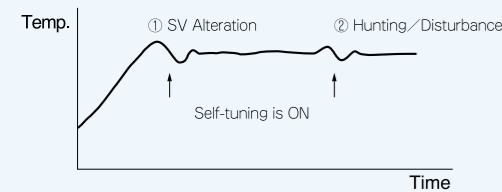
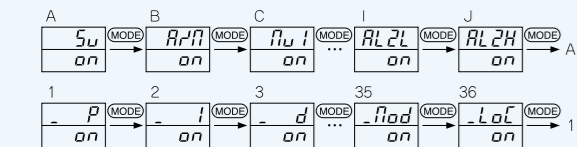


## Advanced Features

### Self-Tuning PID (Standard)



### Blind Function (Standard)

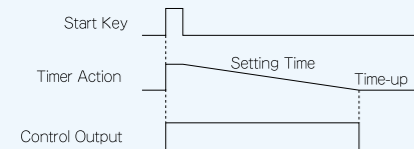


The mode screen or the parameter screen whichever you demand can be displayed by merely pressing a key, at the request. When the SV screen is erased, the set value is normally not indicated but the measured value (PV) is only shown.

### Timer Function (Standard)

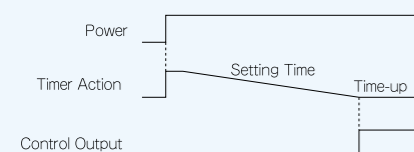
#### 1. Bread Oven Machine

- Put dough into oven and press the timer start key.
- While setting timer, temperature in oven is controlled by heater.
- After timer counts up, control of oven is stopped automatically. (This example is for control stop after the timer counts up.)



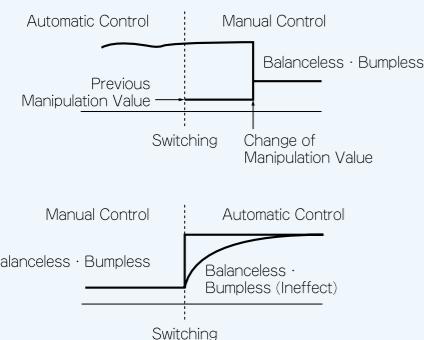
#### 2. Package Machine and Industry Machinery (In case of start of control after the relative equipments are prepared)

- When power is "ON", the timer starts to count.
- While setting timer, control output is stopped.
- After the timer counts up, control is started automatically. (For control start after the timer counts up.)

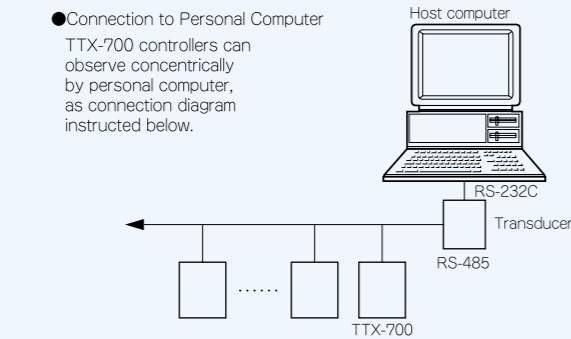


### Automatic/Manual Control (Standard)

Automatic/Manual control can be switched by front key for DI or communication. When checking the manipulation action for valve and heater during a system test run, or when normal control is not operational due to sensor failure, the system can be operated manually in this mode.

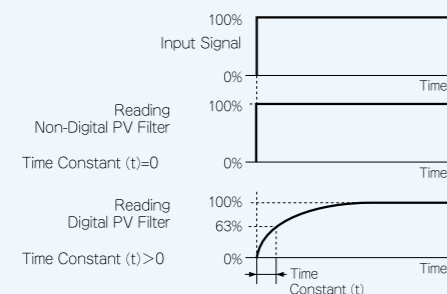


### Communication Function (Option)



### Digital PV Filter (Standard)

This is a function to realize a CR filter effect on software by means of primary delay arithmetic on the measured value (PV). The filter effect can be set by time constant (t). (The time constant is a period to reach 63% of PV value, when the input changes stepwise.)

