www.temcoline.com

The world's Best

A High Performance

PID Control Algorithms

TemcoLine™

DIGITAL PID CONTROLLER

T50 SERIES

T30 SERIES

N50 SERIES

PID Control Algorithms

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.

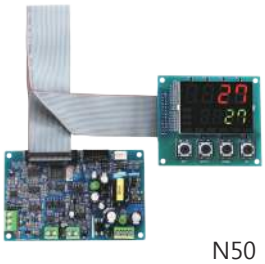
T50 SERIES

T30 SERIES

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

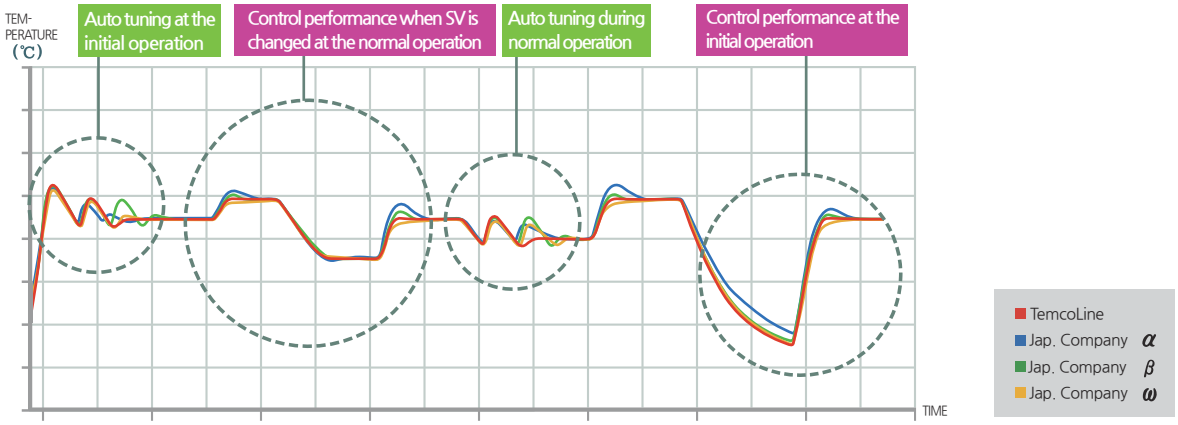
Auto-Sampling Time Control

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.

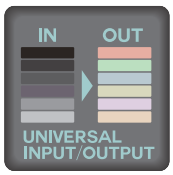
TemcoLine's products are...

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.

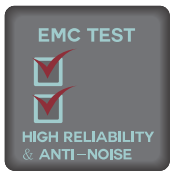
TemcoLine's unique digital filtering technology

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


Test of Porducts


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 improve -ment 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)
- Super 2 degree of freedom PID algorithm
- New concept Auto-sampling(50~250ms) control
- 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)
- 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
- Control type can be set (Heating, Cooling, Heating and cooling control)
- 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) ※ 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) Platinum RTD: KPt100(KS), JPt100(JIS), Pt100(DIN) Current input (A): 4~20mA DC 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. (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 PV(process value), SV(set value), MV(manipulated variable [%]), SPS(sensor module power supply)
Alarm Output	ALARM 1,2 HBA common (C.T)	1a 250V AC 3A (Resistive load) 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℃/ 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

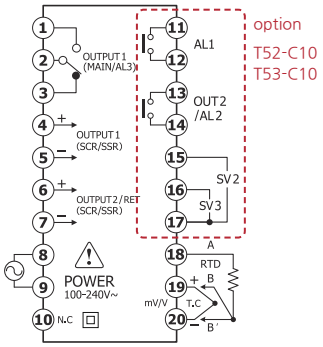
48x96x77 mm / 96x48x77 mm
T52, T53 - C00 / C10

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)

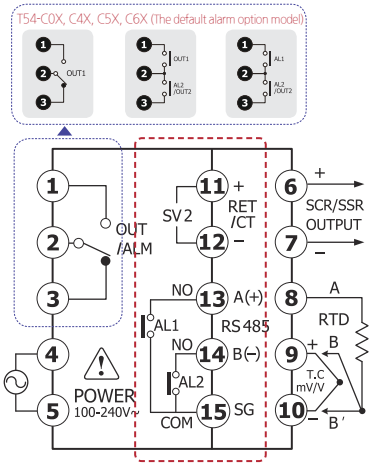
Terminal Configuration



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



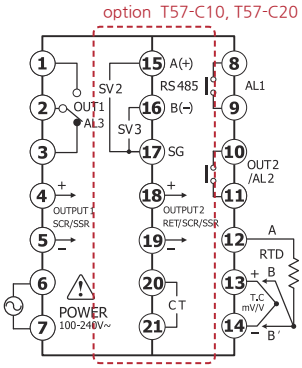
T57

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)

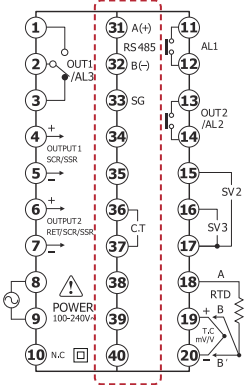


T59

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)



