

Autonics

Multi-channel modular temperature controller

TM2 SERIES

M A N U A L



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

Caution for your safety

- *Please keep these instructions and review them before using this unit.
- *Please observe the cautions that follow;
- Warning** Serious injury may result if instructions are not followed.
- Caution** Product may be damaged, or injury may result if instructions are not followed.
- *The following is an explanation of the symbols used in the operation manual.
- caution:**Injury or danger may occur under special conditions.

Warning

- In case of using this unit with machineries(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device, or contact us.
It may cause a fire, human injury or property loss.
- Install the unit on a panel.
It may cause an electric shock.
- Do not connect, inspect or repair when power is on.
It may cause an electric shock.
- Make sure power supply type and terminal polarity when connecting the wires.
It may cause a fire.
- Do not disassemble the case. Please contact us if it is required.
It may cause an electric shock or a fire.

Caution

- This unit shall not be used outdoors.
It might shorten the life cycle of the product.
- For relay output terminal wire connections, use AWG No. 20(0.50mm²).
It may cause fire due to contact failure.
- Please observe the rated specifications.
It might shorten the life cycle of the product and cause a fire.
- Do not use beyond of the rated switching capacity of Relay contact.
It may cause insulation failure, contact melt, contact failure, relay broken and fire etc.
- In cleaning unit, do not use water or an oil-based detergent and use dry towels.
It may cause an electric shock or a fire.
- Do not use this unit in place where there are flammable or explosive gas, humidity, direct ray of the light, radiant heat, vibration and impact etc.
It may cause a fire or an explosion.
- Do not inflow dust or wire dregs into the unit.
It may cause a fire or a malfunction.
- Please wire properly after check the terminal polarity when connect temperature sensor.
It may cause a fire or an explosion.
- In order to install the units with reinforced insulation, use the power supply unit which reinforced insulation level is ensured.

Ordering information

TM	2	-	2	2	R	B
			Module type		B	Basic Module (*Power / communication terminal)
					E	Expansion Module (*No power / communication terminal)
			Control output		R	Relay
					C	Current or SSR output Selectable(Default:Current Output)
			Power supply		2	24VDC
			Aux I / O		2	Alarm1+Alarm2 Relay Contact Output
					4	Alarm1+Alarm2+Alarm3+Alarm4 Relay Contact Output
			Channel		2	2 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.

Parts description

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

- *1: In case of initial power on, default communication speed will be flickering for 5 sec(1 sec cycle).
- *2: Each CH LED will be flickering during auto tuning (1 sec cycle).
- *3: Power LED will be flickering 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. (Alarm setting not available on AL1)
- *5: Light ON when control type for CH2 is heating & cooling type and cooling output is provided. (Alarm setting not available on AL2)

- 2 CT(Current Transformer) input terminal, DI(Digital input) terminal
- 3 CH1, CH2 Sensor input terminal
- 4 OUT2(Control output), AL3 and AL4(Alarm output) terminal
- 5 OUT1(Control output), AL1 and AL2(Alarm output) terminal
- 6 Communication address setting switch : Set a communication address
- 7 PC loader port(Port A) : In case of PC parameter setting, use a dedicated loader(SCM-US, sold separately)
- 8 Communication address group change switch : Set Communication address group
- 9 Power supply/communications connector(Port B) : Only Basic module
- 10 END Cover : Remove it when connecting each module.
- 11 Rail Lock : Used for fixing units to DIN Rail or to the wall
- 12 Lock switch : Used for fixing each module when connecting module units.(up/down side)

* The above specifications are subject to change and some models may be discontinued without notice.

Specifications

Series		TM2 series							
Channel		TM2-22RB	TM2-42RB	TM2-22RE	TM2-42RE	TM2-22CB	TM2-42CB	TM2-22CE	TM2-42CE
Power Supply		2 channels(Each channel insulated - Dielectric strength 1,000VAC)							
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	(Bigger one either PV ±0.5% or ±1℃) ±1 Digit Max.							
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.							
	Control output	Relay 250VAC 3A 1a SSR ——— 12VDC ±3V 30mA Max. Current ——— DC 4~20mA or DC 0~20mA selectable (Load 500Ω, Max.)							
Auxiliary output		Relay 250VAC 3A 1a							
communication output		RS485 communication output (Modbus RTU)							
Event Input	Leakage current	Approx. Max. 4mA							
	Contacts	ON : Max. 1KΩ, OFF : Max. 100KΩ							
	Non-contacts	ON : Max. 1.5V residual voltage, OFF : Max. 0.1mA leakage current							
	CT	0.0~50.0A(Primary current measurement range) *CT ratio 1,000:1							
Control type	heating, cooling	ON/OFF control mode, P, PI, PD, PID control mode							
	heating&cooling	ON/OFF control mode, P, PI, PD, PID control mode							
Hysteresis		Thermocouples/RTD : 1 ~ 100℃/°F (0.1 ~ 100℃/°F) variable							
Proportional band (P)		0.1 ~ 999.9%							
Integral time (I)		0 ~ 9,999 sec.							
Derivative time (D)		0 ~ 9,999 sec.							
Control period (T)		0.1 ~ 120.0 sec.(Only Relay and SSR output type)							
Manual reset value		0.0 ~ 100.0%							
Sampling period		50ms(2 channel synchronous sampling)							
Dielectric strength		1,000VAC 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 1,000,000 times							
	Electrical	Over 100,000 times (250 VAC 3A resistance load)							
Insulation resistance		100MΩ(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							
Insulation type(*3)		□							
Approval		CE, C, US							
Unit weight		Approx. 144g	Approx. 152g	Approx. 135g	Approx. 143g	Approx. 139g	Approx. 148g	Approx. 130g	Approx. 139g

- *1: In case of thermocouple K,T,N,J,E at -100℃ below and L,U,J, Platinel II, 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℃.
- *3: " □ " Mark indicates that equipment protected throughout by double insulation or reinforced insulation.

