

# TTM-04SP Series Operation Manual

Plug-in Digital Temperature Controller  
Second Edition, July 2008

\* Thank you for purchasing our TTM-04SP Series. Please thoroughly read this manual.  
\* For detailed specifications and usage, consult your dealer or our sales.

## Cautions

- For safety purpose, following symbols are used in this manual.
- Warning** The case that a user may receive fatal damage, electric shock, or severe burn injury when the product is incorrectly used.
  - Caution** The case that a user may receive minor damage or the equipment may get damage.
- Caution**
- Wiring:** Do not use empty terminals for irrelevant purposes.  
**Operation:** Do not use a sharp-pointed tool for operating keys.
- Warning**
- \* Verify correct wiring before turning on electricity since incorrect wiring may cause an equipment failure or a fire.
  - \* Modification of this equipment may cause malfunctioning or a fire.
  - Do not add modification on this equipment.
  - Hand over this operation manual to a person who actually operates the product.
  - Do not reprint or duplicate this manual without permission.
  - Content of this manual may be subject to modification without prior notice.

## Verification of the product

- Verification of the model  
Refer the model name printed in the packing box to the order sheet.
- Verification of accessories:  
Mounting devices (See the section, How to Mount the Panel.)  
Operation manual (this document) -- 1 copy
- Model table:  

Model	Output	Standard specifications
TTM-04SP--□-AB	Symbol	Symbol
	Output 1	A Event output 1 relay contact output
	R Relay contact	B Event output 2 relay contact output ※
	P Voltage to drive SSR	

※Event output2 can be used as control output2.  
When control output1 is the heating control, control output2 is fixed as the cooling control, and when control output1 is the cooling control, control output2 is fixed as the heating control.

## Specifications

Power supply voltage	100 to 240VAC, 50/60Hz
Power consumption	10 VA or less
Memory element	EEPROM
Input	Thermocouple/resistance-temperature detector (switchable in the parameter setting from front key)
Control output	Relay contact/voltage to drive SSR
Control method	Two types of PID, ON/OFF
Range of use temperature and humidity	0 to 50 °C, 20 to 90%RH (dew condensation not allowed)
Range of storage temperature and humidity	-25 to 70 °C, 5 to 95%RH (freezing and dew condensation not allowed)
Weight	200g or less
Installation environment	<ul style="list-style-type: none"> <li>- Absence of corrosive gas, dust, oil, etc.</li> <li>- As far away as possible from electric noises and little effect from magnetic field</li> <li>- As little influence as possible from mechanical vibrations or impacts</li> <li>- No reception of direct sunlight</li> </ul>
Installation	Installation category II

## Before Performing Control

- This product employs nonvolatile memory; Setting is saved even after power-off.
- This product allows switchover of input types.  
For use, match the input type selection with the product input setting.
- This product allows PID control (time proportional control) and ON/OFF control.  
Characteristics of each control are as follows.  
Make selection based on understanding of such characteristics.  
※In self-tuning, PID constant is automatically determined and written in when control starts or SV changes.

	PID control	ON/OFF control
Advantage	Better result is obtained than those from ON/OFF control.	Longer life of relay contact is typically expected due to turn-on at lower temperature than setting and turn-off at higher (case of heating control).
Drawback	Shorter life of relay contact is resulted due to frequent turn-on and off of output.	Quality of control value is lower than that of PID control.

## PARTS INDICATION

TTM-04SP	PV	Process value, character for setting mode display.
	SV	Setting value, input value for setting mode display.
	OUT1	Lights ON when output 1 turn ON
	OUT2	Lights ON when output 2 turn ON
	EV1	Lights ON when Event output 1 turn ON
	EV2	Lights ON when Event output 2 turn ON
	RDY	Lights ON under Ready
	MODE KEY	For change of display
	FUNC KEY	For action of function setting
	▲▼KEY	Up down key for change of setting value. Holding the up down keys are the value at a rapid rate.

## How to Operate/Set

Unnecessary items are not displayed on each setting screen, depending on option, type selection, etc. (Some screens may not appear due to functions as described in the detailed manual.)

**Power-on**

4 min display of initial screen (For warm-up)

**Operating mode screen**

A. Basic screen  
Present value PV Sets temperature.  
Setting value SV  
MODE key

B. Priority screen (See explanation 1)  
\* Displays screen in accordance with priority determined in priority screen setting. If set, max. 9 screens to be displayed.  
Returns to MODE key A.

**FUNC key function**  
Executes operation selected in the setting mode 7.  
\* See explanation 2.

**Explanation 1. Priority screen/priority screen setting**  
Each of all screens in the setting mode can be assigned by using this function in the operating mode with a higher priority depending on customer requirement.  
Select a target screen in the priority screen setting.  
Example: Switches display, at each pressing of MODE key, i.e. (Basic screen) → (Output 1 upper limit display) → (Event output 1 upper limit setting).  
Do not add modification on this equipment.

