

TD510/511

Programmable temperature controller



- 1,2-channel control
- multi input (RTD, TC, VDC)
- Various alarm functions
- Communication function built-in (RS485)
- Detachable and expandable structure
- Digital Recorder function (internal memory, SD card storage)
- Contact input (DI) with up to 32 contacts, contact output (DO) with up to 32 contacts
- Color TFT LCD screen with touch panel (640 * 480 resolution)

Specification

Range configuration by input type

Input type			Measuring range (°C)	Leve
Thermoresistor (RTD)	Pt100 Ω	Pt-1	-200.0 ~ 640.0	±0.1 % of FS ±1 Digit
	KPt100 Ω	KPt-1	-200.0 ~ 500.0	
Thermocouple (TC)	K	K-0	-200 ~ 1370	±0.15 % of FS ±1 digit
		K-1	-200.0 ~ 1370.0	±0.15 % of FS ±1 digit(*2)
	J		-200.0 ~ 1200.0	±0.15 % of FS ±1 digit(*2)
	E		-200.0 ~ 1000.0	±0.15 % of FS ±1 digit(*2)
	T		-200.0 ~ 400.0	±0.15 % of FS ±1 digit(*3)
	R		0.0 ~ 1700.0	±0.15 % of FS ±1 digit(*4)
	B		0.0 ~ 1800.0	±0.15 % of FS ±1 digit(*1)
	S		0.0 ~ 1700.0	±0.15 % of FS ±1 digit(*4)
	L		-200.0 ~ 900.0	±0.15 % of FS ±1 digit(*2)
	N		-200.0 ~ 1300.0	±0.15 % of FS ±1 digit(*3)
	U		-200.0 ~ 400.0	±0.15 % of FS ±1 digit(*3)
	Wre 5-26		0.0 ~ 2300.0	±0.15 % of FS ±1 digit(*4)
DC voltage (VDC)	-10 - 20 mV		-10.00 ~ 20.00	±0.1 % of FS ±1 Digit
	0 - 100 mV		0.00 ~ 100.00	
	1 - 5 V		1.00 ~ 5.00	
	0 - 30 V		0.00 ~ 30.00	

(*1) 0 ~ 400 °C : ±5 % of FS ±1 digit

(*2) -200 ~ -150 °C : ±0.2 % of FS ±1 digit

(*3) -200 ~ -150 °C : ±0.4 % of FS ±1 digit, -150 ~ -100 °C : ±0.2 % of FS ±1 digit

(*4) 0 ~ 200 °C : ±0.2 % of FS ±1 digit

Power input

Power voltage	100 - 240 V a.c. Voltage regulation ±10 %
Power frequency	50/60 Hz
Power consumption	30 VA max
Max. rating of internal fuse	250 V a.c.
Dielectric strength	Between 1st and 2nd terminals : Min. 1500 V a.c for 1 min Between 1st and FG terminals : Min. 1500 V a.c for 1 min Between 2nd and FG terminals : Min. 1500 V a.c for 1 min
Insulation resistance	20 MΩ or 500 V d.c. between power and FG terminals

Sensor input

Input type	2 types of thermoresistor (Pt-100, KPt-100), 11 types of thermocouple (K, J, E, T, R, B, S, L, N, U, Wire 5-26) 4 types of DC voltage (-10 - 20 mV, 0 - 100 mV, 1 - 5 V, 0 - 30 V)
Sampling cycle	250 ms
Measured current of thermoresistor(RTD)	Approx. 0.21 mA
Input resistance	Thermocouple : 1 MΩ or more; DC voltage : 1 MΩ or more
Allowable wire resistance	Thermoresistor : Max. 100 Ω/wire (For RTD between -100.00 and 150.00, max. 10 Ω/wire)

	Thermocouple : 200 Ω or less DC voltage : 2 kΩ or less
Influence of wire resistance	Thermoresistor : ±0.3 °C/10 Ω (3 wires must have the same wire resistance)
Allowable input voltage	Thermocouple : ±10 V d.c. or less, DC voltage : ±33 V d.c. or less
Error of reference junction contact(RJC) temperature	±1.5 °C (0 ~ 50 °C)
Detection of sensor disconnection(Burn-out)	UP-Scale for disconnection

■ Output specification

Contact output(DO)	Up to 32 relay	A Contact	30 V d.c. 3 A max, 250 V a.c. 3 A
		B Contact	NO : 30 V d.c. 5 A max, 250 V a.c. 5 A
Control output	SSR output	ON : 18 V d.c. Pulse voltage(800 Ω or more load resistance)	
	SCR output	4 - 20 mA d.c. (600 Ω or less load resistance)	
Transmission output	Current output	4 - 20 mA d.c	
	Load resistance	600 Ω or less load resistance	
	Output limit	-5.00 ~ 105.00 %	
	Output type	Specific value(PV), Setting value(SV), Output(MV), and random	
	Refresh interval	250 ms	

■ Contact input

Max. number of input	32 points
Input type	No-voltage contact input
ON/OFF sensing resistor	Recognizes as ON for min 1 kΩ or less and OFF for max. 10 kΩ or more.
Min. sensing time	0.25 S
Operational conditions	During operation/Always
Contact function	Operation and stop/hold/step by DI; User can define error screen.

