# **Autonics**

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- $\underline{\Lambda}$  symbol indicates caution due to special circumstances in which hazards may occur.
- **Warning** Failure to follow instructions may result in serious injury or death

**Safety Considerations** 

- 01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.(e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
- Failure to follow this instruction may result in explosion or fire. **03. Install on a device panel to use.**
- Failure to follow this instruction may result in electric shock.04. Do not connect, repair, or inspect the unit while connected to a power source.
- Failure to follow this instruction may result in fire or electric shock. **05. Check 'Connections' before wiring.** 
  - Failure to follow this instruction may result in fire.
- **06.** Do not disassemble or modify the unit. Failure to follow this instruction may result in fire or electric shock.
- ▲ Caution Failure to follow instructions may result in injury or product damage
- 01. When connecting the power input and relay output, use AWG 20 (0.50 mm²) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.

When connecting the sensor input and communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.

Failure to follow this instruction may result in fire or malfunction due to contact failure.

- 02. Use the unit within the rated specifications.
- Failure to follow this instruction may result in fire or product damage 03. Use a dry cloth to clean the unit, and do not use water or organic solvent.
- Failure to follow this instruction may result in fire or electric shock. 04. Keep the product away from metal chip, dust, and wire residue which flow
- into the unit.

Failure to follow this instruction may result in fire or product damage.

# **Cautions during Use**

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Check the polarity of the terminals before wiring the temperature sensor. For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length. For thermocouple (TC) temperature sensor, use the designated compensation wire for extending wire.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case
  installing power line and input signal line closely, use line filter or varistor at power line
  and shielded wire at input signal line. Do not use near the equipment which generates
  strong magnetic force or high frequency noise.
- Do not apply excessive power when connecting or disconnecting the connectors of the product.

# Two-Degree-of-Freedom PID Temperature Controllers



# **TN Series** PRODUCT MANUAL

# For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc are subject to change without notice for product improvement Some models may be discontinued without notice.

# Features

- 2-DOF PID algorithm optimized for various control environments
- + 50 ms high-speed sampling and  $\pm 0.2\%$  display accuracy
- Program control and fixed control models available
- Up to 10 patterns X 20 steps program setting (program control model)
- Timer function for preset operation (fixed control model)
- Simultaneous heating/cooling and automatic/manual control function
  Control functions: Group PID, Zone PID, Anti Reset Windup (ARW)
- Control functions. Group PID, Zone PID, Anti Re
   Control status monitoring of up to 10 events
- Control status monitoring of up to 10 events
   DC495 communication output model quailable
- RS485 communication output model available
   Communication protocols' Madhus DTU/ASCII
- Communication protocols: Modbus RTU/ASCII, PLC ladderless, Sync-Master
- Communication speed: up to 115,200bpsHeater burnout alarm function (CT input)
- Parameter setting via PC
- Comprehensive Device Management Software (DAQMaster) provided
- Communication converter connection with front loader port (TNH, TNL only)
- Shortcut key setting with front user key button [U]
- · Easy maintenance with detachable terminal blocks



- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power. • Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature
- controller.
- When changing the input sensor, turn off the power first before changing. After changing the input sensor, modify the value of the corresponding parameter.
  Do not overlapping communication line and power line. Use twisted pair wire for
- communication line and connect ferrite bead at each end of line to reduce the effect of external noise.
- Make a required space around the unit for radiation of heat. For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
- Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
- Do not wire to terminals which are not used.
- This unit may be used in the following environments. - Indoors (in the environment condition rated in 'Specifications')
- Altitude Max. 2,000 m - Pollution degree 2
- Installation category II

## **Ordering Information**

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website .

