Multi Channel Modular Type Temperature Controller

Multi-channel modular type temperature controller

▣Features

(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

- 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

NEW

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

CE c**RU**US

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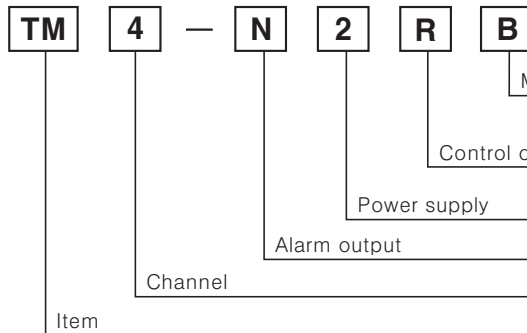
Module type	B	Basic module(※Power/communication terminal)
	E	Expansion module(※No power/communication terminal)
Control output	R	Relay contact output
	S	SSR drive output
Power supply	2	24VDC
Alarm output	N	None(※No Aux I/O)
Channel	4	4 Channel
Item	TM	Multi-channel modular temperature controller

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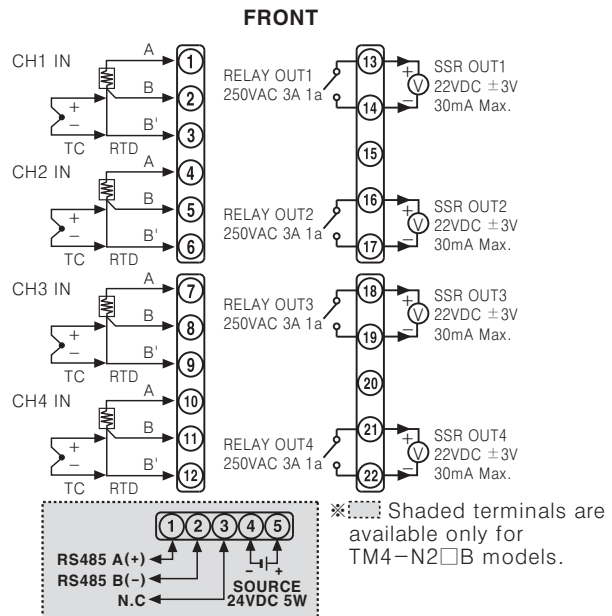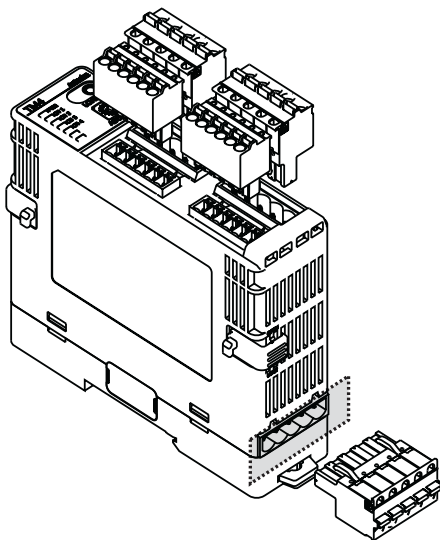
▣Specifications

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		C€ c🅄🅛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.

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(N)
Stepping
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(O)
Graphic
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Field
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Production
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▣ Dimensions
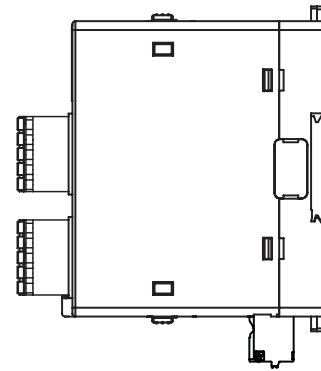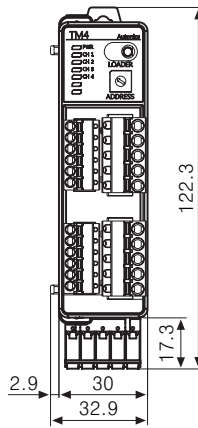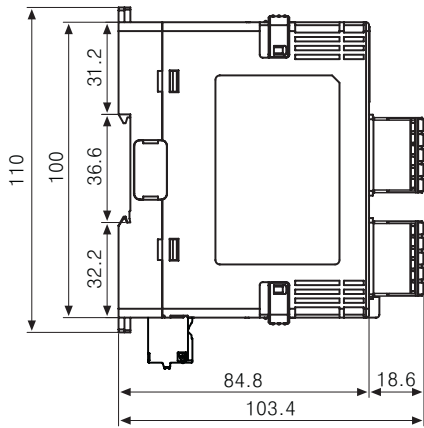
(Unit：mm)

▣ Installation

● Connector connection

Input sensor connector

Control output connector
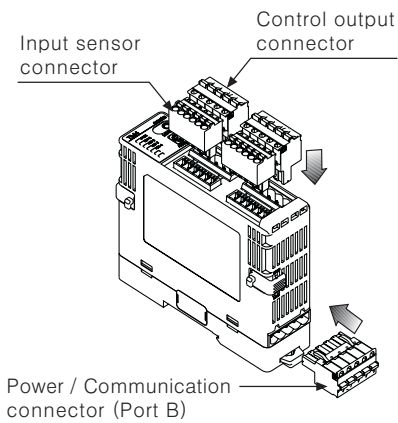
Power / Communication connector (Port B)
※ **TM4-N2□B**

