INSTRUCTION MANUAL

TEMPERATURE CONTROLLER
(Modbus, 5 dight, LED display type, size 48 × 96mm)

MODEL **TC10NM**

BEFORE USE ....

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact our sales office or representatives.

■ PACKAGE INCLUDES:

Temperature controller (controller + CJC sensor, 1 pcs) ..(1)
Mounting bracket.....(2)
Watertight packing .....(1)
Engineering unit label sheet .....(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures. For detailed explanations, please refer to the Model TC10NM operating manual (EM-9582-B).
This controller is programmable by using the PC Configurator Software. For detailed information on the PC configuration, refer to the TC10CFG users manual. The TC10CFG PC Configurator Software is downloadable at our web site.

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

- This equipment is suitable for Pollution Degree 2 and Installation Category II (transient voltage 2500V). Reinforced insulation (signal input or output or Modbus to power input: 300V) and basic insulation (signal input to output to Modbus: 300V) are maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
- Altitude up to 2000 meters.
- The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures* to ensure the CE conformity.
  * For example, installation of noise filters and clamp filters for the power source, input and output connected to the unit, etc.
- In order to enable the operator to turn off the power input immediately, install a switch or a circuit breaker according to the relevant requirements in IEC 60947-2 and properly indicate it.

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
  100 – 240V AC rating: 85 – 264V, 47 – 66 Hz, approx. 6 – 8 VA

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 5 to 90% RH in order to ensure adequate life span and operation.

■ REQUIREMENTS TO ENSURE IP65

- Observe the designated panel cutout size (W45 × H92 mm).
- The watertight packing included in the product package must be placed behind the front cover.
- Both mounting brackets must be fastened tightly until they hit the panel.
- Confirm visually that the sealing is not contorted or excessively run off the edge after installation.

■ WIRING

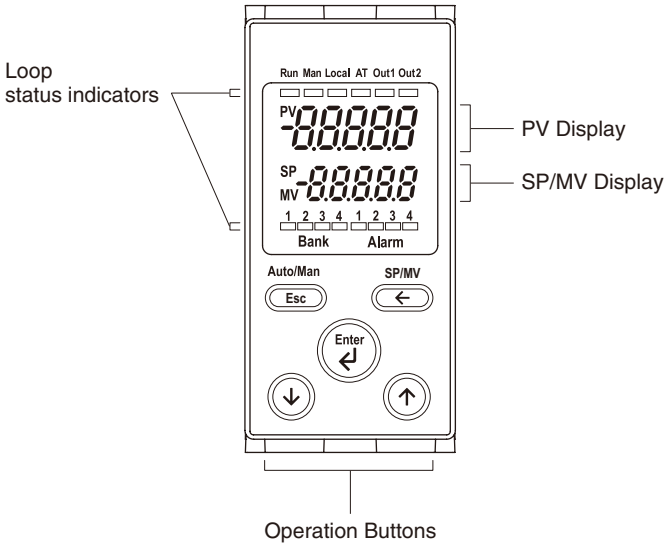
- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND ....

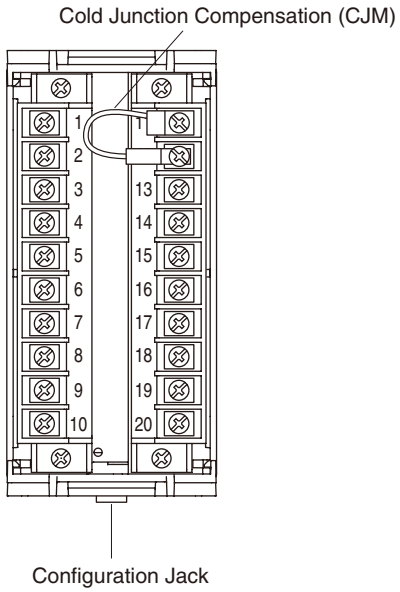
- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.
- With voltage output, do not leave the output terminals shortcircuited for a long time. The unit is designed to endure it without breakdown, however, it may shorten appropriate life dration.

