



Digitized Automation for a Changing World

# **Delta Multi-Loop Modular Temperature Controller DTM Series**



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 **DELTA**  
Smarter. Greener. Together.

# Delta Multi-Loop Modular Temperature Controller DTM Series

With increasingly complex temperature control applications and customer requirements, Delta introduces the Multi-loop Modular Temperature Controller DTM Series, which is designed for easy application and installation. Data collection by host and complete isolation between channels helps to improve communication speed and stability. It also allows users to customize communication addresses. From hardware to software, the DTM's intuitive design enables beginners to get started quickly, while its advanced functions, such as user-defined communication addresses, allow users to plan data management flexibly.

The DTM Series consists of host, measurement module, I/O module and extension cassette. A fully extended DTM group consists of a host plus 7 measurement modules and 8 I/O modules, for up to 64 points temperature control. Several DTM groups can even be connected via RS-485 or Ethernet for temperature control up to 1,000 points or more.

The Delta Multi-loop Modular Temperature Controller DTM Series is an ideal solution for advanced and complex temperature control applications.





## Getting Started and Advanced Settings

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1. Modular design for easy wiring
2. Various extension modules for a wide range of applications
3. Data collection by host for higher data exchange efficiency
4. Supports RS-485 and Ethernet communication, as well as multi-point temperature control
5. User-defined communication address
6. Complete isolation between channels

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- User-Defined Communication Address
- Complete Isolation Between Channels

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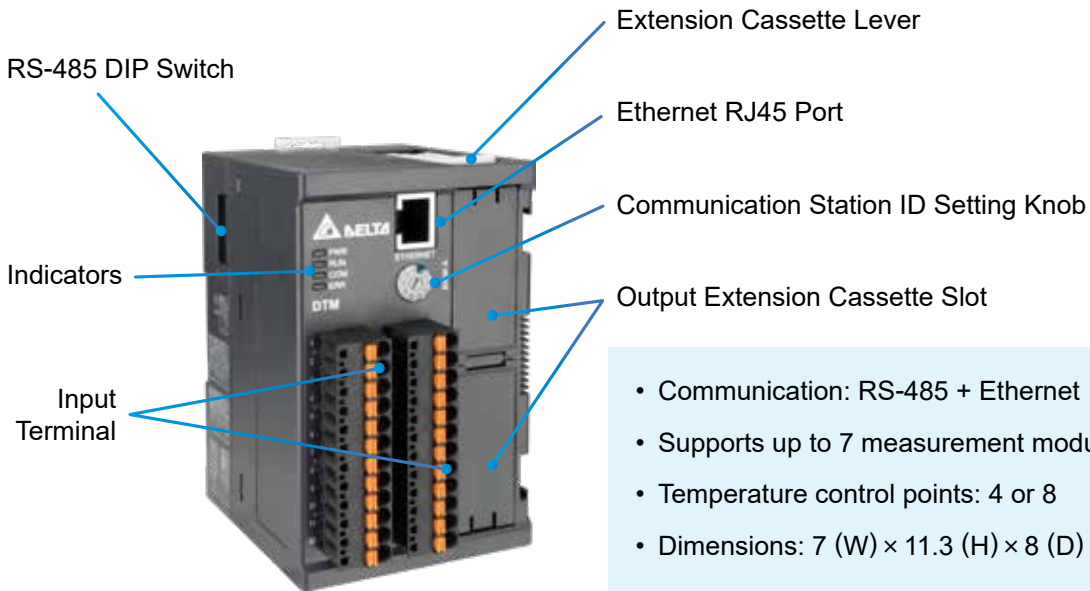
### Dimensions **19**

