Alarm Output Type

ALARM, SUB output type
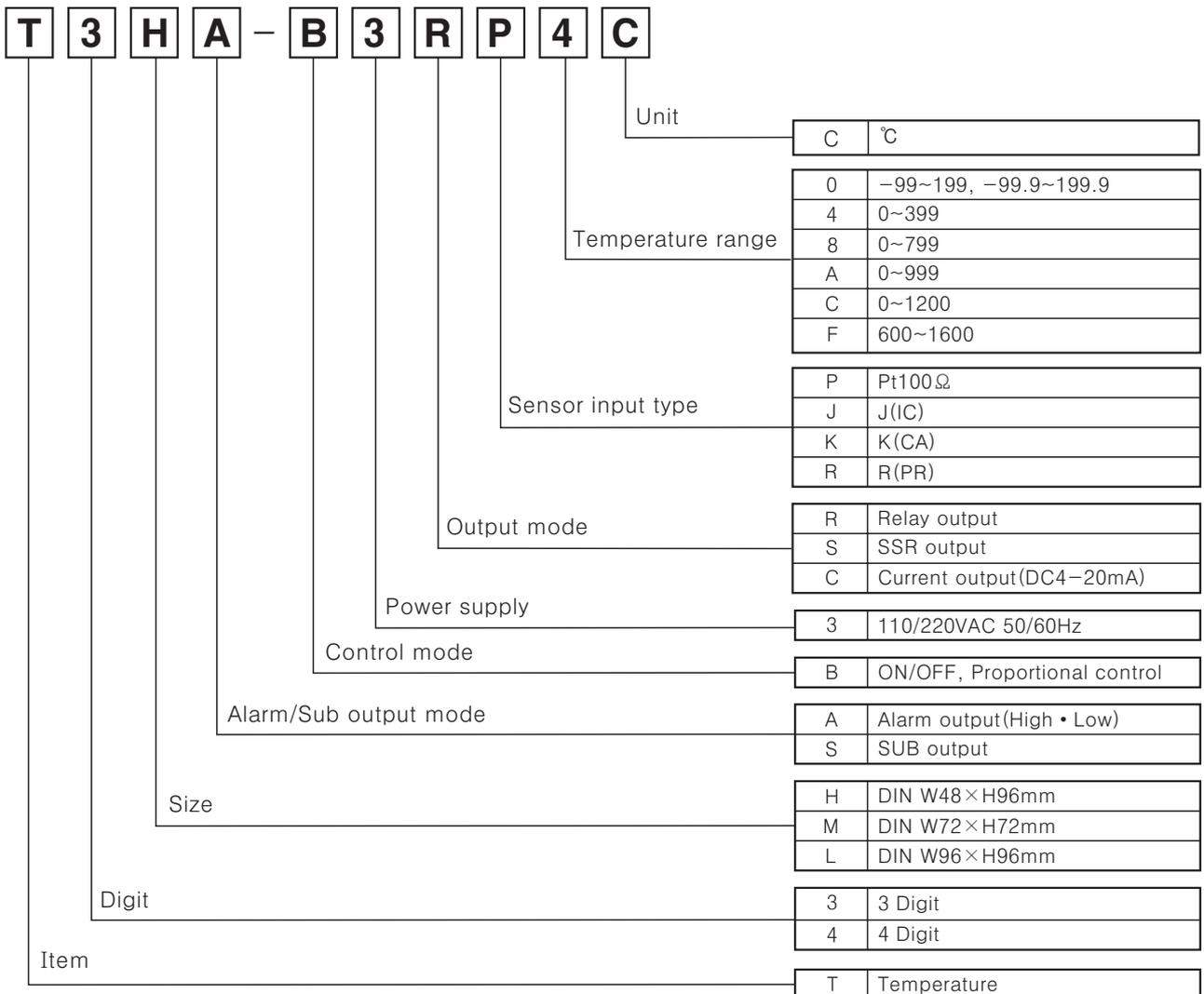
▣Features

- Alarm, SUB output type
- High accuracy measurement : ±0.5
- Various size

<div style="border:1px solid; padding:4px;">⚠ Please read "Caution for your safety" in operation manual before using.</div>

▣Ordering information

T | 3 | H | A | – | B | 3 | R | P | 4 | C

Unit	C	℃

Temperature range	0	−99~199, −99.9~199.9
	4	0~399
	8	0~799
	A	0~999
	C	0~1200
	F	600~1600

Sensor input type	P	Pt100Ω
	J	J(IC)
	K	K(CA)
	R	R(PR)

Output mode	R	Relay output
	S	SSR output
	C	Current output(DC4−20mA)

Power supply	3	110/220VAC 50/60Hz

Control mode	B	ON/OFF, Proportional control

Alarm/Sub output mode	A	Alarm output(High・Low)
	S	SUB output

Size	H	DIN W48×H96mm
	M	DIN W72×H72mm
	L	DIN W96×H96mm

Digit	3	3 Digit
	4	4 Digit

Item	T	Temperature

※**See C-29 about sensor temperature range for selection.**

(A) Counter
(B) Timer
(C) Temp. controller
(D) Power controller
(E) Panel meter
(F) Tacho/ Speed/ Pulse meter
(G) Display unit
(H) Sensor controller
(I) Switching power supply
(J) Proximity sensor
(K) Photo electric sensor
(L) Pressure sensor
(M) Rotary encoder
(N) Stepping motor & Driver & Controller
(O) Graphic panel
(P) Production stoppage models & replacement

T3HA/T3HS/T4MA/T4LA

▣ Temperature range for each sensor

Model	T3HA			T3HS			T4MA / T4LA			
Sensor input type	Thermocouples		RTD	Thermocouples		RTD	Thermocouples			RTD
	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	R(PR)	Pt100Ω

Standard scale range (℃):

T3HA: J(IC) 399℃, K(CA) 799℃, (999℃), RTD Pt100Ω 199℃ / −99℃, 399℃
T3HS: J(IC) 399℃, K(CA) 399℃, RTD 399℃
T4MA / T4LA: J(IC) 399℃, K(CA) 799℃ / 399℃, R(PR) 1600℃ / 600℃, 1200℃, RTD 199.9℃ / −99.9℃, 399℃

※In case, the sensor is R(PR) type, it is not available to indicate the temperature and control correctly.

▣ Specifications

Model		T3HA	T3HS	T4MA	T4LA
Power supply		110/220VAC 50/60Hz			
Allowable voltage range		90 ~ 110% of rated voltage			
Power consumption		3VA			
Display method		7 Segment LED Display			
Character size		W6×H10mm		W7.2×H9.8mm	W9.5×H14.2mm
Display accuracy		F·S ± 0.5% rdg ±1digit			
Setting type		Digital switch setting			
Setting accuracy		F·S ± 0.5%			
Sensor input		Thermocouples : K(CA), J(IC), R(PR) / RTD : Pt100Ω			
Input line resistance		Thermocouples : Max. 100Ω, RTD : Max. 5Ω per a wire			
Control	ON/OFF	Hysteresis : Variable F·S 0.2~3%			
	Proportional	Proportional band : Variable F·S 1~10%, Period : 20sec. fixed			
Alarm output	SUB	SUB : Variable 0 ~ −50℃			
	Alarm	(Note) ALARM : Variable F·S 1~10%			
RESET adjuster range		F·S ±3% Variable(Only for control deviation)			
Control output		• Relay contact output : 250VAC 3A 1c • SSR output : 24VDC ±3V 20mA Max. • Current output : DC4−20mA Load 600Ω Max.			
		ALARM OUT : 250VAC 1A 1a	SUB OUT : 250VAC 1A 1a	ALARM OUT : 250VAC 1A 1a	ALARM OUT : 250VAC 1A 1c
Self−diagnosis		Includes burn out function			
Insulation resistance		Min. 100MΩ (at 500VDC mega)			
Dielectric strength		2000VAC 50/60Hz for 1 minute			
Noise strength		±1kV the square wave noise(pulse width:1μs) by the noise simulator			
Vibration	Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour			
	Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes			
Shock	Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction			
	Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction			
Relay life cycle	Mechanical	Min. 10,000,000 times			
	Electrical	Min. 100,000 times(250VAC 3A at resistive load)			
Ambient temperature		−10 ~ +50℃ (at non−freezing status)			
Storage temperature		−20 ~ +60℃ (at non−freezing status)			
Ambient humidity		35 ~ 85%RH			
Unit weight		Approx. 514g	Approx. 517g	Approx. 425g	Approx. 484g

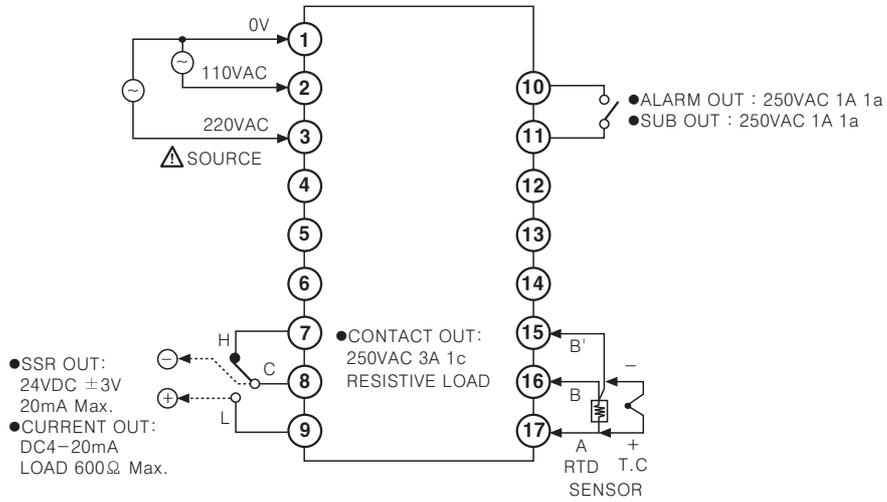※(Note) F.S is same with sensor measuring temperature range.
Ex) In case of using temperature is from −99.9 ~ 199.9℃, Full scale is 299.8.

Autonics

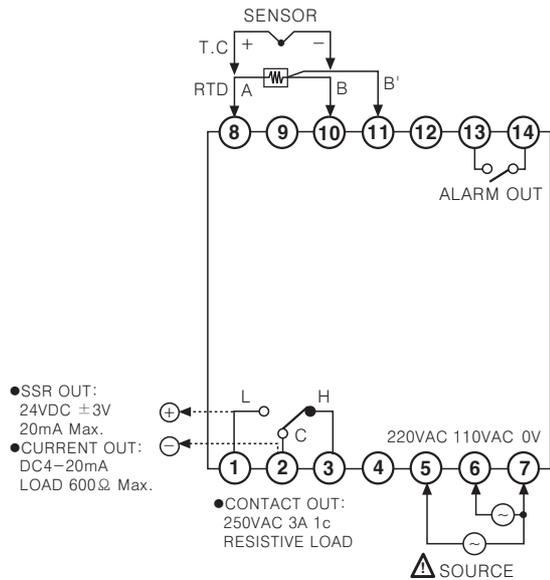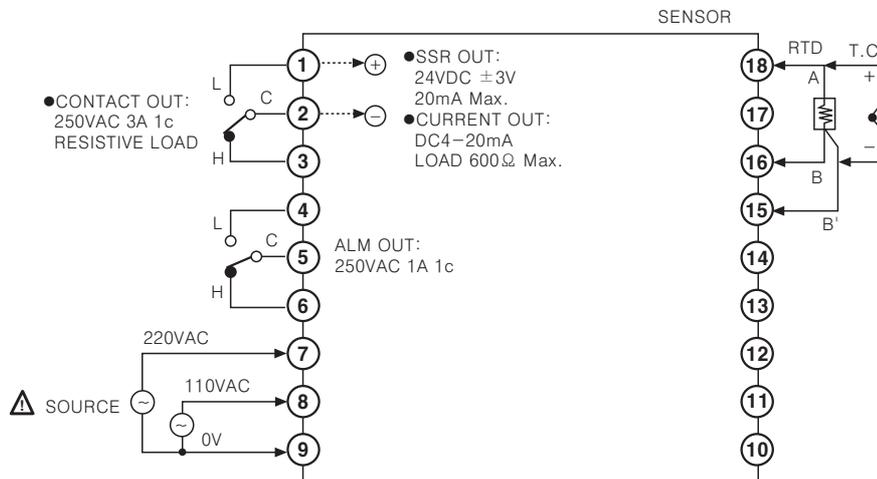# Alarm Output Type

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

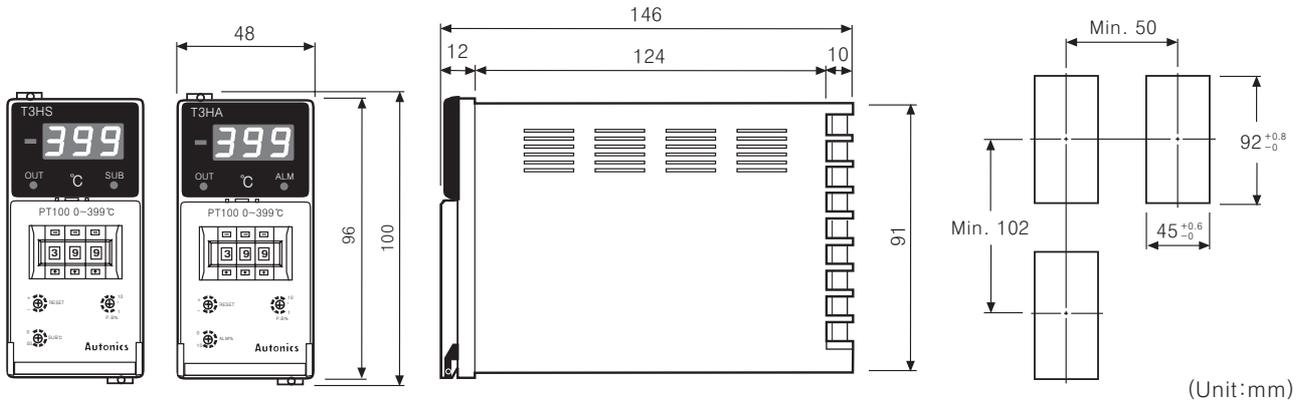(N) Stepping motor & Driver & Controller

(O) Graphic panel

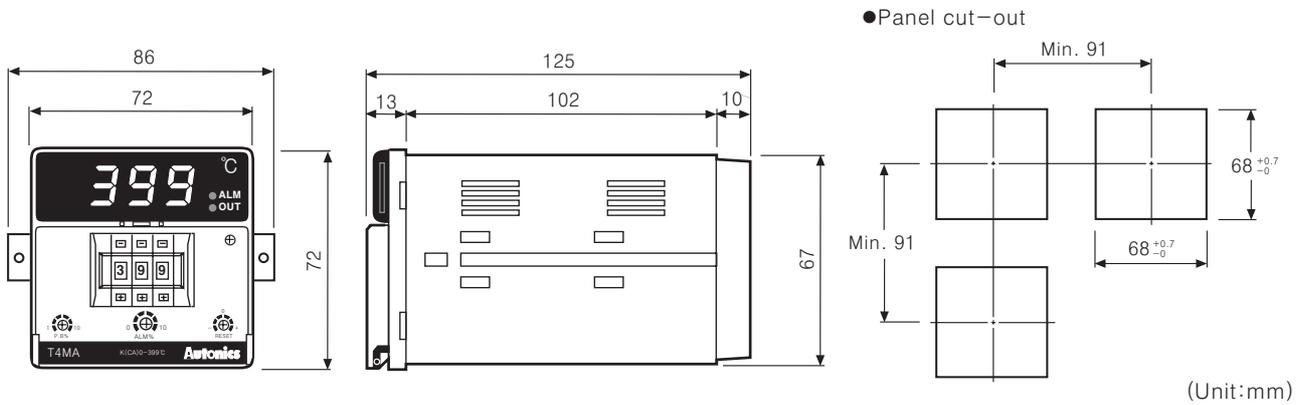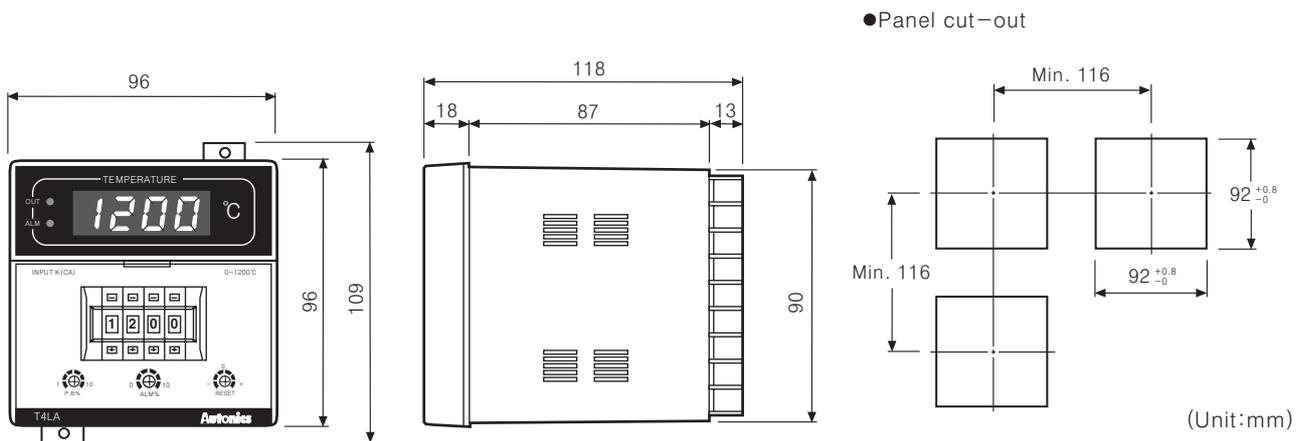(P) Production stoppage models & replacement

▣ Connections

※ RTD (Resistance Temperature Detector) : Pt 100Ω (3−wire type)　　※ Thermocouple : K, J, R

● T3HA, T3HS

● T4MA

● T4LA

T3HA/T3HS/T4MA/T4LA

▣Dimensions

●T3HA, T3HS
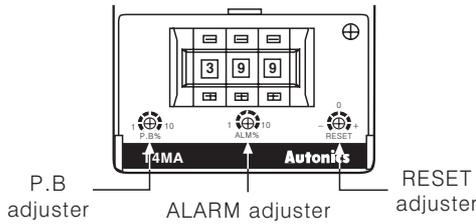
●Panel cut-out

(Unit:mm)

●T4MA

●Panel cut-out

(Unit:mm)

●T4LA

●Panel cut-out

(Unit:mm)

Autonics

▪Proper usage
◎Using front adjuster

P.B adjuster
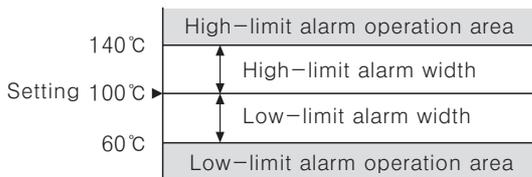ALARM adjuster
RESET adjuster

● P.B adjuster

In case of ON/OFF control, set variable F · S 0.2~3% of hysteresis, and in case of proportional control, set variable F · S 1~10% of hysteresis.

● ALARM adjuster

It adjusts alarm range (F · S 1~10%) and having 1:1 range for upper and lower limited range by set value.

Ex) In case the full scale of temperature controller is 400℃, if setting alarm range is maximum, the value is 400℃ × 0.1 = 40℃. And the alarm range is high−limit 40℃ and lower−limit 40℃.

140℃	High−limit alarm operation area
	High−limit alarm width
Setting 100℃ ▶	
	Low−limit alarm width
60℃	Low−limit alarm operation area

(Note) Full scale (F.S) of the alarm is from 0° up to max. temperature.

Ex) In case of using temperature is from −99~199℃, Full scale is 299℃.

● RESET adjuster

It corrects offset can be occurred by proportional control and has F · S ±3% of adjustable range. Do not operate the adjuster when it is used as ON/OFF control.
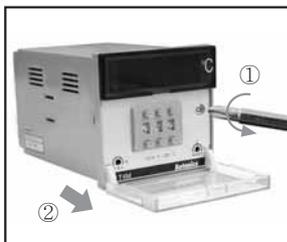

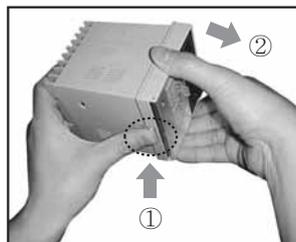① Turn left when offset value is higher than set value. (Direction ①)

② Turn right when offset value is lower than set value. (Direction ②)

◎Case detachment

● T4MA

Pressing the front guide of Lock toward ① and squeeze and pull toward ②, it is detached.

● T3HA(S)/T4LA

Open the front guide, turn it toward ① and pull toward ②, it is detached.

◎How to select ON/OFF or proportional by plug pin

Factory specification is proportional control.
When using ON/OFF control, transfer the switch of control mode from P to F after detaching the case from its body. When control output is current output, P control is fixed, there is no switch Pin of control mode.


Proportional control   ON/OFF control

◎Normal/Reverse operation

Reverse operation executes to output ON when processing value is lower than setting value, and it is used for heating. Normal operation is executed conversely and used for cooling. (This item runs as a reverse operation)

◎SUB function (T3HS)

SUB output is for alarm used as injectior, etc.
If the temperature of controlled material reaches to SUB setting value, the SUB output runs and keeps ON continuously.
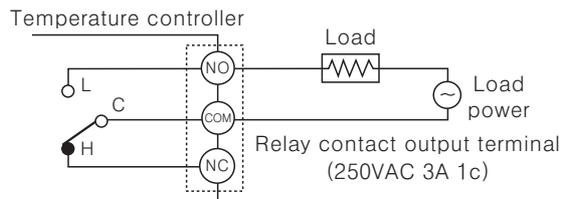

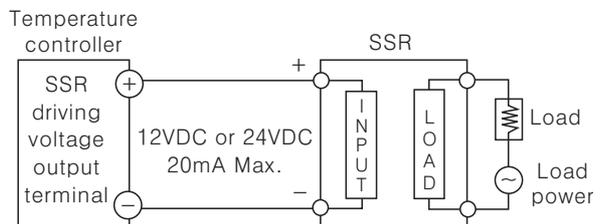
SUB
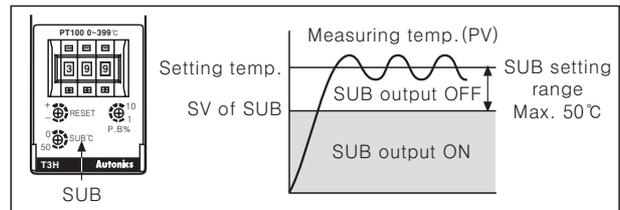
※ SUB function is included only in T3H series.

※ SUB range can be set up to 50℃ lower than setting value.

◎Application of temperature controller and load connection
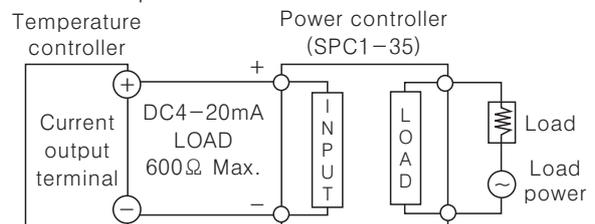
● Relay output

Relay contact output terminal (250VAC 3A 1c)

● SSR output

※ When using voltage (for driving SSR) in the other purposes, do not over the range of rated current.

● Current output

T3S/T3H/T4M/T4L

Digital switch setting type, temperature controller

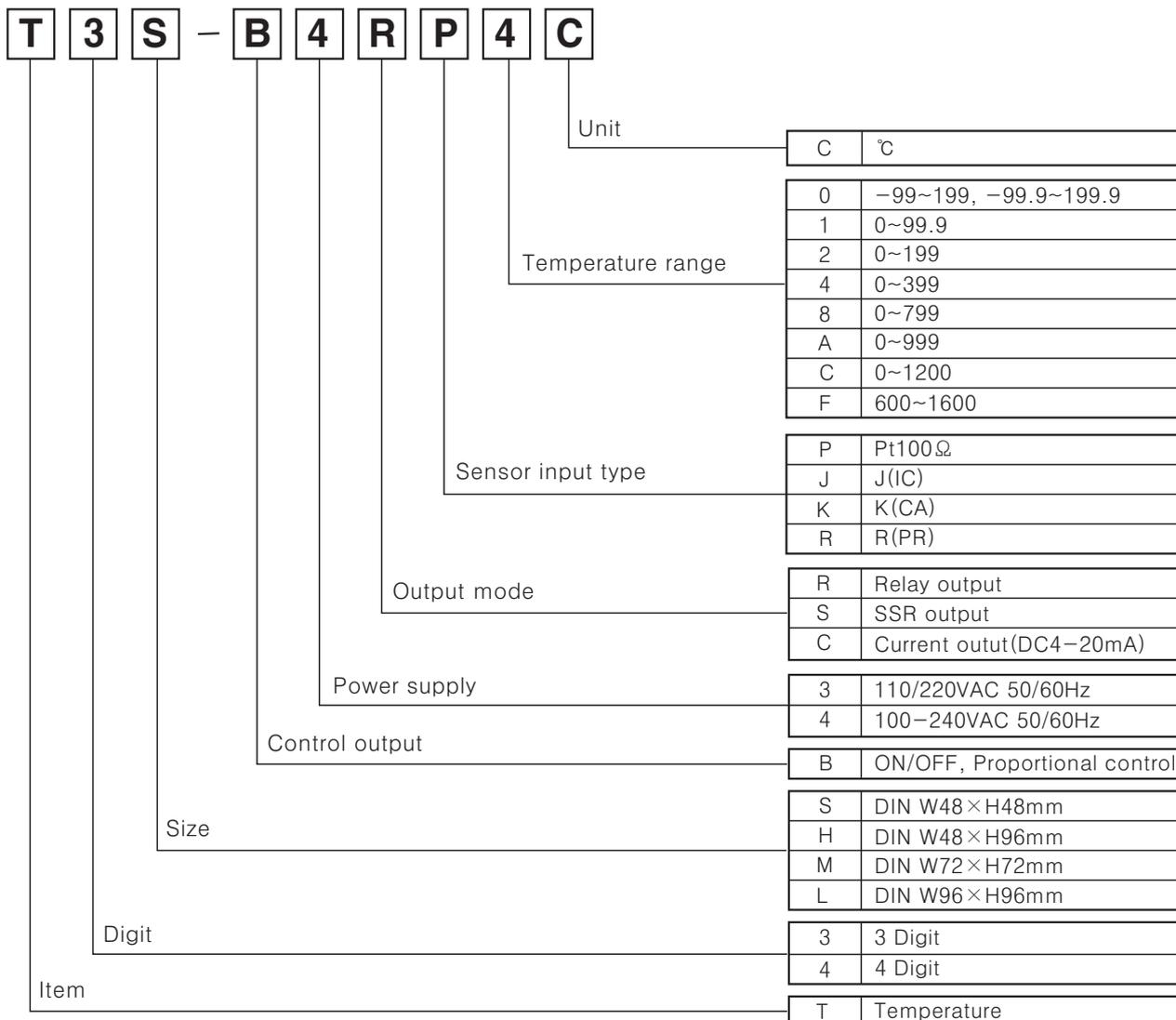### ▣Features

- ●Various size by DIN specification
- ●Accuracy : F・S ±0.5%
- ●Universal power : T3S Series

⚠ **Please read "Caution for your safety" in operation manual before using.**

▣Ordering information

| T | 3 | S | − | B | 4 | R | P | 4 | C |

Unit

C	℃

Temperature range

0	−99~199, −99.9~199.9
1	0~99.9
2	0~199
4	0~399
8	0~799
A	0~999
C	0~1200
F	600~1600

Sensor input type

P	Pt100Ω
J	J(IC)
K	K(CA)
R	R(PR)

Output mode

R	Relay output
S	SSR output
C	Current outut(DC4−20mA)

Power supply

3	110/220VAC 50/60Hz
4	100−240VAC 50/60Hz

Control output

B	ON/OFF, Proportional control

Size

S	DIN W48×H48mm
H	DIN W48×H96mm
M	DIN W72×H72mm
L	DIN W96×H96mm

Digit

3	3 Digit
4	4 Digit

Item

T	Temperature

※**See C-24 about sensor temperature range for selection.**

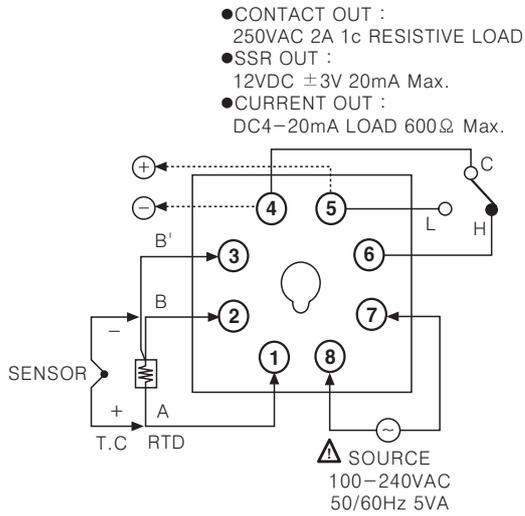Autonics

Digital Switch Setting Type

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

▣Temperature range for each sensor

Model	T3S			T3H			T4M / T4L			
Sensor input type	Thermocouples		RTD	Thermocouples		RTD	Thermocouples			RTD
	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	R(PR)	Pt100Ω

※In case, the sensor is R(PR) type, it is not available to indicate the temperature and control correctly.

▣Specifications

Model	T3S	T3H	T4M	T4L
Power supply	100−240VAC 50/60Hz	110/220VAC 50/60Hz		
Allowable voltage range	90~110% of power supply			
Power consumption	5VA	3VA		
Display method	7 Segment LED Display			
Character size	W4×H8mm	W6×H10mm	W7.2×H9.8mm	W9.5×H14.2mm
Display accuracy	F・S ± 1% rdg ±1digit	F・S ± 0.5% rdg ±1digit		
Setting type	Digital switch setting			
Setting accuracy	F・S ± 1%	F・S ± 0.5%		
Sensor input	Thermocouples：K(CA), J(IC), R(PR) / RTD：Pt100Ω [There is no R(PR) in T3S, T3H series]			
Input line resistance	Thermocouples：Max. 100Ω / RTD：Max. 5Ω per a wire			
Control — ON/OFF Control	Hysteresis： F・S 0.5% ±0.2% Fixed	Hysteresis：F・S 0.2~3%		
Control — Proportional Control	Proportional band： F・S ±3% fixed, Period：20sec. fixed	Proportional band ：F・S 1~10% variable, Period：20sec. fixed		
RESET adjuster range	F・S ±3% variable			
Control output	●Relay output： 250VAC 2A 1c ●SSR output： 12VDC ±3V 20mA max. ●Current output： DC4−20mA Load 600Ω max.	●Relay output：250VAC 3A 1c ●SSR output：12VDC ±3V 20mA max. ●Current output：DC4−20mA Load 600Ω max.		
Self−diagnosis	Built−in burn out function			
Insulation resistance	Min. 100MΩ (at 500VDC mega)			
Dielectric strength	2000VAC 50/60Hz for 1 minute			
Noise strength	±1kV the square wave noise (pulse width：1μs) by the noise simulator			
Vibration — Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour			
Vibration — Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes			
Shock — Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction			
Shock — Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction			
Relay life cycle — Mechanical	Min. 10,000,000 times			
Relay life cycle — Electrical	Min. 100,000 times (250VAC 3A at resistive load)			
Ambient temperature	−10 ~ +50℃ (at non−freezing status)			
Storage temperature	−20 ~ +60℃ (at non−freezing status)			
Ambient humidity	35~85%RH			
Unit weight	Approx. 196g	Approx. 496g	Approx. 399g	Approx. 468g

※F.S is same with sensor measuring temperature range.
　Ex) In case of measurement temperature range is from −99.9 ~ 199.9℃, Full scale is 299.8.

T3S/T3H/T4M/T4L

▣ Connections

※ RTD(Resistance temperature detector) : Pt 100Ω(3-wire type)　　※ Thermocouple : K, J, R

● T3S

- CONTACT OUT :
  250VAC 2A 1c RESISTIVE LOAD
- SSR OUT :
  12VDC ±3V 20mA Max.
- CURRENT OUT :
  DC4-20mA LOAD 600Ω Max.

SENSOR
T.C　RTD

SOURCE
100-240VAC
50/60Hz 5VA

● T4M

※ Although T4M has an alarm terminal, it does not work since it uses the same case with T4MA.

SENSOR
T.C
RTD

ALARM OUT

220VAC 110VAC 0V

SOURCE

- CONTACT OUT:
  250VAC 3A 1c
  RESISTIVE LOAD
- SSR OUT:
  24VDC ±3V
  20mA Max.
- CURRENT OUT:
  DC4-20mA
  LOAD 600Ω Max.

● T3H

0V
110VAC
220VAC

SOURCE

- SSR OUT:
  24VDC ±3V
  20mA Max.

- CONTACT OUT:
  250VAC 3A 1c
  RESISTIVE LOAD

- CURRENT OUT:
  DC4-20mA
  LOAD 600Ω Max.

SENSOR
RTD　T.C

● T4L

SENSOR
T.C　RTD

- CONTACT OUT:
  250VAC 3A 1c
  RESISTIVE LOAD
- SSR OUT:
  24VDC ±3V
  20mA Max.
- CURRENT OUT:
  DC4-20mA
  LOAD 600Ω Max.

220VAC
110VAC
0V

SOURCE

Autonics

Digital Switch Setting Type

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

▣ Dimensions

◎T3S

● Bracket

※Socket : PG-08, PS-08(Sold separately)

● Panel cut-out
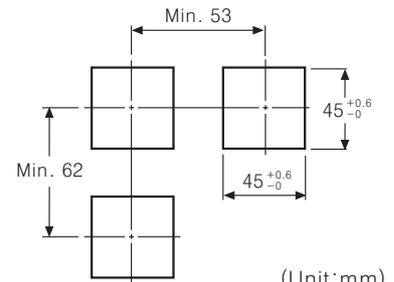
(Unit:mm)
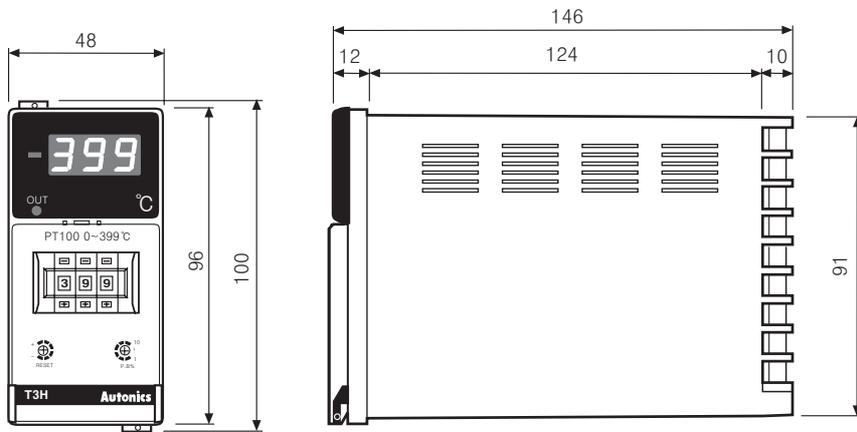
◎T3H

● Panel cut-out

(Unit:mm)

◎T4M

● Panel cut-out

(Unit:mm)

◎T4L
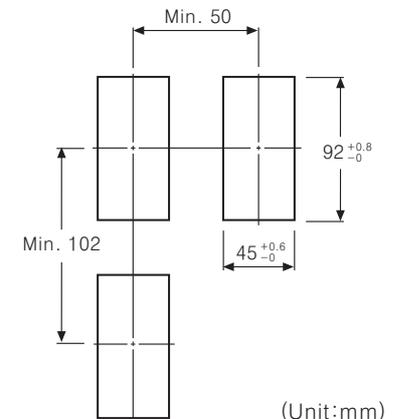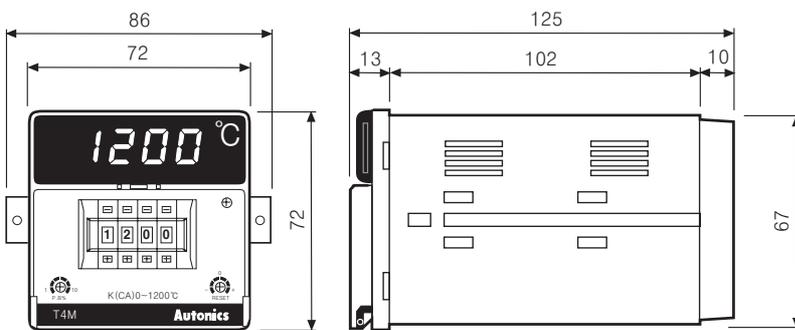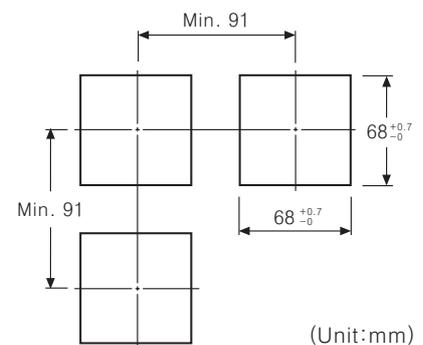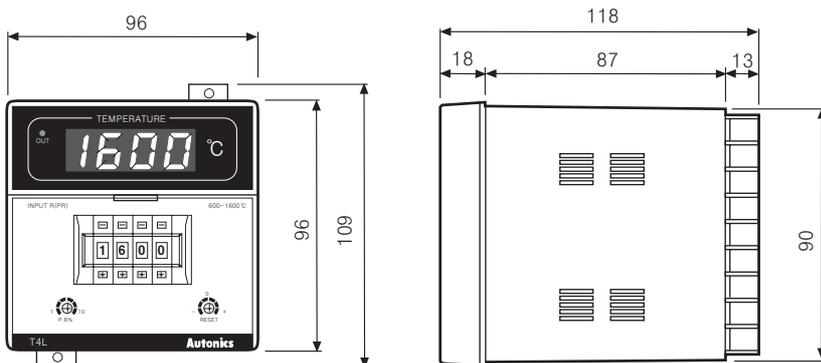
● Panel cut-out
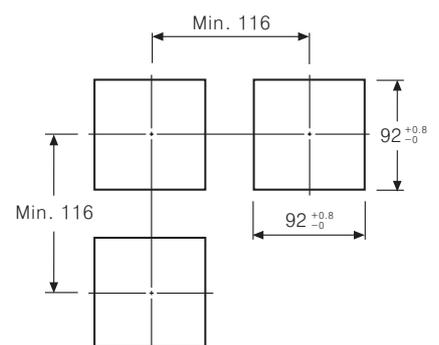
(Unit:mm)

T3S/T3H/T4M/T4L

■Proper usage
◎Using front adjuster

P.B adjuster   RESET adjuster

- P.B adjuster : In case of ON/OFF control, set variable F · S 0.2~3% of hysteresis and in case of proportional control, set variable F · S 1~10% of hysteresis. However, hysteresis(F · S 0.5%) and proportional band(F · S 3%) are fixed in T3S.
- RESET adjuster : It corrects offset can be occurred by proportional control and has F · S ±3% of adjustable range. Do not operate the adjuster when it is used as ON/OFF control.
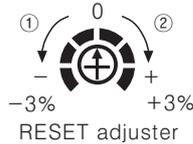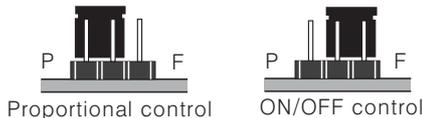

RESET adjuster

①Turn left when offset value is higher than setting value. (Direction ①)

②Turn right when offset value is lower than setting value. (Direction ②)

◎Normal/Reverse operation

Reverse operation executes to output ON when process value is lower than setting value and it is used for heating. Normal operation runs conversely and is executed for cooling. (This item runs as a reverse operation)

◎How to select ON/OFF or proportional by plug pin

Factory specification is proportional control.
When using ON/OFF control, transfer the switch of control mode from P to F after detaching the case from its body. When control output is current output, P control is fixed, there is no switch Pin of control mode.

Proportional control   ON/OFF control

◎Case detachment
- T4L/T3H

Pressing the front guide of Lock toward ① and squeeze and pull toward ②, it is detached.

- T4L/T3H

Open the front guide, turn it toward ① and pull toward ②, it is detached.

Pressing pin plug ①, raise it up with a driver as ② and it is detached.

◎Application of temperature controller and load connection
- SSR output connection

※When using voltage(for driving SSR) in the other purposes, do not over the range of thd rating current.

※Please aware that each series has different voltage(for driving SSR).

- Relay output connection

※Be aware that each model has different contact capacity of RY. When load capacity is high, please use sub relay, which has high contact capacity.

- Current output connection

※The current value of DC4−20mA is available at lower than 600Ω of resistive load.

T4LP

Dual setting type, High accuracy temperature controller

▣Features

- ●Dual setting type
- ●High accuracy measuring function : ±0.5%
- ●Control heater and cooler at once
- ●Use dual setting type of temperature when executing low temperature or precision control. In dual setting control type, the single output is operated as reverse, it is used for heater control. The dual output is used to control the operation of cooler normally.
The dual output is also used for an alarm.

> ⚠ **Please read "Caution for your safety" in operation manual before using.**

▣Ordering information

| T | 4 | L | P | – | B | 3 | R | P | 4 | C |

	Unit	
		C	℃

	Temperature range	
2	0~199.9
4	0~399
8	0~799
C	0~1200
F	600~1600

	Sensor input type	
P	Pt100Ω
J	J(IC)
K	K(CA)
R	R(PR)

	Output mode	
R	Relay output
S	SSR output
C	Current output(DC4−20mA)

	Power supply	
3	110/220VAC 50/60Hz

	Control mode	
B	ON/OFF, Proportional control

	Sub output mode	
P	Dual output

	Size	
L	DIN W96×H96mm

	Digit	
4	4 Digit

	Item	
T	Temperature

※**See C-34 about sensor temperature range for selection.**

　　　　　Autonics

Dual Setting Type

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

▣Temperature range for each sensor

Model	T4LP			
Sensor input type	Thermocouples			RTD
	J(IC)	K(CA)	R(PR)	Pt100Ω
℃				

※In case, the sensor is R(PR) type, it is not available to indicate the temperature and control correctly.

▣Specifations

Model	T4LP
Power supply	110/220VAC 50/60Hz
Allowable voltage range	90 ~ 110% of rated voltage
Power consumption	3VA
Display method	7 Segment LED Display
Character size	W9.5×H14.2mm
Display accuracy	F・S ± 0.5% rdg ±1digit
Setting type	Digital switch setting
Setting accuracy	F・S ± 0.5%
Sensor input	Thermocouples : K(CA), J(IC), R(PR) / RTD : Pt100Ω
Input line resistance	Thermocouples : Max. 100Ω, RTD : Max. 5Ω per a wire
Control ON/OFF	Hysteresis F・S 0.2 ~ 3%
Control Proportional	Proportional band : F・S 1 ~ 10%, Period : 20sec. fixed
RESET adjuster range	F・S ±3%(Only for control deviation)
Control output	• Relay output : 1st out : 250VAC 3A 1c, 2nd out : 250VAC 2A 1c • SSR output : 24VDC ±3V 20mA max. • Current output : DC4−20mA Load 600Ω max.
Self−diagnosis	Includes burn out function
Insulation resistance	Min. 100MΩ (at 500VDC mega)
Dielectric strength	2000VAC 50/60Hz for 1 minute
Noise strength	±2kV the square wave noise(pulse width:1μs) by the noise simulator
Vibration Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour
Vibration Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes
Shock Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction
Shock Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction
Relay life cycle Mechanical	Min. 10,000,000 times
Relay life cycle Electrical	Min. 100,000 times(250VAC 3A at resistive load)
Ambient temperature	−10 ~ +50℃ (at non−freezing status)
Storage temperature	−20 ~ +60℃ (at non−freezing status)
Ambient humidity	35 ~ 85%RH
Unit weight	Approx. 487g

※ **(Note)** F.S is same with sensor measuring temperature range.
Ex) In case of using temperature is from −99.9 ~ 199.9℃, Full scale is 299.8.

T4LP

■Connections

※RTD(Resistance Temperature Detector)：Pt 100Ω(3-wire type)   ※Thermocouple：K, J, R

● CONTACT OUT:
250VAC 3A 1c
RESISTIVE LOAD

● SSR OUT:
24VDC ±3V
20mA Max.
● CURRENT OUT:
DC4-20mA
LOAD 600Ω Max.

ALM OUT :
250VAC 2A 1c

220VAC

⚠ SOURCE

110VAC

0V

RTD   T.C
A   +

SENSOR

B

B'

—

1 (+)
2 (−)
3
4
5
6
7
8
9

18
17
16
15
14
13
12
11
10

■Dimensions

TEMPERATURE

399 ℃

1P
2P

INPUT K(CA)   0~399℃

LO SET   3 9 9   3 9 9   HI SET

P. B%   RESET

T4LP   Autonics

96
96
109

118
18   87   13
90

● Panel cut-out

Min. 101
Min. 114
92 +0.8 −0
92 +0.8 −0

(Unit:mm)

▪Proper usage

◎Operation

This controller has two outputs operated separately. In other words, it is able to set the values separately. Front Low Set runs with reverse operation as other common controllers and High Set runs by normal operation. It is able to control heater and cooler.

```
    Heater control          Cooler control
   ┌─────┐              ┌─────
   │ ON  │    OFF       │ ON
───┘     └──────────────┘
        △              △
       S.V            S.V
     LOW SET        HI SET
```

※Terminal block ①, ②, ③ are for Low set output and terminal block ④, ⑤, ⑥ are for High set output.

◎Using front adjuster

P.B adjuster   RESET adjuster

● P.B adjuster

In case of ON/OFF control, set variable F·S 0.2~3% of hysteresis, and in case of proportional control, set variable F·S 1~10% of hysteresis.

● RESET adjuster

It corrects offset can be occurred by proportional control and has F·S ±3% of adjustable range.

Do not operate the adjuster when it is used as ON/OFF control.

①Turn left when offset value is higher than set value. (Direction ①)

②Turn right when offset value is lower than set value. (Direction ②)

◎Case detachment

Pressing the front guide of Lock toward ① and squeeze and pull toward ②, it is detached.

◎How to select ON/OFF or proportional by plug pin

Factory specification is proportional control.

When using ON/OFF control, transfer the switch of control mode from P to F after detaching the case from its body.

Proportional control   ON/OFF control

◎Normal/Reverse operation

Reverse operation executes to output ON when process value is lower than setting value, and it is used for heating.

Normal operation is executed conversely and used for cooling. (This item runs as a reverse operation.)

◎Application of temperature controller and load connection

● SSR output

※When using voltage (for driving SSR) in the other purposes, do not exceed the range of the rated current.

● Relay output

Output	Relay contact capacity
1st OUT	250VAC 2A
2nd OUT	250VAC 3A

● Current output

※The current value of DC4−20mA is available at lower than 600Ω of resistive load.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

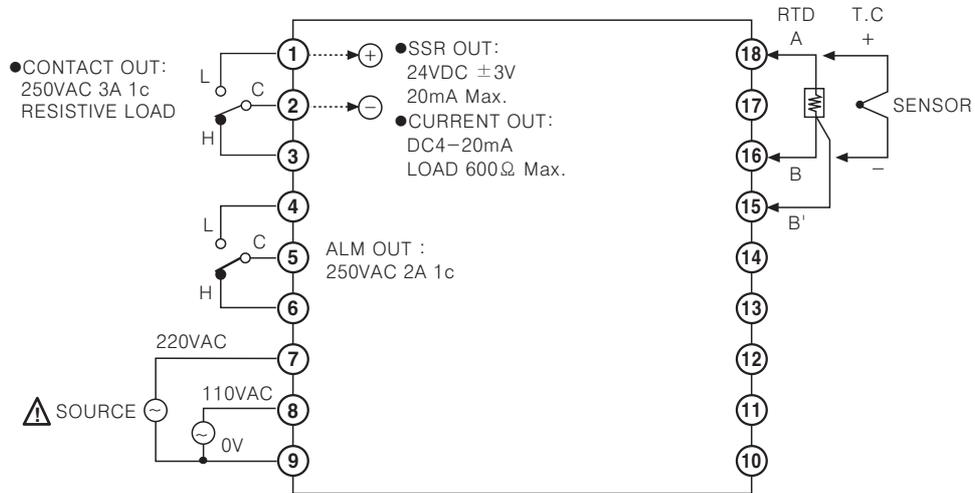(N) Stepping motor & Driver & Controller

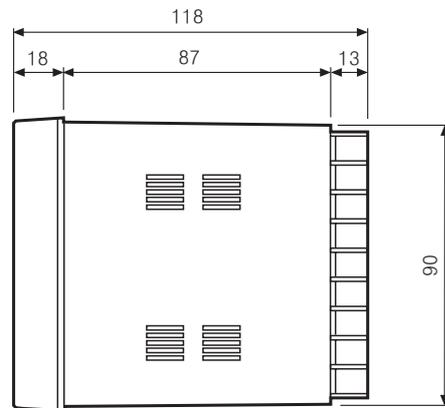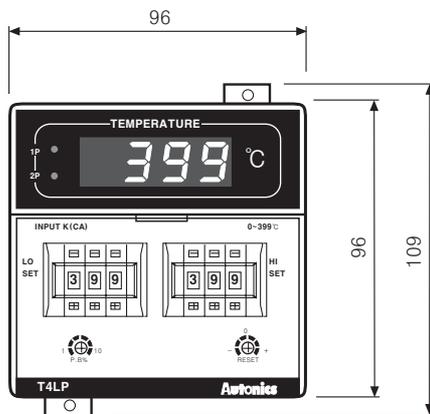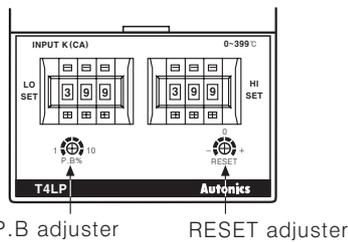(O) Graphic panel

(P) Production stoppage models & replacement

Serial Converter Module(RS232C ←→ RS485 convertable)

▣ Features

- ●Includes the circuit of surge protection.
- ●The insulation type of signal line(Insulating 232C and 485)
- ●Create Tx−Enable signal automatically

⚠ Please read "Caution for your safety" in operation manual before using.

CE MIC

▣ Ordering information

SCM − 3 8 I

I	Insulation
8	RS485
3	RS232C
SCM	Serial Converter Module
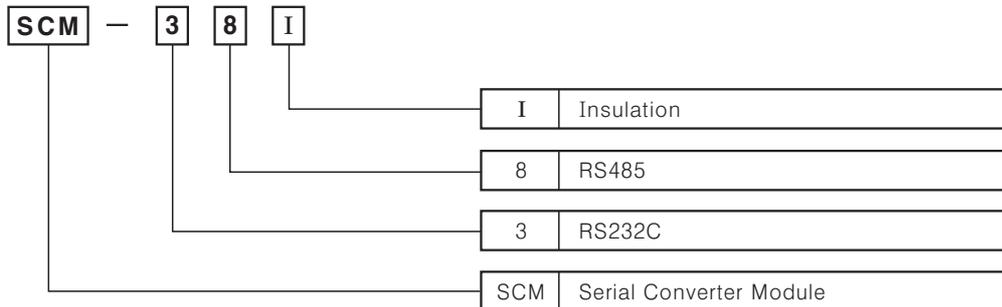
▣ Specifications

Model		SCM-38I
Power supply		12−24VDC
Allowable voltage range		90 ~ 110% of rated voltage
Power consumption		Approx. 1.7W
Maximum communication speed		1200~115200bps(1200/2400/4800/9600/19200/38400/57600/115200)
Communication type		Half Duplex type
Available communication distance		Max. 800m
Multi−Drop		Max. 32 Multi−Drop
(Note) Data type	Data Bit	5 ~ 8 Data Bits
	Stop Bit	1 or 2 Stop Bits
	Parity Bit	No/Odd/Even Parity Bit
Connection type	RS232	D−Sub 9Pin
	RS485	4−wire Screw terminal(2wire communication type)
Insulation resistance		Min. 100MΩ (at 500VDC mega)
Dielectric strength		2500Vrms
Noise strength		±500V the square wave noise(pulse width:1μs) by the noise simulator
Vibration	Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour
	Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes
Shock	Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction
	Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction
Ambient temperature		−10 ~ +55℃ (at non−freezing status)
Storage temperature		−20 ~ +60℃ (at non−freezing status)
Ambient humidity		35 ~ 85%RH
Approval		CE MIC
Unit weight		Approx. 46g

※**(Note)**Data type is set by program.