COMPONENT IDENTIFICATION

■ **FRONT VIEW**



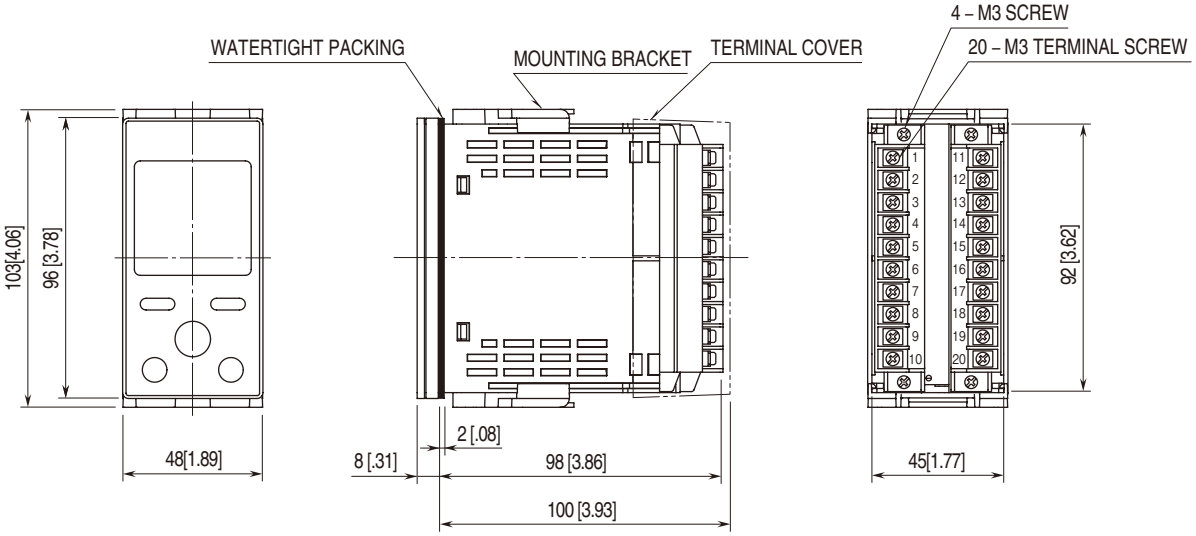
■ **REAR VIEW**



■ **LOOP STATUS INDICATOR**

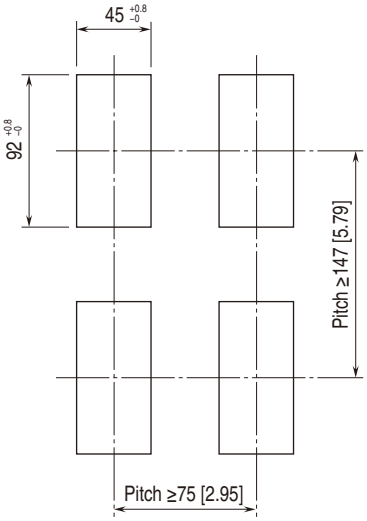
Run : Green LED turns on while loop is in operation.
Man : Green LED turns on during manual mode.
Local : Unused, off.
AT : Green LED turns on during auto-tuning.
Out1 : Green LED turns on during heating control output.
Out2 : Green LED turns on during cooling control output.
Bank1 : Green LED turns on when bank 1 is chosen.
Bank2 : Green LED turns on when bank 2 is chosen.
Bank3 : Green LED turns on when bank 3 is chosen.
Bank4 : Green LED turns on when bank 4 is chosen.
Alarm1: Red LED turns on at alarm 1.
Alarm2: Red LED turns on at alarm 2.
Alarm3: Red LED turns on at alarm 3.
Alarm4: Red LED turns on while setting is saving to the non-volatile memory.

EXTERNAL DIMENSIONS unit: mm [inch]



INSTALLATION

■ PANEL CUTOUT unit: mm [inch]



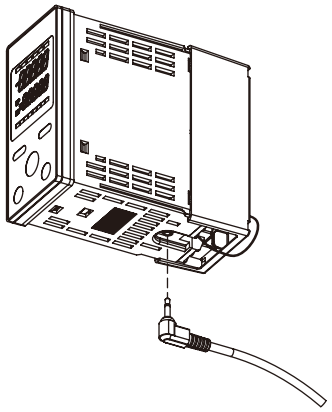
Mounting bracket: 0.5 – 10 [0.02 to 0.39]

■ CAUTION

- Degree of protection, IP65 is applicable to the front panel of the unit with single mounting according to the specified panel cutout. Not applicable in case of re-mounting. After installation ensure waterproof of the mounting.
- Install the unit to vertical panel so that its function buttons are at the bottom side. Installing by other direction will cause degradation of life span or performance due to rise of the internal temperature.
- Ensure that there is sufficient space for ventilation inside a panel. Do not install above the devices that generate high heat such as heaters, transformers or resistors. Observe at the minimum of 55 mm (2.2") in vertical direction, minimum of 30 mm (1.2") in horizontal direction for maintenance purpose.

