

# 10ch Temperature Control Board

Model : **TCB-235**

## ■ Model

Name: 10ch temperature control board  
Model: TCB-235-10M/E

## ■ Input specification

Thermocouple: K External resistance: 100Ω or less.  
RTD: Pt100, 3-wire type, Allowable input lead wire resistance: 10Ω or less per wire  
Rated scale

Input range	Resolution
-200.0 to 500.0°C	0.1°C

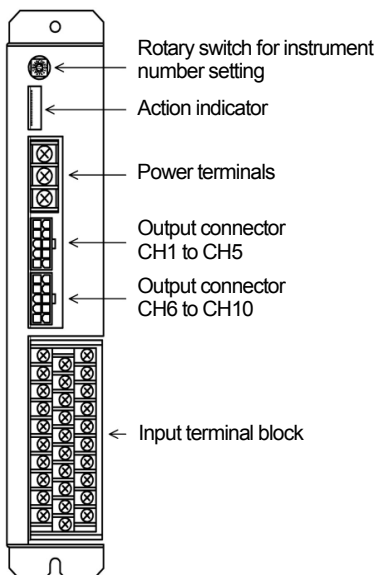
## ■ Indicating structure

Action Indicators

Power indicator (PWR): Lights when the power is turned on. Green LED  
Communication indicator (TX/RX): Lights for TX output. Yellow LED  
CH1 output indicator (OUT1): Lights when CH1 output is ON. Green LED  
CH2 output indicator (OUT2): Lights when CH2 output is ON. Green LED  
CH3 output indicator (OUT3): Lights when CH3 output is ON. Green LED  
CH4 output indicator (OUT4): Lights when CH4 output is ON. Green LED  
CH5 output indicator (OUT5): Lights when CH5 output is ON. Green LED  
CH6 output indicator (OUT6): Lights when CH6 output is ON. Green LED  
CH7 output indicator (OUT7): Lights when CH7 output is ON. Green LED  
CH8 output indicator (OUT8): Lights when CH8 output is ON. Green LED  
CH9 output indicator (OUT9): Lights when CH9 output is ON. Green LED  
CH10 output indicator (OUT10): Lights when CH10 output is ON. Green LED

## ■ Installation specification

Power supply: 100 to 240V AC 50/60Hz  
Allowable voltage fluctuation range: 85 to 264V AC  
Allowable fluctuation range : ±10% of supply voltage  
Power consumption : Approx. 13VA  
Momentary power failure : Within 30ms  
Ambient temperature : 0 to 50°C (23 to 131°F)  
Ambient humidity : 35 to 85%RH (non-condensing)  
Mounting : Wall mounting  
External dimensions : W45 x H244 x D132 mm  
Weights : Approx. 700g



## ■ Setting structure

Rotary switch for instrument number setting  
Sets instrument number to identify the TCB-235.  
(Instrument number: 0 to 9, A to F) (Default: 0)  
DIP switch for setup  
Sets the input range.

Switch No.	Status	Default
1	ON: Pt100, OFF: K	OFF: K
2	Reserved	OFF
3	Reserved	OFF
4	Reserved	OFF
5	Reserved	OFF
6	Reserved	OFF

Switching will be validated by turning the power on again.

## ■ Indication performance

Indicating accuracy : Within ±1.5°C at 25±2°C  
(Equivalent to ±0.2% of full scale ±1 digit)  
Cold junction temperature compensation accuracy:  
Within ±2.0°C at 0 to 50°C of ambient temperature  
Temperature coefficient : ±15ppm/°C  
Input sampling period : 250ms

## ■ Control performance

Setting accuracy: The same as the indicating accuracy  
Control action : PID control (with auto-tuning function), PI control, PD control (with manual reset function), P control (with manual reset function), ON/OFF control action  
Proportional band (P) : 0 to 700.0°C (ON/OFF control when set to 0.0) (Default: 10.0°C)  
Integral time (I) : 0 to 1000 sec (Off when set to 0) (Default: 200 sec)  
Derivative time (D) : 0 to 300 sec (Off when set to 0) (Default: 50 sec)  
Proportional cycle : 1 to 120 sec (Default value: 3 sec)  
ARW : 0 to 100% (Default value: 50%)  
ON/OFF hysteresis : 0.1 to 100.0°C (Default value: 1.0°C)  
Control output: Non-contact voltage (For SSR drive)  
12V DC ±15% Max 20mA

## ■ Temperature alarm

The alarm action point is set by the ± deviation from the SV, and when the input goes outside the alarm setting range, the status flag will be set.

- High limit alarm: Setting range, 0.0 to 500.0°C  
Hysteresis, 2.0°C (Fixed)
- Low limit alarm: Setting range, 0.0 to 500.0°C  
Hysteresis, 2.0°C (Fixed)

## ■ Loop break alarm

The status flag will be set in case of the following.