**Explanation 2. FUNC key function**  
Assigns the FUNC key in the setting mode as a dedicated key for the following operation.  
1. Dedicated key for digit shift  
2. Switches the FUNC key function each time when pressing it: control stop (READY) → control execution (RUN).  
READY lamp lights up during control stop.  
Starts auto-tuning when pressing the FUNC key.  
Switches the FUNC key function between start and reset each time when pressing it.  
4. Dedicated key for the timer  
To use the FUNC key to start/reset the timer.

**Explanation 3. PID selection**  
Characteristics of types A and B  
Type A: Basic PID  
Type B: PID to suppress overshoot

**Explanation 4. ARW function**  
ARW (Anti-reset windup) is effective for a control target with which overshoot due to excessive integration of PID control operation is to be controlled.  
- A function to restrain the integration operation (to align PV to SV)  
- Smaller the value, higher the effect; note, however, 0 value cancels the integration operation.

**Table 1. Input selection table/setting range**

Symbol	Lower limit to upper limit	Unit of °C
00 K thermocouple	-200 to 1372	At 0.0 setting
01 J thermocouple	-200 to 350	-199.9 to 990.0
02 R thermocouple	0 to 1700	-199.9 to 950.0
03 N thermocouple	-200 to 400	-199.9 to 400.0
04 B thermocouple	-200 to 1300	-199.9 to 990.0
05 S thermocouple	0 to 1700	-
06 B thermocouple	0 to 1800	-
10 Pt100	-199 to 500	-199.9 to 500.0
11 JPt100	-199 to 500	-199.9 to 500.0

**Other functions**

- Timer mode
- Blind mode
- Loader communication

**Setting mode**

**SET 1: Initial set**

- Initial setting screen
- Input type setting screen
- PV compensation gain setting screen
- PV compensation zero setting screen
- Input filter setting screen
- Decimal point position setting screen
- FUNC key setting screen
- Key lock setting screen

**SET 2: Control set**

- Control content setting screen
- SV limiter upper limit setting screen
- SV limiter lower limit setting screen
- Control type selection screen
- Forward/reverse operation switchover screen
- Output 1 control amount (%)
- Output 2 control amount (%)
- Output 1 OFF position setting screen
- Output 2 OFF position setting screen
- Output 1 sensitivity setting screen
- Output 2 sensitivity setting screen
- Dead band setting screen

**SET 3: Event output 1 set**

- EV 1 setting mode call-out screen
- EV 1 function setting screen
- EV 1 upper limit setting screen
- EV 1 lower limit setting screen
- EV 1 delay timer setting screen
- EV 1 abnormal function setting screen
- EV 1 polarity setting screen

**SET 4: Event output 2 set**

- EV 2 setting mode call-out screen
- EV 2 function setting screen
- EV 2 upper limit setting screen
- EV 2 lower limit setting screen
- EV 2 delay timer setting screen
- EV 2 abnormal function setting screen
- EV 2 polarity setting screen

**SET 5: Communication set**

- Communication setting mode call-out screen
- Communication protocol setting screen
- Communication parameter setting screen
- Communication speed setting screen
- Communication address setting screen
- Response delay time setting screen
- Communication mode switchover setting screen

**SET 6: Timer set**

- Timer setting mode call-out screen
- Timer unused Control
- Timer function setting screen
- Timer unit switchover screen
- Timer SV start permission width setting screen
- Timer time setting screen
- Timer remaining time monitor setting screen

**SET 7: Priority screen set**

- Priority screen setting
- First priority screen setting
- Second priority screen setting
- Third priority screen setting
- Fourth priority screen setting
- Fifth priority screen setting
- Sixth priority screen setting
- Seventh priority screen setting
- Eighth priority screen setting
- Ninth priority screen setting

**Transfer to blind setting mode**

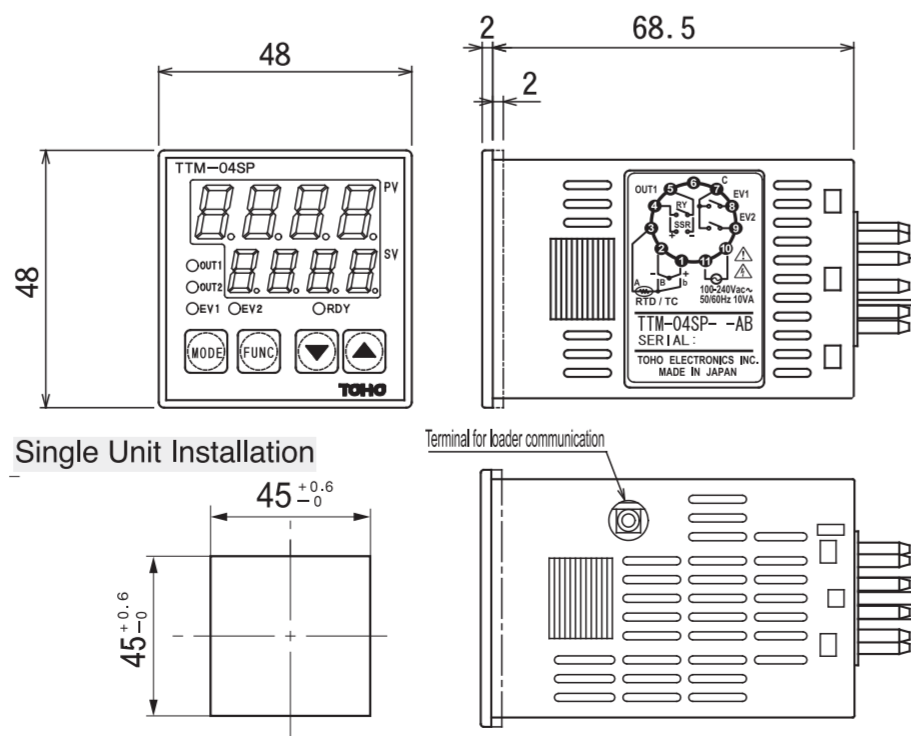
- Power on
- Operating mode screen
- Pressing MODE key for 10 sec
- Pressing FUNC key
- Pressing MODE key for 3 sec
- Display "1" to "7" using ▲▼ key