■ Communication specification

Applied standard	RS485
Max. connection number	1:32 (address 1 - 99)
Communication type	2-wire
Synchronization	Asynchronous
Communication distance	Approx. 1.2 km or less
Communication speed	9600, 19200, 38400, 57600, 115200 bps
Data length	7/8 bits
Parity bit	NONE / EVEN / ODD
Stop bit	1 / 2 bit(s)
Protocol	PC-Link / PC-Link + SUM / MODBUS ASC / MODBUS RTU
Response time	0 ~ 100 ms

■ Control function

Input	Input calibration (Sensor bias)	2 temperature points : EUS(0 - 100 %)
	Scaling	DC voltage(VDC) : Input scaling according to conversion range
	Input filter (LPF)	0 - 120 S
Control mode	Operation type	Constant-value / Program control
Control output	Temperature control output	SSR output or SCR (4 - 20 mA d.c.) output
Control operation	Pattern	100 patterns(1 pattern/100 segments)

	Segment	2000 segments
	PID group	4 groups
	Auto tuning	Auto tuning according to target setting value
	Proportional band	0.00 - 100.00 % (For 0.00 %, ON/OFF control)
	Integral time	0.0 - 3,000 S (OFF when 0 S)
	Derivative time	
	ON/OFF control	Set 0.0 to proportional band(PB)
	Normal Open/ Normal Close	According to selection of Normal Open/Normal Close for control output
	Hysteresis	EUS (0 ~ 100 %)
Transmission output	Temperature (Ch.1 and 2)	4 - 20 mA d.c. Specific value(PV), Setting value(SV) and Output(MV)
	Scaling	Auto scaling for defined upper/lower limit range(4 - 20 mA d.c.)
Alarm setting	Alarm setting	System alarm : 8 points Assign 4 of 8 pattern alarms to a pattern
	Alarm type	Absolute upper/lower limit, Offset upper/lower limit, and Within/Out of range
	Absolute alarm setting range	EU (0 ~ 100 %)
	Offset information setting range	EUS (-100 ~ 100 %)
	Hysteresis	EUS (0 ~ 100 %)

▪ Display specification

Display	TFT color LCD (115.2 x 86.4 mm)
Number of pixels	640 X 480 pixel
Back light	LED Back light
Life cycle of back light	Approx. 40,000 h
Touch type	Resistive type (4 Wires)
Language	Korean/English/Chinese(Simplified)

▪ Memory specification

Internal memory	Non-volatile memory : 80 MB - Saving of 15 days at 1 S interval
External memory	SD card(8 GB) : Saving of 4 years at 1 S interval
Saving interval	1 - 360 S
Memory information	Program information, setting value, recovery, and temperature setting/specific/output value

▪ Use environment

Ambient temperature	0 ~ 50 °C
Temperature fluctuation	10 °C/h or less
Ambient humidity	20 - 90 % RH (Without condensation)
Magnetic field	400 A/m or less
Altitude	2,000 m or less from the sea
Weight	Approx. 1.32 kg

▪ Storage environment

Ambient temperature	-20 ~ 70 °C
Temperature fluctuation	20 °C/h or less
Ambient humidity	5 - 95 % RH (Without condensation)

▪ Influence of ambient temperature

DC voltage, thermocouple sensor	±0.003 % / °C of max. range
Thermoresistor sensor	±0.03 °C/°C

Suffix code

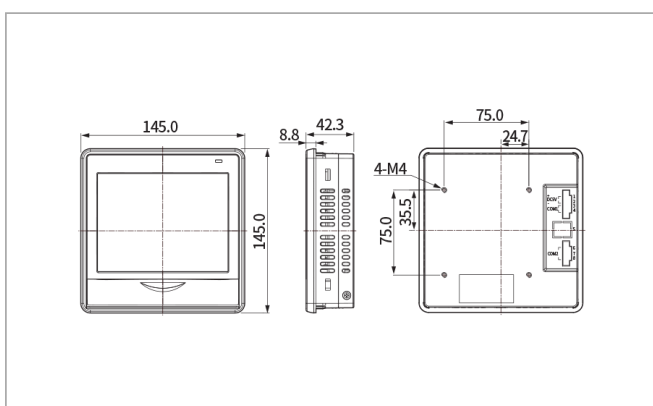
Model	Code				Description
TD51	☐ -	☐	☐	☐	Programmable temperature controller
Control unit	0				2 channels
	1				1 channels
Display		1			Display(5.7" TFT LCD)
		N			None
Input/output			1		8 input points / 6 output points (1 module)+Power module+Control module
			2		8 input points / 14 output points (2 modules)+Power module+Control module
			3		16 input points / 16 output points (3 modules)+Power module+Control module
			N		No input/output
Language				S	Korean, English, and Chinese(Simplified)

※ This product consists of the display and control(power, control, input, and output modules).
(Up to 32 contact input/output points, respectively)

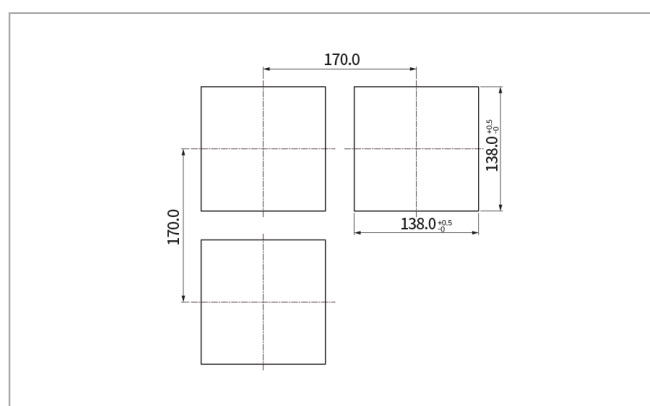
Dimension & Panel cutout

[Unit : mm]

