

www.temcoline.com

jp progress engineering co.ltd  
PLC & WEB SCADA System  
DLMS to Modbus & IEC61850 converter  
www.jpprogress.com  
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# The world's Best A High Performance

PID Control Algorithms



**TemcoLine™**  
DIGITAL PID CONTROLLER

T50 SERIES  
T30 SERIES  
N50 SERIES



PID Control Algorithms

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**TemcoLine™**

## A High-performanced PID control algorithms

Super 2 degree of freedom PID Controllers

Temcoline's products are aimed at elevating the level of the industrial PID controller one step higher with our own high-precision electronics and control technology accumulated through development of sensors, industrial robots, flight vehicles and radars, etc. Our products are already being used in many companies and have earned positive response compare to other products from Japan and Europe. Join in advancing into the global market with industrial PID controller.



T50 SERIES



T30 SERIES

## The world's first Auto-sampling Time(50~250ms) Control

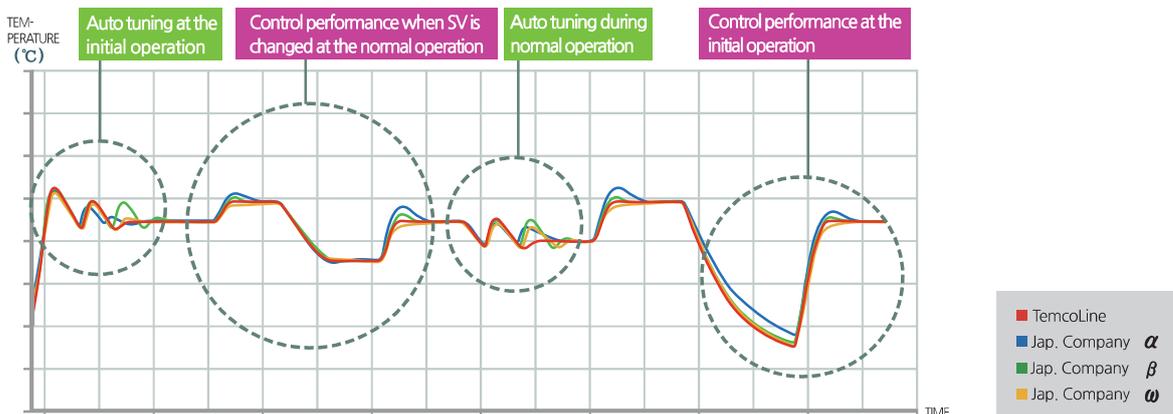
Auto-Sampling Time Control

The fast sampling is not good enough for optimal control because most of an actual temperature changes is moving slowly. Temcoline combined Auto-sampling time control technology into the existing PID control algorithms successfully and this provides an optimal control on an actual temperature changes under no conditions.



N50 SERIES

## Digital PID Controller Function Test



■ You could be checking this compared data in website.

## TemcoLine's products are...



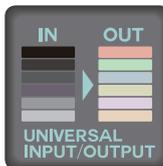
### Excellent control characteristics incomparable to other products

Super 2 degree of freedom PID algorithm allows to provide a fast response characteristic and high control stability while minimizing overshoot and undershoot during power-up or external load disturbance.



### TemcoLine's unique digital filtering technology

By implementing the intelligent digital filtering technology used for aircraft and robots, etc., all the products offer very stable control, especially in harsh work force.



### Universal input and output

The universal input and output design allows the user to simplify the initial setup for a new system.



### High reliability and anti-noise (EMC)

The series are to be delivered to market after a successful test for international standard EMC and 37 kinds of reliability in harsh conditions.

## Fully automated Test / Calibration system

Test and calibration processing in PID controller including other instrument & control products is most important factor to determine the product quality. All of our products pass through the several inspection procedures for quality assurance. PCB inspection, Electrical test, Aging, Calibration and Final inspection are fully automated. This will provide guaranteed quality and minimize the workmanship error in the course of production.

Aging is processed for about 2 hours before calibration and tests. After the final test, the products go through load tests before being packed to make sure only perfect products with no quality problems are released.

### Fully automated Test / Calibration system



Automated Database System



Fully Automated Test / Calibration

Product development is very fast because all data and test reports for each product are managed automatically, and regular data analysis and product/process improvement are made.

TemcoLine's pride-fully automated contact areas like JIG PIN regarding calibration errors are maintained in the best conditions through ultrasonic wash and regular replacement.

# T50 SERIES High-quality functions, High precise control and Modbus communication

T50 Series is high-end PID Controller with high-quality convenient functions, supporting most protocols used in Korea. It offers excellent control stability through SG-PID controlling and advanced digital filtering technology.



