output

| Function | | Pin No. | | Function | |
|---|---|---|---|---|---|
| $10^1$ | 1 | 1 | 14 | 1 | $10^0$ |
| | 2 | 2 | 15 | 2 | |
| | 4 | 3 | 16 | 4 | |
| | 8 | 4 | 17 | 8 | |
| $10^3$ | 1 | 5 | 18 | 1 | $10^2$ |
| | 2 | 6 | 19 | 2 | |
| | 4 | 7 | 20 | 4 | |
| | 8 | 8 | 21 | 8 | |
| POL | | 9 | 22 | MEMORY RESET | |
| OVER | | 10 | 23 | OUTPUT ENABLE | |
| SYNC | | 11 | 24 | LATCH | |
| DATA COM | | 12 | 25 | PEAK MEMORY | |
| BOTTM MEMORY | | 13 | | | |

Connector: Sub D 25P socket type.
Type XM3B-2522

## ■TTL output

### ● Rated input & output

| Input/Output Signal | | TYPE-BP | TYPE-BN | Rate |
|---|---|---|---|---|
| Output | $\times 10^0 \sim \times 10^3$ | Positive logic | Negative logic | TTL level Fo=2<br>CMOS compatible |
| | POL | +="H", −="L" | +="L", −="H" | |
| | OVER | "H" at over | "L" at over | |
| | SYNC | "L" pulse of 10ms | | |
| Input | LATCH | Held by short-circuit ("L") | | $I_{IL} \leqq$-1mA<br>"L"=0~1.5V,<br>"H"=3.5~5V |
| | ENABLE | Allowed by open ("H")<br>Prohibited by short-circuit ("L") | | |
| | MEMORY RESET | Reset by short-circuit ("L") | | |
| | PEAK/BOTTOM MEMORY | Refer to each article. | | |

### ● Measurement data output ($\times 10^0 \sim \times 10^3$)

Parallel BCD (1-2-4-8) code, latch output. The output is Tri-state type, so a connection to the data bus is easy.

### ● Polarity output (POL)

Polarity of measured data is output from the pin ⑨.

### ● Over-range output (OVER)

When the display is over-range, the output is made at the pin ⑩.

The measuring data output at the time when the input has exceeded the display range is the display data of maximum or minimum

value of display range and the OVER data. When the display has exceeded 9999, the measuring data 9999 and OVER data are output.

In case of the amplitude, the data 0 and OVER are output.

### ● Synchronization signal output (SYNC)

"L" pulse of 10ms synchronized with the display cycle is output at the pin ⑪. Read in the data at the rising point of this SYNC.

In case of connection to the multiple data bus, the wired OR connection is possible.

### ● Data enable input (OUTPUT ENABLE)

When the pin ㉓ is opened ("H"), the data (including POL, OVER) are output.

When it is short-circuited ("L") with the DATA COM (pin ⑫), the data (including POL, OVER) becomes "high impedance" state. In this state, the output of SYNC is prohibited and the connection to data bus is easy.

### ● Latch input (LATCH)

By short-circuiting the pints ㉔ and DATA COM (pin ⑫) or making them “L”, the BCD data is held (the display is not held).

● **Peak Memory (PEAK MEMORY), Bottom Memory (BOTTOM MEMORY)**
By operating the pints ㉕, ⑬ and DATA COM (pin ⑫), the output data can be changed to the actual value, peak value, bottom value or amplitude.

| Signal Name | Actual Value | Peak Value | Bottom Value | Amplitude |
|---|---|---|---|---|
| Peak Memory (pin ㉕) | Open "H" | Short-circuit "L" | Open "H" | Short-circuit "L" |
| Bottom Memory (pin⑬) | Open "H" | Open "H" | Short-circuit "L" | Short-circuit "L" |

● **Memory Reset (MEMORY RESET)**
By short-circuiting the pints ㉒ and DATA COM (pin ⑫), the peak memory and bottom memory values are re-written to the actual values.