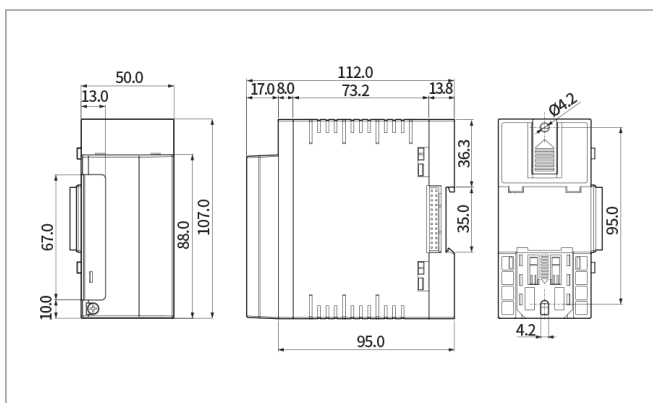
Display



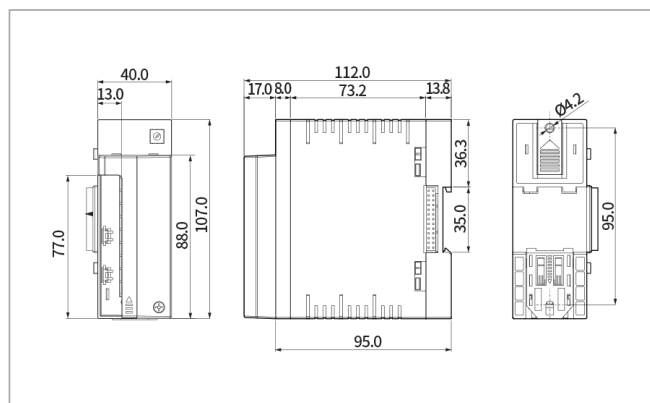
Panel cutout



Power module



Control / Input / Output / Input,Output modules



Product Configuration

Product	Model	Description
Display	TD510-1N□	5.7" TFT LCD
Control module	TD510-MAIN	Temperature 2-channel control module
Power module	TM-PWR	Power module
Input module	TM-DI	Module with 16 input points
Output module	TM-DO	Module with 8 output points
Input/output module	TM-DIO	Module with 8 input and 6 output points

■ How to install



Danger

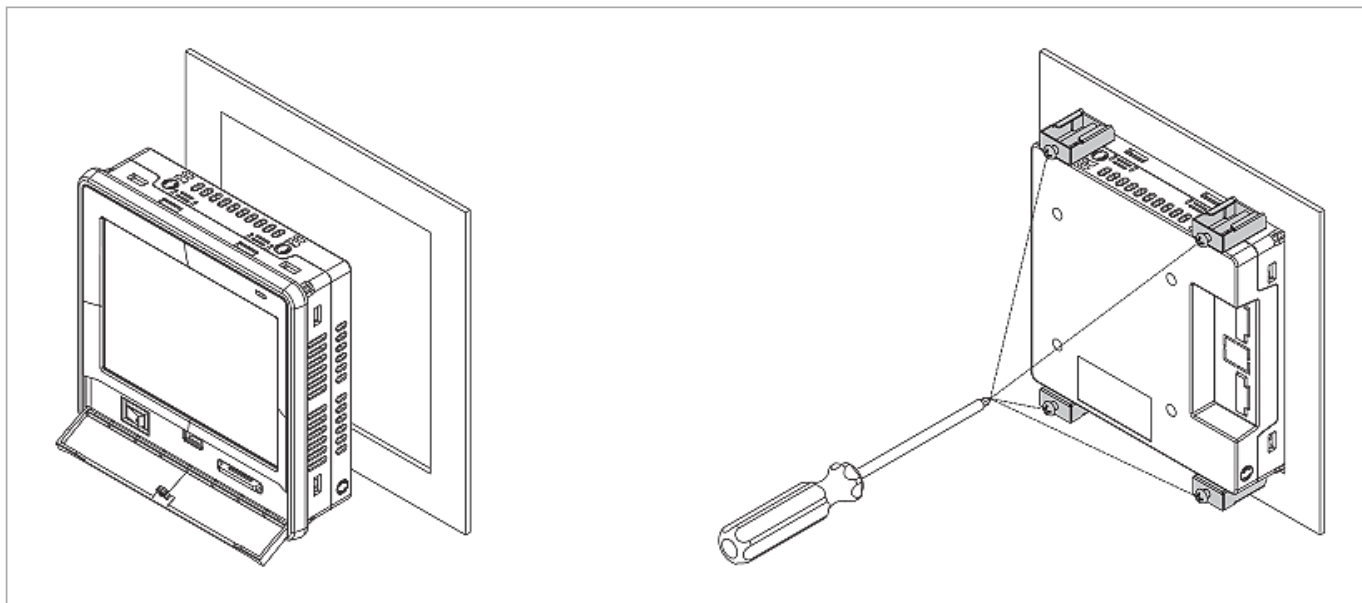
Before installing it, disconnect the power. Do not touch a terminal because it may lead to electric shock.

- Use 2-5mm thick panels.
- Insert this device from the front of panel.
- Connect dedicated clamps to the clamping grooves and fix them with bolts.
(Before fully tightening the clamps, position them in place).