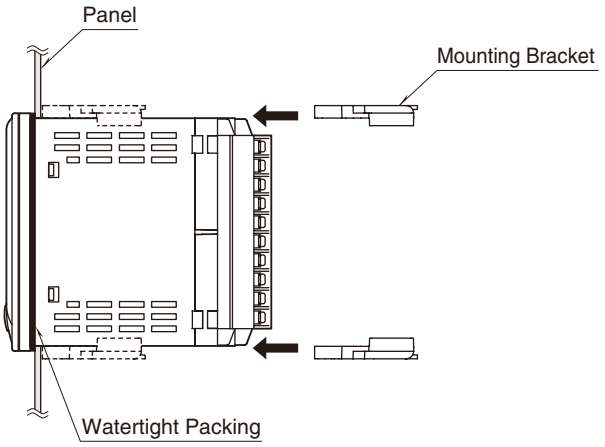
■ HOW TO CONNECT CONFIGURATOR CABLE

- The configuration jack is on the bottom of the unit.



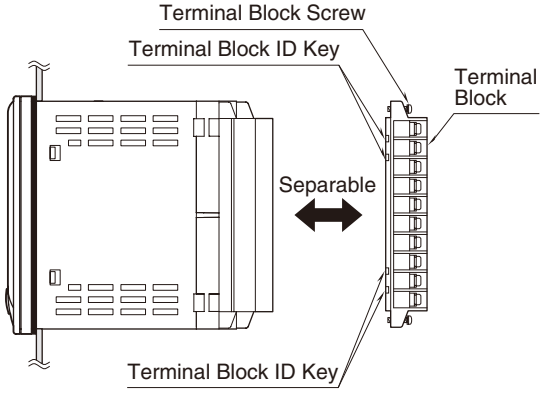
■ HOW TO MOUNT THE UNIT ON A PANEL

1) Remove the mounting brackets.
2) Remove the terminal cover and insert it into the panel cutout prior to insertion of the unit.
3) Insert the unit into the panel cutout. The watertight packing must be in place to conform degree of protection, IP65. Do not remove it.
4) Push the mounting brackets into the grooves on both sides of the rear module, until they hit the panel's rear side.



■ HOW TO REMOVE THE TERMINAL BLOCK

- The terminal block is separable in two pieces. Loosen two screws on top and bottom of the terminal block to separate.
- Be sure to turn off the power supply, input/output signal and communication signal before separating the terminal block.
- Each terminal block has ID keys so that it can be inserted to applicable terminal socket only.

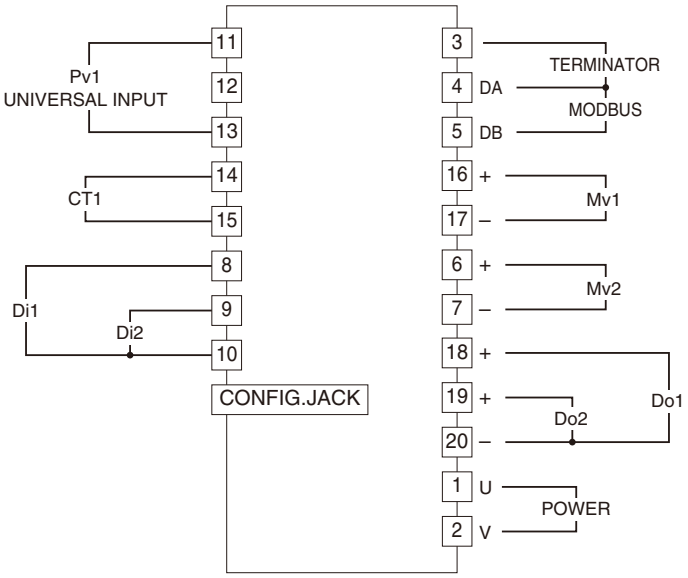


LIGHTNING SURGE PROTECTION

We offer a series of lightning surge protector for protection against induced lightning surges. Please contact us to choose appropriate models.