● **Data Common (DATA COM)**
Pin ⑫ is common for the measurement data output, POL, OVER, SYNC, LATCH OUTPUT ENABLE, PEAK MEMORY, BOTTOM MEMORY, MEMORY RESET.

● **NC**
NC pins are open pins but do not use them as relay terminal.

**Note:** Data output and control signals are unified to the TTL level, so ensure not to apply the voltage DC5V or higher. Arrange the wiring of data output and control input/output signal lines apart from the power source line, relays or magnet switches etc. of big capacity, as well as the input line.

## ■ Transistor output

In case that the BCD output of plural numbers of the instrument is connected to one PC, the wired OR connection is possible for the measured data (including POL, OVER), SYNC.

● **Rated input & output**

| Signal Code | | Item | TYPE-DN |
|---|---|---|---|
| Output | $\times 10^0 \sim \times 10^3$ | Output type | Sink type |
| | POL<br>OVER<br>SYNC | Output capacity | DC30V 30mA MAX,<br>Saturated voltage 1.6V or less |
| Input | LATCH<br>ENABLE<br>MEMORY RESET<br>PEAK MEMORY<br>BOTTOM MEMORY | Signal level | Input power source = 1mA or less<br>OFF (H)=3.5V~5V, ON( L)=0~1.5V |

● **Measurement Data Output ($\times 10^0 \sim \times 10^3$)**
Parallel BCD (1-2-4-8) code, latch output.
Transistor ON with the measured data "1". Transistor OFF with the measured data "0".

● **Polarity Output (POL)**
Polarity of measured data is output from the pin ⑨.
Transistor ON when the display value is (+). Transistor OFF when the display value is (-).

● **Over-range Output (OVER)**
When the display is over-range, the output is made at the pin ⑩.
Transistor ON when the display is over-range.
The measuring data output at the time when the input has exceeded the display range is the display data of maximum or minimum
value of display range and the OVER data. When the display has exceeded 9999, the measuring data 9999 and OVER data are output.
In case of the amplitude, the data 0 and OVER are output.

● **Synchronization Signal Output (SYNC)**
"ON" pulse of 10ms which is synchronized with the display cycle is output at the pin ⑪.
Read in the data at the rising point (ON→OFF) of this SYNC.

● **Data Enable Input (OUTPUT ENABLE)**
When the pin ㉓ is opened, the data (including POL, OVER) and SYNC are output.
When it is short-circuited with the DATA COM (pin ⑫) , the data (including POL, OVER) becomes "OFF" state.
In this state, the output of SYNC is prohibited, so the connection to data bus is easy.

● **Latch (LATCH)**
By short-circuiting the pints ㉔ and DATA COM (pin ⑫), the data is held (the display is not held).

● **Peak Memory (PEAK MEMORY), Bottom Memory (BOTTOM MEMORY), Amplitude**
By operating the pints ㉕, ⑬ and DATA COM (pin ⑫), the output data can be changed to the actual value, peak value, bottom value or amplitude.

| Signal Name | Actual Value | Peak Value | Bottom Value | Amplitude |
|---|---|---|---|---|
| Peak Memory (pin ㉕) | Open | Short-circuit | Open | Short-circuit |
| Bottom Memory (pin⑬) | Open | Open | Short-circuit | Short-circuit |

- **Memory Reset (MEMORY RESET)**
  By short-circuiting the pints ㉒ and DATA COM (pin ⑫), the peak memory and bottom memory values are re-written to the actual values.