SCM-38I

▣Dimensions

(Unit:mm)
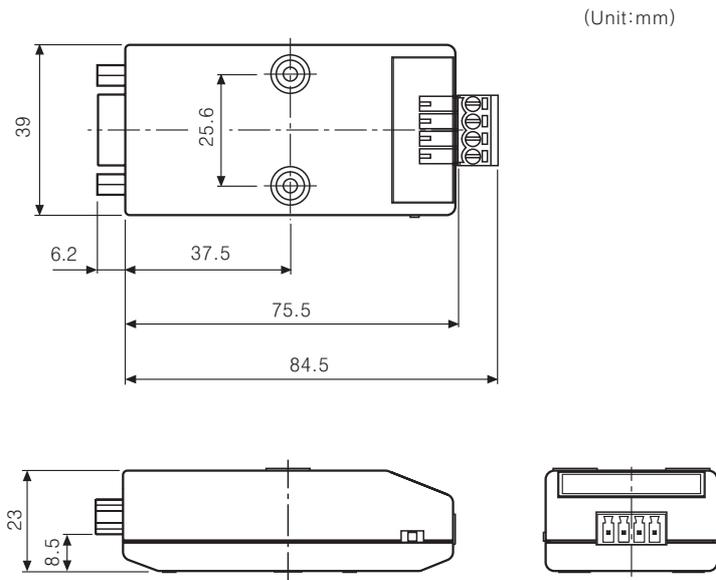
※**Side view of the multilayer**

M3 screw bolt

'B'(Length of screw)

'A'(Height of layer)

Panel

Number of layers(N)	"A" Size (23.3N+1.2)	B" Size (23.3N−3.3)
1	24.5mm	20mm
2	47.5mm	43.3mm
3	71.1mm	66.6mm
4	94.4mm	89.9mm

39
25.6
6.2
37.5
75.5
84.5
23
8.5

▣Functional block diagram

※**Rt : Terminal resistance**

RXD
TXD

RS232C

GND

RXD
TXD
TXD

RS232C

RXD

VCC
RX
A

RS485

ON   OFF
Rt

B
TX   GND

Power

DC Converter

A(+)
B(−)

RS485

+
−

12−24VDC

▣Connections

A B V G

G:GROUND
V:12−24VDC
B(−):RS485 signal line
A(+):RS485 signal line
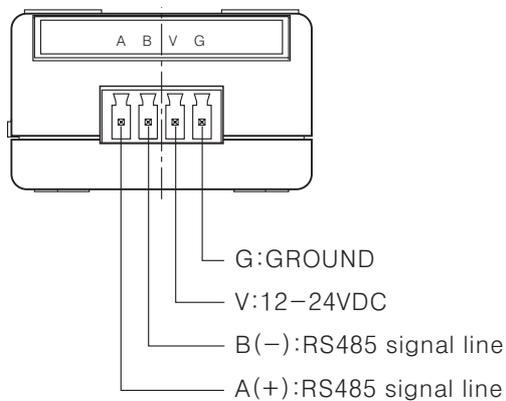
▣Terminal resistance selection

ON ← → OFF

| ON | Using terminal resistance |
| OFF | Not using terminal resistance |

Autonics
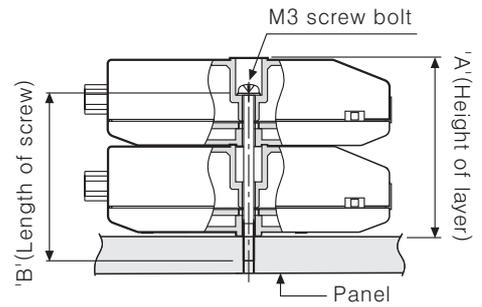
(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
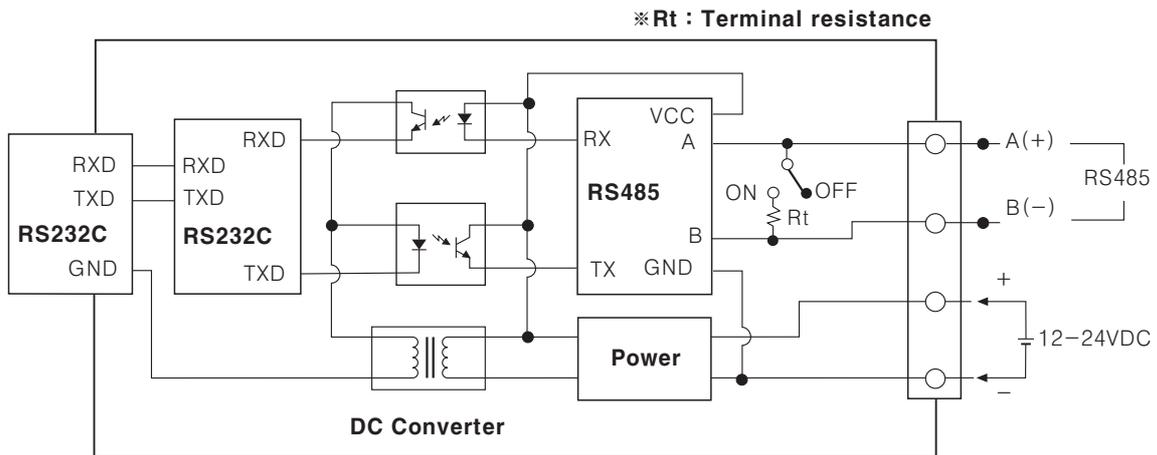device
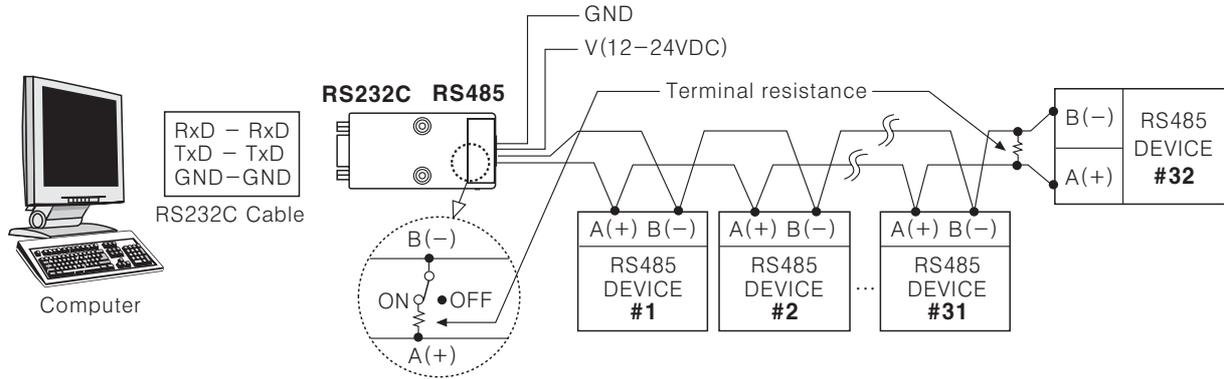
(Q)
Production
stoppage
models &
replacement

■System organization

◎Multi－Drop connection method with PC

◎RS232C cable connection
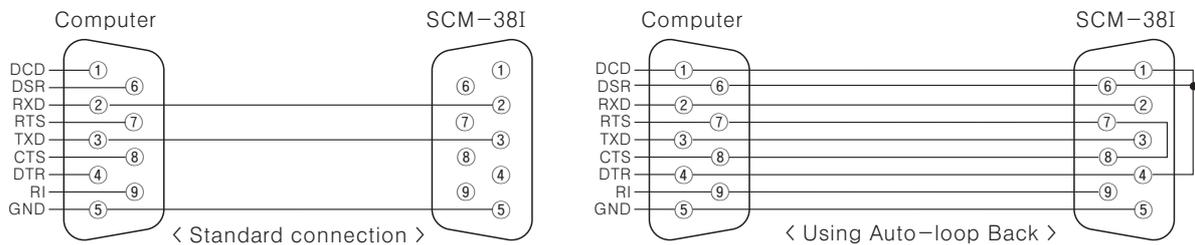
※When the software of the communication driver uses Auto－loop Back, please connect as the above.

■Proper usage

● Tx_Enable signal(RTS signal) :
Tx_Enable signal(RTS signal) is automatically generated according to protocol.

● Auto－loop Back : When Auto－loop Back is required, please use as 'RS232C cable connections'.

● Setting of protocol rule(Start bit, Stop bit, Parity bit, Data bit, Baud rate) can be set by software without external input or internal setting.

● Using the Twist pair cable(24－AWG), which is suitable to RS485 communication is recommended. If the twist pair cable is not used, be sure preserving the length of A(+) and B(−) cables.

● The extension of communication cable is maximum 1.2km, and the number of available connecting communication product is 32 items.

● After connecting the communication cable between SCM－38I and lower system, be sure to attach the terminal resistance(100~120Ω).
(The terminal resistance of SCM－38I is set by external switch)

● For the connection be sure that protocol is consisted with each communication product when programming the software program by connecting to other communication products.

● Terminal resistance : RS485 communication have a rapid transmission speed and long communication distance, if the communication line and impedance between Driver, Receiver of RS485 are not matched, it causes a reflective wave.
It can make an error for using, please use the terminal resistance at the tip of the network.
(Terminal resistance : 100~200Ω)

● To avoid inductive noise, separate the wires from high voltage cable and power cable.

● Do not this unit as following place
 • A place where vibration, shock is occurred.
 • A place where strong alkali or acid material is used.
 • A place where the direct ray of light is occurred.
 • A place where strong magnetic force or electric noise is occurred.

● Storage
To preserve for long term, please avoid direct ray of light and keep it under the temperature from −20℃ ~60℃ and the relative humidity less than 35~85%RH. Wrap same as shipping for optimum storage.

● Installation environment
 • It shall be used indoor
 • Altitude Max. 2000m
 • Pollution Degree 2
 • Installation Category I

Serial Converter Module(USB ←→ Serial)

■ Features

- ● Applicable OS : Windows 98, 98SE, ME, 2000, Server 2003, XP, Vista
- ● Both USB 1.1 and USB 2.0 compatible
- ● Data transmission / power supply indicating LED
- ● Easy to connect with PC
- ● Built-in protection circuit
- ● Ferrite Core cable for noise reduction
- ● Non-isolation type

⚠ **Please read "Caution for your safety" in operation manual before using.**

CE (€

NEW

※ This unit is specifically designed to connect to particular Autonics products.

■ Ordering information

| SCM | – | U | S | | |

	Non-isolation
S	Serial(TTL Level)
U	USB
SCM	Serial Converter Module
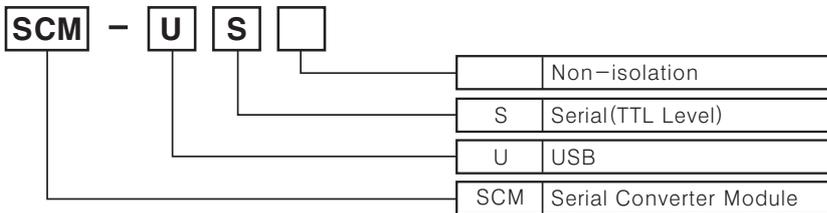
■ Specifications

Model		SCM-US
Power supply		5VDC (Supplied from PC)
Power consumption		Approx. 1W
Communication speed		(∗1) Recommended ☞ 9600bps(1200/2400/4800/9600/19200/38400/57600/115200)
Communication Type		Half Duplex
Communication distance		1.5m(No extension allowed)
Isolation type		Non-isolated
Vibration	Destruction	0.75mm amplitude at frequency of 10~55Hz(for 1 min.) in each X, Y, Z direction for 1 hr.
	Malfunction	0.5mm amplitude at frequency of 10~55Hz(for 1 min.) in each X, Y, Z direction for 10 minutes.
Shock	Destruction	300m/s² (30G) in X, Y, Z directions for 3 times
	Malfunction	100m/s² (10G) in X, Y, Z directions for 3 times
Ambient temperature		−10 ~ 55℃ (at non-freezing status)
Storage temperature		−20 ~ 60℃ (at non-freezing status)
Ambient humidity		35~85%RH
Connector type		• Computer ☞ USB(Type A) / • Autonics Products ☞ Earphone Jack (4 pole stereo phone plug)
Accessory		Install CD
Approval		CE (€
Unit weight		Approx. 41g

※ **(∗1)** Protocol is set by programs.
※ There might be some differences in the specification above depending on PC environment.

■ Dimensions
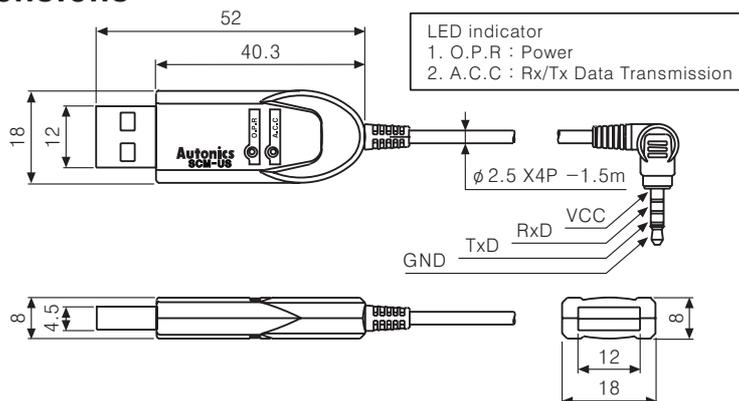
LED indicator
1. O.P.R : Power
2. A.C.C : Rx/Tx Data Transmission

φ2.5 X4P −1.5m

VCC
RxD
TxD
GND

52
40.3
18
12

8
4.5

8
12
18

(Unit:mm)

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

SCM-US

▣Connection and Installation

Personal Computer　　**SCM-US**　　**Autonics Products**
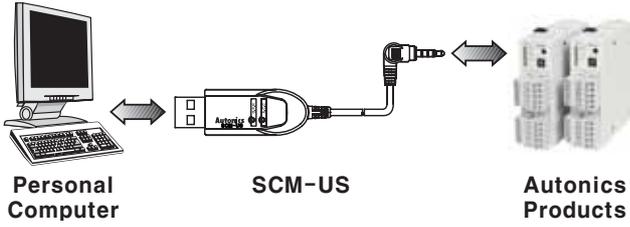
◎**Driver Installation**

1)Installing via install CD

①Insert the CD-ROM into computer's CD-ROM drive and connect the unit to PC. (CD-ROM will be provided with the products.)

②Select **"Install the software automatically (Recommended)"** and click the Next button when following window is displayed.

③Hardware installation message will appear while Found New Hardware Wizard is running. Click Continue Anyway to proceed with the installation.
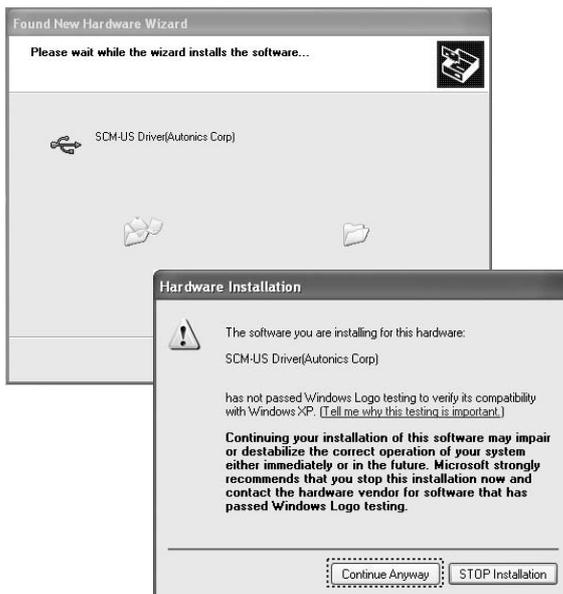
④The following window will be displayed if the driver is installed properly. Click the Finish button.

※SCM-US driver installs "common serial bus controller" first before installing the USB port (COM and LPT). Therefore, it is not an operational error that driver installation proceeds twice.

2)Installing via website download

①Visit our website (http://www.autonics.com) and download SCM-US user manual and 'SCM-us.zip' at download center.
②Decompress the file at desired folder and connect SCM-Us.
③Select **"Install from a list or specific location (Advanced)"** and click Next button to proceed with installation.

※Select **'Search for the best driver in these locations'** and **'Include this location in the search'** continuously. Click the **'Browse'** button and select the folder to unzip a file.
(Following window will be displayed if selecting 'C:\SCM−US' folder to unzip the file)
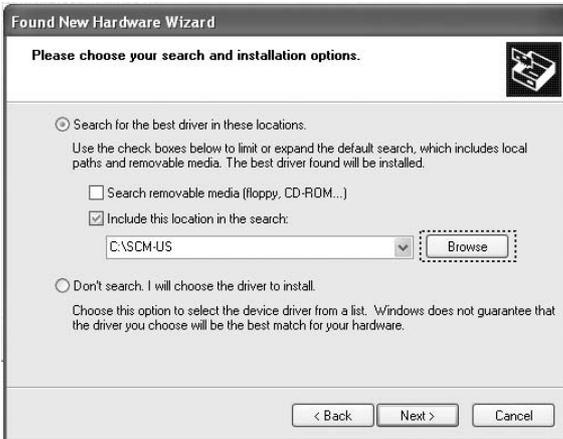
④Follow the same procedures described in 1) Installing via install CD ② and ③.

☞**Verify that the drivers were installed properly with the Windows Device Manager after finishing installation.**

To access the Device Manager, open the folder [My Computer], open the System folder (click right), click the Hardware tab, and click the Device Manager Button. Then, make sure that "SCM−US Driver (Autonics Corp)" is found in "Common Serial Bus Controller" category and "Port (COM and LPT)" is found in "SCM−US Serial Port (COM□)" category. If it is, USB driver is installed properly (In case of Window XP).
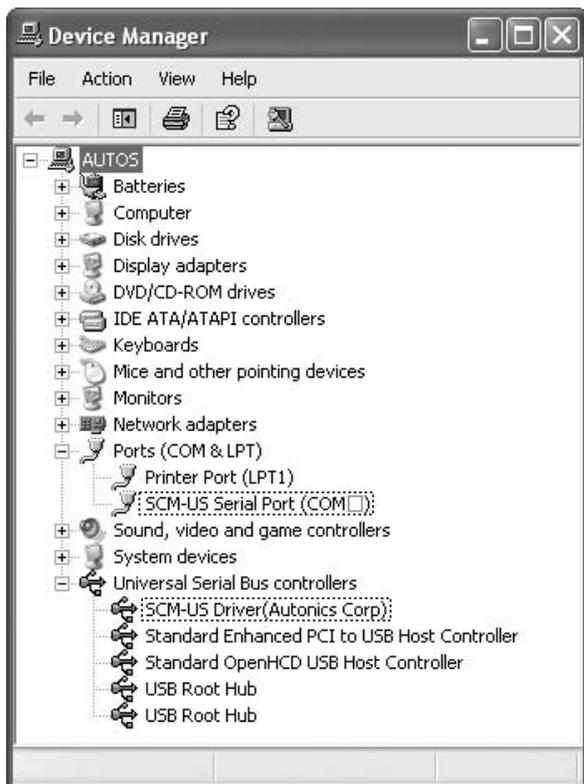
■Proper usage

● This cable is non−isolated type model. Improper usage of unit may result in damage.
● When changing PC USB port and connecting this unit to another (changed) USB port, USB driver will be reinstalled. This is not a malfunction.
● When connecting SCM−US communication module, please connect PC and SCM−US first. Then, connect Autonics products afterward. When disconnecting the units, remove the unit in reverse order.
● All protocols (Start bit, Stop bit, Data bit, Baud−rate) can be set by provided S/W.
● While detecting USB Driver, VCP Driver is installed after USB Driver is installed. This is not a malfunction.
● In case of multiple connections of unit, No. of COM Port will be numbered in order. This is not a malfunction. (e.g., COM14, COM15, COM16)
● When connecting USB cable, check COM port number before communication. It may take some time for the computer to detect the cable after the cable is connected. This is not a malfunction.
● Do not extend the USB portion of this cable with an extension cable. It may cause cable malfunction.
● This unit is specifically designed to connect to specific Autonics products. Do not apply this unit to other products not supported.
● Observe the rated voltage.
● To avoid malfunctions due to noise, do not place the unit close to a high−voltage power line.
● Proper application environment (Avoid following environments for unit to be used.)
 • Where severe vibration or shock exists
 • Where close to a strong alkali or strong acid
 • Where direct rays of light exist
 • Where near facilities generating strong magnetic forces or electrics noise.
● Storage
 Keep the unit −20~60℃, 35~85% RH with avoiding direct rays of light. It is recommended to keep the unit package as it is.
● Installation environment
 • It shall be used indoor
 • Altitude Max. 2000m
 • Pollution Degree 2
 • Installation Category I

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

Indication type only, Various sizes

▣ Features

- Various size
  : W48×H24, W72×H36, W48×H48, W48×H96,
    W72×H72, W96×H96mm
- No output function, Indication only
- High accuracy measuring function
  : F・S±0.3% or ±0.5%

> ⚠ **Please read "Caution for your safety" in operation manual before using.**

▣ Ordering information

T 3 S I – N 4 N P 4 C

Unit

C	℃

Temperature range

0	−99~199, −99.9~199.9, −99.9~99.9
1	0~99.9
2	0~199
4	0~399
5	0~500
8	0~799
A	0~999
C	0~1200
F	600~1600

Sensor input type

P	Pt100Ω
J	J(IC)
K	K(CA)
R	R(PR)

Control output

N	No output

Power supply

X	12−24VDC
3	110/220VAC 50/60Hz
4	100−240VAC 50/60Hz

Control method

N	No control function

Sub output mode

I	Indicator

Size

N	DIN W48×H24mm
Y	DIN W72×H36mm
W	DIN W96×H48mm
S	DIN W48×H48mm
H	DIN W48×H96mm
M	DIN W72×H72mm
L	DIN W96×H96mm

Digit

3	3 Digit
4	4 Digit

Item

T	Temperature

※**See C−67 about sensor temperature range for selection.**

T3NI/T4YI/T4WI/T3SI/T3HI/T4MI/T4LI

▣ Temperature range for each sensor
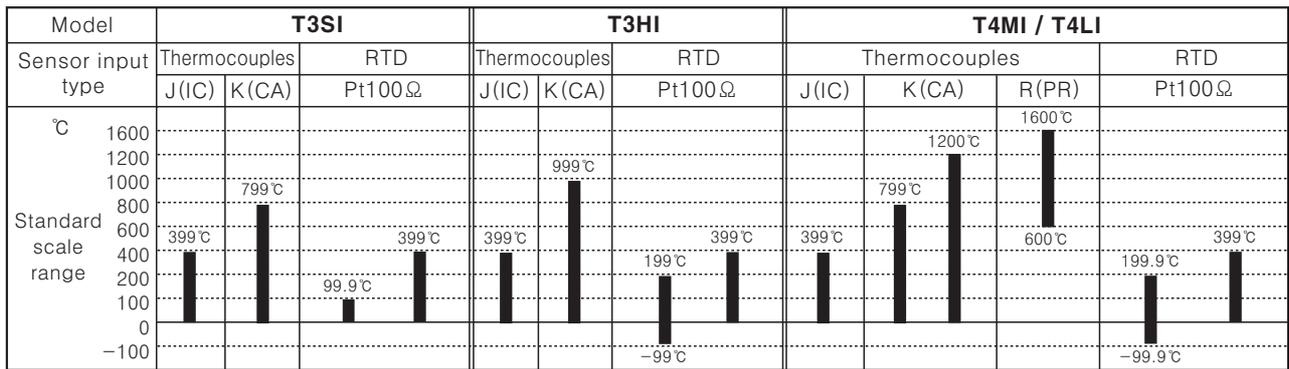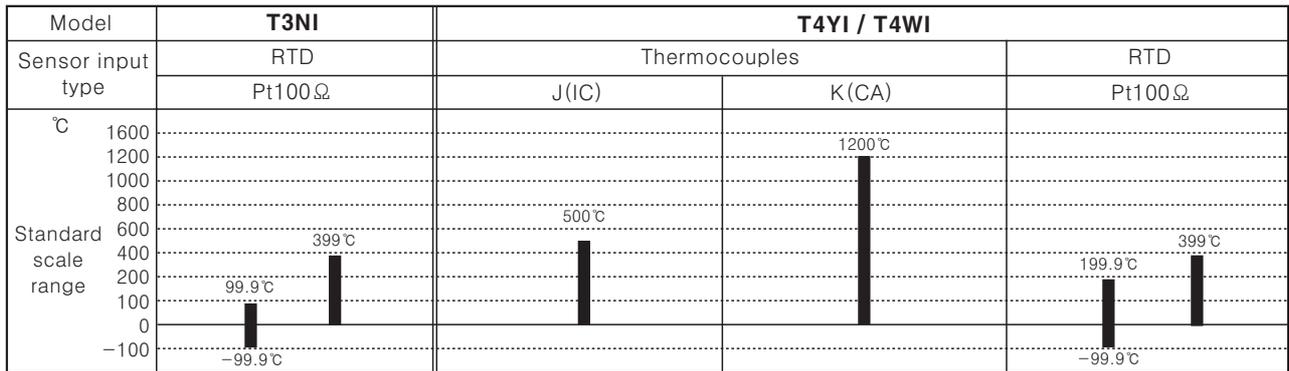
Model	T3NI	T4YI / T4WI		
Sensor input type	RTD	Thermocouples		RTD
	Pt100Ω	J(IC)	K(CA)	Pt100Ω
Standard scale range (℃)	99.9℃ / −99.9℃, 399℃	500℃	1200℃	199.9℃ / −99.9℃, 399℃

Model	T3SI			T3HI			T4MI / T4LI			
Sensor input type	Thermocouples		RTD	Thermocouples		RTD	Thermocouples			RTD
	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	R(PR)	Pt100Ω
Standard scale range (℃)	399℃	799℃	99.9℃	399℃	999℃	199℃ / −99℃, 399℃	399℃	799℃, 1200℃	1600℃ / 600℃	199.9℃ / −99.9℃, 399℃

※In case input sensor is R(PR) type, it is not available to perform correct control under 600℃.

▣ Specifications

Model	T3NI	T4YI	T4WI	T3SI	T3HI	T4MI	T4LI
Power supply	12−24VDC	100−240VAC 50/60Hz	110/220VAC 50/60Hz	100−240VAC 50/60Hz	110/220VAC 50/60Hz		
Allowable voltage range	90 ~ 110% of rated voltage						
Power consumption	2W	3VA					
Display method	7 Segment LED Display						
Character size	W5×H8mm	W9.8×H14.2mm		W4×H8mm	W6×H10mm	W7.2× H9.8mm	W9.5× H14.2mm
Display accuracy	F・S ± 0.3% rdg ±1digit	F・S ± 0.5% rdg ±1digit					
Sensor input	Pt100Ω	Thermocouples(T.C): K(CA), J(IC), R(PR) / RTD : Pt100Ω					
Input line resistance	Max. 5Ω per a wire	Thermocouples : Max. 100Ω / RTD : Max. 5Ω per a wire					
Insulation resistance	Min. 100MΩ (at 500VDC mega)						
Dielectric strength	2000VAC 50/60Hz for 1 minute						
Noise strength	±500V	±1kV the square wave noise(pulse width:1μs) by the noise simulator					
Vibration — Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour						
Vibration — Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes						
Shock — Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction						
Shock — Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction						
Ambient temperature	−10 ~ +50℃ (at non−freezing status)						
Storage temperature	−20 ~ +60℃ (at non−freezing status)						
Ambient humidity	35 ~ 85%RH						
Unit weight	Approx. 34g	Approx. 170g	Approx. 322g	Approx. 107g	Approx. 368g	Approx. 356g	Approx. 433g

※F.S is same with sensor measuring temperature range.
　Ex) In case of using temperature is from −99.9 ~ 199.9℃, Full scale is 299.8.

Autonics

Indicator Type

▣Connections

※RTD(Resistance Temperature Detector)：Pt 100Ω(3−wire type)   ※Thermocouple：K, J, R

●T3NI

4 3 2 1

+ − B' B A

12−24VDC SOURCE   RTD SENSOR

●T4YI

1 2 3 4 5 6

RTD A B B'
T.C + −
SENSOR

SOURCE 100−240VAC 50/60Hz 3VA

●T4WI

220VAC 110VAC 50/60Hz 50/60Hz 0V

1 2 3 4 5 6 7

RTD A B B'
T.C + −
SENSOR

SOURCE

●T3SI

SENSOR
B' B − + A
T.C RTD

SOURCE 100−240VAC 50/60Hz 3VA

●T4MI

SENSOR
T.C + −
RTD A B B'

8 9 10 11 12 13 14

220VAC 110VAC 50/60Hz 50/60Hz 0V

1 2 3 4 5 6 7

SOURCE

●T3HI

0V
110VAC 50/60Hz
220VAC 50/60Hz
SOURCE

RTD
B' T.C −
B
SENSOR
A +

●T4LI

SENSOR
T.C + RTD A
− B
B'

220VAC 50/60Hz
110VAC 50/60Hz
0V
SOURCE

Autonics
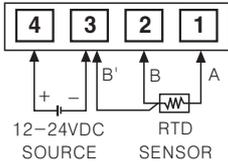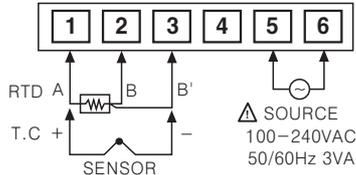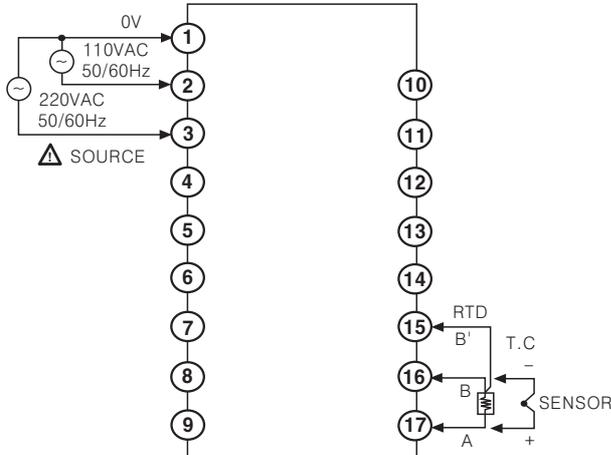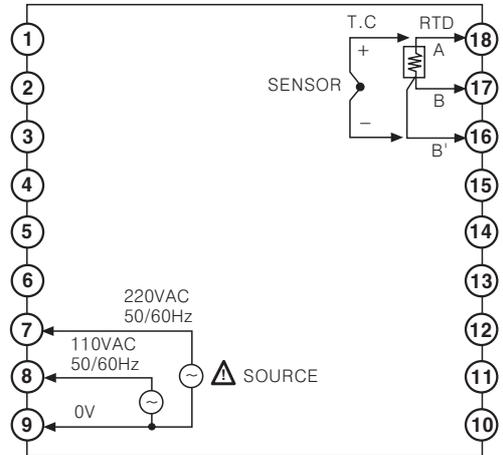
T3NI/T4YI/T4WI/T3SI/T3HI/T4MI/T4LI

■Dimensions

◎T3NI

●Bracket

48

24
35

℃
999
T3NI Autonics

52
4 41 7

21

●Panel cut−out

Min. 55

22.2 $^{+0.3}_{-0}$

Min. 37

45 $^{+0.6}_{-0}$

(Unit:mm)

◎T4YI

85
72

36

399 ℃
T4YI Autonics

100
7 80 13

30

●Panel cut−out

Min. 91

31.5 $^{+0.5}_{-0}$

Min. 40

68 $^{+0.7}_{-0}$

(Unit:mm)

◎T4WI

98
96

THERMO METER
1200 ℃
T4WI Autonics

48

111.6
12 90 9.6

45

●Panel cut−out

Min. 116

45 $^{+0.6}_{-0}$

Min. 52

92 $^{+0.8}_{-0}$

(Unit:mm)

◎T3SI

●Bracket

48

399
℃
TEMPERATURE
INDICATOR
T3SI K 0-399℃ Autonics

48
60

100
12 73 15

45

●Panel cut−out

Min. 53

45.5 $^{+0.5}_{-0}$

Min. 62

45.5 $^{+0.5}_{-0}$

(Unit:mm)

▣ Dimensions

● T3HI

48 · 96 · 100 · K(CA) 0~399℃ · INDICATOR · T3H · OUT · ℃

146 · 12 · 124 · 10 · 91

● Panel cut-out

Min. 50 · $92^{+0.8}_{-0}$ · Min. 102 · $45^{+0.6}_{-0}$

(Unit:mm)

● T4MI

86 · 72 · 72 · INDICATOR · K(CA) 0~1200℃ · T4MI · Autonics · ℃

125 · 13 · 102 · 10 · 67

● Panel cut-out

Min. 91 · $68^{+0.7}_{-0}$ · Min. 91 · $68^{+0.7}_{-0}$

(Unit:mm)

● T4LI

96 · TEMPERATURE · OUT · ℃ · INPUT K(CA) · 0~399℃ · INDICATOR · T4LI · Autonics · 96 · 109

118 · 18 · 87 · 13 · 90

● Panel cut-out

Min. 116 · $92^{+0.8}_{-0}$ · Min. 116 · $92^{+0.8}_{-0}$

(Unit:mm)

▣ Proper usage

◎ T3NI

- T3NI is used exclusively for measuring the internal and actual temperature of panel.
- Since the RTD type of T3NI is not produced, please check items before selecting the product.
- The power supply of T3NI is 12~24VDC and AC power is not produced.
- RTD requires to use Pt100Ω 3-wires type and same length and thickness of lead wire.

◎ The other items

- Please check a model name when choose the item since the thermocouple is marked the same sign with Pt100Ω. Ex)T4WI-N3NPO
- RTD requires to use Pt100Ω 3-wire type, and same length and thickness of lead wire.
- The extension wire of thermocouple must be used with the rated compensating wire or thermocouple strand.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

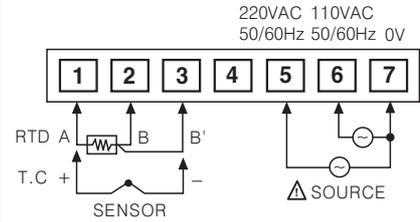(P) Field network device
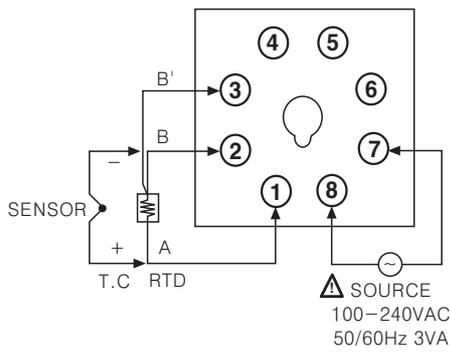
(Q) Production stoppage models & replacement

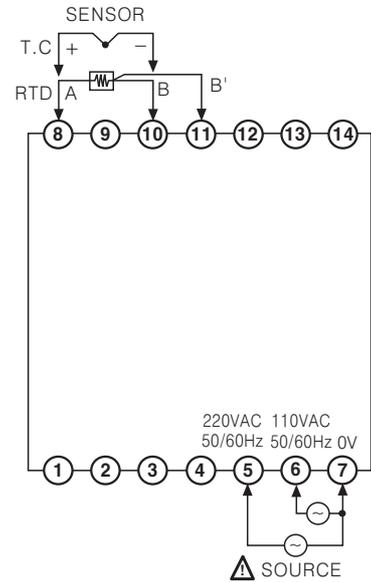## Digital switch setting type, temperature controller

▣Features

- ●Various size by DIN specification
- ●Accuracy : F • S ±0.5%
- ●Universal power : T3S Series

⚠ **Please read "Caution for your safety" in operation manual before using.**

▣Ordering information

T 3 S − B 4 R P 4 C

| Unit | C | ℃ |
| | F | °F |

Temperature range	0	−99~199, −99.9~199.9
	1	0~99.9
	2	0~199
	4	0~399
	8	0~799
	A	0~999
	C	0~1200
	F	600~1600

Sensor input type	P	Pt100Ω
	J	J(IC)
	K	K(CA)
	R	R(PR)

Control output	R	Relay output
	S	SSR drive output
	C	Current outut(DC4−20mA)

| Power supply | 3 | 110/220VAC 50/60Hz |
| | 4 | 100−240VAC 50/60Hz |

| Control method | B | ON/OFF, Proportional control |

Size	S	DIN W48×H48mm
	H	DIN W48×H96mm
	M	DIN W72×H72mm
	L	DIN W96×H96mm

| Digit | 3 | 3 Digit |
| | 4 | 4 Digit |

| Item | T | Temperature |

※See C−53 about sensor temperature range for selection.

T3S/T3H/T4M/T4L

▣ Temperature range for each sensor

Model	T3S			T3H			T4M / T4L			
Sensor input type	Thermocouples		RTD	Thermocouples		RTD	Thermocouples			RTD
	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	Pt100Ω	J(IC)	K(CA)	R(PR)	Pt100Ω

Standard scale range (℃):
- T3S: J(IC) 199℃, K(CA) 399℃ / 399℃, Pt100Ω 99.9℃ / 199℃ / 399℃
- T3H: J(IC) 800°F / 399℃, K(CA) 399℃ / 799℃ / 999℃, Pt100Ω 99.9℃ / −99℃ / 199℃ / 399℃
- T4M / T4L: J(IC) 399℃, K(CA) 399℃ / 799℃ / 1200℃, R(PR) 1600℃ / 600℃, Pt100Ω 199.9℃ / −99.9℃ / 399℃

※ In case input sensor is R(PR) type, it is not available to perform correct control under 600℃.

▣ Specifications

Model	T3S	T3H	T4M	T4L
Power supply	100−240VAC 50/60Hz	110/220VAC 50/60Hz		
Allowable voltage range	90~110% of power supply			
Power consumption	5VA	3VA		
Display method	7 Segment LED Display			
Character size	W4×H8mm	W6×H10mm	W7.2×H9.8mm	W9.5×H14.2mm
Display accuracy	F・S ± 1% rdg ±1digit	F・S ± 0.5% rdg ±1digit		
Setting type	Digital switch setting			
Setting accuracy	F・S ± 1%	F・S ± 0.5%		
Sensor input	Thermocouples : K(CA), J(IC), R(PR) / RTD : Pt100Ω [There is no R(PR) in T3S, T3H series]			
Input line resistance	Thermocouples : Max. 100Ω / RTD : Max. 5Ω per a wire			
Control method — ON/OFF Control	Hysteresis : F・S 0.5% ±0.2% Fixed	Hysteresis : F・S 0.2~3%		
Control method — Proportional Control	Proportional band : F・S ±3% fixed, Period : 20sec. fixed	Proportional band : F・S 1~10% variable, Period : 20sec. fixed		
RESET adjuster range	F・S ±3% variable			
Control output	●Relay output : 250VAC 2A 1c ●SSR drive output : 12VDC ±3V 20mA max. ●Current output : DC4−20mA Load 600Ω max.	●Relay output : 250VAC 3A 1c ●SSR output : 24VDC ±3V 20mA max. ●Current output : DC4−20mA Load 600Ω max.		
Self−diagnosis	Built−in burn out function			
Insulation resistance	Min. 100MΩ (at 500VDC mega)			
Dielectric strength	2000VAC 50/60Hz for 1 minute			
Noise strength	±1kV the square wave noise(pulse width:1μs) by the noise simulator			
Vibration — Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour			
Vibration — Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes			
Shock — Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction			
Shock — Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction			
Relay life cycle — Mechanical	Min. 10,000,000 times			
Relay life cycle — Electrical	Min. 100,000 times(250VAC 3A at resistive load)			
Ambient temperature	−10 ~ +50℃ (at non−freezing status)			
Storage temperature	−20 ~ +60℃ (at non−freezing status)			
Ambient humidity	35~85%RH			
Unit weight	Approx. 196g	Approx. 496g	Approx. 399g	Approx. 468g

※ F.S is same with sensor measuring temperature range.
  Ex) In case of measurement temperature range is from −99.9 ~ 199.9℃, Full scale is 299.8.

Digital Switch Setting Type

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

■Connections

※RTD(Resistance temperature detector) : Pt 100Ω(3−wire type)　※Thermocouple : K, J, R

●T3S

●CONTACT OUT :
250VAC 2A 1c RESISTIVE LOAD
●SSR OUT :
12VDC ±3V 20mA Max.
●CURRENT OUT :
DC4−20mA LOAD 600Ω Max.

SENSOR

T.C　RTD

⚠ SOURCE
100−240VAC
50/60Hz 5VA

●T4M

※Although T4M has an alarm terminal, it does not work since it uses the same case with T4MA.

SENSOR

T.C
RTD

ALARM OUT

220VAC 110VAC 0V

⚠ SOURCE

●CONTACT OUT:
250VAC 3A 1c RESISTIVE LOAD
●SSR OUT:
24VDC ±3V 20mA Max.
●CURRENT OUT:
DC4−20mA LOAD 600Ω Max.

●T3H

0V
110VAC
220VAC

⚠ SOURCE

●SSR OUT:
24VDC ±3V 20mA Max.

●CONTACT OUT:
250VAC 3A 1c RESISTIVE LOAD

●CURRENT OUT:
DC4−20mA LOAD 600Ω Max.

RTD　T.C
SENSOR

●T4L

SENSOR

T.C　RTD

●CONTACT OUT:
250VAC 3A 1c RESISTIVE LOAD
●SSR OUT:
24VDC ±3V 20mA Max.
●CURRENT OUT:
DC4−20mA LOAD 600Ω Max.

220VAC
110VAC
0V

⚠ SOURCE

T3S/T3H/T4M/T4L

■Dimensions

◎T3S

●Bracket

●Panel cut−out

48

100

12 · 73 · 15

48 · 60

45

Min. 53

Min. 62

$45^{+0.6}_{-0}$

$45^{+0.6}_{-0}$

※Socket : PG−08, PS−08(Sold separately)

(Unit:mm)

◎T3H

●Panel cut−out

48

146

12 · 124 · 10

96 · 100

91

PT100 0~399℃

Min. 50

Min. 102

$92^{+0.8}_{-0}$

$45^{+0.6}_{-0}$

(Unit:mm)

◎T4M

●Panel cut−out

86

72

125

13 · 102 · 10

72 · 67

K(CA)0~1200℃

Min. 91

Min. 91

$68^{+0.7}_{-0}$

$68^{+0.7}_{-0}$

(Unit:mm)

◎T4L

●Panel cut−out

96

118

18 · 87 · 13

96 · 109

90

TEMPERATURE

INPUT R(PR)   600~1600℃

Min. 116

Min. 116

$92^{+0.8}_{-0}$

$92^{+0.8}_{-0}$

(Unit:mm)

▣Proper usage
◎Using front adjuster

P.B adjuster   RESET adjuster

● P.B adjuster : In case of ON/OFF control, set variable F·S 0.2~3% of hysteresis and in case of proportional control, set variable F·S 1~10% of hysteresis. However, hysteresis(F·S 0.5%) and proportional band(F·S 3%) are fixed in T3S.

● RESET adjuster : It corrects offset can be occurred by proportional control and has F·S ±3% of adjustable range. Do not operate the adjuster when it is used as ON/OFF control.

RESET adjuster

①Turn left when offset value is higher than setting value. (Direction ①)

②Turn right when offset value is lower than setting value. (Direction ②)

◎Normal/Reverse operation

Reverse operation executes to output ON when process value is lower than setting value and it is used for heating. Normal operation runs conversely and is executed for cooling. (This item runs as a reverse operation)

◎How to select ON/OFF or proportional by plug pin

Factory specification is proportional control. When using ON/OFF control, transfer the switch of control method from P to F after detaching the case from its body. When control output is current output, P control is fixed, there is no switch Pin of control method.

Proportional control   ON/OFF control

◎Case detachment
● T4L/T3H

Pressing the front guide of Lock toward ① and squeeze and pull toward ②, it is detached.

● T4L/T3H

Open the front guide, turn it toward ① and pull toward ②, it is detached.

Pressing pin plug ①, raise it up with a driver as ② and it is detached.

◎Application of temperature controller and load connection
● SSR output connection

※When using voltage(for driving SSR) in the other purposes, do not over the range of thd rating current.

※Please aware that each series has different voltage(for driving SSR).

● Relay output connection

※Be aware that each model has different contact capacity of RY. When load capacity is high, please use sub relay, which has high contact capacity.

● Current output connection

※The current value of DC4−20mA is available at lower than 600Ω of resistive load.

Dual setting type, High accuracy temperature controller

■Features

- ●Dual setting type
- ●High accuracy measuring function : ±0.5%
- ●Control heater and cooler at once
- ●Use dual setting type of temperature when executing low temperature or precision control. In dual setting control type, the single output is operated as reverse, it is used for heater control. The dual output is used to control the operation of cooler normally.
  The dual output is also used for an alarm.

> ⚠ **Please read "Caution for your safety" in operation manual before using.**

■Ordering information

| T | 4 | L | P | − | B | 3 | R | P | 4 | C |

Unit

| C | ℃ |

Temperature range

2	0~199.9
4	0~399
8	0~799
C	0~1200
F	600~1600

Sensor input type

P	Pt100Ω
J	J(IC)
K	K(CA)
R	R(PR)

Control output

R	Relay output
S	SSR drive output
C	Current output(DC4−20mA)

Power supply

| 3 | 110/220VAC 50/60Hz |

Control method

| B | ON/OFF, Proportional control |

Sub output mode

| P | Dual output |

Size

| L | DIN W96×H96mm |

Digit

| 4 | 4 Digit |

Item

| T | Temperature |

※**See C-63 about sensor temperature range for selection.**

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller
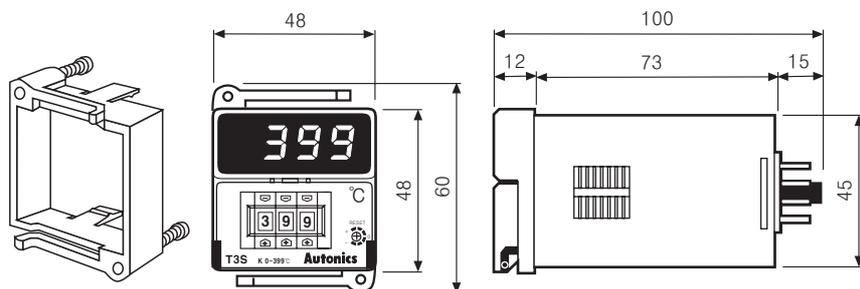
(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

T4LP

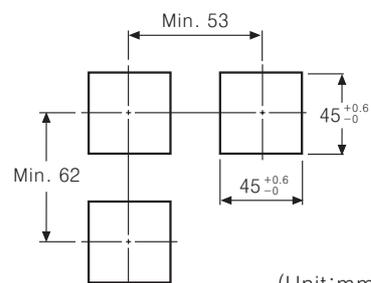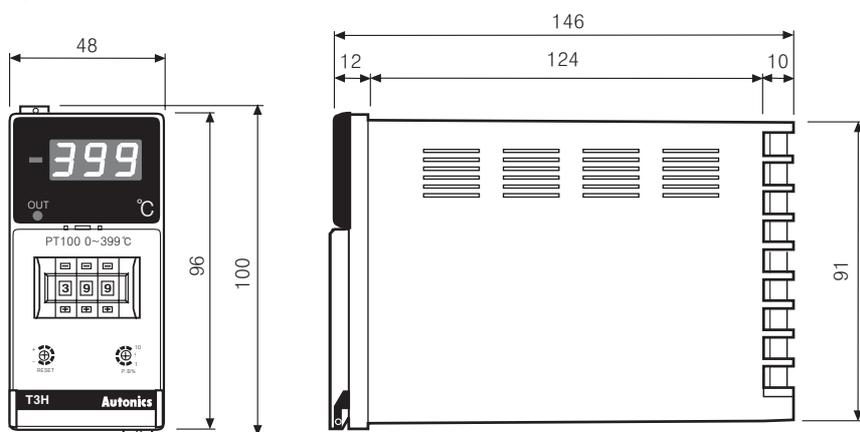## ▣Temperature range for each sensor

Model	T4LP			
Sensor input type	Thermocouples			RTD
	J(IC)	K(CA)	R(PR)	Pt100Ω
℃ Standard scale range	399℃	399℃ / 799℃ / 1200℃	600℃ / 1600℃	199.9℃ / 399℃

※In case, the sensor is R(PR) type, it is not available to indicate the temperature and control correctly.

▣Specifations

Model	T4LP	
Power supply	110/220VAC 50/60Hz	
Allowable voltage range	90 ~ 110% of rated voltage	
Power consumption	3VA	
Display method	7 Segment LED Display	
Character size	W9.5×H14.2mm	
Display accuracy	F・S ± 0.5% rdg ±1digit	
Setting type	Digital switch setting	
Setting accuracy	F・S ± 0.5%	
Sensor input	Thermocouples : K(CA), J(IC), R(PR) / RTD : Pt100Ω	
Input line resistance	Thermocouples : Max. 100Ω, RTD : Max. 5Ω per a wire	
Control method	ON/OFF	Hysteresis F・S 0.2 ~ 3%
	Proportional	Proportional band : F・S 1 ~ 10%, Period : 20sec. fixed
RESET adjuster range	F・S ±3%(Only for control deviation)	
Control output	• Relay output : 1st out : 250VAC 3A 1c, 2nd out : 250VAC 2A 1c • SSR drive output : 24VDC ±3V 20mA max. • Current output : DC4−20mA Load 600Ω max.	
Self−diagnosis	Includes burn out function	
Insulation resistance	Min. 100MΩ (at 500VDC mega)	
Dielectric strength	2000VAC 50/60Hz for 1 minute	
Noise strength	±2kV the square wave noise(pulse width:1μs) by the noise simulator	
Vibration	Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour
	Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes
Shock	Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction
	Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction
Relay life cycle	Mechanical	Min. 10,000,000 times
	Electrical	Min. 100,000 times(250VAC 3A at resistive load)
Ambient temperature	−10 ~ +50℃(at non−freezing status)	
Storage temperature	−20 ~ +60℃(at non−freezing status)	
Ambient humidity	35 ~ 85%RH	
Unit weight	Approx. 487g	

※**(Note)** F.S is same with sensor measuring temperature range.
Ex) In case of using temperature is from −99.9 ~ 199.9℃, Full scale is 299.8.

Dual Setting Type

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

▣Connections

※RTD（Resistance Temperature Detector）：Pt 100Ω（3−wire type）　　※Thermocouple：K, J, R

- CONTACT OUT: 250VAC 3A 1c RESISTIVE LOAD
- SSR OUT: 24VDC ±3V 20mA Max.
- CURRENT OUT: DC4−20mA LOAD 600Ω Max.
- ALM OUT : 250VAC 2A 1c

RTD　T.C

SENSOR

220VAC
110VAC
0V

⚠ SOURCE

▣Dimensions

96

TEMPERATURE

399 ℃

1P
2P

INPUT K(CA)　　　0~399℃

LO SET　　　399　　　399　　HI SET

P. B%　　　RESET

T4LP　　Autonics

96
109

118

18　　87　　13

90

● Panel cut−out

Min. 101

Min. 114

$92^{+0.8}_{-0}$

$92^{+0.8}_{-0}$

(Unit:mm)

T4LP

■Proper usage

◎Operation

This controller has two outputs operated separately. In other words, it is able to set the values separately. Front Low Set runs with reverse operation as other common controllers and High Set runs by normal operation. It is able to control heater and cooler.

```
      Heater control          Cooler control
      ┌────────┐                      ┌────────
      │   ON   │     OFF       ON     │
──────┘        └──────────────┬───────┘
               △              △
             S.V            S.V
           LOW SET         HI SET
```

※Terminal block ①, ②, ③ are for Low set output and terminal block ④, ⑤, ⑥ are for High set output.

◎Using front adjuster

P.B adjuster   RESET adjuster

● P.B adjuster

In case of ON/OFF control, set variable F·S 0.2~3% of hysteresis, and in case of proportional control, set variable F·S 1~10% of hysteresis.

● RESET adjuster

It corrects offset can be occurred by proportional control and has F·S ±3% of adjustable range.

