Multi-channel(4 channel / 2 channel) modular type PID control

NEW

▣ Features

- Multi-channel(4 channel/ 2 channel) simultaneous controlling possible
- High-speed sampling cycle(4 channel : 100ms, 2 channel : 50ms)
- **No communication and power supply for expansion modules required by using side connectors : Max. 31 units (124 channels / 62 channels)**
- Input channel isolated design(Dielectric strength 1,000 VAC)
- Heating/Cooling simultaneous controlling
- Allows parameter setting and monitoring by USB port of PC : only for using DAQMaster or USB to Serial converter (SCM-US, sold separately)
- Easy maintenance via connector type connection : Sensor input connector, control output connector, power/communication connector
- Multi input / Multi range
- Heater disconnection function(CT input)

※ CT, sold separately : CSTC-E80LN, CSTC-E200LN

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

▣ User manual

- Visit our website (www.autonics.com) to download user manual and communication manual.
- User manual describes for specifications and function, and communication manual describes for RS485 communication (Modbus RTU protocol) and parameter address map data.

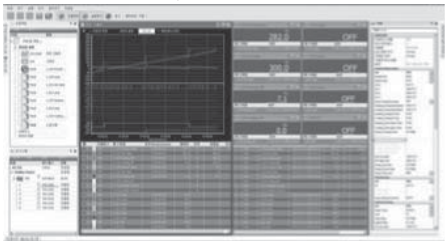
▣ Integrated device management program(DAQMaster)

- DAQMaster is a integrated device management program for convenient management of parameters and multiple device data monitoring.
- Visit our website (www.autonics.com) to download user manual and integrated device management program

< Computer specification for using software >

Item	Recommended specification
Processor	IBM PC compatible computer with Intel Pentium III or above
Operating system	Windows 98 / NT / XP / Vista / 7
RAM	Over 256MB
Hard disk	Over 1GB of available space
VGA	Over 1024×768
Communication port	RS232 Serial port, USB port

< DAQMaster screen >



▣ Ordering information

TM	4	N	2	R	B

Module type	B		Basic module
	E		Expansion module
Control output	2 Channel	R	Relay output
		C	Current or SSR output selectable
	4 Channel	R	Relay output
		S	SSR drive output
Power supply	2		24VDC
Sub output	2 Channel	2	Alarm1+Alarm2 Relay output
		4	Alarm1+Alarm2+Alarm3+Alarm4 Relay output
	4 Channel	N	None(※No sub output)
Channel	2		2 Channel
	4		4 Channel
Item	TM		Multi-channel modular temperature controller