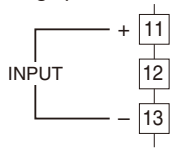
TERMINAL CONNECTIONS

■ **CONTROL OUTPUT: A, V and P**

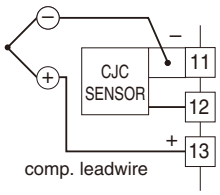


■ **UNIVERSAL INPUT CONNECTION (Pv1) e.g.**

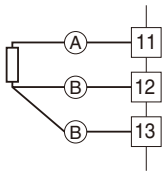
- **DC Current (0 – 20mA DC)**
- **DC Voltage (-1000 – +1000mV DC)**
- **DC Voltage (-10 – +10V DC)**



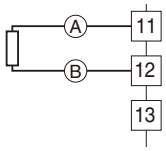
- **Thermocouple**



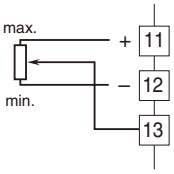
- **RTD/Resistor (3-wire)**



- **RTD/Resistor (2-wire)**

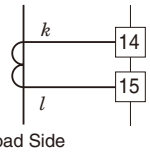


- **Potentiometer**



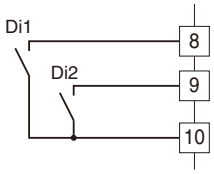
■ **CT1 CONNECTION e.g.**

- **Clamp-on Current Sensor (model : CLSE)**

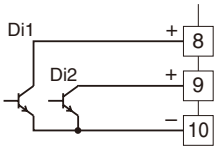


■ **DISCRETE INPUT CONNECTION e.g.**

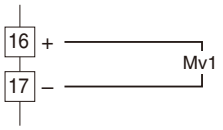
- **Mechanical Contact**



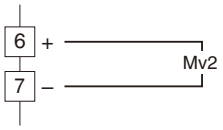
- **Open Collector**



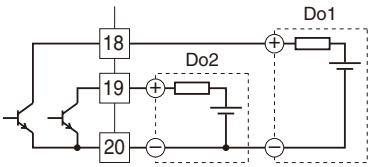
■ **CONTROL OUTPUT 1 CONNECTION e.g.**



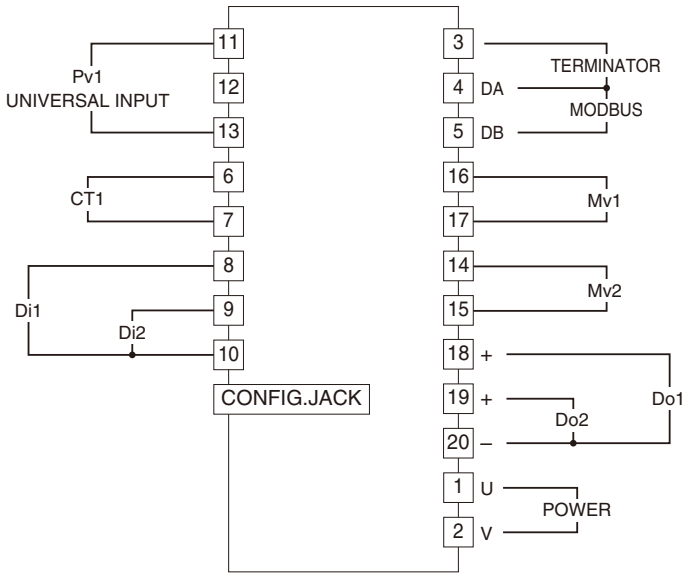
■ **CONTROL OUTPUT 2 CONNECTION e.g.**



■ **CONTROL OUTPUT 3 & 4 CONNECTION e.g.**

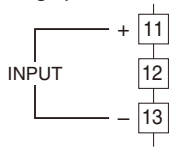


■ **CONTROL OUTPUT: R**

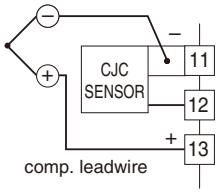


■ **UNIVERSAL INPUT CONNECTION (Pv1) e.g.**

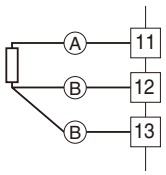
- **DC Current (0 – 20mA DC)**
- **DC Voltage (-1000 – +1000mV DC)**
- **DC Voltage (-10 – +10V DC)**