Universal input/output (Input 24 types /Output 4 types)



New concept Auto-sampling(50~250ms) control



20 alarm options and 3 event output option  
Output port selectable



RS485 communication with fully independent isolation structure (PC/TL-link, Modbus-ASCII/RTU and other 2 options)



Control type can be set (Heating, Cooling, Heating and cooling control)



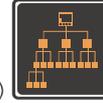
Super 2 degree of freedom PID algorithm



Fast mode, 3-Zone PID, Ramp function, Quick-AT, Easy-Menu



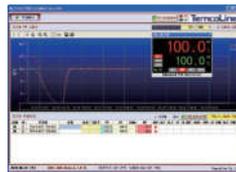
Current monitor (offset, hold function)  
Heater burnout alarm(HBA)  
Heater usage time (heater life prediction)



Support SYNC communication and possible to use Synchronous communication up to 250 by adjusting Sync-Master/Slave



Providing Remote supervisory control software and Data viewer which offer more powerful temperature recording and integrated management function



T50 series' remote supervisory control software provides the graphical temperature recording and it's very useful to monitor the examination of the precision control machine and the slight variations of the temperature, and also helpful to analysis output data in laboratory.

## General Specification

|                                    |  |  |
|------------------------------------|--|--|
| Power Supply                       | Rating 100~240V AC 50~60Hz (voltage operating range: 85~265V AC)<br>※ Option: Rating 24V AC or DC (operating voltage range 20~28V DC)  |  |
| Power Consumption                  | 5VA (Max.)   |  |
| Input Type                         | TC: K, J, T, E, R, B, S, L, N, U, C(W5), D(W3)<br>Platinum RTD: KPt100(KS), JPt100(JIS), Pt100(DIN)<br>Current input (A): 4~20mA DC<br>Voltage input (V): 1~5V DC, -10~20mV DC, 0~100mV DC       |  |
| Display Accuracy                   | ±0.3% of FS + 1 Digit  |  |
| Input Impedance                    | Current input(250Ω), Voltage input(includingTC) ≥ 1MΩ min.<br>(RTD line resistance: ≤ 10Ω, when 3-line resistance are the same)  |  |
| Input Sampling Period              | 50~250ms (variable according to SG-PID algorithm)  |  |
| Control Output                     | Relay  | 1c 250V AC, 3A(resistance load) electric lifespan ≥ 100,000 min. (time proportional PID output or ON/OFF output) |
|                                    | Voltage (S.S.R)  | DC15V 25mA (Built-in short protection circuit) Voltage pulse (time proportional PID output)                      |
|                                    | Current (S.C.R)  | 4~20mA DC, load impedance ≤ 600Ω (continuous PID output)   |
| Control Method                     | Super 2 degree-of-freedom PID (SG-PID algorithm), Fast, Auto-Tuning  |  |
| Multi SV Input (D.I)               | ON: ≤ 1KΩ, OFF: ≥ 100KΩ (external control SV1, 2, 3)   |  |
| Retransmission Output              | 4~20mA DC, load impedance ≤ 600Ω resolution 1/4,600<br>PV(process value), SV(set value), MV(manipulated variable [%]), SPS(sensor module power supply)   |  |
| Alarm Output                       | ALARM 1,2 HBA common (C.T)<br>1a 250V AC 3A (Resistive load)<br>HBA : 0.1 ~ 38.0 A AC (Resolution 0.1A)  |  |
| Communication Output               | 2 wires RS485 totally independent isolation structure Max. speed : 19,200bps/ Max. connect no. 99 devices (32 devices recommended) Support protocol : PC-Link, TL-Link, Modbus-ASCII, Modbus-RTU |  |
| Ambient Temperature and Humidity   | -10~50°C/ relative humidity 25~85% RH (but with neither condensation nor freezing)   |  |
| Weight (B/K, Accessories included) | ■ T52, T53, T57: 230g    ■ T54: 140g    ■ T59: 320g    *if options are added + 30g   |  |

# T52 / T53

48x96x77 mm / 96x48x77 mm  
T52, T53 - C00 / C10

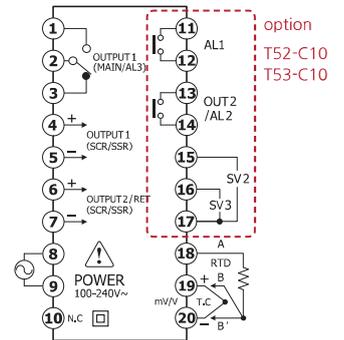


## Optional Function

- Basic : 1 relay output
- 2 SSR & SCR output
- 2 alarm output
- retransmission output(4~20mA)

- Standard C00 : multi SV input(DI)
- Option C10 : RS-485 communication
- heater burnout alarm(HBA)

## Terminal Configuration

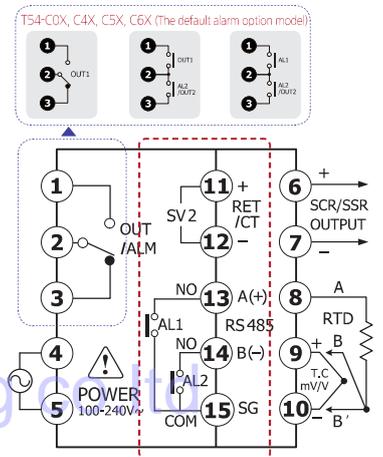


# T54

48x48x77 mm  
T54 - C00 / C10 / C20  
C30 / C40 / C50  
C60 / C70



- Basic C00 : 1 relay output
- 1 SSR & SCR output
- 1 alarm output
- Option C10 : 1 retransmission output
- 2 alarm output
- C20 : heater burnout alarm(HBA)
- 2 alarm output
- C30 : multi SV input
- 2 alarm output
- C40 : 1 retransmission output
- RS-485 communication
- C50 : heater burnout alarm(HBA)
- RS-485 communication
- C60 : multi SV input
- RS-485 communication
- C70 : RS-485 communication
- 2 alarm output