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

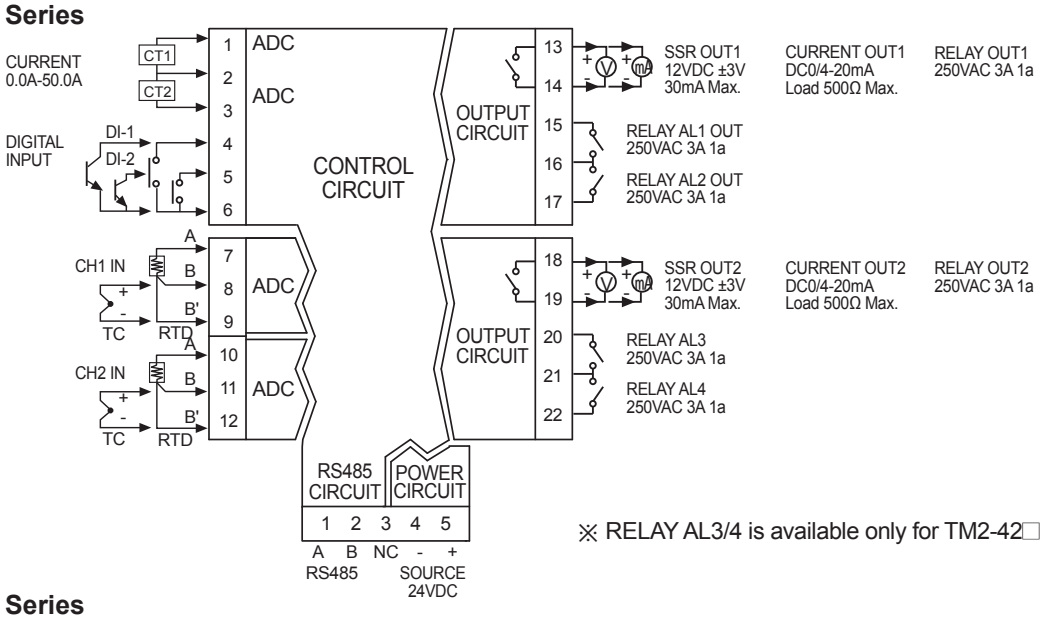
■ Specifications

Series		TM2-22RB	TM2-42RB	TM2-22RE	TM2-42RE	TM2-22CB	TM2-42CB	TM2-22CE	TM2-42CE	TM4-N2RB	TM4-N2RE	TM4-N2SB	TM4-N2SE
Channel		2 Channel (Each channel insulated-Dielectric strength 1,000 VAC)								4 Channel (Each channel insulated-Dielectric strength 1,000 VAC)			
Power Supply		24VDC											
Allowable voltage range		90 to 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)											
	Thermocouple	K, J, E, T, L, N, U, R, S, B, C, G, PLII(13types)											
Indicating accuracy	RTD / Thermocouple※1	(Bigger one either PV ±0.5% or ±1℃) ±1digit Max.											
	CT input	(±5% F.S.) ±1digit Max.								—			
	Current output	(±1.5% F.S.) ±1digit Max.								—			
Influence of Temperature※2	RTD / Thermocouple	(Bigger one either PV ±0.5% or ±2℃) ±1digit Max.(In case of thermocouple input, it is ±5℃ at -100℃ below.) ●Thermocouples L, U, C, G, R, S, B : (Bigger one either PV ±0.5% or ±5℃) ±1digit Max.											
Control output	Relay	250VAC 3A 1a				-				250VAC 3A 1a		—	
	SSR	—				12VDC ±3V 30mA Max.				—		22VDC ±3V30mA Max.	
	Current	—				DC 4-20mA or DC 0-20mA selectable(Load 500Ω Max.)				—			
Sub output	Relay	250VAC 3A 1a								—			
	Communication	RS485 Communication output(Modbus RTU)											
Event input	CT input	0.0-50.0A(Primary current meaurement range) ※CT ratio = 1/1000								-			
	Digital input	●Contact input: ON Max. 1kΩ, OFF Min. 100kΩ ●Non-contact input: ON Max. 1.5V residual voltage, OFF Max. 0.1mA leakage current ●Outflow current : Approx. 0.5mA								-			
Control method	Heating, cooling / Heating&cooling	ON/OFF control mode, P, PI, PD, PID control mode											
Hysteresis		1 to 100℃/℉(0.1 to 100℃/℉) variable								1 to 100 digit			
Proportional band (P)		0.1 to 999.9℃											
Integral time (I)		0 to 9999 sec.											
Derivative time (D)		0 to 9999 sec.											
Control period (T)		0.1 to 120.0 sec.(Only relay and SSR output type)											
Manual reset value		0.0 to 100.0%											
Sampling period		50ms(2 channel synchronous sampling)								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 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours											
Relay life cycle	Mechanical	Min. 10,000,000 operations											
	Electrical	Min. 100,000 operations (250 VAC 3A resistance load)											
Insulation resistance		100MΩ(at 500VDC megger)											
Noise resistance		Square shaped noise by noise simulator (pulse width 1μs) ±0.5kV											
Environ-ment	Ambient temperature	-10 to 50℃, storage: -20 to 60℃											
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH											
Accessory		Expansion connector											
		Power / communication connector[※Basic module only]											
Insulation type		Double insulation or reinforced insulation (Mark: ⊡, Dielectric strength between the measuring input part and the power part : 1kV)											
Approval		CE cULus											
Unit weight		Approx. 144g	Approx. 152g	Approx. 135g	Approx. 143g	Approx. 139g	Approx. 148g	Approx. 130g	Approx. 139g	Approx. 174g	Approx. 166g	Approx. 160g	Approx. 152g

※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.
※2. Applied when used out of range 23 ±5℃.
※Environment resistance is rated at no freezing or condensation.