Do not operate the adjuster when it is used as ON/OFF control.

①Turn left when offset value is higher than set value. (Direction ①)

②Turn right when offset value is lower than set value. (Direction ②)

◎Case detachment

Pressing the front guide of Lock toward ① and squeeze and pull toward ②, it is detached.

◎How to select ON/OFF or proportional by plug pin

Factory specification is proportional control.

When using ON/OFF control, transfer the switch of control method from P to F after detaching the case from its body.

Proportional control   ON/OFF control

◎Normal/Reverse operation

Reverse operation executes to output ON when process value is lower than setting value, and it is used for heating.

Normal operation is executed conversely and used for cooling. (This item runs as a reverse operation.)

◎Application of temperature controller and load connection

● SSR output

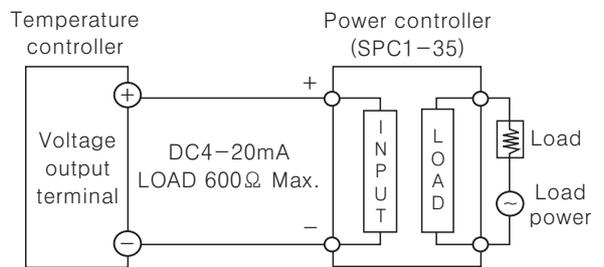※When using voltage (for driving SSR) in the other purposes, do not exceed the range of the rated current.

● Relay output

Output	Relay contact capacity
1st OUT	250VAC 2A
2nd OUT	250VAC 3A

● Current output

※The current value of DC4−20mA is available at lower than 600Ω of resistive load.

Autonics

T4WM

Automatic switching function of 5 point temperature indication

▣Features

- ●Indication type only
- ●High accuracy measurement : F・S ±0.5%
- ●5 Point temperature measurement
- ●Automatic or manual display of temperature in each point

⚠ **Please read "Caution for your safety" in operation manual before using.**

▣Ordering information

| T | 4 | W | M | — | N | 3 | N | P | 4 | C |

Unit	C	℃

Temperature range	0	−99.9~199.9
	4	0~399
	5	0~500
	C	0~1200

Sensor input type	P	Pt100Ω
	J	J(IC)
	K	K(CA)

Control output	N	No output

Power supply	3	110/220VAC 50/60Hz

Control method	N	No control

Input	M	5 Point Indicator

Size	W	DIN W96×H48mm

Digit	4	4 Digit

Item	T	Temperature

※**Please check the range of temperature when select model. (Refer to C-90 page)**

Autonics

5 Point Input Type

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
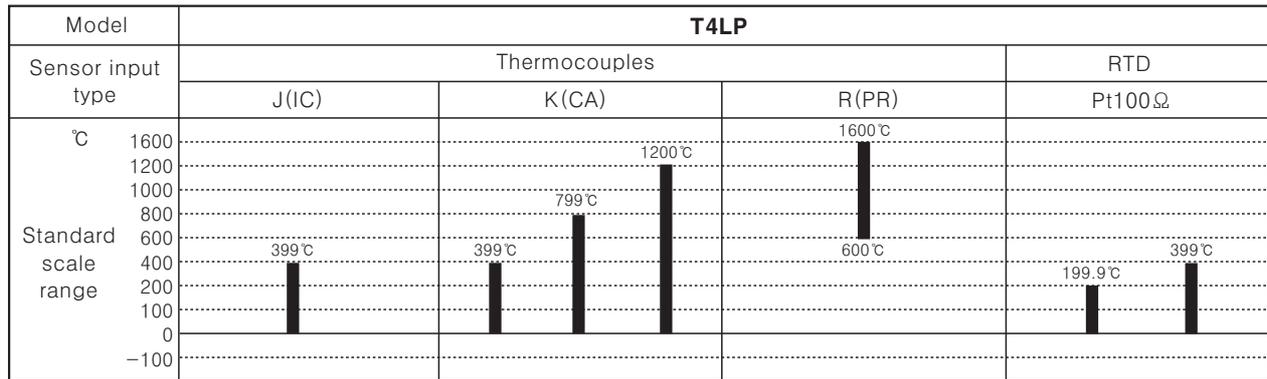Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

▣ Temperature range for each sensor

Model	T4WM		
Sensor input type	Thermocouples		RTD
	J(IC)	K(CA)	Pt100Ω
℃ Measuring range of temperature	500℃	1200℃	199.9℃ 399℃ −99.9℃

▣ Specifications

Model		T4WM
Power supply		110/220VAC 50/60Hz
Allowable voltage range		90 ~ 110% of rated voltage
Power consumption		3VA
Display method		7 Segment LED Display
Character size		W9.8×H14.2mm
Display accuracy		F・S ± 0.5% rdg ±1digit
Input sensor		Thermocouples : K(CA), J(IC) / RTD : Pt100Ω
Input line resistance		Thermocouples : Max. 100Ω / RTD : Max. 5Ω per a wire
Available sensor quantity		Thermocouple : Max. 5pcs / RTD : Max. 5pcs
Insulation resistance		Min. 100MΩ (at 500VDC)
Dielectric strength		2000VAC 50/60Hz for 1 minute
Noise strength		±1kV the square wave noise (pulse width:1μs) by the noise simulator
Vibration	Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour
	Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes
Shock	Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction
	Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction
Ambient temperature		−10 ~ +50℃ (at non−freezing status)
Storage temperature		−25 ~ +65℃ (at non−freezing status)
Ambient humidity		35 ~ 85%RH
Unit weight		Approx. 322g

▣ Front panel identification
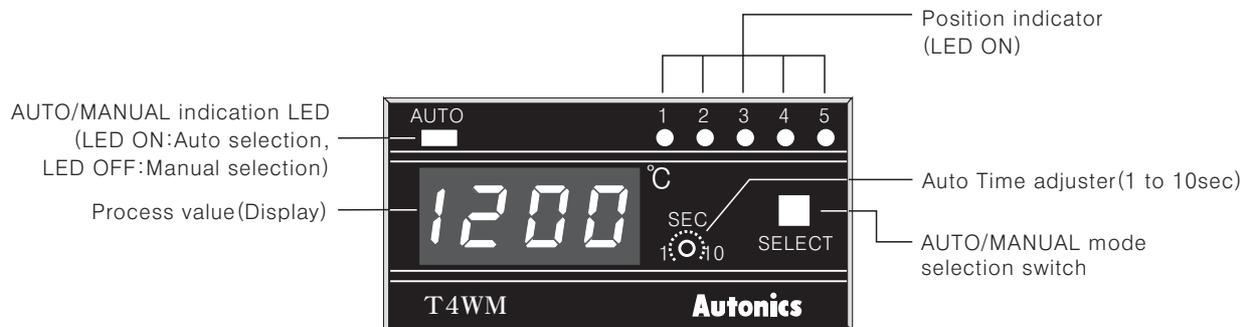
Position indicator (LED ON)

AUTO/MANUAL indication LED (LED ON:Auto selection, LED OFF:Manual selection)

Process value (Display)

Auto Time adjuster (1 to 10sec)
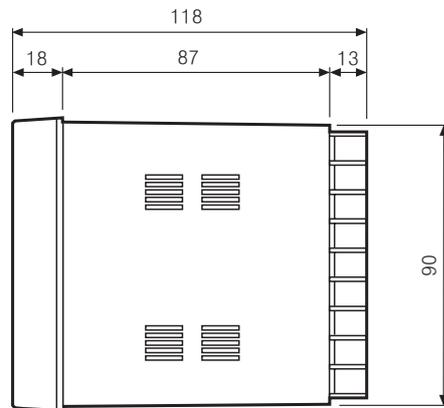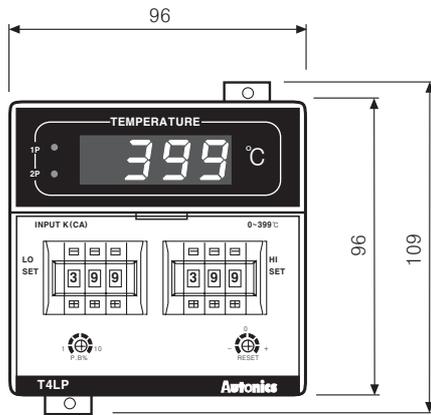
AUTO/MANUAL mode selection switch

T4WM

▣ Connections
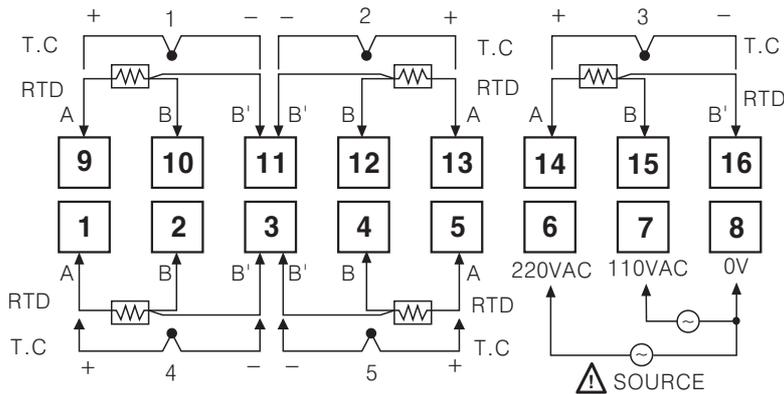
※ RTD (Resistance Temperature Detector) : Pt 100Ω (3-wire type), Thermocouple : K, J

▣ Dimensions

●Panel cut-out

(Unit:mm)
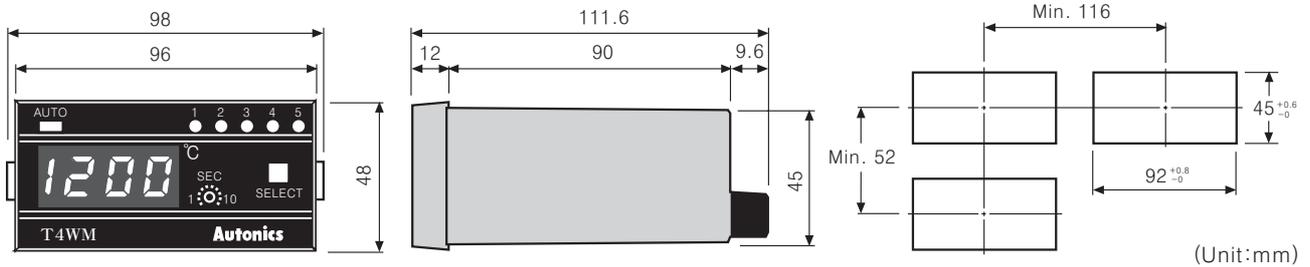
▣ Mode selection

◎ Manual selection and Automatic selection

Manual	Select switch	Auto
Sensor number is flashed when press it (Auto LED : OFF)	SELECT	Auto lamp will be ON by pressing for 3sec. then run

◎ Manual function

● Each time the switch is pressed, the LED of selected sensor number is flashing and display shows the temperature of that sensor.
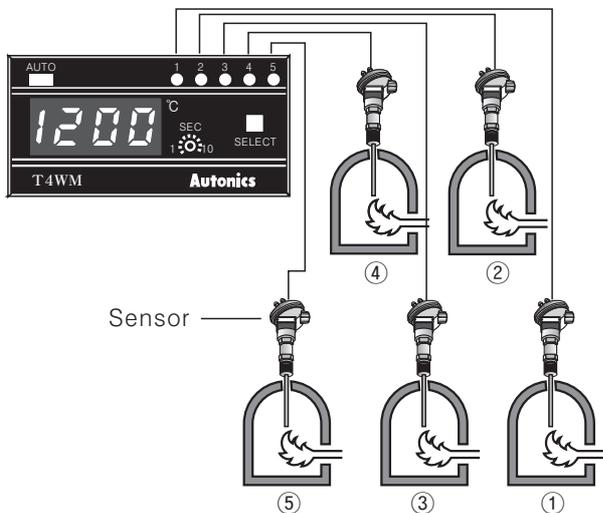
Sensor

◎ Auto function

● Each temperature of sensor will be displayed automatically for setting time of Auto time.
● Auto time can be adjustable from 0 to 10sec.
● When it operates as Automatic function, Auto LED will be ON .

▣ Selection of input sensor number by internal DIP switch

Max. 5 different sensors can be connected but do not use thermocouple and Pt100Ω together.

Sensor	2	3	4	5
DIP switch				

▣ Memory protection

When the power fails, the data value will be protected for 3 months.
(The battery must be charged fully.)

Board Type PID Controller

Board type Temperature controller

■Features

- ●High quality and economical product
- ●Convenient organization of panel to use
- ●Dual PID control
- ●Time reservation

> ⚠ Please read "Caution for your safety" in operation manual before using.

ᵤUₗUS

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

■Ordering information

| TB | 4 | 2 | – | 1 | 4 | R |
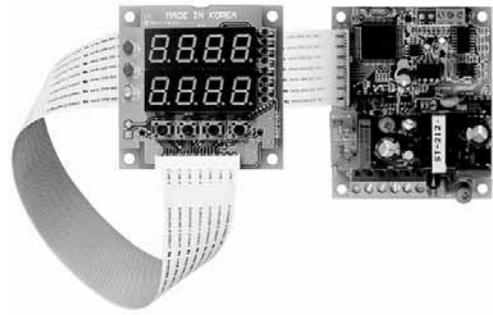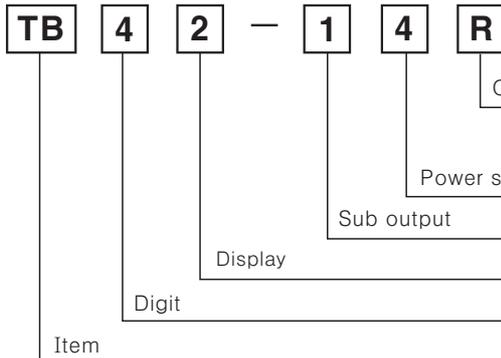
R	Relay output	
S	SSR output	
C	Current output(DC4–20mA)	
N	PV Transmission output(DC4–20mA)	
4	100–240VAC 50/60Hz	
1	EVENT1 output type	
2	2 Display	
4	4 Digit	
TB	Temperature Board	

- Output mode
- Power supply
- Sub output
- Display
- Digit
- Item

※PV transmission output type does not have EVENT1 output.

■Specifications

Model			TB42-14R	TB42-14S	TB42-14C	TB42-14N
Power supply			100–240VAC 50/60Hz ±10%			
Power consumption			Approx. max. 5VA			
Display method			7 Segment LED Display [Processing value(PV):Green, Setting value(SV):Red]			
Character size			W8×H10mm			
Input	Thermocouple		K(CA), J(IC) [Tolerance outer resistance is max. 100Ω]			
	RTD		Pt100Ω, JIS Pt100Ω [Allowable line resistance is max. 5Ω per a wire]			
Output	Relay		250VAC 3A 1a	——	——	——
	SSR		——	12VDC ±3V 30mA Max.	——	——
	Current		——	——	DC4–20mA Load 600Ω Max.	——
	Transmission		——	——	——	DC4–20mA, load Max. 600Ω for PV
Sub output			• Event1 output : Relay output(250VAC 0.5A 1a) • Event2 output : OK monitoring display by LED			
Control method			ON/OFF control, P, PI, PD, PIDF, PIDS			
Setting type			Front push buttons			
Display accuracy			F.S ±0.5% rdg ±1 Digit based on SV or 3℃ Max.			
Hysteresis			Adjustable 1 ~ 100℃(0.1 ~ 100.0℃) at ON / OFF control			
Proportional band(P)			0.0 ~ 100.0%			
Integral time(I)			0 ~ 3600sec			
Derivative time(D)			0 ~ 3600sec			
Control cycle(T)			1 ~ 120sec			
Sampling period			0.5sec fixed			
Dielectric strength			2000VAC 50/60Hz for 1 minute(Between input and power terminal)			
Vibration			0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours			
Relay life cycle	Main output		Mechanical : Min. 10,000,000, Electrical : Min. 100,000(250VAC 3A resistive load)			
	Sub output		Mechanical : Min. 20,000,000, Electrical : Min. 200,000(250VAC 0.5A resistive load)			
Insulation resistance			Min. 100MΩ (500VDC mega)			
Noise strength			±2kV the square wave noise(pulse width:1μs) by the noise simulator			
Memory protection			10 years(When using non–volatile semiconductor memory type)			
Ambient temperature			−10 ~ 50℃			
Storage temperature			−20 ~ 60℃			
Ambient humidity			35 ~ 85% RH			
Approval			ᵤUₗUS			
Unit weight			Approx. 113.5g			

Autonics

TB42 Series

▣Connections

※RTD(Resistance Temperature Detector)：DIN Pt 100Ω , JIS Pt 100Ω(3－wire type)   ※Thermocouple：K, J

RTD
A
T.C
B
−
B'
+
SENSOR

SENSOR

① ② ③

SENSOR

Power ⑨ ⑧   ⚠ SOURCE
100−240VAC 50/60Hz

Sub output ⑦ ⑥   EVENT1：250VAC 0.5A 1a

Main output ⑤ ④

Relay output   SSR output   Current output   Transmission output

- CONTACT OUT:
250VAC 3A 1a
RESISTIVE LOAD
- SSR OUT:
12VDC±3V
30mA Max.
- Current OUT:
DC4−20mA
Load 600Ω Max.
- PV transmission OUT:
DC4−20mA
Load 600Ω Max.
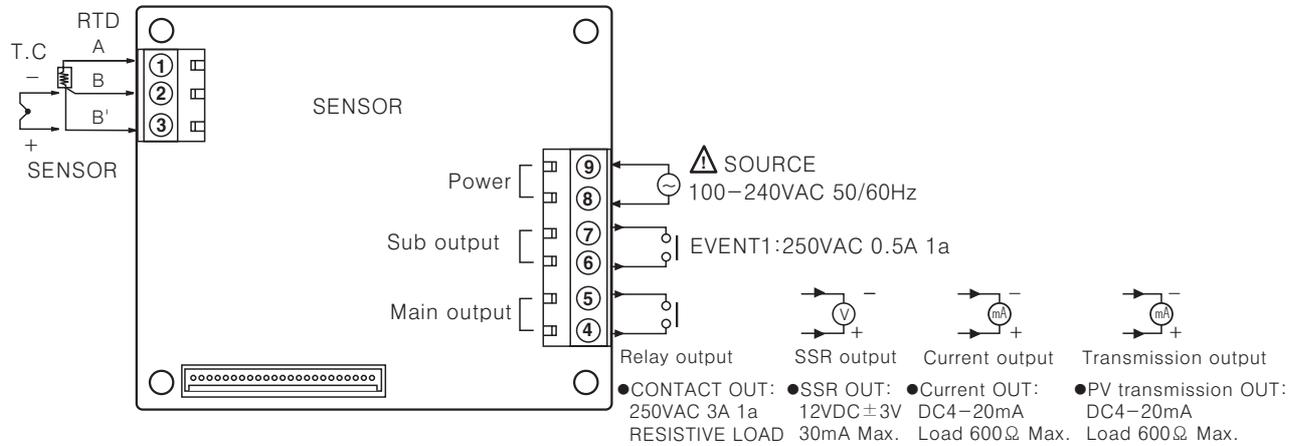
▣Dimensions

- Display part

60
10.47   39   10.53
15.4
8 8
8
60
14.52
14
14
29.29
S1 S2 S3 S4
MD « » ⨎
4−φ4.0
4
16.29 9.2 9.2 9.44
4

- Control part

78
4
4
65
1
2
3
9
8
7
6
5
4
4−φ4.0

- Layout

60
78
60
Display part
300
CABLE 20P
Control part
65
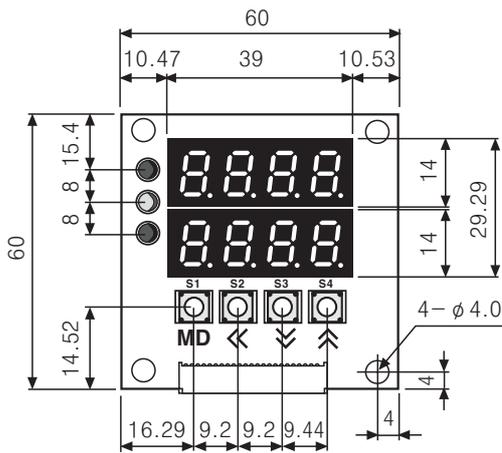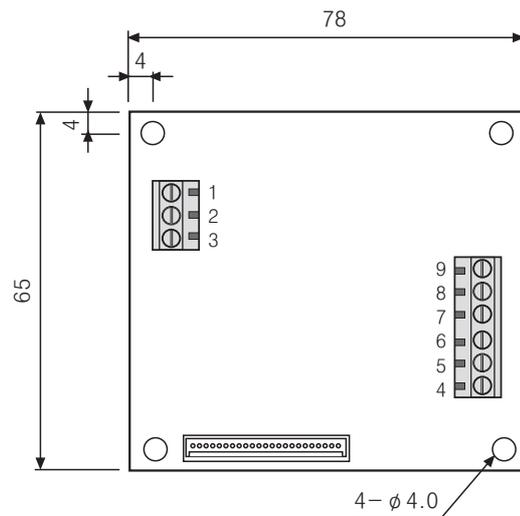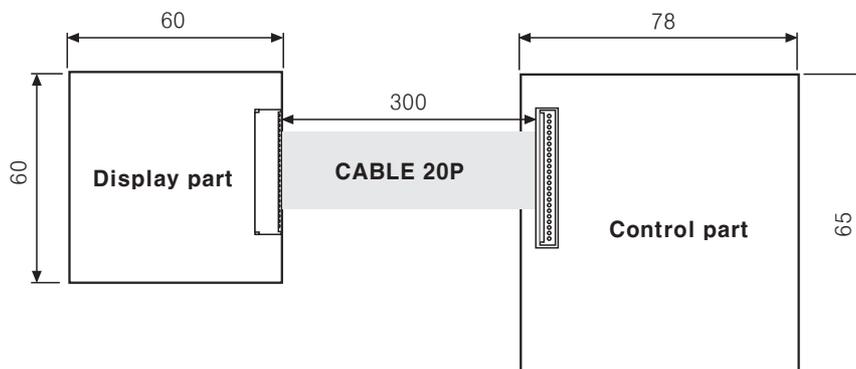
(Unit：mm)

※Cable length is 300mm.
※The size of board is based on user's application.（Customizable）

Touch Switch Type Temperature Controller

Touch Switch Type Temperature Controller

■Features

NEW

- Realizes ideal temp. controlling with newly developed PID control algorithm and 100ms high speed sampling
- **Relay output and SSRP output embodied together : SSRP output makes phase control and cycle control possible.**
- Dramatically increased visibility using wide display part
- Mounting space saving with compact design : Approx. 38% reduced size compared with existing model(depth-based)
- SV/PV deviation indicatable

⚠ **Please read "Caution for your safety" in operation manual before using.**

CE c**RU**us

■Ordering information

```
T   C   4   S   —   1   4   R
```

Control output	N	Indicator − Without control output
	R	Relay output+SSRP output
Power supply	4	100−240VAC 50/60Hz
Alarm output	N	No alarm output
	1	Alarm1 output
(※1)	2	Alarm1 output+Alarm2 output
	S	DIN W48×H48mm(Terminal block type)
(※2)	SP	DIN W48×H48mm(Plug type)
	Y	DIN W72×H36mm
Size	M	DIN W72×H72mm
	H	DIN W48×H96mm
	W	DIN W96×H48mm
	L	DIN W96×H96mm
Digit	4	4Digit
Setting type	C	Set by touch switch
Item	T	Temperature controller

(※1) It is unavailable for TC4SP, TC4Y.
(※2) TC4SP sockets (PG−11, PS−11) are sold separately.

■Specifications

Series		TC4S	TC4SP	TC4Y	TC4M	TC4H	TC4W	TC4L
Power supply		100−240VAC 50/60Hz						
Allowable voltage range		90~110% of rated voltage						
Power consumption		Max. 5VA						
Display method		7Segment(Red), Other display(Green, Yellow, Red LED)						
Character size		W7×H15mm		W7.4×H15mm	W9.5×H20mm	W7×H14.6mm	W9.5×H20mm	W11×H22mm
Input type	RTD	DIN Pt100Ω (Allowable line resistance max. 5Ω per a wire)						
	TC	K(CA), J(IC)						
Display method	TC, RTD	(★1) (PV ±0.5% or ±1℃ higher one) rdg ±1Digit (★2) ※TC4SP (Plug type) is (PV ±0.5% or ±2℃ higher one) rdg ±1Digit ☞Based on normal temperature(23℃ ±5℃)						
Control output	Relay	250VAC 3A 1a						
	SSRP	12VDC ±2V 20mA Max.						
Sub output		AL1, AL2 relay output : 250VAC 1A 1a(※TC4SP, TC4Y have AL1 only.)						
Control method		ON/OFF and P, PI, PD, PID control						

※(★1)(PV ±0.5% or ±2℃ higher one) rdg ±1Digit, except normal temperature range.
※(★2)TC4SP is (PV ±0.5% or ±3℃ higher one) rdg ±1Digit, except normal temperature range.

TC Series

▣ Specifications

Series	TC4S	TC4SP	TC4Y	TC4M	TC4H	TC4W	TC4L
Hysteresis	1 ~ 100℃(KCA,JIC,PT1) / 0.1 ~ 50.0℃(PT2)						
Proportional band	0.1 ~ 999.9℃						
Integral time(I)	9999sec.						
Derivative time(D)	9999sec.						
Control period	0.5 ~ 120.0sec.						
Manual reset	0.0 ~ 100.0%						
Sampling period	100ms						
Dielectric strength	2000VAC 50/60Hz for 1min.(Between input terminal and power terminal)						
Vibration	0.75mm amplitude at frequency of 5~55Hz in each X, Y, Z directions for 2 hours						
Relay life cycle — Mechanical	Mechanical : Min. 10,000,000 operations, Electrical : Min. 100,000 operations(250VAC 3A resistive load)						
Relay life cycle — Electrical	Mechanical : Min. 10,000,000 operations, Electrical : Min. 300,000 operations(250VAC 1A resistive load)						
Insulation resistance	Min. 100MΩ (at 500VDC mega)						
Noise	Square shaped noise by noise simulator(pulse width 1μs)±2kV R−phase and S−phase						
Memory retention	Approx. 10 years (When using non−volatile semiconductor memory type)						
Ambient temperature	−10 ~ 50℃(at non−freezing status)						
Storage temperature	−20 ~ 60℃(at non−freezing status)						
Ambient humidity	35 ~ 85%RH						
Unit weight	Approx. 97g	Approx. 84g	Approx. 127g	Approx. 127g	Approx. 118g	Approx. 118g	Approx. 172g
Approval	CE c ℛ us						

▣ Connections

※TC4 series has both Main Out and SSR Out. You may select the model as your needs.

●TC4S   ●TC4SP
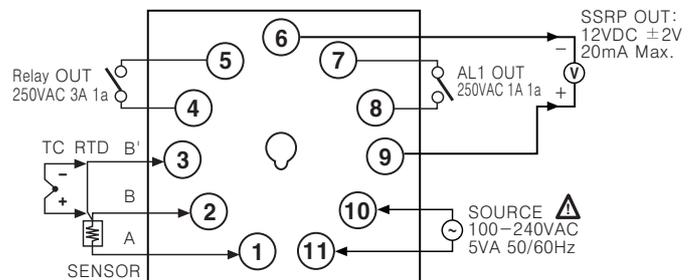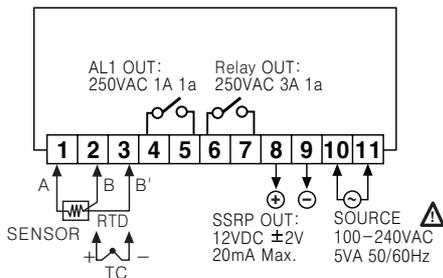
●TC4Y   ●TC4W

Touch Switch Type Temperature Controller

● TC4M

```
1    10
2    11
3    12
4    13   AL1 OUT:
5    14   250VAC
6    15   AL2 OUT:
7    16   250VAC
8    17
9    18
```

SSRP OUT: ⊕
12VDC ±2V
20mA Max. ⊖

AL1 OUT:
250VAC
1A 1a

AL2 OUT:
250VAC
1A 1a

Relay OUT
250VAC 3A 1a

SOURCE
100−240VAC
5VA 50/60Hz

B' RTD TC

B

A

SENSOR

● TC4H/L

```
1    13
2    14
3    15
4    16
5    17
6    18
7    19
8    20
9    21
10   22
11   23
12   24
```

SSRP OUT: ⊕
12VDC ±2V
20mA Max. ⊖

AL1 OUT:
250VAC
1A 1a

AL2 OUT:
250VAC
1A 1a

Relay OUT
250VAC 3A 1a

SOURCE
100−240VAC
5VA 50/60Hz

B' RTD TC

B

A

SENSOR

■ Dimensions

● TC4S

● Bracket
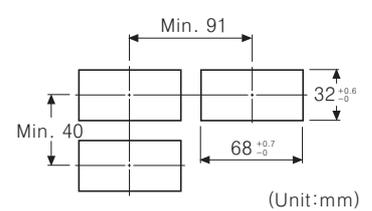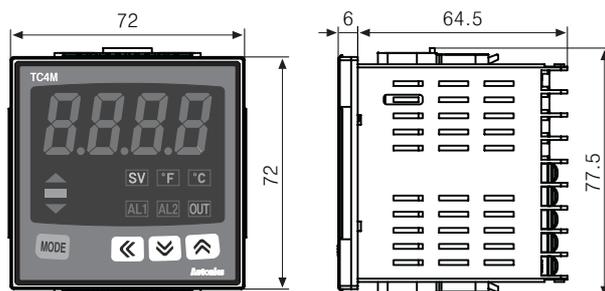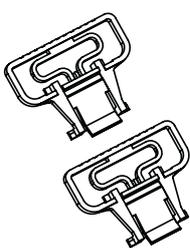
48

48

6

64.5

56

● Panel cut−out

Min. 65

Min. 65

$45^{+0.6}_{-0}$

$45^{+0.6}_{-0}$

(Unit:mm)

● TC4SP

● Bracket

48

48

6

72.2

58.5

56

● Panel cut−out

Min. 65

Min. 65

$45^{+0.6}_{-0}$

$45^{+0.6}_{-0}$

(Unit:mm)

● TC4Y

87

72

36

7

77

30

● Panel cut−out

Min. 91

Min. 40

$32^{+0.6}_{-0}$

$68^{+0.7}_{-0}$

(Unit:mm)

● TC4M

● Bracket

72

72

6

64.5

77.5

● Panel cut−out

Min. 90

Min. 90

$68^{+0.7}_{-0}$

$68^{+0.7}_{-0}$

(Unit:mm)

TC Series

●**TC4H**

●Bracket

48

96

6 64.5

101.5

●Panel cut−out

Min. 65

92 $^{+0.8}_{-0}$

Min. 115

45 $^{+0.6}_{-0}$

(Unit:mm)

●**TC4W**

●Bracket

96

48

6 64.5

●Panel cut−out

Min. 115

45 $^{+0.6}_{-0}$

Min. 65

92 $^{+0.8}_{-0}$

(Unit:mm)

●**TC4L**

●Bracket

96

96

6 64.5

101.5

●Panel cut−out

Min. 115

92 $^{+0.8}_{-0}$

Min. 115

92 $^{+0.8}_{-0}$

(Unit:mm)

▣Product mounting

●TC4S/SP(48×48mm) series
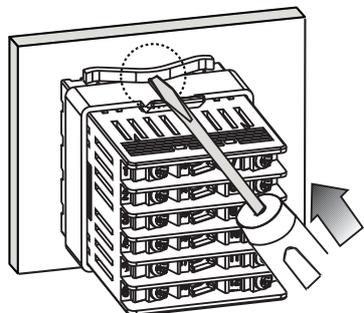
●TC4Y(72×36mm) series
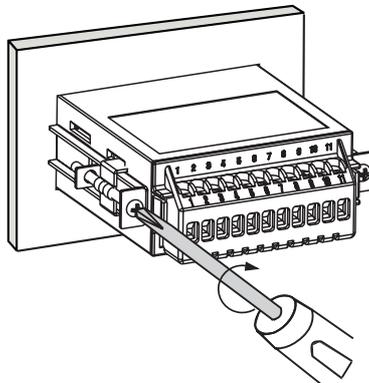
●Other series
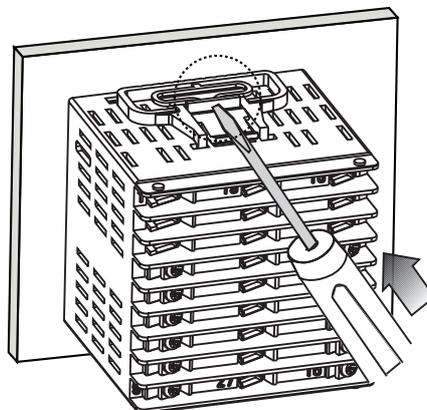
※Insert product into a panel, fasten bracket by pushing with tools as shown above.
(In case of TC4Y, fasten the bracket bolts.)

Autonics

Touch Switch Type Temperature Controller

■SSRP(Solid State Relay Phase Output) output function[55r.ñ]

● SSRP is a user selectable output type which phase control and cycle control are added to standard SSR drive output.
● Standard SSR output is still available by internal parameter setting [55r.ñ]; in addition, "cycle control" with connecting Zero cross turn-on type SSR or Random turn-on type SSR and "phase control" with connecting Random turn-on type SSR are also available.
● Realizing high accuracy and cost effective temperature control with both current output(4-20mA) and linear output(cycle control and phase control).

Temp. controller

TC4 series

SSRP voltage output 12VDC

SSR module

INPUT   LOAD

Load

SRH1 series

Power ~
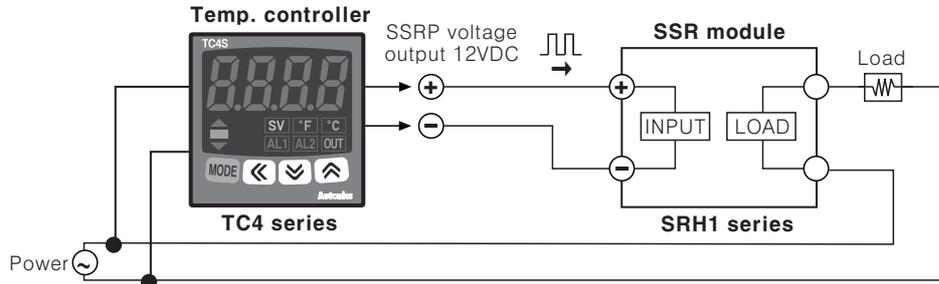
※You can select the functions with parameter settings.

ON/OFF output

ON   OFF   ON   OFF

Cycle output

When using Zero Cross Turn-on SSR or Random Turn-on SSR (2% cycle control)

50cycle
50%(2cycle OFF, 2cycle ON)

50cycle
80%(1cycle OFF, 4cycle ON)

Phase output

When using Random Turn-on SSR for AC half cycle phase control output

40%   70%
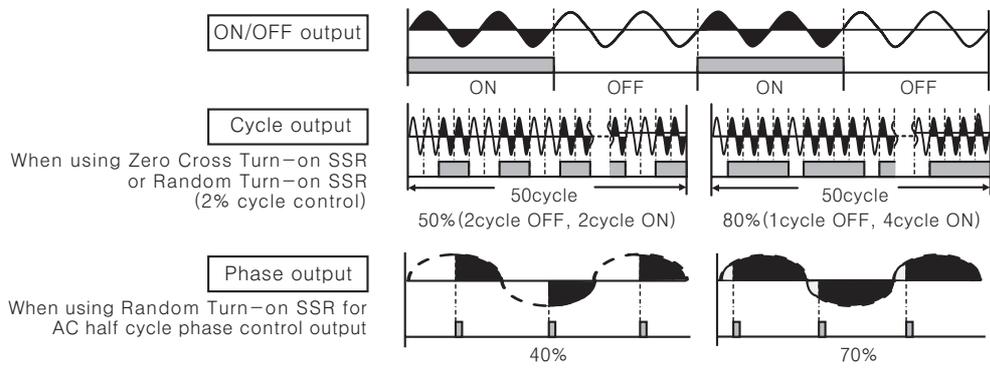
● Standard control mode [5tnd]
  A mode to control the load in the same way as RELAY output type.(ON: output level 100%, OFF: output level 0%)
● Cycle control mode [CYCL]
  A mode to control the load by repeating output ON / OFF according to the rate of output within setting cycle
  Having improved ON / OFF noise feature(ZERO CROSS type)
● Phase control mode [PHRS]
  A mode to control the load by controlling the phase within AC half cycle.
  Serial control is available
  RANDOM Turn-on type SSR must be used for this mode.
※When selecting phase or cycle control mode, the power supply for load and temperature controller must be the same.
※In case of selecting PID control type and phase / cycle control output modes, control cycle (t) is not allowed to set.

■Parts description
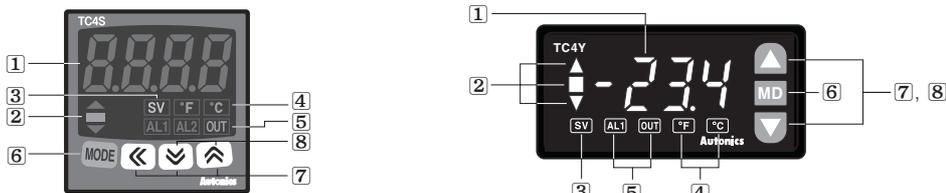
TC4S

TC4Y

1 Temperature display
  It shows current temperature(PV) in RUN mode and parameter and set value for each setting group in parameter change mode.
2 Deviation and Auto-tuning indicator
  It shows current temperature(PV) based on set temperature(SV) by LED.
  Deviation indicators(▲, ■, ▼) are flashed by every 1sec when operating auto-tuning.
3 Set temperature(SV) indicator
  Press any front key once to check or change current set temperature(SV), set temperature(SV) indicator is on and preset set value is flashed.
4 Temperature unit(℃/℉) indicator : It shows current temperature unit.
5 Control/alarm output indicator
  −OUT : It will light up when control output(Main Control Output) is on.
    ※It will light up over 3.0% of operation in CYCLE/PHASE control.
  −AL1/AL2 : It will light up when alarm output AL1/AL2 are on.
6 MODE Key : Used when entering into parameter setting group, returning to RUN mode, moving parameter and saving setting values.
7 Adjustment : Used when entering into set value change mode, Digit moving and Digit Up/down.
8 FUNCTION key : Press [∨]+[∧] keys for 3 sec to operate function(RUN/STOP, alarm output cancel) set in inner parameter[dI -t].
  ※Press [∨]+[∧] keys once in set value operation to move digit.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

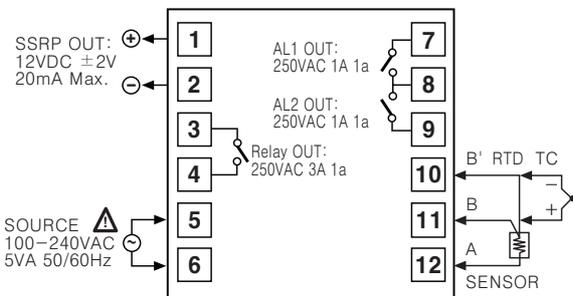(Q) Production stoppage models & replacement

TC Series

▣Flow chart for setting group

RUN mode ⑤

① Press any key among MODE, «, ∨, ∧. ② Press MODE for 2sec. ③ Press MODE for 4sec.

SV setting group → First setting group(**PAr 1**) Second setting group(**PAr2**)

MODE Press MODE for 3sec. Press MODE for 3sec.
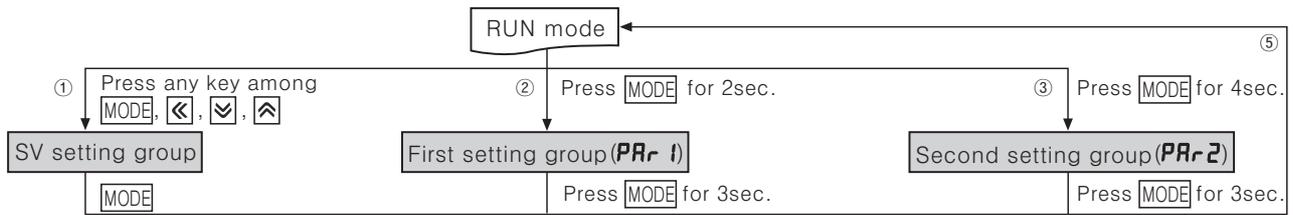
④
AL 1	Alarm1 setting value
AL2	Alarm1 setting value
At	Auto−tuning execute
P	Proportional band
I	Integral time
d	Derivation time
rESt	Manual reset
HYS	Hysteresis

In-t	Input type
Unit	Temperature unit
In-b	Input bias
nAuF	Input digital filter
L-Su	SV low limit
H-Su	SV high limit
o-Ft	Control operating type
C-nd	Control method
oUt	Control output type
SSr.n	SSRP output method
t	Control time
AL-1	Alarm1 mode
AL-2	Alarm2 mode
AHYS	Alarm hysteresis
LbAt	LBA monitoring time
LbAS	LBA detection setting value
LbAb	LBA detection band
dI-Y	Function key operation
Er.nu	Input error MV
LoC	Lock

※Parameter marked in ⌐¬ might not be displayed depending on other parameter settings.

①Press any key once in RUN mode, it advances to set value setting group.
②Press MODE key over 2sec in RUN mode, it advances to setting group 1.
③Press MODE key over 4sec in RUN mode, it advances to setting group 2.
④First parameter will be displayed on viewer when it advances to the setting group.
⑤Press MODE key over 3sec in the setting group, it returns to RUN mode.
　[※Exception : Press MODE key once in setting group of set value, it returns to
　 RUN mode.]

※If no key touched for 30sec, it will return to RUN mode automatically and the set
　value of parameter will not be changed.
※Press MODE key again within a sec after return to RUN mode by press MODE key
　over 3sec, it advances to the first parameter of previous setting group.
※Parameter setup
　Setting group2 → Setting group1 → Setting group of set value
　• Set parameter as the above considering parameter relation of each setting group.
　• Check parameter set value after change parameter of setting group2.
　• Parameter marked in ⌐¬ would not be displayed by another parameter setting.
※Indicator type displays colored parameter of setting group2.
※**AL2** and **AL-2** parameter display is available with only "Alarm output 1 + Alarm output 2" model.
※**AHYS** parameter will not be displayed when **AL-1** or **AL-2** is set to LBA or HBA.

▣Flow chart for SV setting group(※To change preset temperature 210℃ into 250℃.)

200 ① RUN mode(display a current temperature)

Press any key among MODE, «, ∨, ∧.

③ Finish the setup.

0210 ② Set value change mode
Change set value
by «, ∨, ∧ keys. **0250** MODE **250**

④ To check a SV MODE

Touch Switch Type Temperature Controller

■Flow chart for first setting group
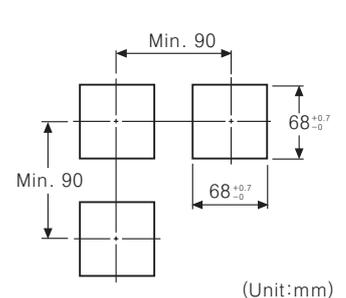
(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
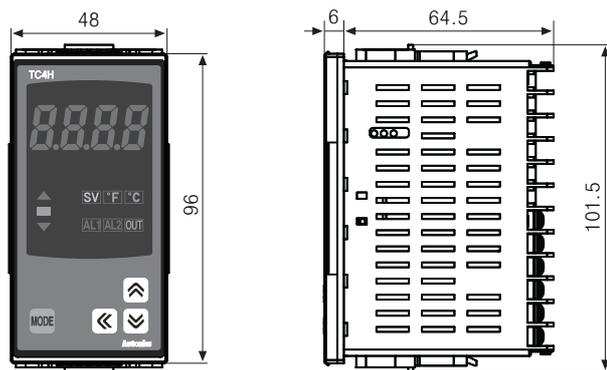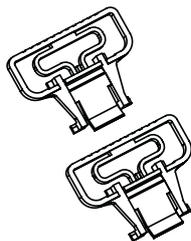Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
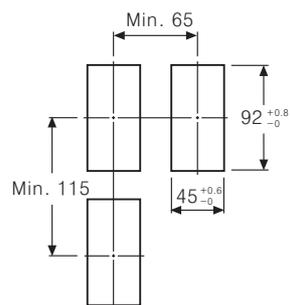device

(Q)
Production
stoppage
models &
replacement

Press MODE for 3sec. → **Run mode**

PAr 1 Press MODE for 2sec.

MODE

※ S : Press any key among ≪, ∨, ∧.
※After checking or changing setting value in each parameter, press MODE key to save and move to next parameter setting.

Alarm1 setting value
AL 1 — S → **1250**
MODE / MODE

Setting range : Deviation alarm(−[F.S]~[F.S], Absolute value alarm(Input range)
※In case alarm operation mode (AL-1) is set to [And_/SbA. :/LbA_], no parameters will be displayed.

Alarm2 setting value
AL2 — S → **1250**
MODE

Setting range : Deviation alarm(−[F.S]~[F.S], Absolute value alarm(Input range)
※In case alarm operation mode (AL-2) is set to [And_/SbA. :/LbA_], no parameters will be displayed.

Auto−tuning execute
At — S → **oFF** ⇄ **on**
MODE

※It starts to operate auto−tuning when it is ON and set as OFF automatically after finish the operation.
※**Front deviation indicator(▲, ■, ▼)** will be flickering(cycle:1 sec) during auto tuning function.

Proportional band
P — S → **0 10.0**
MODE

Setting range : **0.1 ~ 999.9℃**

Integral time
I — S → **0000**
MODE

Setting range : **0 ~ 9999sec.**
※Integral operation will be OFF when set value is "0".

Derivation time
d — S → **0000**
MODE

Setting range : **0 ~ 9999sec.**
※Derivative operation will be OFF when set value is "0".
※It will be displayed only if control method parameter(C-nd) is set as [PI d].

Manual reset
rESt — S → **050.0**
MODE

Setting range : **0.0 ~ 100.0%**
※It will be displayed in P/PD control and not in ON/OFF and PI/PID control.

Hysteresis
HYS — S → **002**
MODE

Setting range : **1 ~ 100℃ [0.1~50.0℃]**
※It will be displayed in ON/OFF control.

■Flow chart for second setting group

Press MODE for 3sec. → **Run mode**

PAr2 Press MODE for 4sec.

MODE

※ S : Press any key among ≪, ∨, ∧.
※After checking or changing setting value in each parameter, press MODE key to save and move to next parameter setting.

Input type
In-t — S → **YCA** ⇄ **JIC** ⇄ **Pt 1** ⇄ **Pt2**
MODE / MODE

Temperature unit
Unit — S → **℃** ⇄ **℉**
MODE

※Front temperature unit indicator will be flickering when selecting the unit.

Input bias
In-b — S → **000**
MODE

Setting range:**−999 ~ 999℃[※Pt2 : −199.9 ~ 999.9℃]**

Input digital filter
nAuF — S → **0.1**
MODE

Setting range:**0.1 ~ 120.0sec.**

TC Series

※ [S] : Press any key among [«], [∨], [∧].
※ After checking or changing setting value in each parameter, press [MODE] key to save and move to next parameter setting.

SV low limit

[L-Su] [S] → [-050]

Setting range : Within using range of each sensor(KCA sensor)
※ It enables to set ranged [L-Su ≤ H-Su] −1

SV high limit

[H-Su] [S] → [1200]

Setting range : Within using range of each sensor(KCA sensor)
※ It enables to set ranged [H-Su ≥ L-Su] +1

Control operating type

[o-Ft] [S] → [HEAt] ⇄ [Cool]

Control method

[C-md] [S] → [PId] ⇄ [onoF]

Control output type

[oUt] [S] → [rLY] ⇄ [SSr]

※ Preset output will be operated as control output.

SSRP output method

[SSrm] [S] → [Stnd] ⇄ [CYCL] ⇄ [PHAS]

※ It will be displayed when selecting [oUt] as [SSr].

Control time

[t] [S] → [020.0]

Setting range : **0.5 ~ 120.0sec.**
※ In case of [rLY] output mode default value is 20.0 sec.(2.0sec in case of [SSr] mode)
※ It will not be displayed when [SSrm] is set as [CYCL/PHAS].

Alarm1 mode

[AL-1] [S] → [Am1.A] ⇄ [LbA_] ← [Am1.A] ⇄ [Am1.d]

※ Select alarm operation mode   ※ Select alarm option

※ Press [«] key to convert alarm operation mode into alarm option.

Alarm2 mode

[AL-2] [S] → [Am2.A]

※ Same with the above [AL-1].

Alarm hysteresis

[AHYS] [S] → [001]

Setting range : **1 ~ 999℃ [0.1 ~ 50.0℃]**
※ AHYS parameter will not be displayed when set value is set as [Amo_/SbA.:/LbA_].

LBA monitoring time

[LbAt] [S] → [0]

Setting range : **0 ~ 9999sec.**
※ [LbAt] parameter will be displayed when alarm operation mode(AL-1, AL-2) is set as [LbA_].

LBA detection setting value

[LbAS] [S] → [008]

Setting range : **1 ~ 999℃**
※ When setting [AL-1, AL-2] to [LbA_] and [LbAt] setting value is 0, [LbAS] parameter is not displayed.

LBA detection band

[LbAb] [S] → [003]

Setting range : **1 ~ 999℃**
※ [LbAb] parameter will be displayed when alarm operation mode(AL-1, AL-2) is set as [LbA_] and [LbAt] is not 0.

Function key operation

[dI-Y] [S] → [StoP] ⇄ [AL.rE]

※ [AL.rE] will not be displayed in case of no alarm output models.

Input error MV

[Er.mu] [S] → [000.0]

Setting range : **0.0 ~ 100.0%**
※ 0.0/100.0% will be displayed in ON/OFF control.

Lock

[LoC] [S] → [oFF] ⇄ [LoC1] ⇄ [LoC2] ⇄ [LoC3]

Autonics

Touch Switch Type Temperature Controller

▣Factory default

●First setting group

Mode	Setting value	Mode	Setting value	Mode	Setting value	Mode	Setting value
AL1	1250	At	oFF	I	0	rESt	50.0
AL2	1250	P	10.0	d	0	HYS	2

●Second setting group

Mode	Setting value	Mode	Setting value	Mode	Setting value	Mode	Setting value	Mode	Setting value
In-t	KCA	L-Su	-50	oUt	rLY	AL-2	Añ2A	LbAb	3
Unit	°C	H-Su	1200	SSrñ	Stnd	AHYS	I	dI-t	StoP
In-b	0	o-Ft	HEAt	t	20.0	LbAt	0	Er.ñu	0.0
ñAuF	0.1	C-ñd	PId	AL-I	Añ1A	LbAS	8	LoC	oFF

▣Input sensor and range[In-t]

●Select proper input sensor type by user application.

Input sensor		Display	Input range ℃	Input range °F
ThermoCouple	K(CA)	KCA	−50 ~ 1200℃	−58 ~ 2192°F
	J(IC)	JIC	−30 ~ 500℃	−22 ~ 932°F
RTD	DIN rated Pt 1	Pt1	−100 ~ 400℃	−148 ~ 752°F
	Pt 2	Pt2	−100.0 ~ 400.0℃	−148.0 ~ 752.0°F

▣Function

See C−25 page for TC / TD common features.

◎SV / PV deviation display function

A function to display SV / PV deviation on front lamp
●When PV is higher than SV over +2℃(+2.0℃), ▲(RED) lamp is ON. (PV > SV + 2.0℃)
●When PV / SV deviation is ±2℃(±2.0℃), ■(GREEN) lamp is ON.(SV + 2.0℃ ≥ PV ≥ SV − 2.0℃)
●When PV is lower than SV over −2℃(−2.0℃), ▼ (RED) lamp is ON.(PV < SV − 2.0℃)

◎Control output type selection[oUt]

●A function to select control output type; Relay output(rLY), SSRP voltage output(SSr).
※In case of selecting SSRP voltage output, SSRP output method(SSrñ) selection parameter is displayed.

◎Lock setting[LoC]

●It locks set value and parameter change of the group.
●It enables to check parameter set value of locked setting group.

Display	Description
oFF	Lock off
LoC1	Lock setting group 2
LoC2	Lock setting group 1, 2
LoC3	Lock setting group 1, 2, SV setting group

※oFF, LoC1 are available only for indicator(TC4□−N□N).