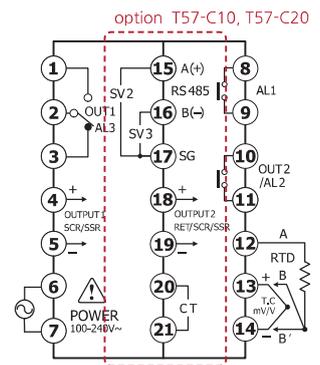


# T57

72x72x77 mm  
T57 - C00 / C10 / C20



- Basic C00 : 1 relay output
- 1 SSR & SCR output
- 2 alarm output
- Option C10 : RS-485 communication
- retransmission output(4~20mA)
- heater burnout alarm(HBA)
- C20 : multi SV input(DI)
- retransmission output(4~20mA)
- heater burnout alarm(HBA)

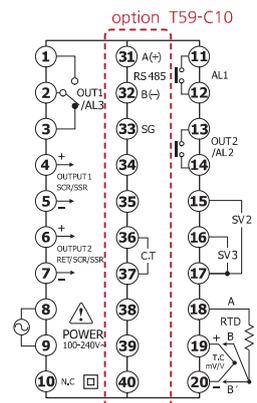


# T59

96x96x77 mm  
T59 - C00 / C10



- Basic C00 : 1 relay output
- 1 SSR & SCR output
- 2 alarm output
- retransmission output(4~20mA)
- multi SV input(DI)
- Option C10 : RS-485 communication
- heater burnout alarm(HBA)



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# T30 SERIES Easy control, High precise control and High speed responsibility

T30 Series is economical and basic PID Controller with high-precision control, various convenient functions and very high-response speed.



Universal input/output  
(Input 24 types /  
Output 4 types)



New concept Auto-sampling(50~250ms) control



20 alarm options and  
3 event output option



Control loop break alarm  
(LBA)



Super 2 degree of freedom  
PID algorithm



2-Zone PID, External input SV1  
and SV2, Input digital filtering  
function



Timer(6 type)  
External digital input (DI)  
(Run / Stop)



Retransmission output

## jp progress engineering co.ltd

### General Specification

|   |  |
|---|--|
| <b>Power Supply</b>                       | Rating 100~240V AC 50~60Hz (voltage operating range: 85~265V AC)<br>※ Option: Rating 24V AC or DC (operating voltage range 20~28V DC)  |
| <b>Power Consumption</b>                  | 5VA (Max.)   |
| <b>Input Type</b>                         | TC: K, J, T, E, R, B, S, L, N, U, C(W5), D(W3)<br>Platinum RTD: KPt100(KS), JPt100(JIS), Pt100(DIN)<br>Current input (A): 4~20mA DC<br>Voltage input (V): 1~5V DC, -10~20mV DC, 0~100mV DC |
| <b>Display Accuracy</b>                   | ±0.3% of FS + 1 Digit  |
| <b>Input Impedance</b>                    | Current input(250Ω), Voltage input(including TC) ≥ 1MΩ min.<br>(RTD line resistance: ≤ 10Ω, when 3-line resistance are the same)   |
| <b>Input Sampling Period</b>              | 50~250ms (variable according to SG-PID algorithm)  |
| <b>Control Output</b>                     | <b>Relay</b> 1c 250V AC, 3A(resistance load) electric lifespan ≥ 100,000 min. (time proportional PID output or ON/OFF output)  |
|   | <b>Voltage (S.S.R)</b> DC15V 25mA (Built-in short protection circuit) Voltage pulse (time proportional PID output)   |
|   | <b>Current (S.C.R)</b> 4~20mA DC, load impedance ≤ 600Ω (continuous PID output)  |
| <b>Control Method</b>                     | Super 2 degree-of-freedom PID (SG-PID algorithm), Auto-Tuning  |
| <b>Multi SV Input (D.I)</b>               | ON: ≤ 1KΩ, OFF: ≥ 100KΩ (external control SV1, 2)  |
| <b>Retransmission Output</b>              | 4~20mA DC, load impedance ≤ 600Ω resolution 1/4,600<br>PV(process value), SV(set value), MV(manipulated variable [%]), SPS(sensor module power supply)                                     |
| <b>Alarm Output</b>                       | <b>Alarm 1, 2 (LBA common)</b><br>1a 250V AC 3A (Resistive load)<br>20 types of independent event output & Control loop break alarm  |
| <b>Ambient Temperature and Humidity</b>   | -10~50℃/ relative humidity 25~85% RH (but with neither condensation nor freezing)  |
| <b>Weight (B/K, Accessories included)</b> | ■ T32, T33, T37: 230g    ■ T34: 140g    ■ T39: 320g    *if options are added + 30g   |

