

PROCESS  
CONTROLLER

**TTM-100** SERIES



ISO 9001:1994  
登録番号 JSAQ 097



**JAB**  
QS Accreditation  
認定番号 R001





# 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 48x48mm(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

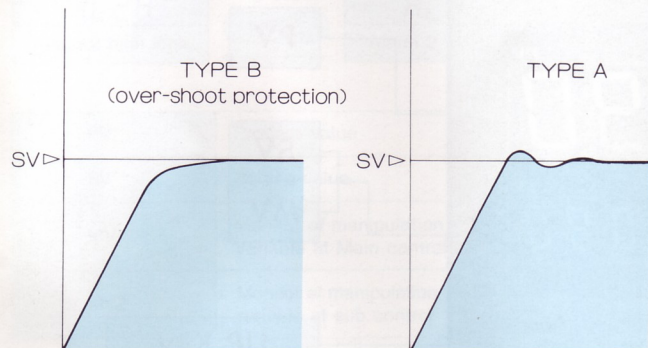
When SV (setting value) is set in PID mode, values at each P. I. D are automatically calculated.

### 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)



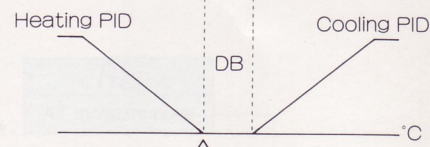
## Function Features

### 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.

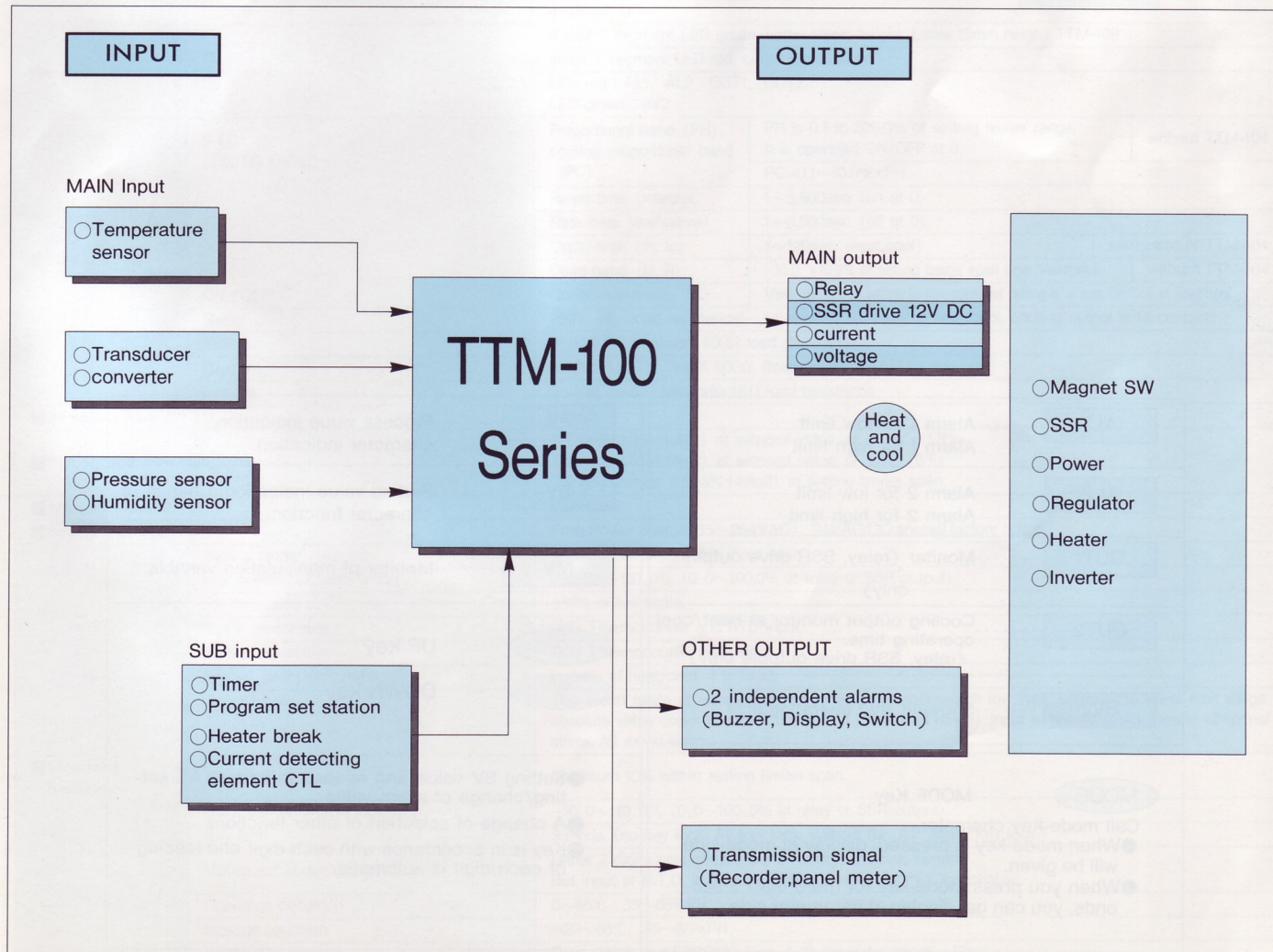
Ex. -199.0°C~100.0°C —SLL"—199.9"  
—SLH"100.0"