● Multi Module connection

TM4-N2□B   **TM4-N2□E**   **TM4-N2□E**
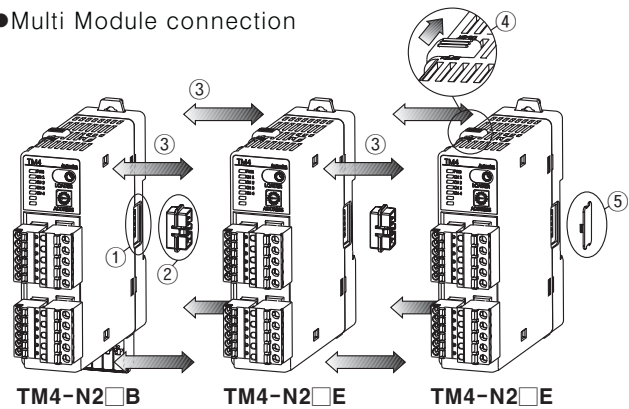
※① Remove END cover for both basic modules and expansion modules.
　② Insert expansion module connection connectors.
　③ Connect an expansion module without space.
　④ Fix the LOCK switch by pushing it in the LOCK direction.
　⑤ Mount the END cover at each side.
※ Up to 30 expansion modules can be connected 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)
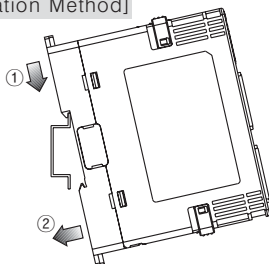
● Bolt Inserting
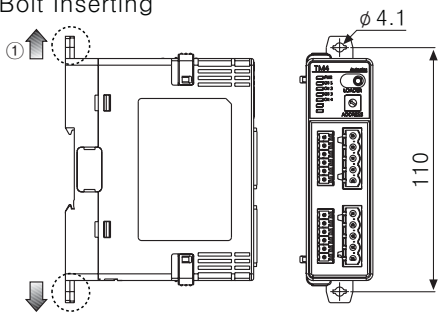
① Pull each Rail Lock switch up and down.
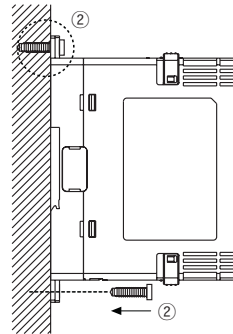
② Insert the bolts to fix.
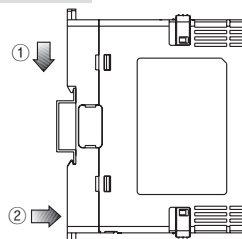(Tightening torque is 0.5N · m ~ 0.9N · m.)

● 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.

TM Series
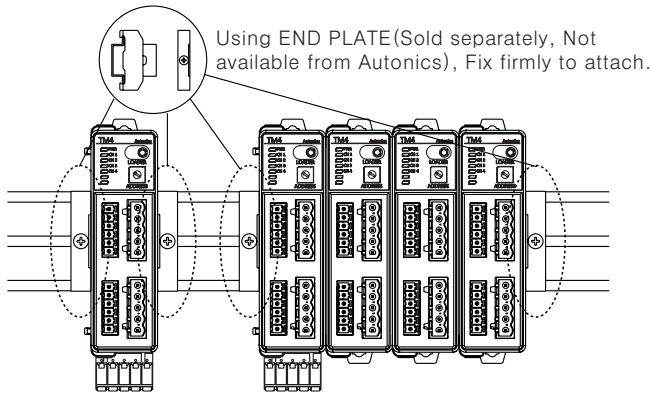
Using END PLATE(Sold separately, Not available from Autonics), Fix firmly to attach.

※**Make sure to install the unit vertically to the ground.**
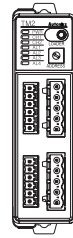
Vertical Installation
(O)
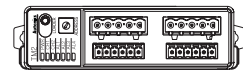
Horizontal Installation
(X)

▪Parts description
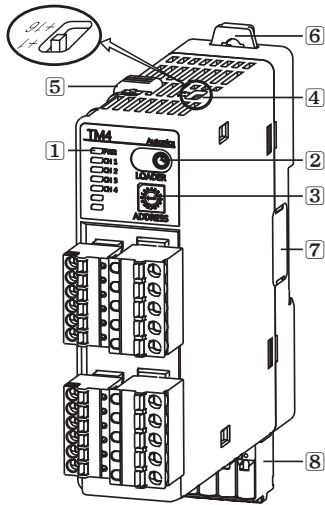
① Indicating LED

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

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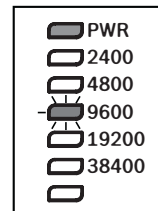
①Set the communication address using SW1 and SW2.
Setting range is 01 ~ 31. (※In case setting 00, communication is not available.)

※Default : SW1 : 1, SW2 : +1

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

■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 CategoryⅡ.

◎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.

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