# T32 / T33

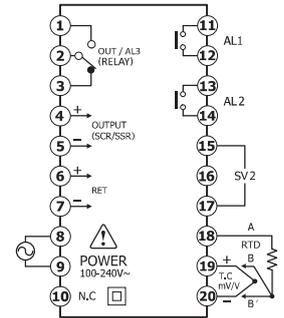
48x96x77 mm / 96x48x77 mm



## Optional Function

- Basic S00 : 1 relay output  
 1 SSR & SCR output  
 2 alarm output  
 retransmission output(4~20mA)  
 multi SV input(DI)

## Terminal Configuration



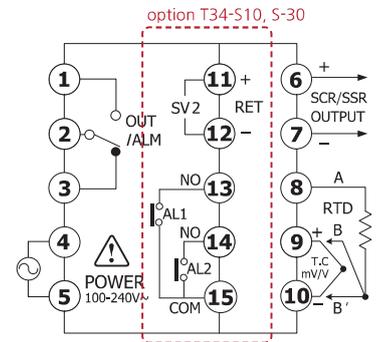
# T34

48x48x77 mm  
 T34 - S00 / S10 / S30



- Basic S00 : 1 relay output  
 1 SSR & SCR output

- Option S10 : 1 retransmission output  
 2 alarm output  
 S30 : multi SV input  
 2 alarm output



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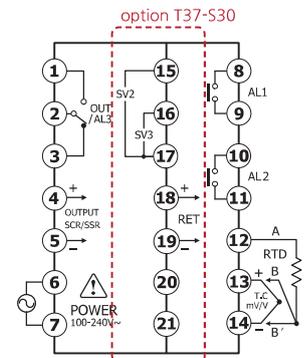
# T37

72x72x77 mm  
 T37 - S00 / S30



- Basic S00 : 1 relay output  
 1 SSR & SCR output  
 2 alarm output

- Option S30 : multi SV input(DI)  
 retransmission output(4~20mA)

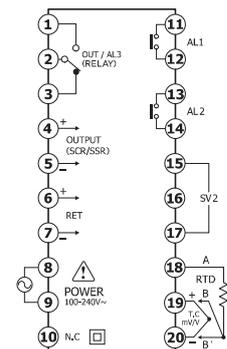


# T39

96x96x77 mm  
 T39 - S00



- Basic S00 : 1 relay output  
 1 SSR & SCR output  
 2 alarm output  
 retransmission output(4~20mA)  
 multi SV input(DI)



# T30 SERIES - TIMER

ALARM 2 of the T30 series supports powerful digital timer function.

## 1. Output operation mode (ALARM 2)

Normal : ON-Delay

- T1 : ON-Time, Auto Run (one shot)
- T2 : ON-Time, Manual Run (one shot)
- T3 : ON-Time, Manual Run (one shot) : without temperature
- T4 : Flicker (ON-Time setting from front display)
- T5 : Flicker (OFF-Time setting from front display)

Except the time set from the front, it is set in the internal menu.