- PV does not rise as much as the span or more within the time it takes to assess the loop break alarm after the MV has reached 100%.
  - PV does not fall as much as the span or more within the time it takes to assess the loop break alarm after the MV has reached 100%.
- Setting range: Loop break alarm time : 0 to 200 minutes  
Loop break alarm span: 0.0 to 150.0°C

**Serial communication**

Communication line : RS-485  
 Communication method : Half-duplex communication  
 Synchronization method : Start-stop synchronization  
 Communication speed : 9600bps  
 Data format Start bit : 1  
 Data bit : 7  
 Parity : Even  
 Stop bit : 1

**Attached functions**

Control Enabled/Disabled, Automatic cold junction temperature compensation, PV filter time constant, Burnout (Overscale), Underscale, Power failure countermeasure, Reception timeout processing, Self-diagnosis

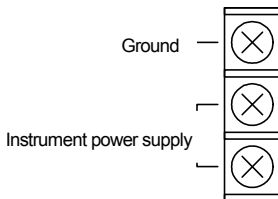
**Optional specifications**

PLC interface function (Option code: TLB)  
 Direct connection to the PLC is possible.

**Terminal and connector arrangement**

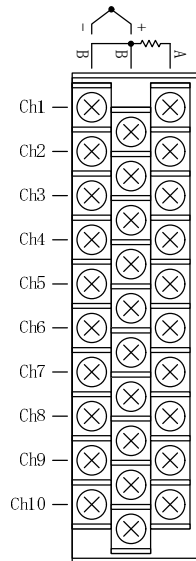
**Instrument power terminal:**

OTB-761-BL 3P (Made by OSADA CO., LTD.)  
 Terminal screw : M4×8L  
 Solderless terminal : Terminal with an insulation sleeve in which an M4 screw fits  
 Terminal width: 8mm or less  
 Tightening torque : 1.2N·m



**Input terminal block:**

ML-740- W3FF-30P (Made by SATO PARTS )  
 Terminal screw : M3×7L  
 Solderless terminal : Terminal with an insulation sleeve in which an M3 screw fits  
 Terminal width: 6.2mm or less  
 Tightening torque : 0.5N·m



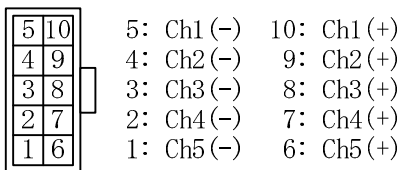
**RS-485 communication connector:**

RJ-11 : 6-terminal,  
 2 pieces (Pins of the same number are connected internally)  
 Connector: Modular plug based on RJ-11

RS-485	No. 1		No. 1	COM
	No. 6		No. 2	NC
	No. 1		No. 3	YB (+)
	No. 6		No. 4	YA (-)
			No. 5	NC
			No. 6	COM

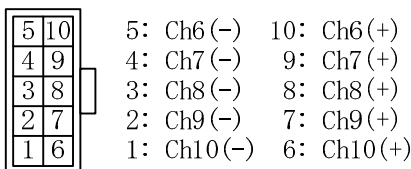
**Output connector CH1 to CH5:**

39-30-0100 (5569-10A2-210) (Made by MOLEX CO., LTD)  
 Housing: 39-01-2120 (5557-10R)



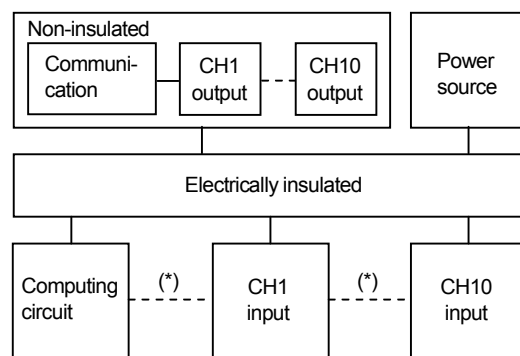
**Output connector CH6 to CH10:**

39-30-0100 (5569-10A2-210) (Made by MOLEX CO., LTD)  
 Housing: 39-01-2120 (5557-10R)



**Insulation and dielectric strength**

**Circuit insulation configuration**



(\*): An insulation test must not be carried out between inputs. When the RTD input is selected, they are not electrically insulated from each other.  
 Insulation resistance: 10MΩ or more, at 500V DC

**Dielectric strength**

Between input terminal and ground terminal, 500V AC for 1 minute  
 Between input terminal and power terminal, 1.5kV AC for 1 minute  
 Between output terminal and power terminal, 1.5kV AC for 1 minute  
 Between power terminal and ground terminal, 1.5kV AC for 1 minute  
 (A dielectric strength test must not be carried out between inputs.)