T N O - O O O	56	- 7	8 - 6				
● Size S: DIN W 48 × H 48 mm H: DIN W 48 × H 96 mm L: DIN W 96 × H 96 mm	R: Rela S: SSR	,					
♥ Control method No mark: Fixed control P: Program control	Con     N: Nor     R: RS4		tion				
<b>S Power supply</b> 4: 100 - 240 VAC		Terminal type     S: Screw					
Alarm outputs	🕑 Op	tion inpu	t/output				
2: Alarm 1 / 2 4: Alarm 1 / 2 / 3 / 4	No.	Digital input	CT input	Transmission output			
6: Alarm 1 / 2 / 3 / 4 / 5 / 6	006	0	1	0			
Control output 1	008	2	1	0			
R: Relay	009	3	1	0			
S: SSR drive	014	3	2	0			
C: Current or SSR drive	026	0	1	1			
o. cancillor containe	031	U	2	1			

#### Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.

**035** 6

Download the manuals from the Autonics website.

#### Software

Download the installation file and the manuals from the Autonics website.

#### DAQMaster

DAQMaster is comprehensive device management program. It is available for parameter setting, monitoring.

#### **Product Components**

Product (+ bracket)

Instruction manual

# **Sold Separately**

- Front cover: FSA / FHA / FLA-COVER Current transformer (CT)
- Terminal protection cover: RSA / RMA / RHA / RLA-COVER

Specif	ications						
Power sup	nly	100 - 240 VAC~, 50/60 Hz					
	le voltage range	90 to 110 % of rated voltage					
	sumption	≤8 VA					
Display ty		11 segment, LCD type (operating value display part: 7 segment)					
Sampling	•	50 / 100 / 250 ms (parameter)					
Input spec		Refer to 'Input Type and Using Range'					
Option	СТ	• 0.0-50.0 A (primary current measurement range) • CT ratio: 1/1,000 • Measurement accuracy: ±5% F.S. ±1digit					
input	Digital	• Contact - ON: $\leq 2 \text{ k}\Omega$ , OFF: $\geq 90 \text{ k}\Omega$ • Non contact - residual voltage $\leq 1.0 \text{ V}$ , leakage current $\leq 0.1 \text{ mA}$ • Outflow current: $\approx 0.5 \text{ mA}$ per input					
	Relay	250 VAC~ 3A 1a					
Control	SSR	12 VDC= $\pm$ 2 V, $\leq$ 20 mA					
output	Current	DC 0 - 20 mA or DC 4 - 20 mA (parameter), Load resistance: $\leq$ 500 $\Omega$					
	Alarm	250 VAC~ 3 A 1a					
Option output	Transmission	DC 4 - 20 mA (load resistance: $\leq$ 500 $\Omega,$ output accuracy: $\pm 0.3\%$ F.S.)					
	Communication	R\$485					
	Туре	ON/OFF, P, PI, PD, PID					
Control type	Multi SV	$\leq$ 4 SV					
	Group PID	≤ 8 group					
type	Zone PID	4 zones					
	ARW (Anti Reset Windup)	50 to 200 %					
Program	Program	≤ 10 patterns					
Program control	Step	$\leq$ 200 steps (1 pattern: $\leq$ 20 steps)					
Hysteresis	Setting type	Time setting • Thermocouple, RTD: 1 to 100 (0.1 to 100.0) °C/°F					
Bronortio	nal band (P)	•Analog: 1 to 100 digit 0.1 to 999.9 °C (0.1 to 999.9%)					
Integral ti		0 to 9,999 sec					
Derivative		0 to 9,999 sec					
Control cy		Relay / SSRP output: 0.1 to 120.0 sec     Selectable current or SSR drive output: 1.0 to 120.0 sec					
Manual re	set	0.0 to 100.0%					
Dielectric		Between the charging part and the case: 3,000 VAC $\sim$ 50/60 Hz for 1 min					
Vibration		0.75 mm amplitude at frequency of 5 to 55 Hz in each X, Y, Z direction for 2 hours					
Relay life	Mechanical	OUT1/2: ≥ 5,000,000 operations     AL1/2/3/4/5/6: ≥ 20,000,000 operations					
cycle	Electrical	OUT1/2: ≥ 200,000 operations     AL1/2/3/4/5/6: ≥ 100,000 operations					
Insulation	resistance	≥ 100 MΩ (500 VDC== megger)					
Insulation	type	Double insulation or reinforced insulation (mark: $\Box$ , dielectric strength between the measuring input part and the power part: 3 kV)					
Noise imn	nunity	$\pm 2$ kV square shaped noise by noise simulator (pulse width: 1 $\mu s$ R-phase, S-phase					
Memory re	etention	pprox 10 years (non-volatile semiconductor memory type)					
Ambient t	emperature	-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)					
Ambient h	umidity	35 to 85%RH					
Protection	n structure	IP65 (Front panel, IEC standards)					
Loader po	rt	TNS: top side     TNH, TNL: front side					
Unit weig	nt (packaged)	$\begin{array}{l} \bullet TNS:\approx 128 \ g \ (\approx 156 \ g) \\ \bullet TNL:\approx 301 \ g \ (\approx 443 \ g) \end{array} \bullet TNH:\approx 184 \ g \ (\approx 286 \ g) \end{array}$					
Certificati	on	C E K SN IS C					