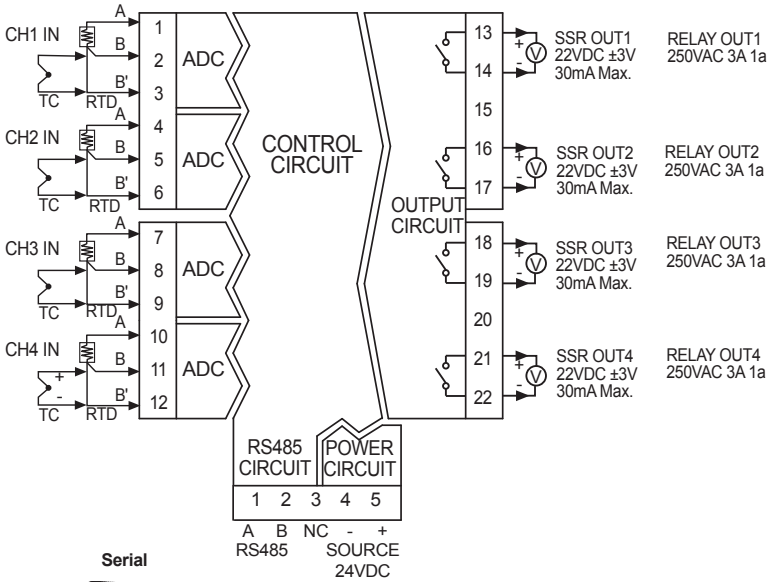
▣ Connections and block diagram

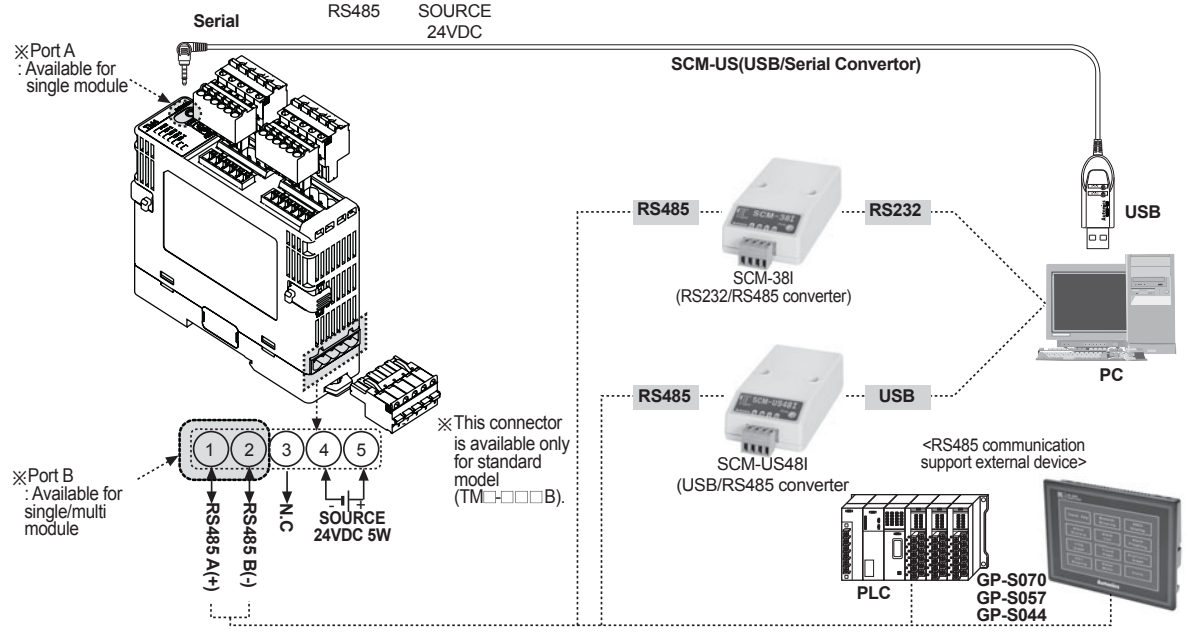
●TM2 Series



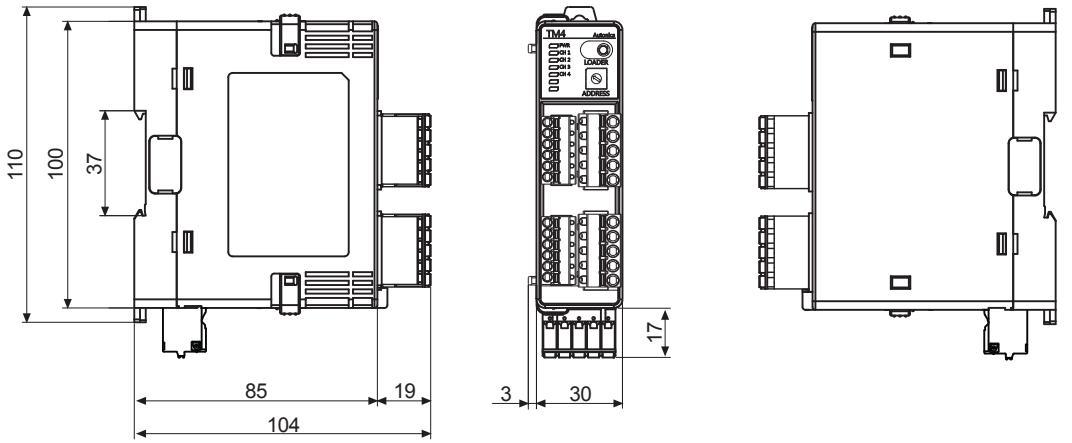
※ RELAY AL3/4 is available only for TM2-42□□ model.

●TM4 Series





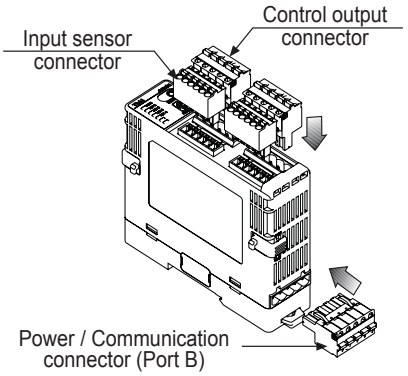
▣ Dimensions



(unit: mm)

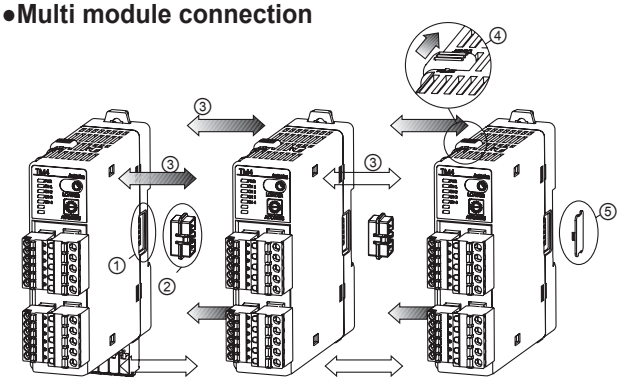
▣ Installation

●Connector connection



※**TM□-□□□B**

●Multi module connection

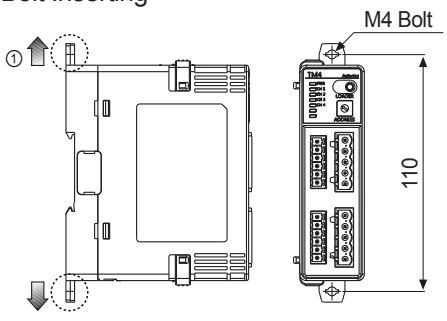


TM□-□□□B (Basic module) **TM□-□□□E (Expansion module)** **TM□-□□□E (Expansion module)**

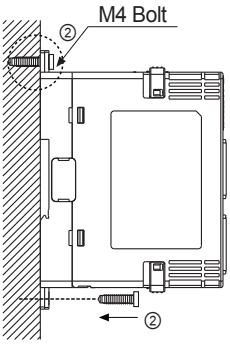
※① Remove END cover for both basic modules and expansion modules.
② Insert expansion connectors.
③ Connect an expansion module without space.
④ Fix the LOCK switch by pushing it in the LOCK direction.
⑤ Mount the END cover at each side.