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)
- Super 2 degree of freedom PID algorithm
- New concept Auto-sampling(50~250ms) control
- 2-Zone PID, External input SV1 and SV2, Input digital filtering function
- 20 alarm options and 3 event output option
- Timer(6 type) External digital input (DI) (Run / Stop)
- Control loop break alarm (LBA)
- Retransmission output

General Specification

Power Supply		Rating 100~240V AC 50~60Hz (voltage operating range: 85~265V AC) ※ 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) Platinum RTD: KPt100(KS), JPt100(JIS), Pt100(DIN) Current input (A): 4~20mA DC 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(including TC) ≥ 1MΩ min. (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), Auto-Tuning
Multi SV Input (D.I)		ON: ≤ 1KΩ , OFF: ≥ 100KΩ (external control SV1, 2)
Retransmission Output		4~20mA DC, load impedance ≤ 600Ω resolution 1/4,600 PV(process value), SV(set value), MV(manipulated variable [%]), SPS(sensor module power supply)
Alarm Output	Alarm 1, 2 (LBA common)	1a 250V AC 3A (Resistive load) 20 types of independent event output & Control loop break alarm
Ambient Temperature and Humidity		-10~50℃/ relative humidity 25~85% RH (but with neither condensation nor freezing)
Weight (B/K, Accessories included)		■T32, T33, T37: 230g ■T34: 140g ■T39: 320g *if options are added + 30g

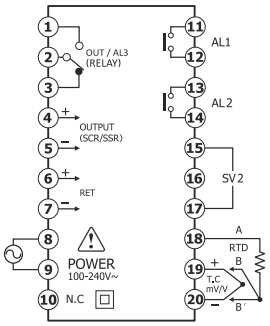
T32 / T33

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



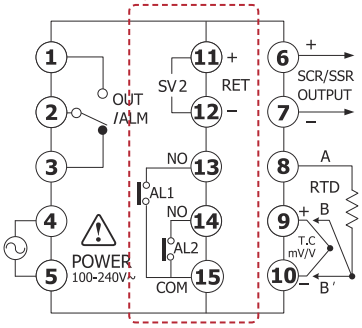
T34

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

option T34-S10, S-30



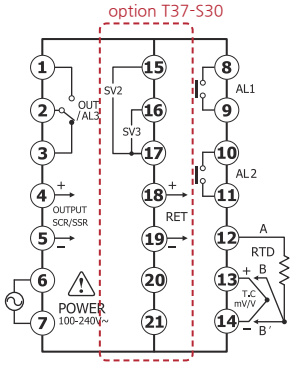
T37

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)

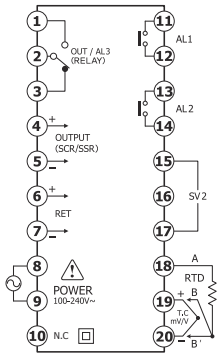
option T37-S30



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 temperture

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.

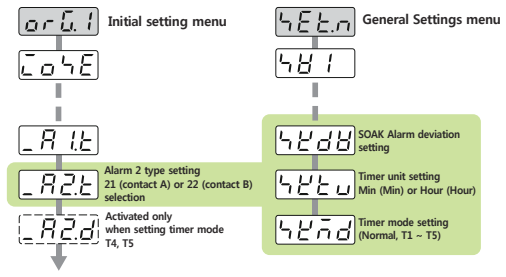
2. 2 time units

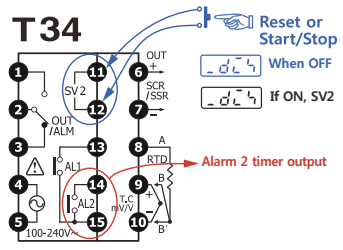
3. External digital input (DI)

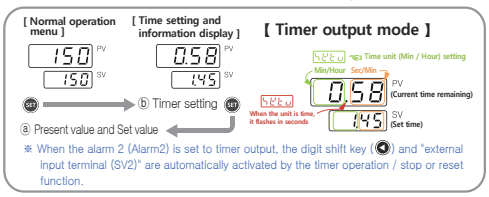
Timer (normal , T1~5) Output Operation Timing Chart