#### **Communication Interface**

RS485	
Comm. protocol	Modbus RTU/ASCII, Sync-Master, PLC ladderless
Connection type	RS-485, RS-422A
Application standard	EIA RS485 compliance with
Maximum connection	32 units (address: 01 to 99)
Synchronous method	Asynchronous
Comm. Method	Two-wire half duplex
Comm. effective range	≤ 800 m
Comm. speed	$\leq$ 115,200 bps
Response time	5 to 99 ms (default: 20 ms)
Start bit	1 bit (fixed)
Data bit	8 bit (fixed)
Parity bit	None (default), Odd, Even
Stop bit	1 bit, 2 bit (default)
EEPROM life cycle	pprox 1,000,000 operations (Erase / Write)

• 1 character of ModBus RTU is fixed at 11 bit

# Input Type and Using Range

The setting range of some parameters is limited when using the decimal point display.

Input type		Decimal point	Display	Using range (°C)	Using range (°F)			
	K (CA)	1	K E A.H	-200 to 1,350	-328 to 2,462			
	R (CA)	0.1	K E R.L	-199.9 to 999.9	-199.9 to 999.9			
	J (IC)	1	JI E.H	-200 to 800	-328 to 1,472			
	J (IC)	0.1	JI E.L	-199.9 to 800.0	-199.9 to 999.9			
	E (CR)	1	E C R.H	-200 to 800	-328 to 1,472			
	E (CR)	0.1	E C R.L	-199.9 to 800.0	-199.9 to 999.9			
	T (CC)	1	E E E.H	-200 to 400	-328 to 752			
	1 (CC)	0.1	E C C.L	-199.9 to 400.0	-199.9 to 752.0			
	B (PR)	1	ь PR	0 to 1,800	32 to 3,272			
These	R (PR)	1	R PR	0 to 1,750	32 to 3,182			
Thermo	S (PR)	1	S PR	0 to 1,750	32 to 3,182			
-couple	N (NN)	1	N NN	-200 to 1,300	-328 to 2,372			
	C (TT) 01)	1	C EE	0 to 2,300	32 to 4,172			
	G (TT) 02)	1	ն եե	0 to 2,300	32 to 4,172			
		1	LIE.H	-200 to 900	-328 to 1,652			
	L (IC)	0.1	LI E.L	-199.9 to 900.0	-199.9 to 999.9			
	U (CC)	1	U С С.Н	-200 to 400	-328 to 752			
		0.1	U C C.L	-199.9 to 400.0	-199.9 to 752.0			
	Platinel II	1	PLII	0 to 1,390	32 to 2,534			
	L (RUS)	1	L R.H	-200 to 800	-328 to 1,472			
	L (RUS)	0.1	L R.L	-199.9 to 800.0	-199.9 to 999.9			
	Cu50 Ω	0.1	CU 5	-199.9 to 200.0	-199.9 to 392.0			
	Cu100 Ω	0.1	C U 10	-199.9 to 200.0	-199.9 to 392.0			
	10+100.0	1	JPE.H	-200 to 650	-328 to 1,202			
DTD	JPt100 Ω	0.1	JPE.L	-199.9 to 650.0	-199.9 to 999.9			
RTD	DPt50 Ω	0.1	dPtS	-199.9 to 600.0	-199.9 to 999.9			
	DPt100 Ω	1	d P E.H	-200 to 650	-328 to 1,202			
	DPt100 1	0.1	d P E.L	-199.9 to 650.0	-199.9 to 999.9			
	Nickel120 Ω	1	NI 12	-80 to 260	-112 to 500			
	0 to 10 V	-	AV I	0 to	10 V			
	0 to 5 V	-	812	0 to	5 V			
Analag	1 to 5 V	-	8¥3	1 to	5 V			
Analog	0 to 100 mV	-	AMV I	0 to	100 mV			
	0 to 20 mA	-	A M A I	0 to	20 mA			
	4 to 20 mA	-	8882	4 to	20 mA			