**Other displays**

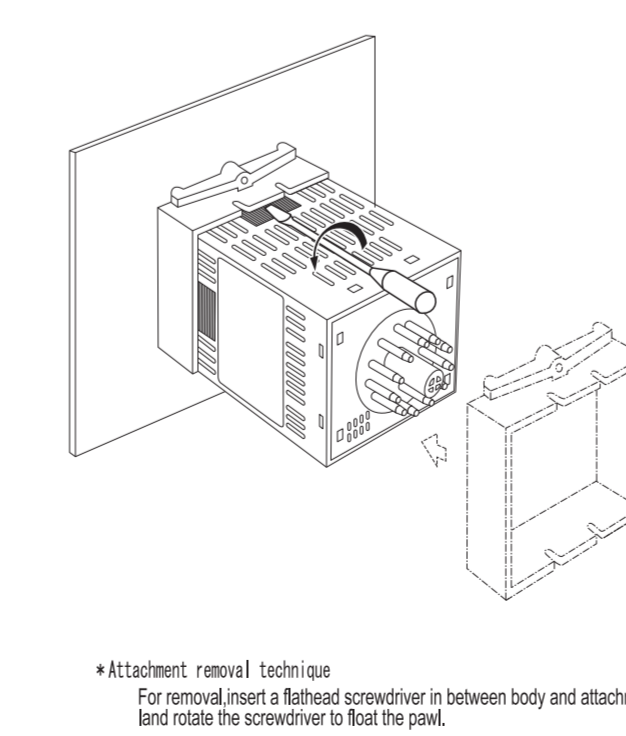
- Displayed when input exceeds the display range upper limit.
- Displayed when input exceeds the display range lower limit.
- Displayed at memory error.
- Displayed when thermocouple is set, but resistance-temperature detector is disconnected, or when A/D conversion error is present.
- Displayed at auto-tuning error.
- Displayed when attempting to change a parameter during key lock.
- Alternately displayed between SV and PV screens during auto-tuning.
- Displayed when attempting to change a setting value on control mode screen provided that FUNC key is assigned RUN/READY.
- Displayed when attempting to change a setting value on control mode screen during timer in use.

## INSTALLATION AND WIRING

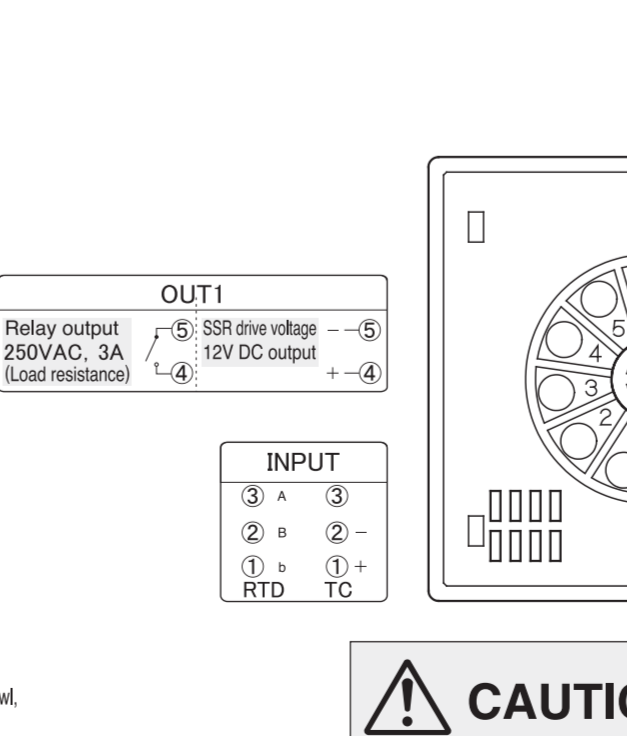
### Outer Dimensions and Panel Cutout



### Mounting



### Wiring



Unit : mm

**TOHO ELECTRONICS INC.**  
Web site: http://www.toho-inc.com  
E-Mail: overseas@toho-inc.co.jp  
Head office: 1-13-21, Tanashi-cho, Sagami-hara Kanagawa 229-1125 Japan.  
Tel: +81-42-777-3311  
Fax: +81-42-777-3751

**CAUTION** For prevention of electric shock, please do wiring connection only after turning power off and don't touch the terminal part under power on.