◎Error

●Error mark will flash(every 1sec) in PV viewer when error is occurred during the control operation.

Display	Description
oPEn	If input sensor is disconnected or sensor is not connected.
HHHH	If measured sensor input is higher than temperature range.
LLLL	If measured sensor input is lower than temperature range.

●It will operate normally, if input sensor is connected or returned to normal range under error oPEn / HHHH / LLLL status.

◎Output connections

●Application of relay output type
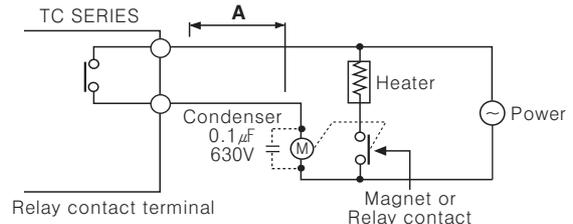
Keep power relay as far away as possible from temperature controller. If wires length of **A** is short, electromotive force occurred from a coil of magnet switch & power relay may flow in power line of the unit, it may cause malfunction. If wires length of **A** is short, please connect a mylar condenser 104(630V) across coil of the power relay "Ⓜ" to protect electromotive force.

●Application of SSRP output method
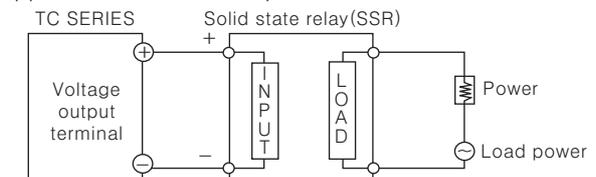
※SSR should be selected by the capacity of load, otherwise, it may short−circuit and result in a fire. Indirect heated should be used with SSR for efficient working.
※Please use a cooling plate or it may cause the capability deterioration, breakdown of SSR for a long usage.
※Refer to C−12 page for phase / cycle control connections.

(A) Counter
(B) Timer
(C) Temp. controller
(D) Power controller
(E) Panel meter
(F) Tacho/ Speed/ Pulse meter
(G) Display unit
(H) Sensor controller
(I) Switching power supply
(J) Proximity sensor
(K) Photo electric sensor
(L) Pressure sensor
(M) Rotary encoder
(N) Stepping motor & Driver & Controller
(O) Graphic panel
(P) Field network device
(Q) Production stoppage models & replacement

TC3YF

DIN W72×H36mm Freezing/Defrost Temperature controller

■Features

- ●ON/OFF Control
- ●Input specification ☞ Basic specification:NTC(Thermistor), Option:RTD(DIN Pt100Ω)
- ●Includes delay functions. Auto/Manual Defrost selection function, Start-up delay of compressor, Re-operation delay, Minimum ON time, Delay of defrost-end, Operation delay of evaporation-fan
- ●Input correction function
- ●Enable to set operation period for protecting compressor in error.

⚠ Please read "Caution for your safety" in operation manual before using.

C ⓊⓁ US
(Except for 12-24VDC)

■Ordering information

| TC | 3 | Y | F | — | 1 | 4 | R |

Control output	R	Relay output
Power supply	1	12-24VDC
	4	100-240VAC 50/60Hz
Output	1	Compressor output
	2	Compressor+Defrost output
	3	Compressor+Defrost+Evaporation output
Control method	F	Freezing control
Size	Y	DIN W72×H36mm
Digit	3	3Digit
Item	TC	Temperature Controller

■Specifications

Model	(★1)TC3YF-14R	(★1)TC3YF-14R	TC3YF-24R	TC3YF-24R	TC3YF-34R	TC3YF-34R
Power supply	12-24VDC	100-240VAC 50/60Hz	12-24VDC	100-240VAC 50/60Hz	12-24VDC	100-240VAC 50/60Hz
Allowable voltage range	90 to 110% of rated voltage					
Power consumption	8W	4VA	8W	4VA	8W	4VA
Display method	7 Segment LED Display (Red)					
Indication range	NTC : −40.0 ~ 99.9℃ (40 ~ 212°F), RTD : −99.9 ~ 99.9℃ (−148 ~ 212°F)					
Display accuracy	[PV ±0.5% or ±1℃ Max.] rdg ±1digit					
Sampling period	0.5sec					
Input sensor	(★2)	NTC : Thermistor, RTD : DIN PT 100Ω				
Input line resistance	Tolerance line resistance is max. 5Ω					
Control method	ON/OFF control (Adjustment sensitivity 0.5~5.0℃, 2~50°F variable)					
Control output	Compressor (250VAC 5A 1a)		Compressor (250VAC 5A 1a) Defrost output (250VAC 10A 1a)		Compressor (250VAC 5A 1a) Defrost output (250VAC 10A 1a) Evaporation-fan output (250VAC 5A 1a)	
Memory protection	Approx. 10 years (When using non-volatile semiconductor memory)					
Insulation resistance	Min. 100MΩ (at 500VDC mega)					
Dielectric strength	2000VAC 60Hz for 1 minute (between all external terminal and case)					
Noise strength	±2kV R-phase and S-phase (pulse width 1μs)					
Relay life cycle	COMP	Mechanical : Min. 20,000,000 times, Electrical : Min. 50,000 times (250VAC 5A resistive load)				
	DEF	Mechanical : Min. 20,000,000 times, Electrical : Min. 100,000 times (250VAC 10A resistive load)				
	FAN	Mechanical : Min. 20,000,000 times, Electrical : Min. 50,000 times (250VAC 5A resistive load)				
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours				
	Electrical	0.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10 minutes				
Ambient temperature	−10 ~ 50℃ (at non-freezing status)					
Storage temperature	−20 ~ 60℃ (at non-freezing status)					
Ambient humidity	35 ~ 85%RH					
Unit weight	Approx. 143g					

※(★1) There is no defrost function   (★2) RTD(PT 100Ω) type is optional.

Freezing/Defrost Temperature Controller

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

■Connections

FAN OUT: 250VAC 5A RESISTIVE LOAD
DEF OUT: 250VAC 10A RESISTIVE LOAD
COMP OUT: 250VAC 5A RESISTIVE LOAD

NO   NO   NO

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

A B B' RTD

NTC SENSOR

SOURCE ⚠ 100−240VAC 4VA 50/60Hz 12−24VDC 8W

■Dimensions

87
72
TC3YF   Autonics
COMP DEF FAN °F °C
36

84
7 65 12
30

●Panel cut−out
Min. 91
Min. 40
32 $^{+0.5}_{-0}$
68 $^{+0.7}_{-0}$
(Unit:mm)

■Front panel identification

TC3YF   Autonics
COMP DEF FAN °F °C

1 DEF(Defrost output lamp) : Light is ON when defrost output is ON
2 FAN(Evaporation−fan output lamp) : Light is ON when evaporation output is ON.
3 COMP(Compressor output lamp) : Light is ON when compressor output is ON.
4 MD(Mode key) : For entering, changing, shifting and saving parameters
5 ▼ ▲(Setting key:Up/Down) : For changing parameters
6 − : Displaying minus symbol
7 Display process value) : Display a current value (PV) on RUN mode. Display a parameter and a setting value when setting parameter.
8 ●(Display a decimal point) : Display a decimal point when the time unit is 'Min'
9 ●(Display a decimal point) : Display a decimal point when the temperature unit is '℃'
10 ▲, ■, ▼(Display a deviation) : "▲" indication turns on when PV is higher than SV, "▼" indication turns on when PV is lower than SV
11 ℃, °F (Temperature unit) : Selectable ℃ or °F
※When delay time is applied, the output lamp of defrost output, evaporation−fan and compressor is ON simultaneously after the lamp flashes every one second.

■How to set and change setting value(Su)

RUN mode
MD
Su
▲, ▼
0.0 ⟷ -10.0
Set and change the setting value
MD   MD

Display a current temperature. Display "Su" when pressing MD key.

●A setting value flashes every 0.5 sec, and it is available to change the value with ▲ or ▼ key.
●When pressing MD key, a setting value is saved and it returns to operation mode.
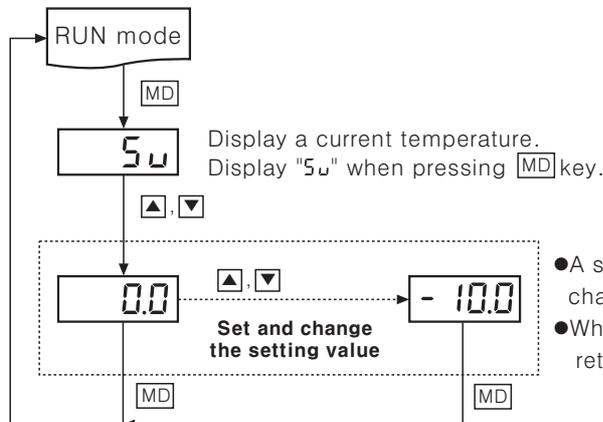
◎Input specification and range

Input specification	Setting temperature/Using range	
	℃	°F
RTD(DPT 100Ω)	−99.9 ~ 99.9	−148 ~ 212
Thermistor	−40.0 ~ 99.9	−40 ~ 212

※The setting range of temperature is fixed as using range.

※If any key is untouched for 60sec, it returns to operation mode.
※When pressing MD key for displaying setting value, it returns to operation mode.
※When ▼ key at "0.0", minus values are enable to set.
※Press ▲ or ▼ key to set(change) the value continuously, number is increased(decreased) at high speed.

TC3YF

▣ Flow chart for setting group 1

```
  ┌──> RUN mode
  │
  │    Press MD key for 3sec.
  │         ▲, ▼
  │     HYS ────────> 1.0      Set a hysteresis of compressor output within 0.5℃~5.0℃ or 2~50°F.
  │  MD              MD
  │         ▲, ▼
  │     d In ───────> 4        Set a defrosting period within 0~24 hours.
  │  MD              MD        ※If defrosting interval is set to 0, it is operated as a manual.
  │         ▲, ▼
  │     dEt ───────> 30        Set a defrosting period within 0~59 minutes.
  │  MD              MD        ※If defrosting interval is set to 0, it does not operated.
  │         ▲, ▼
  │     L bA ──────> 0         Set monitoring time for loop break alarm within 0~999sec.
  │  MD              MD        ※If monitoring time is set to 0, LBA does not operated.
  │         ▲, ▼
  │     I nb ──────> 0.0       Correct an error generated in input sensor.
  │  MD              MD        The setting range is −10.0~10.0℃.
```
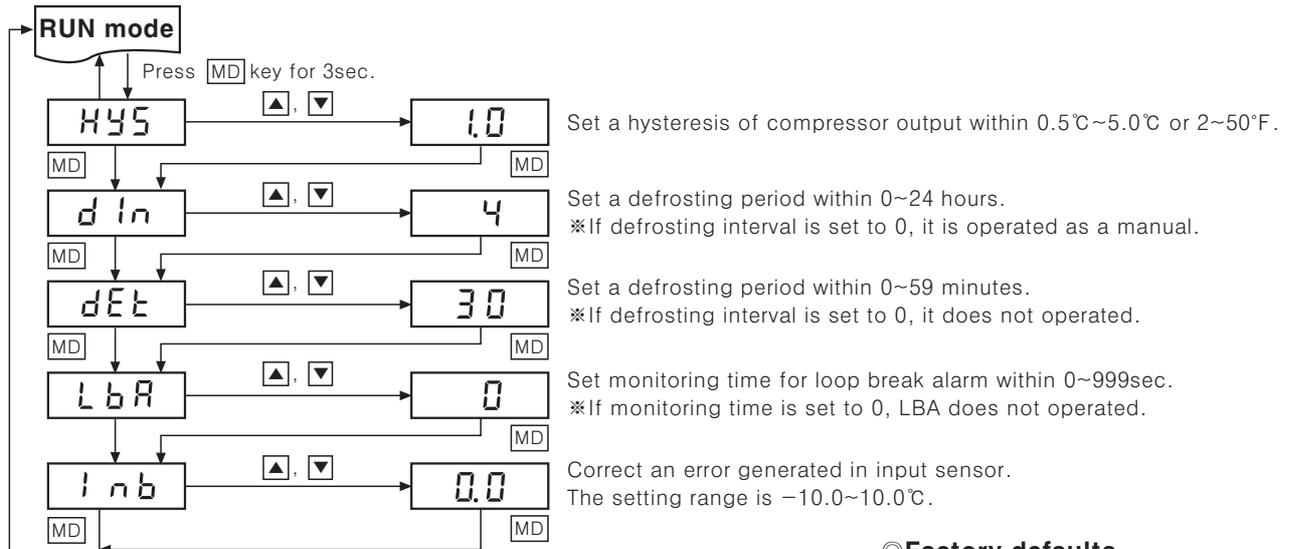
※In RUN mode, if MD key is pressed for 3 sec, it enters into setting group 1 and displays HYS.
※HYS parameter is displayed when entering into setting group 1.
※Press MD key during setting operation to save the changed setting value and display next parameter.
※Press MD key for 3 min during setting operation, it returns to RUN mode.

◎**Factory defaults**

Mode	Setting value	Mode	Setting value
HYS	1.0	L bA	0
d In	4	I nb	0.0
dEt	30		

▣ Flow chart for setting group 2
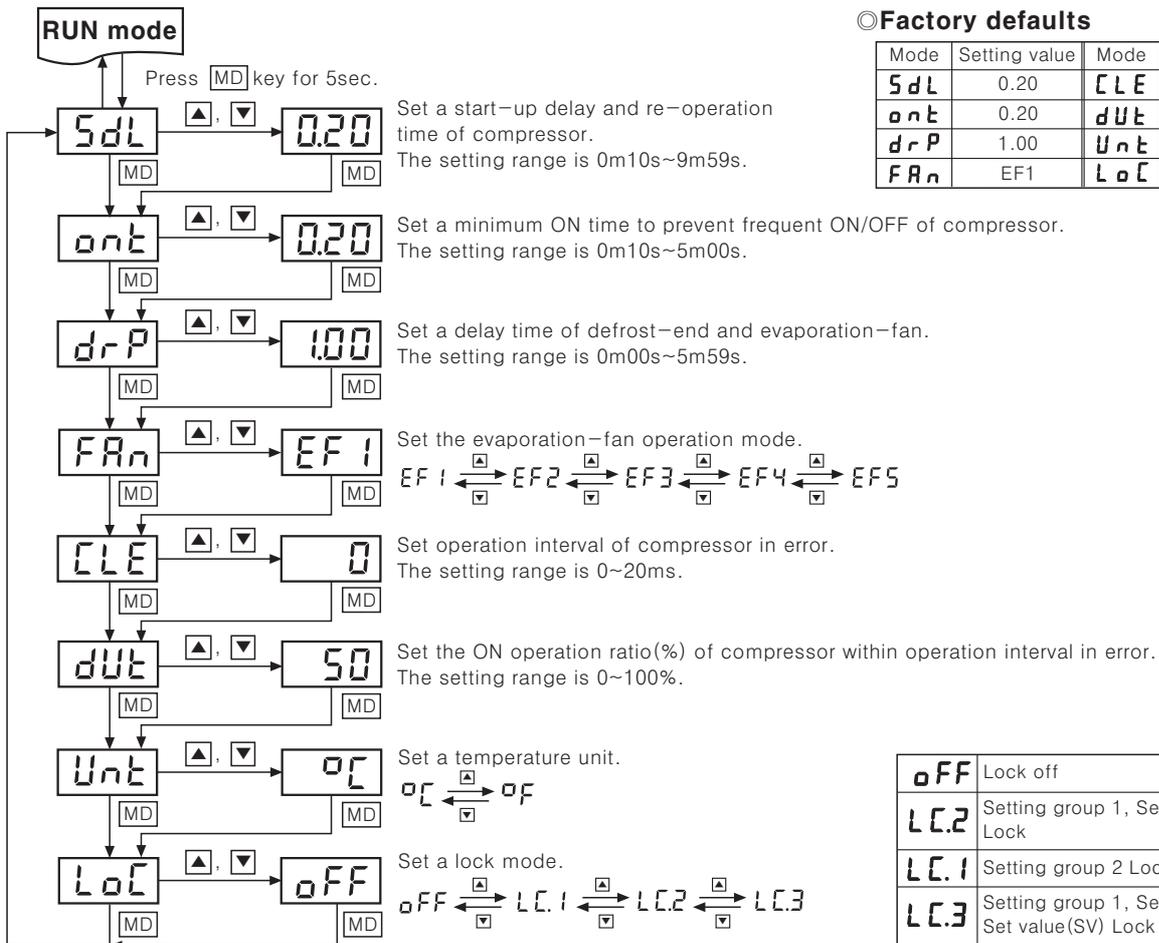
◎**Factory defaults**

Mode	Setting value	Mode	Setting value
SdL	0.20	CLE	0
ont	0.20	dUt	50
drP	1.00	Unt	℃
FAn	EF1	LoC	oFF

```
  ┌──> RUN mode
  │
  │    Press MD key for 5sec.
  │         ▲, ▼
  │     SdL ───────> 0.20      Set a start−up delay and re−operation time of compressor.
  │  MD              MD        The setting range is 0m10s~9m59s.
  │         ▲, ▼
  │     ont ───────> 0.20      Set a minimum ON time to prevent frequent ON/OFF of compressor.
  │  MD              MD        The setting range is 0m10s~5m00s.
  │         ▲, ▼
  │     drP ───────> 1.00      Set a delay time of defrost−end and evaporation−fan.
  │  MD              MD        The setting range is 0m00s~5m59s.
  │         ▲, ▼
  │     FAn ───────> EF 1      Set the evaporation−fan operation mode.
  │  MD              MD
  │                            EF 1 ⇄ EF2 ⇄ EF3 ⇄ EF4 ⇄ EF5
  │         ▲, ▼
  │     CLE ───────> 0         Set operation interval of compressor in error.
  │  MD              MD        The setting range is 0~20ms.
  │         ▲, ▼
  │     dUt ───────> 50        Set the ON operation ratio(%) of compressor within operation interval in error.
  │  MD              MD        The setting range is 0~100%.
  │         ▲, ▼
  │     Unt ───────> ℃         Set a temperature unit.
  │  MD              MD        ℃ ⇄ °F
  │         ▲, ▼
  │     LoC ───────> oFF       Set a lock mode.
  │  MD              MD        oFF ⇄ LC.1 ⇄ LC.2 ⇄ LC.3
```

oFF	Lock off
LC.2	Setting group 1, Setting group 2 Lock
LC.1	Setting group 2 Lock
LC.3	Setting group 1, Setting group 2, Set value(SV) Lock

※In RUN mode, if MD key is pressed for 5 sec, it enters into setting group 2 and displays SdL.
※SdL parameter is displayed when entering into setting group 2.
※Press MD key during setting operation to save the changed setting value and display next parameter.
※Press MD key for 3 sec during setting operation, it returns to RUN mode.

Autonics

Freezing/Defrost Temperature Controller

▣Function and operation

◎Hysteresis [HYS]
- It executes ON/OFF control and controls compressor output.
- The compressor can be damaged by frequent ON/OFF cycle at setting value. Therefore it can establish Hysteresis between activation temperature and deactivation temperature to prevent the compressor.

 EX) If TC3YF is established as setting temperature(SU) as −20℃, hysteresis(HYS) as 1.0, the compressor output is ON when it is reached −19℃ and it is OFF when it is reached −21℃.

  ※In ON/OFF control, the temperature is lower than SV, the output is OFF and it is ON when it is higher and it is also designated as dual position control.

  ※The setting range of hysteresis is 0.5~10.0℃(2~50°F).

◎Input correction [Inb]
It corrects an error generated by temperature sensor inputted from external.

Ex) When room temperature is −18℃, the display temperature of temperature controller is −20℃, set the input correction(Inb) value as 2.0, it is corrected as −18℃.

※The setting range of input correction is −10.0℃~10.0℃. (−18~18°F)

◎Defrost
When compressor is operated for a long time, the efficiency is lowered by the frost evaporator and freezer built in. A defrost designates to remove frost and ice around the evaporator.
- Heating defrost(Auto defrost)

  Mount a heater next to an evaporator and operate it with defrost interval[d In] and time[dEt] of temperature controller, removing frost and ice.
- Manual defrost

  When pressing ▲ key is pressed for 3 sec, the defrosting is activated for defrost time[dEt] during the compressor operation.

  The prior defrost interval value is not deleted.

  ※When pressing ▲ key for 3 sec, it returns to auto defrost. (The defrost interval starts again from defrost output is OFF.)

  ※When defrost interval is set to "0.0", it is only operated as manual defrost.

  ※When it used as manual defrost, compressor output and evaporation-fan output are OFF when the defrost output is ON.

  ※The setting range of defrost interval[d In] is 0~24 hours and defrost time[dEt] is 0~59 min.

◎Cooling(Compressor) operation
Temperature control : Keep the setting temperature by repeating ON/OFF operation in the range of hysteresis.
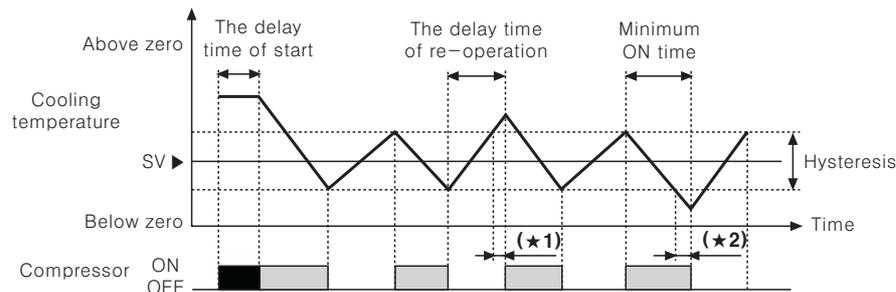
※ ■ : The output is not operated, only the front COMP lamp is flashing.

◎The delay time of start-up and re-operation [SdL]
1) Delay of start-up : When applying the power again on a compressor after power is failed, the compressor will be overloaded. In this case, delay of start-up prevents curtailing of the life cycle of a compressor. The setting range is 0m10s~9m59s.

※The output lamp is ON simultaneously after the lamp flashes every one second during delay time.

2) Delay of re-operation : It does not operate within delay time of re-operation after compressor turned OFF to prevent frequent ON/OFF. The setting range is 0m10s~9m59s.

※(★1)For delay time of start-up, compressor output is OFF even when PV is lower than SV.
It is turned ON after delay time of re-operation is over.

- Minimum ON time [ont]

  Set a minimum ON time to prevent frequent ON/OFF. The setting range is 0m10s~5m00s.

  ※(★2)Compressor output is ON even when PV is lower than hysteresis. It is turned to OFF after the minimum ON time is over.

◎Defrost operation(Heating defrost)

—— Power ON　　※ ■ : The display lamp is only flashing. (The output is not operated.)
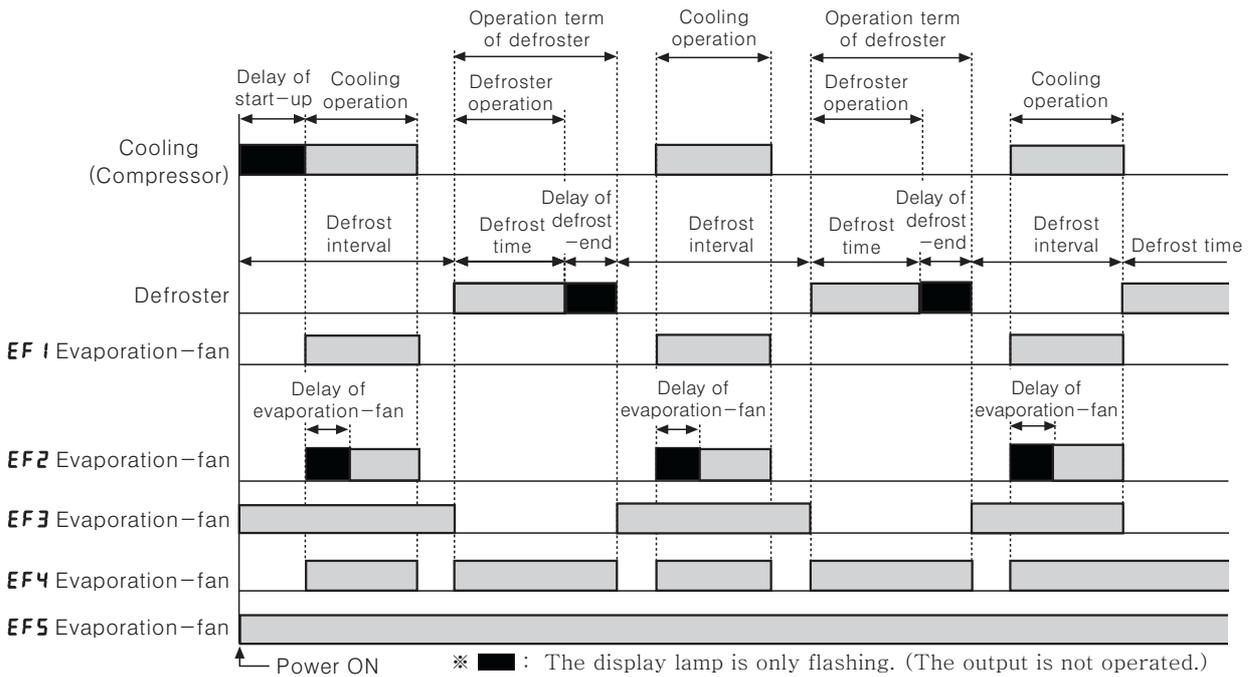
●Defrost interval [d In]

It starts to defrost for relevant interval. The setting range is 0~24 hours.

When the defrost interval is set to "0.0", it is only operated as manual.

●Defrost time [dEt]

The defroster (heater) is ON during defrost time. The setting range is 0m~59m.

●The delay time of defrost-end / evaporation-fan operation [Dripping Time : drP]

1) The delay time of defrost-end : It is the time for draining remained drops. After the delay time is over, compressor starts operating. (The setting range : 0m00s~5m59s)

2) The delay time of evaporation-fan operation : To improve the efficiency of cooling system, the operation of evaporation fan is delayed until evaporation plate gets frozen after compressor operating. (The setting range : 0m00s~5m59s)

※The delay time of defrost-end and evaporation-fan operation are applied with one setting time. (drP)

※When the delay time of defrost-end is finished, defrost is discontinued and defrost interval is repeated.

※The output lamp is ON simultaneously after the lamp flashing every one second during the delay time.

◎Evaporation operation mode [FAn]

●Operation mode 1[EF 1] : It operates same as cooler.

●Operation mode 2[EF2] : It operates after the delay time of evaporation-fan operation. OFF during defrost operation.

●Operation mode 3[EF3] : It is started when the power is applied and only operated during the defrost interval. (It does not any influence upon the freezer.)

●Operation mode 4[EF4] : The evaporation-fan operates only in the operation term of freezer or defrost, it is OFF when compressor and defroster are stopped.

(It is used to control the above zero temperature.)

●Operation mode 5[EF5] : It is started when the power is applied and it works until the power is failed.

◎Display an error

Err mark and content are flashing every 0.5 sec when error is occurred.

Err / oPn	Input sensor is disconnected
Err / LbA	Input sensor is normal or freezer temperature is not changed over 1.0℃(2°F) for observation time(LbA) of loop break.
Err / LLL	Process temperature (PV) is lower than the display range
Err / HHH	Process temperature (PV) is higher than the display range

※The error display of oPn/LLL/HHH disappears after the abnormal factors are cleared.
(Sensor connection/returning to the display range)

Freezing/Defrost Temperature Controller

(A)
Counter

(B)
Timer

**(C)
Temp.
controller**

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

◎**Operation cycle [⼰L⼰] / ON duty ratio of compressor in error [dUt]**

When an error occurs, repeats ON/OFF operation based on setting values of operation cycle(⼰L⼰) and ON duty ratio(dUt) of second setting group to protect the inside of the compressor. This is repeated until error is removed.

※The setting range of operation cycle : 0~20 min,
The setting range of ON duty ratio : 0~100%

※When operation cycle of compressor is "0", it keeps OFF status in error. The ON duty ratio(dUt) is not displayed in error.

※The duty ratio of compressor ON is "100", it keeps ON status in error.

Operation cycle
of compressor

ON ratio(%)

Compressor ON
OFF
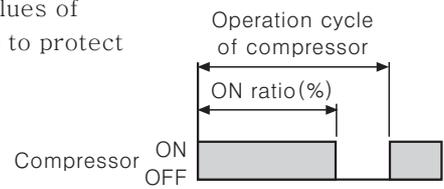
◎**Alarming of loop disconnection(LBA : Loop Break Alarm)**

When the cooling temperature is not changed over 1.0℃(2℉) during monitoring time set at loop break alarm(LbA) parameter, it is regarded as abnormal operation. It displays Err and LbA every 0.5sec and the compressor output repeats ON/OFF by the operation cycle(⼰L⼰) and ON duty ratio(dUt) setting in error. When pressing MD key simultaneously for 3sec, after checking the compressor, it operates normally with cancelling the error. LBA function does not operated when LBA value is at "0".
(LBA setting range : 0~999sec)

◎**Set the Lock [Loⵉ]**

Limit the change of SV and parameter.

oFF : Lock off

Lⵉ.1 : Lock the ssetting group 2

Lⵉ.2 : Lock the setting group 1 and 2

Lⵉ.3 : Lock the setting group 1, 2 and setting value

■**Proper usage**

1. Please beware not to exceed the rated specification of relay when using relay contact or it may cause a fire with breakdown.
2. Please mount a surge absorption device at coil when controlling high−capacity power relay or a magnet, the counter electromotive force can be flowed into the inside of the device for relay contact operation.
3. Please install a power switch or circuit breaker in order to cut of power supply.
4. The switch or a circuit breaker should be installed near by user for easy operation.
5. Do not use this temperature controller as a Volt−meter or Ampere−meter.
6. In case of using RTD sensor, please connect as 3−wire type and use 3 same thickness of lines when you need to extend. It might cause the deviation of temperature if the resistance of line is different.
7. Please check the polarity and connect correctly when connecting RTD sensor to temperature controller. NTC sensor is a non−polarity.
8. In case of making power line and input signal line close, line filter for noise protection should be installed at power line and input signal line should be shielded.
(Note) Please make sensor line shortly and use it because the narrow range of input correction range.
9. Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, high−capacity SCR controller etc.)
10. Please use AWG No. 12~28 for power input and relay output connection, fasten the terminal block as a torque 0.3Nm.
11. Installation environment
①It shall be used indoor
②Pollution Degree 2
③Altitude Max. 2000m
④Installation Category Ⅱ

TD Series

Digital Switch PID Temperature Controller

NEW

▣Features

- ●**Digital switch application to PID control temperature controller**
- ●Realizes ideal temp. controlling with newly developed PID control algorithm and 100ms high speed sampling
- ●SSR drive output / relay output and SSR drive output / current output selecatable(TD4H / TD4L)
- ●Dramatically increased visibility using wide display part
- ●Mounting space saving with compact design
  : Approx. 38% reduced size compared with existing model(depth−based)

⚠ **Please read "Caution for your safety" in operation manual before using.**

CE c ᴿᵁ US

▣Ordering information

T	D	4	M	—	1	4	R

	Control output (※1)	TD4SP/TD4M	R	Relay contact output
			S	SSR drive output
			C	Current output
		TD4H/TD4L	R	Relay contact output + SSR drive output
			C	Current output + SSR drive output
Power supply		4	100−240VAC 50/60Hz
Alarm output		N	No alarm output
		1	Alarm1 output
		2	Alarm1 output+Alarm2 output
Size		SP	DIN W48×H48mm(8 pin plug type)(※2)
		M	DIN W72×H72mm
		H	DIN W48×H96mm
		L	DIN W96×H96mm
Digit		4	4 Digit
Setting type		D	Set by digital switch
Item		T	Temperature Controller

(※1) Control output type is different depending on model size.
(※2) 8 Pin Socket(PG−08, PS−08) : Sold separately

▣Specifications

Series		TD4 series			
		TD4SP	**TD4M**	**TD4H**	**TD4L**
Power supply		100−240VAC 50/60Hz			
Allowable voltage range		90 ~ 110% of rated voltage			
Power consumption		Max. 5VA			
Display method		7 Segment(Red), Other display part(Green, Yellow, Red LED)			
Character size		H15×W7mm	H18×W9mm	H15×W7mm	H22×W11mm
Input type	RTD	DIN Pt100Ω (Allowable line resistance max. 5Ω per a wire)			
	TC	K(CA), J(IC)			
Display accuracy	RTD	(PV ±0.5% or ±1℃ higher one) rdg ±1Digit			
	TC	※TD4SP (Plug type) is (PV ±0.5% or ±2℃ higher one) rdg ±1Digit			
Control output	Relay	250VAC 3A 1c	250VAC 3A 1a	RELAY(250VAC 3A 1a) + SSR(24VDC±3V 20mA)	
	SSR	24VDC±3V 20mA Max			
	Current	DC4−20mA (Load resistance Max. 600Ω)			
Sub output		—	ALM relay output : 250VAC 1A 1a	ALM relay output : 250VAC 1A 1a	
Control method		ON/OFF and P, PI, PD, PID control			
Hysteresis		1 ~ 100℃/℉			
Proportional band(P)		0.1 ~ 999.9℃/℉			

Autonics

Digital Switch PID Temperature Controller

■Specifications

Series	TD4 series			
	TD4SP	**TD4M**	**TD4H**	**TD4L**
Integral time(I)	9999sec.			
Derivative time(D)	9999sec.			
Control period(T)	0.5 ~ 120.0sec.			
Manual reset	0.0 ~ 100.0%			
Sampling period	100ms			
Dielectric strength	2000VAC 50/60Hz for 1min.(Between input terminal and power terminal)			
Vibration	0.75mm amplitude at frequency of 5~55Hz in each X, Y, Z directions for 2 hours			
Relay life cycle — Control output	Mechanical : Min. 10,000,000 operations, Electrical : Min. 100,000 operations			
Relay life cycle — Alarm output	Mechanical : Min. 5,000,000 operations, Electrical : Min. 100,000 operations			
Insulation resistance	Min. 100MΩ (at 500VDC mega)			
Noise strength	Square shaped noise by noise simulator(pulse width 1μs) ±2kV R−phase and S−phase			
Memory retention	Approx. 10 years (When using non−volatile semiconductor memory type)			
Ambient temperature	−10 ~ 50℃ (at non−freezing status)			
Storage temperature	−20 ~ 60℃ (at non−freezing status)			
Ambient humidity	35~85%RH			
Insulation type(★1)	(★1)	回		
Unit weight	Approx. 76g	Approx. 126g	Approx. 131g	Approx. 193g
Approval	CE c ᵁᴸus			

※(★1) " 回 " Mark indicates that equipment protected throughout by double insulation or reinforced insulation.

■Connections

●**TD4SP-N4□ (Indicator only, no alarm output model)**
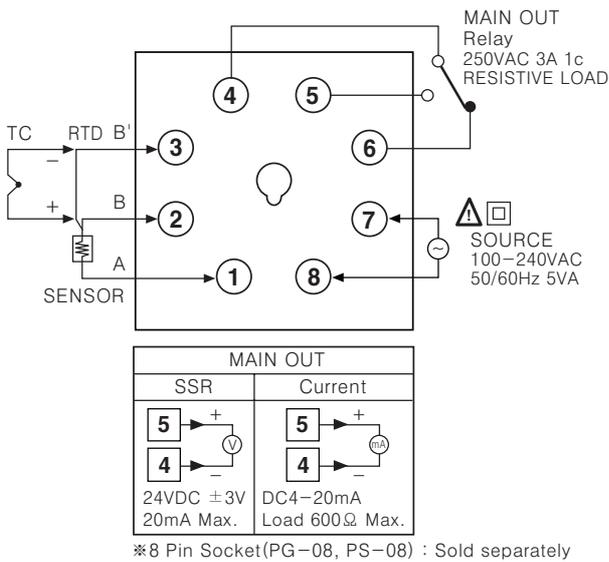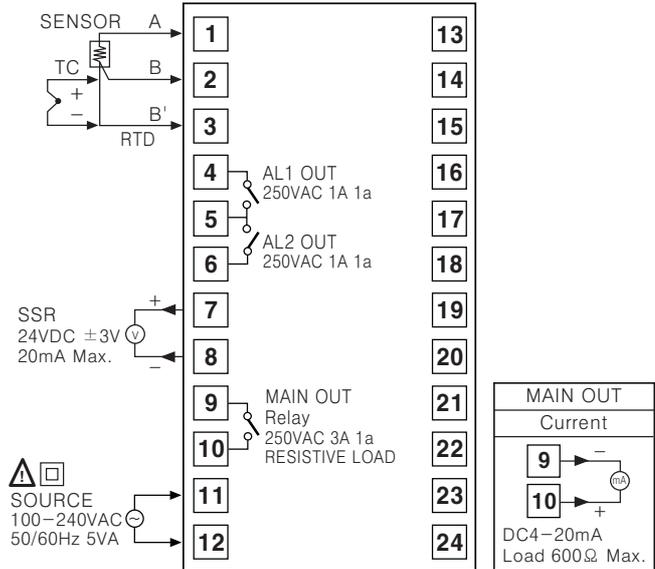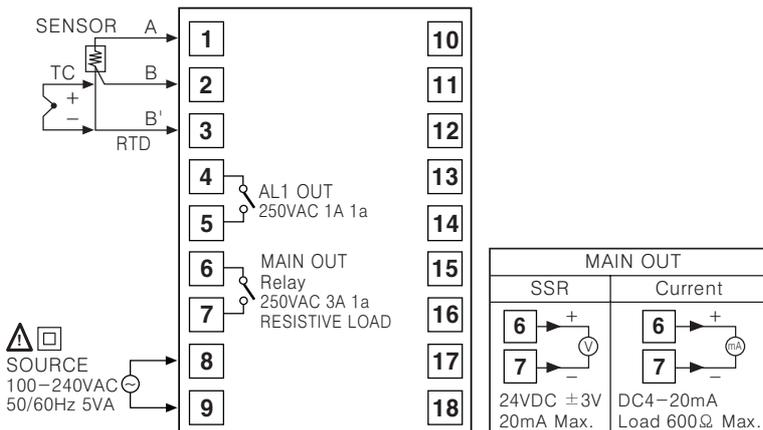
MAIN OUT	
SSR	Current
5 + (V) / 4 →	5 + (mA) / 4 →
24VDC ±3V 20mA Max.	DC4−20mA Load 600Ω Max.

※8 Pin Socket(PG−08, PS−08) : Sold separately

●**TD4H/TD4L**

MAIN OUT	
Current	
9 → − / 10 → + (mA)	
DC4−20mA Load 600Ω Max.	

●**TD4M**

MAIN OUT	
SSR	Current
6 + (V) / 7 −	6 + (mA) / 7 −
24VDC ±3V 20mA Max.	DC4−20mA Load 600Ω Max.

(A) Counter
(B) Timer
(C) Temp. controller
(D) Power controller
(E) Panel meter
(F) Tacho/ Speed/ Pulse meter
(G) Display unit
(H) Sensor controller
(I) Switching power supply
(J) Proximity sensor
(K) Photo electric sensor
(L) Pressure sensor
(M) Rotary encoder
(N) Stepping motor & Driver & Controller
(O) Graphic panel
(P) Field network device
(Q) Production stoppage models & replacement

TD Series

▣ Dimensions

● TD4SP

● Bracket
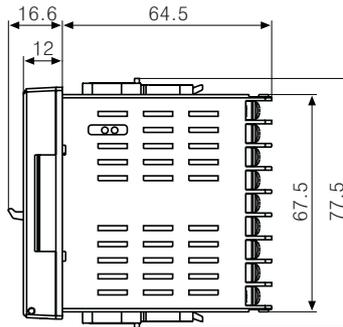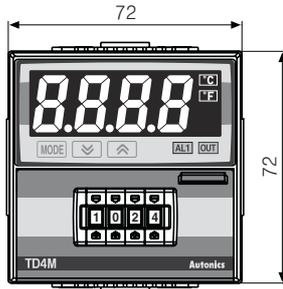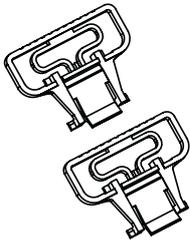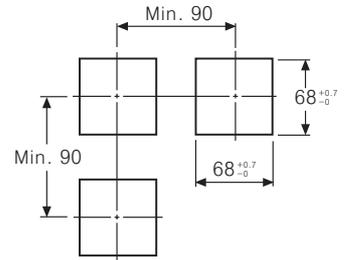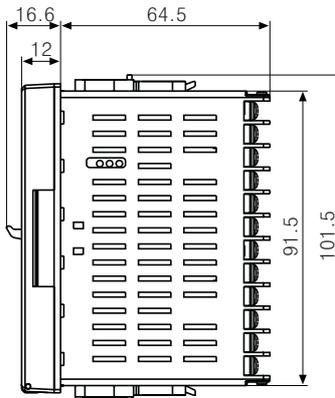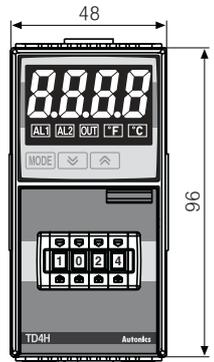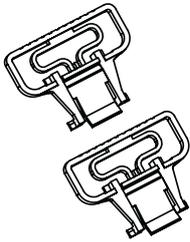
12.4 64.6
9.5 50
48
54.5 48 45 56

● Panel cut-out

Min. 65
Min. 65
$45^{+0.6}_{-0}$
$45^{+0.6}_{-0}$

(Unit:mm)

● TD4M

● Bracket

72
16.6 64.5
12
72 67.5 77.5

● Panel cut-out

Min. 90
Min. 90
$68^{+0.7}_{-0}$
$68^{+0.7}_{-0}$

(Unit:mm)

● TD4H

● Bracket

48
16.6 64.5
12
96 91.5 101.5

● Panel cut-out

Min. 65
Min. 115
$92^{+0.8}_{-0}$
$45^{+0.6}_{-0}$

(Unit:mm)

● TD4L

● Bracket

96
16.5 64.5
12
96 91.5 101.5

● Panel cut-out

Min. 115
Min. 115
$92^{+0.8}_{-0}$
$92^{+0.8}_{-0}$

(Unit:mm)

Autonics
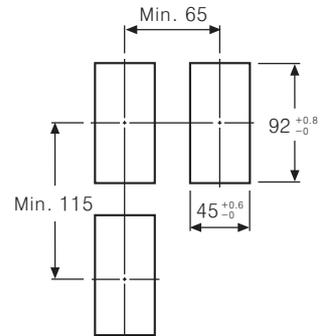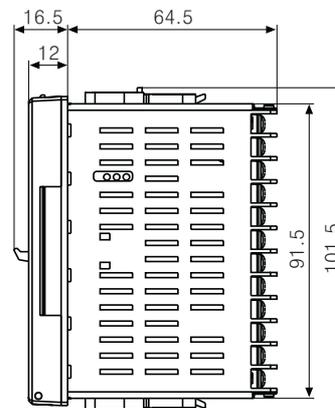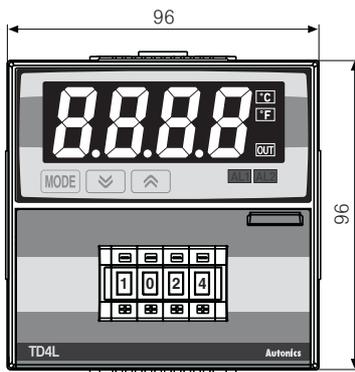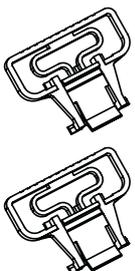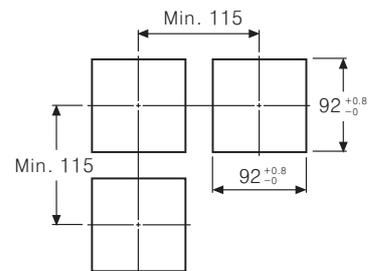
Digital Switch PID Temperature Controller

■Product mounting

● TD4SP (48×48) series
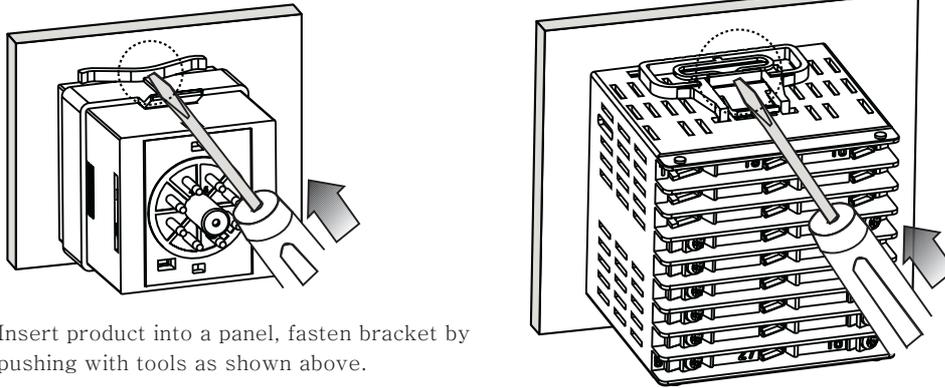
※Insert product into a panel, fasten bracket by
pushing with tools as shown above.

Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
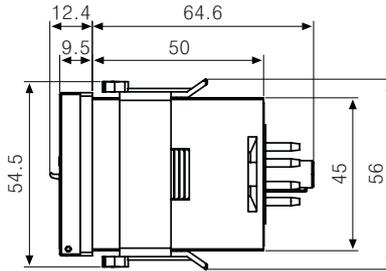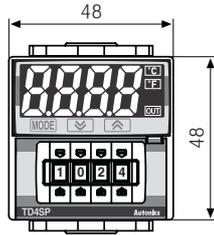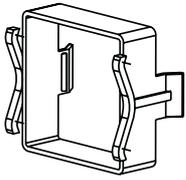panel

(P)
Field
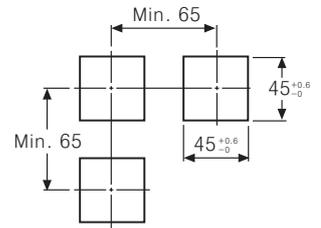network
device

(Q)
Production
stoppage
models &
replacement

■Parts description
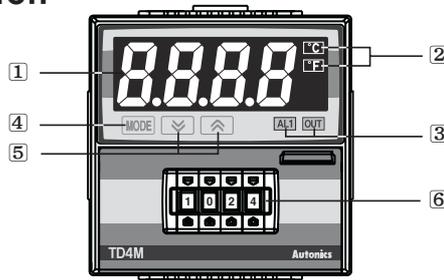
1 Temperature display
It shows current temperature (PV) in RUN mode and parameter and set value for each setting group
in parameter change mode.
2 Temperature unit indicator(℃/℉)
−It shows current temperature unit.
−Temperature unit(℃ or ℉) display lamp will be flickering during AT function.
3 Control/sub output indicator
−OUT : It will be ON when control output is ON.
※In case of current output type, it will be OFF when output level is under 2%, and ON when output level is over 3%.
−ALM : It will light up when ALARM output is on.
4 MODE Key : Used when entering into parameter setting group, returning to RUN mode, moving parameter
and saving setting values.
5 Adjustment : Used when entering into set value change mode, Digit moving and Digit Up/down.
Press ∨ + ∧ key at the same time to perform setting functions in Function Key setting
mode(**dI -ʁ**) and to make Digit movement.
6 Digital Switch : Used to set SV to control

■Factory default

●First setting group

Parameter		Factory default
AL I	Alarm1 setting value	**1250**
AL2	Alarm2 setting value	
At	Auto−tuning execute	**oFF**
P	Proportional band	**10.0**
I	Intergral time	**0**
d	Derivation time	
rESt	Manual reset	**50.0**
HYS	Hysteresis	**2**

●Second setting group

Parameter		Factory default	Parameter		Factory default
In-t	Input type	**℉CA**	**AL-1**	Alarm1 mode	**Am 1A**
Unit	Temperature unit	**℃**	**AL-2**	Alarm2 mode	**Am2A**
In-b	Input bias	**0**	**AHYS**	Alarm hysteresis	**1**
mAuF	Input digital filter	**0.1**	**LbA.t**	LBA monitoring time	**0**
L-Su	SV low limit	**-50**	**LbAS**	LBA detection setting value	**8**
H-Su	SV high limit	**1200**			
o-Ft	Control operating type	**HEAt**	**LbAb**	LBA detection band	**3**
C-md	Control method	**PI d**	**dI -ʁ**	Function key operation	**StoP**
oUt	(*1)Control output type	**rLY**	**Er.mu**	Input error MV	**0.0**
t	Control time	**20.0** **2.0**	**LoC**	Lock	**oFF**

※**(*1)** is available with only TD4H/TD4L model.
※Default for [**t**] ☞ Relay contact output[**rLY**] : 20.0 sec / SSR output[**SSr**] : 2.0 sec.
(In case of current output[**CUr**], no factory default is displayed.)

TD Series

▣ Flow chart for setting group

RUN mode ④

① Press MODE for 2sec.　　② Press MODE for 4sec.

First setting group [PAr 1]　　Second setting group [PAr2]

Press MODE for 3sec.　　Press MODE for 3sec.

③

AL 1	Alarm1 setting value
AL2	Alarm2 setting value
At	Auto-tuning execute
P	Proportional band
I	Integral time
d	Derivation time
rESt	Manual reset
HYS	Hysteresis

In-t	Input type
Unlt	Temperature unit
In-b	Input bias
āAuF	Input digital filter
L-Su	SV low limit
H-Su	SV high limit
o-Ft	Control operating type
C-ād	Control method
oUt	(※)Control output type (Available with only TD4H/L model)
t	(※)Control time
AL-1	(※)Alarm1 mode
AL-2	(※)Alarm2 mode
AHYS	Alarm hysteresis
LbAt	LBA monitoring time
LbAS	LBA detection setting value
LbAb	LBA detection band
dl-Y	Function key operation
Er.āu	Input error MV
LoC	Lock

①Press MODE key over 2sec in RUN mode, it advances to setting group 1.

②Press MODE key over 4sec in RUN mode, it advances to setting group 2.

③First parameter will be displayed on viewer when it advances to the setting group.

④Press MODE key over 3sec in the setting group, it returns to RUN mode.

●If no key touched for 30sec, it will return to RUN mode automatically and the set value of parameter will not be changed.

●Press MODE key again within a sec after return to RUN mode by press MODE key over 3sec, it advances to the first parameter of previous setting group.

●Parameter setup

　Setting group 2 → Setting group 1

　• Set parameter as the above considering parameter relation of each setting group.

　• Check parameter set value after change parameter of setting group 2.

　• Setting group description above is for 24R models.

　• ⸬ The part shown in dotted line is displayed depending on setting in setting group 2.

●(※) is displayed depending on the model type.

▣ Flow chart for first setting group
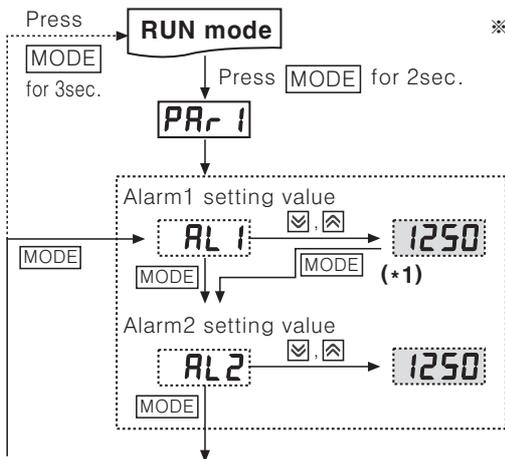
Press MODE for 3sec.

RUN mode

Press MODE for 2sec.

PAr1

Alarm1 setting value

MODE

AL 1 → ∨,∧ → 1250

MODE → MODE (*1)

Alarm2 setting value

AL2 → ∨,∧ → 1250

MODE

※(*1)Press MODE key to save setting values in each setting mode and move to next parameter setting.

Setting range : Deviation alarm(−[F.S] ~ [F.S]),
Absolute value alarm(Input range)

※In case alarm operation mode(AL-1, AL-2) is set as [AāQ_/SbA.⸬/LbA_], parameter will not be displayed.

Autonics

Digital Switch PID Temperature Controller

Auto-tuning execute

Rt ⮀ **oFF** ⮀ **on**

※It starts to operate auto tuning when it is ON and set as OFF automatically after finish the operation.
※Front temperature unit display lamp will be flickering during auto tuning.