■ Display

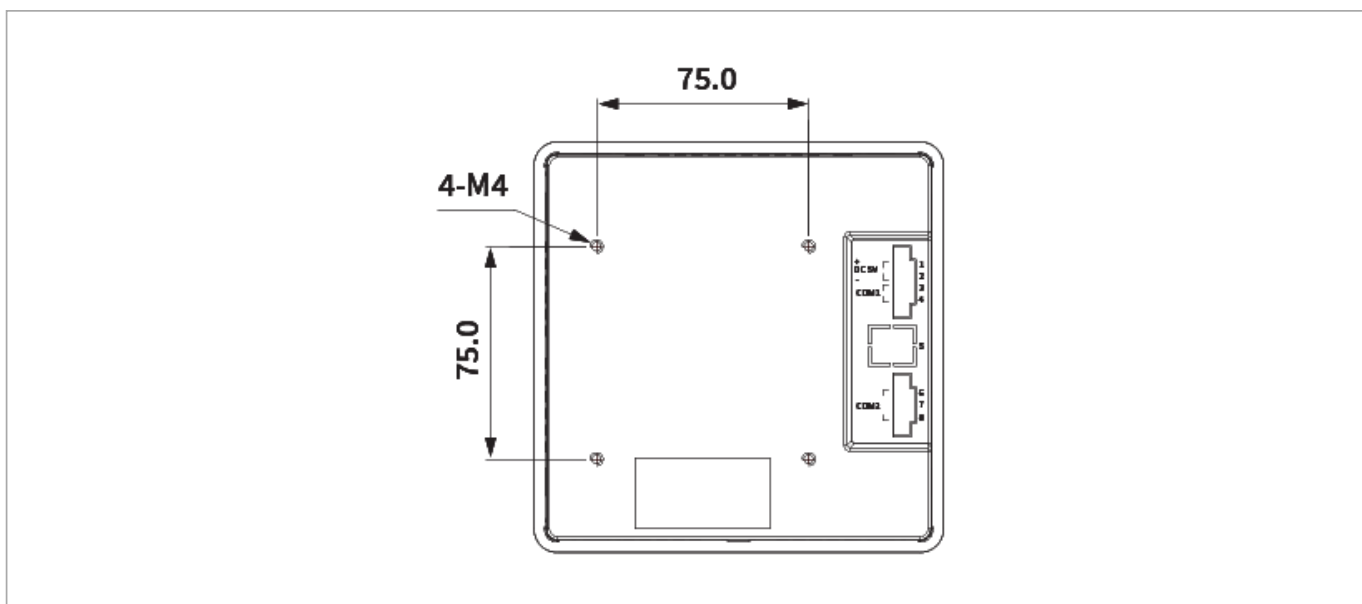
■ How to attach panel

The tightening torque must be 0.5 N·m or less for clamping. Forcible tightening may lead to deformation or damage.



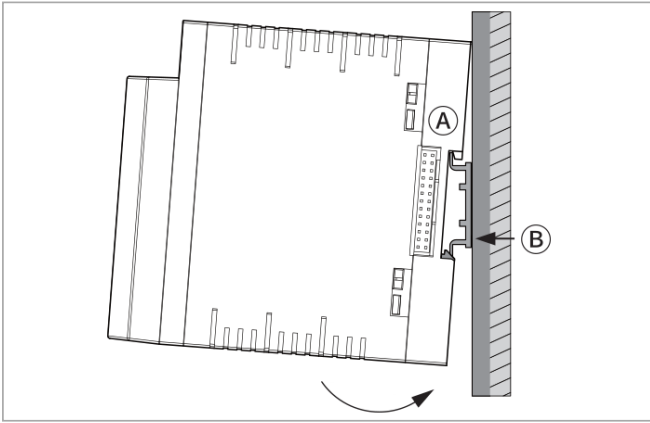
■ How to install VESA mount

Connect an M4 X 7L bolt into a VESA hole

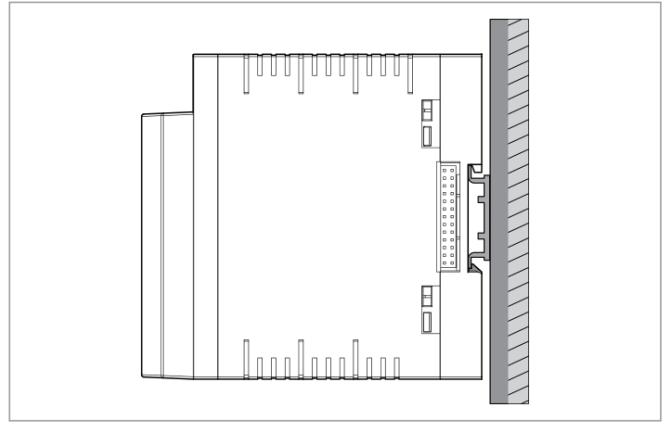


■ Control

■ How to install DIN rail



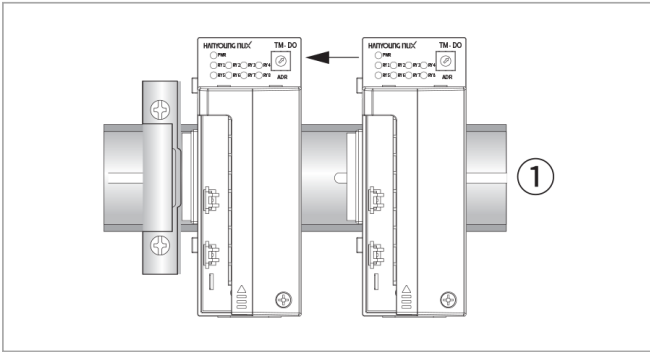
Connect the top hook(A) of bottom of floor to the DIN rail and press it(B) in order to install it.



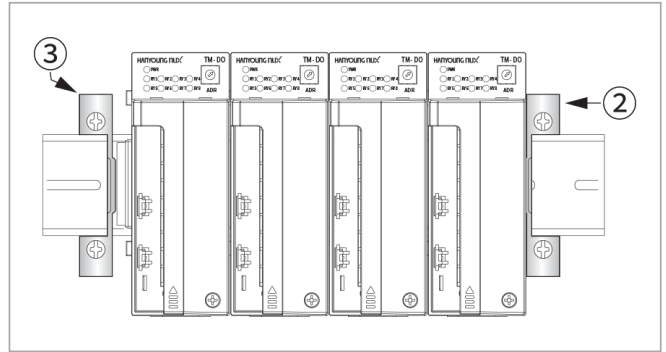
Check if it is fixed by pushing up the mounting bracket.

■ How to install module

TD510 series module can connect up to 7 units. Any module must be installed vertically.



① Push a module aside in order to connect it to a connector.

