

PROCESS
CONTROLLER

TTM-100 SERIES



TTM-100

TTM-100 Series EXCELLENT PID FUNCTION PROCESS CONTROLLER

- Available for both Process controllers
(all 100 series controllers from 104 to 109) and signal conditioner (all 104 to 109 models) ,
- 4 digits display
PV is green LED, SV is Red LED, each 4 digits are independent displays.
- Free voltage AC85 to 264V.
- Competitive price with lots of functions.
- Compact size
Depth is only 80 mm but 48×48mm (104 model) is 100mm.
- Easy operation
Up/down key for each digit.
- Various abnormal alarm functions (option)
Alarms for temperature abnormal. heater break, input break, output trouble and others.

Control Features

Auto tuning

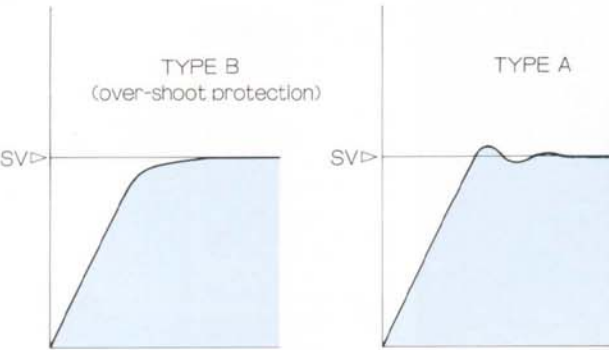
When SV (setting value) is set in PID mode, values at each P. I. D are automatically calculated.

●Excellent P.I.D. (Toho Electronics' own control)

Toho's PID control technology is high technology of advanced PID control and actually mounted on from ordinary controllers to high grade TM55 process controllers. For TTM-100 series, this technology is extended and mounted. We provide two kinds control selectable;

PID-A (usual type PID)

PID-B (over-shoot protection type)



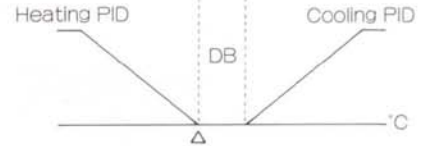
Function Features

1 Volume monitor operation (MV1, MV2)

Output volume for main control and sub-control, at the control time, will be indicated as numbers.

2 Heat/cool PID

low cost type



3 Manipulated variable limit (new function for 48x48mm model)

Limit for output signal is -10% to $+100\%$ for load. On relay or SSR, it is 0% to 100.0% .

4 Abnormal alarm (new function!)

Controller itself can detect own troubles such as input broken, short-circuit output broken/melted.

5 Manual reset

In order to protect OFFSET at proportional control, manual reset for proportional band is provided.

Because 'offset' is taken place sometimes at proportional control.

6 Scaling function

You can change setting range freely.