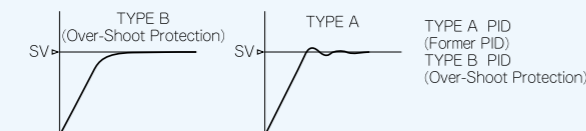


Digital PV filter with the following uses

- To eliminate high frequency noise: When electric noise is added to the input, the adverse effect is reduced.
- When input changes abruptly, the response delay is possibly made.

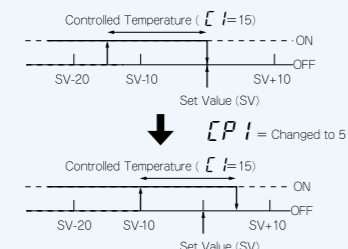
### PID Over-Shoot Protection

It is functional to inhibit PID Over-Shoot.



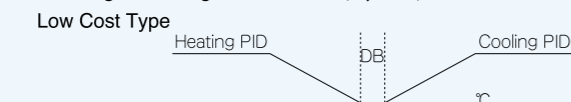
### Sifting OFF Position in ON-OFF Control (Standard)

When the shift value is set to 0(zero), the OFF position is the set value position.

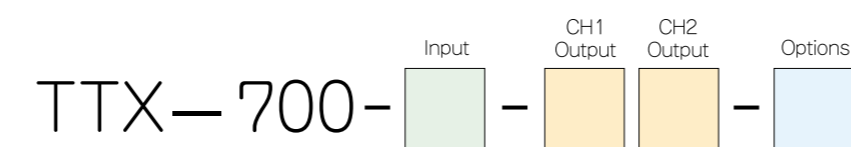


When the OFF position setting is shifted by +5, ON / OFF position shifts to that of +5 minutes upper than the original position, though the set value is not changed. When the OFF position setting is shifted toward the minus direction, the OFF position shifts in the reverse direction.

### Heating/Cooling PID Control (Option)



## Ordering Information (Model Configurations)



Input	Nil	Thermocouple, R.T.D., 0-10mAVDC
	2	4-20mADC, 0-5VDC, 1-5VDC
Out 1 Out 2	R	Relay contact
	P	SSR drive voltage 12VDC
	I	Current 4-20mADC
	V	Voltage 1-5VDC
Options	A	Event Output
	E	DI

Please refer to this table for appropriate specifications when placing order.



# DIGITAL CONTROLLER TTX-700

# DIGITAL CONTROLLER TTX-700

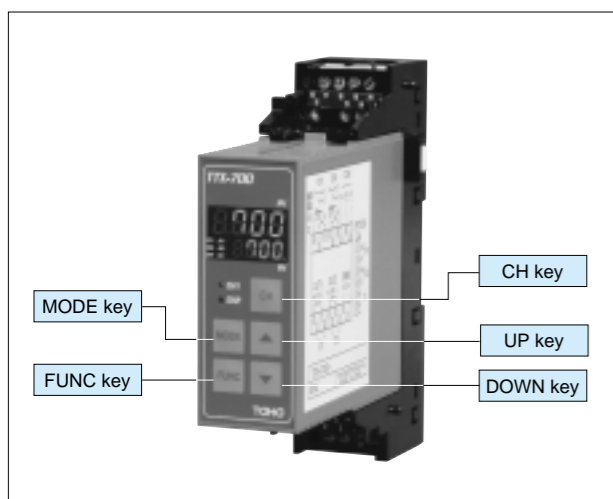
DIN rail installation type, 2 channels digital temperature controller  
 Feasible to operate the various settings from the front display and key switches  
 Communications can be connected up to 31 units