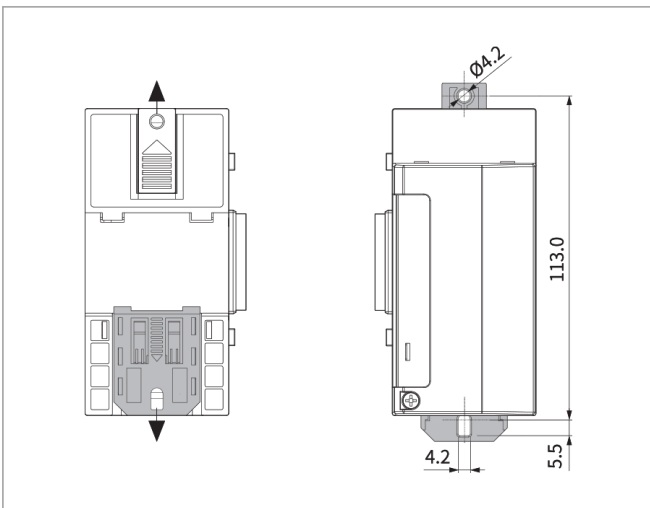


② ③ Fix a module on both ends using stoppers.

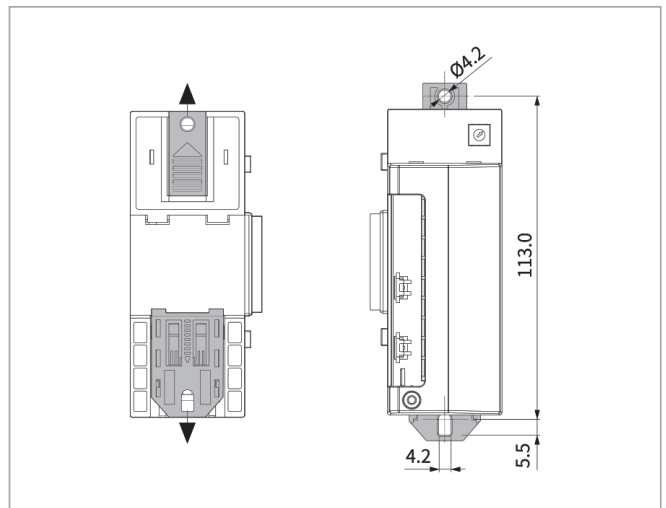
■ How to attach panel

- Referring to the hole dimensions on the left, find where to install it
- Push outside the top and bottom hooks for fixing screws at the bottom of modules.
- Fix it with an M3 screw.

■ POWER



■ Main, input/output, input, and output



■ Wiring



Before wiring, disconnect the power. Do not touch a terminal because it may lead to electric shock.

■ Power connection

- Vinyl-insulated wire(0.9 - 2.0 mm² (KSC 3304)) must be used.

※ **Caution** | Too much noise may lead to damage or malfunction to the device. Use line filter to remove the noise.

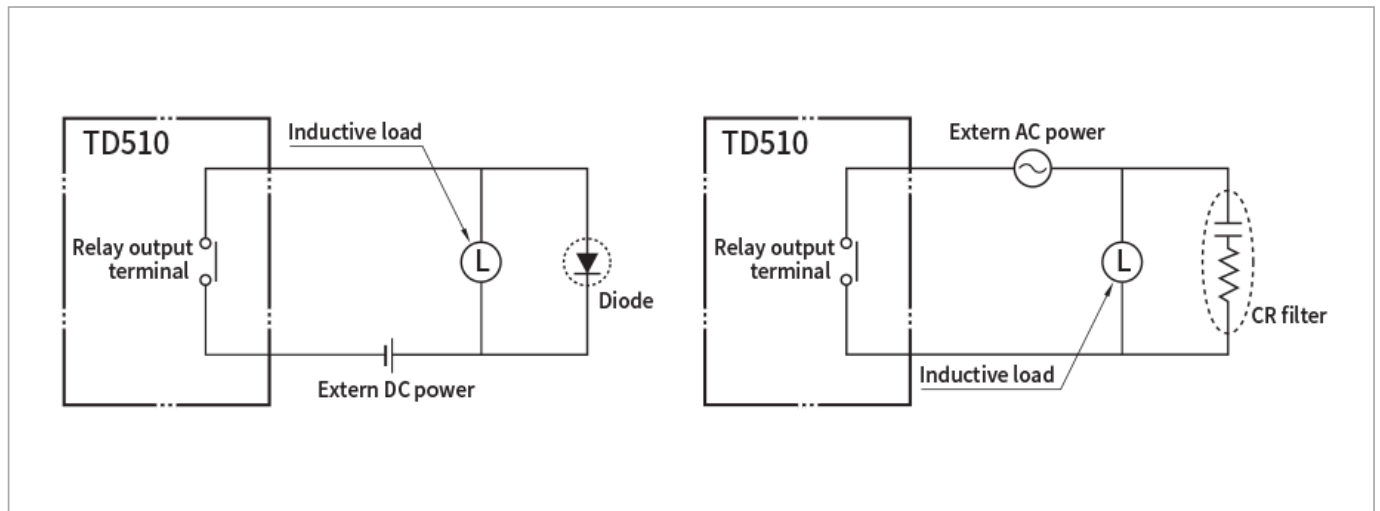
■ FG wiring

- Vinyl-insulated wire(2.0 mm² (KSC 3304)) must be used.
- It must be grounded at 3 points or more with 100 Ω or less resistance.

■ Relay output wiring

※ **Caution** | Inductive load(L) including motor, solenoid, and external relay may lead to malfunction. It must be connected in parallel with CR filter for AC circuit and diodes for DC circuit.