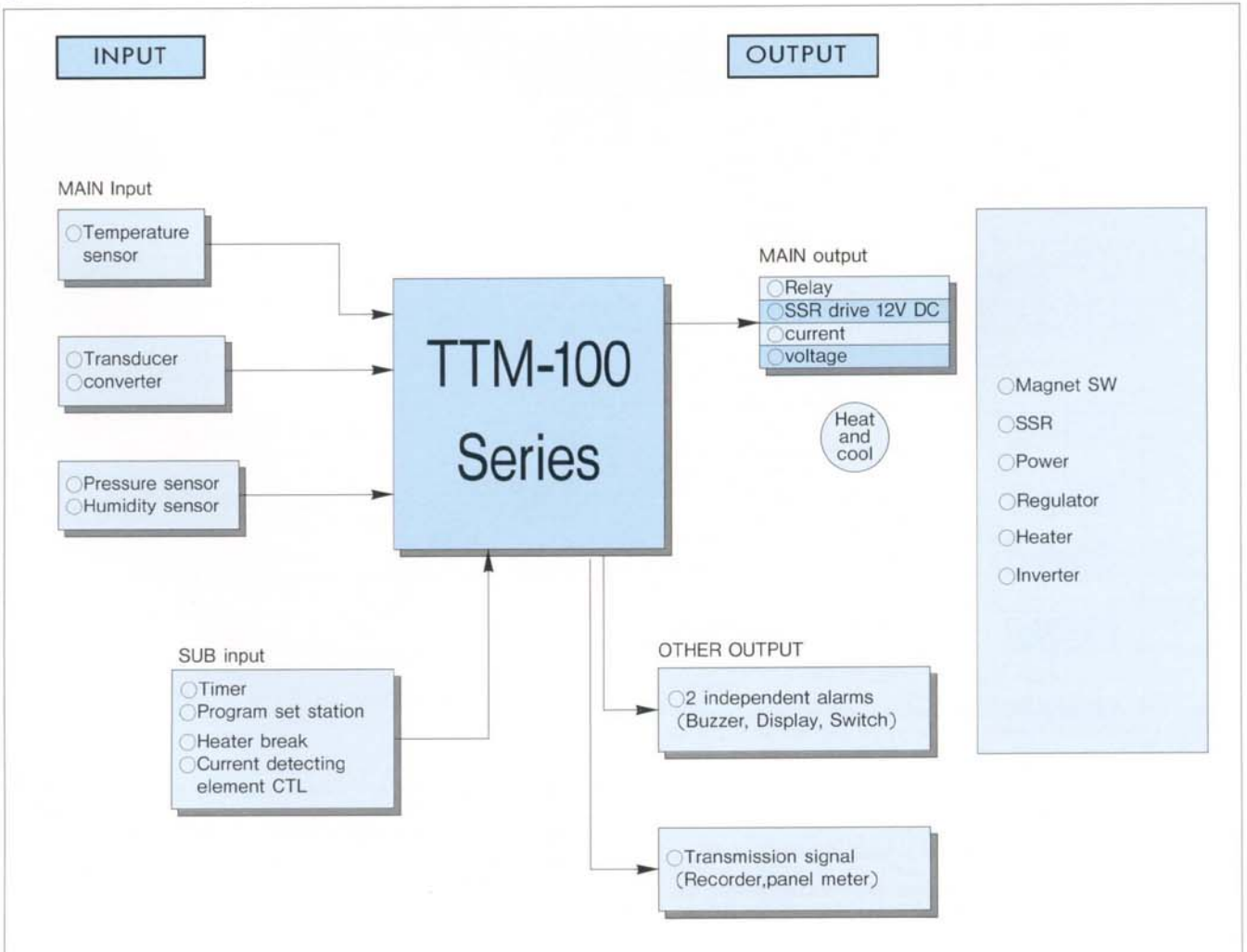
Ex. $-199.0^{\circ}\text{C} \sim 100.0^{\circ}\text{C}$ $\text{--SLL--} -199.9^{\circ}$
 $\text{--SLH--} 100.0^{\circ}$

7 Analog output

PV value, MV value, SV value are brought to an "output" as analog current/voltage signals, therefore, you can connect with a recorder (chart), and other various measuring instruments.