- Permissible line resistance per line:  $\leq 5~\Omega$ 

01) C (TT): Same as existing W5 (TT) type sensor

02) G (TT): Same as existing W (TT) type sensor

#### Display accuracy

Input type	Using temperature	Display accuracy
Thermo -couple	At room temperature (23°C ±5 °C)	$\begin{array}{l} (\text{PV}\pm0.2\% \mbox{ or }\pm1\ \ensuremath{^{\circ}\text{C}}\ \mbox{ higher one)}\pm1\mbox{-digit} \\ \bullet\ \mbox{Thermocouple K, J, T, N, E below-100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ and L, U, PLII,} \\ \text{RTD}\ \ensuremath{^{\circ}\text{C}}\ \mbox{ or }\mbox{ 120\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 100\ \ensuremath{^{\circ}\text{C}}\ \mbox{ below}\ \mbox{ 200\ \ensuremath{^{\circ}\text{C}}\ \mbox{ loss}\ \mbox{ loss}\ \mbox{ 200\ \ensuremath{^{\circ}\text{C}}\ \mbox{ core math{^{\circ}\text{C}}\ \mbox{ loss}\ \mbox{ loss}\ \mbox{ loss}\ \mbox{ respected}\ \mbox{ loss}\ \mbox{ loss}\ \mbox{ core math{^{\circ}\text{C}}\ \mbox{ loss}\ \mbox{ RTD}\ \mbox{ loss}\ \mbox{ loss}$
RTD	Out of room temperature range	$\begin{array}{l} (\text{PV}\pm0.5\% \text{ or } \pm2\ ^\circ\text{C} \text{ higher one}) \pm1\text{-digit} \\ \bullet \text{RTD} \text{CuSO}\ \Omega, \text{DPtSO}\ \Omega; (\text{PV}\pm0.5\% \text{ or } \pm3\ ^\circ\text{C} \text{ higher one}) \\ \pm1\text{-digit} \\ \bullet \text{Thermocouple R, S, B, C, G:} \\ (\text{PV}\pm0.5\% \text{ or } \pm5\ ^\circ\text{C} \text{ higher one}) \pm1\text{-digit} \\ \bullet \text{Other sensors:} \leq \pm5\ ^\circ\text{C} (\leq-100\ ^\circ\text{C}) \end{array}$
Analog	At room temperature (23°C ±5°C)	±0.2% F.S. ±1-digit
Analog	Out of room temperature range	±0.5% F.S. ±1-digit

**Unit Descriptions** 

• Below is based on TNL Series.