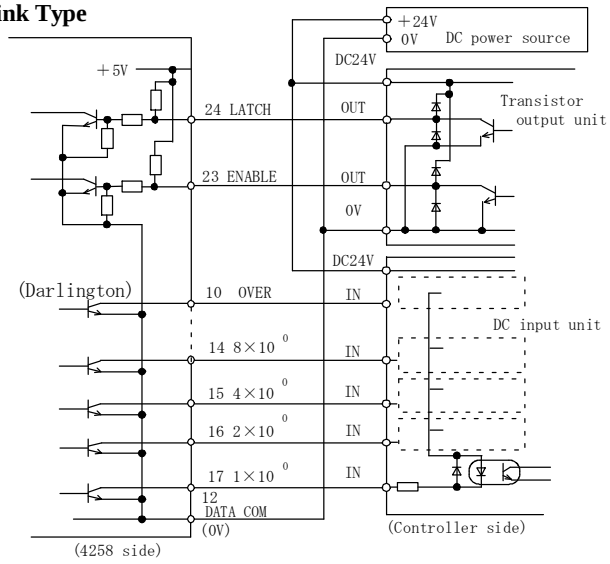
- **Data Common (DATA COM)**
  Pin ⑫ is common for the measurement data output, POL, OVER, SYNC, LATCH OUTPUT ENABLE, PEAK MEMORY, BOTTOM MEMORY, MEMORY RESET.

- **NC**
  NC pins are open pins but do not use them as relay terminal.

**Note:** Arrange the wiring of data output and control input/output signal lines apart from the power source line, relays or magnet switches etc. of big capacity, as well as the input line.

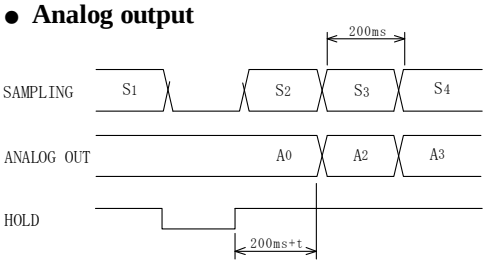
## ■Connection Example

**Sink Type**



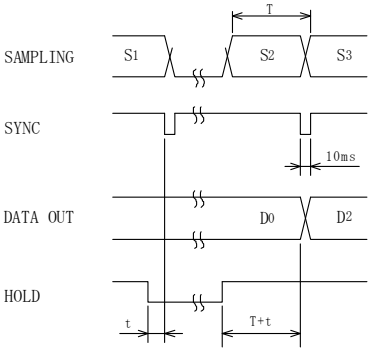

## ■Timing Chart

- **Analog output**



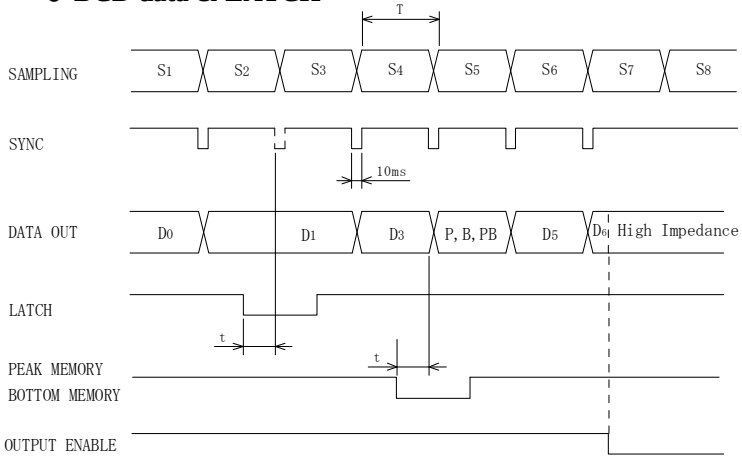

t: Internal transaction time approx. 15ms.

- **BCD data & HOLD**




t : Internal transaction time approx. 15ms.
T : Display cycle or sampling rate.

- **BCD data & LATCH**




P or B, PB : Peak memory value, bottom memory value or amplitude.
t : Internal transaction time approx. 15ms.
T : Display cycle or sampling rate.

## ■Maintenance

Store the instrument within the specified storage temperature (-20~70°C).
When the front panel or the case becomes dirty, wipe it with soft cloth.
For heavy dirt, wipe it lightly with the soft cloth wetted with the neutral cleaner thinned by water, and finish the cleaning with dry

cloth. Do not use organic solvent like benzene or paint thinner as they may deform or discolor the case.

## ■Calibration

In order to maintain a long term accuracy, a calibration at an interval of about one year is recommended.
Perform the calibration under the environmental condition of 23 °C±5 °C, 75%RH or less.