SYSTEM CONSTITUTION

●Process control for various specific needs



LOCATION of FRONT PANEL

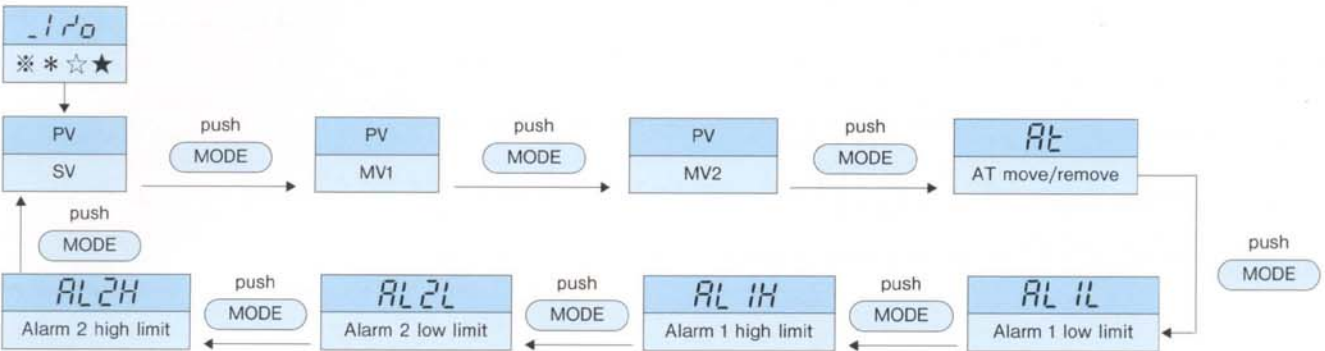


| | | | |
|------|---|--|---|
| AL1 | -----Alarm 1 for low limit Alarm 1 for high limit | PV | -----Process value indication, character indication. |
| AL2 | -----Alarm 2 for low limit Alarm 2 for high limit | SV | -----Setting value indication. Change of character function. |
| OUT1 | -----Monitor (relay, SSR drive output only) | MV | -----Monitor of manipulation variable. |
| OUT2 | -----Cooling output monitor at heat/cool operating time. (relay, SSR drive outputs only) | △ | ----- UP key |
| SV2 | -----showing SV2 operating time | ▽ | ----- DOWN key |
| MODE | -----MODE Key Call mode-key character. ●When mode-key is pushed, display at mode-side will be given. ●When you push mode-key for more than 2 sec- onds, you can get display at parameter side. | ●Setting SV value and release a start of AT set- ting/change of alarm value ●A change of selection of other functions ●Key is in accordance with each digit. and feeding of each digit is automatic. | |

HOW TO SET

When Power is "ON", it displays for 6 seconds.

When Power is "ON" and Mode-key is pushed, you can get following characters. Please set in compliance with each character. (when option is not included in, its display will not shown.)



| | | | |
|-----|--|-------|-------------------|
| PV | Process value | At | Auto tuning |
| SV | Setting value | AL 1L | Alarm1 lowlimit |
| MV1 | Monitor of manipulation Variable at Main control | AL 1H | Alarm1 high limit |
| MV2 | Monitor of manipulation variable at sub control | AL 2L | Alarm2 high limit |
| | | AL 2H | Alarm2 high limit |