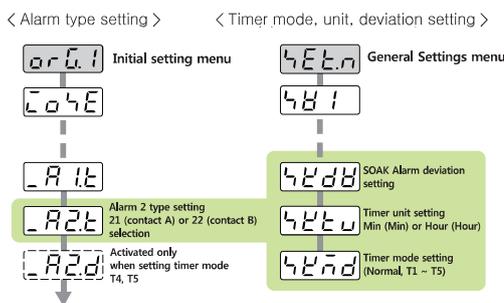
## 2. 2 time units

## 3. External digital input (DI)

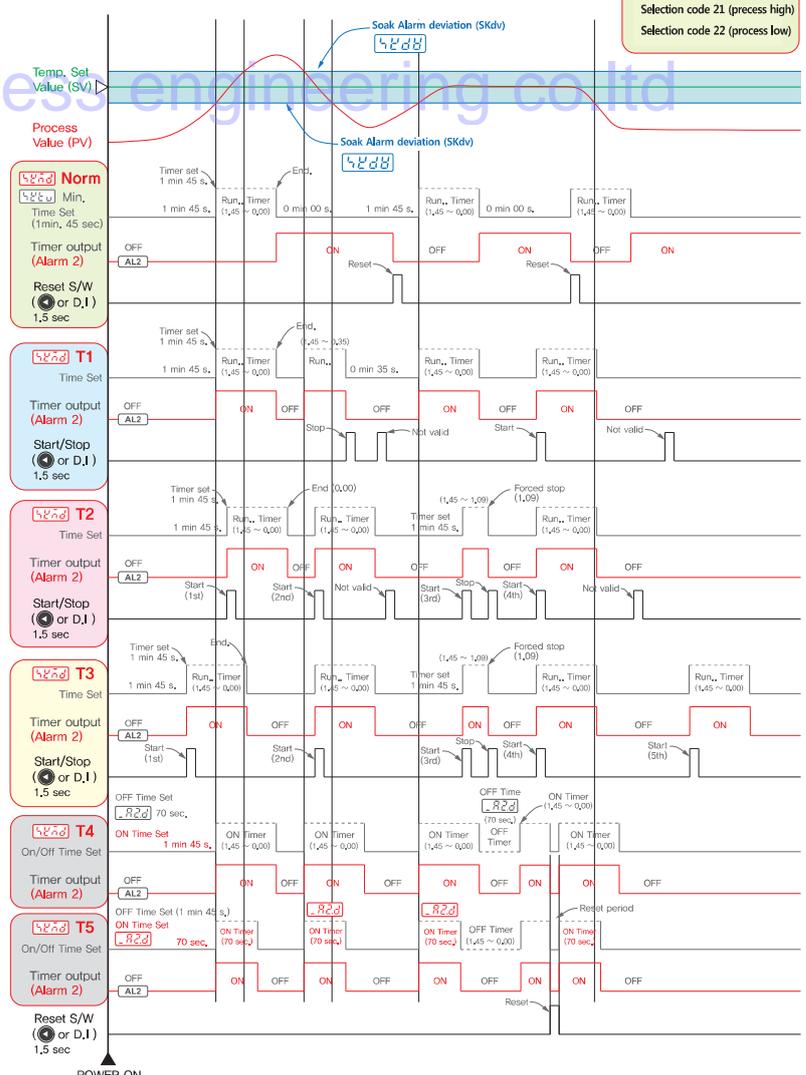
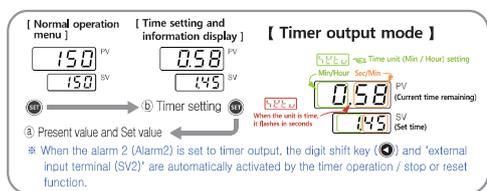
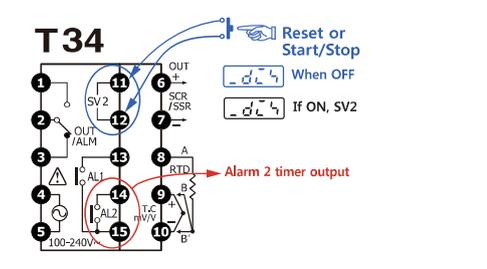


## Timer (normal, T1~5) Output Operation Timing Chart

### < SOAK alarm and timer output >



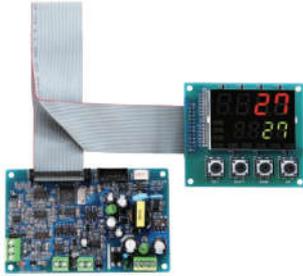
◆ Alarm setting   R2E    
Selection code 21 (process high)  
Selection code 22 (process low)



# N50 SERIES Board Type PID Controller

N50 Series is an integrated board type product based on T50 Series. The series has high performance to configure various systems/applications at economical cost.

With its powerful communication function and excellent control characteristics, N50 is exclusively used for semiconductor test equipment of global companies.



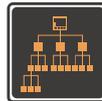
Universal input/output (Input 24 types /Output 4 types)



New concept Auto-sampling(50~250ms) control



RS485 communication with fully independent isolation structure (PC/TL-link, Modbus-ASCII/RTU and other 2 options)



Support SYNC communication and possible to use Synchronous communication up to 250 by adjusting Sync-Master/Slave



Providing Remote supervisory control software and Data viewer which offer more powerful temperature recording and integrated management function



Super 2 degree of freedom PID algorithm



Fast mode, 3-Zone PID, Ramp function, Quick-AT, Easy-Menu



20 alarm options and 3 event output option  
Output port selectable



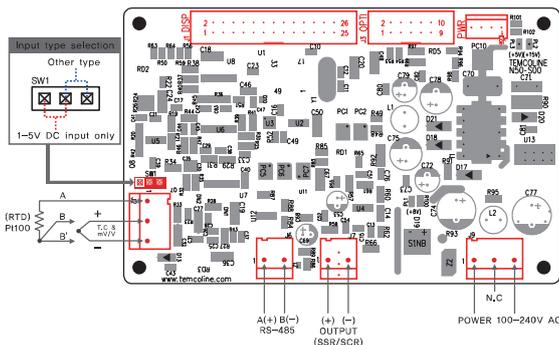
Current monitor (offset, hold function)  
Heater burnout alarm(HBA)  
Heater usage time (heater life prediction)