Input Sensor Type and Temperature Range

Input type	No.	Dot	Display	Input range(℃)	Input range(°F)
ThermoCouple	K(CA)	0	1	K(CA).H	-200 ~ 1350
		0	1	K(CA).L	-200.0 ~ 1350.0
		2	0	J(I(C).H	-200 ~ 800
	J(I(C)	3	0.1	J(I(C).L	-200.0 ~ 800.0
		4	1	E(CR).H	-200 ~ 800
		5	0.1	E(CR).L	-200.0 ~ 800.0
	T(CC)	6	1	T(CC).H	-200 ~ 400
		7	0.1	T(CC).L	-200.0 ~ 400.0
		8	1	B(PR)	0 ~ 1800
	R(PR)	9	1	R(PR)	0 ~ 1750
		10	1	S(PR)	0 ~ 1750
		11	1	N(NN)	-200 ~ 1300
RTD	C(TT)(*1)	12	1	C(TT)	0 ~ 2300
		13	1	G(TT)(*2)	0 ~ 2300
		14	1	L(I(C).H	-200 ~ 900
	L(I(C)	15	0.1	L(I(C).L	-200.0 ~ 900.0
		16	1	U(CC).H	-200 ~ 400
		17	0.1	U(CC).L	-200.0 ~ 400.0
	U(CC)	18	1	PLII	0 ~ 1400
		19	1	JPt100.H	-200 ~ 600
		20	0.1	JPt100.L	-200.0 ~ 600.0
	JIS Standards	21	1	DPt100.H	-200 ~ 600
		22	0.1	DPt100.L	-200.0 ~ 600.0

*1: C(TT) - Same as existing W5(TT)

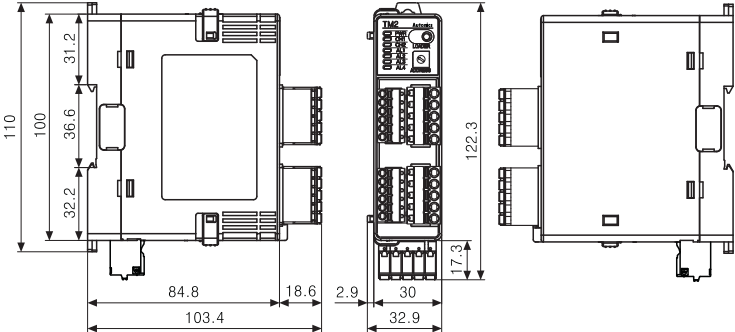
*2: G(TT) - Same as existing W(TT)

* Default: K(CA).H

Error Indication

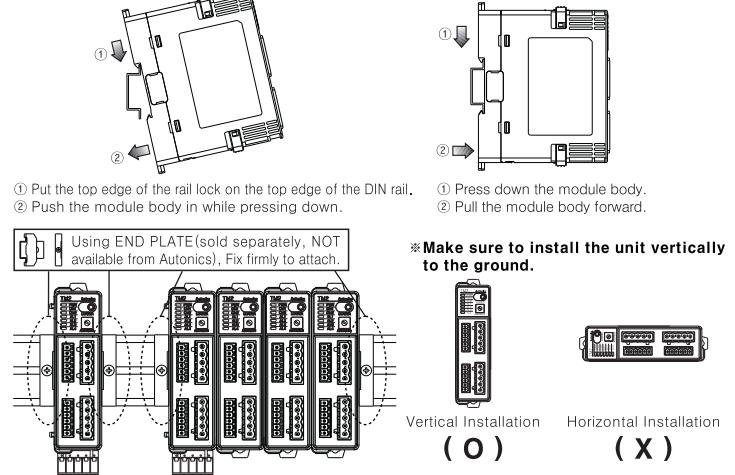
	Input Sensor Open Error		Over Temperature Range	
			RED ON	
PWR LED			RED ON	
CH1 LED			RED Flickering (for 0.5 sec)	
CH2 LED			RED Flickering (for 0.5 sec)	
Communication Output (decimal)	'31000' output	'30000 (upper limit)' output, '-30000 (lower limit)' output		
Dedicated program	'OPEN' indication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

Dimensions

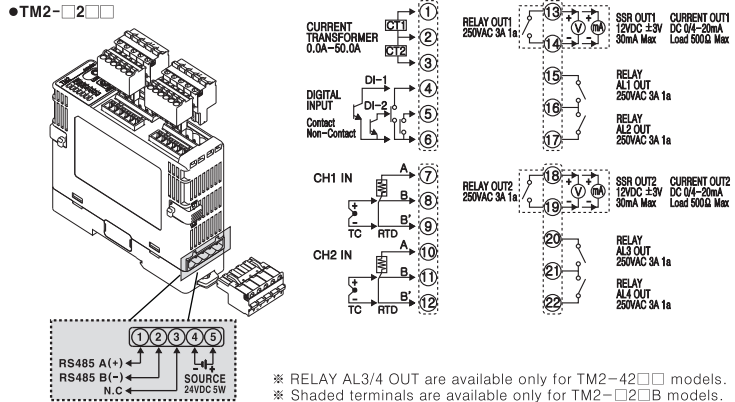


Installation

- Connector connection
 - Input sensor connector
 - Control output connector
 - Power / Communication connector (Port B)
- Multi Module connection
 - 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: 0.5 to 0.9 N · m).
- DIN Rail Installation
 - 4.1 Installation Method
 - 4.2 Removal Method



Connections



Communication Setting

○A function for external parameter setting using 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, 480