STANDARD SPECIFICATIONS

| | | | | |
|---------------------------------|--|--|--|---|
| | | TTM-104, TTM-105, TTM-107, TTM-109 | | |
| Input | Thermocouple | K, J, E, T, R, S, N, Wre5-26 (untill 100Ω load resistance) | | |
| | R.T.D. | Pt100ΩDIN, JPt100Ω (untill 5Ω load resistance) | | |
| | Voltage | 0~5V, 1~5VDC, (If 250 ohm resistor is attached additionally, 0 to 20 mA 4 to 20 mA will be provided.) 0~10V, 0~1V, 0~10mVDC. | | |
| | current | 4~20mA DC | | |
| Indication | PV | 4 digit 7 segment LED green, Letter 10mm height. Letter 15mm height : TTM-109 | | |
| | SV | 4digit 7 segment LED red, Letter 8mm height. LED red : AL1, AL2, OUT1, OUT2, LED green : SV2 | | |
| Control output | PID (AUTO tuning) | Proportional band (PH) | PH is 0.1 to 200.0% of setting limiter range. | without TTM-104 |
| | | cooling proportional band (PC) | It is operated ON/OFF at 0. PC=0.1~10.0%×PH | |
| | | Reset time (integral) | 1~3,600sec (off at 0) | |
| | | Rate time (derivative) | 1~3,600sec (off at 0) | |
| | | Cyrcle time (th, tc) | 1~120sec (heat,cool) | without tc of TTM-104 |
| | | Dead band (D, B) | -10.0, +10.0% of setting limiter span only heat/cool | withuot TTM-104 |
| | | ON/OFF | Control sensitivity (C) | Maximum 10% of setting limiter span. but setting is at mm. ON/OFF of heat/cool. |
| | | Relay | 250V, 3A (load resistance) . 1c contact (in case of heat/cool, cooling output is 1a contact) | |
| | SSR | 0~12V DC Minimum 600Ω load resistance. | | |
| | current | 4~20mA DC MAX 600Ω (load resistance.) | | |
| | Voltage | 0~10V, 1~5V Minimum 1KΩ load resistance. | | |
| Sampling time | 0.5sec. | | | |
| Setting and indicating accuracy | R.T.D ±(0.3%+1digit) at setpoint value, or ±0.9°C (1.8°F) TC ±(0.3%+1digit) at setpoint value, or ±3°C (6°F) Current/Voltage ±(0.3%+1digit) in setting limiter span. | | | |
| memory element | EEPROM | | | |
| Source Voltage | Free Power source (35~264VAC), AC, DC24:special factory option. | | | |
| Standard function | Setting limiter | Minimum 50 digit within input span | | |
| | Manipulated variable limiter | -10.0~-110.0% (0.0~100.0% at relay or SSR output) | | |
| | PV correction | ±10% of full scale. | | |
| | °C/°F switchable | Only Thermocouple and RTD input. | | |
| | Sensor correction | Only Thermocouple, RTD input. | | |
| | Normal/direct switchable | In case of heat/cool, it is fixed. | | |
| | Alarm mode | Two alarm mode of independent switchable (deviation-high low limit. upper limit. lower limit range. absolute value upper low limit. upper limit lower limit range) Input abnormal alarm. Heater abnormal alarm. All round alarm. | | |
| | Alarm sensitivity | Maximum 10% within setting limiter span. | | |
| | manipulated variable indication | -10.0~-110.0% (0.0~100.0% at relay or SSR output) | | |
| | Key lock | 3 mode (no key lock. All key lock. without SV. AT. Alarm key lock.) | | |
| | Movement of decimal position | Under 2 digits only when input is voltage. electric current. But input of R.T.D. is only PV display. 1--0.1 (°C/°F) switchable. | | |
| | Operation condition | 0~55°C, 35~85%PH | | |
| | Stocking condition | -20~65°C, 35~85%PH | | |
| | Watch dog function | Data check by EEPROM : Erro, A/D converter check : Erro | | |

Optional function

| Optional function | Item | Contents | TTM-104 | TTM-105, 107, 109 |
|-------------------|---|---|---------|-------------------|
| | Buzzer | ON/OFF Buzzer sound | ○ | ○ |
| | Alarm 1 | 250V AC/0.5A, 120V AC/1A (1a contact) | ○ | ○ |
| | Alarm 2 | 250V AC/0.5A, 120V AC/1A (1a contact) | ○ | ○ |
| | Second SV | Setting range of SV is same | △ | ○ |
| | Heater abnormal alarm | It can detect in current from 1A~30A/AC. (ON time is upper 300msec, error is ± 50%) | △ | ○ |
| | Transmission output | 1~5V, 4~20mA, 0~10mV output (choice from PV, SV, MV1,) with a function that output is reversible. | — | △ |
| Heat/cool | Relay, SSR drive, current, voltage output are available for both MV1 and MV2. | — | △ | |