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# Module Introduction

## Host

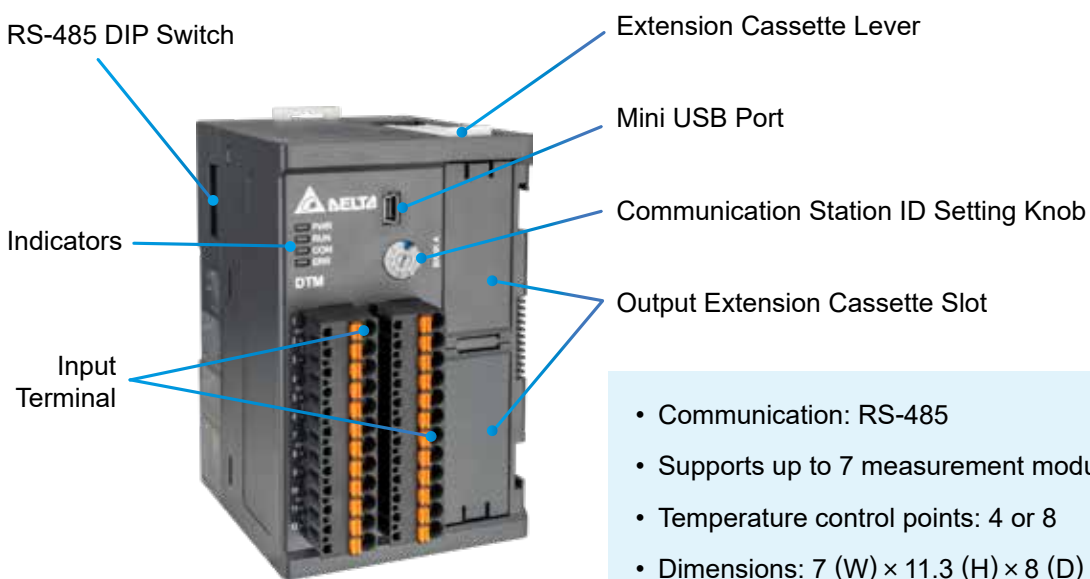
### Ethernet Type DTME08 / DTME04



- Communication: RS-485 + Ethernet
- Supports up to 7 measurement modules + 8 I/O modules
- Temperature control points: 4 or 8
- Dimensions: 7 (W) × 11.3 (H) × 8 (D) cm

\* Optional output extension cassette for all measurement modules.  
\* Delta reserves the right to make further changes without prior notice.

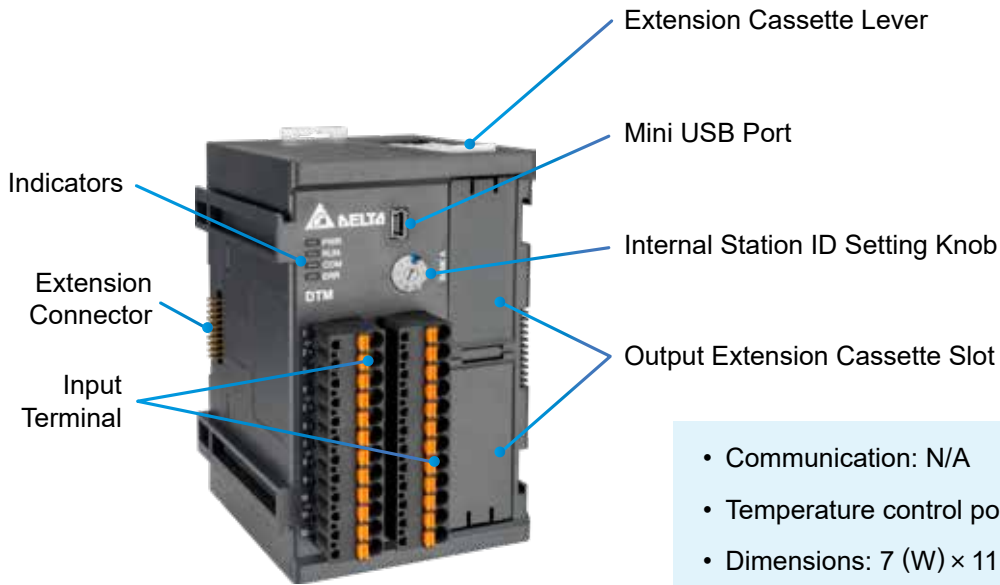
### RS-485 Type DTMR08 / DTMR04



- Communication: RS-485
- Supports up to 7 measurement modules + 8 I/O modules
- Temperature control points: 4 or 8
- Dimensions: 7 (W) × 11.3 (H) × 8 (D) cm