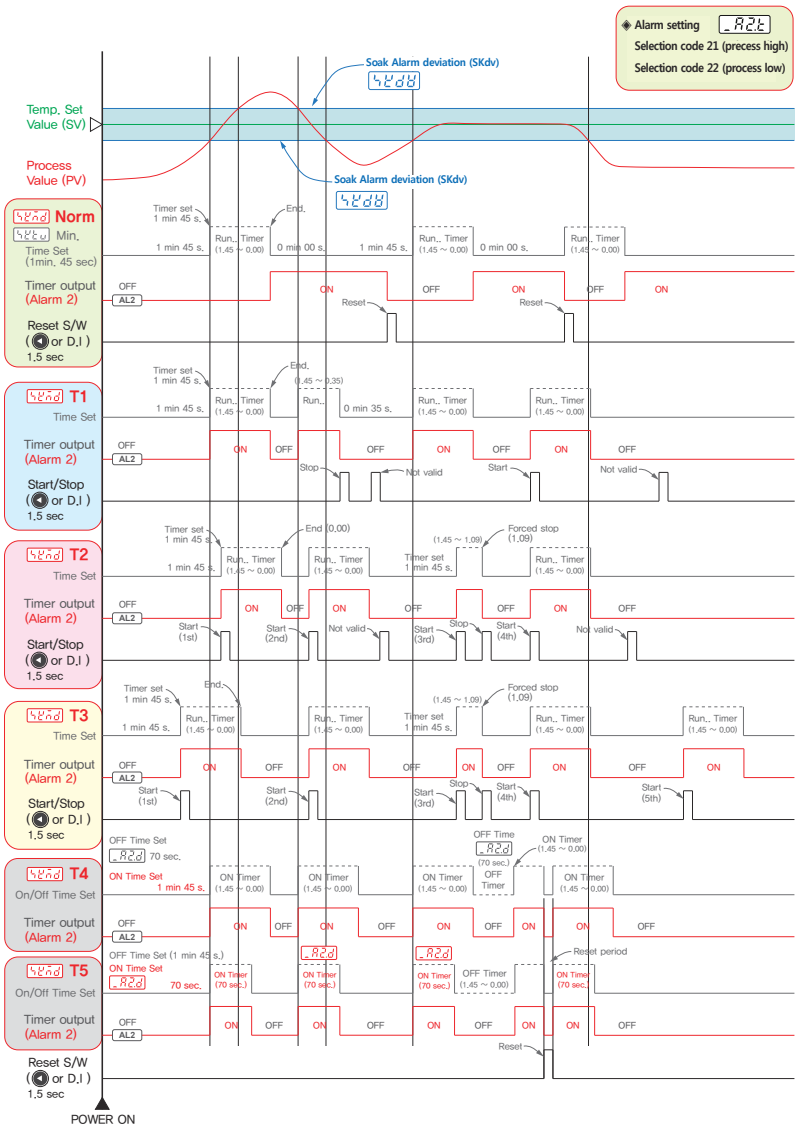
〈 SOAK alarm and timer output 〉

〈 Alarm type setting 〉 〈 Timer mode, unit, deviation setting 〉



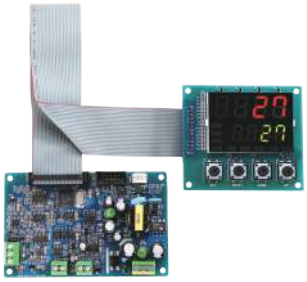






N50 SERIES Board Type PID Controller

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

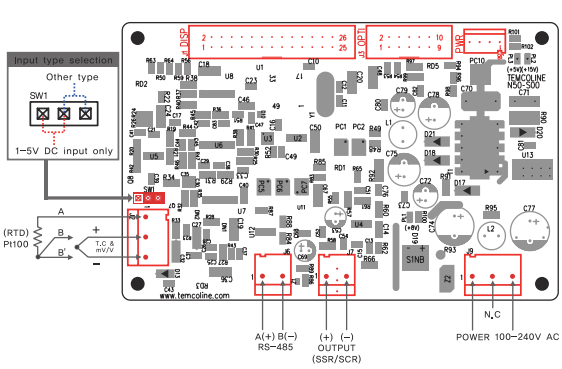
20 alarm options and 3 event output option Output port selectable

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

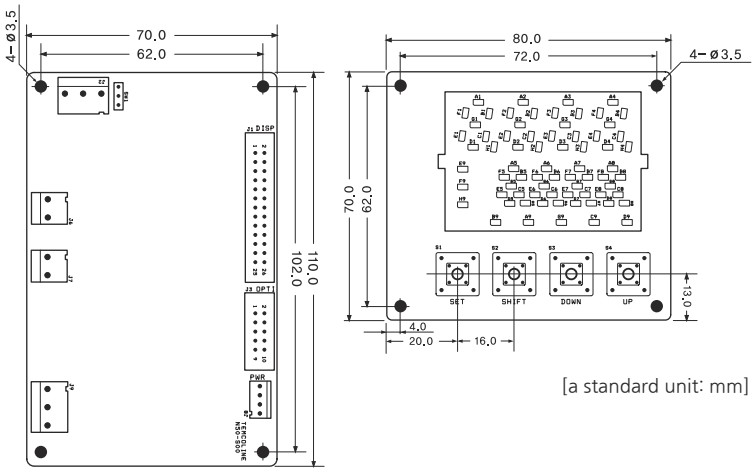
option

General Specification

Power Supply		Rating 100~240V AC 50~60Hz (voltage operating range: 85~265V AC) ※ 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) Platinum RTD: KPt100(KS), JPt100(JIS), Pt100(DIN) Current input (A): 4~20mA DC Voltage input (V): 1~5V DC, -10~20mV DC, 0~100mV DC
Display Accuracy		±0.3% of FS + 1 Digit
Input ImpedanceInput		Current input(250 Ω), Voltage input(includingTC) ≥ 1MΩ min. (RTD line resistance: ≤ 10Ω, when 3-line resistance are the same)
Sampling Period		50~250ms (variable according to SG-PID algorithm)
Control 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
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℃/ relative humidity 25~85% RH (but with neither condensation nor freezing)
Weight (B/K, Accessories included)		Main Board: 66g / Display Board: 35g / Connectable Cable: 24g