△ mark means that it is selectable only one

Input and its range Thermocouples, RTDs, electric current, for various ranges freely. (scaling)

| Thermocouple | Setting range | Display range | Thermocouple | Setting range | Display range |
|----------------|---------------|---------------|----------------------|---------------|---------------|
| K (JIS/IEC) | °C | 0~1200 | N (NBC) | °C | 0~1300 |
| | °F | 0~2200 | | °F | 32~2350 |
| J (JIS/IEC) | °C | 0~800 | W5Re/W26Re (ASTM) | °C | 0~2300 |
| | °F | 0~1450 | | °F | 32~4200 |
| E (JIS/IEC) | °C | 0~ 800 | R (JIS/IEC) | °C | 0~1700 |
| | °F | 0~1450 | | °F | 32~3100 |
| T (JIS/IEC) | °C | -200~400 | S (JIS/IEC) | °C | 0~1700 |
| | °F | -330~750 | | °F | 32~3100 |

| R.T.D | Setting range | Display range | Current, voltage | Setting range | Display range |
|--------------------|---------------|---------------|-----------------------------|--------------------|--|
| Pt100 (JIS/IEC) | °C | -199.9~500.0 | 4~20mA, 1~5V | -1999~9999 | SLL is 12%, SLH is +12% in setting range |
| | °F | -199.9~950.0 | | | |
| JPT100 (JIS) | °C | -199.9~500.0 | 0~10V, 0~1V 0~10mV, 0~5V | or -199.9~999.9 | SLL is 2%, SLH is +10% in setting range |
| | °F | -199.9~950.0 | | | |

SLL means low limit value of SV limiter
SLH means high limit value of SV limiter

Alarm mode

Unusual alarm

| | |
|---|--|
| 0 | Non |
| 1 | PV unusual alarm (refer PV alarm) |
| 2 | Heater abnormal alarm |
| 3 | PV unusual alarm and heater abnormal alarm |

PV alarm

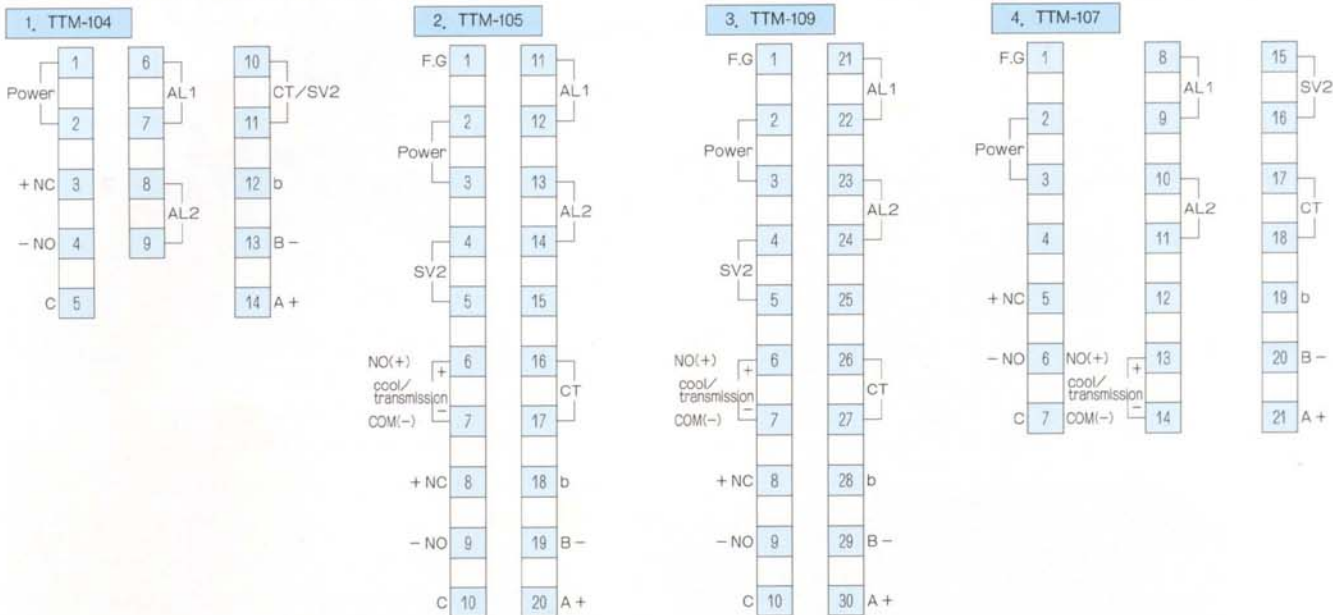
| | |
|---|---|
| 0 | Non |
| 1 | Deviation high and low limit alarm |
| 2 | Deviation high limit alarm |
| 3 | Deviation low limit alarm |
| 4 | Deviation high and low range alarm |
| 5 | Absolute value high and low limit alarm |
| 6 | Absolute value high limit alarm |
| 7 | Absolute value low limit alarm |
| 8 | Absolute value high and low rang alarm |