### 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.

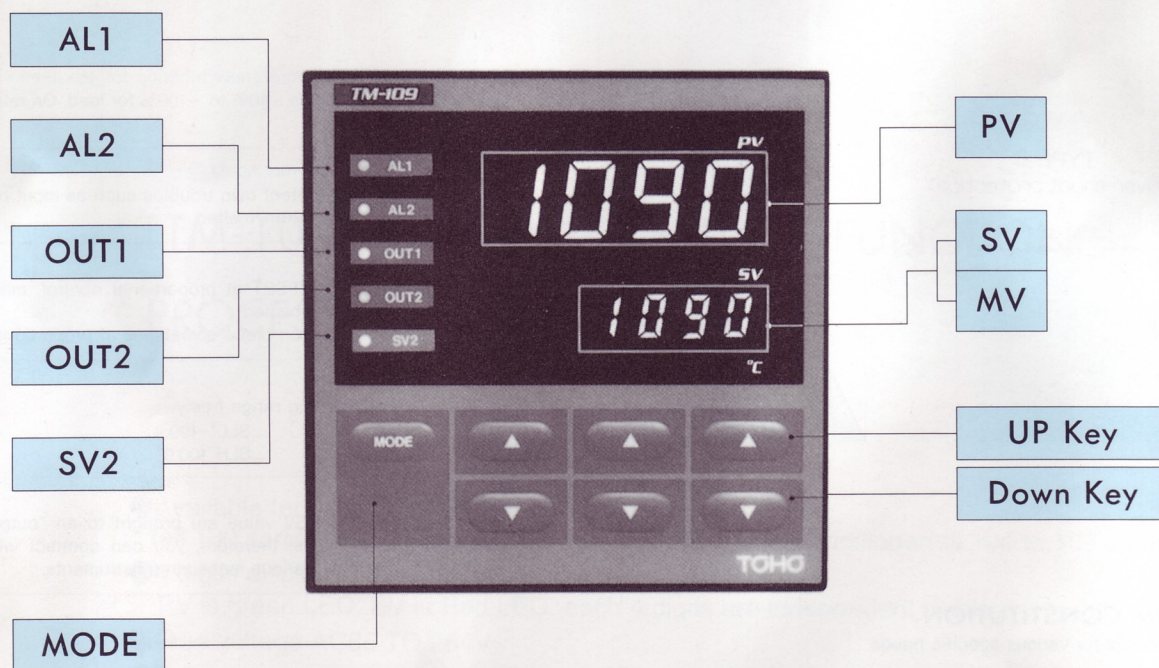
## SYSTEM CONSTITUTION

### Process control for various specific needs





## LOCATION of FRONT PANEL



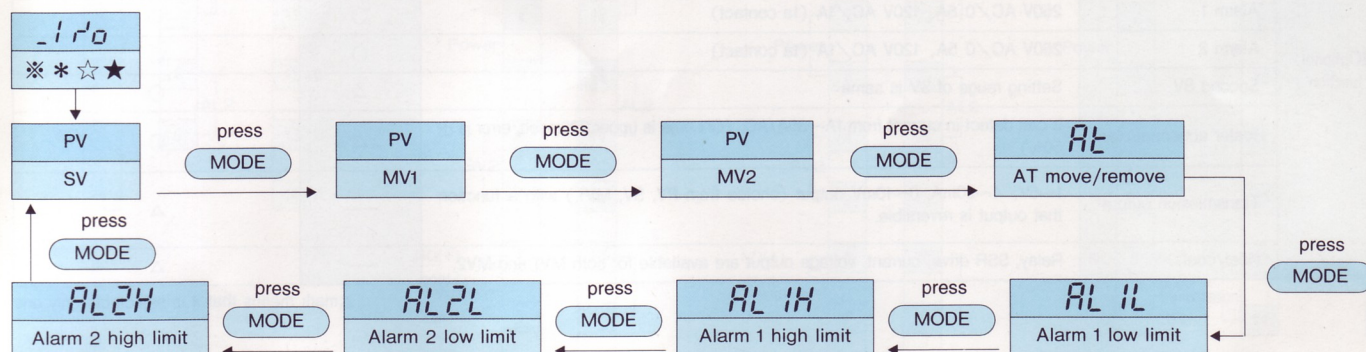
AL1	Alarm 1 for low limit Alarm 1 for high limit	PV	Process value indication, character indication.
AL2	Alarm 2 for low limit Alarm 2 for high limit	SV	Setting value indication. Change of character function.
OUT1	Monitor (relay, SSR drive output only)	MV	Monitor of manipulation variable.
OUT2	Cooling output monitor at heat/cool operating time. (relay, SSR drive outputs only)	UP key	UP key
SV2	Showing SV2 operating time	DOWN key	DOWN key
MODE	MODE Key Call mode-key character. ●When mode-key is pressed, display at mode-side will be given. ●When you press 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	AL	Auto tuning
SV	Setting value	AL1L	Alarm1 lowlimit
MV1	Monitor of manipulation Variable at Main control	AL1H	Alarm1 high limit
MV2	Monitor of manipulation variable at sub control	AL2L	Alarm2 high limit
		AL2H	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.)	
	current	0~10V, 0~1V, 0~10mVDC.	
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.	
Control output	PID (AUTO tuning)	Proportional band (PH) cooling proportional band (PC)	PH is 0.1 to 200.0% of setting limiter range. It is operated ON/OFF at 0. PC=0.1~10.0%×PH
	ON/OFF	Reset time (integral)	1~3,600sec (off at 0)
	Relay	Rate time (derivative)	1~3,600sec (off at 0)
	SSR	Cyclic time (th, tc)	1~120sec (heat,cool)
	Current	Dead band (D, B)	-10.0, +10.0% of setting limiter span only heat/cool