Terminal Configuration



[a standard unit: mm]

1. Check point before using

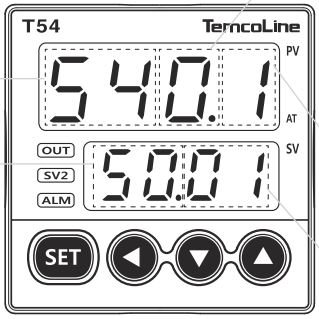
1) Initial Value

INPUT : K-Type(sel.code 1) OUTPUT : SSR mode(sel.code 1)

In the case of standard model T34-S00 only, when SSR(1) and SCR(2) are chosen as the output mode, Alarm1 output will be in the main relay.

2) 7 Segment display indications

3) Initial display on power supply(ex. model T54)



- **Model name**
- **Firmware version**
- **Option**
  0 : NONE
  1 : RET, ALARM1, 2
  2 : HBA(CT), ALARM1, 2
  3 : DI(SV1, 2), ALARM1, 2
  4 : RET, RS-485
  5 : HBA(CT), RS-485
  6 : DI(SV1, 2), RS-485
  7 : RS-485, ALARM1, 2
- **Output type**
  0 : RELAY ON/OFF CONTROL
  1 : SSR (VOLT-PULSE) PID CONTROL
  2 : SCR (4~20mA) PID CONTROL
  3 : RELAY PID CONTROL
- **Input type**
  01 : K-Type (-200~1370 ℃)
  02 : K-Type (-199.9~999.9 ℃)
  :
  33 : mV DC (0~100mV)

2. Initial installation and minimum operation procedure

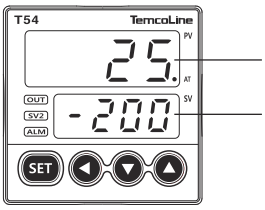
1) Check the external wiring diagram and specification (power supply & terminal arrangement)

2) Check input and output type

T50 and T30 Series are univeral input and output. It must be chosen the correct input and output.

At first, should be set input type setting and then will be change others. Because if you change the input type, all setting value were reset.

① Input type selection

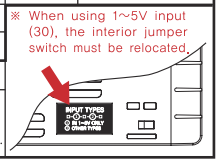


PV(Process-Value)

SV(Set-Value)

Input type selection code table

INPUT TYPE		SETTING CODE	TEMPERATURE RANGE	ACCURACY	REMARK
Thermo couple (T.C)	K	1	−200 ~ 1370	±0.3% of F.S +1Digit	* F.S is max. value to min.value of each range. * Digit is minimum of display.
		2	−199.9 ~ 999.9		
	J	15	−200 ~ 1000		
		3	−199.9 ~ 999.9		
	E	16	−200 ~ 1000		
		4	−199.9 ~ 999.9		
	T	5	−199.9 ~ 400.0		
	R	6	0 ~ 1700		
	B	7	400 ~ 1800		
	S	8	0 ~ 1700		
	L	17	−200 ~ 900		
		9	−199.9 ~ 900.0		
	N	10	−200 ~ 1300		
	U	11	−199.9 ~ 400.0		
	C (W5)	12	0 ~ 2300		
	D (W3)	13	0 ~ 2400		
RTD	JPt100Ω (JIS, KS)	20	−199.9 ~ 500.0		
		22	−200 ~ 500		
	Pt100Ω (DIN, IEC)	21	−199.9 ~ 640.0		
		23	−200 ~ 640		
Voltage (V DC/mV DC)	0~100 mV DC	33	0 ~ 100 mV DC		※ When using 1~5V input (30), the interior jumper switch must be relocated.
	−10~20 mV DC	32	−10 ~ 20 mV DC		
	1~5 V DC	30	1~5 V DC		
Current	4~20mA DC	30	When using current input, use the resistor 250Ω on input terminal.		



T50 SERIES

SET Press and holding more than 3 sec.

dCHP → SET Press shortly

0.ctr → ▼

9.Cn → SET

CnP → ◀ or ▼, ▲ set a desired value press SET store value.

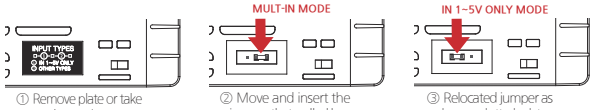
T30 SERIES

SET + ◀ Press and hold simultaneously more than 3 sec.