Proportional band

P → **0100**

Setting range : 0.1 ~ 999.9℃/°F

Integral time

I → **0000**

Setting range : 0 ~ 9999sec.
※Integral operation will be OFF when set value is "0".

Derivation time

d → **0000**

Setting range : 0 ~ 9999sec.
※Derivative operation will be OFF when set value is "0".
※It will be displayed only if control method parameter (**C-ñd**) is set as [**PI d**].

Manual reset

rESt → **0500**

Setting range : 0.0 ~ 100.0%
※It is displayed when selecting P/PD control modes.
(No parameters are displayed when selecting PID, or ON/OFF mode.)

Hysteresis

HY5 → **002**

Setting range : 1 ~ 100℃/°F
※It will be displayed in ON/OFF control.

▣ Flow chart for second setting group

Press **MODE** for 3sec.

RUN mode

※(*1) Press **MODE** key to save setting values in each setting mode and move to next parameter setting.

Press **MODE** for 4sec.

PRr2

Input type

In-t → **ЬCR** ⮀ **JI C** ⮀ **Pt**   (*1)

Temperature unit

Unl t → **℃** ⮀ **°F**

※Front temperature unit indicator will be flickering when selecting the unit.

Input bias

In-b → **000**

Setting range : −999 ~ 999℃/°F

Input digital filter

ñRu.F → **0.1**

Setting range : 0.1 ~ 120.0sec.

SV low limit

L-5u → **-050**

Setting range : Within input range of each sensor
※It enables to set ranged [**L-5u** ≤ **H-5u**] −1

SV high limit

H-5u → **1200**

Setting range : Within input range of each sensor
※It enables to set ranged [**H-5u** ≥ **L-5u**] +1

Control operating type

o-Ft → **HERt** ⮀ **CooL**

TD Series

Control method

[C-ñd] ⊻,⊼ → [PI d] ⟷ [onoF]

MODE

※Control type display is available with only TD4H/TD4L models.
※Preset output will be operated as control output.

Control output type

[oUt] ⊻,⊼ → [rLY] ⟷ [SSr]   [CUr] ⇄ [SSr]

MODE

Control time

[t] ⊻,⊼ → [020.0]

MODE

Setting range : 0.5 ~ 120.0sec.
※In case of [rLY] output mode default value is 20.0 sec.
  (2.0sec in case of [SSr] mode)
※No parameters are displayed when selecting current output.

Alarm1 mode

[AL-1] ⊻,⊼ → [Añ1.A] ⟷ [LbA_]   ⊻+⊼ [Añ1.A] ⟷ [Añ1.d]

MODE   MODE

※Select alarm function

※Press ⊻+⊼ key to convert alarm operation mode into alarm option.

Alarm2 mode

[AL-2] ⊻,⊼ → [Añ2.A]

MODE

※Same with the above [AL-1].

Alarm hysteresis

[AHYS] ⊻,⊼ → [001]

MODE

Setting range : 1 ~ 999℃/°F
※[AHYS] parameter will not be displayed when set value is set as [AñO_/SbA. ⊡/LbA_.]

LBA monitoring time

[LbАt] ⊻,⊼ → [0]

MODE

Setting range : 0 ~ 9999sec.
※[LbАt] parameter will be displayed when alarm operation mode(AL-1, AL-2) is set as [LbA_.]

LBA detection setting value

[LbA.S] ⊻,⊼ → [008]

MODE

Setting range : 1 ~ 999℃/°F
※When setting [AL-1, AL-2] to [LbA_] and [LbАt] setting value is 0, [LbA.S] parameter is not displayed.

LBA detection band

[LbA.b] ⊻,⊼ → [003]

MODE

Setting range : 1 ~ 999℃/°F
※When selecting [LbA_] alarm mode(AL-1, AL-2) and [LbАt] setting value is 0, [LbA.b] parameter is not displayed.

Function key operation

[dI-Y] ⊻,⊼ → [StoP] ⇄ [ALrE]

MODE

※[ALrE] will not be displayed in case of no alarm output models.

Input error MV

[Er.ñu] ⊻,⊼ → [000.0]

MODE

Setting range : 0.0 ~ 100.0%
※0.0/100.0% will be displayed in ON/OFF control.

Lock

[LoC] ⊻,⊼ → [oFF] ⇄ [LoC1] ⇄ [LoC2]

▣Input sensor and range[In-t]

●Select proper input sensor type by user' application.

Input sensor		Display	Input range ℃	Input range °F
ThermoCouple	K(CA)	YCA	−50 ~ 1200℃	−58 ~ 2192°F
	J(IC)	JIC	−30 ~ 500℃	−22 ~ 932°F
RTD	DIN rated Pt	Pt	−100 ~ 400℃	−148 ~ 752°F

●Setting range : [YCA / JIC / Pt] (Default : [YCA])

Digital Switch PID Temperature Controller

▣Function

See C-25 page for TC / TD common features.

◎Control output type selection[out]
(※Available with only TD4H/L model)

● In case of relay output type model, relay output and SSR output supported. In case of current output type model, current output (DC4~20mA) and SSR output supported.

● A function to select control output type.

◎Lock setting[LoC]

● A function to prevent changing SV and parameters of each setting group.

● Parameter setting values are still possible to check while Lock mode is ON.

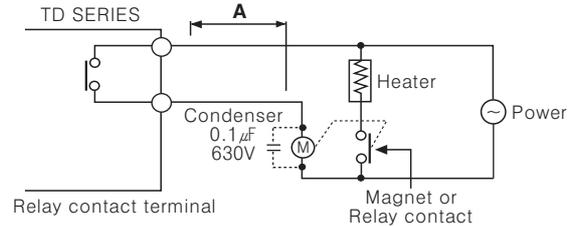| Display	Description
oFF	Lock off
LoC1	Lock setting group 2
LoC2	Lock setting group 1, 2

◎Error

● Error mark will flash(every 1sec) in PV viewer when error is occurred during the control operation.

Display	Description
Er.Su	Setting error (When SV is out of SV range)
oPEn	If input sensor is disconnected or sensor is not connected.
HHHH	If measured sensor input is higher than temperature range.
LLLL	If measured sensor input is lower than temperature range.

● It will operate normally, if input sensor is connected or returned to normal range under error oPEn / HHHH / LLLL status.
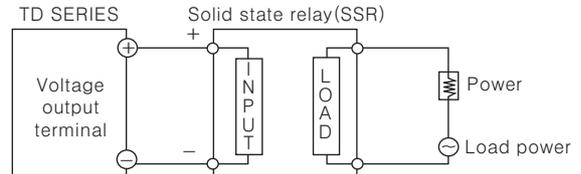
◎Output connections

● Application of relay output type

Keep power relay as far away as possible from temperature controller. If wires length of **A** is short, electromotive force occurred from a coil of magnet switch & power relay may flow in power line of the unit, it may cause malfunction. If wires length of **A** is short, please connect a mylar condenser 104(630V) across coil of the power relay "Ⓜ" to protect electromotive force.

● Application of SSR output type

※ SSR should be selected by the capacity of load, otherwise, it may short-circuit and result in a fire. Indirect heated should be used with SSR for efficient working.

※ Heat sink integrated SSR must be used. Unless it may cause 70~80% of performance degrades or it may cause SSR failure in case of long term use.

● Application of current output(DC4-20mA)
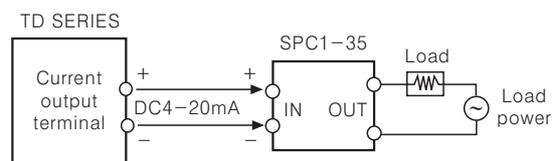
※ It is important to select SCR unit after checking the capacity of the load.

※ If the capacity is exceeded, it may cause a fire.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

THD Series

## Indoor, Duct & Wall mounting type Temperature/Humidity transducer

■Features

- Compact design
- Built-in temp./humidity sensor
- 7 Segment LED Display(THD-DD/THD-WD)
- Various output modes
  DC4-20mA, 1-5VDC, RS485(MODBUS RTU)
- Wide range of temp./humidity measurement
  −19.9 ~ 60.0℃ / 0.0 ~ 99.9%RH
- Communication speed : 115200bps

⚠ **Please read "Caution for your safety" in operation manual before using.**

THD-DD□   THD-WD□

THD-R

THD-D□

THD-W□
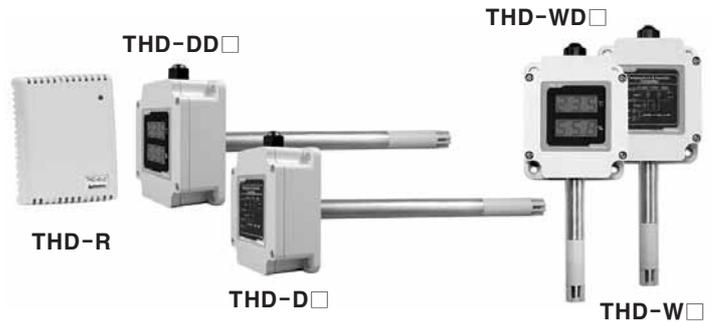
■Ordering information

| THD | − | D | D | 1 | − | C |
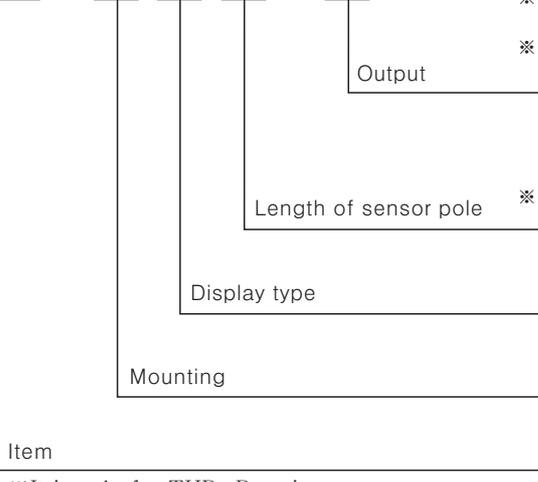
Output

※	PT	Temperature sensor resistance value(PT100Ω)
※	PT/C	Temperature sensor resistance value(PT100Ω) / Current output(DC4-20mA)
	C	Current output(DC4-20mA)
	V	Voltage output(1-5VDC)
	T	RS485 communication output(MODBUS RTU)

Length of sensor pole

※		Built-in
	1	100mm
	2	200mm

Display type

| | | Non-Display |
| | D | Display |

Mounting

	R	Room(For indoor)
	D	Duct mounting
	W	Wall mounting

Item

| | THD | Temperature Humidity Double |

※It is only for THD-R series.

■Specifications

Model		THD-R-PT	THD-R-PT/C	THD-R-□	THD-D□-□ THD-W□-□	THD-DD□-□ THD-WD□-□
Display type		————	Non-indicating type			7Segment LED Display
Digit		————	————			3Digit for tempera-ture, humidity
Character size		————	————			10mm
Power supply		————	24VDC ±10%			
Power consumption		————	Max. 2.4W			
Measuring input		Temperature (Built-in sensor)	Temperature, Humidity (Built-in sensor)			
Output	Temp.	PT100Ω resistance value	●DC4-20mA ●1-5VDC ●RS485(MODBUS RTU)			
	Humidity	————	DC4-20mA			
Measurement range	Temp.	−19.9~60.0℃				
	Humidity	————	0.0~99.9%RH(THD-R series is required to attend for using over 90%RH.)			
Accuracy	Temp.	Max. ±0.8℃	−19.9~5.0℃ : Max. ±1.0℃, 5.0~40.0℃ : Max. ±0.5℃, 40.0~60.0℃ : Max. 1.0℃			
	Humidity	————	Max. ±3%RH at 30~70%RH (at 25~45℃)			

Autonics
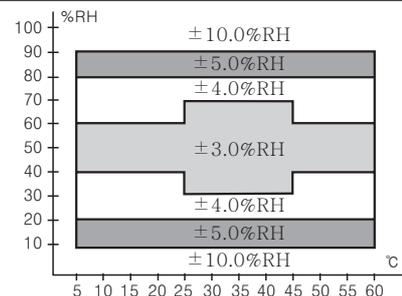
Temperature/Humidity Transducer

■Specifications

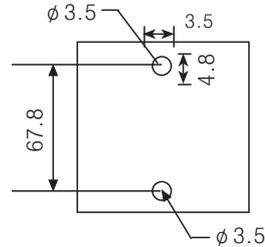| Model	THD-R-PT	THD-R-PT/C	THD-R-□	THD-D□-□ THD-W□-□	THD-DD□-□ THD-WD□-□
Sampling period	———	Fixed 0.5sec			
Insulation resistance	———	Min. 100MΩ (500VDC mega)			
Dielectric strength	———	500VAC 50/60Hz for 1 minute			
Noise strength	———	±0.3kV the square wave noise (pulse width:1μs) by the noise simulator			
Vibration — Mechanical	———	0.75mm amplitude at frequency of 10~55Hz in each of X, Y, Z directions for 1hour			
Vibration — Malfunction	———	0.5mm amplitude at frequency of 10~55Hz in each of X, Y, Z directions for 10minutes			
Shock — Mechanical	———	300m/s² (30G) in X, Y, Z directions for 3 times			
Shock — Malfunction	———	100m/s² (10G) in X, Y, Z directions for 3 times			
Protection	IP10			IP65 (Except sensing part.)	
Ambient temperature	−20 ~ 60℃ (at non−freezing status)				
Storage temperature	−20 ~ 60℃ (at non−freezing status)				
Cable	Terminal type			4P, φ4mm, Length:2m	
Unit weight	Approx. 55g			Approx. 160g	

※The allowable impedance of current output is max. 600Ω

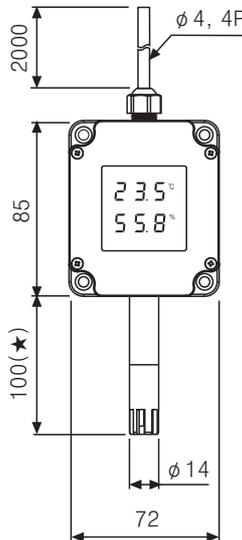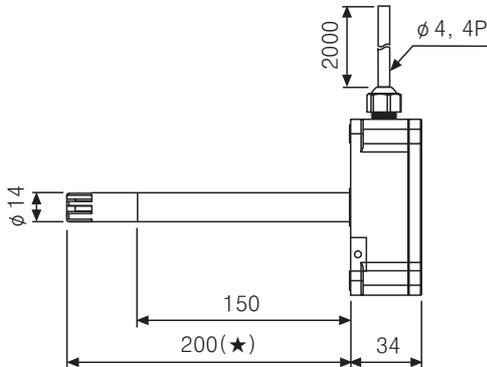## ■Dimensions

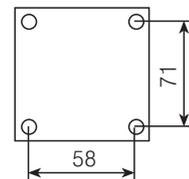●THD-R-□ ●THD-R-PT ●THD-R-PT/C   ※Mounting part   (Unit:mm)
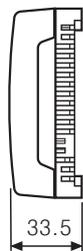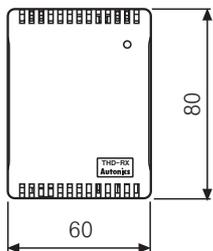
●THD-D□-□ / THD-DD□-□   ●THD-W□-□ / THD-WD□-□   ※Mounting part

※(★) See the ordering information to select the one with 2 sensing poles.
※See the ordering information about display model, THD−DD□−□, THD−WD□−□.

■Connections

◎THD−R Series
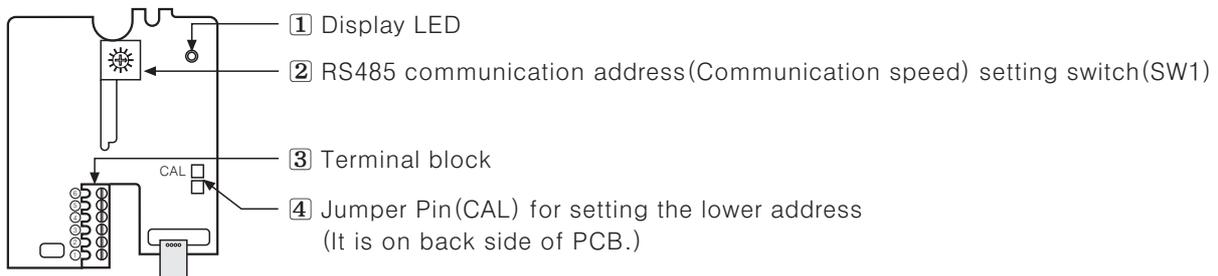
1 Display LED

2 RS485 communication address (Communication speed) setting switch (SW1)

3 Terminal block

4 Jumper Pin (CAL) for setting the lower address
   (It is on back side of PCB.)

(A) Counter
(B) Timer
(C) Temp. controller
(D) Power controller
(E) Panel meter
(F) Tacho/ Speed/ Pulse meter
(G) Display unit
(H) Sensor controller
(I) Switching power supply
(J) Proximity sensor
(K) Photo electric sensor
(L) Pressure sensor
(M) Rotary encoder
(N) Stepping motor & Driver & Controller
(O) Graphic panel
(P) Field network device
(Q) Production stoppage models & replacement

THD Series

●**THD-R-PT/C**

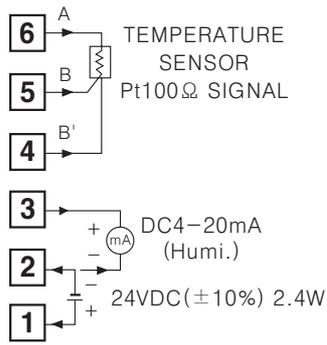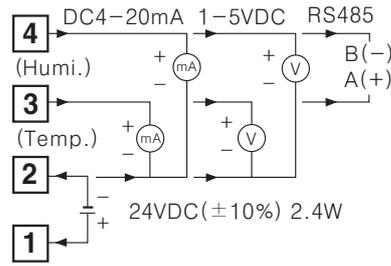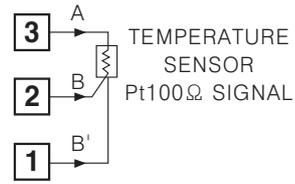|		
6	A	
5	B	TEMPERATURE SENSOR Pt100Ω SIGNAL
4	B'	

3 + (mA) − DC4−20mA (Humi.)

2

1 − + 24VDC(±10%) 2.4W

●**THD-R-C, V, T**

4 DC4−20mA (Humi.) + (mA) −   1−5VDC + (V) −   RS485 B(−) A(+)

3 (Temp.) + (mA) −   + (V) −

2

1 − + 24VDC(±10%) 2.4W

※Please note the terminal connection and be careful with power supply.

●**THD-R-PT**

3	A	
2	B	TEMPERATURE SENSOR Pt100Ω SIGNAL
1	B'	

◎**THD-D / THD-W Series**

CAL   Setting terminal for lower address

※ Output terminal   Operation LED
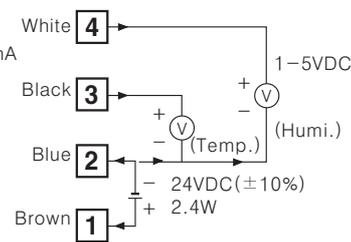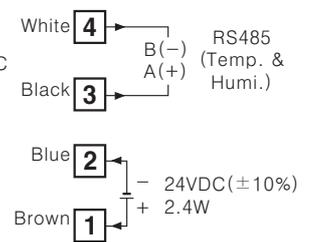
※Separate the case cover only in case of setting communication, set the unit code, communication speed using communication setting switch.

●Current output type

White **4**
DC4−20mA
Black **3** + (mA) −   + (mA) − (Humi.)
Blue **2** (Temp.)
Brown **1** − + 24VDC(±10%) 2.4W

●Voltage output type

White **4**
1−5VDC
Black **3** + (V) −   + (V) − (Humi.)
Blue **2** (Temp.)
Brown **1** − + 24VDC(±10%) 2.4W

●Communication output type

White **4** B(−) A(+)   RS485 (Temp. & Humi.)
Black **3**
Blue **2** − + 24VDC(±10%) 2.4W
Brown **1**

▣Case detachment

●**THD-R Series**

Unscrew the bolt on the bottom of product and separate the case.
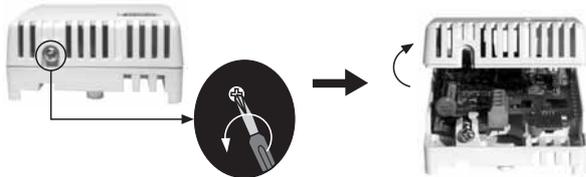
●**THD-D / THD-W Series**

Unscrew 4 bolts on the top of product and separate the case.
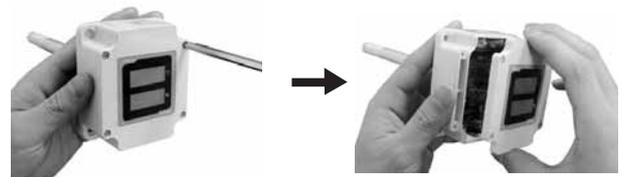
▣Functions

◎**Voltage output**

It transmits current temperature/humidity to other equipments, PC or recorder and outputs 1−5VDC. 1VDC output represents −19.9℃ of temperature and 0.0% RH of humidity, 5VDC at 60℃ of temperature and 99.9% RH of humidity. The temperature and humidity output are separated and the resolution is divided as 1,000.

◎**Current output**

It transmits current temperature/humidity to other equipments, PC or recorder and outputs DC4−20mA. It outputs DC4mA at −19.9℃ of temperature and 0.0%RH of humidity, DC20mA at 60.0℃ of temperature and 99.9%RH of humidity. The temperature and humidity output are separated and the resolution divisible by 1,000.

◎**Temperature sensor output(Pt 100Ω resistance value output)**

It transmits current temperature/humidity to other equipments, recorder or thermometer. It outputs 100Ω at 0℃ and 119.40Ω at 50℃. (TCR=3850 ppm/℃)

Temperature/Humidity Transducer

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

◎RS485 communication output

It is used to transmit current temperature and humidity to other equipment.

●Interface

Standard	EIA RS485
Number of connections	31, It is available to set address 01~31
Communication method	Half Duplex
Synchronous method	Asynchronous type
Communication distance	Within max. 800m
Communication speed	1200 ~ 115200bps(Available to set)
Start bit	1bit(Fixed)
Stop bit	1bit(Fixed)
Parity bit	None(Fixed)
Data bit	8bit(Fixed)
Protocol	MODBUS RTU

※It is not possible to change parameter related to communication of THD under the communication with high order system.

※Match the parameter of THD communication to be same as the high order system.

※It is not allowed to set overlapping communication address at the same communication line.

※Please use a proper twist pair for RS485 communication.

●Application of system organization
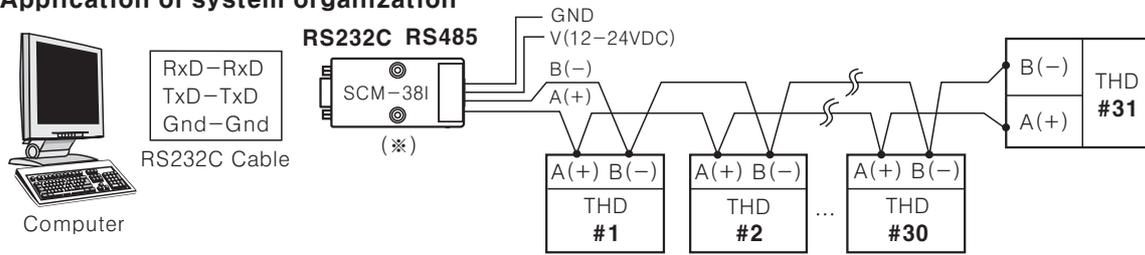
※SCM−38I made by Autonics is recommended to use with RS232C to RS485 converter.

◎Communication control ordering

● The communication method is MODBUS TRU(PI−MBUS−300 REV.J).

● After 0.5sec of power supply into the high order system, it starts to communicate.

● Initial communication will be started by the high order system. When a command comes out from the high order system, THD will respond.

※A → Min. 0.5 sec. after applying power
  B → Within(Communication speed×10)×10
  EX : 9600bps=960cps=1.04ms×10
※C → Min. (Communication speed×10)×4
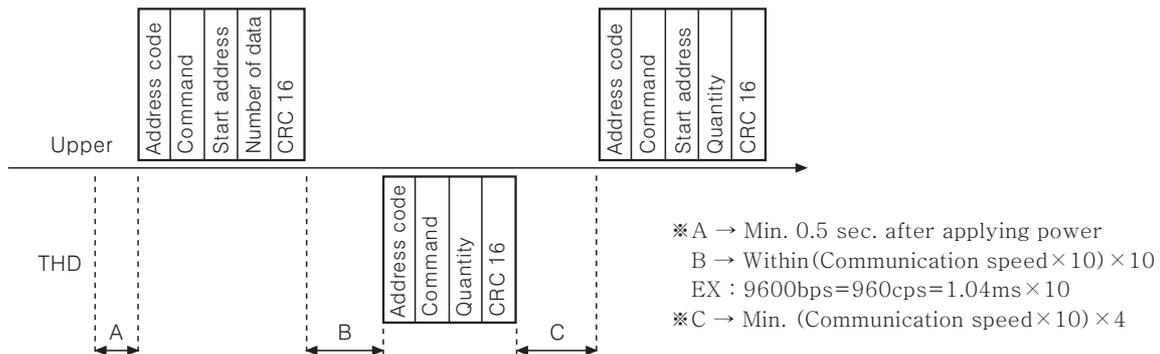
●Communication command and block

The format of query and response

Query

Address code	Command	Start address	Number of data	CRC16

Calculation range of CRC16
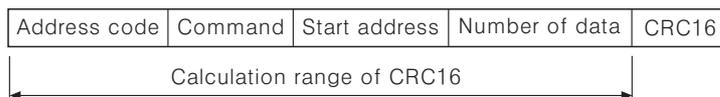
①Address code : This code which the high order system can identify THD by. It can be set within range 01H−1FH.

②Command : Read command for input register.

③Start address : The start address of input register to read (Start address), it is available to select 0000 and 0001 for start address. 16 bit data in the address 0000 indicates temperature value, 16 bit data in the address 0001 indicates humidity value.(Refer to MODBUS Mapping table.)

④Number of data : The number of 16 bit data from start address(No. of Points) It reads 2 of 16 bit data when start address is 0000 or reads 1 of 16 bit data is available when start address is 0001.

⑤CRC16 : Check Sum which checks the whole frame and it is used for more reliable transmit/receive to check the error between transmitter and receiver.

THD Series

Response

Address code	Command	Number of data	Temperature data	Humidity data	CRC16

Calculation range of CRC16

① Address code : The code, W the high order system can identify THD by. It can be set within range 01H－1FH.
② Command : Read command for input register.
③ Number of data : The number of 8 bit data to send from start address(No. of Bytes)
  It reads 4 of 8 bit data when start address is 0000 or reads 2 of 8 bit data is available when start address is 0001.
 (Refer to MODBUS Mapping Table)
④ Temperature data : To get a current temperature value, divide read value by 100.
  Ex) When read data is 0x09B6, decimal value 2486, the current value is 2486/100＝24.86℃.
⑤ Humidity data : To get a current humidity value, divide read value by 100.
  Ex) When read data is 0x12FE, decimal value 4862, the current value is 4862/100＝48.62%RH.
⑥ CRC16 : Check Sum which checks the whole frame.(Refer to E－34 for CRC16 Table.)

● **Application**

(Query) : Address code(01), Start address(0000), The number of 16 Bit data to read(2) Check Sum(0x71CB)

01	04	00	00	00	02	71	CB
Unit number	Command	Start code		Amount of data		CRC16	
		High order	Low order	High order	Low order	High order	Low order

(Response) : Address code(01), The number of 8 Bit data to read(4), Temperature(0x09B6), Humidity(0x12FE)
       CRC Check sum(0x94DE)

01	04	04	09	B6	12	FE	94	DE
Unit number	Reponse command	Amount of data	Temperature data		Humidity data		CRC16	
			High order	Low order	High order	Low order	High order	Low order

● **Error processing(Slave → Master)**

1. Non－supportable command

01	81	01	81	90
Unit number	Response command	Exception code	CRC16	

  ※ Set a received highest bit and send it to response command and exception code 01.

2. The start code of queried data is not matched to the transmittable code

01	81	02	81	90
Unit number	Response command	Exception code	CRC16	

  ※ Set a received highest bit and send it to response command and exception code 02.

3. The number of queried data is bigger than transmittable one

01	84	03	X	X
Unit number	Response command	Exception code	CRC16	

  ※ Set a received highest bit and send it to response command and exception code 03.

4. Abnormal processing for a received command

01	84	04	X	X
Unit number	Response command	Exception code	CRC16	

  ※ Set a received highest bit and send it to response command and exception code 04.

◎ **Change the communication speed(THD-R Series)**

1) Set SW1 to 0 and apply the power.
2) Operation LED is flashing.
3) Set a communication speed after choose SW1 within the range 1~8 and hold it for 3sec.
4) After set a communication speed, LED will be ON.
※ Factory default communication speed is 9600bps(SW 1:4) for communication speed.
※ In order to change the communication speed, please turn off the power and repeat step 1) ~ 4).
※ Setting table of communication speed(bps).

SW1	Communication speed(BPS)
1	1200
2	2400
3	4800
4	9600
5	19200
6	38400
7	57600
8	115200

Switch setting communication address(SW1)

CAL

<Inner PCB of THD－R>

Switch setting communication address(SW1)

<Inner PCB of THD－D□, THD－W□>

Autonics

Temperature/Humidity Transducer

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
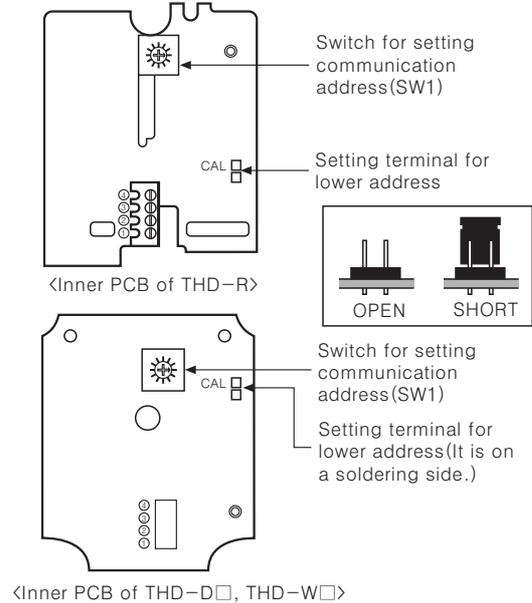**replacement**

◎Change the communication address(THD-R Series)

1) Set CAL Jump pin and SW1 at new address, apply the power.
2) The communication address is changed automatically.

※Factory default communication address is 01. (SW1 : 1, CAL Jump pin : Open)
※In order to change the communication address, please turn off the power and repeat step 1)~2).
※Setting table of communication address

CAL Pin	SW1	Add no.	CAL Pin	SW1	Add no.
OPEN	1	01	SHORT	0	16
OPEN	2	02	SHORT	1	17
OPEN	3	03	SHORT	2	18
OPEN	4	04	SHORT	3	19
OPEN	5	05	SHORT	4	20
OPEN	6	06	SHORT	5	21
OPEN	7	07	SHORT	6	22
OPEN	8	08	SHORT	7	23
OPEN	9	09	SHORT	8	24
OPEN	A	10	SHORT	9	25
OPEN	B	11	SHORT	A	26
OPEN	C	12	SHORT	B	27
OPEN	D	13	SHORT	C	28
OPEN	E	14	SHORT	D	29
OPEN	F	15	SHORT	E	30
−	−	−	SHORT	F	31

Switch for setting communication address(SW1)

Setting terminal for lower address

〈Inner PCB of THD−R〉

OPEN   SHORT

Switch for setting communication address(SW1)

Setting terminal for lower address(It is on a soldering side.)

〈Inner PCB of THD−D□, THD−W□〉

■Caution for using

1. After checking the input specification, terminal polarity, connect the wires correctly.
2. Do not connect a wire, examine and repair when the power is applying.
3. Do not touch the temperature/humidity sensor module.
4. Please use THD−R series as wall mounting type.
5. Caution for cleaning
   ①Use dry towel
   ②Do not use acid, chrome acid and solvent but alcohol.
   ③Clean after turn off the power and turn it on 30 min. after.
6. Be sure that metal dust and wire−dregs are not flowed in the unit.
7. Connect the wires after checking polarity.
8. Please use separated line from high voltage line or power line in order to avoid inductive noise.
9. Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, big capacitive SCR controller)
10. The switch or circuit breaker should be installed near by user for convenience.
11. Installation environment
    ①It shall be used indoor
    ②Altitude Max. 2000m
    ③Pollution Degree 2
    ④Installation Category Ⅱ

Multi Channel Modular Type Temperature Controller

Multi-channel modular type temperature controller

■Features

- High-speed sampling cycle(100ms for 4 channels)
- **No communication and power supply for expansion modules required via using module connectors**
  : Up to 31 module (124 channels) expansion possible
- Input channel Isolated design(Dielectric Strength 1,000 VAC)
- Heating/Cooling simultaneous controlling
- PC parameter setting via USB cable and RS485 communication(Modbus RTU)
- Dedicated USB cable - no separate power supply or connections required
  : Sensor input connector, control output connector, power/communication connector
- Multi input / Multi range

⚠ **Please read "Caution for your safety" in operation manual before using.**

CE c ᴚ US

NEW

■User manual

- Please refer to TM series user manual for more detailed information and instructions.
- Visit our website (www.autonics.com) to download user manual and PC loader program.
- Function setting, Control method, parameter group and PC loader program explanations available.

■S/W - PC Loader Program(DAQ Master)

DAQ Master is a comprehensive device management program for Autonics TM series providing GUI control for easy and convenient management of parameters and multiple device data monitoring.

⟨ Computer specification for using software ⟩

Item	Minimum specification	Recommended specification
System	Pentium III	
Memory	128MB	256MB
Hard disk	Over 100MB of available space	Over 200MB of available space
Resolution	800×600	1024×768
Operating system	Windows 98/ME/2000/XP, Vista	
Communication port	USB port, Serial port(9pin)	

■Ordering information

TM 4 - N 2 R B
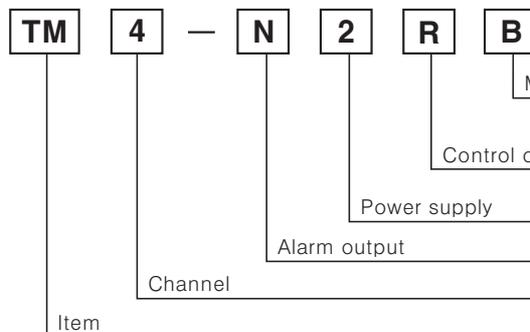
Module type	B	Basic module(※Power/communication terminal)
	E	Expansion module(※No power/communication terminal)
Control output	R	Relay contact output
	S	SSR drive output
Power supply	2	24VDC
Alarm output	N	None(※No Aux I/O)
Channel	4	4 Channel
Item	TM	Multi-channel modular temperature controller

※Make sure to purchase both expansion module and basic module together since power supply/communication terminals are provided with basic modules only.

■Specifications

Series		TM4-N2RB	TM4-N2RE	TM4-N2SB	TM4-N2SE
Channel		4-Channel (Channel Isolated - Dielectric Strength 1,000 VAC)			
Power Supply		24VDC			
Allowable voltage range		90 ~ 110% of rated voltage			
Power consumption		Max. 5W(At maximum load)			
Indicating type		Non-indicating type Parameter setting & monitoring with external devices (PC or PLC)			
Input type	RTD	DPt100Ω, JPt100Ω 3 wire (Allowable line resistance : Max. 5Ω)			
	Thermocouples	K, J, E, T, L, N, U, R, S, B, C, G, PLII(13types)			
Indicating accuracy	RTD	(Bigger one either PV ±0.5% or ±1℃) ±1 Digit Max.			
	Thermocouples (★1)				

※(★1)In case of thermocouple K, T, N, J, E at -100℃ below and L,U, PlatinelII, it is ±2℃±1Digit Max.
In case of thermocouple B, indicating accuracy cannot be ensured under 400℃.
In case of thermocouple R, S at 200℃ below and thermocouple C, G, it is 3℃±1Digit Max.

TM Series

�■ Specifications

Series		**TM4-N2RB**	**TM4-N2RE**	**TM4-N2SB**	**TM4-N2SE**
Influence of Temperature (★2)	RTD	(Bigger one either PV ±0.5% or ±2℃) ±1 Digit Max.(In case of thermocouple input, it is ±5℃ at −100℃ below.)			
	Thermocouples	• Thermocouples L, U, C, G, R, S, B : (Bigger one either PV ±0.5% or ±5℃) ±1 Digit Max.			
Sub output	Relay	250VAC 3A 1a			
	SSR			22VDC ±3V 30mA Max.	
Communication output		RS485 Communication output (Modbus RTU)			
Control method	heating, cooling	ON/OFF control mode, P, PI, PD, PID control mode			
	heating&cooling				
Hysteresis		Thermocouples/RTD : 1 ~ 100℃/℉(0.1 ~ 100℃/℉) variable			
Proportional band (P)		0.1 ~ 999.9℃			
Integral time (I)		0 ~ 9999 sec.			
Derivative time (D)		0 ~ 9999 sec.			
Control period (T)		0.1 ~ 120.0 sec.(Only Relay and SSR output type)			
Manual reset value		0.0 ~ 100.0%			
Sampling period		100ms(4 channel synchronous sampling)			
Dielectric strength		1000VAC 50/60Hz for 1 min. (between power source terminal and input terminal)			
Vibration resistance		0.75mm amplitude at frequency of 5~55Hz(for 1 min.) in each X, Y, Z direction for 2 hours			
Relay life cycle	Mechanical	Over 10,000,000 times			
	Electrical	Over 100,000 times (250 VAC 3A resistance load)			
Insulation resistance		100MΩ (at 500VDC megger)			
Noise resistance		Square shaped noise by noise simulator (pulse width 1μs) ±0.5kV			
Ambient temperature		−10 ~ 50℃(at non−freezing status)			
Storage temperature		−20 ~ 60℃(at non−freezing status)			
Ambient humidity		35 ~ 85%RH			
Accessories		Parallel expansion connector			
		Power / communication connector		Power / communication connector	
Approval		CE c⚡U us			
Unit weight		Approx. 174g	Approx. 166g	Approx. 160g	Approx. 152g

※(★2)Applied when used out of range 23±5℃.

■ Connections

● TM4-N2□□

FRONT

※▨ Shaded terminals are available only for TM4−N2□B models.
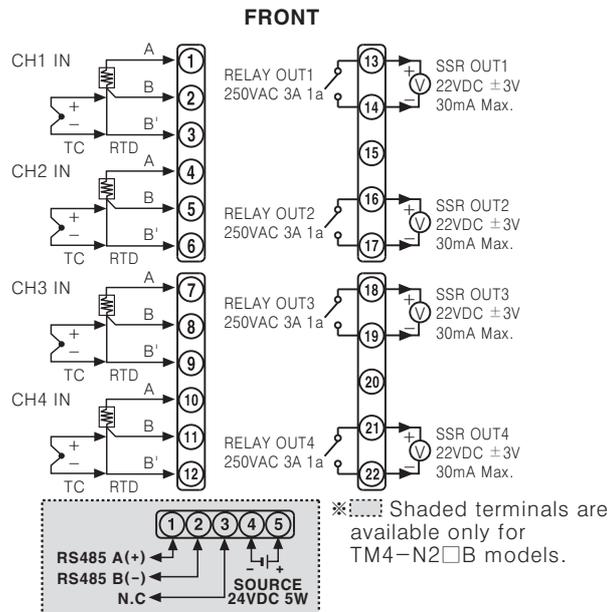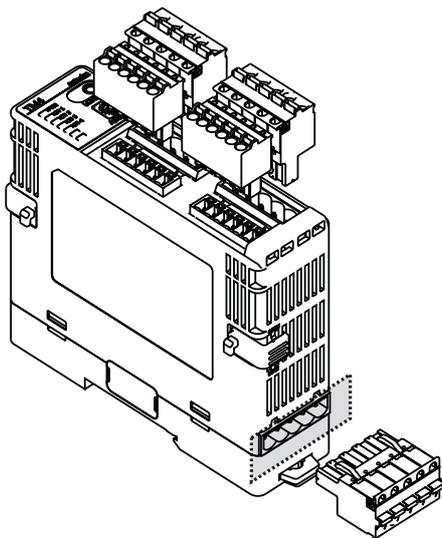
Multi Channel Modular Type Temperature Controller

■ Dimensions
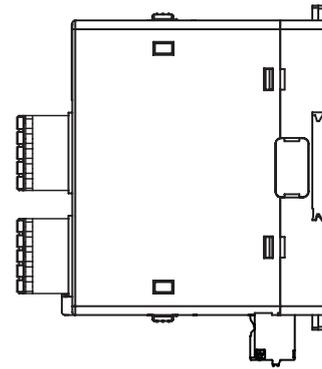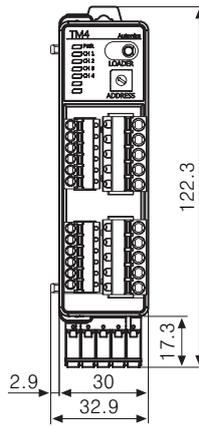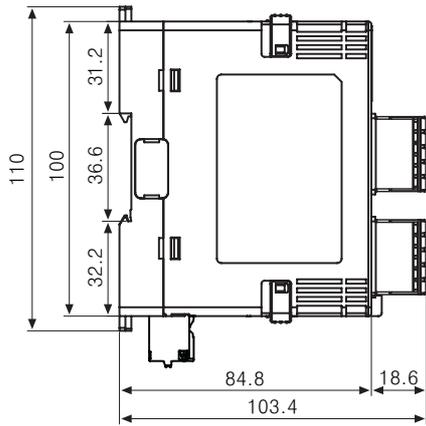
(Unit:mm)

■ Installation

● Connector connection

Input sensor connector

Control output connector

Power / Communication connector (Port B)
※ **TM4-N2☐B**

● Multi Module connection

TM4-N2☐B   **TM4-N2☐E**   **TM4-N2☐E**

※① Remove END cover for both basic modules and expansion modules.
  ② Insert expansion module connection connectors.
  ③ Connect an expansion module without space.
  ④ Fix the LOCK switch by pushing it in the LOCK direction.
  ⑤ Mount the END cover at each side.
※ Up to 30 expansion modules can be connected to a basic module.
  Use an adequate power supply system for the power input specifications
  and overall capacity.(Maximum power required when connecting 31 units)

● Bolt Inserting

① Pull each Rail Lock switch up and down.

② Insert the bolts to fix.
(Tightening torque is 0.5N · m ~ 0.9N · m.)

● DIN Rail Installation

[Installation Method]

① Put the top edge of the rail Lock on the top edge or the DIN rail.
② Push the module body in while pressing down.

[Removal Method]

① Press down the module body.
② Pull the module body forward.

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TM Series

Using END PLATE(Sold separately, Not available from Autonics), Fix firmly to attach.
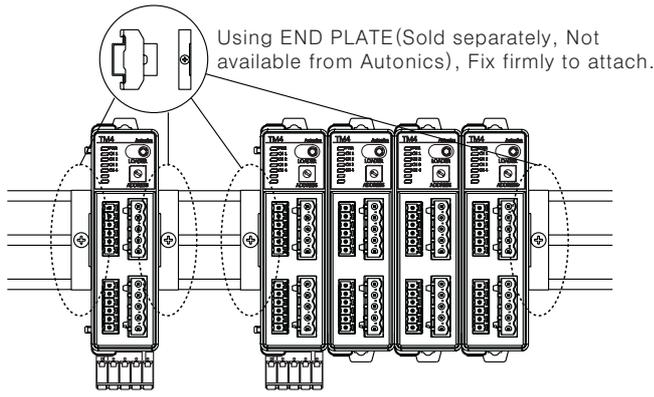
※**Make sure to install the unit vertically to the ground.**

Vertical Installation
(O)

Horizontal Installation
(X)
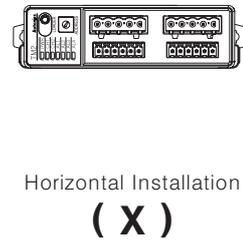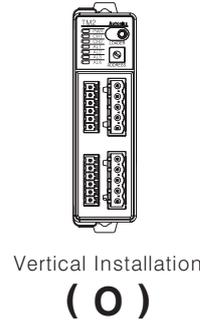
▣Parts description
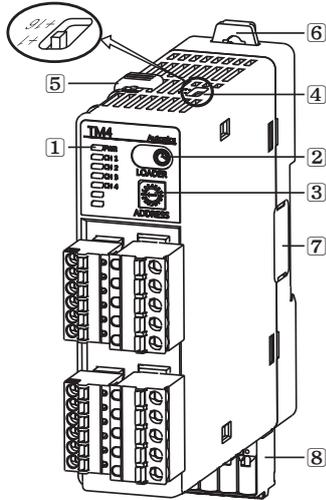
1 Indicating LED

Indicating LED ＼ Status	Initial power on(※1)	Control output	Auto tuning(※2)
PWR LED(※3)	Green	Green	Green
CH1 LED	2400bps− Flickering	ON − RED	Flickering
CH2 LED	4800bps− Flickering	ON − RED	Flickering
CH3 LED	9600bps− Flickering	ON − RED	Flickering
CH4 LED	19200bps− Flickering	ON − RED	Flickering
	38400bps− Flickering	—	—

※(*1)In case of initial power on, default communication speed will be flickering for 5 sec (1 sec cycle).
※(*2)Each CH3 LED will be flickering during auto tuning (1 sec cycle).
※(*3)Power LED will be flickering while communicating with external units (1 sec cycle).

2 PC loader port(Port A)：In case of PC parameter setting, use a dedicated loader (SCM−US, sold separately)
3 Communication address setting switch: Set a communication address
4 Lock switch : Used for fixing each module when connecting module units. (up/down side)
5 Rail Lock: Used for fixing units to DIN Rail or to the wall
6 Communication address group change switch: Set communication address group.
7 END Cover: Remove it when connecting each module.
8 Power supply / communications connector(PortB)：Only Basic module

▣Input range for the sensor

Input sensor			No.	Dot	Display	Input range(℃)	Input range(℉)
Thermocouple	K(CA)		0	1	K(CA).H	−200 ~ 1350	−328 ~ 2462
			1	0.1	K(CA).L	−200.0 ~ 1350.0	−328.0 ~ 2462.0
	J(IC)		2	1	J(IC).H	−200 ~ 800	−328 ~ 1472
			3	0.1	J(IC).L	−200.0 ~ 800.0	−328.0 ~ 1472.0
	E(CR)		4	1	E(CR).H	−200 ~ 800	−328.0 ~ 1472
			5	0.1	E(CR).L	−200.0 ~ 800.0	−328.0 ~1472.0
	T(CC)		6	1	T(CC).H	−200 ~ 400	−328 ~ 752
			7	0.1	T(CC).L	−200.0 ~ 400.0	−328.0 ~ 752.0
	B(PR)		8	1	B(PR)	0 ~ 1800	32 ~ 3272
	R(PR)		9	1	R(PR)	0 ~ 1750	32 ~ 3182
	S(PR)		10	1	S(PR)	0 ~ 1750	32 ~ 3182
	N(NN)		11	1	N(NN)	−200 ~ 1300	−328 ~ 2372
	C(TT)(*1)		12	1	C(TT)	0 ~ 2300	32 ~ 4172
	G(TT)(*2)		13	1	G(TT)	0 ~ 2300	32 ~ 4172
	L(IC)		14	1	L(IC).H	−200 ~ 900	−328 ~ 1652
			15	0.1	L(IC).L	−200.0 ~ 900.0	−328.0 ~ 1652.0
	U(CC)		16	1	U(CC).H	−200 ~ 400	−328 ~ 752
			17	0.1	U(CC).L	−200.0 ~ 400.0	−328.0 ~ 752.0
	Platinel II		18	1	PLII	0 ~ 1400	32 ~ 2552
RTD	JIS standard	JPt 100Ω	19	1	JPt100.H	−200 ~ 600	−328 ~ 1112
		JPt 100Ω	20	0.1	JPt100.L	−200.0 ~ 600.0	−328.0 ~ 1112.0
	DIN standard	DPt 100Ω	21	1	DPt100.H	−200 ~ 600	−328 ~ 1112
		DPt 100Ω	22	0.1	DPt100.L	−200.0 ~ 600.0	−328.0 ~ 1112.0

※(*1) C(TT)：Same as existing W5(TT).　　(*2) G(TT)：Same as existing W(TT).　　※Default：K(CA).H
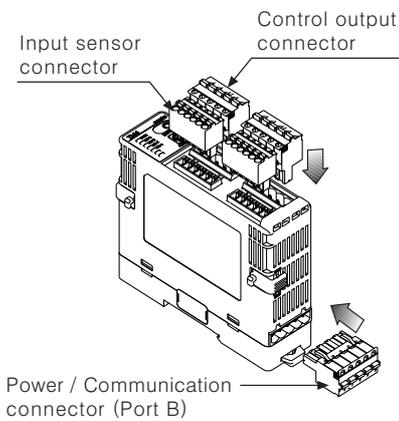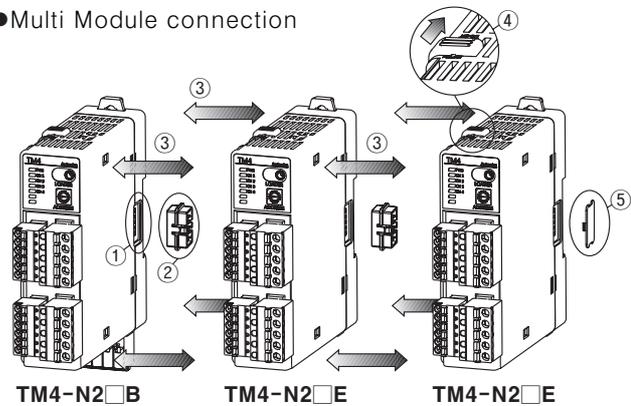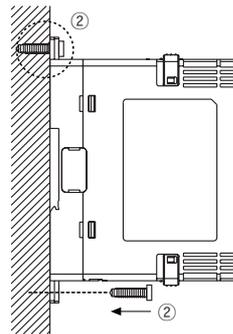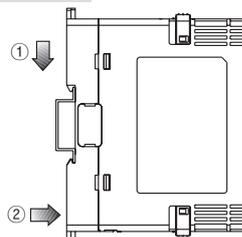
Autonics

Multi Channel Modular Type Temperature Controller

▣Error indication

	Input Sensor Open Error	Over Temperature Range
PWR LED		RED ON
CH1 LED		RED Flickering (for 0.5 sec)
CH2 LED		RED Flickering (for 0.5 sec)
CH3 LED		RED Flickering (for 0.5 sec)
CH4 LED		RED Flickering (for 0.5 sec)
Communication Output (decimal)	'31000' output	'30000 (upper limit)' output , '−30000 (lower limit)' output
Dedicated program	'OPEN' indication	'HHHH (upper limit)' indication , 'LLLL (lower limit)' indication

▣Communication setting

◎A function for external parameter setting & monitoring with PC or PLC.

●Interface

Application Standard	Compliance with EIA RS 485
Max. connection	31 units (communication address setting: 01 ~ 31)
Communication type	Two wire, Half Duplex
Synchronization method	Asynchronous
Communication distance	Max. 800m
Communication speed (bps)	2400, 4800, 9600 (default), 19200, 38400
Communication response time	5 ~ 99ms
Start Bit	1bit (fixed)
Stop Bit	1bit, 2bit (default)
Parity Bit	None (default), Odd, Even
Data Bit	8bit (fixed)
Protocol	Modbus RTU

※Overlapped address setting is not allowed on the same communication line.
Twisted Pair wires (for RS485 communication) must be used for communication cable.

●Communication speed indication
①Current communication speed will be flickering in case of initial power ON for 5 sec (1 sec cycle).

```
□ PWR
□ 2400
□ 4800
□ 9600
□ 19200
□ 38400
□
```
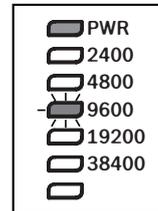
※One module communication is allowed for Port A. Communication speed is fixed to 9600bps.
※Multiple communication is allowed for Port B. It is required to reset controller's Power (Power OFF → Power ON) after changing communication speed.
※Simultaneous monitoring can not be done for port A and B since Port A is for parameter setting only.