■ Connection of relay



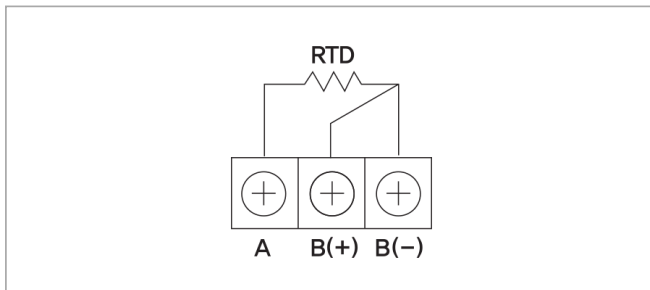
■ Input wiring

※ Caution

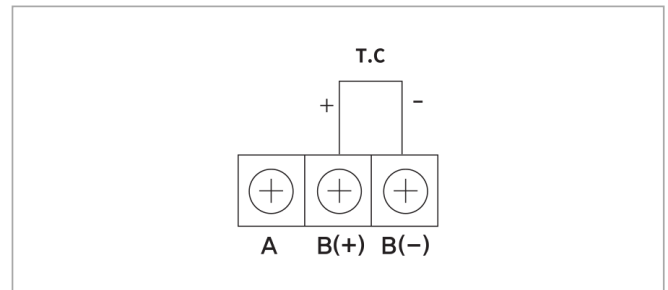
- Input wire must use shielded cable and be wired with certain distance from the power and ground circuits.
- RTD sensor must be 3-wire type with the same wiring resistance.
- Enclosure must be grounded at 3 points or more(100 Ω or less of grounding resistance) using 2 mm² or bigger cable.
- Input signal and output lines must be of shielded cable with 1 grounding point.
- Thermoresistor input must be wired with no resistance difference between 3 wires.
- Input/output signal line must be isolated from power line.
- To use current input, attach 250 Ω 0.1 % resistor at both ends of input terminal.

■ Sensor input

■ Thermoresistor input

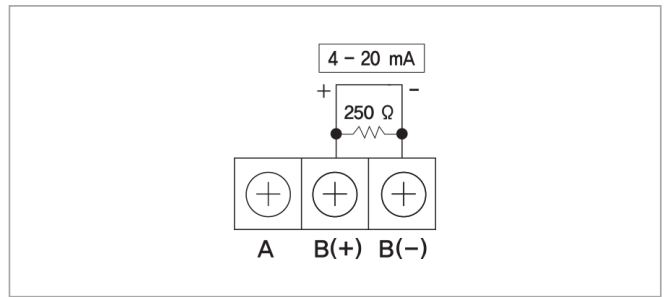
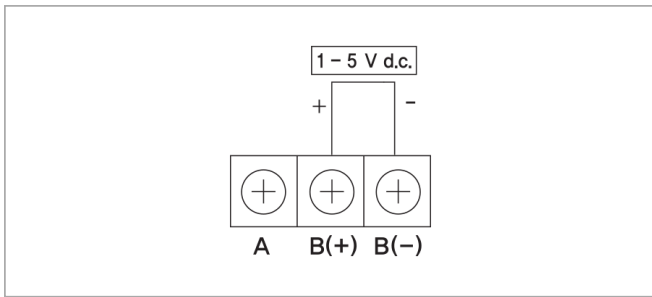


■ Thermocouple input

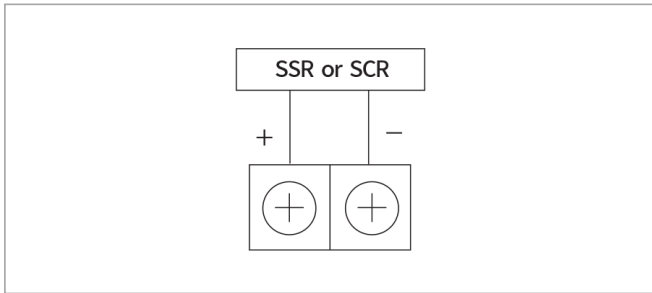


■ DC voltage input

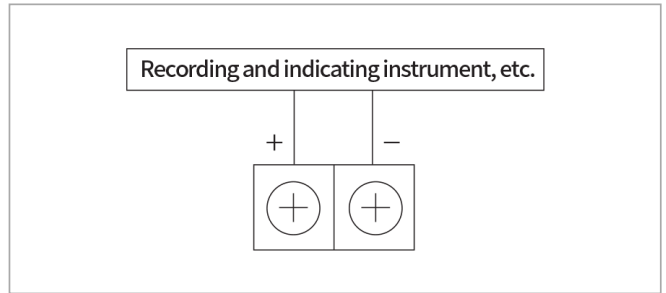
■ DC current input



- Wiring of temperature control and transmission output
- Temperature control output