## Features

- Self-Tuning PID  
 Most appropriate PID constant is automatically reckoned up for control objects.
- PID constant is calculated when making alteration of setting value, or it is corrected when occurring disturbance/hunting etc.
- Blind Function  
 At the request, desirable parameter screen is only displayed and set up.
- Simplified Timer  
 ON/OFF setting control is available after some certain interval. Function of ON/OFF alarm output is independently usable.
- Multiple Inputs  
 Thermocouple/R.T.D.(Pt 100 & JPt 100) are selectable by front key.
- Sampling Cycle Time  
 0.25sec of sampling time is adapted.
- Manual Control (Balanceless & Bumpless)  
 Manual output function is applicable for versatile applications of instrumentation systems.
- Communication Function (RS-485)  
 The communication distance is extended up to 500 meters, and maximum 31 units can be connected with the computer

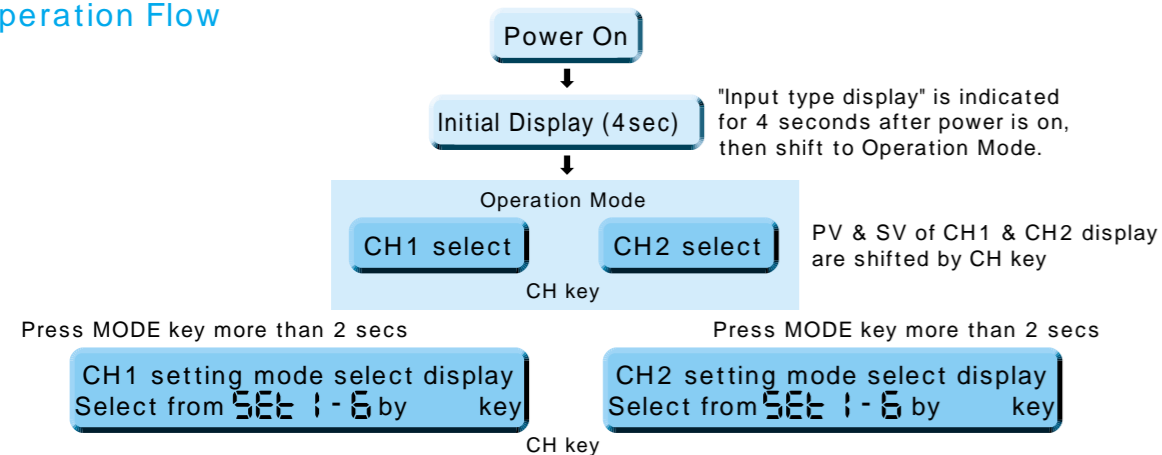
- at a time. Centralized supervision is available for collection of the whole data and alteration of setting values at remote location.
- In addition to conventional TTM series protocol, a protocol corresponds to MODBUS protocol.
- Digital PV Filter  
 For abrupt alteration of input value, filter effect is operational on software.
- PID Over-Shoot Protection  
 It is functional to inhibit PID Over-Shoot.
- DI Functions (CH1 only, CH2 only, or CH1+CH2 both)  
 The following functions are selective.
  - SV/SV2
  - RUN/READY
  - Auto/Manual
  - Normal/Reverse Action
  - AT Start/Stop
  - Normal(SV2)/Reverse(SV2) Action
  - Timer Start/Reset
- Others
  - CT Input (Input Monitor usable)  
 Shift setting of OFF position during ON/OFF control(for both output 1 & 2)
  - Heating/Cooling control(PID control function equipped at cooling side)

## Front Panel



<b>MODE</b>	MODE key Mode key for shifting display (Memorizes the setting parameters)
<b>FUNC</b>	FUNC key Executes a set function Digit shift key(Selected digit is blinking): Effective in all modes AT Start/Stop: Function is switched by each press, only effective in operation mode RUN/READY: Function is switched by each press, only effective in operation mode Timer Start/Reset: Function is switched by each press, only effective in operation mode
	Use when decreasing setting values Push 1s-10s : 1digit/100ms Push 10s-20s : 10 digits/100ms Push 20s or over : 100 digits/100ms
	Use when increasing setting values Push 1s-10s : 1digit/100ms Push 10s-20s : 10 digits/100ms Push 20s or over : 100 digits/100ms
<b>CH</b>	CH key Changes display or setting channels over CH1 and CH2 are switched by each press