## Measurement Module

### DTMN08 / DTMN04

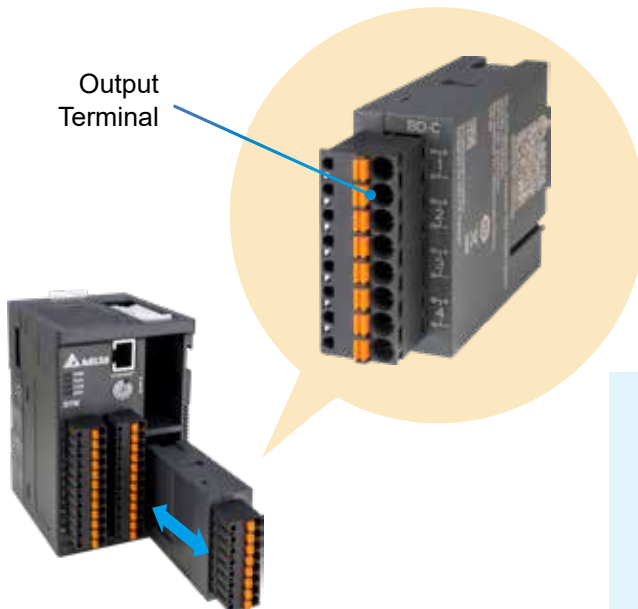


- Communication: N/A
- Temperature control points: 4 or 8
- Dimensions: 7 (W) × 11.3 (H) × 8 (D) cm

\* Optional output extension cassette for all measurement modules.

## Output Cassette

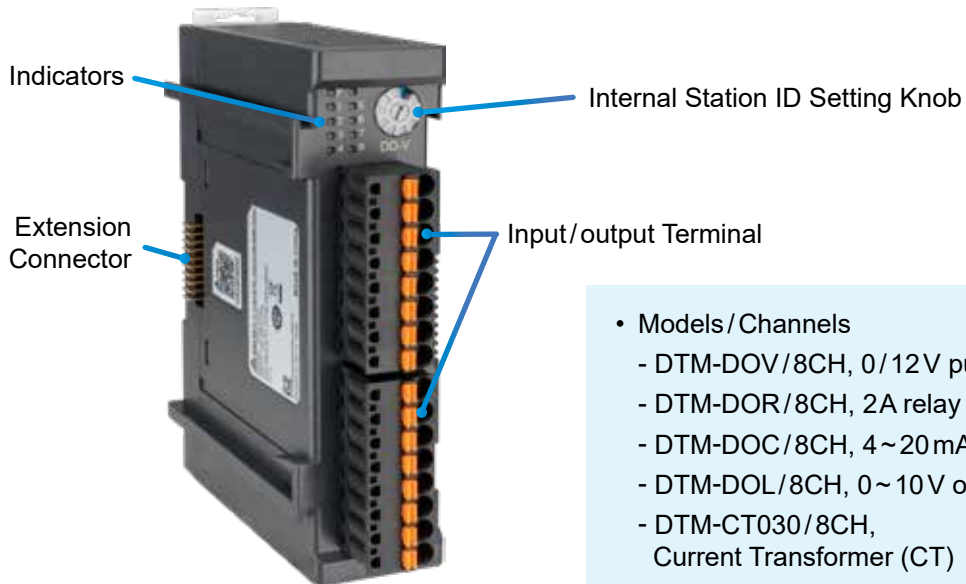
Output Terminal



DTM-BDL installed on DTMN08

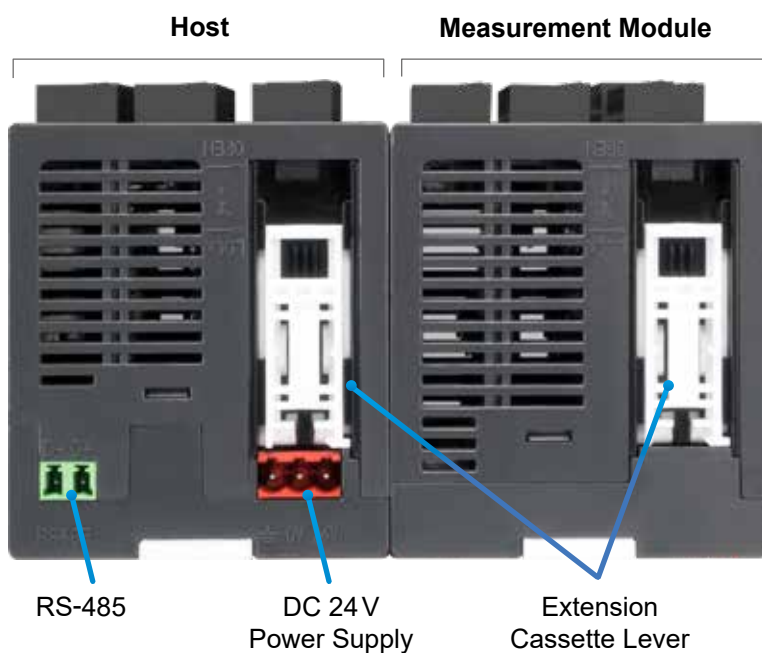
- Models/Channels
  - DTM-BDV/4CH, 0 / 12V pulse voltage
  - DTM-BDR/4CH, 2 A relay contact
  - DTM-BDC/4CH, 4~20 mA output
  - DTM-BDL/4CH, 0~10V output
- Dimensions: 2.5 (W) × 4.8 (H) × 7.7 (D) cm
- Please refer to the picture on the left for installation