option

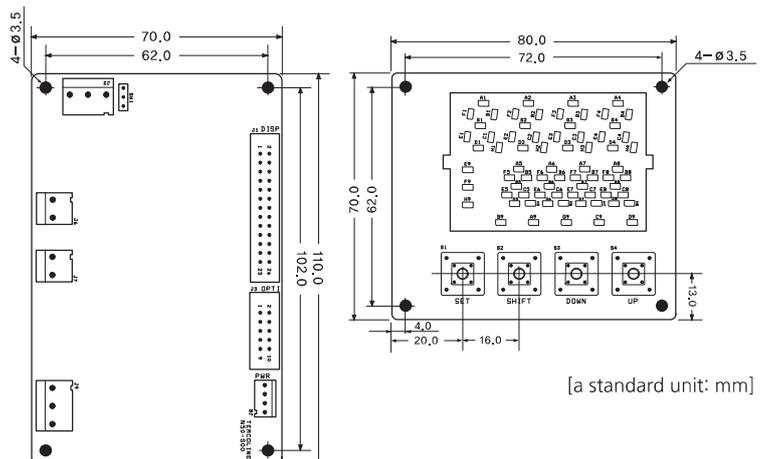
## General Specification

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|   |  |
|---|--|
| <b>Power Supply</b>                       | Rating 100~240V AC 50~60Hz (voltage operating range: 85~265V AC)<br>※ Option: Rating 24V AC or DC (operating voltage range 20~28V DC)  |
| <b>Power Consumption</b>                  | 5VA (Max.)   |
| <b>Input Type</b>                         | TC: K, J, T, E, R, B, S, L, N, U, C(W5), D(W3)<br>Platinum RTD: KPt100(KS), JPt100(JIS), Pt100(DIN)<br>Current input (A): 4~20mA DC<br>Voltage input (V): 1~5V DC, -10~20mV DC, 0~100mV DC                     |
| <b>Display Accuracy</b>                   | ±0.3% of FS + 1 Digit  |
| <b>Input Impedance</b>                    | Current input(250Ω), Voltage input(including TC) ≥ 1MΩ min.<br>(RTD line resistance: ≤ 10Ω, when 3-line resistance are the same)   |
| <b>Sampling Period</b>                    | 50~250ms (variable according to SG-PID algorithm)  |
| <b>Control Output</b>                     | <b>Voltage (S.S.R)</b><br>DC15V 25mA (Built-in short protection circuit)<br>Voltage pulse (time proportional PID output)<br><b>Current (S.C.R)</b><br>4~20mA DC, load impedance ≤ 600Ω (continuous PID output) |
| <b>Control Method</b>                     | Super 2 degree-of-freedom PID (SG-PID algorithm), Fast, Auto-Tuning  |
| <b>Communication Output</b>               | 2 wires RS485 totally independent isolation structure Max. speed : 19,200bps/ Max. connect no. 99 devices (32 devices recommended)<br>Support protocol : PC-Link, TL-Link, Modbus-ASCII, Modbus-RTU            |
| <b>Ambient Temperature and Humidity</b>   | -10~50°C/ relative humidity 25~85% RH (but with neither condensation nor freezing)   |
| <b>Weight (B/K, Accessories included)</b> | Main Board: 66g / Display Board: 35g / Connectable Cable: 24g  |



Terminal Configuration



[a standard unit: mm]





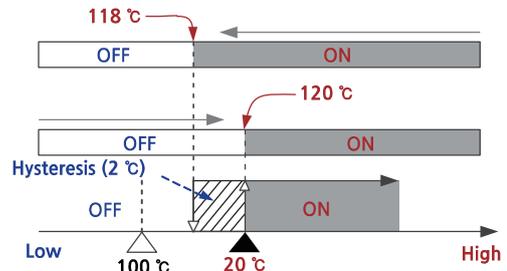
### ③ Alarm Type and Selection code

T50/T30 Series have three independent alarm outputs, and are able to use the event mode variously.

#### < Example of Alarm 1 output Setting >

| T50 SERIES  | T30 SERIES   |
|---|--|
| Alarm 1 Type<br><b>A1EY</b><br>Set Value: 03          | Alarm 1 Type<br><b>A1E</b><br>Set Value: 03        |
| Alarm 1 Dead band<br><b>A1db</b><br>Set Value: 2°C    | Alarm 1 Hysteresis<br><b>A1H</b><br>Set Value: 2°C |
| Alarm 1 Set Value<br><b>AL1</b><br>Set Value: 20°C    | Alarm 1 Set Value<br><b>AL1</b><br>Set Value: 20°C |
| Alarm 1 Output port<br><b>ALPn</b><br>Set Value: AL 1 |  |