※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 (155W=31ea X 5W) is required when connecting 31 units]

●Bolt Inserting



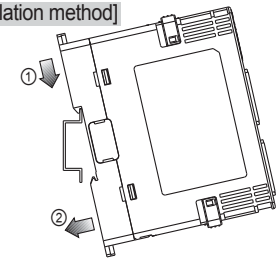
① Pull each Rail Lock switch up and down.



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

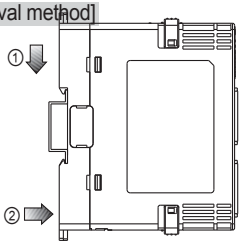
●DIN Rail Installation

[Installation method]

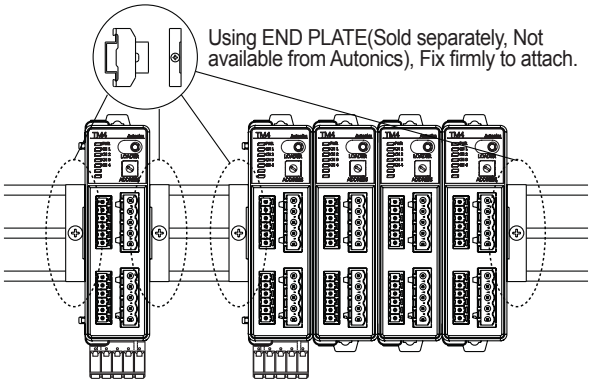


① Put the top edge of the rail Lock on the top edge or the DIN rail.
② Push the module body in while pressing down.

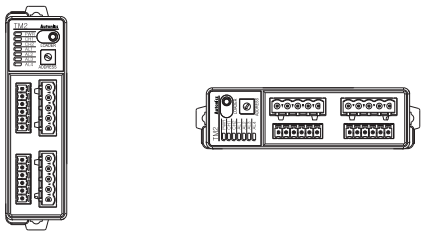
[Removal method]



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



※**Make sure to install the unit vertically to the ground.**

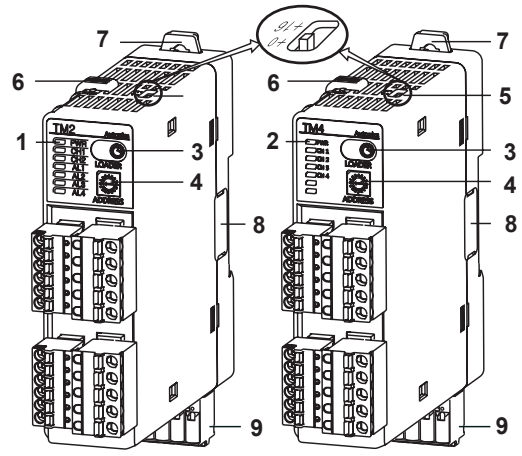


Vertical Installation (O)

Horizontal Installation (X)

▣ Parts description

◎TM2 Series **◎TM4 Series**



3. PC loader port(Port A)
   : Integrated device management program (DAQMaster, free download on our site) is for setting parameter by PC through USB to Serial converter (SCM-US, sold separately).
4. Communication address setting switch (SW1)
   : Used to set communication address.
5. Communication address group change switch (SW2)
   : When communication address is over 16, select +16.
   Ex) For setting 20 address, set the communication address group change switch (SW) as +16 and set the commuicaiton address setting switch (SW1) as 4.
6. Lock switch
   : Used for fixing units to DIN rail or to the wall
7. Rail lock
   : Used for fixing units to DIN rail or to the wall
8. END cover
   : Remove it when connecting each module.
9. Power supply/Communications connector(Port B)
   : Only Basic module(TM□-□2□B)