●Communication address setting
①Set the communication address using SW1 and SW2.
Setting range is 01 ~ 31. (※In case setting 00, communication is not available.)

SW2 \ SW1		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	+1 / +16	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
	+1 / +16	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

※Default : SW1 : 1, SW2 : +1

▣Accessories [Sold separately]

●Communication converter
[SCM-38I (RS485 TO RS232)]

●Converter Cable [SCM-US (Serial TO USB)]

TM Series

▣Proper usage

◎Simple Failure Diagnosis

● When indicating LED is flickering every 0.5 sec or when error message is indicated on external units

① It represents input sensor open error. Cut off the power of controller and check input sensor connection. If sensor is properly connected, disconnect sensor line from the controller and short the input terminal (+) / (−). Then, make sure that current indoor temperature is indicated. If current indoor temperature is properly indicated, it represents no errors detected. If external unit displays 'HHHH' or 'LLLL', please contact our A/S center.

(Current indoor temperature checking is available only if selecting thermocouple type.)

② Make sure proper input sensors are selected.

● When no output is operated

① Check output indicating LED at the front. In case output indicating LED does not work properly, please check each parameter setting again. In case output indicating LED works properly, disconnect the output terminal and check controller's output type (relay contact, SSR, Current) again.

● When external units receive no response or error data

① Check communication converter first. [RS−485 to serial converter (SCM−381, sold separately), serial to USB converter (SCM−US, sold separately)]

② Do not install the unit with overlapping communication converter lines and AC power supply lines.

③ Use separate power supply (24VDC) for communication converter if possible.

④ Strong external noise could be a possible cause for this symptom. Please contact our A/S center. In addition, analyze the main cause that triggers strong noise and take measures to prevent it. Even though this unit complies with proper noise resistance standards, consistent noise induction could affect internal circuit break.

● When communication does not work properly

① Check converter's power supply and connection.

② Check communication setting.

③ Check main body's connections to external units.

● When changing input sensors, power off the controller first. Connect input sensors as specified and supply the power again. Then, change & download related parameters using PC loader program.

● Use (−) driver screws (2mm) or use plastic driver screws. If not, it might cause product damage.

● Twist Pair wires must be used for communication cable. Connect Ferrite Bead at each end of line in order to reduce the effect of external noise.

● Avoid installing the unit with overlapping communication line and AC power line together.

● Draw a draft while using the controllers. In case of installing at a closed area, please take measures for ventilation.

● Installation environment
① It shall be used indoor
② Altitude Max. 2000m
③ Pollution Degree 2
④ Installation Category II.

◎Caution for using

● Use DC power only.

● Keep the ambient temperature −10℃ ~ 50℃.

● For more accurate controlling, start temperature controlling approx. 20 minutes later after connecting input sensors and supplying power.

● In case indicating accuracy does not meet the specification, check Input Bias parameter first.

● Power switch or a circuit breaker must be installed for proper application.

● Make sure that the power switch or a circuit breaker installed near operators.

● This unit is solely allowed for temperature controlling application. Do not apply this unit as a voltage meter or current meter.

● When line extension is required, please use specified compensation line. If not, there occurs temperature difference at the joint part between thermocouples and extension lines.

● In case of using RTD, line connection must be done with 3 wires. When line extension is required, use the same wire with material, thickness and length. Different line resistance may cause temperature difference.

● Make sure controller's line connection must be separated from high voltage line or power supply line in order to prevent induced noise.

● If it is required that power supply line should be connected near input signal line, use line filter on controller's power supply line and input signal line must be shielded.

● Avoid installing controllers adjacent to high frequency noise generating units including high frequency soldering machine, high frequency sewing machine, and high capacity SCR controllers and motors.

● Avoid using the unit near radio, TV or wireless machines that may cause high frequency interference.

TOS/TOM/TOL

Analog and Non-indicating type, Set temperature by dial

▣Features

- Non-indicating type
- Setting temperature by Dial
- Includes burn out function
- Universal power : TOS

⚠	Please read "Caution for your safety" in operation manual before using.

c**ᴿᵁ**us

(TOS Series only)

▣Ordering information

T	O	S	–	B	4	R	P	4	C

Unit		C	℃
		F	°F

Temperature range		X	0~60
		1	0~100
		2	0~200
		3	0~300
		4	0~400
		6	0~600
		8	0~800
		A	0~1000
		C	0~1200

Sensor input type		P	Pt100Ω
		J	J(IC)
		K	K(CA)

Control output		R	Relay output
		S	SSR drive output

Power supply		3	110/220VAC 50/60Hz
		4	100-240VAC 50/60Hz

Control method		P	Proportional control
		F	ON/OFF control
		B	ON/OFF, Proportional control

Size		S	DIN W48×H48mm
		M	DIN W72×H72mm
		L	DIN W96×H96mm

Digit		O	Non-indicating

Item		T	Temperature

※**See C-72 about sensor temperature range for selection.**

Analog Setting Non-Indicating Type

▣Temperature range for each sensor

Model	TOS / TOM / TOL		
Sensor input type	Thermocouples		RTD
	J(IC)	K(CA)	Pt100Ω

▣Specifications

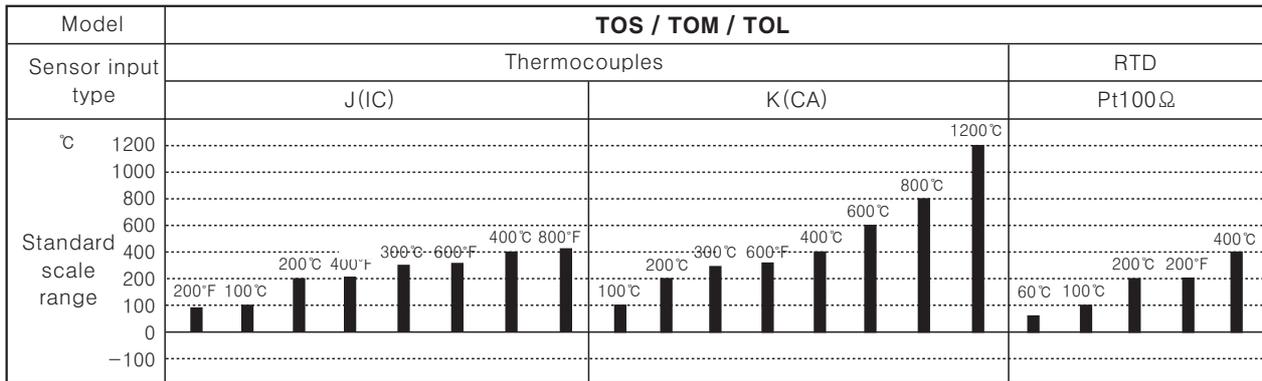| Model		TOS	TOM	TOL
Power supply		100－240VAC 50/60Hz	110/220VAC 50/60Hz	
Allowable voltage range		90 ~ 110% of rated voltage		
Power consumption		2.2VA	3VA	
Display method		LED ON	LED ON/OFF	
Setting type		Dial setting		
Setting accuracy		F · S ±2%		
Sensor input		Thermocouples : K(CA), J(IC) / RTD : Pt100Ω		
Input line resistance		Thermocouples : Max. 100Ω, RTD : Max. 5Ω per a wire		
Control	ON/OFF	Hysteresis : F · S 0.5 ±0.2% fixed		
	Proportional	Proportional band : F · S 3% fixed, Period : 20sec. fixed		
Control output		• Relay output : 250VAC 2A 1c • SSR drive output : 12VDC ±3V Load 20mA Max.	• Relay contact output : 250VAC 3A 1c • SSR drive output : 12VDC ±3V 20mA max.	
Self－diagnosis		Includes burn out function		
Insulation resistance		Min. 100MΩ (at 500VDC mega)		
Dielectric strength		2000VAC 50/60Hz for 1 minute		
Noise strength		±1kV the square wave noise(pulse width:1μs) by the noise simulator		
Vibration	Mechanical	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour		
	Malfunction	0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes		
Shock	Mechanical	300m/s² (Approx. 30G) 3 times at X, Y, Z direction		
	Malfunction	100m/s² (Approx. 10G) 3 times at X, Y, Z direction		
Relay life cycle	Mechanical	Min. 10,000,000 times		
	Electrical	Min. 100,000 times(250VAC 3A at resistive load)		
Ambient temperature		−10 ~ +50℃ (at non−freezing status)		
Storage temperature		−20 ~ +60℃ (at non−freezing status)		
Ambient humidity		35 ~ 85%RH		
Aproval		c Ⓤus	———	———
Unit weight		Approx. 104g	Approx. 419g	Approx. 426g

※F.S is same with sensor measuring temperature range.
　Ex) In case of using temperature is from 0~800℃, Full scale is "800".

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

TOS/TOM/TOL

▣ Connections

※RTD（Resistance Temperature Detector）：Pt 100Ω（3-wire type）　※Thermocouple：K, J, R

● TOS

CONTACT OUT:
250VAC 2A 1c
RESISTIVE LOAD

SSR OUT:
12VDC ±3V
20mA Max.

SENSOR

T.C RTD

⚠ SOURCE
100-240VAC
50/60Hz

● TOM

CONTACT OUT:
250VAC 3A 1c
RESISTIVE LOAD

SSR OUT:
12VDC ±3V
20mA Max.

SENSOR

RTD　T.C

⚠ SOURCE
220VAC
50/60Hz

110VAC
50/60Hz

0V

● TOL

CONTACT OUT:
250VAC 3A 1c
RESISTIVE LOAD

SSR OUT:
12VDC ±3V
20mA Max.

220VAC
50/60Hz

110VAC
50/60Hz

⚠ SOURCE

0V

RTD　T.C

SENSOR

▣ Dimensions

● TOS

48

92

13　64　15

48　60

45

● Panel cut-out

Min. 53

Min. 62

$45^{+0.6}_{-0}$

$45^{+0.6}_{-0}$

(Unit:mm)

※Socket：PG-08, PS-08（Sold separately）

Analog Setting Non-Indicating Type

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller
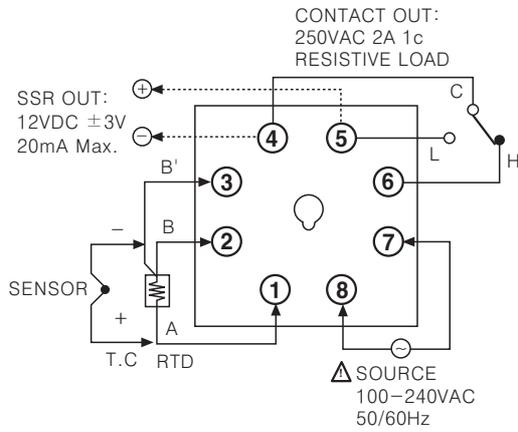
(O)
Graphic
panel

(P)
Field
network
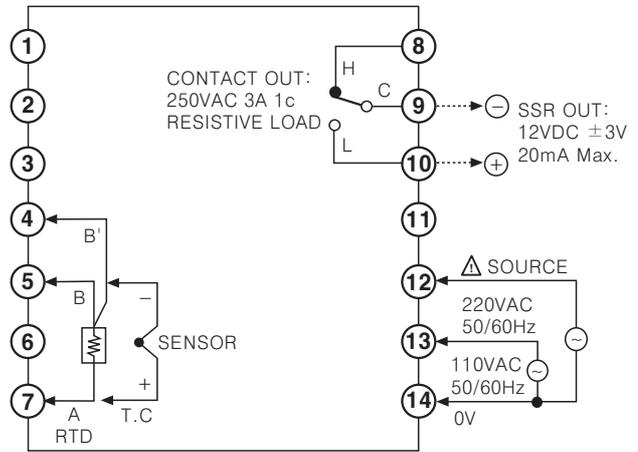device

(Q)
Production
stoppage
models &
replacement

▣ Dimensions

● TOM

72
72
89

TOM Autonics

132
20 102 10
67

● Panel cut-out

Min. 91
Min. 91
$68^{+0.7}_{-0}$
$68^{+0.7}_{-0}$

(Unit: mm)

● TOL, TDL

96
96
108

ON ◀   ▶ OFF
°C
C
TOL Autonics

121
21 87 13
90

● Panel cut-out

Min. 116
Min. 116
$92^{+0.8}_{-0}$
$92^{+0.8}_{-0}$

(Unit: mm)

▣ Proper usage

◎ Application of temperature controller and load connection
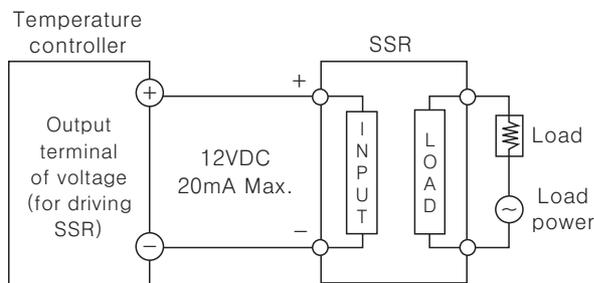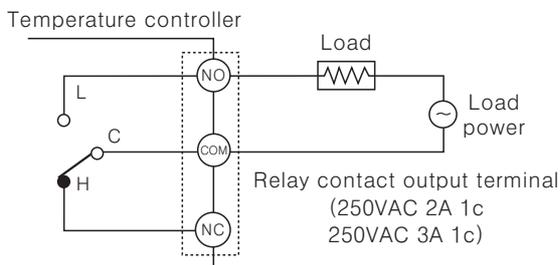
● SSR output

Temperature controller

Output terminal of voltage (for driving SSR)

12VDC 20mA Max.

SSR

INPUT LOAD Load

Load power

● Relay output

Temperature controller

Load

L
C
H

NO
COM
NC

Load power

Relay contact output terminal
(250VAC 2A 1c
250VAC 3A 1c)

◎ Normal/Reverse operation

Reverse operation executes to output ON when processing value is lower than setting value, and it is used for heating.
Normal operation is executed conversely and used for cooling.
(This item runs as a reverse operation.)

◎ How to select ON/OFF or proportional by plug pin

Factory specification is proportional control. When using ON/OFF control, transfer the switch of control method from P to F after detaching the case from its body.

Note) Several models require to change control method by jump line or solder.

P   F   P   F

Proportional control   ON/OFF control
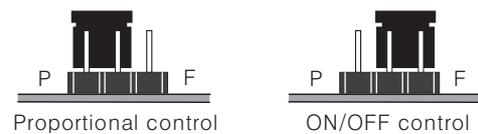
◎ Case detachment

● TOM, TOL
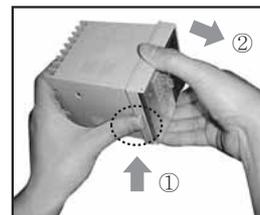
Pressing the front guide of Lock toward ① and squeeze and pull toward ②, it is detached.

● TOS

Pressing Pin plug ①, raise it up with a driver as ② and it is detached.

Контроллер с двойной функцией авто настройки PID регулятора.

▣ Характеристики

- Двойная функция автонастройки PID регулятора: два режима получения ответа - высокоскоростной и низкоскоростной. Если нужно получать текущее значение быстро, то нужно работать в высокоскоростном режиме (PIDF), если нужно минимизировать погрешности, невзирая на уменьшение скорости ответа, используйте низкоскоростной режим.

- Высокая точность определения:
  Точность : + 0.3% (от полной шкалы каждого выхода)

- Двухступенчатая функция автонастройки.

- Функция мульти-входа:
  13 видов функции мульти-входа, таких как температурный датчик, выбор функции напряжения и тока.

- Функция различных Sub выходов:
  LBA, SBA 7 видов защиты на выходе, 4 вида предупреждающих функций. Встроенное значение выходной передачи (4 - 20 мА), выход RS485.

- Отображает десятичных знаков для аналогового входа.

⚠ Перед включением ознакомьтесь с разделом "Меры предосторожности" в руководстве по эксплуатации.

c ⓊⓁus C E Ⓡ АИ50

▣ Информация для заказа

TZ	4	M	—	1	4	R

Выход		R	Релейный выход		
		S	SSR выход		
		C	Выход по току (4 - 20мА=)		
Питание (•1)		2	24 В~/24-48 В= 50/60Гц		
		4	100 - 240 В~ 50/60Гц		
Sub выход	TZ4SP/TZN4S	1	Этап 1 выход		
	TZ4ST	1	Этап 1 выход		
		2	Этап 1 + Этап 2 выход мА		
		R	Этап 1 + Передача на выходе 4 - 20мА		
	и т.д.	1	Этап 1 выход		
		2	Этап 1 + Этап 2 выход		
		R	Этап 1 + Передача на выходе 4 - 20мА=		
		A	Этап 1 + Этап 2 + Передача на выходе 4 - 20мА=		
		T	Этап 1 + Rs485		
		B	Этап 1 + Этап 2 + Rs485		
Размер	TZN4	S	DIN размеры ш48 х в48 мм (блочный тип)		
	TZ4	SP	DIN размеры ш48 х в48 мм (штепсельный тип)		
		ST	DIN размеры ш48 х в48 мм (блочный тип)		
	TZ4/TZN4	M	DIN размеры ш 72 х в 72 мм		
		W	DIN размеры ш 96 х в 48 мм		
		H	DIN размеры ш 48 х в 96 мм		
		L	DIN размеры ш 96 х в 96 мм		
Цифры		4	4 цифры		
Тип		TZ	Температурный PID регулятор		
		TZN	Температурный PID регулятор новый тип		

(*1) Только для серий TZ4SP, TZ4ST, TZ4L, TZN4H

Контроллер с двойной функцией авто настройки PID регулятора

▣ Спецификации

• Отмеченные цветом (☐) являются усовершенствованными функциями.

А

Счетчики

Б

Таймеры

В

Темп. контроллеры

Г

Измерители

Д

Счетчики импульсов

Е

Сенсорные контроллеры

Серия		TZ4SP TZN4S	TZ4ST	TZ4M TZN4M	TZ4W TZN4W	TZ4H TZN4H	TZ4L TZN4L
Напряжение питания		100-240В~ 50/60Гц, 24В~ 50/60Гц / 24-48В=					
Допустимый диапазон напряжений		90~110% от источника питания					
Потреб. мощность		Приблизительно 5ВА		Прибл. 6ВА (низкое потребление) AC: Прибл. 8ВА, DC:Прибл. 7Вт)			
Индикация		7-сегментная светодиодная [Текущее значение (PV): красный, Установочное значение (SV): зеленый]					
Размеры		**TZ4SP >** W4.8•H7.8мм **TZN4S >** PV:W7.8•H11мм SV:W5.8•H8мм	W4.8xH7.8мм	**TZ4M >** PV:W9.8xH14.2мм SV:W8xH10мм **TZN4M >** PV:W8xH13мм SV:W5xH9мм	W8xH10мм	**TZ4H >** W3.8xH7.6мм **TZN4H >** PV:W7.8xH11мм SV:W5.8xH8мм	PV:W9.8xH14.2мм SV:W8xH10мм
Вход	Термопара	K(CA), J(IC), R(PR), E(CR), T(CC), S(PR), N(NN), W(TT) <Максимальный допуск сопротивления 100 ОМ на каждый провод>					
	RTD	Pt100 ОМ, JIS Pt100 ОМ, 3 типа проводов <Максимальный допуск сопротивления 5 ОМ на каждый провод>					
	Аналоговый	1-5В=, 0-10В=, 4-20мА=					
Выход	Ответ	250В~ 3А 1с					
	SSR	12В~ ±3В 30мА Макс.					
	Ток	Пост. 4-20мА Максимальная нагрузка 600 Ом Макс.					
Sub Выход	Трансмиссия	———	PVТрансмиссия : Пост. 4-20мА Максимальная нагрузка 600 Ом				
	Случай 1	250В~ 1А 1a					
	Случай 2	———	250В~ 1А 1a				
	Связь	———	———	PV трансмиссия, SV установка			
Тип регулирования		ВКЛ./ВЫКЛ. регулирование P, PI, PD, PIDF, PIDS					
Точность отображения		F.S ± 0.3% or 3⁰ C(Выше одного)					
Тип установки		С помощью кнопок на передней панели прибора					
Запаздывание		Настройка 1~100 ºC(0.1~100.0 ºC) при ВКЛ./ВЫКЛ. регулировании					
Аварийный выход		Переменный аварийный выход ВКЛ./ВЫКЛ. 1~100 (0.1~100.0) ºC для аварийного выходы					
Диапазон пропорционального регулирования		0.0 ~ 100.0%					
Интегральное время		0 ~ 3600сек					
Время преобразования		0 ~ 3600сек					
Время регулирования		1 ~ 120сек					
Время выборки		0.5сек					
LBA установ. время		1 ~ 999сек					
Установ. время рампы		Подъем Рампы, Спуск Рампы 1~99мин.					
Пробивное напряжение		2000В~ 50/60Гц в минуту					
Вибрации		0.75 мм амплитуда при частоте 10-55Гц в X, Y,Z направлениях за 2 часа					
Цикл реле	Гл. выход	Механический: : Мин 10,000,000 раз, Электрический : Min. 100,000 раз(250В~ 3А активной нагрузки)					
	Доп.(Sub)	Механический: : Мин. 20,000,000 раз, Электрический : Мин. 300,000 раз (250В~ 1А активной нагрузки)					
Входное сопротивление		Мин. 100Ом (при 500В=)					
Уровень шума		прямоугольный сигнал шума (ширина импульса 1мкс) при имитации помех ±1.2кВ					
Сохранение в памяти		10 лет (без подачи напряжения и при использовании полупроводникого типа памяти)					
Температура окр. среды		-10 ~ 50 ºC					
Температура хранения		-20 ~ 60 ºC					
Влажность		35 ~ 85%RH					
Сертификаты		CE c℞us PG A
Au50					
Вес		TZ4SP: Приблизительно 136г TZN4S: Приблизительно 150г	Приблизительно 136г	Приблизительно 270г	TZ4W: Приблизительно 270г TZN4W: Приблизительно 259г	Приблизительно 259г	Приблизительно 360г

* Низкое напряжение только для серий TZ4SP, TZ4ST, TZ4L, TZN4M.

▣ Подсоединение

* RTD (Резистивный датчик температуры) : DIN Pt 100 Ом (3-х проводного типа), JIS Pt 100 Ом (3-х проводного типа)
* T.C. (Термопара) : K, J, R, E, T, S, W, N
* В случае аналогового выхода используйте T.C вход и проверьте полярность.

• **TZN4S**

ВЫХОД	
SSR	Ток
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 Ом Макс.

• **TZN4M**

ВЫХОД	
SSR	Ток
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 Ом Макс.

• **TZ4SP**

ВЫХОД	
SSR	Ток
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 Ом Макс.

• **TZ4ST**

ВЫХОД		Sub выход
SSR	Ток	PV Выход передачи
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 ОМ Макс.	4-20мА= Нагрузка 600 Ом Макс.

• **TZ4M**

ВЫХОД	
SSR	Ток
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 ОМ Макс.
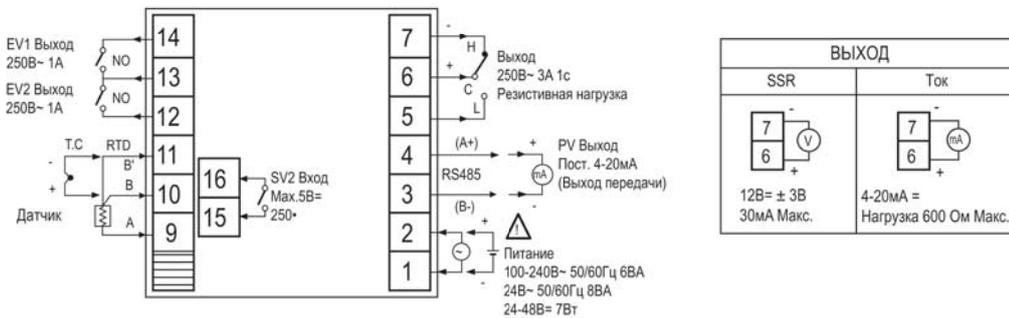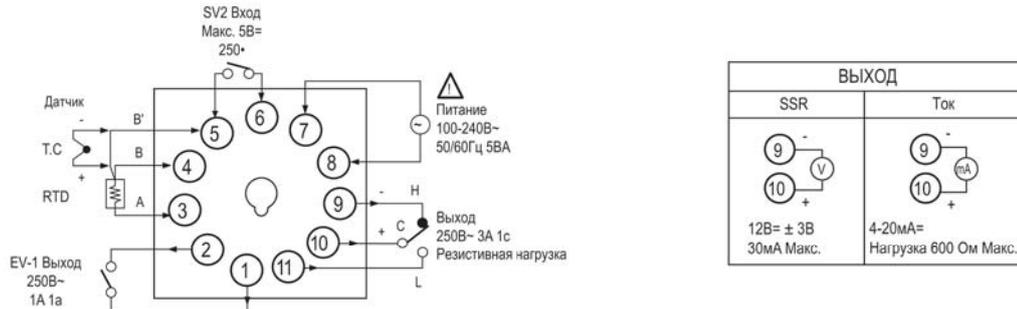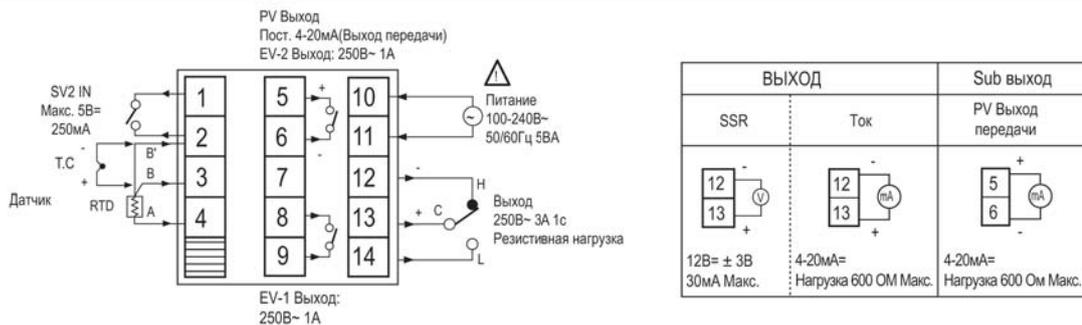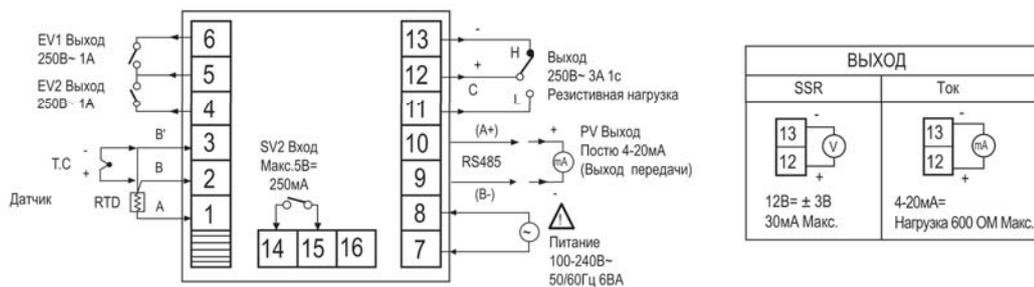
Контроллер с двойной функцией авто настройки PID регулятора

• TZ4W/TZN4W

Выход
250В~ 3A 1c
Резистивная нагрузка

PV Выход
Пост. 4-20мА
(Выход передачи)

RS485 (A+)   RS485 (B-)

Питание
100-240В~
50/60Гц 6ВА

H   L   C

| 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |

NO   NO

EV1 Выход
250В~ 1A

EV2 Выход
250В~ 1A

SV2 Вход
Макс.5В=
250мА

RTD   B'   B   A

T.C   Датчик

ВЫХОД

SSR	TOK
15 / 14 (V)	15 / 14 (mA)
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 Ом Макс.

• TZ4H / TZN4H

EV1 OUT 250В~ 1A   NO   8
EV2 OUT 250В~ 1A   NO   7
                        6
SV2 IN Max.5В= 250В=   5
                        4
T.C   B'   3
      B   2
SENSOR A   1

17
16
15   H
14   C   Выход 250В~ 3A 1c Резистивная нагрузка
13   L
12   (A+) +   PV Выход Пост. 4-20мА (Выход передачи)
11   RS485 (B-)
10   Питание 100-240В~ 50/60Гц 6ВА
9

ВЫХОД

SSR	TOK
15 / 14 (V)	15 / 14 (mA)
12В= ± 3В 30мА Макс.	4-20мА Нагрузка 600 Ом Макс.

• TZ4L / TZN4L

EV1 Выход 250В~ 1A   NO   8
EV2 Выход 250В~ 1A   NO   7
                          6
SV2 Вход Макс.5В= 250мА   5
                          4
T.C   B'   3
      B   2
Датчик A   1

17
16
15   -   H   MAIN Выход 250В~ 3A 1c Резистивная нагрузка
14   +   C
13   L
12   (A+) + PV Выход Пост. 4-20мА (Выход передачи)
11   RS485 (B-)
10   Питание 100-240В~ 50/60Гц 6ВА
9   24В~ 50/60Гц 8ВА
                         24-48В= 7Вт

ВЫХОД

SSR	TOK
15 / 14 (V)	15 / 14 (mA)
12В= ± 3В 30мА Макс.	4-20мА= Нагрузка 600 Ом Макс.

•Размеры

• TZN4S

• Крепеж

48
48 / 60

100
10   78   12
45

• Профиль панели

Мин. 55
45 +0.6/-0
Мин. 62
45 +0.6/-0

(Единицы измерения: мм)

• TZN4M

84
72
72

95
10   73   12
67

• Профиль панели

Мин. 91
68 +0.7/-0
Мин. 91
68 +0.7/-0

(Единицы измерения: мм)

А   Счетчики
Б   Таймеры
В   Темп. контроллеры
Г   Измерители
Д   Счетчики импульсов
Е   Сенсорные контроллеры

Серия TZN/TZ

▣ Размеры

• TZ4SP
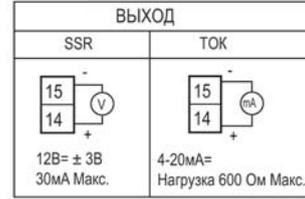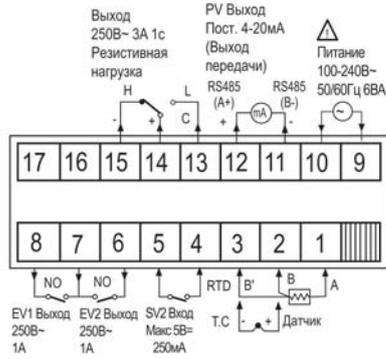
48 / 48 / 60

107 / 12 / 80 / 15 / 45

• Профиль панели

Мин. 55 / Мин. 62 / 45 $^{+0.6}_{-0}$ / 45 $^{+0.6}_{-0}$

• TZ4ST

48 / 48 / 60

107 / 12 / 87 / 8 / 45
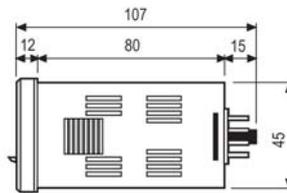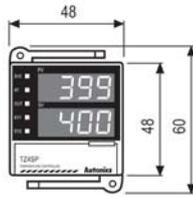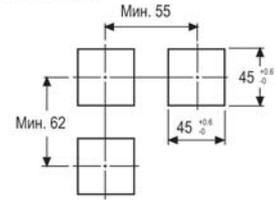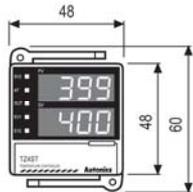
• Крепеж
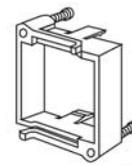
(Единицы измерения: мм)

* Так как TZ4SP имеет такие же паспортные данные как и TZ4ST , лампа не работает , несмотря на то, что есть EV2 выходной сигнал.

• TZ4M

72 / 72 / 86

113 / 13 / 90 / 10 / 68

• Профиль панели

Мин. 74 / Мин. 90 / 68 $^{+0.7}_{-0}$ / 68 $^{+0.7}_{-0}$

(Единицы измерения: мм)

• TZ4H   • TZN4H

48 / 96 / 108

48 / 96 / 108

113 / 13 / 90 / 10 / 90

• Профиль панели

Мин. 50 / Мин. 112 / 92 $^{+0.8}_{-0}$ / 45 $^{+0.6}_{-0}$

(Единицы измерения: мм)

• TZ4W

108 / 96 / 48

113 / 13 / 90 / 10 / 45

• Профиль панели

Мин. 112 / Мин. 50 / 45 $^{+0.6}_{-0}$ / 92 $^{+0.9}_{-0}$

• TZN4W

108 / 96 / 48

(Единицы измерения: мм)

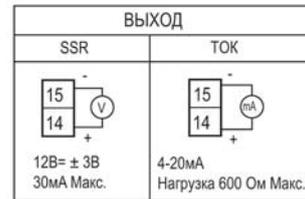# Контроллер с двойной функцией авто настройки PID регулятора

А

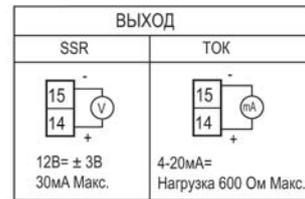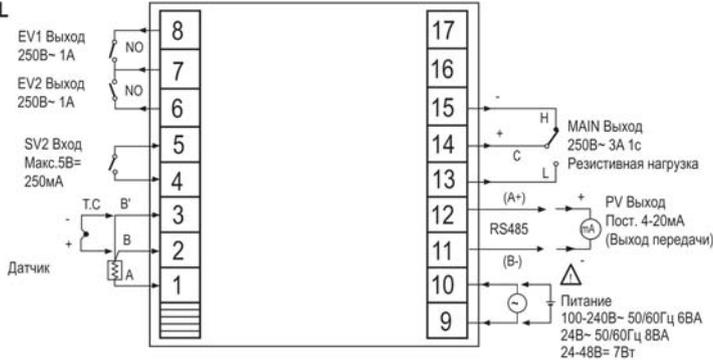Счетчики

Б

Таймеры

В

Темп. контроллеры

Г

Измерители

Д

Счетчики импульсов

Е

Сенсорные контроллеры

• TZ4L   • TZN4L   • Профиль панели
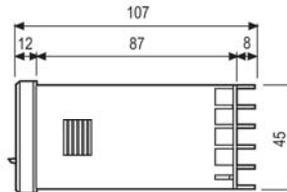

(Единицы измерения: мм)
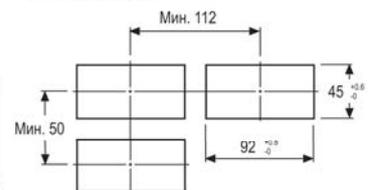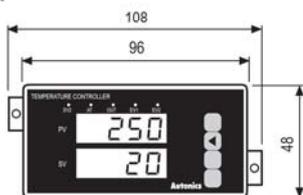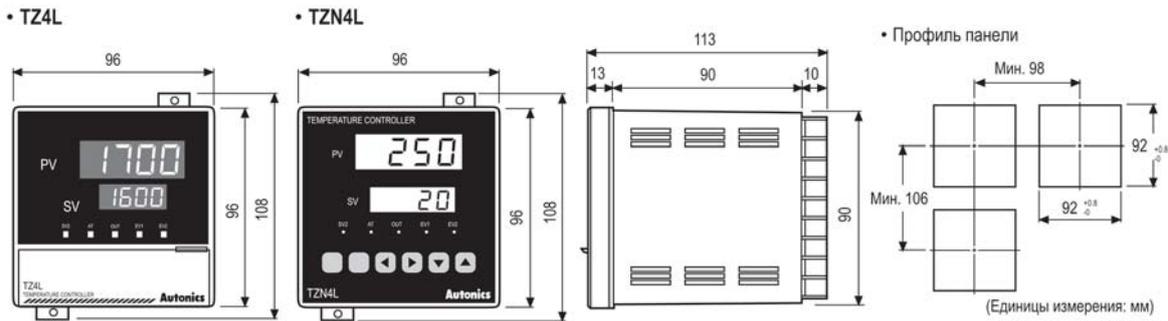
▣ Передняя панель прибора

• TZN4S   • TZN4M
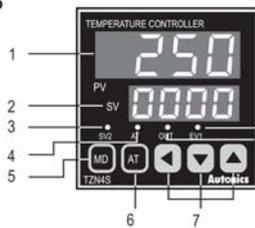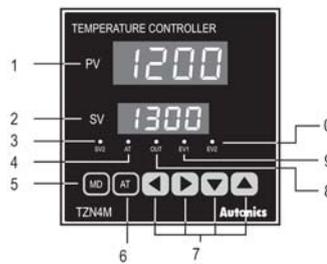
• TZ4ST/TZ4SP   • TZ4M
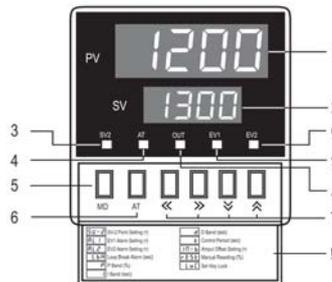
1 : PV : Текущее дисплейное значение (Красный)

5 : MD клавиша : Клавиша режимов

9 : EV1 : Индикация выхода СОБЫТИЕ1

2 : SV : Установочное дисплейное значение (Зеленый)

6 : AT клавиша : Индикация пуска автонастройки

10 : EV2 : Индикация выхода СОБЫТИЕ2

3 : Индикация операции SV2

7 : Установочные клавиши

11 : Порядок установочных клавиш

4 : AT клавиша : Индикация автонастройки

8 : OUT : Индикация выхода

* Так как TZ4SP имеет такие же паспортные данные как и TZ4ST , лампа не работает , несмотря на то, что есть EV2 выходной сигнал.

* В моделях TZ4P, TZ4M нет клавиш ▶ (≫) .

* Индикатор контроля выхода (OUT) не работает, когда он используется в качестве токового выхода.

▣ Как менять установочное значение

1   При изменении установочного значения в режиме RUN, нажмите клавишу ◀ (≪) 10^0 цифра будет мигать при SV.

2   Нажмите клавишу ◀ (≪), вспышка будет перемещаться шаг за шагом.

3   Если мигает цифра, нажмите ▼ (≫) , ▲ (≪) и измените установочное значение.

4   Нажмите клавишу MD , когда закончиться установка. Мигание закончиться и прибор вернется в режим RUN.

* Выше приведенное описание справедливо для TZ4M. В случае TZ серии используйте клавиши в группе установочных кнопок.

В моделях TZ4S, TZ4SP и TZ4ST нет клавиш ▶ (≫) . Она не используется для изменения или установки значения.

Серия TZN/TZ

▣ Блок-схема для первой установочной группы.

| RUN | При удерживании ⓂⒹ дольше 3с. Переходим в режим первой блок-схемы. |

ⓂⒹ

SU-2 SV-2 установка — **0** — Установка значения SV-2 в пределах диапазона для каждого датчика

ⓂⒹ

AL 1 Темп.защита 1 — **10** — Установка температуры аварийного выхода, выбирая EV-1. Диапазон установки находится в пределах диапазона каждого датчика.

ⓂⒹ

AL2 Темп. защита 2 — **10** — Установка температуры аварийного выхода, выбирая EV-2. Диапазон установки находится в пределах диапазона каждого датчика.

ⓂⒹ

L bA Аварийный разрыв цепи — **999** — Установка времени АРЦ (аварийного разрыва цепи) от 0-999с.

ⓂⒹ

AHYS Аварийный гистерезис — **2** — Установка интервала между ON и OFF для аварийного выхода от 1 до 100℃ (Десятичный вид: 0.1 - 100.0 ℃), отображается только для температурного аварийного выхода.

ⓂⒹ

P Пропорциональный диапазон — **3.0** — Установка пропорционального диапазона от 0.0 до 100%. Если значение P = 0.0, то будет контроль ON/OFF.

ⓂⒹ

I Интегральное время — **0** — Установка интегрального времени от 0 - 3600с. При I = 0с., функция выключена. Не отображается при P = 0,0 (контроль ВКЛ/ВЫКЛ)

ⓂⒹ

d Диффере-нциальное время — **0** — Установка дифференциального времени от 0 - 3600с. При D = 0с., функция выключена. Не отображается при P = 0,0 (контроль ВКЛ/ВЫКЛ)

ⓂⒹ

t Контрольный период — **20** — Установка пропорционального контрольного цикла от 1 - 120с. В случае выходного SSR, это значение маленькое (2с.).

ⓂⒹ

HYS Гистерезис — **2** — Установка гистерезиса от 1 до 100 ℃ (Десятичный вид: 0.1 - 100.0 ℃). Функция используется для контроля ON/OFF (ВКЛ./ВЫКЛ,) .

ⓂⒹ

In-b Входная коррекция — **0** — Коррекция ошибки на входе датчика от -49 - +50 ℃ (Десятичный тип: -50.0 - 50.0С)

ⓂⒹ

rESt Ручной сброс — **0.0** — Установка сброса вручную, значение от 0.0 - 100.0%. Действует только для Р типа, не для PID.

rАPU Увеличение по рампе — **0** — Установка увеличения по рампе - время от 1-99 мин.

rАPd Падение по рампе — **0** — Установка падения по рампе - время от 1-99 мин. Только при выборе RAMP функции. В установочной группе 2

ⓂⒹ

LoC Блокировка — **oFF** — Блокировка установочного значения.

↑▼↓▲ — **on** — Данная функция - для блокировки установочного значения. Доступна при работе с AT ключем.

↑▼↓▲ — **on 1** — При выборе ON1, изменение установочного значения в первой установочной группе и клавиши AT на передней панели не возможно.

ⓂⒹ

* При нажатие клавиши ◀ (<<) начинает мигать разряд, мигающий разряд смещается нажатием клавиш ◀ , ▶ , (<<), (>>), а значение изменяется клавишами ▼ , ▲ ,(ⱴ), (ⱱ). После чего, при нажатии ⓂⒹ данные будут изменены и на дисплее отобразится след. режим.
* При удерживании ⓂⒹ больше 3с, счетчик вернется в рабочий режим.
* Если ни одна из клавиш не нажата в течение 60с ,при изменении предустановок, счетчик возвращается в рабочий режим.
* Если режимы принадлежащие ко второй установочной группе AL 1, AL2, LbA, I, d, t, HYS, rESt, rАPU, rАPd не устанавливаются , то их необходимо пролистать и переходить к следующему режиму.

▣ Заводские установки (первая установочная группа).

Режим	Уст. значение	Режим	Уст. значение	Режим	Уст. значение	Режим	Уст. значение
SU-2	0	AHYS	2	t	20	rАPU	10
AL 1	10	P	3.0	HYS	2	rАPd	10
AL2	10	I	0	In-b	0	LoC	oFF
LbA	600	d	0	rESt	0.0		

Autonics

Контроллер с двойной функцией авто настройки PID регулятора

А
Счетчики
Б
Таймеры
В
Темп. контроллеры
Г
Измерители
Д
Счетчики импульсов
Е
Сенсорные контроллеры

▣ Блок-схема для второй установочной группы.

RUN — При одновременном нажатии (MD) и (☆) дольше 3с. из рабочего режима переходим во вторую установочную группу.

Тип температ. датчика	Темп. защита1	Темп. Защита2	Аварийный режим	Режим Авто настройки	Режим PID контроля	Режим нагрева& охлаждения	Тип датчика	Масштаб max. предел	Масштаб min. предел	Десятичная точка
In-t	EU-1	EU-2	AL-t	Att	PIdt	o-Ft	Unit	H-SC	L-SC	dot

ЧCA.H	LbA	LbA	AL-A	tun1	PI dS	HEAt	°C	1300	-100	0
ЧCA.L	SbA	SbA	AL-b	tun2	PI dF	Cool	°F			0.0
JIC.H	AL-0	AL-0	AL-C							0.00
JIC.L	AL-1	AL-1	AL-d							0.000
r Pr	AL-2	AL-2								
ECr.H	AL-3	AL-3								
ECr.L	AL-4	AL-4								
tCC.H	AL-5	AL-5								
tCC.L	AL-6	AL-6								
S Pr										
П nn										
U tt										
JPt.H										
JPt.L										
dPt.H										
dPt.L										
A--1										
A--2 (*1)										
A--3										

(*2) Установка адресной связи / Установка адресной связи — (*2) Нижний предел на выходе / Верхний предел на выходе

Тип темпер. датчика	Режим блокировки	Установка адресной связи	Установка адресной связи	Функция рампы	Нижний предел на выходе	Верхний предел на выходе
In-t	LoC	AdrS	bPS	rAnP	FS-L	FS-H

	on	1	9600	oFF	-100	1300
	oFF	118		on		
		24				

In-t	Тип входного датчика: 19 видов	dot	Выбор положения десятичной точки
EU-1	Темп. защита 1: выбор из 9 видов	FS-H	Установка верхнего масштабного предела, при выходной ретрансмиссии (20мА)
EU-2	Темп. защита 2: выбор из 9 видов		
AL-t	Аварийный выход: выбор из 4 видов	FS-L	Установка нижнего масштабного предела, при выходной ретрансмиссии (4мА)
At.t	Авто настройка: выбор 1или 2		
PIdt	PID: выбор PIDF или PIDS	rAnP	ON/OFF функции рампы
o-Ft	Выбор: функция нагрева или охлаждения	bPS	Установка скорости обмена данных
Unit	Единица температуры: C или F	AdrS	Установка адреса
H-SC	Масштабный макс. предел (вкл. анал. выход)	LoC	Данные не могут быть изменены, при включенной блокировочной клавише
L-SC	Масштабный мин. предел (вкл. анал. выход)		

* При нажатие клавиши ◄ («) начинает мигать , нажатием клавиш ▲ (☆), ▼ (≫) выбираем режимы. После нажатия MD данные изменяются, а на дисплее появляется следующий режим.

* Для возвращения в рабочий режим, удерживайте клавишу MD в течении 3с. , после внесения изменений.

* Если ни одна из клавиш не нажата в течение 60с, при изменении предустановок, счетчик автоматически возвращается в рабочий режим.

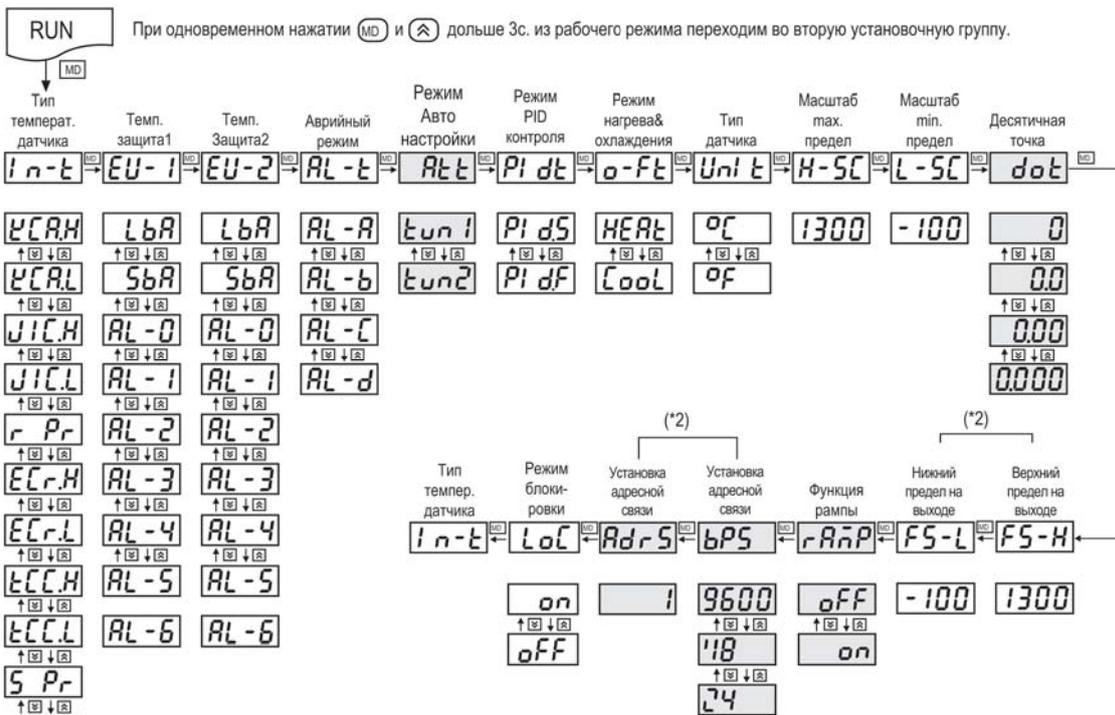* Если не требуется устанавливать режимы принадлежащие ко второй установочной группе AL 1, AL 2, LbA, I, d, t, HyS, rEST, rAPU, rAPd. то их пролистывать и переходить к следующему режиму.

(*1) Выводится на дисплей только когда входной переключатель Датчик/Напряжение/Ток находится в позициях напряжение или ток.

(*2) Выводится на дисплей только для моделей с ограничителем Высокого/Низкого трансмиссионного выхода.

▣ Заводские установки (вторая установочная группа).

Режим	Уст. значение	Режим	Уст. значение	Режим	Уст. значение	Режим	Уст. значение
In-t	ЧCA.H	AL-t	AL-A	PIdt	PI dS	H-SC	1300
EU-1	AL-1	Att	tun1	o-Ft	HEAt	L-SC	-100
EU-2	AL-2	rAnP	oFF	Unit	°C	LoC	oFF

▣ Таблица выбора входных датчиков

Входной датчик		Обозначение	Температурный диапазон °C	Температурный диапазон °F
Термопара	K(CA) H	ᵏCᴬH	-100~1300 C	-148~2372 F
	K(CA) L	ᵏCᴬL	-100.0~999.9 C	Не используется при F
	J(IC) H	J ICH	0~800 C	32~1472 F
	J(IC) L	J ICL	0.0~800.0 C	Не используется при F
	R(PR)	r Pr	0~1700 C	32~3092 F
	E(CR) H	ECr.H	0~800 C	32~1472 F
	E(CR) L	ECr.L	0.0~800.0 C	Не используется при F
	T(CC) H	tCC.H	-200~400 C	-328~752 F
	T(CC) L	tCC.L	-199.9~400.0 C	Не используется при F
	S(PR)	S Pr	0~1700 C	32~3092 F
	N(NN)	Π nn	0~1300 C	32~2372 F
	W(TT)	U tt	0~2300 C	32~4172 F
RTD	JIS станд.	JPt H	JPt.H	0~500 C	32~932 F
		JPt L	JPt.L	-199.9~199.9 C	-199.9~391.8 F
	DIN станд.	DPt H	dPt.H	0~500 C	32~932 F
		DPt L	dPt.L	-199.9~199.9 C	-199.9~391.8 F
Аналоговый вход	0-10VDC	A- - 1	-1999~9999 C	-1999~9999 F
	1-5VDC	A- - 2	-1999~9999 C	-1999~9999 F
	DC4-20mA	A- - 3	-1999~9999 C	-1999~9999 F

▣ Выбор подключения для входных датчиков / напряжения / тока

A) В случае входных термопар типов < K(CA), J(IC), R(PR), E(CR), T(CC), S(PR), N(NN), W(TT)>
   В случае RTD входа <DPtL, DPtH, JPtL, JPtH>

S/W1

S/W2

S/W1:1   1   1   mA V   S/W2:V

B) В случае входного напряжения <1-5B=, 0-10B=>

S/W1

S/W2

S/W1:2   2   2   mA V   S/W2:V

C) В случае входного тока<4-20мA=>

S/W1

S/W2

S/W1:2   2   2   mA V   S/W2:мA

* В заводской спецификации выходной переключатель Датчик/Направление/Ток: установлен вход температурного датчика.

* Пожалуйста, выберите B) или C) соответствующие входной спецификации - напряжение или ток.

А

Счётчики

Б

Таймеры

В

Темп. контроллеры

Г

Измерители

Д

Счетчики импульсов

Е

Сенсорные контроллеры

Контроллер с двойной функцией авто настройки PID регулятора

▣ Функция температурной защиты

Этот прибор имеет выход управления и аварийный выход. Аварийный выход имеет выборные опции. (Он представляет собой выходное реле и его действие не связано с реле контроля.) Аварийный выход срабатывает, при текущей температуре выше или ниже установочного значения.