1

2

3

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5

6

• The shape and function of each part may be different depending on the series, and it is possible to check the additional information in the user manual.

#### 1. PV display part (White)

• RUN mode: Displays PV (Present value) and unit. • Setting mode: Displays parameter name

2. SV display part (Green) • RUN mode: Displays SV (Setting value) and unit.

• Setting mode: Displays parameter setting value. 3. Operating value display part (Yellow)

• RUN mode: Displays selected value among MV (Manipulated output value), P/S, TM, CT with unit.

#### 4. Temperature control indicator

• Fixed control: Relative PV value status display based on SV

 $PV > SV (\nearrow), PV = SV (\rightarrow), PV < SV (\searrow)$ 

• Program control: Displays temperature control status of up ( $\nearrow$ ), hold ( $\rightarrow$ ), down ( $\searrow$ ).

For connecting communication converter

(SCM-USP).

Name

User key Mode key

Setting value control key

5. Opera	tion status in	dicator	7. Input key	
Display	Name	Description	Display	Nam
LOCK	Lock	Turns ON during key lock status.	[U]	User
PROG	Program	Turns ON during program control.	[M]	Mode Settir
WAIT	Wait	Turns ON during waiting status.	[◀], [▼], [▲]	contr
HBA1/2	Heater break alarm	Turns ON when the heater break alarm output is ON.	8. PC loader	port

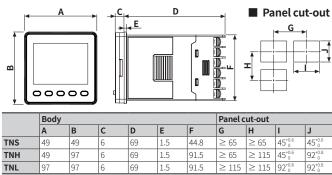
6. Output status indicator										
Display	Name	Description								
OUT1/2	Control output	Turns ON when the control output is ON								
AT	Auto tuning	Flashes during auto tuning every 1 sec								
MAN	Manual control	Turns ON during manual control mode								
STOP	Control output stop	Turns ON during control output stop mode								
HOLD	Program control hold	Turns ON when program control is hold status								
AL1 to 6	Alarm output	Turns ON when the alarm output is ON								

# **Errors**

Display	Input	Description	Output	Troubleshooting		
oPEN	Temperature sensor	Flashes at 0.5 sec interval when input sensor is disconnected or sensor is not connected.	'Sensor error, MV' parameter setting value	Check input sensor status.		
0 F C 14	Analog	Flashes at 0.5 sec interval when input is over F.S. $\pm 10\%$ .	'Sensor error, MV' parameter setting value	Check analog input status.		
Temperature sensor		Flashes at 0.5 sec interval if the input value is above the input range.	Heating: 0%, Cooling: 100%			
нннн	Analog	Flashes at 0.5 sec interval if the input value is over 5 to 10% of high limit or low limit value.	Normal output	When input is within the rated		
	Temperature sensor	Flashes at 0.5 sec. interval if the input value is below the input range.	Heating: 100%, Cooling: 0%	input range, this display disappears.		
LLLL	Analog	Flashes at 0.5 sec interval if the input value is over 5 to 10% of low limit or high limit value.	Normal output			
ERR	-	Flashes at 0.5 sec interval if there is error for setting and it returns to the error-before screen.		Check setting method.		
ĿMR.E	-	Flashes twice and stops operation at the start of operation if the timer operation related parameter setting is not completed.	'STOP, MV' parameter setting value	Set the timer operation related parameters.		
P E N.E	-	Flashes twice and stops operation at the start of operation if the program operation related parameter setting is not completed.	'STOP, MV' parameter setting value	Set the program operation related parameters.		
E R	-	Flashes twice the address of failed Slave when using Sync communication or PLC setting copy function.	-	Check the failed slave connection status and communication settings.		

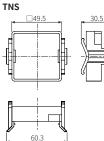
## **Dimensions**

- Unit: mm, For the detailed drawings, follow the Autonics website.
- Below is based on TNS Series.