### ● Calibration of thermocouple

Prepare the standard voltage generator, cold junction circuit (ice water in a pot) and the referential thermocouple for calibration.

Keep pressing the [M] switch, power on the meter relay, then it enters calibration mode.

Power supply OFF

Make the wiring as Fig. 1 shows.
Keep pressing the [M] switch, power on the meter relay.
Keep pressing the [M] switch for about 5 seconds, then it enters calibration mode.

CAL and the sensor number are displayed

Select the sensor number 0~6 to calibrate with [F] switch.

[M] switch introduces the ZERO and MAX calibration.

Measurement value is displayed.
Display in 0.1°C up to 1000°C
Display in 1°C for 1000°C and higher.

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

| No. | Sensor | ZERO | | MAX | |
|---|---|---|---|---|---|
| 0 | K | 0.0 °C | 0.000mV | 1300 °C | 52.410mV |
| 1 | J | 0.0 °C | 0.000mV | 1200 °C | 69.553mV |
| 2 | R | 0.0 °C | 0.000mV | 1700 °C | 20.222mV |
| 3 | E | 0.0 °C | 0.000mV | 1000 °C | 76.373mV |
| 4 | T | 0.0 °C | 0.000mV | 400 °C | 20.872mV |
| 5 | B | 0.0 °C | 0.000mV | 1800 °C | 13.591mV |
| 6 | N | 0.0 °C | 0.000mV | 1300 °C | 47.513mV |

※1: When the calibration is made out of the range, Err is displayed.
※2: This item is not for the sensor B.

Input voltage varies depending upon the sensor to calibrate.
Refer to the table on the right.

[M] switch introduces the gain calibration of cold junction compensation section. ※2

Measurement value is displayed.

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

[M] switch introduces the ZERO calibration of cold junction compensation section. ※2

Make the wiring as Fig. 2 shows.
Measurement value is displayed.

Press [>] switch with 0.0mV input, then the ZERO is temporarily memorized. ※1

[M] switch makes the display of CAL and sensor number.

With [∧] switch, the calibration value is memorized and at this moment, the display blinks.

Power supply OFF

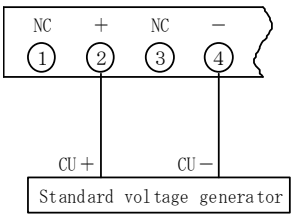



Fig. 1

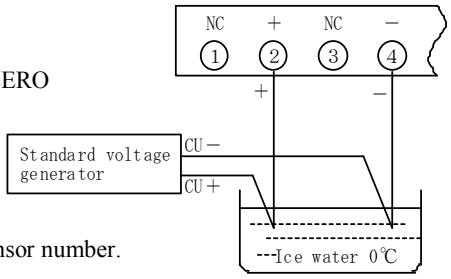



Fig. 2

## ● Calibration of resistance thermometer

Prepare the standard variable resistor.
Calibration of Pt100Ω automatically calibrates JPt100Ω also.

Keep pressing the [M] switch, power on the meter relay, then it enters calibration mode.

Power supply OFF

Make the wiring as Fig. 3 shows.
Keep pressing the [M] switch, power on the meter relay.
Keep pressing the [M] switch for about 5 seconds, then it enters calibration mode.

CAL and the sensor number are displayed.

Select the sensor number A with [F] switch.

[M] switch introduces the ZERO and MAX calibration.

Measurement value is displayed.

| No. | Sensor | ZERO | | MAX | |
|---|---|---|---|---|---|
| A | Pt100Ω | 0°C | 100.00Ω | 800°C | 375.70Ω |

※: When the calibration is made out of the range, Err is displayed.

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

[M] switch makes the display of CAL and sensor number.

With [>] switch, the calibration value is memorized and at this moment, the display blinks.

Power supply OFF

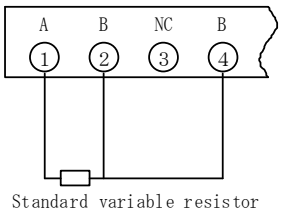



Fig. 3

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