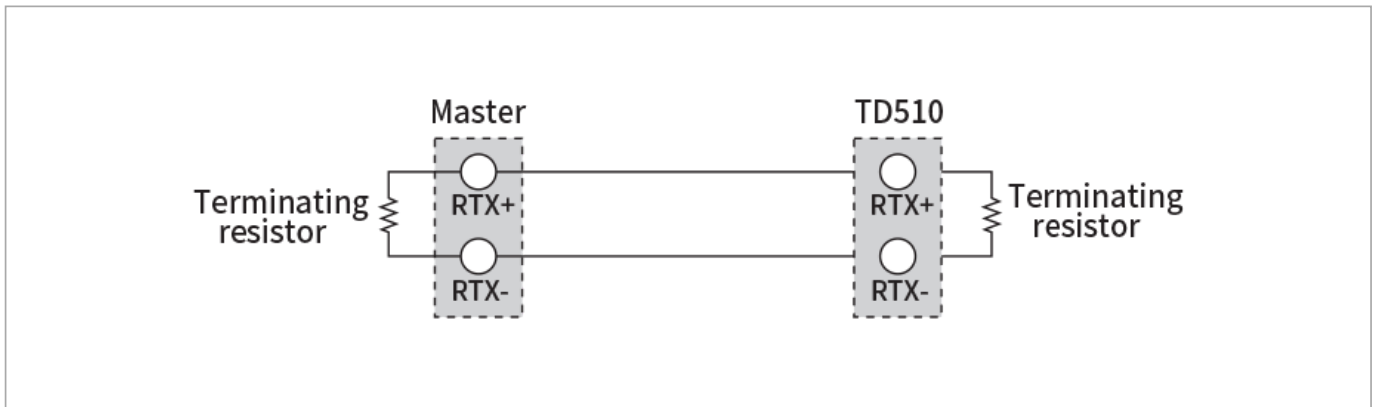
- Temperature transmission output



■ Communication wiring

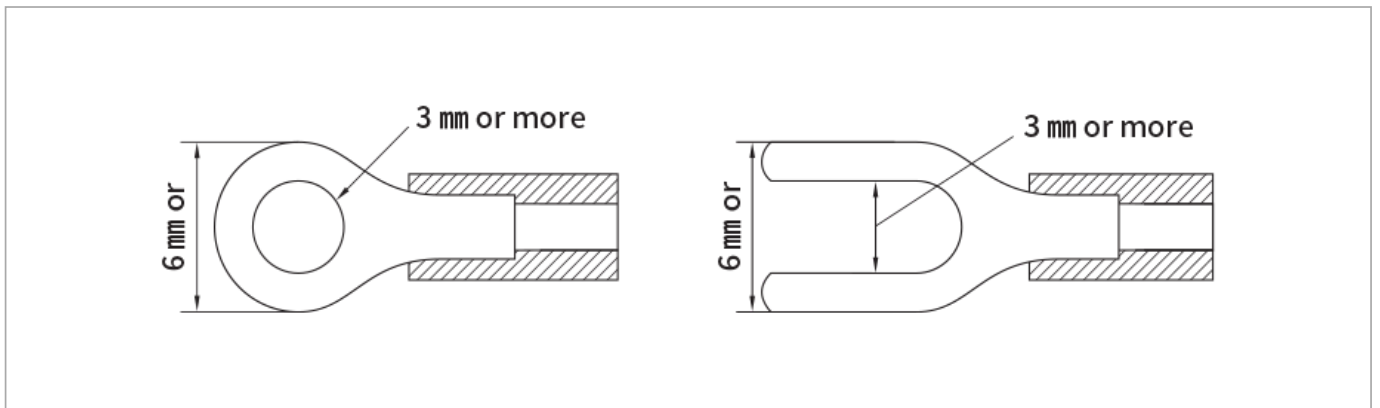
Connect terminating resistors(100 - 200 Ω, 0.25 W) at both ends of communication cable.