	Voltage	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 (85~264VAC) . 24VAC/DC: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	
	Storage 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
K (JIS/IEC)	°C		0~1200	-40~1326
	°F		0~2200	-40~2420
J (JIS/IEC)	°C		0~800	-31~ 850
	°F		0~1450	-24~1563
E (JIS/IEC)	°C		0~ 800	-27~ 833
	°F		0~1450	-16~1531
T (JIS/IEC)	°C		-200~400	-231~407
	°F		-330~750	-385~765

Thermocouple			Setting range	Display range
N (NBC)	°C		0~1300	0~1335
	°F		32~2350	32~2435
W5Re/W26Re (ASTM)	°C		0~2300	0~2336
	°F		32~4200	32~4236
R (JIS/IEC)	°C		0~1700	0~1755
	°F		32~3100	32~3192
S (JIS/IEC)	°C		0~1700	0~1730
	°F		32~3100	32~3146

R.T.D			Setting range	Display range
Pt100 (JIS/IEC)	°C		-199.9~500.0	-199.9~539.1
	°F		-199.9~950.0	-199.9~999.9
JPt100 (JIS)	°C		-199.9~500.0	-199.9~529.0
	°F		-199.9~950.0	-199.9~984.4

Current, voltage			Setting range	Display range
4~20mA, 1~5V 0~10V, 0~1V 0~10mV, 0~5V			-1999~9999	SLL is 12%, SLH is +12% in setting range
		or	-199.9~999.9	SLL is 2%, SLH is +10% in setting range

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

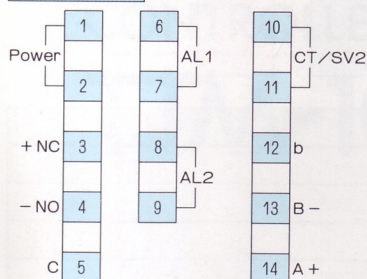
0	Non
1	Alarm holding
2	Buzzer
3	Awaiting-sequence
4	Alarm holding and Buzzer
5	Alarm holding and Awaiting-sequence
6	Buzzer and Awaiting-sequence
7	Alarm holding and Buzzer, Awaiting-Sequence

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

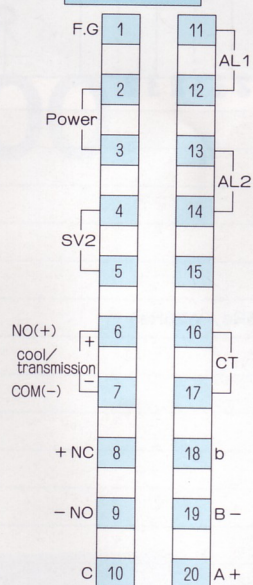


## Terminal connections on back side

### 1. TTM-104

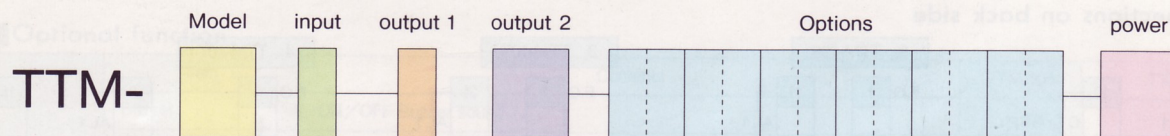


### 2. TTM-105





## Ordering Information



### Contents

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 relay
	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	24VAC/DC (Special factory option)