When set value (SV) = 100 °C



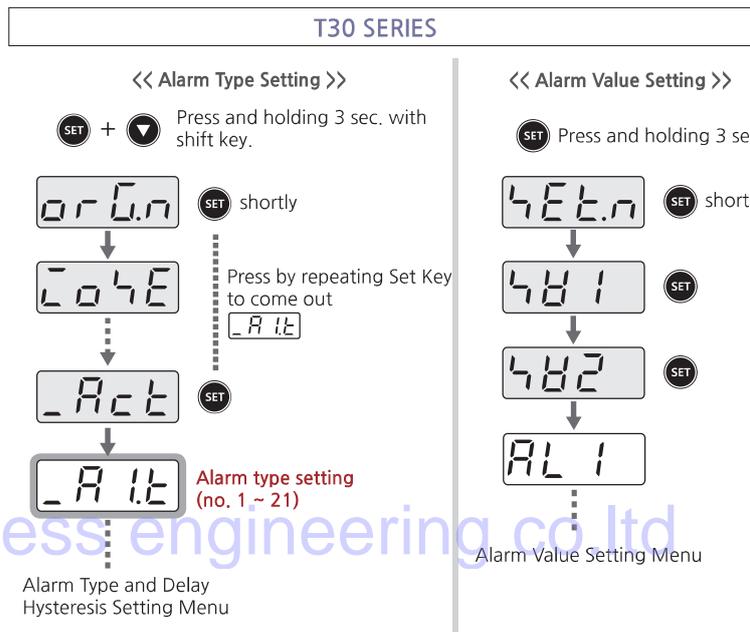
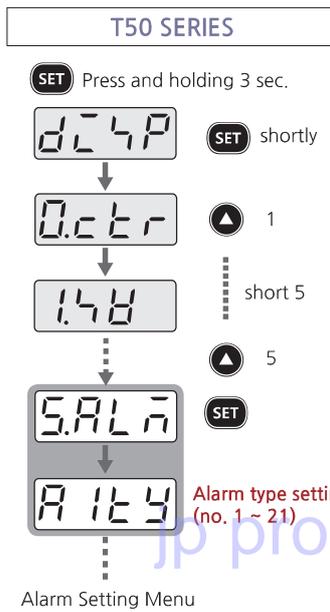
#### Alarm output type and Selection code

| Code no. | Alarm type                                       | Alarm output operation  |
|----------|--|---|
| 01       | Absolute value upper-limit                       | When temperature is falling: OFF to ON  |
| 09       | Process low                                      | When temperature is rising: OFF to ON   |
| 11       | with hold function                               | Temperature graph showing hysteresis band   |
| 19       | with hold function (Inverted)                    | Temperature graph showing hysteresis band   |
| 02       | Absolute value lower-limit                       | When temperature is falling: ON to OFF  |
| 10       | Process low                                      | When temperature is rising: ON to OFF   |
| 12       | with hold function                               | Temperature graph showing hysteresis band   |
| 20       | with hold function (Inverted)                    | Temperature graph showing hysteresis band   |
| 03       | Upper-limit deviation                            | < Negative temp. value setting >: OFF to ON; < Positive temp. value setting >: OFF to ON    |
| 05       | Process low                                      | < Negative temp. value setting >: OFF to ON; < Positive temp. value setting >: OFF to ON    |
| 13       | with hold function                               | Temperature graph showing hysteresis band   |
| 15       | with hold function (Inverted)                    | Temperature graph showing hysteresis band   |
| 04       | Lower-limit deviation                            | < Negative temp. value setting >: ON to OFF; < Positive temp. value setting >: ON to OFF    |
| 06       | Process low                                      | < Negative temp. value setting >: ON to OFF; < Positive temp. value setting >: ON to OFF    |
| 14       | with hold function                               | Temperature graph showing hysteresis band   |
| 16       | with hold function (Inverted)                    | Temperature graph showing hysteresis band   |
| 07       | Upper & Lower-limit deviation                    | When temperature is falling: ON to OFF to ON; When temperature is rising: ON to OFF to ON   |
| 17       | Upper & Lower-limit deviation with hold          | Temperature graph showing hysteresis band   |
| 08       | Upper & Lower-limit deviation in range           | When temperature is falling: OFF to ON to OFF; When temperature is rising: OFF to ON to OFF |
| 18       | Upper & Lower-limit deviation in range with hold | Temperature graph showing hysteresis band   |
| 21       | Heater break alarm (HBA)                         | Refer to HBA (ALARM1 only)  |
|          | Control Loop break alarm                         | LBA operation when heater break alarm (HBA) is not used. (ALARM1 only)                      |

### T30(TIMER) ALARM OUTPUT TYPE AND SELECTION CODE

| CODE NO. | ALARM TYPE | ALARM OUTPUT OPERATION  |
|----------|------------|---|
| 21       | ALARM 1    | Loop break alarm (LBA) Refer to Loop break alarm (LBA)! (ALARM1 only)   |
|          | ALARM 3    | Inverter operation / stop output alarm Page 25, 1) Refer to inverter operation stop control! (ALARM 3 only)                   |
|          |            | [Alarm No. 2 code 21] Supports five kinds of SOAK alarm and timer output(Process high) (Setting mode T1 to T5)                |
| 22       | ALARM 2    | [Alarm No. 2 code 22] SOAK Alarm and Timer Output (Process low) refer to<br>※ Page 33, "14. SOAK alarm and timer output mode" |

### < Alarm (AL1, AL2) Group Setting >

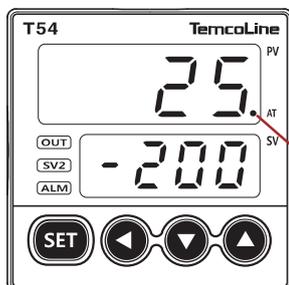


※ According to a set input type and function change a order of setting menu.