- Выбор аварийного режима из 7 возможных, при EV-1 (EV-2) во второй установочной группе.
- Так как EV-1 и EV-2 работают независимо друг от друга, то EV-1 и EV-2 не могут быть использованы одновременно в качестве верхнего или нижнего аварийного предела.
- При выборе функции LbA или SbA в EV-1 (EV-2) аварийный выход не работает.
- Пожалуйста, внимательно ознакомьтесь со "Схемой действия аварийного выхода" и "Выбор аварийного выхода".

▣ Схема действия аварийного выхода

AL-0	—	Нет аварийного выхода.
AL-1	OFF [b] ON SV 100°C PV 110°C • При установки 10°C в AL 1(AL 2) в качестве температуры отклонения	•Аварийная защита по верхнему пределу. Если изменение между PV и SV выше, чем отклонение установленного значения температуры, защита включается . Значения отклонения температуры задаются в AL-1и AL-2 первой установочной группе.
AL-2	ON [b] OFF PV 90°C SV 100°C • При установки 10°C в AL 1(AL 2) в качестве температуры отклонения	•Аварийная защита по нижнему пределу. Если изменение между PV и SV ниже, чем отклонение установленного значения температуры, защита включается . Значения отклонения температуры задаются в AL-1и AL-2 первой установочной группе.
AL-3	ON [b] OFF [b] ON PV 90°C SV 100°C PV 110°C • При установки 10°C в AL 1(AL 2) в качестве температуры отклонения	•Аварийная защита по верхнему/нижнему пределу. Если изменение между PV и SV выше или ниже, чем отклонение установленного значения температуры, защита включается . Значения отклонения температуры задаются в AL-1и AL-2 первой установочной группе.
AL-4	OFF [b] ON [b] OFF PV 90°C SV 100°C PV 110°C • При установки 10°C в AL 1(AL 2) в качестве температуры отклонения	•Реверсивная аварийная защита по верхнему/нижнему пределу. Если изменение между PV и SV выше или ниже, чем отклонение установленного значения температуры, защита выключена . Значения отклонения температуры задаются в AL-1и AL-2 первой установочной группе.
AL-5	OFF [b] ON SV 100°C PV 110°C • При установки 110°C в AL 1(AL 2) в качестве аварийной температуры.	•Абсолютное значение верхнего предела защиты. Если PV равно или выше , чем установленное значение аварийной температуры, защита включается. Значения отклонения температуры задаются в AL-1и AL-2 первой установочной группе.
AL-6	ON [b] OFF PV 90°C SV 100°C • При установки 90°C в AL 1(AL 2) в качестве аварийной температуры.	•Абсолютное значение нижнего предела защиты. Если PV равно или ниже , чем установленное значение аварийной температуры, защита включается. Значения отклонения температуры задаются в AL-1и AL-2 первой установочной группе.

* "b" гистерезиз между ВКЛ. и ВЫКЛ., диапазон 1 - 100 °C (0.1 - 100.0 °C) и может быть установлено в "AHyS" в первой установочной группе.

▣ Установки защиты [AL-t]

Символ	Название операция	Функция
AL-A	Общая защита	Без выбора типа защиты.
AL-b	Блокирующая функция	Когда защита сработав один раз, остается включенной постоянно.
AL-C	Резервная последовательная функция	Не срабатывает при первом действии.(По достижении первого значения объекта.)
AL-d	Блокирующая и Резервная последовательная функция	Блокирующая и Резервная последовательная функция срабатывают вместе.

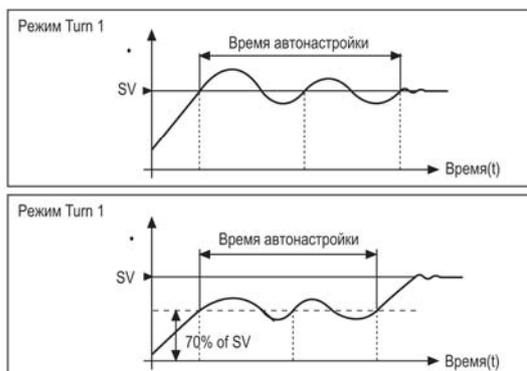## ▣ Функции

◎ Функция автонастройки

Функция автонастройки PID регулятора состоит в том, чтобы автоматически измерять температурные характеристики и выработать величину сигнала обратной связи и после расчета констант PID регулятора поддерживать их, с высокой степенью точности, в заданном температурном режиме.

• Функция автонастройки включается сразу после подсоединения контроллера или датчика.

• Автонастройка инициализируется нажатием кнопки AT в течении 3с.

• При запуске автонастройки лампочка AT начнет мигать, при отключении функции - лампочка выключается.

• Отключить функцию, во время ее работы, можно удерживая клавишу AT 5с. и более.

• Если питание отключить и появляется сигнал "СТОП" во время действия автонастройки, то константы PID регулятора не изменятся, значение перед выключением запоминается.

• Константы PID регулятора, выбранная функцией автонастройки, может быт.ь изменена в первой установочной группе.

• **Имеется два режима Автонастройки. Функция автонастройки запускается при установке значения (SV), в режиме Tun1 и является заводской установкой.**
Функция автонастройки действует при 70% от установочного значения (SV). Режим изменения установки находиться во второй установочной группе.

• Функция автонастройки периодически включается, т. к. температурные характеристики контрольного объекта могу меняться, если контроллер функционирует непрерывно длительное время.

◎ Функция температурной защиты.

Температурная защита выполняет главную регулирующую и защитную функции. Это единственная защитная функция в этой модели.

• Выход температурной защиты - это выходное реле "A", типа сухой контакт.

• Можно выбрать один режим из 7 возможных аварийных режимов, LBA срабатывает при отключении линии нагрева, SBA срабатывает, когда обрывается линия датчика.

• Температурная защита может автоматически включаться или выключиться, в зависимости от выбранного режима.

• Когда происходит обрыв линии датчика или линии нагрева включаются SBA или LBA. Позиция "Защита ON" может быть отменена отключением питания.

◎ Функция сенсорной защиты (SBA)

Эта функция срабатывает, если на линии сенсора произошел обрыв цепи или она разомкнута.
Это легко установить, если при обрыве срабатывает звуковая сигнализация.

• Установка этой функции в режиме SBA, в Ev1 и Ev2 во второй установочной группе.

◎ Функция аварийного разрыва цепи (LBA)

Функция LBA выявляет отклонения от заданной температуры в системе. Если температура системы изменяется больше, чем +2 C, за период времени, установленный в LBA, включается защита.
Например: Если установочная величина SV = 300 $^{\circ}$C, а текущее значение 50 C, работа прибора 100%.
В то же время, отсутствие изменений температуры, означает, что нагреватель отключен, а затем срабатывает LBA защита.

• LBA защита выбирается в EV1 второй установочной группы.

• Если LBA защита не выбрана, то она не будет отображаться на экране.

• Диапазон установок LBA защиты от 1 - 999сек.

• Если сигнал проходит слишком медленно, то значение LBA нужно переустановить на более высокое.

• LBA защита работает, когда регулируемые значения контроллера находятся в пределах от 0 - 100%.

• Когда LBA вход включен, проверьте следующее:

1. Кз или обрыв температурного датчика
2. Ненадлежащее состояние оборудования (магнит, суб-реле и т.д.)
3. Ненадлежащие состояние нагрузки (нагреватель, охладитель)
4. Плохое соединение или обрыв кабеля.

• Когда SBA защита срабатывает при поломке датчика, для возвращения к работе нужно отключить питание, а затем включить снова.

◎ Отображение ошибки на дисплее.

При возникновении ошибки во время работы контроллера на дисплее отображаться следующее.

• "LLLL" мигает, если текущая температура ниже, чем температурный диапазон датчика.

• "HHHH" мигает, если текущая температура выше, чем температурный диапазон датчика.

• "oPEn" мигает, если датчик на входе не подсоединен или обрыв цепи.

◎ Управление ON/ OFF(ВКЛ./ВЫКЛ.)

ВКЛ./ВЫКЛ. управление имеет две позиции, и работает как двухуровневый регулятор: когда PV меньше SV, и когда PV больше SV.

Таким способом управляется не только текущая температура, но и это основной способ контроля частот.

• Если Вы устанавливаете значение P = "0.0", в первой установочной группе, то ВКЛ./ВЫКЛ. управление - в работе.

• Программируемые температуры для ВКЛ. и ВЫКЛ. в ВКЛ./ВЫКЛ. управлении должны отличаться, если различие между ними слишком мало, то возможны вибрации. Температурная разница устанавливается в позиции HyS первой установочной группы. Диапазон от 1 -100 (или 0.1 - 100.0).

• HyS режим отображается на дисплее, когда P = "0.0"- но HyS не будет отображаться в случае когда значение P не "0.0".

• ВКЛ./ВЫКЛ. управление нельзя применять, если оборудование (например, охлаждающее), которым управляет контроллер не допускает частых переключений ВКЛ./ВЫКЛ.

• Даже, если ВКЛ./ВЫКЛ. контроль нормально функционирует вибрации могут случаться из-за установочных значений HyS или мощности нагревателя, или ответных характеристик оборудования, которым управляет контроллер, или типа сборки датчика. Пожалуйста, постарайтесь минимизировать вибрации, при сборке системы.

◎ Функция ручного сброса

Пропорциональное управление имеет погрешности, так как процесс повышение температуры отличается от процесса понижения. Функция ручного сброса используется только в режиме пропорционального управления.

• Если установить функцию ⌐E5Ł в первой установочной группе, то инициализируется ручной сброс.

• При равенстве PV и SV, выходная мощность будет 50% от начальной, если температура ниже чем SV, то значение ⌐E5Ł будет выше, и с другой стороны, значение сброса будет меньше - метод rEST устанавливается по результатам проверки.
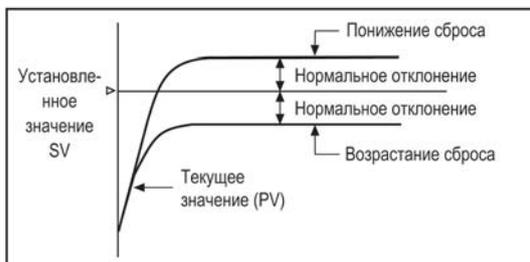
◎ Функция двойного PID управления.

Для регулирования температуры предусмотрено два типа настроек. Первый, если Вам нужно минимизировать время, при котором значение PV достигнет значения SV (Рис.1). Второй, при котором Вам нужно минимизировать выбросы, даже если PV достигнет значения SV медленнее (Рис.2).

• Прибор допускает использование двух режимов - высокоскоростной и низкоскоростной.
Поэтому, пользователь должен выбирать каждую функцию в соответствии в типом режима.

• Вы можете выбрать функцию двойного PID управления во второй группе установок. Для этого выберите PIDF (как на дисплее) или PIDS в опции PIDt.

• PIDF (быстродействующий тип, как на дисплее)
Эта модель используется в механизмах или системах, для которых важно быстродействие обратного сигнала. Например: Механизмы, которые должны быть прогреты перед началом работы.

* Инжекторные механизмы, электропечи и т.д.

(Рис.1)

* t : Время приближения
S : Выброс
SV : Установленное значение
PV : Текуще значение
PIDF
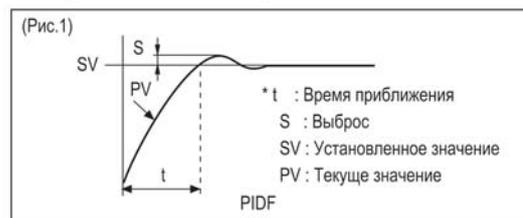
• PIDS (низкоскоростной тип) Эта модель используется в механизмах или системах, которые допускают небольшие отклонения от заданного значения. Например) Возникновение открытого пламени из-за температурных выбросов. Контроль температуры в механизмах для нанесения покрытий, контроль температуры масла в масляных системах и т.д.

(Рис 2)

* t : Время приближения
SV : Установленное значение
PV : Текущее значение
PIDS
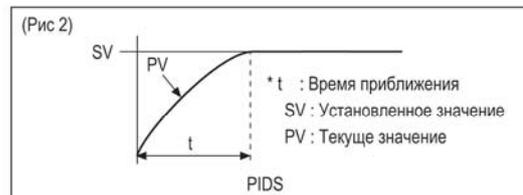
* Выставляются фабричные настройки PIDF.
Режим выбирается в соответствии с регулируемой системой.

◎ Функция Rs485 подсоединения

Она служит для передачи PV и установки значений SV на внешнее устройство.

• Установка адреса во второй установочной группе в бодах.

• Установка скорости обмена 2400, 4800, 9600 бод (Начальный бит 1, Конечный бит1, паритет)

• Диапазон адреса : 1 - 99
Совместимый PLC: LG, Mitsubishi, CIMON и т.д.

• Если внешнее устройство - PC, то необходимо использовать конвертор (SCM-38I).

◎ Функция установки десятичной точки

Десятичная точка обозначена "dot" во второй установочной группе, только для аналогового входа. (0-10 В=, 1-5В=, пост. 4-20мА)

◎ Функция охлаждения/нагрева

Существует два способа управления температурой объекта, первый (функция нагрева) поднимает температуру, когда PV падает (Нагреватель). Второй (функция охлаждения) понижает температуру, когда PV возрастает (Охлаждение). Действие этих функций обратно способу ON/OFF управления и пропорционального управления.

Но в случае временной константы PID эти функций будут действовать в соответствии с типом управления PID регулятора.

• Параметры функции охлаждения и функции нагрева задаются во второй установочной группе.

• Параметры функции охлаждения и функции нагрева должны быть точно заданы, в соответствии с описанием, т.к. ошибка может привести к пожару.

(Если параметр функции охлаждения задать неправильно, то позднее срабатывание при перегреве, может привести к пожару).

• Не изменяйте параметры функции охлаждения и функции нагрева в процессе работ прибора.

• Работа обеих функций одновременно невозможна, выбрать можно только одну.

• Фабричная установка - функция нагрева.

◎ Функция дополнительной уставки SV-2

При использовании функции SV-2 можно изменять температуру управляемой системы во второй установочной группе с помощью внешнего релейного сигнала. Возможно последовательное изменение установочных значений через реле, без ключевых операций.
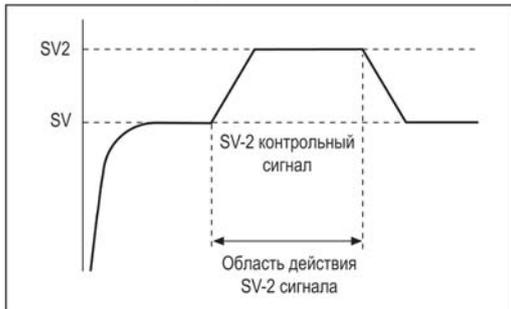

• Можно установить SV-2 на заданное время и период действия, ка показано на рисунке.

• SV-2 находиться в первой установочной группе.

• Применение:

Управляемая система - печь, которая должна поддерживать постоянную температуру. При открытии двери, температура падает.

В таком случае, если установить второе установочное значение выше, чем установочное значение, температура будет быстро расти. Однако, после установки микро переключателя, для определения открыта/закрыта дверь и подсоединения его к SV-2 (второе установочное значение должно быть выше, чем SV), контроль за температурой печи будет более эффективен.

◎ Функция рампы

Функция рампы предназначена для замедления времени увеличения или спада температуры. Если изменять установочное значение при постоянном контроле, это приведет к увеличению или падению температуры в течении установленного времени при rAPU, rAPd в первой установочной группе.

**Если rAmP выключено во второй установочной группе, rAP и rAPd не появится в первой установочной группе.**

• **Установите rAmP в первой установочной группе для применения функции рампы - установочный диапазон возрастающего и понижающего времени в режиме rAPU, в реж. rAPD в установочной группе 1.**

• Функция рампы будет действовать, если изменить установочное значение, когда система будет в рабочем состоянии или при подаче питания, после его выключения - установочный диапазон возрастающего и понижающего времени 1~99 мин.

* rAPU функция (Замедление времени увеличения)
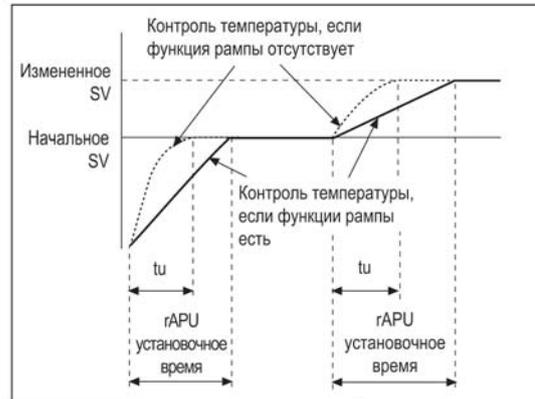
На этом рисунке показано замедление увеличения температуры при установленном значении во время постоянного контроля и замедление начального увеличения температуры: (rAPd время не может быть короче, чем время падения без применения функции рампы).

* rAPd функция (Замедление времени падения)
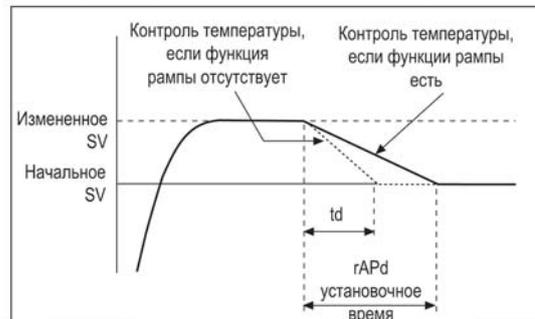
На этом рисунке показано замедление спада температуры: (rAPd время не может быть короче, чем время падения без применения функции рампы).

Контроллер с двойной функцией авто настройки PID регулятора

◎ **Функция входной коррекции (In-b)**

Входная корректировка предназначена для изменения возможных отклонений, при использовании таких температурных датчиков, как термопары, RTD, аналоговые датчики и т.д. Если Вы проверяете отклонение каждого датчика, то измерения температуры будут иметь высокую точность.

• Входная коррекция может устанавливаться в режиме "In-b" в первой установочной группе.

• Используйте этот режим после измерения возможных отклонений температурного датчика.

Из-за не исправленных значений отклонений, текущая температура, выводимая на дисплей, может быть или заниженной, или завышенной.

• Диапазон входной корректировки -49 - +50 °C (-49.0 - +50.0 °C).

• Когда Вы вводите значение входной корректировки, лучше записать его, т.к. Это может пригодиться при отладке прибора.

◎ **Аналоговый вход (А-1, А-2, А-3 режим)**

• В случаях измерения влажности и давления, потока и т.п. используют подходящий конвертор, который преобразовывает текущее значение в 4-20мА=, или 1- 5В=, или 0-10В=.
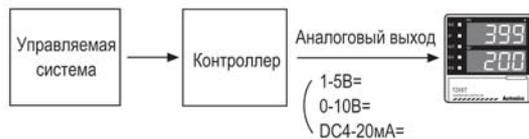
• Для того что бы использовать аналоговый выход конвертера в качестве входа контроллера, выберите входной датчик, встроенный в контроллер переключатель напряжения/тока должен быть в аналогичном положении с аналоговым входом

• Этот прибор имеет режим для встроенного контроллера. Пожалуйста, выберите А--1(0-10В=), или А--2 (1-5В=), или А--3 (4-20мА=) в режиме выбора входа во второй установочной группе.

• Входное значение устанавливается в режимах H-SC и L-SC.

• Подсоедините аналоговый выход конвертора к клеммам темп. датчика, контроллера. При подключении соблюдайте полярность.

• Последующие действия функции те же, что и при контроле температуры.

• Пример:

◎ **Выходные подсоединения**

• Подсоединение реле выходного типа
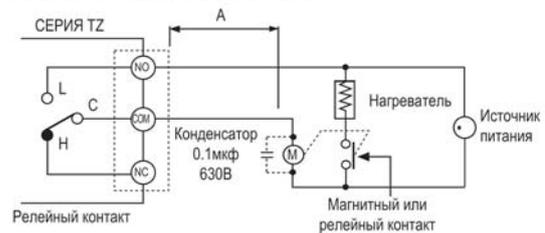
Источник питания реле должен быть расположен как можно дальше от TZ/TZN контроллера. Если длина провода А недостаточна, то токи намагничивания, возникающие в обмотках катушки могут вызвать сбои в работе прибора. Если недостаточна длина провода , подсоедините майларный конденсатор 0,1мФ (104 630В) через катушку реле " M " для защиты от намагничивания.

• Применение твердо тельного реле (SSR)
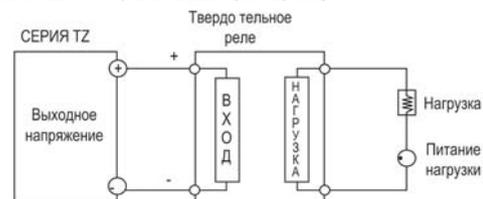
* SSR должно подбираться в соответствии с мощностью нагрузки, иначе может возникнуть короткое замыкание.

Для более эффективной работы непрямого нагрева нужно использовать выход с SSR.

* Используйте охлаждающую пластину иначе это может привезти к ухудшению работы или выхода из строя SSR на длит. период.
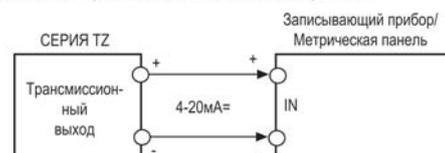
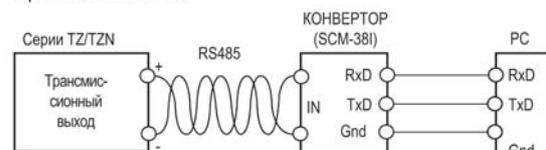• Применение токового выхода (4-20мА=)
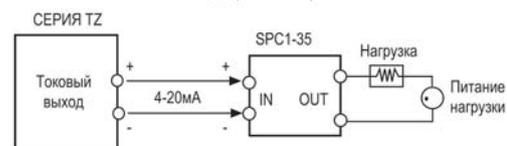
* Важно, после проверки величины нагрузки выбрать устройство SCR.

* Если мощность возрастает, то это может привести к пожару.

• Применение трансмиссионного выхода (4-20мА=

• Применение RS-485

Autonics   B-20

▣ Управление передачей данных

◎ Интерфейс

Стандарт	EIA RS485
Количество подключений	32,можно установить адрес 01~99.
Метод подключения	2 полудуплексных провода
Метод синхронизации	Асинхронный тип
Расстояние соединения	до 1.2км
Скорость соединения	2400, 4800, 9600(Возможные установки)
Стартовый бит	1бит(фикс.)
Стоповый бит	1бит(фикс.)
Паритетный бит	Нет
Бит данных	8бит(фикс.)
Протокол	BCC

◎ Порядок системы
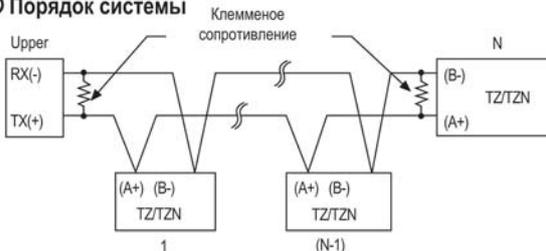
◎ Порядок управления передачей данных

1. Передача данных приборов серии TZ/TZN имеет свой протокол.
2. Передача возможна через 4 сек. после подачи питания.
3. Начальная передача инициализируется внешней системой. Сигнал поступает из внешнего устройства, а затем отвечает контроллер.

• A > Выше мин 4сек, B > в пределах макс 300 мсек, C > Выше мин 20мсек

◎ Управление передачей и блокировка

Форма команды и ответа

1. Код пуска :
   В начале он обозначается BLOCK STX [02H], в случае ответа добавляется ACK.
2. Код адреса:
   Это код внешней системы, распознается контроллерами TZ/TZN серии, задается в пределах 01 - 99 (BCD ASCII)

3. Код команды:
   Он обозначает команду двумя буквами, как показано ниже.
   RX (чтение запроса)   R[52H], X[58H]
   RD (чтение ответа)   R[52H], D[44H]
   WX (запись запроса)   W[57H], X[58H]
   (Сохранение на дисплее TZ/TZN)
   WD (запись ответа)   W[57H], D[44H]
   (Сохранение на дисплее TZ/TZN)
4. Отражает детали, относительно Команды/Ответа (см. Команда)
5. Код завершения: Обозначает завершение передачи BLOCK. ETX > [03H]
6. Код блокировки(BCC):Обозначается как значение XOR от первого до значения ETX протокола, по аббревиатуре TZ/TZN.

◎ Команды передачи

• Чтение [RX] текущего/заданного значения

Адрес 01, Команда RX

1. Команда (внешняя)

   1) Команда

STX	0	1	R	X	P	0	ETX	FSC
Пуск	Адрес		Команда		P:Текущее значение S:Установ. значение		Стоп	Блок

   2) Применение: Адрес (01), код команды (RX), Текущее значение (P)

STX	0	1	R	X	P	0	ETX	FSC
02H	30H	31H	52H	58H	50H	30H	03H	BCC

• Запись [WX] текущего значения:

Адрес 01, Команда WX

1. Команда (внешняя)

   1) Команда

STX	0	1	W	X	S	0	Symbol	10³	10²	10¹	10⁰	ETX	FSC
Пуск	Адрес		Команда		S:Устан. значение		Пробел, /, -	10³	10²	10¹	10⁰	Стоп	Блок

   2) Применение: Адрес (01), код команды (WX), Установочное значение (S) +123

STX	0	1	W	X	S	0	Symbol	10³	10²	10¹	10⁰	ETX	FSC
02H	03H	31H	57H	58H	53H	30H	20H	30H	31H	32H	33H	03H	BCC

◎ Ответ

• Чтение текущего/установочного значения

1. В случае получения нормального текущего значения: Данные передаются с прибавлением ACK[60H]
   (В случае текущего значения + 123,4)

ACK	STX	0	1	R	D	P	0	Символ	10³	10²	10¹	10⁰	Десятичная точка	ETX	FSC
ACK	STX	0	1	R	D	P	0	Пробел	0	1	2	3	1	ETX	BCC
06H	02H	30H	31H	52H	44H	50H	30H	20H	30H	31H	32H	33H	31H	03H	BCC

2. Если текущее значение -100

ACK	STX	0	1	R	D	P	0	-	0	1	0	0	0	ETX	BCC
06H	02H	30H	31H	52H	44H	50H	30H	2DH	30H	31H	30H	30H	30H	03H	BCC

• Запись установленного значения

Если установленное значение = -100

A C K	S T X	0	1	W	D	S	0	Символ	10³	10²	10¹	10⁰	E T X	F S C
A C K	S T X	0	1	W	D	S	0	-	0	1	0	0	E T X	B C C
06H	02H	30H	31H	57H	44H	53H	30H	2DH	30H	31H	30H	30H	03H	B C C

• Прочее: в случае отсутствия ответа ACK

1. Если адрес имеет другое значение после получения STX.

2. Если происходит переполнение буфера приема.

3. Если не совпадают значения скорости передачи или другого параметра связи.

• Если не поступает ответ ACK

1. Проверьте состояние линий.

2. Проверьте настройку параметров связи (установленные значения).

3. Если возможной причиной проблемы являются помехи, предпримите еще три попытки установления связи, пока связь не возобновится.

4. Если сбой связи возникает часто, отрегулируйте скорость связи.

▣ Указания по надлежащему использованию

◎ Простая диагностика ошибок

• Если нагрузка (обогреватель и т. п.) не работает, проверьте состояние индикатора выхода на передней панели модуля. Если индикатор не светится, проверьте параметры настройки. Если индикатор светится, отсоедините выходную линию от модуля и проверьте состояние выхода (релейный выход, выход напряжения для управления ТТР, токовый выход 4-20 мА). Однако индикатор выхода не работает для выхода 4-20 мА.

• Если во время работы отображается "Open" (Разомкнуто). Данное сообщение предупреждает об отключении внешнего датчика. Выключите питание и проверьте состояние датчика. Если датчик не отключен, отсоедините линию датчика от клеммного блока и соедините клеммы "+" и "-" между собой. После подачи питания модуль должен отобразить значение комнатной температуры. Если данный модуль не отображает значение комнатной температуры, значит, неисправен сам модуль. Удалите этот модуль из оборудования и отремонтируйте либо замените его. (Индикация комнатной температуры возможна, когда в качестве источника входного сигнала выбрана термопара.)

• Если на дисплее отображается "ЕrrО" (Ошибка). Данное сообщение об ошибке отображается в случае повреждения данных программы во внутренней микросхеме под воздействием интенсивных электромагнитных помех. В этом случае удалите модуль из системы и отправьте его в наш центр послепродажного обслуживания. Конструкция данного модуля обеспечивает защиту от помех, однако она не рассчитана на продолжительное воздействие помех высокой интенсивности. Если уровень помех, воздействующих на модуль, превышает максимально допустимое значение (2 кВ), модуль может быть поврежден.

▣ Меры предосторожности при эксплуатации

• Для подключения модуля к источнику питания переменного тока используйте клеммы (М3,5, макс. 7,2 мм).

• Значок ⚠ на схеме предупреждает об опасности. Пожалуйста, ознакомьтесь с документацией, сопровождающей модуль.

• При чистке модуля соблюдайте следующие меры предосторожности:
1.Удаляйте пыль сухой тканью.
2.Для чистки модуля используйте только спирт. Запрещается использовать кислоту, хромовую кислоту, растворитель и т. п.
3.Перед чисткой модуля обязательно отключайте питание и включайте питание только по истечении 30 мин. после чистки.

• Если способ эксплуатации модуля не соответствует указаниям производителя, это может стать причиной травмы или повреждения имущества.

• Предотвращайте попадание металлической пыли и обрезков провода внутрь модуля, так как это может стать причиной повреждения модуля или привести к возгоранию.

• Срок службы релейного выхода модуля указан в настоящем руководстве, однако фактический срок службы зависит от величины нагрузки и интенсивности коммутаций, поэтому, прежде чем использовать модуль, проверьте величину нагрузки и частоту коммутаций.

• Выполняйте подключение цепей правильно, предварительно проверяя обозначения полюсов на клеммах.

• Не эксплуатируйте данный модуль в следующих местах.
1.В местах присутствия пыли, агрессивных газов, масла, влаги.
2.В местах повышенной влажности или в местах замораживания.
3.В местах воздействия прямых солнечных лучей и теплового излучения.
4.В местах воздействия вибрации и механических ударов.

• Если способ эксплуатации оборудования не соответствует указаниям производителя, степень защиты, обеспечиваемая оборудованием, может снизиться.

• Для отключения питания установите выключатель питания или автоматический выключатель.

• При использовании температурного контроллера в оборудовании должен быть предусмотрен выключатель или автоматический выключатель (автомат защиты), удовлетворяющий соответствующим требованиям МЭК 947-1 и МЭК 947-3.

• Выключатель или автоматический выключатель (автомат защиты) должен быть установлен рядом с пользователем.

• Данный прибор предназначен для регулирования температуры, не используйте его в качестве вольтметра или амперметра.

• Условия эксплуатации
1.Предназначен для эксплуатации внутри помещения
2.Макс. высота над уровнем моря: 2000 м
3.Степень загрязнения: 2
4.Категория монтажа II

• Если вы хотите сменить входной датчик, отключите питание и установите переключатели (SW1, SW2) в соответствии с типом каждого входа. Подайте питание и установите режим работы датчика с помощью кнопок на передней панели согласно второй схеме. Цепи данного ТТР и токовые цепи данного контроллера гальванически развязаны с внутренними цепями питания.

• Не подключайте линию электропитания к клеммам для подключения датчика. Это может привести к повреждению внутренних цепей.

A

Счетчики

Б

Таймеры

В

Темп. контроллеры

Г

Измерители

Д

Счетчики импульсов

Е

Сенсорные контроллеры

Dual PID Auto Tuning Controller

Dual PID auto tuning controller

▣Features

- ●Dual PID auto tuning function :
  High−speed response of PID control to reach to the desired value fast, low−speed of response of PID control to minimize the overshoot even though response is a little bit slow.
- ●High display accuracy :
  ±0.3%(by F・S value of each input)
- ●2−Steps auto tuning control function
- ●Multi−input function(13 kinds of multi− input selection function) :
  Temperature sensor, voltage and current selection function.
- ●Various sub output function :
  Includes in LBA, SBA, 7kinds of alarm output and 4 kinds of alarm option function, PV transmission output(DC4−20mA), RS485 communication output
- ●Display the decimal point for analog input

> ⚠ Please read "Caution for your safety" in operation manual before using.

C ᴿᵁUS CE

▣Ordering information

TZ	4	M	—	1	4	R

Control output	R	Relay contact output
	S	SSR drive output
	C	Current output(DC4−20mA)

Power supply (※1)	2	24VAC/24−48VDC
	4	100−240VAC 50/60Hz

Sub output	TZ4SP/TZN4S	
	1	Event 1 output
	TZ4ST	
	1	Event 1 output
	2	Event 1 + Event 2 output
	R	Event 1+PV transmission output(DC4−20mA)
	Etc.	
	1	Event 1 output
	2	Event 1 + Event 2 output
	R	Event 1+PV transmission output(DC4−20mA)
	A	Event 1 + Event 2 + PV transmission output(DC4−20mA)
	T	Event 1+RS485 communication output
	B	Event 1+Event 2+RS485 communication output

Size	TZN4	
	S	DIN W48×H48mm (Terminal block type)
	TZ4	
	SP	DIN W48×H48mm (Plug type)
	ST	DIN W48×H48mm (Terminal block type)
	TZ4/TZN4	
	M	DIN W72×H72mm
	W	DIN W96×H48mm
	H	DIN W48×H96mm
	L	DIN W96×H96mm

Digit	4	4 Digit

Item	TZ	Temperature PID
	TZN	Temperature PID New Type

(※1) Only for TZ4SP, TZ4ST, TZ4L, TZN4M Series.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

TZN/TZ SERIES

■Specifications

※A blacked(▢) item is upgraded function.

Series	TZ4SP TZN4S	TZ4ST	TZ4M TZN4M	TZ4W TZN4W	TZ4H TZN4H	TZ4L TZN4L
Power supply	100−240VAC 50/60Hz, **24VAC 50/60Hz / 24−48VDC**					
Allowable voltage range	90~110% of power supply					
Power consumption	Approx. 5VA		Approx. 6VA(Low voltage type ☞ AC:Approx. 8VA, DC:Approx. 7W)			
Display method	7Segment LED Display【Process value(PV) : Red, Setting value(SV) : Green】					
Character size	**TZ4SP** ☞ W4.8×H7.8mm **TZN4S** ☞ PV:W7.8×H11mm SV:W5.8×H8mm	W4.8×H7.8mm	**TZ4M** ☞ PV:W9.8×H14.2mm SV:W8×H10mm **TZN4M** ☞ PV:W8×H13mm SV:W5×H9mm	W8×H10mm	**TZ4H** ☞ W3.8×H7.6mm **TZN4H** ☞ PV:W7.8×H11mm SV:W5.8×H8mm	PV:W9.8×H14.2mm SV:W8×H10mm
Input — Thermocouple	K(CA), J(IC), R(PR), E(CR), T(CC), S(PR), N(NN), W(TT) <Tolerance of line resistance is max. 100Ω per a wire>					
Input — RTD	Pt100Ω, JIS Pt100Ω, 3wire <Tolerance of line resistance is max. 5Ω per a wire>					
Input — Analog	1−5VDC, 0−10VDC, DC4−20mA					
Control output — Relay	250VAC 3A 1c					
Control output — SSR	12VDC ±3V 30mA Max.					
Control output — Current	DC4−20mA(Resistive load Max. 600Ω)					
Sub output — Transmission	———	PV transmission : DC4−20mA Load max. 600Ω				
Sub output — EVENT 1	250VAC 1A 1a					
Sub output — EVENT 2	———	250VAC 1A 1a				
Sub output — Communication	———	———	RS485(PV transmission, SV setting)			
Control method	ON/OFF control P, PI, PD, PIDF, PIDS					
Display accuracy	F.S ± 0.3% or 3℃(Higher one)					
Setting type	Front push buttons					
Hysteresis	Adjustable 1~100℃(0.1~100.0℃) at ON/OFF control					
Alarm output hysteresis	**Adjustable ON/OFF 1~100 (0.1~100.0)℃ of alarm output**					
Proportional band(P)	0.0 ~ 100.0%					
Intergral time(I)	0 ~ 3600sec.					
Derivative time(D)	0 ~ 3600sec.					
Control time(T)	1 ~ 120sec.					
Sampling period	0.5sec.					
LBA setting	1 ~ 999sec.					
RAMP setting	Ramp Up, Ramp Down at 1~99min.					
Dielectric strength	2000VAC 50/60Hz for 1min.					
Vibration	0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours					
Relay life cycle — Main output	Mechanical : Min. 10,000,000 times, Electrical : Min. 100,000 times(250VAC 3A resistive load)					
Relay life cycle — Sub output	Mechanical : Min. 20,000,000 times, Electrical : Min. 300,000 times(250VAC 1A resistive load)					
Insulation resistance	Min. 100MΩ(at 500VDC megger)					
Noise	Square shaped noise by noise simulator(pulse width 1μs) ±2kV					
Memory protection	Approx. 10years(When using non−volatile semiconductor memory)					
Ambient temperature	−10 ~ 50℃(at non−freezing status)					
Storage temperature	−20 ~ 60℃(at non−freezing status)					
Ambient humidity	35 ~ 85%RH					
Approval	CE ᴄℝᵁₗᵤₛ					
Unit weight	TZ4SP: Approx. 136g TZN4S: Approx. 150g	Approx. 136g	Approx. 270g	TZ4W: Approx. 270g TZN4W: Approx. 259g	Approx. 259g	Approx. 360g

※The low voltage is only for TZ4SP, TZ4ST, TZ4L, TZN4M series.

C−37

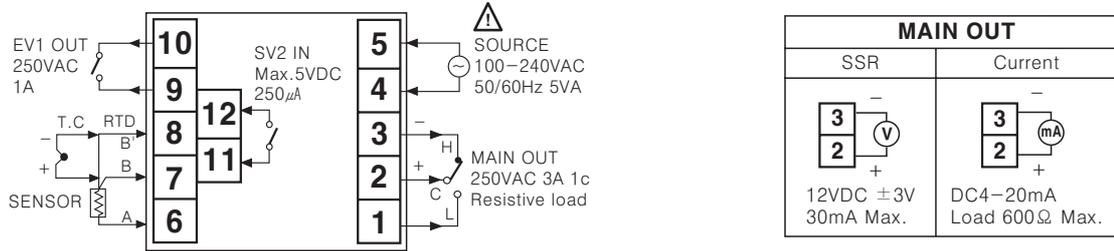Autonics

Dual PID Auto Tuning Controller

■Connections

※RTD(Resistance Temperature Detector) : DIN Pt 100Ω (3−wire type), JIS Pt 100Ω (3−wire type)
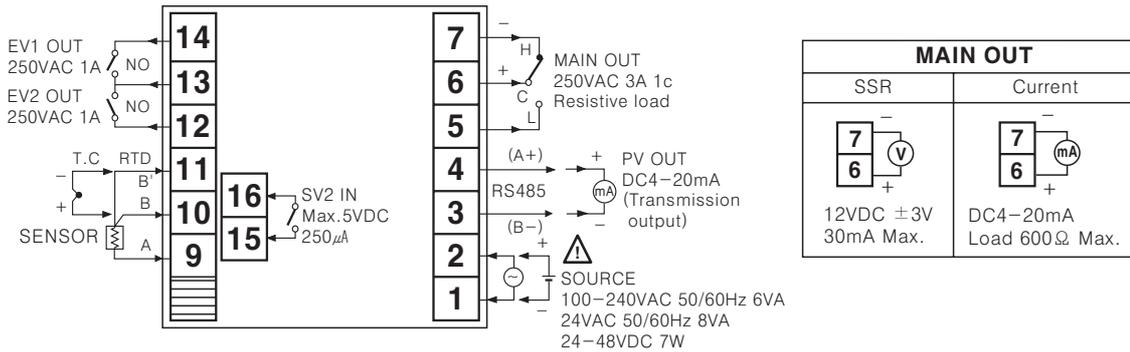※T.C(Thermocouple) : K, J, R, E, T, S, W, N
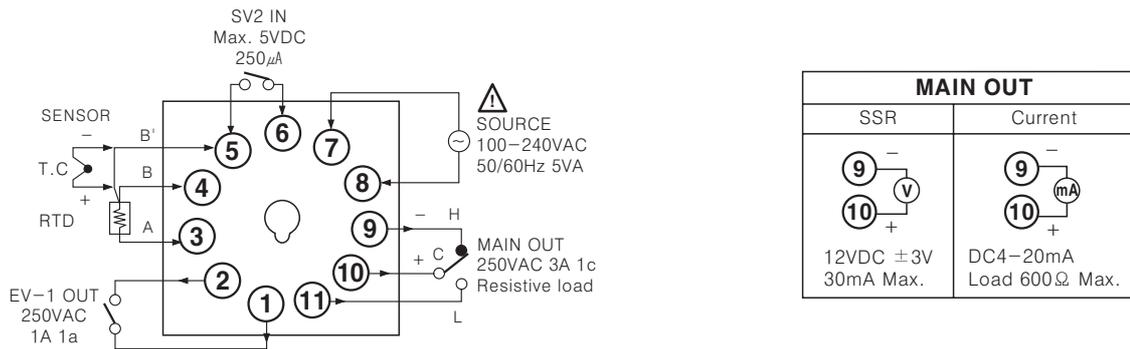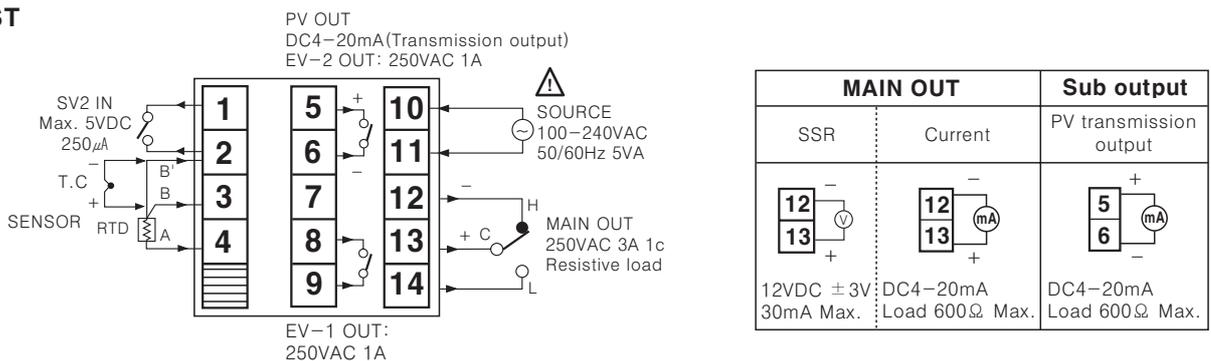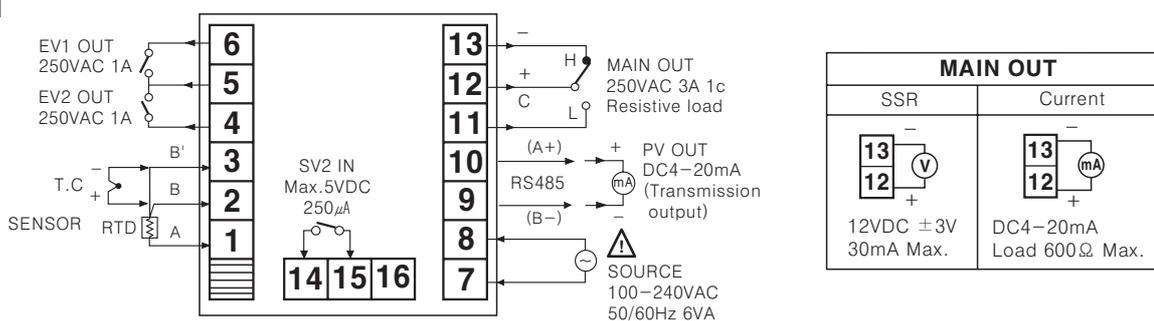※In case of Analog input, please use T.C(Thermocouple) terminal and be careful about polarity.

●TZN4S

MAIN OUT	
SSR	Current
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

●TZN4M

MAIN OUT	
SSR	Current
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

●TZ4SP

MAIN OUT	
SSR	Current
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

●TZ4ST

MAIN OUT		Sub output
SSR	Current	PV transmission output
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.	DC4−20mA Load 600Ω Max.

●TZ4M

MAIN OUT	
SSR	Current
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder
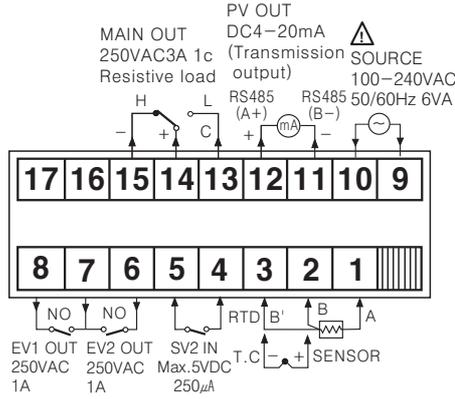
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device
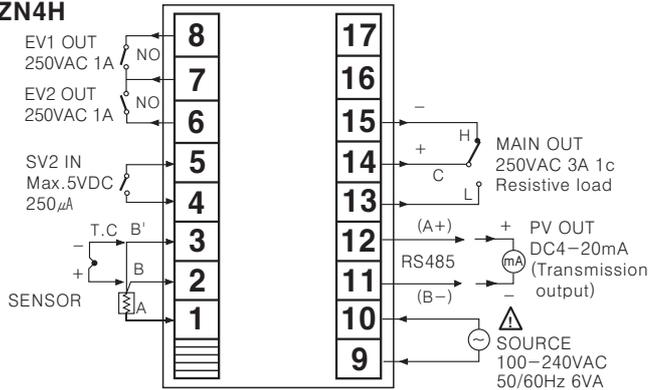
(Q) Production stoppage models & replacement
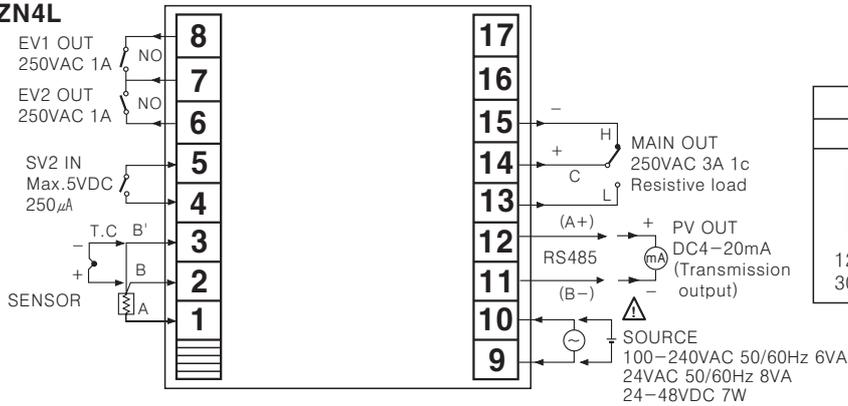
TZN/TZ Series

●TZ4W/TZN4W

MAIN OUT
250VAC3A 1c
Resistive load

PV OUT
DC4−20mA
(Transmission output)

⚠ SOURCE
100−240VAC
50/60Hz 6VA

| H | L | C | RS485 (A+) | mA | RS485 (B−) | ~ |

| 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

NO — EV1 OUT 250VAC 1A
NO — EV2 OUT 250VAC 1A
SV2 IN Max.5VDC 250μA
RTD B' / B / A — T.C — SENSOR

MAIN OUT

SSR	Current
15 (V) 14	15 (mA) 14
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

●TZ4H / TZN4H

EV1 OUT 250VAC 1A — NO — 8
EV2 OUT 250VAC 1A — NO — 7
6
SV2 IN Max.5VDC 250μA — 5 / 4
T.C B' — 3 / B — 2 / A — 1
SENSOR

| 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |

15 — 14 (H) — 13 (C) (L) MAIN OUT 250VAC 3A 1c Resistive load
12 (A+) — 11 (B−) RS485 mA PV OUT DC4−20mA (Transmission output)
10 — 9 ~ ⚠ SOURCE 100−240VAC 50/60Hz 6VA

MAIN OUT

SSR	Current
15 (V) 14	15 (mA) 14
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

●TZ4L / TZN4L

EV1 OUT 250VAC 1A — NO — 8
EV2 OUT 250VAC 1A — NO — 7
6
SV2 IN Max.5VDC 250μA — 5 / 4
T.C B' — 3 / B — 2 / A — 1
SENSOR

| 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |

15 — 14 (H) — 13 (C) (L) MAIN OUT 250VAC 3A 1c Resistive load
12 (A+) — 11 (B−) RS485 mA PV OUT DC4−20mA (Transmission output)
10 — 9 ~ ⚠ SOURCE 100−240VAC 50/60Hz 6VA 24VAC 50/60Hz 8VA 24−48VDC 7W

MAIN OUT

SSR	Current
15 (V) 14	15 (mA) 14
12VDC ±3V 30mA Max.	DC4−20mA Load 600Ω Max.