Co4.n → SET Press shortly

_CnP → 1

※ How to change the interior switch when using 1~5V input

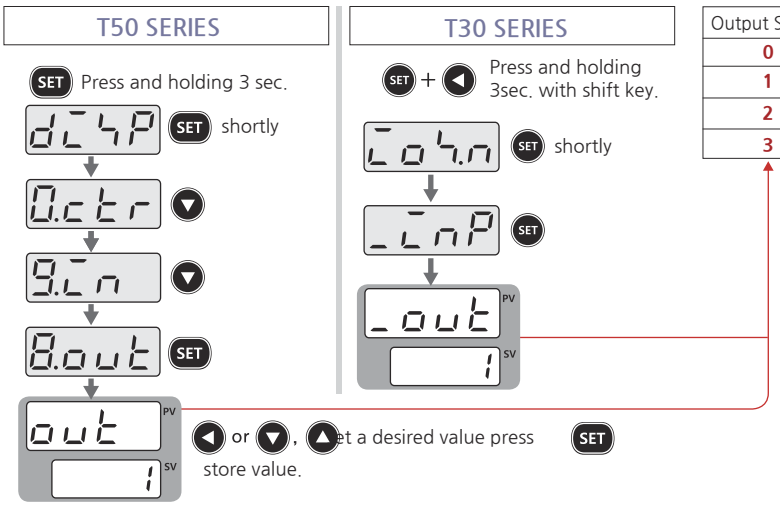


① Remove plate or take out the main cover.

② Move and insert the jumper that pulled by tweezers.

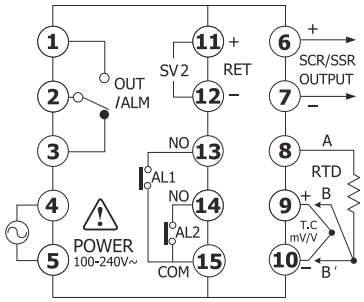
③ Relocated jumper as above and attach plate or mounted cover.

② Output Setting



Output Set No.	Control Output	Output Terminal (T34)
0	RELAY ON/OFF CONTROL	①, ②, ③
1	SSR PID CONTROL	⑥, ⑦
2	SCR(4~20mA) PID CONTROL	⑥, ⑦
3	RELAY PID CONTROL	①, ②, ③

based on
T34 Terminal Configuration



If press Set key( ) more than 3sec. in the entering setting menu,
it will be return to operating menu.
Also AT(Auto-Tuning) has been completed, input/output mode will limited.
It is ensure safety and protect from user miscontrol.
If you need resetting, please refer to the user's manual.

Output Set Number

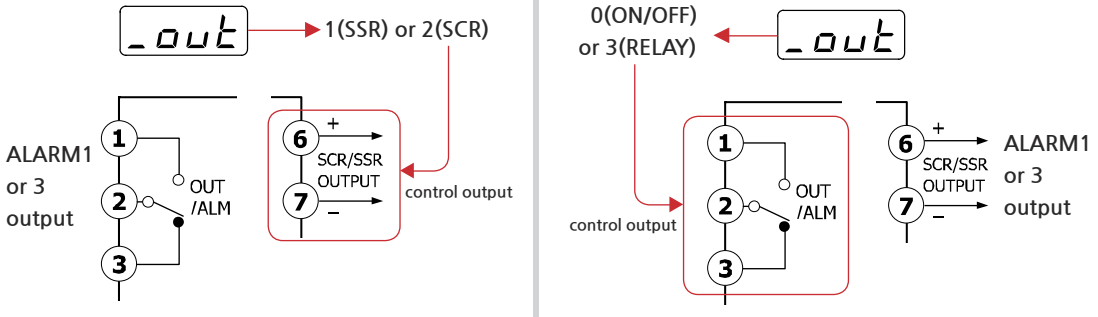
1 : SSR output of PID control(Voltage Pulse) **[output set number: 1]**
This is the General Setting and Initial Value.

2 : SCR output of PID control(4~20mA current output) **[output set number: 2]**
This setting is used mainly with thyristor power regulator(TPR) modules and is capable of precision control.

3 : Relay output of PID control **[output set number: 3]**
This is most cost-efficient method of inplementing PID control and is used mainly with magnetic switches(electric switches).
However, it may wear the contact point, and is difficult to use in places that require fast response.

0 : Relay output of ON/OFF control **[output set number: 0]**
This is simple on/off control mainly used to control cooling devices.(Do not use Heating control.)

Alarm output of T34(48×48) standard model(S00)



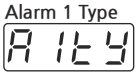
It is only for T34-S00!
With the standard model of T34(48×48) is required caution when using it alarm output. When control output is being used as a relay, the alarm output will be SSR output (voltage pulse).
In this case take SSR or alarm option (S10, S30) enabled models.