1. Indicating LED(TM2 Series)

Status / Indicating LED	Initial power on ※1	Control output	Alarm output N.O OFF(OPEN)	Alarm output N.O ON(CLOSE)	Alarm output N.C OFF(OPEN)	Alarm output N.C ON(CLOSE)	Auto tuning ※2
PWR LED ※3	Green	Green	-	-	-	-	Green
CH1 LED	2400bps-Flashing	Power ON-RED	-	-	-	-	Flashing
CH2 LED	4800bps-Flashing	Power ON-RED	-	-	-	-	Flashing
AL1 LED	9600bps-Flashing	Power ON-YELLOW※4	Light OFF	Light ON	Light ON	Light OFF	Light OFF
AL2 LED	19200bps-Flashing	Power ON-YELLOW※5	Light OFF	Light ON	Light ON	Light OFF	Light OFF
AL3 LED	38400bps-Flashing	-	Light OFF	Light ON	Light ON	Light OFF	Light OFF
AL4 LED	-	-	Light OFF	Light ON	Light ON	Light OFF	Light OFF

2. Indicating LED(TM4 Series)

Status / Indicating LED	Initial power on※1	Control output	Auto tuning※2
PWR LED※3	Green	Green	Green
CH1 LED	2400bps- Flashing	ON - RED	Flashing
CH2 LED	4800bps- Flashing	ON - RED	Flashing
CH3 LED	9600bps- Flashing	ON - RED	Flashing
CH4 LED	19200bps- Flashing	ON - RED	Flashing
	38400bps- Flashing	-	-

※1. In case of initial power on, default communication speed will be flashing for 5 sec. (1 sec. cycle).
※2. Each CH3 LED will be flashing during auto tuning (1 sec. cycle).
※3. Power LED will be flashing while communicating with external units (1 sec. cycle).
※4. Light ON when control type for CH1 is heating & cooling type and cooling output is provided.
※5. Light ON when control type for CH2 is heating & cooling type and cooling output is provided.

■ Input sensor type and temperature range

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

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

■ Error indication

	Input sensor open error	Over temperature range
PWR LED	Red ON	
CH1 LED	RED Flashing (for 0.5 sec.)	
CH2 LED	RED Flashing (for 0.5 sec.)	
CH3 LED※1	RED Flashing (for 0.5 sec.)	
CH4 LED ※1	RED Flashing (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

※1. Only for TM4 Series(4CH).

■ Communication setting

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

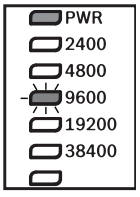
●Interface

Application Standard	Compliance with EIA RS 485
Max. connection	31 units(communication address setting: 01 to 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 to 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 flashing in case of initial power ON for 5 sec. (1 sec. cycle).



※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.
※If connects communication through Port A, Port B will be disconnected communication automatically.

●Communication address setting

①Set the communication address using SW1 and SW2.
Setting range is 01 to 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
+0	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
+16																
+0	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
+16																

※Default : SW1 : 1, SW2 : +0

■ Sold separately

●Communicatoin converter

[SCM-38I(RS232C to RS485 converter)]

[SCM-US48I(USB to RS485 converter)]

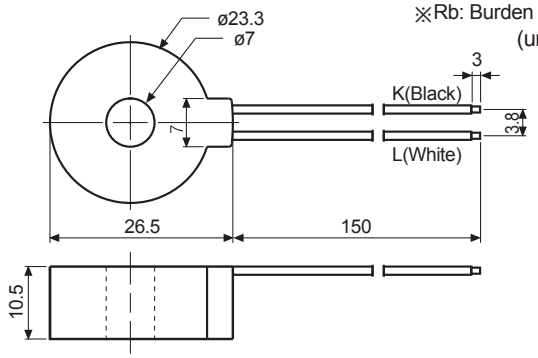
[SCM-US(USB to Serial converter)

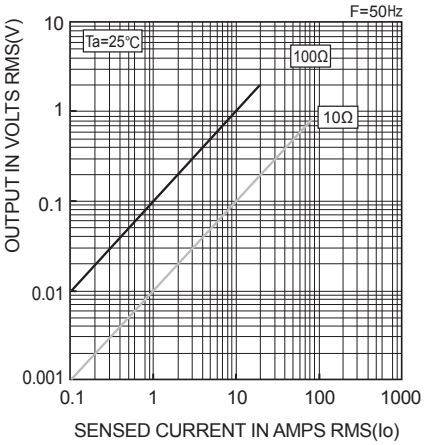
●Current transformer(CT)