Additional function of alarm

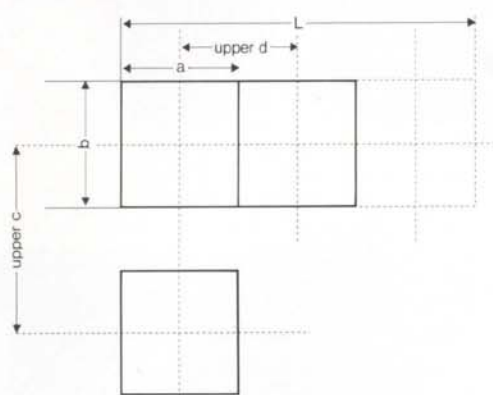
| | |
|---|---|
| 0 | Non |
| 1 | Alarm holding |
| 2 | Buzzer |
| 3 | Awaiting-sequence |
| 4 | Alarm holding and Buzzer |
| 5 | Alarm holding and Awaiting-sequence |
| 6 | Buzzer and Awaiting-sequence |
| 7 | Alarm holding and Buzzer, Awaiting-Sequence |

When kind of PV alarm is 0, only selectabe 0, 1, 2, and 4.

Terminal connections on back side



Panel cut out dimensions



Panel cut out dimensions

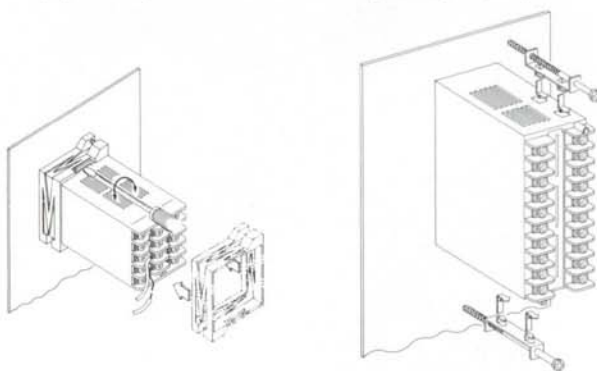
| Model | a | b | c | d | A | B | C | D |
|---------|----------------------------------|----------------------------------|-----|----|----|----|----|-----|
| TTM-104 | 45 ^{+0.6} ₋₀ | 45 ^{+0.6} ₋₀ | 60 | 48 | 48 | 48 | 8 | 100 |
| TTM-105 | 45 ^{+0.6} ₋₀ | 92 ^{+0.8} ₋₀ | 120 | 48 | 96 | 48 | 11 | 80 |
| TTM-107 | 68 ^{+0.6} ₋₀ | 68 ^{+0.6} ₋₀ | 90 | 72 | 72 | 72 | 11 | 80 |
| TTM-109 | 92 ^{+0.8} ₋₀ | 92 ^{+0.8} ₋₀ | 120 | 96 | 96 | 96 | 11 | 80 |

※L=(d×N-3)_{±0.1} for multiple units installation case.