## I/O Module



- Models/Channels
  - DTM-DOV/8CH, 0/12V pulse voltage
  - DTM-DOR/8CH, 2A relay contact
  - DTM-DOC/8CH, 4~20mA output
  - DTM-DOL/8CH, 0~10V output
  - DTM-CT030/8CH, Current Transformer (CT) (optional) Detect AC power current
- Dimensions: 3 (W) × 11.3 (H) × 8 (D) cm

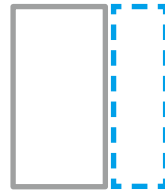
## Module Bottom View



## Module Installation

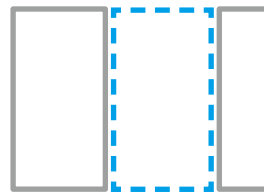
Features DIN rail for quick replacement and installation

### Adding a Module



- Auto connection between internal power supply and signal
- Simplified wiring

### Easy Module Maintenance and Replacement

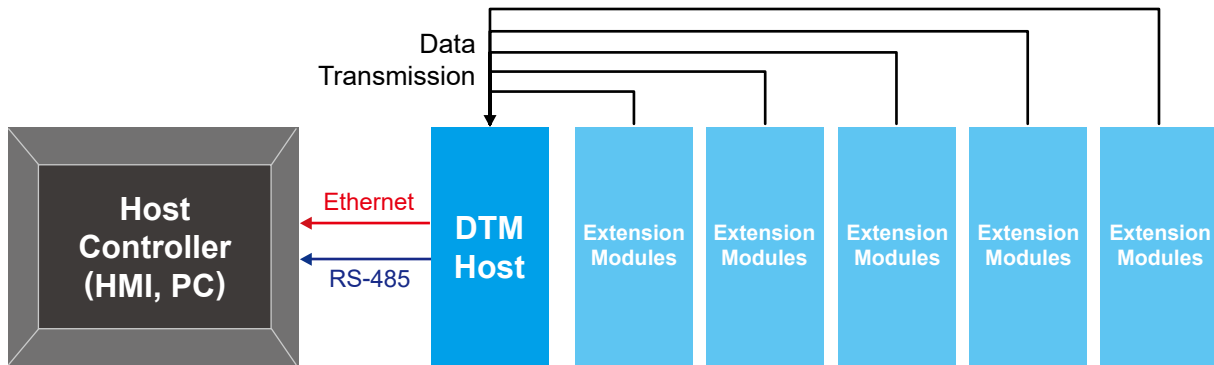


- Quick replacement and easy installation
- Pull out extension modules from the front without disconnecting other parts
- Allows easy maintenance when installed in limited spaces

## Product Features

### Data Collection by Host

The DTM host collects data from all extension modules at any time and uploads to the master controller immediately for higher communication efficiency



The host sends all data from the DTM group to the host controller.