INS	49	49	6	69	1.5	44.8	$\geq 65$	$\geq 65$	45.0	45 0
TNH	49	97	6	69	1.5	91.5	$\geq 65$	$\geq 115$	45 <sup>+0.6</sup>	92 <sup>+0.8</sup>
TNL	97	97	6	69	1.5	91.5	$\geq 115$	$\geq$ 115	92 <sup>+0.8</sup>	92 <sup>+0.8</sup>

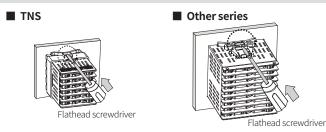
#### Bracket







# **Installation Method**

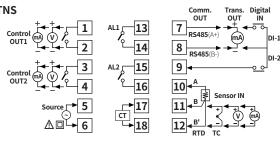


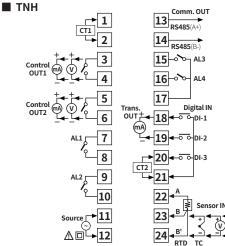
Insert the unit into a panel, fasten the bracket by pushing with tools with a flathead screwdriver.

# Connections

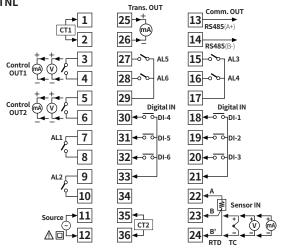
• Digital input is not electrically insulated from internal circuits, so it should be insulated when connecting other circuits.

# TNS





TNL



# **Crimp Terminal Specifications**

• Unit: mm, Use the crimp terminal of follow shape.

≤5.8 ≥3.0

≥3.0 ≤5.8

Fork crimp terminal

Round crimp terminal

#### **Initial Display When Power is ON**

When power is supplied, after all display will flash for 1 sec, model name is displayed sequentially. After input sensor type will flash twice, enter into RUN mode.

Display part 1. Model		2. Model	3. Input specification	4. RUN mode
PV ENS.P		RS	ЕЧРЕ	oPEN
SV	42RR	006	K E A.H	٥

# **Mode Setting**

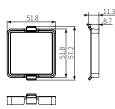
	、 、				r			
	Auto before entering to mode			Password Pass	Key input Auto	Entering r Selected r		
	(when using	$\rightarrow$	Password input	Fail	[◀], [▲], [▼]			
	password)			. an	[MODE]	Run mode	j	
	[◀], [▲], [▼] (in manual control)	$\rightarrow$	MV setting	Save: Whe	lue: [▲], [▼] n chage value ODE] or no ke			
	[◀], [▲], [▼] (in auto control)	÷	SV setting	Save and I	s: [◀] lue: [▲], [▼] Return: [MODE ut over 3 sec	] or		
RUN	[▼] + [▲] 3 sec	$\rightarrow$	Control output run/stop	Auto	$\rightarrow$			
RUN	[M] + [▲]	$\rightarrow$	Operating value display part (MV / P/S / TM / CT) setting	Auto		$\rightarrow$	RUN	
	[U] + [◀] / [▼] / [▲] 2 sec	$\rightarrow$	Shortcut key 1/2/3	Auto		$\rightarrow$		
	[ <b>◀</b> ] + [ <b>▼</b> ] 3 sec	$\rightarrow$	Key lock ON/OFF	Auto		$\rightarrow$		
	[M] 2 sec [U] 2 sec	$\rightarrow$	Parameter group	[ <b>◀</b> ] 2 sec		$\rightarrow$		
		$\rightarrow$	U key enter parameter group	[ <b>◀</b> ] 2 sec		$\rightarrow$		
	[◀] + [▲] + [▼] 5 sec	$\rightarrow$	Parameter reset	Auto		$\rightarrow$		

• TNS series does not support 'MV setting', 'Operation value display part setting' mode. For the details, refer to the user manual