Attachment for panel in stalling

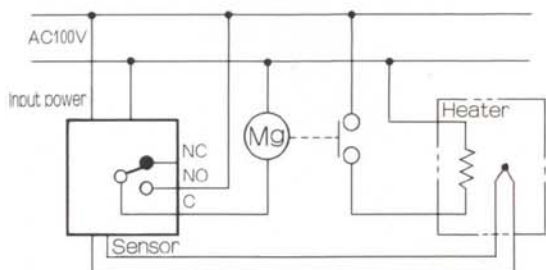
(only TTM-104)

(TTM-105, 107, 109)

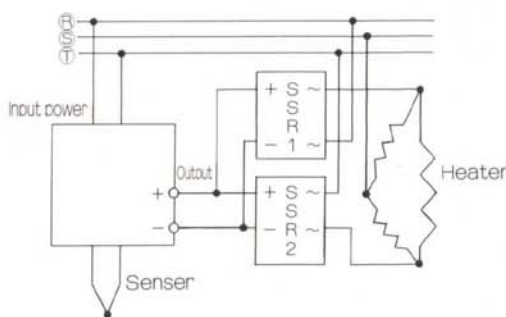


Wiring diagram

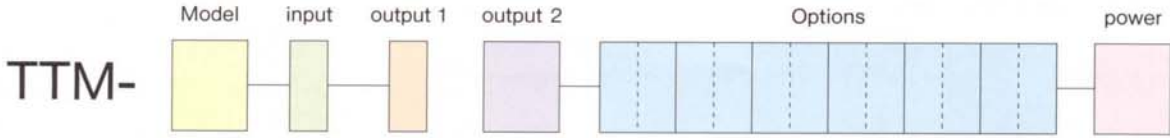
Example 1 : (Relay contact, Heating)



Example 2 : (SSR drive, Heating)



Ordering Information



| Contents | | |
|---|-----|---|
| Model | 104 | 48×48mm |
| | 105 | 96×48mm |
| | 107 | 72×72mm |
| | 109 | 96×96mm |
| Input | 0 | Thermocouple (K, J, E, T, R, S, N, W5Re/W26Re) multiple input |
| | 1 | R. T. D. Pt100 DIN. JPt100 switchable |
| | 2 | Voltage 1~5V |
| | 3 | Current 4~20mA |
| | 4 | Voltage 0~1V |
| | 5 | Voltage 0~10V |
| | 6 | Voltage 0~10mV |
| | 7 | Voltage 0~5V |
| Output1 | N | Nothing. Output 1 is output only for either heat/cool control or cooling control. In the time of heat/cool control, it is for heat output. |
| | R | Relay contact |
| | P | SSR drive 12VDC |
| | F | Voltage 1~5V |
| | G | Voltage 0~10V |
| | I | Current 4~20mA |
| Output2 (options) Limited cooling at heat/cool operation time. TTM-104 does not provide Output-2. | N | Nothing Output 2 is output at cooling side at cooling control time. When output 1 is N (nothing) , you cannot select except N. When you select transfer output, output 2 must be N (nothing). |
| | R | Relay contact |
| | P | SSR drive 12V |
| | F | Voltage 1~5V |
| | G | Voltage 0~10V |
| | I | Current 4~20mA |
| Options A selection of option is maximum 6 digits. (TTM-104 is maximum 4 digits.) | A | AL1 Alarm rery |
| | B | AL2 Alarm relay |
| | C | Buzzer |
| | D | CT input When AL1 or AL2 are not selected, you cannot select CT input. When SV2 is selected On TTM-104 model, you cannot select CT input. |
| | E | SV2 When CT input is selected on TTM-104, you cannot select SV2. When Output 1 is N, SV2 cannot be selected. |
| | F | Transmission output : 1~5V. TTM-104 does not provide. |
| | I | Transmission output : 4~20mA |
| | H | Transmission output : 0~10mV (G : 0~10V) |
| Power | 24 | AC/DC-24V (Special factory option) |



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