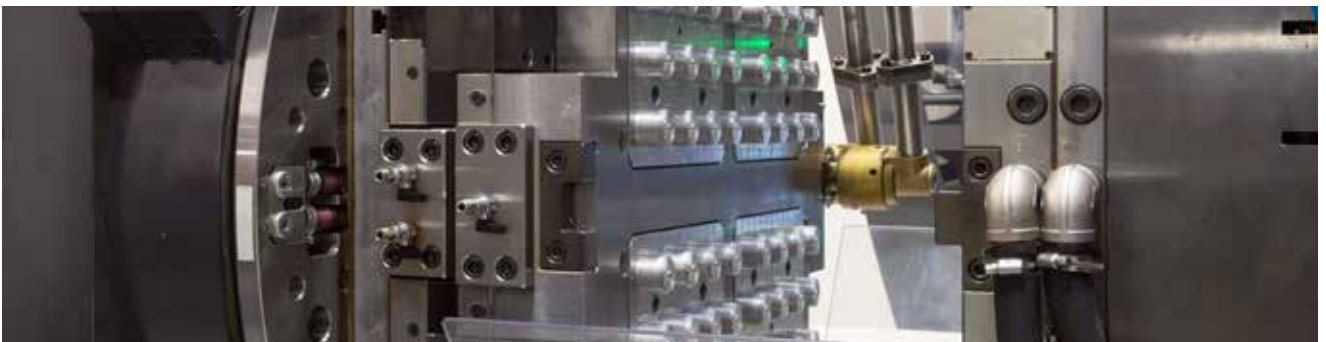
### Multi-Point Temperature Control via RS-485 and Ethernet

#### 1. DTM offers multi-point control

- 1 host controls up to 8 points; 1 host group controls up to 64 points
- DTM host provides 8 sets of sensor inputs to control 8 points simultaneously
- 1 host can support up to 7 measurement modules and 8 I/O modules as a group



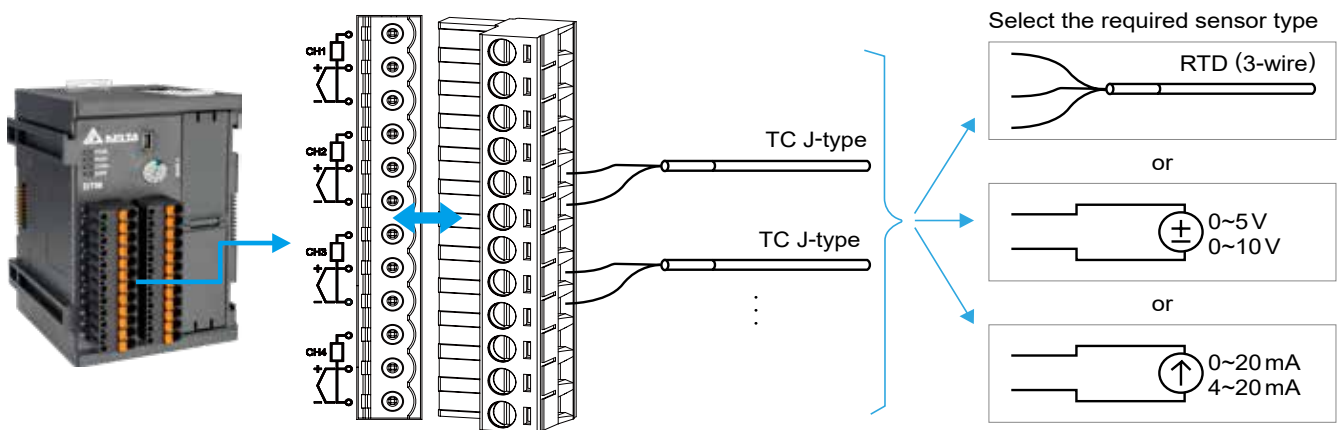
- Several DTM groups can be connected via RS-485 or Ethernet to control more than 1,000 points.





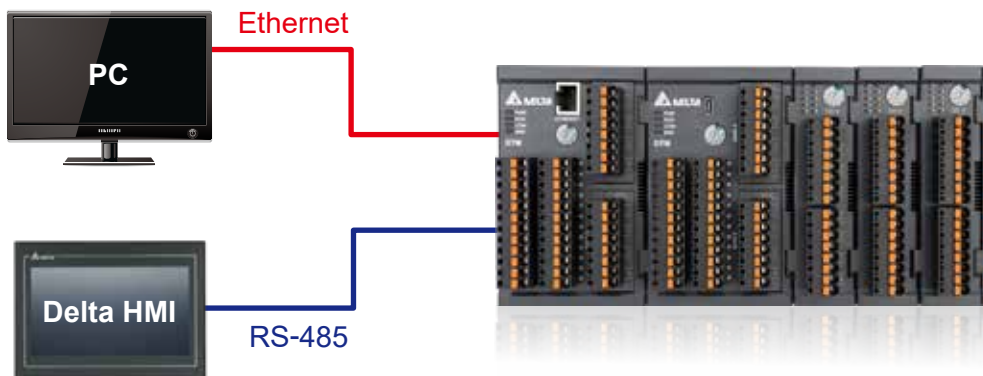
## 2. Various input channels

- The single channel supports analog voltage, analog current, thermocouple and platinum RTD input
- Allows users to select a sensor type for each channel separately