## Operation Flow



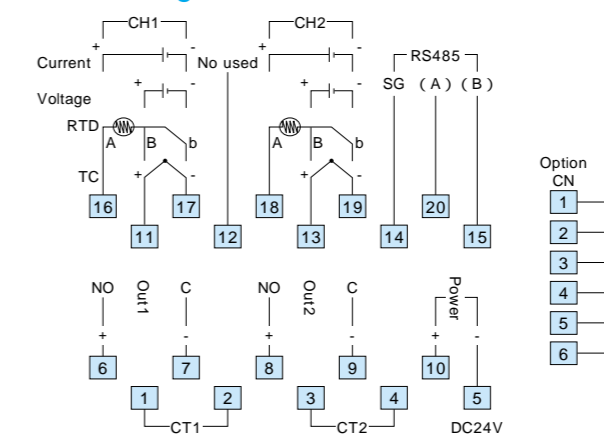
## Standard Specifications

Input Switchable	Thermocouple	K, J, R, T, N, S, B (JIS C 1602-1995)
	R.T.D.	Pt100, JPt100 (Load resistance: 10Ω or less)(JIS C 1604-1997)
	Current	4-20mADC (Input resistance 250Ω)
	Voltage	1-5VDC, 0-5VDC, 0-10VDC (Input resistance 500kΩ or more), 0-10mVDC (Input resistance 1MΩ or more)
Display	PV display	7 segments Green LED 7.6mm height
	SV display	7 segments Red LED 5.3mm height
Control Method	Lamp	CH1/CH2 select lamp (Green), CH1/CH2 output lamp (Red), CH1/CH2 event lamp (Red), COM lamp (1st decimal digit of SV)
	PID (Type A, TypeB)	Proportional band (P1) 0.1-200.0% of setting limiter span
	Auto-Tuning	Proportional band (P2) 0.10-10.00 times (Magnification to P)
	Self-Tuning	Integral time (I) 1-3600sec (0: OFF)
		Derivative time(D) 1-3600sec (0: OFF)
		Proportional cycle (T1, T2) 1-120sec
		Dead band (DB) -100.0 - +100.0 or -100 - +100 ( )
	ON/OFF	Control sensitivity (C1, C2) 0-999 or 0.0-999.9 ( )
		OFF point of OUT 1&2 -199-999 or -199.9-999.9 ( )
	Control Output	Relay Contact
	SSR Drive Voltage	0-12VDC (Load resistance: 600Ω or more)
	Current	4-20mADC (Load resistance: 600Ω or less)
	Voltage	1-5VDC (Load resistance: 1kΩ or more)
Sampling Time		0.25sec (Output change period is the same)
Setting and Indication Accuracy	Thermocouple/ R.T.D. /Current-Voltage	Refer to the table of Input and scale range
Memory Element		EEPROM
Voltage Source		24VDC±10%
Weight		Less than 200g
Power Consumption		Less than 4W
Accessories		Instruction manual
Standard Condition		23 ±10℃, 45-75%RH
Operation Condition		0-50℃, 20-90%RH (Under non-condensation)
Storage Condition		-25-70℃, 5-95%RH (under non-condensation)
Functions	Manipulated Variable Limiter (ML1, MH1, ML2, MH2)	0.0(-10.0: Current-Voltage)-100.0(110.0: Current-Voltage)%
	Setting Limiter (SLL, SLH)	SV low limit setting range-SV high limit setting range, but the difference more than 50 digits is required between low and high range
	Selectable Control Mode (CNT)	PID type (Normal, Reverse), ON/OFF ( Normal, Reverse)
	PV Correction 0 Point Setting(PVS)	-199.999 or -199.9-999.9
	PV Correction Gain Setting(PVG)	0.50-2.00 (times)
	Input Filter	0-99 (sec)
	Blind Function	No indication available for non-required display by front key
	CT Input	Setting range: 1-30A, Accuracy: ±5% (Setting resolution 1A)
	Timer Operation Mode	0m.00s-.59m.59s. 0h.00m-.99h.59m. Accuracy: ±(1.5%+0.5 sec) of setting time.
	Watch Dog Function	EEPROM data check(Err0), A/D converter check (Err1), Auto-Tuning check (Err2)
Heating & Cooling	Only input of ch1 is available when heating/cooling action	
Communication	RS-485 conformable: Multi-Drop 2 line system. Max. 1:31 stations Protocol: TOHO TTM-100type MODBUS (RTU/ASC II) Communication speed: 1200/2400/4800/9600/19200bps	
Other function		Manual Control, Auto-Tuning(AT) Coefficient