■Dimensions

●TZN4S

●Bracket

48 / 48 / 60

TEMPERATURE CONTROLLER
PV 250
SV 0000
SV2 AT OUT EV1
MD AT ◄ ▼ ▲
TZN4S Autonics

100 / 10 / 78 / 12 / 45

●Panel cut−out

Min. 55 / 45 +0.6/−0 / 45 +0.6/−0 / Min. 62

(Unit:mm)

●TZN4M

84 / 72 / 72

TEMPERATURE CONTROLLER
PV 1200
SV 1300
SV2 AT OUT EV1 EV2
MD AT ◄ ► ▼ ▲
TZN4M Autonics

95 / 10 / 73 / 12 / 67
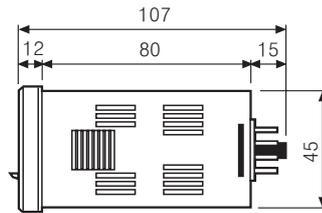
●Panel cut−out

Min. 91 / 68 +0.7/−0 / 68 +0.7/−0 / Min. 91

(Unit:mm)

Autonics

Dual PID Auto Tuning Controller

▣Dimensions

●TZ4SP

48

48 / 60

399
400

TZ4SP
TEMPERATURE CONTROLLER Autonics

107
12 / 80 / 15
45

●Panel cut−out

Min. 55
$45^{+0.6}_{-0}$
$45^{+0.6}_{-0}$
Min. 62

●TZ4ST

48

48 / 60

399
400
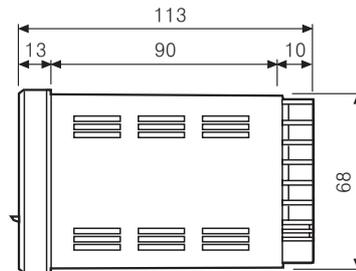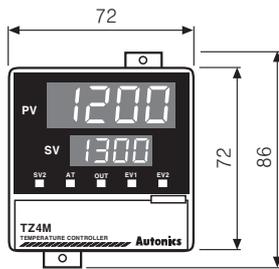
TZ4ST
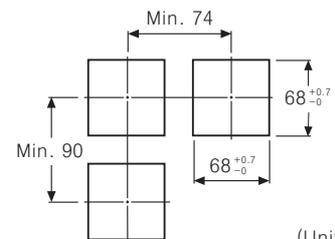TEMPERATURE CONTROLLER Autonics

107
12 / 87 / 8
45
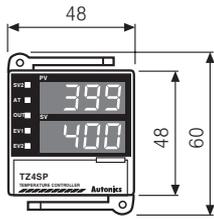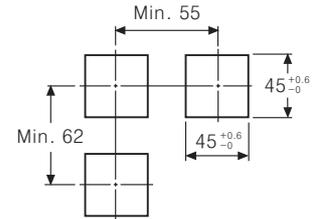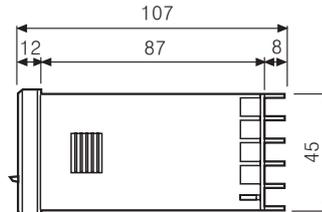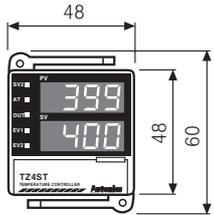
●Bracket
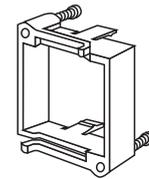
(Unit:mm)

※Since TZ4SP uses same indentification plate with TZ4ST, the lamp does not work even though it has a EV2 output signal lamp.
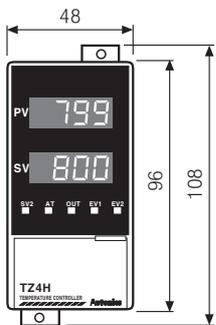
●TZ4M
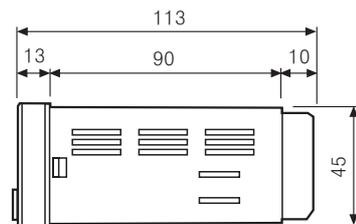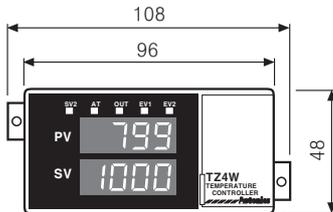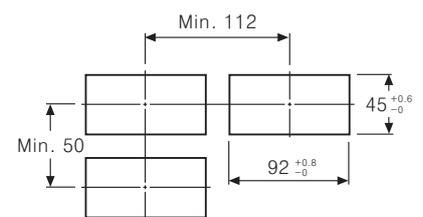
72

72 / 86
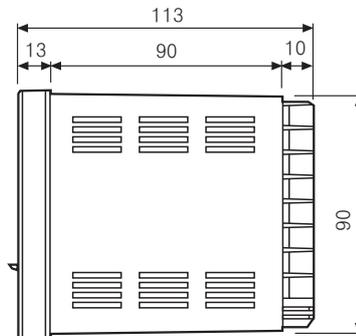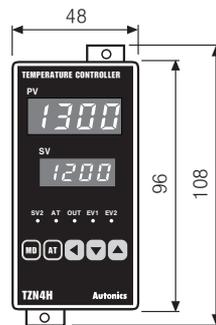
PV 1200
SV 1300

SV2 AT OUT EV1 EV2

TZ4M
TEMPERATURE CONTROLLER Autonics

113
13 / 90 / 10
68

●Panel cut−out

Min. 74
$68^{+0.7}_{-0}$
$68^{+0.7}_{-0}$
Min. 90

(Unit:mm)

●TZ4H   ●TZN4H

48

96 / 108

PV 799
SV 800
SV2 AT OUT EV1 EV2

TZ4H
TEMPERATURE CONTROLLER Autonics

48

96 / 108

TEMPERATURE CONTROLLER
PV 1300
SV 1200
SV2 AT OUT EV1 EV2
MD AT ◀ ▼ ▲

TZN4H Autonics

113
13 / 90 / 10
90

●Panel cut−out

Min. 50
$92^{+0.8}_{-0}$
Min. 112
$45^{+0.6}_{-0}$

(Unit:mm)

●TZ4W

108
96

SV2 AT OUT EV1 EV2
PV 799
SV 1000
TZ4W
TEMPERATURE CONTROLLER
Autonics

48

113
13 / 90 / 10
45

●Panel cut−out

Min. 112
$45^{+0.6}_{-0}$
Min. 50
$92^{+0.8}_{-0}$

●TZN4W

108
96

TEMPERATURE CONTROLLER
SV2 AT OUT EV1 EV2
MD
AT
PV 250
SV 20
◀ ▼ ▲
TZN4W Autonics

48

(Unit:mm)

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
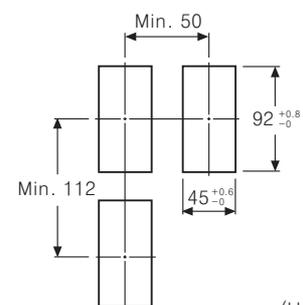device

(Q)
Production
stoppage
models &
replacement

TZN/TZ Series
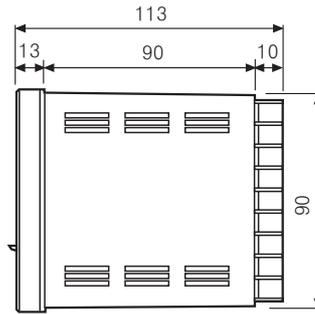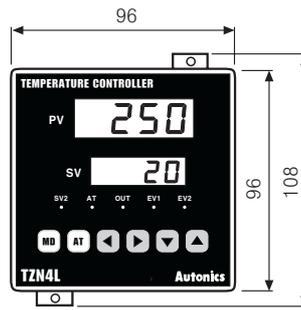
● TZ4L   ● TZN4L   ● Panel cut−out
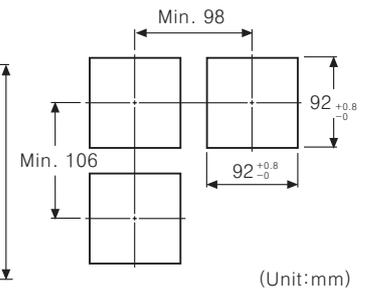
(Unit:mm)

▣ Front panel identification

● TZN4S   ● TZN4M
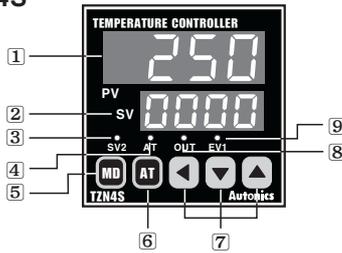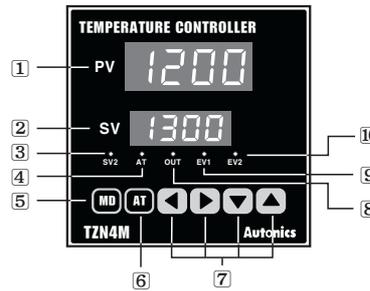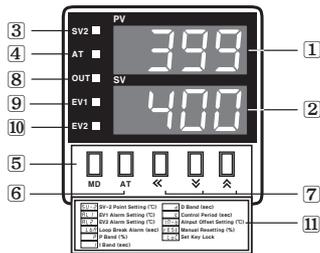
● TZ4ST/TZ4SP   ● TZ4M
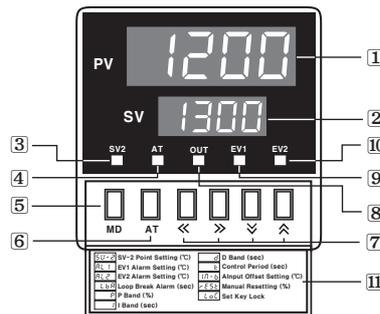
1 : Display Processing value(Red)   5 : Mode key   9 : Indicate EVENT 1 output
2 : Display Setting value(Green)   6 : Autotuning operation key   10 : Indicate EVENT 2 output
3 : Indicate SV2 operation   7 : Setting keys   11 : Procedure of setting key
4 : Indicate Autotuning operation   8 : Indicate control output operation

※ Since TZ4SP uses same identification plate with TZ4ST, the lamp does not work even though it has a EV2 output signal lamp.
※ There are no(▶ , ≫)Key in TZ4H and TZN4H.
※ Control output indicator(OUT) does not work when it is used as current output type.

▣ How to set and change the setting value(SV)

1 In case of changing the setting value at status of RUN, push ◀ (≪) key.
10⁰ digit will flash at SV.

2 Push ◀ (≪) key, and then the flash will be shifted step by step.

3 Push ▼ (≻), ▲ (≺) at the flash digit, and then change the setting value.

4 Push MD key when the setting is completed. It will stop flashing, then return to **RUN** mode.

※ Above explanations are the example of TZ4M. In case of TZ series. Use the Key in brackets for setting(changing).
There are no ▶ (≫) Key in TZN4S, TZ4SP and TZ4ST. It is not used for setting or changing the setting value.

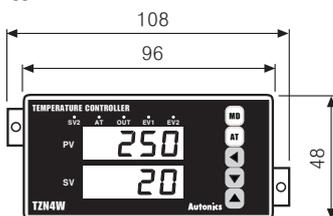# Dual PID Auto Tuning Controller

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
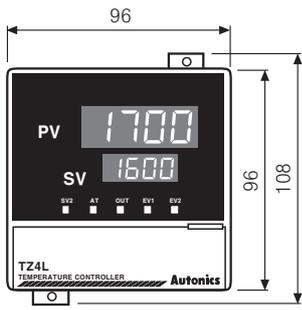Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

■Flow chart for setting group 1

RUN | If press MD key for 3sec. This mode changes to first flow chart.

SU-2 SV-2 (Setting value 2) | `0` | Set SV-2 value within input range for each sensor.

AL 1 Event 1 Setting value | `10` | Set alarm temperature in EV-1 within the rated using range of each sensor.

AL2 Event 2 Setting value | `10` | Set alarm temperature in EV-2 within the rated using range of each sensor.

LbA Loop Break Alarm | `999` | Set monitoring time of loop break alarm within 0~999sec.

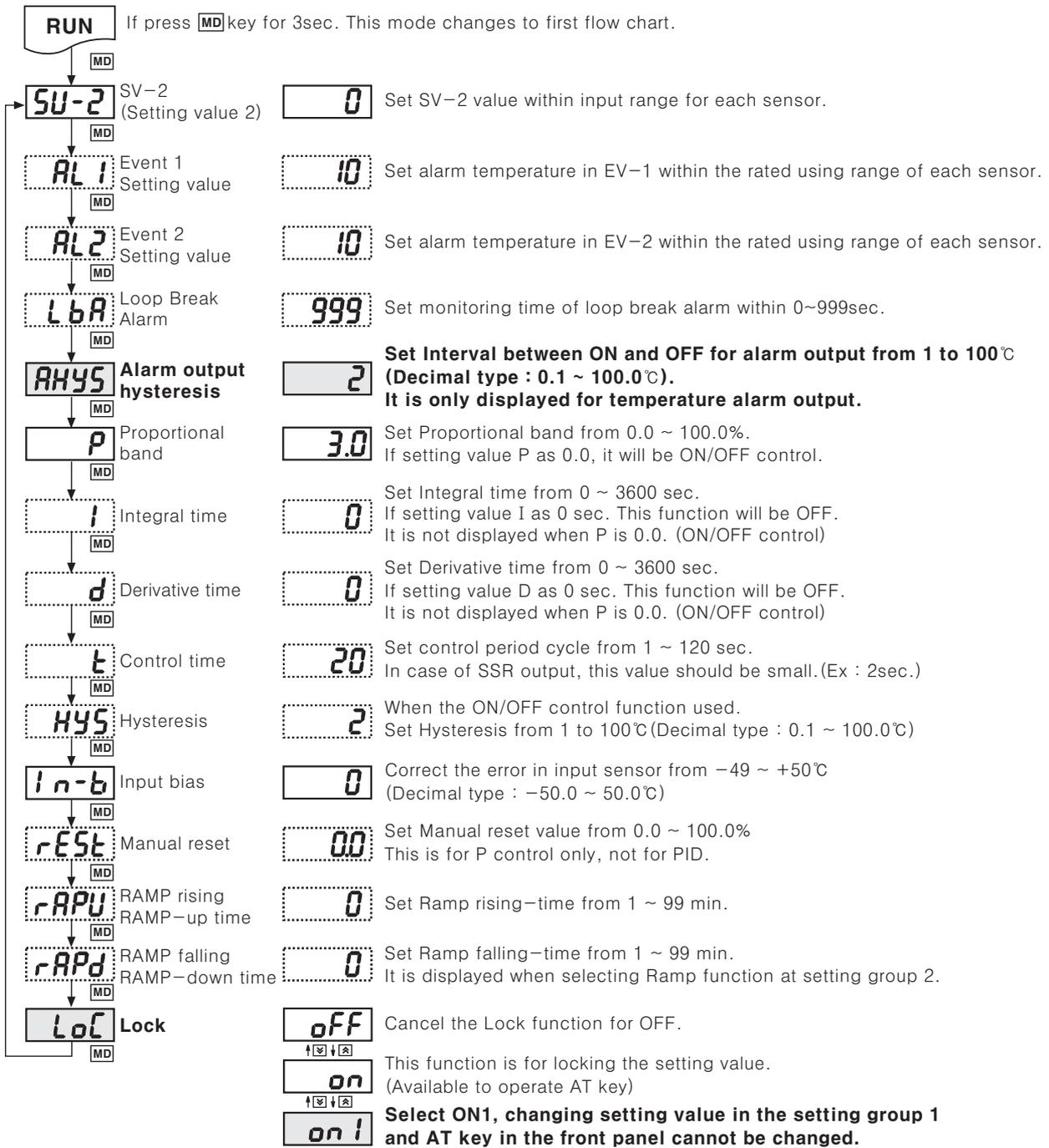**AHYS** Alarm output hysteresis | `2` | **Set Interval between ON and OFF for alarm output from 1 to 100℃ (Decimal type : 0.1 ~ 100.0℃). It is only displayed for temperature alarm output.**

P Proportional band | `3.0` | Set Proportional band from 0.0 ~ 100.0%. If setting value P as 0.0, it will be ON/OFF control.

I Integral time | `0` | Set Integral time from 0 ~ 3600 sec. If setting value I as 0 sec. This function will be OFF. It is not displayed when P is 0.0. (ON/OFF control)

d Derivative time | `0` | Set Derivative time from 0 ~ 3600 sec. If setting value D as 0 sec. This function will be OFF. It is not displayed when P is 0.0. (ON/OFF control)

t Control time | `20` | Set control period cycle from 1 ~ 120 sec. In case of SSR output, this value should be small.(Ex : 2sec.)

HYS Hysteresis | `2` | When the ON/OFF control function used. Set Hysteresis from 1 to 100℃(Decimal type : 0.1 ~ 100.0℃)

In-b Input bias | `0` | Correct the error in input sensor from −49 ~ +50℃ (Decimal type : −50.0 ~ 50.0℃)

rESt Manual reset | `0.0` | Set Manual reset value from 0.0 ~ 100.0% This is for P control only, not for PID.

rAPU RAMP rising RAMP−up time | `0` | Set Ramp rising−time from 1 ~ 99 min.

rAPd RAMP falling RAMP−down time | `0` | Set Ramp falling−time from 1 ~ 99 min. It is displayed when selecting Ramp function at setting group 2.

LoC Lock | `oFF` | Cancel the Lock function for OFF.

`on` | This function is for locking the setting value. (Available to operate AT key)

`on1` | **Select ON1, changing setting value in the setting group 1 and AT key in the front panel cannot be changed.**

※It will start to flash by pressing ◀ (《) key and the flash will be moved by ◀(《), ▶(》) keys then set the value by ▲(ㅅ), ▼(ㅄ) keys. After that if pressing MD key the DATA will be changed then display next mode.
※It returns to RUN status in case of pressing MD key for 3sec. after setting all mode to change.
※If no key touched for 60sec., it will return to RUN mode automatically.
※If not to set related mode in setting group 2, AL 1, AL2, LbA, I, d, t, HYS, rESt, rAPU, rAPd mode will disappear and then jump to next mode.

■Factory defaults(Setting group 1)

Mode	Setting value	Mode	Setting value	Mode	Setting value	Mode	Setting value
SU-2	0	AHYS	2	t	20	rAPU	10
AL 1	10	P	3.0	HYS	2	rAPd	10
AL2	10	I	0	In-b	0	LoC	oFF
LbA	600	d	0	rESt	0.0		

TZN/TZ Series

▣ Flow chart for setting group 2

RUN — If press (MD) & (⋀) key for 3sec. at once in RUN state, it will go to setting group 2.

		(Note)		**Auto-**		Control		Scaling	Scaling	(★)
Input type	Event 1 mode	Event 2 mode	Alarm type	**tuning type**	PID type	operating type	Temperature unit	high limit	low limit	**Decimal point**
`In-t`	`EU-1`	`EU-2`	`AL-t`	`Att`	`PIdt`	`o-Ft`	`Unlt`	`H-SC`	`L-SC`	`dot`

Column under In-t:
`HCA.H`, `HCA.L`, `JIC.H`, `JIC.L`, `r Pr`, `ECr.H`, `ECr.L`, `tCC.H`, `tCC.L`, `S Pr`, `N nn`, `U tt`, `JPt.H`, `JPt.L`, `dPt.H`, `dPt.L`, `A--1`, `A--2`, `A--3` (★1)

Column under EU-1: `LbA`, `SbA`, `AL-0`, `AL-1`, `AL-2`, `AL-3`, `AL-4`, `AL-5`, `AL-6`

Column under EU-2: `LbA`, `SbA`, `AL-0`, `AL-1`, `AL-2`, `AL-3`, `AL-4`, `AL-5`, `AL-6`

Column under AL-t: `AL-A`, `AL-b`, `AL-C`, `AL-d`

Column under Att: `tun1`, `tun2`

Column under PIdt: `PIdS`, `PIdF`

Column under o-Ft: `HEAt`, `Cool`

Column under Unlt: `°C`, `°F`

Column under H-SC: `1300`

Column under L-SC: `-100`

Column under dot: `0`, `0.0`, `0.00`, `0.000`

Input type	Lock	(★2) Address	(★2) Bit per second	Ramp function	(★2) Transmission output low limit	(★2) Transmission output high limit
`In-t`	`LoC`	`AdrS`	`bPS`	`rAnP`	`FS-L`	`FS-H`
	`on` / `oFF`	`01`	`9600` / `4800` / `2400`	`oFF` / `on`	`-100`	`1300`

`In-t`	Input type : Select from 19 type	`dot`	**Select decimal point position for Analog input**
`EU-1`	Event 1 : Select from 9 type	`FS-H`	Set the high−limit when retransmission output is applied. (20mA)
`EU-2`	Event 2 : Select from 9 type		
`AL-t`	Alarm type : Select from 4 type	`FS-L`	Set the low−limit when retransmission output is applied. (4mA)
`Att`	**Auto-tuning : Selectable tun1 or tun2.**		
`PIdt`	PID : Selectable PIDF or PIDS	`rAnP`	**Able to set ON and OFF of Ramp function.**
`o-Ft`	Selectable heat−function or cool−function	`bPS`	Set communication speed
`Unlt`	Temperature unit: ℃ or °F	`AdrS`	Set communication address
`H-SC`	Set scaling high limit (Include analog output)	`LoC`	The data cannot be changed when the lock key is ON
`L-SC`	Set scaling low limit (Include analog output)		

※ It will start to flash by pressing ◀ (《) key then select each mode by ▲(⋀), ▼(⋁) keys.
   After that if press MD key, the DATA will be changed then display next mode.
※ It returns to RUN status in case of pressing MD key for 3 sec. after setting all mode to change.
※ If no key is touched for 60sec. in each mode, it will return to RUN mode automatically.
※ AL 1, AL 2, LbA, I, d, t, HyS, rEST, rAPU, rAPd modes are not displayed depending on the result of setting group 1. 2 and then jump to next mode.
※ "(★1)" is displayed only when input Sensor/Voltage/Current switch is voltage or current.
※ "(★2)" is displayed only for model with High/Low−limit of transmission output.
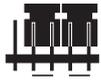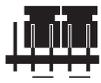
▣ Factory defaults(Setting group 2)

Mode	Setting value	Mode	Setting value	Mode	Setting value	Mode	Setting value
`In-t`	`HCA.H`	`AL-t`	`AL-A`	`PIdt`	`PIdS`	`H-SC`	`1300`
`EU-1`	`AL-1`	`Att`	`tun1`	`o-Ft`	`HEAt`	`L-SC`	`-100`
`EU-2`	`AL-2`	`rAnP`	`oFF`	`Unlt`	`°C`	`LoC`	`oFF`

Dual PID Auto Tuning Controller

■Input range for the sensor

Input sensor		Display	Selectable temperature range(℃)	Selectable temperature range(℉)
Thermocouple	K(CA) H	ʯCAH	−100~1300℃	−148~2372℉
	K(CA) L	ʯCAL	−100.0~999.9℃	This mode cannot be used as ℉
	J(IC) H	J ICH	0~800℃	32~1472℉
	J(IC) L	J ICL	0.0~800.0℃	This mode cannot be used as ℉
	R(PR)	r Pr	0~1700℃	32~3092℉
	E(CR) H	ECr.H	0~800℃	32~1472℉
	E(CR) L	ECr.L	0.0~800.0℃	This mode cannot be used as ℉
	T(CC) H	tCC.H	−200~400℃	−328~752℉
	T(CC) L	tCC.L	−199.9~400.0℃	This mode cannot be used as ℉
	S(PR)	S Pr	0~1700℃	32~3092℉
	N(NN)	Π nn	0~1300℃	32~2372℉
	W(TT)	U tt	0~2300℃	32~4172℉
RTD	JIS standard	JPt H	JPt.H	0~500℃	32~932℉
		JPt L	JPt.L	−199.9~199.9℃	−199.9~391.8℉
	DIN standard	DPt H	dPt.H	0~500℃	32~932℉
		DPt L	dPt.L	−199.9~199.9℃	−199.9~391.8℉
Analog input	0−10VDC	A-- 1	−1999~9999℃	−1999~9999℉
	1−5VDC	A-- 2	−1999~9999℃	−1999~9999℉
	DC4−20mA	A-- 3	−1999~9999℃	−1999~9999℉

■Selection switch for Input sensor/Voltage/Current

A)In case of thermocouple input ⟨K(CA), J(IC), R(PR), E(CR), T(CC), S(PR), N(NN), W(TT)⟩
  In case of RTD input ⟨DPtL, DPtH, JPtL, JPtH ⟩

S/W1   **S/W2**
S/W1:1   1 1   mA V   S/W2:V

B)In case of voltage input ⟨1−5VDC, 0−10VDC⟩

S/W1   **S/W2**
S/W1:2   2 2   mA V   S/W2:V

C)In case of current input ⟨4−20mADC⟩

S/W1   **S/W2**
S/W1:2   2 2   mA V   S/W2:mA

※Factory specification of Input sensor/Voltage/Current conversion switch : Temperature sensor input.
※Please select B) or C) according to input specification when it is voltage or current.

(A) Counter
(B) Timer
(C) Temp. controller
(D) Power controller
(E) Panel meter
(F) Tacho/ Speed/ Pulse meter
(G) Display unit
(H) Sensor controller
(I) Switching power supply
(J) Proximity sensor
(K) Photo electric sensor
(L) Pressure sensor
(M) Rotary encoder
(N) Stepping motor & Driver & Controller
(O) Graphic panel
(P) Field network device
(Q) Production stoppage models & replacement

TZN/TZ Series

▣ Alarm output function

This unit has output for control and sub(alarm) output. Sub output is optional. (This alarm output is relay contact(1a) and operates regardless of output for control.) Alarm output operates when the temperature of target is getting higher or lower than setting value.

● 1 alarm mode can be selected among 7 kinds of alarm mode at **EV-1(EV-2)** in the setting group 2.

● Since **EV-1** and **EV-2** operate separately, both **EV-1** and **EV-2** cannot be used as a high or low 2nd alarm operation.

● When selecting **LbA** or **SbA** function in **EV-1(EV-2)** of **EV-1**, alarm cannot be operated.

● Please note below "Operation chart for alarm output" & "Option of alarm output" for detailed operation and optional operation.

▣ Operation chart for alarm output

AL-0	————————	No alarm output.
AL-1	OFF [b] ON △ SV △ PV 100℃ 110℃ ※When set 10℃ in AL 1(AL 2) as deviation temperature	■ Deviation High−limit alarm If deviation between PV and SV is occurring higher than deviation of temperature setting value, the output will be ON. The deviation temperature is set in AL−1 or AL−2 of setting group 1.
AL-2	ON [b] OFF △ PV △ SV 90℃ 100℃ ※When set 10℃ in AL 1(AL 2) as deviation temperature	■ Deviation Low−limit alarm If deviation between PV and SV is occurring lower than deviation of temperature setting value, the output will be ON. The deviation temperature is set in AL−1 or AL−2 of setting group 1.
AL-3	ON [b] OFF [b] ON △ PV △ SV △ PV 90℃ 100℃ 110℃ ※When set 10℃ in AL 1(AL 2) as deviation temperature	■ Deviation High/Low−limit alarm If deviation between PV and SV is higher or lower than deviation of temperature setting value, the output will be ON. The deviation temperature is set in AL−1 or AL−2 of setting group 1.
AL-4	OFF [b] ON [b] OFF △ PV △ SV △ PV 90℃ 100℃ 110℃ ※When set 10℃ in AL 1(AL 2) as deviation temperature	■ Deviation High/Low−limit reverse alarm If deviation between PV and SV is higher or lower than deviation of temperature setting value, the output will be OFF. The deviation temperature is set in AL−1 or AL−2 of setting group 1.
AL-5	OFF [b] ON △ SV △ PV 100℃ 110℃ ※When set 110℃ in AL 1(AL 2) as alarm temperature	■ The absolute value High−limit alarm If PV is equal or higher than alarm temperature setting value, the output will be ON. The alarm temperature is set in AL−1 or AL−2 of setting group 1.
AL-6	ON [b] OFF △ PV △ SV 90℃ 100℃ ※When set 90℃ in AL 1(AL 2) as alarm temperature	■ The absolute value Low−limit alarm If PV is equal or lower than alarm temperature setting value, the output will be ON. The alarm temperature is set in AL−1 or AL−2 of setting group 1.

※ **"b" is interval between ON and OFF the setting range is 1 ~ 100℃(0.1 ~ 100.0℃) and can be set at "AHYS" made in setting group 1.**

▣ Alarm type setting [AL-t]

| Symbol	Operation name	Function
AL-A	General alarm	General alarm output without option.
AL-b	Latch function	When alarm output turns on once, the output will be ON continuously.
AL-C	Standby sequence function	It doesn't output at first operation. (When it reaches to first target value)
AL-d	Latch & Standby sequence function	It operates latch & Standby sequence function together.

Dual PID Auto Tuning Controller

▣Function

◎Auto tuning type

PID Auto tuning function automatically measures the thermal characteristics and response of the control system and then executes its value under high response & stability after calculating the time constant of PID required to control optimum temperature.

● Execute the Auto tuning function at initial time after connecting the controller & the sensor.

● Execution of Auto tuning is started when pressing AT key for 3sec. or more.

● When the Auto tuning is started, AT lamp will flash, and when the lamp is OFF, this operation will stop.

● While the Auto tuning function is executing, it is stopped by pressing AT key for 5sec. or more.

● When the power turns off or the stop signal is applied while Auto tuning function is executing, time constant of PID is not changed and it remembers the value before power turns off.

● Time constant of PID selected by Auto tuning function can be changed in setting group 1.

● **It has two kinds of Auto tuning mode.
Auto tuning operation is executed at setting value(SV) in Tun1 mode which is factory default. Auto tunig operation is executed at 70% of setting value(SV). Mode change is available in setting group 2.**
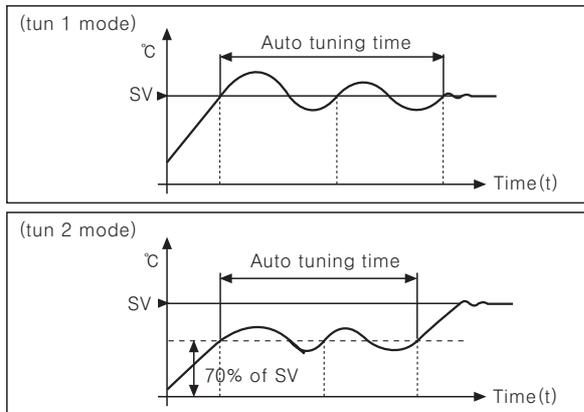
● Execute the Auto tuning function again periodically, because the thermal characteristics for the control object can be changed when the controller is used continuously for a long time.

◎Sub output(Event) function

Sub output can execute as main control output and sub function as well. There is one sub output in this unit.

● This sub output is relay "1a" contact output.

● 1 mode can be selected among 7 kinds of alarm mode or LBA operated when the heater line is cut, SBA operated when the sensor line is cut.

● The Sub output can be latched ON or automatically reset depending on the alarm option mode selected.

● When the sensor line or the heater line is cut, SBA or LBA output turns on. This "Output on" status must be reset by turning the power off.

◎Sensor Break Alarm(SBA) function

This function causes the sub output to turn on when the sensor line is cut or open.
It can easy to check that the sensor line is cut or not by operating a buzzer by the relay contact.

● Set SBA mode at Event1 or Event2 mode in setting group 2.

◎Loop Break Alarm(LBA) function

LBA function is to diagnose an abnormal temperature of the control system. If the temperature of the control system is not changed within $\pm 2℃$ during setting time of LBA, the LBA output will be ON.
Ex) When setting value(SV) is 300℃, process value(PV) is 50℃, this unit controls 100%.
In this time if there is no change of system temperature, it recognizes Heater is cut off then LBA output will be ON.

● LBA output can be selected at EV1 of the setting group 2.

● If LBA output is not selected at event output, it will not be displayed in setting group 1.

● Setting range of LBA output is 1 to 999sec.

● If thermal response of the control system is slow, LBA value should be set to a high value.

● LBA output operates when the manipulated value of the controller is 0% and 100%.

● In case the LBA output is ON, please check the following;
①Short-circuit or cutting of the temp. sensor.
②Abnormal condition of the equipment(Magnet, sub-relay, etc.)
③Abnormal condition of the load(Heater, cooler)
④Wrong-wiring or cutting of the other cables.

● Once SBA is ON due to broken sensor, it will not reset, although sensor is connected. In this case, turn off the power then turn on again.

◎Error display

If error is occurred while the controller is operating, it will be displayed as follow.

● "LLLL" is flashing when measured input temperature is lower than input range of the sensor.

● "HHHH" is flashing when measured input temperature is higher than input range of the sensor.

● "oPEn" is flashing when the input sensor is not connected or its wire is cut.

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

TZN/TZ Series

◎**ON/OFF control**

ON/OFF control is called two position control because the output turns on when PV falls lower than SV and the output turns off when PV is higher than SV.

This control method is not only for controlling temperature, but also it is basic control method for sequence control.

● If you set value P as "**0.0**" in setting group 1, ON/OFF control will operate.

● There is a programmable temperature difference between ON and OFF in ON/OFF control, if difference is too small, then hunting(chattering) can occur. Temperature difference can be set in HyS position of setting group 1. Setting range is 1 to 100(or 0.1 to 100.0).

● HyS mode is displayed when P value is "**0.0**", but HyS will not be displayed, and then jump if P value is not "**0.0**".

● This ON/OFF control should not be applied when equipment(Cooling compressor) to be controlled can be damaged by frequent ON and OFF.

● Even if ON/OFF control is stable status, the hunting can be occurred by setting value in HyS or capacity of the heater or response characteristic of the equipment to be controlled or installing position of the sensor. Please consider above points to minimize the hunting when designing the system.

◎**Manual reset function**

Proportional control has deviation because rising time is not same as falling time, even if the unit operates normally. Manual reset function is used at proportional control mode only.

● If set **rESt** function in setting group 1, the manual reset will run.

● When PV and SV is equal, Reset value is 50.0% and when control is stable, if the temperature is lower than SV, **rESt** value should be higher and on the other hand, reset value should be smaller.

● **rESt** setting method according to result of control.
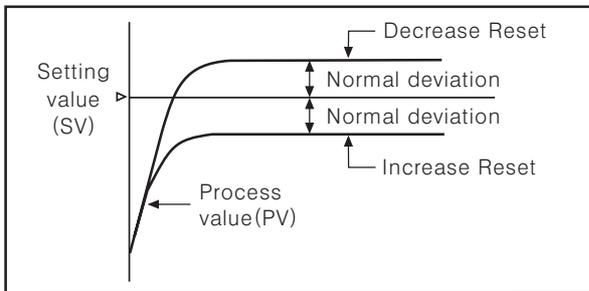
◎**Dual PID control function**

When controlling temperature, two types of control characteristic are available as below.

One is when you need to minimize the time which PV reaches to SV as like(Fig. 1). The other is when you need to minimize overshoot even though the reaching time(PV to SV) is slow(Fig. 2).

● There are high-speed response type and low-speed response type built in this unit. Therefore user can select each function according to their application.
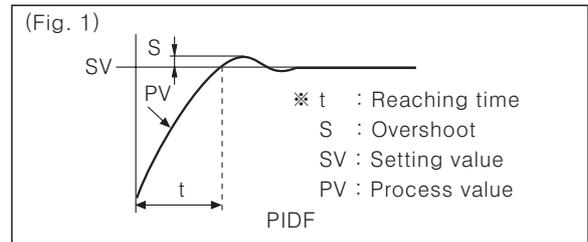
● You can select dual PID control function in setting group 2. It is selectable **PI dF** or **PI dS** in **PI dt** display.

● **PI dF**(High-speed response type)

This mode is applied to machines or systems which require high-speed response.

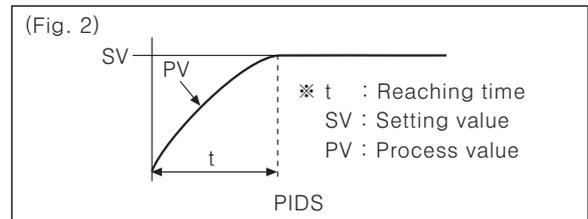Ex) Machines which must be applied preliminary heat before it operates

※Injection machine, an electric furnace, etc.

(Fig. 1)

● **PI dS**(Low-speed response type)

It is PID Slow, used to minimize overshoot even though the response is slow.

For control temperature of oil, plating machine have a possibility of fire with overshoot, **PI dS**(Limit Over) should be used.

(Fig. 2)

※Factory default setting is **PI dS**.

Please select mode according to control system.

◎**RS485 communication function**

It is used on the purpose that transmitting PV to an external equipment, setting SV at the external equipment.

● It can be set at bps, Adrs in second setting group

● Start bit(1bit, Fixed), Stop bit(1bit, Fixed), Parity bit(None)

● Adrs setting : 1 ~ 99

● If the external equipment is a PC(Personal Computer) using Converter(SCM-38I) sold separately.

◎**Decimal point(Dot) setting function**

Decimal point is displayed as "dot" in second setting group when the input is analog only. (0-10VDC, 1-5VDC, DC4-20mA)

Dual PID Auto Tuning Controller

◎Cool/Heat function

Generally there are two ways to control temperature, one(Heat-function) is to heat when PV is getting down(Heater). The other(Cool-function) is to cool when PV is getting higher(Freezer).

These functions are operating oppositely when it is ON/OFF control or proportional control.

But in this case PID time constant will be different due to PID time constant will be decided according to control system when it is PID control.

- ●Cool-function and heat-function can be set at "Setting group 2".
- ●Cool-function and heat-function must be set correctly according to the application, if set as opposite function, it may cause a fire.
  (If set cool-function at heater, even if temperature is getting high, it will be maintained ON and it may cause a fire.)
- ●Avoid changing heat-function to cool-function or cool-function to heat-function on the unit is operating.
- ●It is impossible to operate both function at once in this unit. Therefore, only one function should be selected only.
- ●Factory default setting is heat-function.

◎SV-2 function

If using SV-2 function, it changes the temperature of control system to the second setting value by external relay contact signal. It can change the setting value as sequentially by relay contact without key operation.
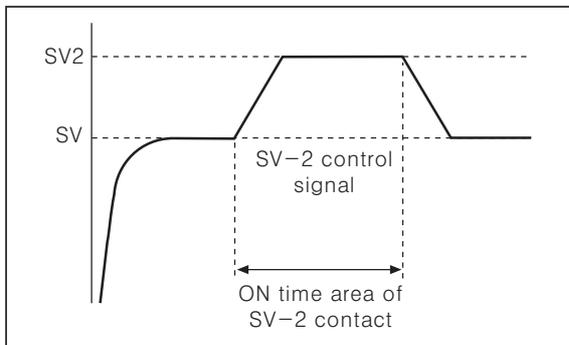
- ●It can set SV-2 at required time and particular area as like the above chart.
- ●SV-2 is in setting group 1.
- ●Application :
  The control system, which has to maintain constant temperature such as oven. If you open the door, temperature will go down.
  In this case, if you set the second setting value higher than setting value, temperature will rise fast. Therefore, after installing a micro-switch in order to detect the door Open/Close and connect it to SV-2(the second setting value should be higher than SV) then it controls temperature of oven efficiently.
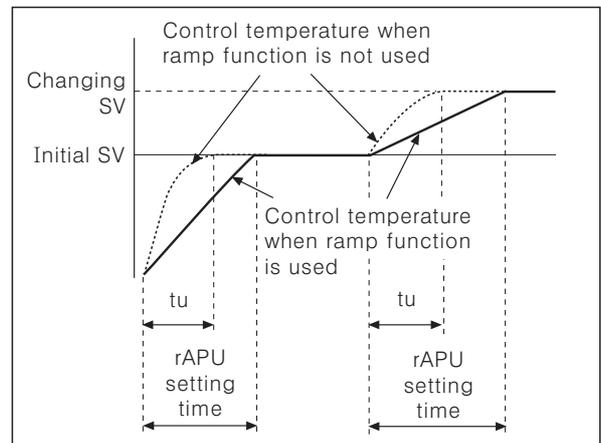
◎Ramp function

Ramp function is to delay the rising time or falling time of temperature. If you change setting value at stable state of control, it forces to rise or fall the temperature of control system during setting time at rAPU, rAPd in setting group 1.

If rAmp is not ON in setting group 2,rAPu, rAPd will not be displayed in setting group 1.

- ●**Set rAmP is ON in setting group 2 for using Ramp function.**
- ●Set the rising time and falling time at rAPU mode and rAPd mode of setting group 1.
- ●Ramp function will be operating when changing the set value at stable control status or supply the power again after the power was removed.
- ●The setting range of rising and falling time is 1~99 minute.

※rAPU function(Delay of rising time)

It makes delay rising temperature when change the set value at stable control status or delay the initial rising temperature as like above picture.

Note)rAPU time cannot be shorter than rising time (tu) of temperature when Ramp function is not used.

※rAPd function(Delay of falling time)
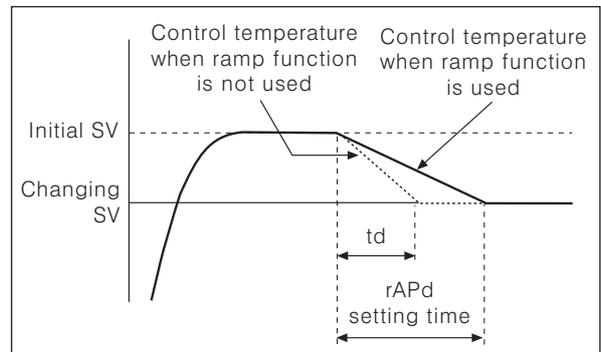
It controls falling temperature as like above.

Note)rAPd time cannot be shorter than falling time (td) of temperature when Ramp function is not used.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

◎ Input bias(In-b) function

Input correction is to correct deviation occurred from temperature sensor such as thermocouples, RTD, Analogue sensor etc. If you check the deviation of every temperature sensor precisely, it can measure temperature accurately.

- Input revise can be set at "In-b" mode in setting group 1.
- Use this mode after measuring deviation occurred from temperature sensor exactly.
  Because if measured deviation value is not corrected, displayed temperature may be too high or too low.
- Setting range of input revise is −49 ~ +50℃ (−50.0 ~ +50.0℃)
- When you set the Input revise value, you may need to record it, because it will be useful when performing maintenance.

◎ Analog input(A-1, A-2, A-3 mode)

- In case of measuring or controlling humidity & pressure, flux, etc, it uses the proper converter which is converting the measuring value to DC4−20mA or 1−5VDC or 0−10VDC.
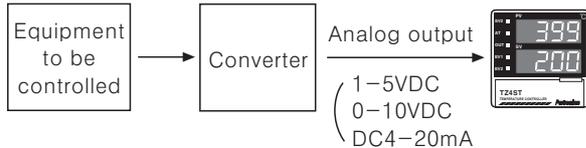

- In order to use the analog output of the converter as the controller input, select the input sensor, voltage/current converter switch built in the controller to be a same condition with analog output.
  (This should be operated in power−off status.)
- This unit has the mode for the converter built−in. Please select A−1(0−10VDC) or A−2(1−5VDC) or A−3(DC4−20mA) in selection mode of input in second setting group.
- Set the input value by High scale(H-SC) and Low scale(L-SC) mode.
- Please connect the analog output of the converter to the temperature sensor terminal of the controller. Please be cautious of the polarity.
- After the procedure, it is controlled same with temperature control.
- Ex) After the procedure, it is controlled same with temperature control.
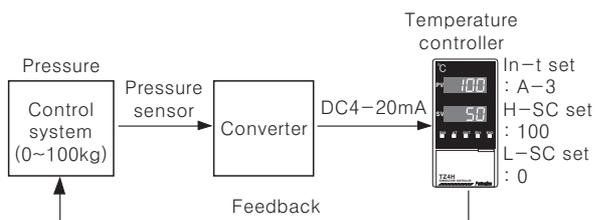
◎ Output connections

● Application of relay output type
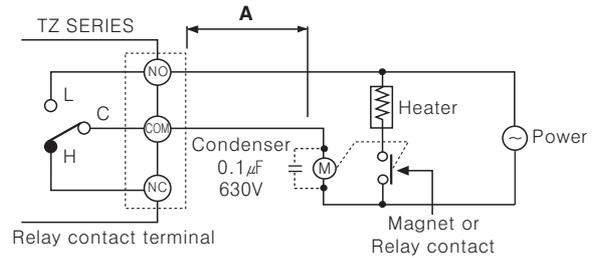
Keep power relay as far away as possible from TZ/TZN series. If wires length of **A** is short, electromotive force occurred from a coil of magnet switch & power relay may flow in power line of the unit, it may cause malfunction. If wires length of **A** is short, please connect a mylar condenser 104(630V) across coil of the power relay "Ⓜ" to protect electromotive force.
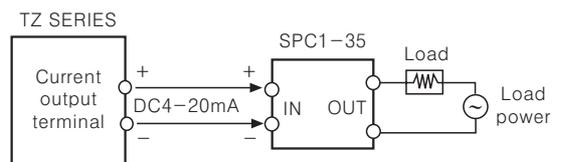
● Application of SSR output type
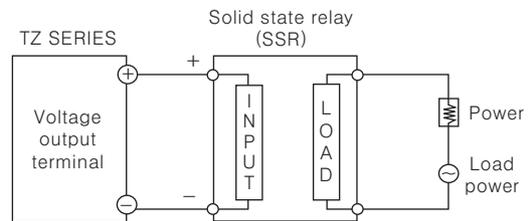
※ SSR should be selected by the capacity of load, otherwise, it may short−circuit and result in a fire. Indirect heated should be used with SSR for efficient working.

※ Please use a cooling plate or it may cause the capability deterioration, breakdown of SSR for a long usage.
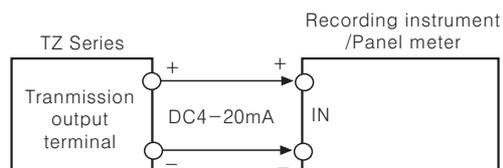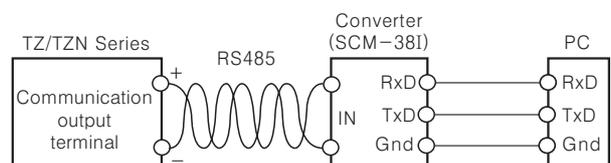
● Application of current output(DC4−20mA)

※ It is important to select SCR unit after checking the capacity of the load.

※ If the capacity is exceeded, it may cause a fire.

● Application of transmission output(DC4−20mA)

● Application of communication output(RS485)

Dual PID Auto Tuning Controller

(A) Counter	
(B) Timer	
(C) Temp. controller	
(D) Power controller	
(E) Panel meter	
(F) Tacho/ Speed/ Pulse meter	
(G) Display unit	
(H) Sensor controller	
(I) Switching power supply	
(J) Proximity sensor	
(K) Photo electric sensor	
(L) Pressure sensor	
(M) Rotary encoder	
(N) Stepping motor & Driver & Controller	
(O) Graphic panel	
(P) Field network device	
(Q) Production stoppage models & replacement	

■Communication output

◎Interface

| Standard	EIA RS485
Number of connections	Max. 31units. It is available to set address 01~99.
Communication method	2 wire half duplex
Synchronous method	Asynchronous type
Communication distance	Within 1.2km
Communication speed	2400, 4800, 9600(Available to set)
Start bit	1bit(Fixed)
Stop bit	1bit(Fixed)
Parity bit	None
Data bit	8bit(Fixed)
Protocol	BCC

◎System ordering
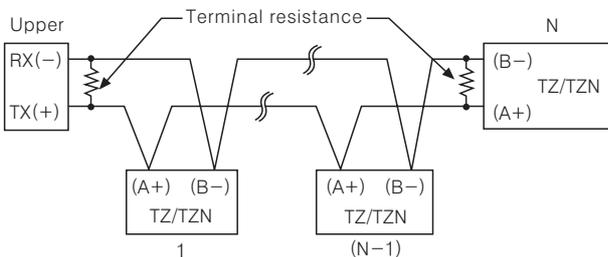
◎Communication control ordering

1. The communication control ordering of TZ/TZN series is exclusive protocol.
2. After 4sec. being supplied the power into upper system, then able to start communicating.
3. Initial communication will be started by upper system. When Command signal comes out from upper system then TZ/TZN series will respond.

※A → Over min. 4sec, B → Within max. 300ms,
　C → Over min. 20ms
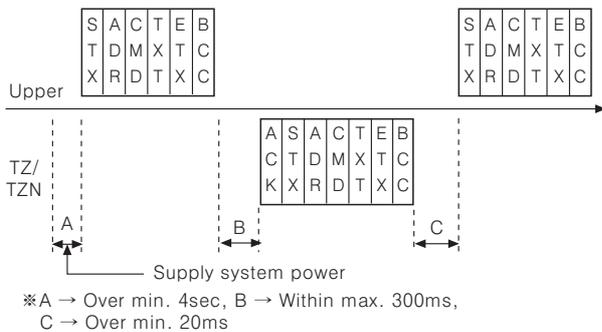
◎Communication Command and Block

Format of Command and Response
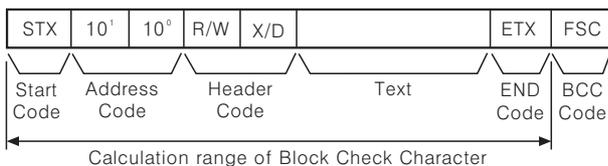
①Start code
　It indicates the first of Block STX → [02H], in case of response, ACK will be added.
②Address code
　This code is upper system can discern TZ/TZN series and able to set within range of 01 to 99.
　(BCD ASCII)

③Header code :
　It indicates command as 2 alphabets as below.
　RX(Read request) → R[52H], X[58H]
　RD(Read response) → R[52H], D[44H]
　WX(Write request) → W[57H], R[58H]
　(Reservation at upper vision of TZ/TZN)
　WD(Write response) → W[57H], D[44H]
　(Reservation at upper vision of TZ/TZN)
④Text : It indicates the detail contents of Command /Response. (See command)
⑤END code :
　It indicates the end of Block. ETX → [03H]
⑥BCC : It indicates XOR operating value from the first to ETX of the protocol as abbreviation of TZ/TZN.

◎Communication Command
●Read[RX] of measurement/setting value :
Address 01, Command RX

1. Command(Upper)
①Command

STX	0	1	R	X	P	0	ETX	FSC
Start	Address		Command head		P:Process value S:Setting value		End	BCC

②Application : Address(01), Header code(RX), Current value(P)

STX	0	1	R	X	P	0	ETX	FSC
02H	30H	31H	52H	58H	50H	30H	03H	BCC

●Write[WX] of setting value :
Address 01, Command WX

1. Command(Upper)
①Command

STX	0	1	W	X	S	0	Symbol	10³	10²	10¹	10⁰	ETX	FSC
Start	Address		Command head		S:Setting value		Space/−	10³	10²	10¹	10⁰	End	BCC

②Application : Address(01), Head Code(WX) setting value(S) +123

STX	0	1	W	X	S	0	Symbol	10³	10²	10¹	10⁰	ETX	FSC
02H	03H	31H	57H	58H	53H	30H	30H	20H	30H	32H	33H	03H	BCC

◎Response
●Read of process/Setting value

1. In case of receiving normal process value :
The data is transmitted adding ACK[60H].
(In case process value is +123.4)

ACK	STX	0	1	R	D	P	0	Symbol	10³	10²	10¹	10⁰	Decimal point	ETX	FSC
ACK	STX	0	1	R	D	P	0	Space	0	1	2	3	1	ETX	BCC
06H	02H	30H	31H	52H	44H	50H	30H	20H	30H	31H	32H	33H	31H	03H	BCC

2. In case process value is −100

ACK	STX	0	1	R	D	P	0	−	0	1	0	0	0	ETX	BCC
06H	02H	30H	31H	52H	44H	50H	30H	2DH	30H	31H	30H	30H	30H	03H	BCC

TZN/TZ Series

● Write of setting value

In case setting value is -100

A C K	S T X	0	1	W	D	S	0	Symbol	10^3	10^2	10^1	10^0	E T X	F S C
A C K	S T X	0	1	W	D	S	0	–	0	1	0	0	E T X	B C C
06H	02H	30H	31H	57H	44H	53H	30H	2DH	30H	31H	30H	30H	03H	B C C

● Others : In case of no response of ACK

①When the address is not the same after receiving STX.

②When receiving buffer overflow is occurred.

③When the baud rate or others communication setting value are not the same.

● When there are no ACK response

①Check the status of lines

②Check the communication condition (Setting value)

③When assuming the problem is due to noise, try to operate communication 3 times more until recovery.

④When occurred communication failure frequently, please adjust the communicating speed.

▣ Proper usage

◎ Simple "error" diagnosis

● In case, the load (Heater etc) is not operated, please check operation of the out lamp located in front panel of the unit. If lamp does not operate, please check the parameter of all programmed mode. If lamp is operating, please check the output (Relay, Driving voltage of SSR, DC4-20mA current) after separating output line from the unit.

But, the out lamp is not operated for DC4-20mA current output.

● When it displays "oPEn" during operation.

This is a warning that external sensor is cut off. Please turn off power and check the state of sensor. If sensor is not cut off, disconnect sensor line from terminal block and +, - together. When you turn on power it can check room temperature.

If this unit cannot indicate room temperature, this unit itself is faulty. Please remove this unit from equipment and service or replace.

(When the input mode is thermocouple, it is available to indicate room temperature.)

● In case of indicating "Error" in display

This Error message is indicated in case of damaging inner chip program data by outer strong noise.

In this case, please send the unit to our after service center after removing the unit from system.

Noise protection is designed in this unit, but it does not stand up strong noise continuously.

If bigger noise than specified (Max. 2kV) flows in the unit, it can be damaged.

▣ Caution for using

● Please use the terminal (M3.5, Max. 7.2mm) when connecting the AC power source.

● "⚠" mark indicated on the diagram of this unit means caution-refer to accompanying documents.

● In case of cleaning the unit, please keep as following Cautions;

①Clean dust with a dry tissue.

②Be sure to use alcohol to clean the unit, do not use acid, chromic acid, solvent, etc.

③Be sure to clean the unit after turning off the power and then turn on the power after passing 30minute after cleaning.

● If this unit is used in a manner not to be specified by the manufacture, it can be injury to a person or damage to property.

● Be sure that metal dust and wire-dregs do not flow in the unit, because of malfunction damage of the unit or the cause of a fire.

● Service life for the relay of the unit is indicated in this manual, life cycle is different according to the load capacity and switching times, therfore please use the unit after checking the load capacity and switching times.

● Connect wires correctly after checking polarity of terminals.

● Do not use this unit as following place.

①A place where dust, corrosive gas, oil, moisture are occurred.

②A place where there are high humidity or freezing place.

③A place where sunshine, radiant heat is occurred.

④A place where vibration, shock is occurred.

● If the equipment is used in a manner not specified by the manufacture the protection provided by the equipment may be impaired.

● Please install power switch or circuit-breaker in order to cut power supply off.

● A switch or circuit-breaker meeting the relevant requirements of IEC947-1 and IEC947-3 shall be included in equipment when the temperature controller.

● The switch or circuit-breaker should be installed near by users.

● Do not use this product as Volt-meter or Ampere-meter, this is a temperature controller.

● Installation environment

①It shall be used indoor

②Altitude Max. 2000m

③Pollution Degree 2

④Installation Category Ⅱ.

● If you want to change the input sensor, reset switches (SW1, SW2) according to each input specification after powe off. Turn on power and then set sensor mode by front keys at second flow chart.

This SSR and current of this controller are insulate from internal power.

● Do not connect power line to sensor connecting part. The inner circuit may be damaged.