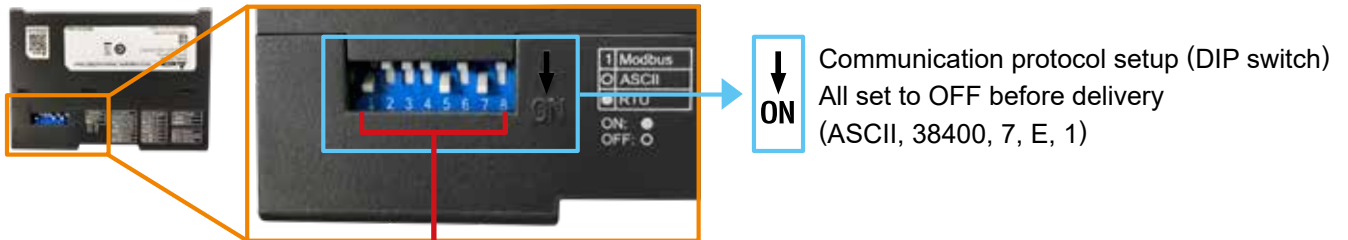


## 3. RS-485 and Ethernet introduction

- Ethernet: supports Ethernet/IP communication
- RS-485 :
  - max. Baud rate 115,200 bps
  - Supports ASCII and RTU
  - Offers external switches communication protocols, address setup, and easy installation and maintenance



#### 4. RS-485 configuration



Bit 1	Communication Code	Bit 2	Bit 3	Bit 4	Communication Rate	Bit 5	Bit 6	Bit 7	Protocol	Bit 8	Address Code
OFF	ASCII	OFF	OFF	OFF	38,400	OFF	OFF	OFF	7, E, 1	ON	Original communication address plus 64
ON	RTU	ON	OFF	OFF	57,600	ON	OFF	OFF	7, O, 1	OFF	Original communication address
		OFF	ON	OFF	115,200	OFF	ON	OFF	7, N, 1		
		ON	ON	OFF	19,200	ON	ON	OFF	8, E, 1		
		OFF	OFF	ON	9,600	OFF	OFF	ON	8, O, 1		
		ON	OFF	ON	4,800	ON	OFF	ON	8, N, 1		
						OFF	ON	ON	7, E, 2		
						ON	ON	ON	8, N, 2		

**Note:** All settings for external switches will take effect after the device reconnects to power.

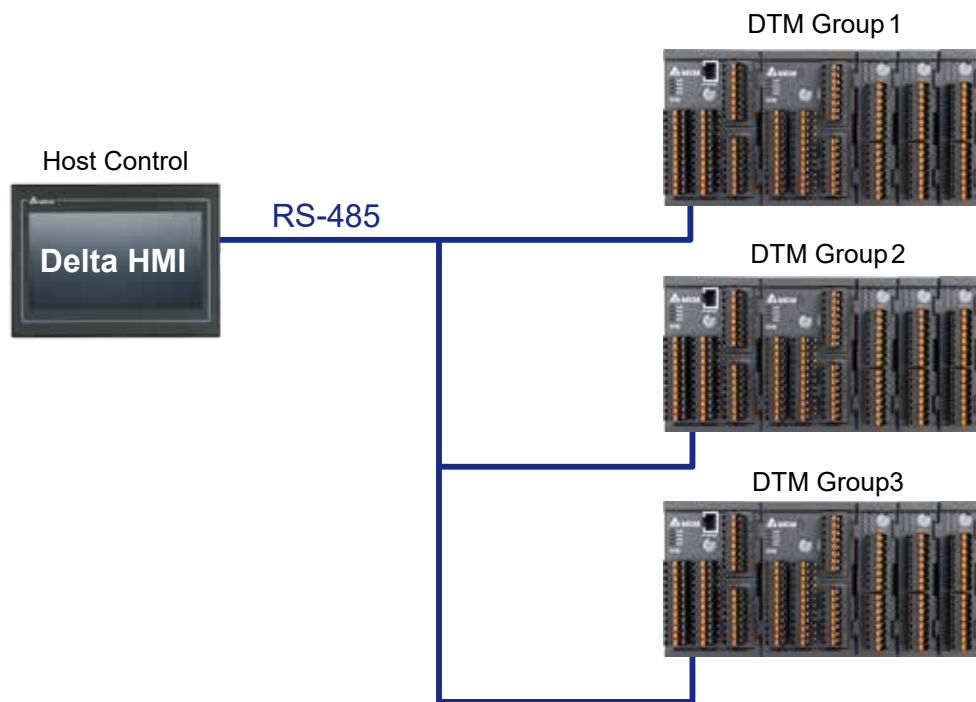
#### 5. DTM host and module station ID configuration