- How to wire for communication



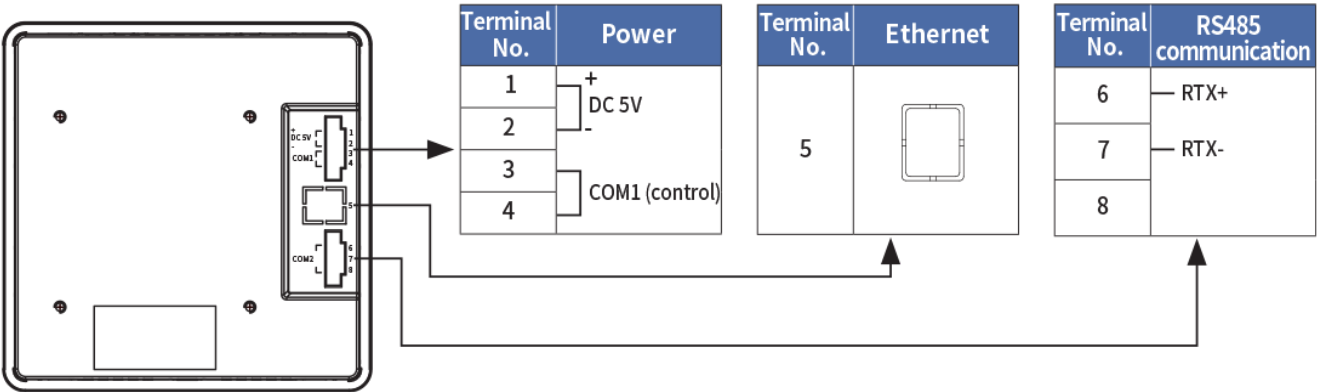
■ Terminal specifications

- Solderless terminal
- Power/Input/Output - M3 screw

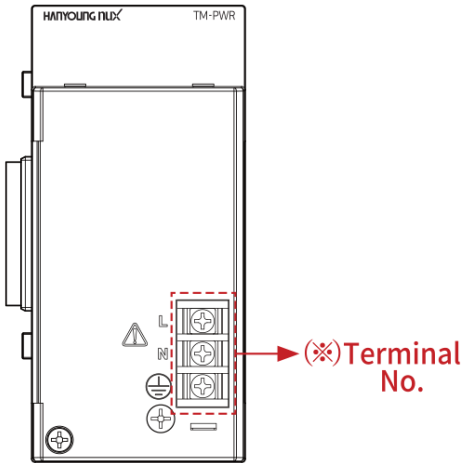


Terminal connection diagram

Display

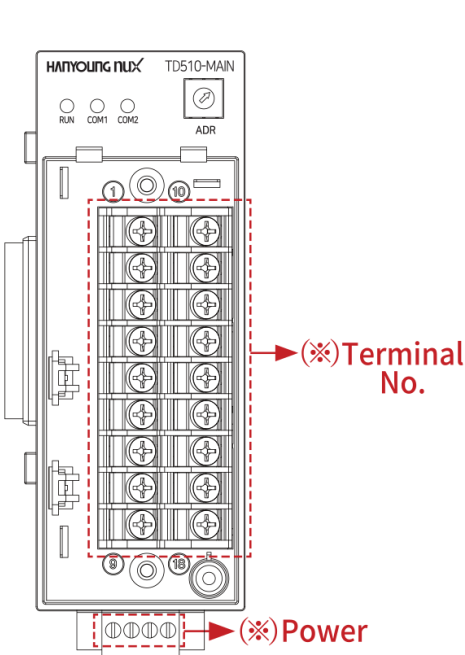


Power module

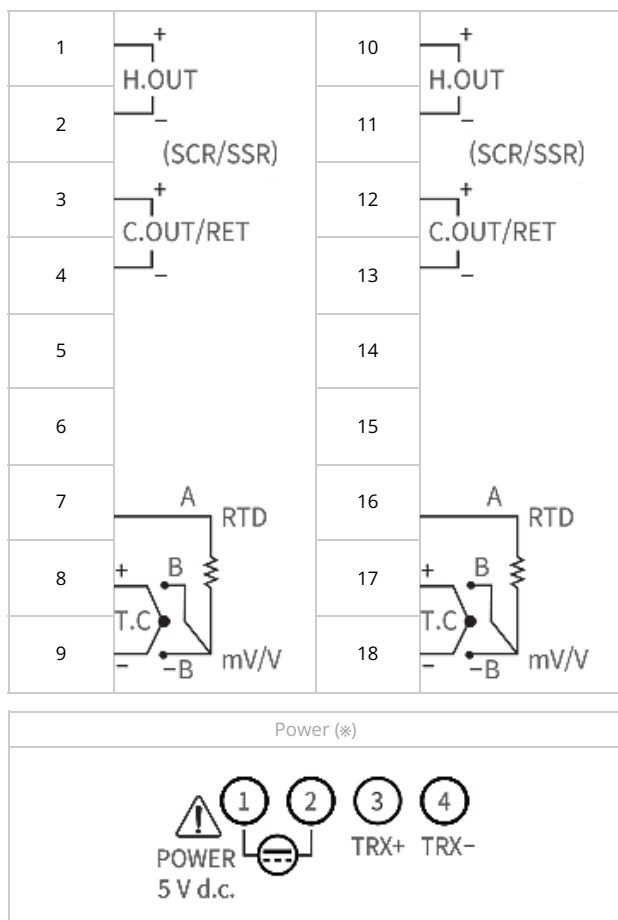


Terminal No.(*)	Power	
L		100 - 240 V a.c. 50/60 Hz 22 VA
N		

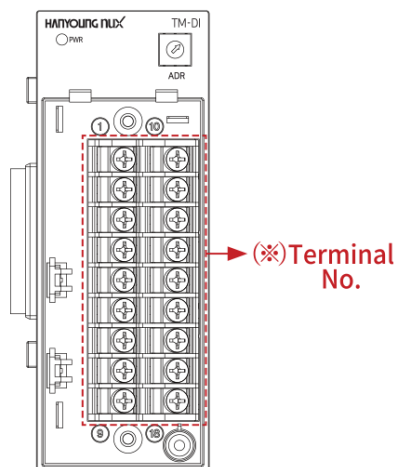
Control module



Terminal No.(*)	CH1	Terminal No.(*)	CH2
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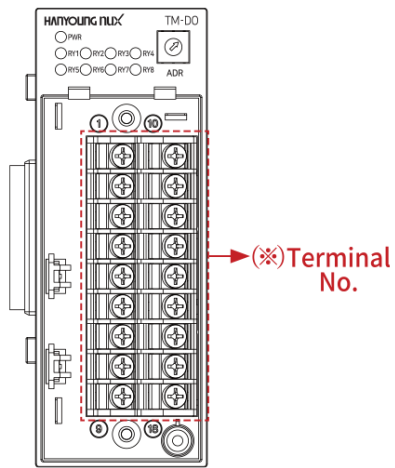


Input module



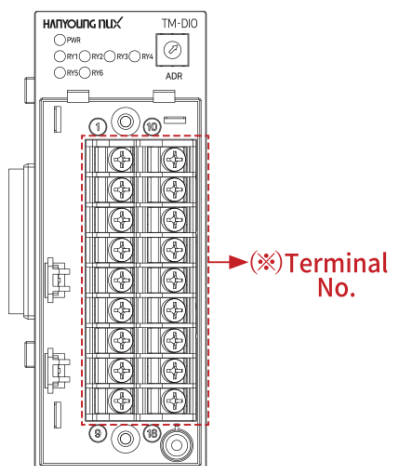
Terminal No.(※)	Input(1~8)	Terminal No.(※)	Input(9~16)
1	DI1	10	DI9
2	DI2	11	DI10
3	DI3	12	DI11
4	DI4	13	DI12
5	DI5	14	DI13
6	DI6	15	DI14
7	DI7	16	DI15
8	DI8	17	DI16
9	COM	18	COM

Output module



Terminal No.(※)	Output(1~4)	Terminal No.(※)	Output(5~8)
1	RY1	10	RY5
2		11	
3		12	
4	RY2	13	RY6
5		14	
6	RY3	15	RY7
7		16	
8	RY4	17	RY8
9		18	

Input/output module



Terminal No.(※)	Input(1~8)	Terminal No.(※)	Output(1~6)
1	DI1	10	RY1 COM RY2
2	DI2	11	
3	DI3	12	
4	DI4	13	RY3 COM RY4
5	DI5	14	
6	DI6	15	
7	DI7	16	RY5 COM RY6
8	DI8	17	
9	COM	18	

Name of section



■ Front LED

Back light OFF	STOP (Red lamp ON), RUN (Red lamp OFF)
Back light ON	STOP (Green lamp ON), RUN (Green lamp OFF)