## Additional Functions (Option)

Event	Function	-PV contact output (8 modes), Special contact output (3 modes), Additional functions (3 modes) Setting Range : -199.9-999.9 or -1999-9999 ( ) Sensitivity :0.0-999.9 or 0-9999( ) Rating :250VAC 1A (Load resistance) 1a contact Contact polarity is selectable either normal open or normal close.
DI	Function	:SV/SV2 switchable (OFF: SV2), Auto/Manual switchable (OFF: Manual), Run/Ready switchable, Normal/Reverse switchable, Normal (SV2)/Reverse (SV2) switchable, Timer Start/Reset
	Input Specifications	:Minimum input time: 250ms, OFF voltage: 6DC max, ON current: 6mA max, Permissible resistance value between terminals: ON333 max, OFF=500K min

## Wiring



## Terminals

Relay Output	C: Common. NO: Normal open
DI	No parity
Communication	Connect T/R (A) and T/R (B)
SG	Use as communication signal ground
SSR Drive Output	Connect directly to + & - input of SSR
CT	Connect specific current transformer (CTL)
R.T.D. Input	Connect to A, B and b with care
Thermocouple Input	Connect to polarity (+, -) with care
Output	Connect to polarity (+, -) with care
Current, Voltage Output	Connect to polarity (+, -) with care

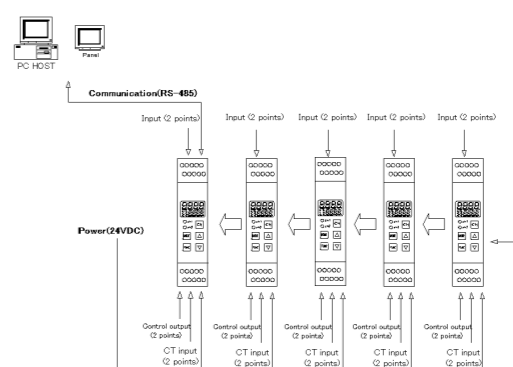
## Input and Range(Thermocouple & R.T.D. switchable by key)

Thermocouple	Setting Range	Display Range		Measurement Accuracy
		Non-decimal point	Decimal point	
K	°C -200 - 1370	-210	-1380	±(0.3% + 1 digit) of input value or ±2, either of bigger numeral values is taken. -100-0 : ±3, -200-100 : ±4 Thermocouple B under 400 is not regulated.
J	°C -200 - 850	-210	-860	
R	°C 0 - 1700	-10	-1710	
T	°C -200 - 400	-210	-410	
N	°C -200 - 1300	-210	-1310	
S	°C 0 - 1700	-10	-1710	
B	°C 0 - 1800	-20	-1802	

R.T.D.	Setting Range	Display Range		Measurement Accuracy
		Non-decimal point	Decimal point	
Pt100	°C -190 - 500	-190.0	-530.0	±(0.3% + 1 digit) of input value or ±0.9, either of bigger numeral values is taken.
JPt100	°C -190 - 500	-190.0	-520.0	

Current, Voltage	Setting Range	Display Range		Measurement Accuracy
		Non-decimal point	Decimal point	
0 - 5VDC	V	-1999	+9999	±(0.3% + 1 digit) in setting limiter span.
1 - 5VDC	V	Approx. -10% of low limiter setting	Decimal point is switchable	
0 - 10VDC	V	-1999	+9999	
0 - 10mVDC	mV	Approx. +10% of high limiter setting, within the setting range.	Decimal point is switchable	
4 - 20mADC	mA			

## Connection



## Dimensions