# Sold Separately: Front cover

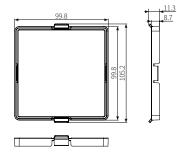
# • Unit: mm

#### TNS: FSA-COVER





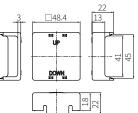




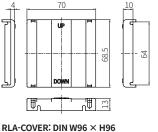
# Sold Separately: Terminal Protection Cover

• Unit: mm

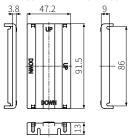
#### RSA-COVER: DIN W48 $\times$ H48



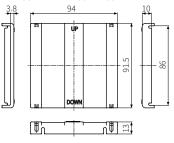
RMA-COVER: DIN W72  $\times$  H72







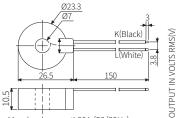




#### Sold Separately: Current Transformer (CT)

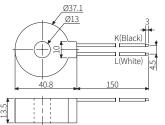
- Unit: mm
- The current for above CTs is 50A same but inner hole sizes are different. Please use this for your environment. • Do not supply primary current in case that CT output is open. High voltage will be
- generated in CT output.

#### CSTC-E80LN



- Max. load current: 80A (50/60Hz)
  Current ratio: 1/1000
  Wire wounded resistance: 31Ω±10%

#### CSTC-E200LN

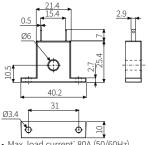


• Max. load current: 200A (50/60Hz)

Current ratio: 1/1000

- Wire wounded resistance:  $20\,\Omega\pm10\%$ 

#### CSTS-E80PP

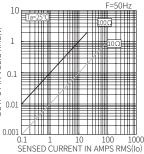


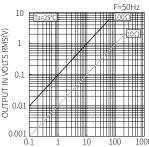
- Max. load current: 80A (50/60Hz)
   Current ratio: 1/1000
- Wire wounded resistance  $31\Omega \pm 10\%$

# **Segment Table**

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

7 Segment			11	Seg	mer	nt	12	Seg	mer	nt	16	Seg	mer	nt	
٥	0	1	1	٥	0	1	1	٥	0	1	1	٥	0	Ĩ	1
1	1	J	J	1	1	J	J	1	1	J	J	1	1	Ū	J
2	2	ĥ	К	2	2	ĸ	К	2	2	К	к	2	2	ĸ	K
З	3	L	L	Э	3	L	L	Э	3	L	L	Э	3	L	L
ч	4	ñ	М	ч	4	М	М	Ч	4	Μ	М	Ч	4	М	М
5	5	n	N	5	5	N	N	5	5	N	N	5	5	Ν	N
6	6	ο	0	6	6	ο	0	Б	6	٥	0	6	6	۵	0
Л	7	Ρ	Р	Л	7	Ρ	Р	Л	7	Ρ	Р	Л	7	Ρ	Р
8	8	9	Q	8	8	۵	Q	8	8	Q	Q	8	8	Q	Q
9	9	r	R	9	9	R	R	9	9	R	R	9	9	Ŗ	R
R	A	5	S	Я	Α	5	S	Я	А	5	S	Я	А	5	S
Ь	В	Ł	Т	Ь	В	F	Т	Ь	В	Ł	Т	3	В	T	Т
E	С	U	U	٢	С	U	U	Ľ	С	U	U	٢	С	U	U
d	D	U	V	d	D	V	V	d	D	V	V	J	D	V.	V
Ε	E	Ū.	W	Ε	Е	М	W	Ε	Е	М	W	Ε	Е	и	W
F	F	5	Х	F	F	×	Х	F	F	×	Х	F	F	×	Х
6	G	Ч	Y	G	G	Ч	Y	5	G	Ч	Y	6	G	Y	Y
Н	Н	Ξ	Ζ	н	Н	ž	Ζ	Н	Н	ž	Ζ	Н	Н	Z	Ζ





0.1 1 10 100 1000 SENSED CURRENT IN AMPS RMS(Io)