#### ④ Auto Tuning

PID Controller works normally only it that was tuned P,I,D value before to use.

Auto-tuning is function for the best performance by tuned itself automatically accroding to full load operating condition and sataus.



- ① Set to need a Set Value(SV).
- ② Start Auto-Tuning(AT).
- ③ Hold on when turn automatically off a AT indicator lamp.

AT indicator lamp

AT operation start : SET + 0.5 second

AT stop by perforce : SET + 0.5 second

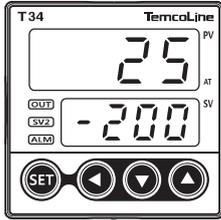
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When auto-tuning begins, the "auto-tuning indicator lamp" will blinking every 0.5 second and will turn off upon completion of the tuning process. If you change a set value(SV) in auto-tuning, proceed the tuning before to work on auto-tuning.

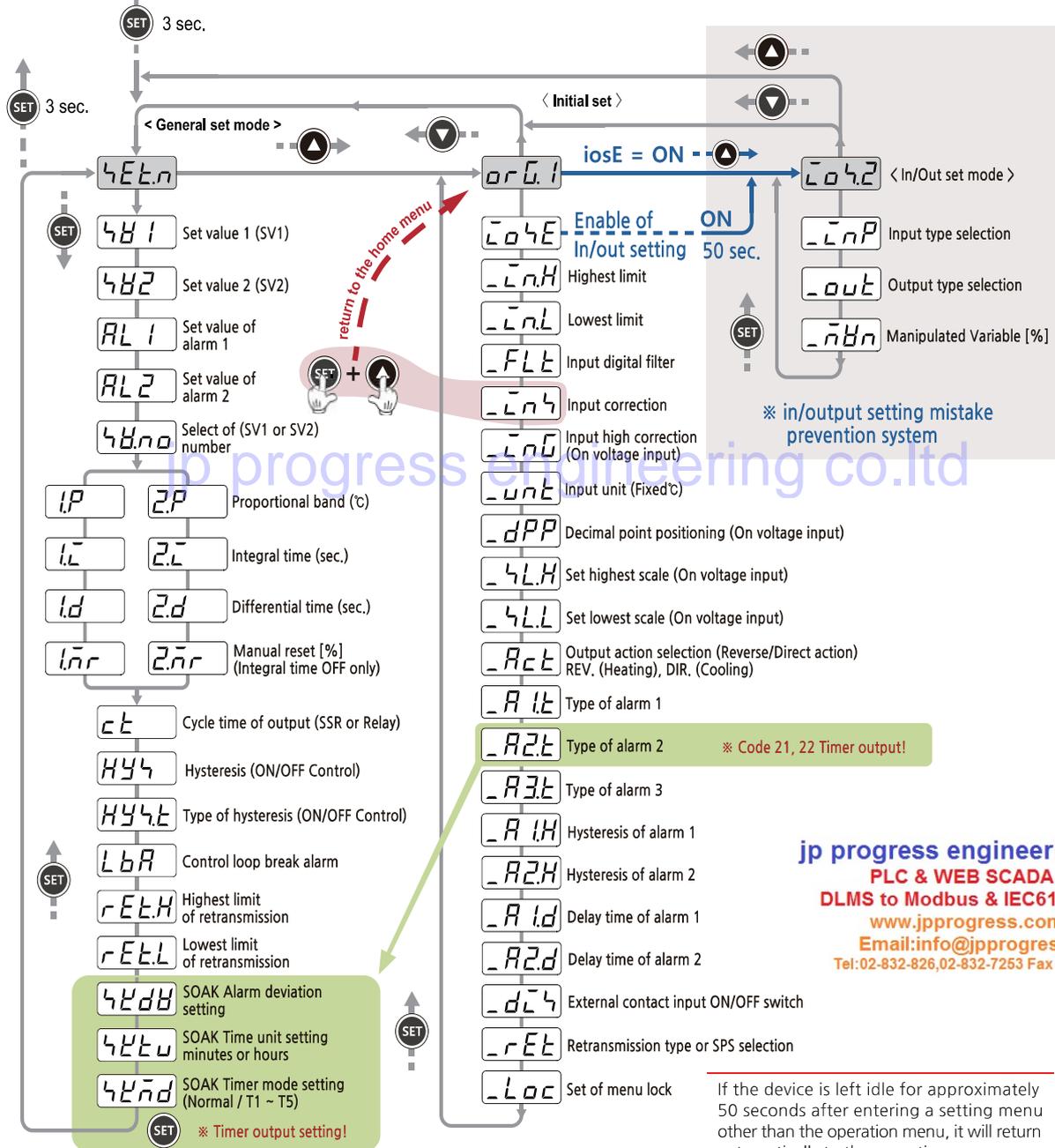


T30 SERIES

operation menu



SET + ▲ 0.5 sec. **AUTO TUNING...**



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If the device is left idle for approximately 50 seconds after entering a setting menu other than the operation menu, it will return automatically to the operation menu.

The above is a brief explanation of the operation. For more information, please refer to user's manual that is included in product.

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