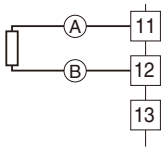
- **Thermocouple**



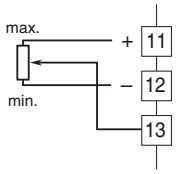
- **RTD/Resistor (3-wire)**



- **RTD/Resistor (2-wire)**

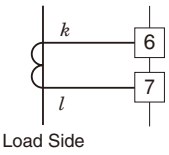


- **Potentiometer**



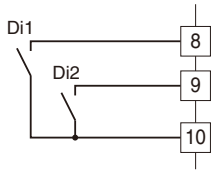
■ **CT1 CONNECTION e.g.**

- **Clamp-on Current Sensor (model : CLSE)**

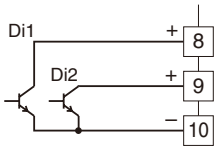


■ **DISCRETE INPUT CONNECTION e.g.**

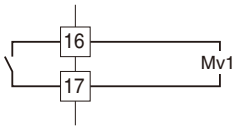
- **Mechanical Contact**



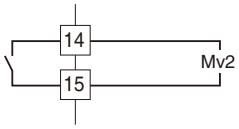
- **Open Collector**



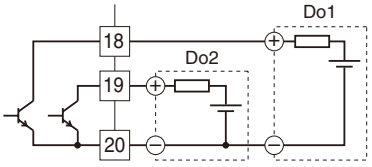
■ **CONTROL OUTPUT 1 CONNECTION e.g.**



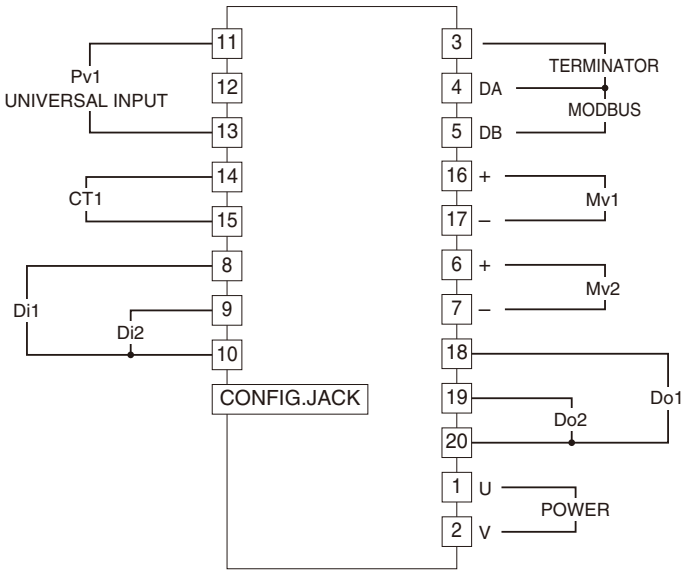
■ **CONTROL OUTPUT 2 CONNECTION e.g.**



■ **CONTROL OUTPUT 3 & 4 CONNECTION e.g.**

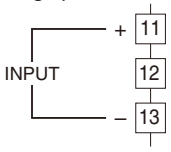


■ **CONTROL OUTPUT: A1, V1 and P1**

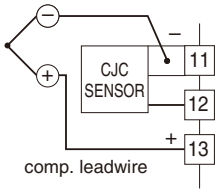


■ **UNIVERSAL INPUT CONNECTION (Pv1) e.g.**

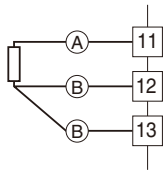
- **DC Current (0 – 20mA DC)**
- **DC Voltage (-1000 – +1000mV DC)**
- **DC Voltage (-10 – +10V DC)**