Type	Knob Station ID	Station ID Address
Measurement Host	RS-485 Station ID	1~F 0 <sup>*1</sup>
	Internal Station ID <sup>*2</sup>	0 <sup>*3</sup>
Measurement Module	Internal Station ID <sup>*4</sup>	1~F
I/O Module (DO)	Internal Station ID <sup>*4</sup>	1~F
I/O Module (CT)	Internal Station ID <sup>*4</sup>	1~F

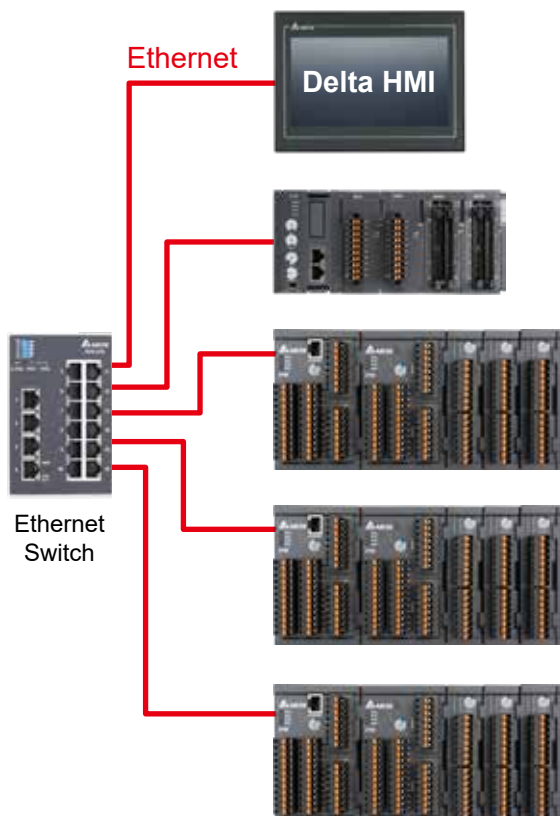
**Note:**

- \*1. When the host station ID is set to 0, RS-485 station ID address is 16.
- \*2. Station ID for DTM group internal communication.
- \*3. The host internal station ID is preset to 0 and cannot be changed.
- \*4. Please do not set the internal station ID to 0, which indicates engineering mode for this model.
- 5. The internal station IDs of a module cannot be used for another of the same type, but can be used for a different type.
- 6. All settings for external switches will take effect after the device reconnects to power.