[CSTC-E80LN]

Current measuring range	100mA to 80A (Rb=10Ω)	Current ratio	1000:1
Wire wounded resistance	31Ω±10%	Accuracy	2.0 grade (5A to 80A)

※Rb: Burden resistor
(unit: mm)

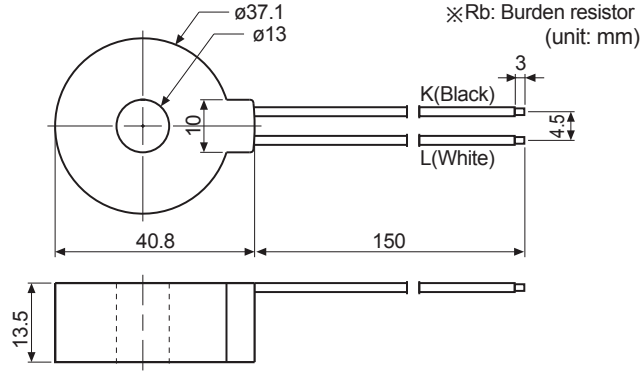


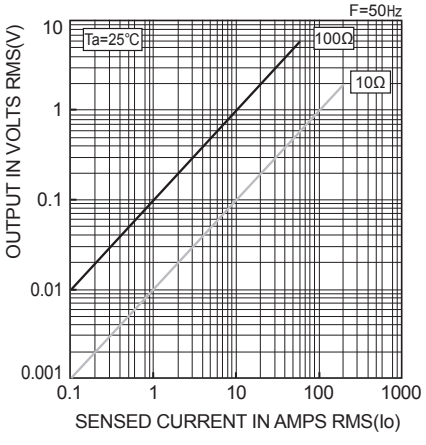


[CSTC-E200LN]

Current measuring range	100mA to 200A (Rb=10Ω)	Current ratio	1000:1
Wire wounded resistance	20Ω±10%	Accuracy	2.0 grade (5A to 200A)

※Rb: Burden resistor
(unit: mm)





※Do not supply primary current in case that CT output is open. High voltage will be generated in CT output.

▣ Proper usage

◎ Simple failure diagnosis

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

①It 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.)

②Make sure proper input sensors are selected.

●When no output is operated

①Check 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

①Check communication converter first. [RS232C to RS485 converter(SCM-38I, sold separately), USB to RS485 converterserial(SCM-US48I, sold separately) USB to Serial converter(SCM-US, sold separately)]

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

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

④Strong 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

①Check converter's power supply and connection.

②Check communication setting.

③Check main body's connections to external units.

◎ Caution for using

1. Use DC power only.
2. Keep the ambient temperature -10℃ to 50℃
3. For more accurate controlling, start temperature controlling approx. 20 minutes later after connecting input sensors and supplying power.
4. In case indicating accuracy does not meet the specification, check Input Bias parameter first.
5. Power switch or a circuit breaker must be installed for proper application.
6. Make sure that the power switch or a circuit breaker installed near operators.
7. This unit is solely allowed for temperature controlling application. Do not apply this unit as a voltage meter or current meter.
8. 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.
9. 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.
10. Make sure controller's line connection must be separated from high voltage line or power supply line in order to prevent induced noise.
11. 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.
12. 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.
13. Avoid using the unit near radio, TV or wireless machines that may cause high frequency interference.
14. 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.
15. Use (-) driver screws (2mm) or use plastic driver screws. If not, it might cause product damage.
16. 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.
17. Avoid installing the unit with overlapping communication line and AC power line together.
18. Draw a draft while using the controllers. In case of installing at a closed area, please take measures for ventilation.
19. Installation environment
    ①It shall be used indoor. ②Altitude Max. 2000m.
    ③Pollution Degree 2 ④Installation CategoryII.

※Please keep the above precautions to avoid malfunction and damages.

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