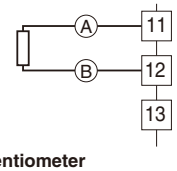
- **Thermocouple**



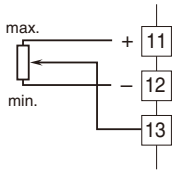
- **RTD/Resistor (3-wire)**



- **RTD/Resistor (2-wire)**

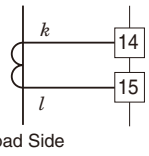


- **Potentiometer**



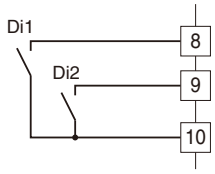
■ **CT1 CONNECTION e.g.**

- **Clamp-on Current Sensor (model : CLSE)**

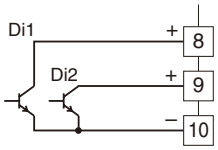


■ **DISCRETE INPUT CONNECTION e.g.**

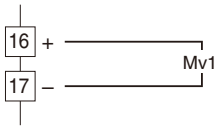
- **Mechanical Contact**



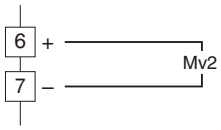
- **Open Collector**



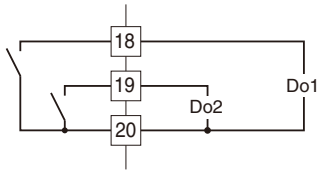
■ **CONTROL OUTPUT 1 CONNECTION e.g.**



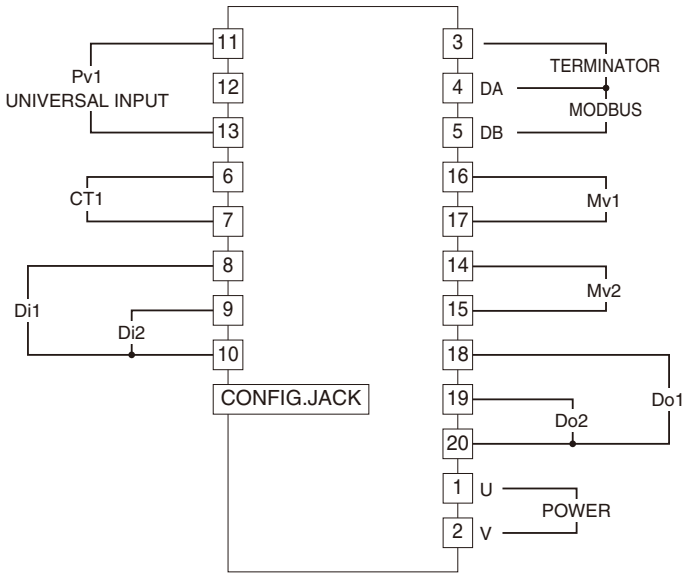
■ **CONTROL OUTPUT 2 CONNECTION e.g.**



■ **CONTROL OUTPUT 3 & 4 CONNECTION e.g.**

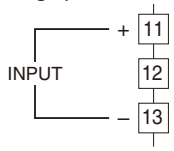


■ CONTROL OUTPUT: R1

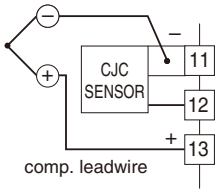


■ UNIVERSAL INPUT CONNECTION (Pv1) e.g.

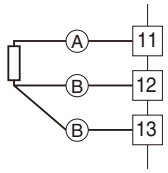
- **DC Current (0 – 20mA DC)**
- **DC Voltage (-1000 – +1000mV DC)**
- **DC Voltage (-10 – +10V DC)**



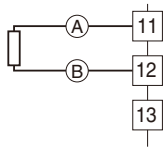
- **Thermocouple**



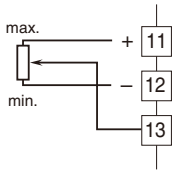
- **RTD/Resistor (3-wire)**



- **RTD/Resistor (2-wire)**

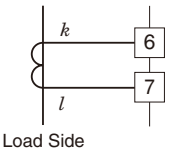


- **Potentiometer**



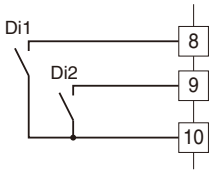
■ CT1 CONNECTION e.g.