③ Alarm Type and Selection code

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

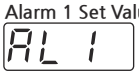
〈 Example of Alarm 1 output Setting 〉

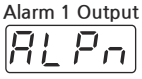
T50 SERIES

Alarm 1 Type

Set Value: 03

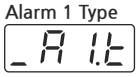
Alarm 1 Dead band

Set Value: 2℃

Alarm 1 Set Value

Set Value: 20℃

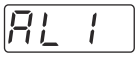
Alarm 1 Output port

Set Value: AL 1

T30 SERIES

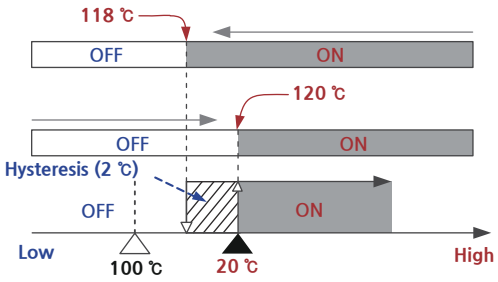
Alarm 1 Type

Set Value: 03

Alarm 1 Hysteresis

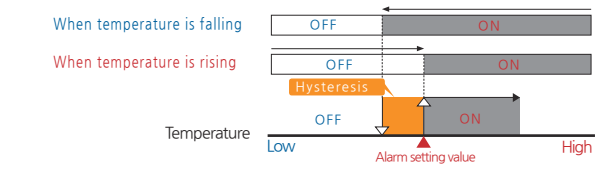
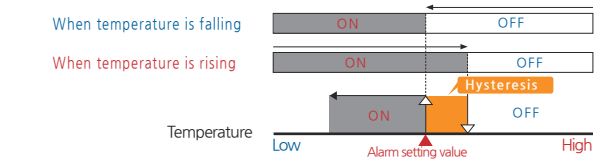
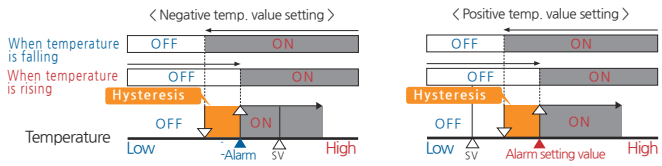
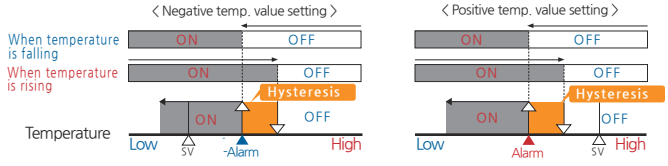
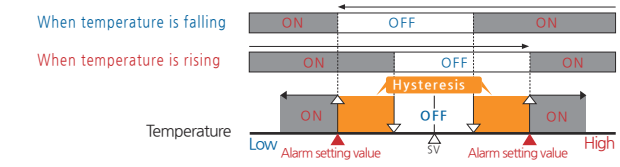
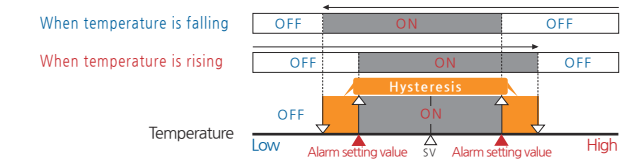
Set Value: 2℃

Alarm 1 Set Value

Set Value: 20℃

When set value (SV) = 100 ℃



Alarm output type and Selection code

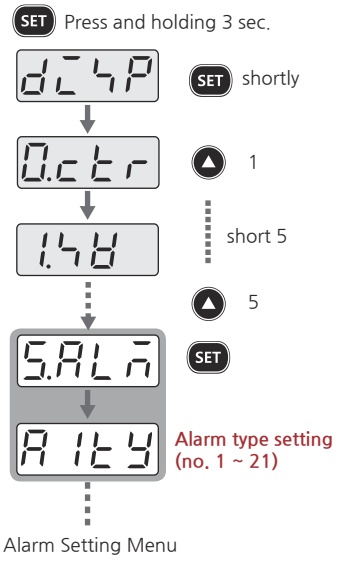
Code no.	Alarm type	Alarm output operation
01	Absolute value upper-limit	
09	Process low	
11	with hold function	
19	with hold function (Inverted)	
02	Absolute value lower-limit	
10	Process low	
12	with hold function	
20	with hold function (Inverted)	
03	Upper-limit deviation	
05	Process low	
13	with hold function	
15	with hold function (Inverted)	
04	Lower-limit deviation	
06	Process low	
14	with hold function	
16	with hold function (Inverted)	
07	Upper & Lower-limit deviation	
17	Upper & Lower-limit deviation with hold	
08	Upper & Lower-limit deviation in range	
18	Upper & Lower-limit deviation in range with hold	
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

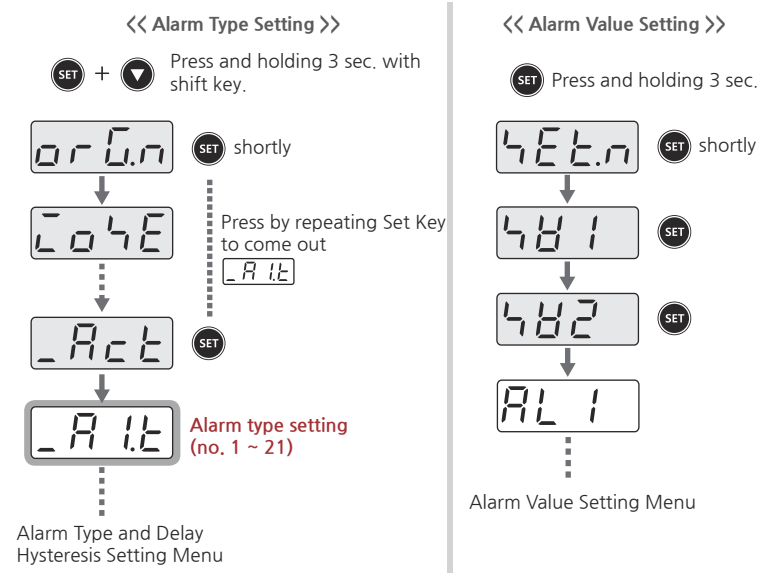
CODE NO.	ALARN TYPE		ALARM OUTPUT OPERATION
21	ALARM 1	Loop break alarm (LBA)	Refer to Loop break alarm (LBA)! (ALARM1 only)
	ALARM 3	Inverter operation / stop output alarm	Page 25, 1) Refer to inverter operation stop controll! (ALARM 3 only)
	ALARM 2	[Alarm No. 2 code 21] Supports five kinds of SOAK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

〈 Alarm (AL1, AL2) Group Setting 〉

T50 SERIES



T30 SERIES

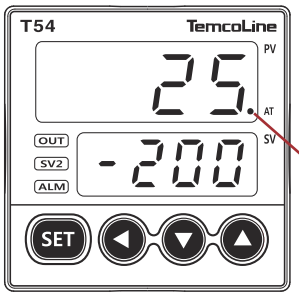


※ According to a set input type and function change a order of setting menu.

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.

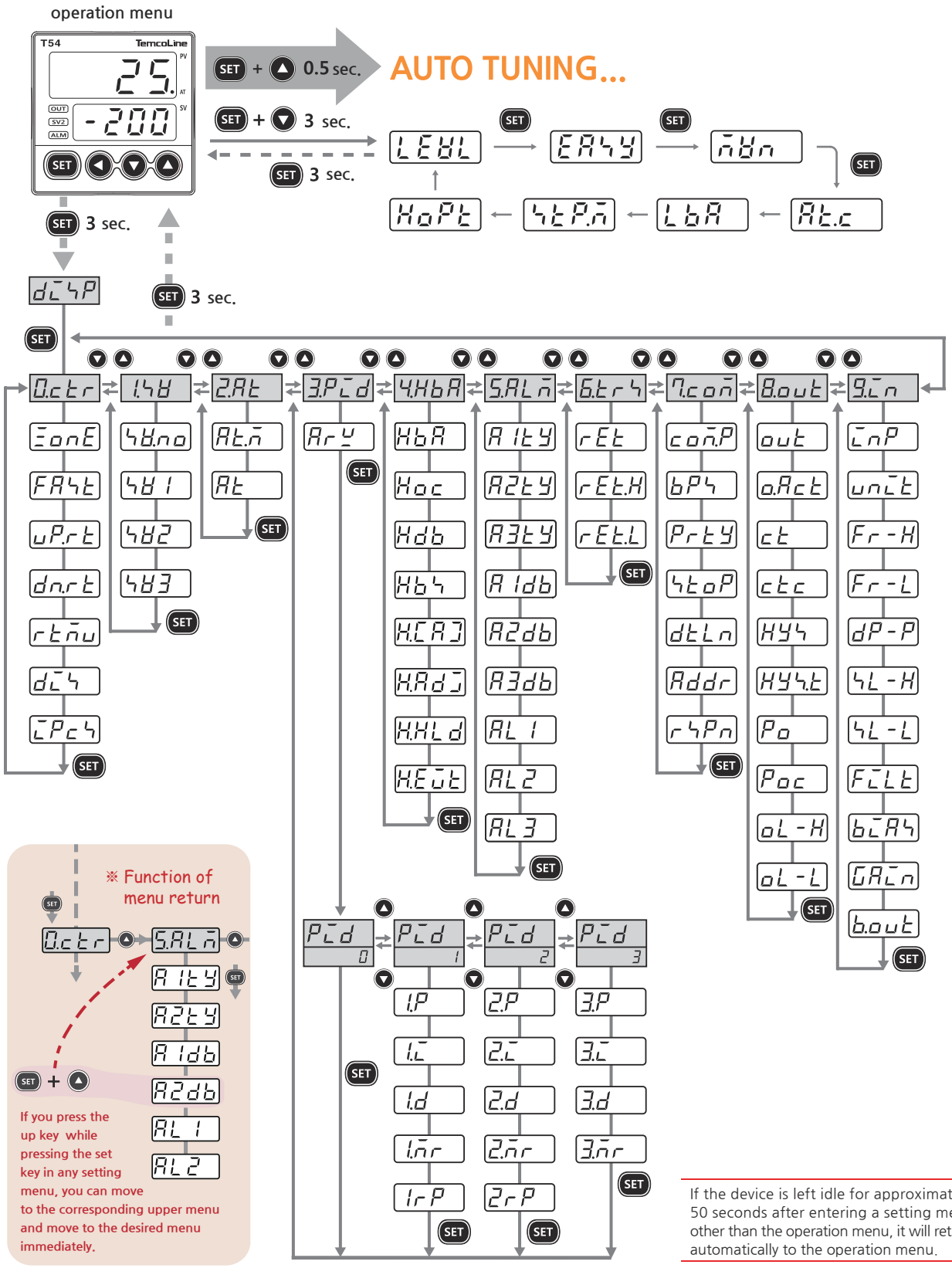
AT operation start : SET + ▲ 0.5 second

AT stop by perforce : SET + ▲ 0.5 second

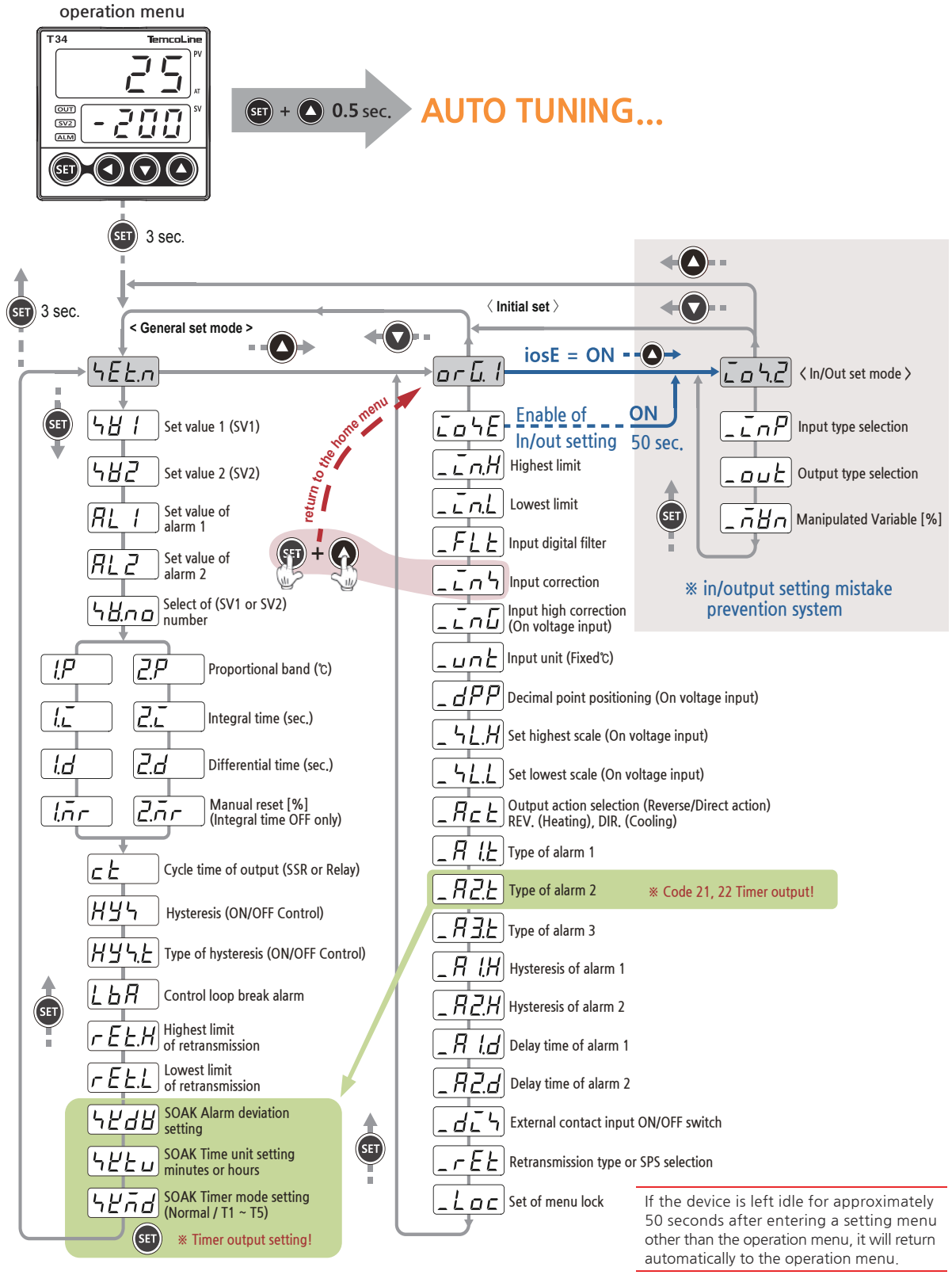
When auto-tuning begins, the "auto-tuning indicator lamp" will blinking every 0.5 second and will turn off upon completion of the tuning process. If you change a set value(SV) in auto-tuning, proceed the tuning before to work on auto-tuning.

3. Flow Chart (Parameter structure)

T50 SERIES



The full menu diagram above shows all control and setting menus on the T50 series/ T30 Series, but during actual operations the menus that are the most relevant to the situation according to the options and the operation mode, providing a simpler user interface while retaining functionality.



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

TemcoLine™

TEMCOLINE Co., Ltd.

Misung Bldg, 217-1, Gurojungang-ro, Guro-gu, Seoul, 152-865 Korea
Tel. : 02-3667-5521 Fax : 02-2632-5549 E-Mail : sales@temcoline.com
A/S : 1588-5439