- **Clamp-on Current Sensor (model : CLSE)**

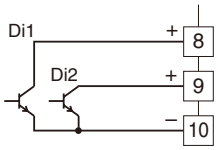


■ DISCRETE INPUT CONNECTION e.g.

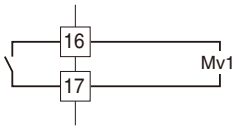
- **Mechanical Contact**



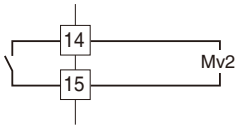
- **Open Collector**



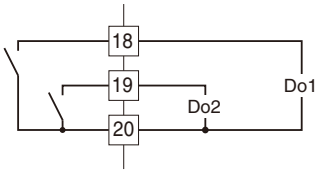
■ CONTROL OUTPUT 1 CONNECTION e.g.



■ CONTROL OUTPUT 2 CONNECTION e.g.

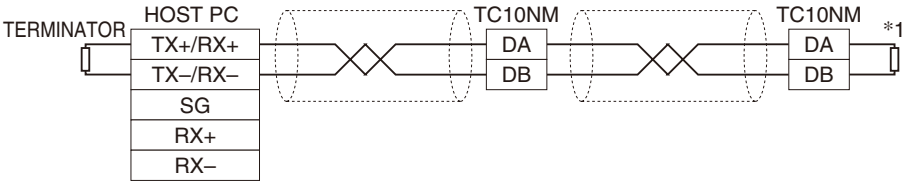


■ CONTROL OUTPUT 3 & 4 CONNECTION e.g.



CONNECTION DIAGRAMS

■ **MASTER CONNECTION**



NO.	ID	FUNCTION
4	DA	DA
5	DB	DB

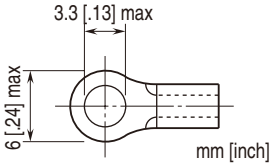
*1. For using internal terminator, short-accross terminals 3 and 4.

■ **SCREW TERMINAL**

Torque: 0.5 N·m

■ **SOLDERLESS TERMINAL**

Refer to the drawing on the right.
Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd
Applicable wire size: 0.25 to 1.65 mm² (AWG 22 to 16)



SYSTEM CONFIGURATIONS & CONTROL EXAMPLES

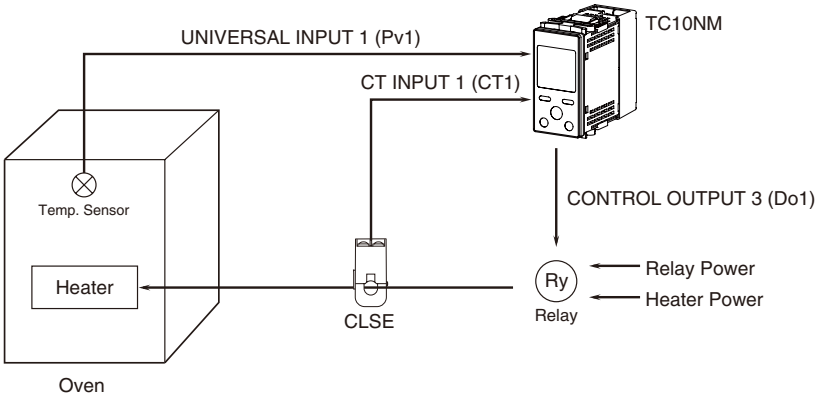
■ **Heating ON/OFF control and heater wire break detection**

1. Installation example:

- Temperature Controller (model: TC10NM)
- Clamp-on Current Sensor (model: CLSE)
- Oven
- Heater
- Relay
- Temperature sensor

2. Proccess until start operating:

Turn ON power supply
↓
Set input sensor type and range
↓
Set CT input to wire break detection
↓
Select control mode (ON/OFF Control)
↓
Specify target temperature (SP)
↓
Select operation mode (auto)
↓
Start operation



■ **Heating and cooling control (PID)**

1. Installation example:

- Temperature Controller (model: TC10NM)
- Object to heat/cool
- Temperature sensor

2. Proccess until start operating:

Turn ON power supply
↓
Set input sensor type and range
↓
Select control mode (PID)
↓
Set deadband
↓
Specify target temperature (SP)
↓
Select operation mode (auto)
↓
Start operation