## 6. DTM RS-485 connection diagram



## 7. DTM Ethernet connection diagram



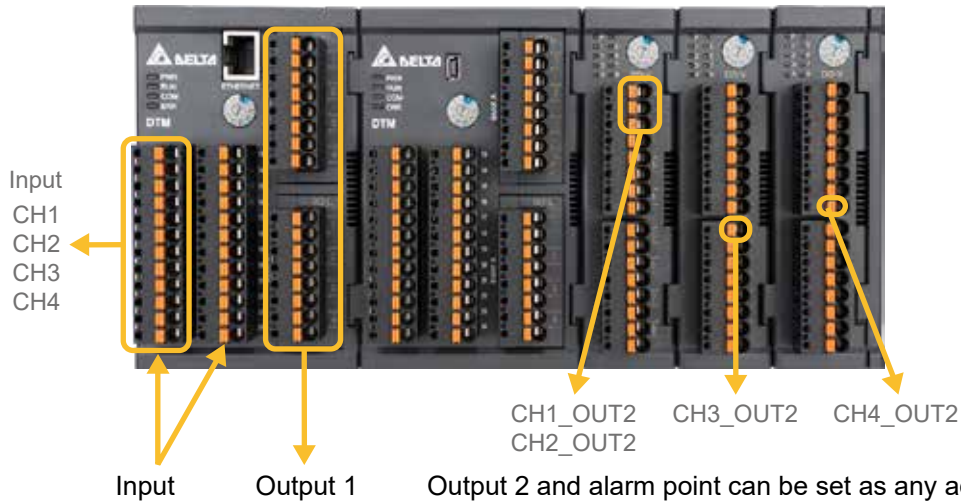
### Ethernet Communication Features

- Supports Ethernet/IP communication protocol
- MDI/MDI-X auto detection
- Transmission rate up to 10/100Mbps (auto detection)

Interface	RJ-45 (Auto MDI/MDIX)
Number of ports	1 Port
Transmission mode	IEEE 802.3, IEEE 802.3u
Network cable type	CAT-5E Shielded (100M)
Transmission rate	10/100Mbps, auto detection
Network protocol	ICMP, IP, TCP, UDP, DHCP, HTTP, SMTP, Modbus over TCP/IP, Delta system configuration

## 8. I/O module address allocation

Allows user-defined output address (Output 1, 2 and alarms) for each sensor input, convenient for wiring.



Output 2 and alarm point can be set as any address in the I/O module as required.

\*User-definable output for each input.

## User-Defined Communication Addresses

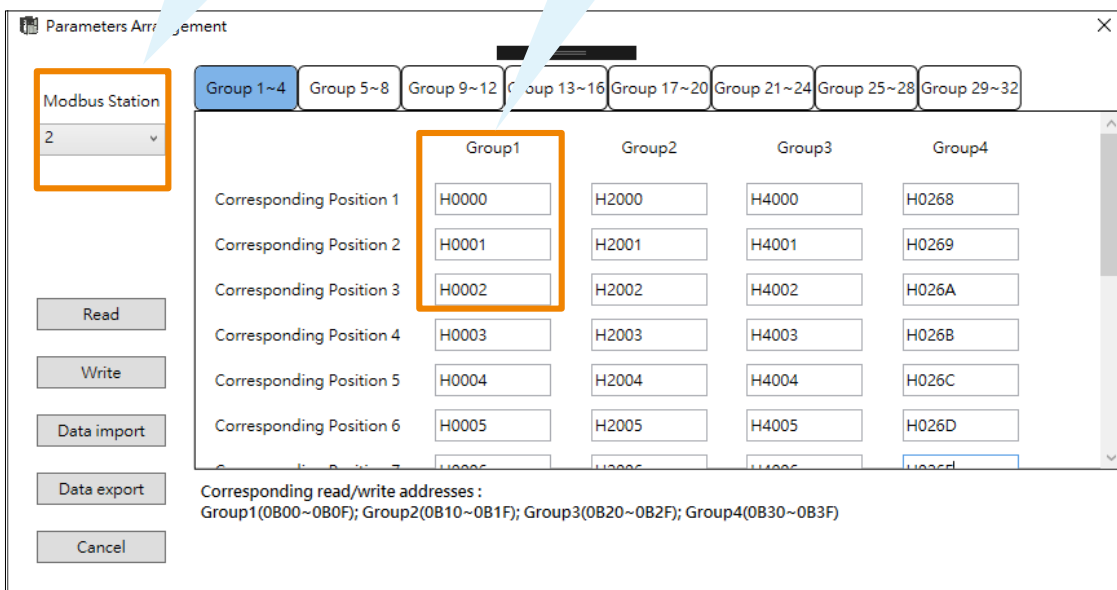
- Flexible operation interface for user-defined communication addresses
- Rapidly collects parameters among equipment for high communication efficiency

### User-defined functions:

Only host station IDs collected by the host are available.

### Parameter grouping function:

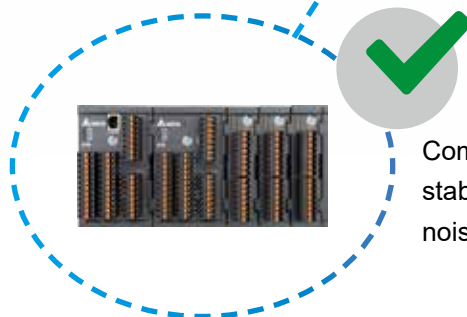
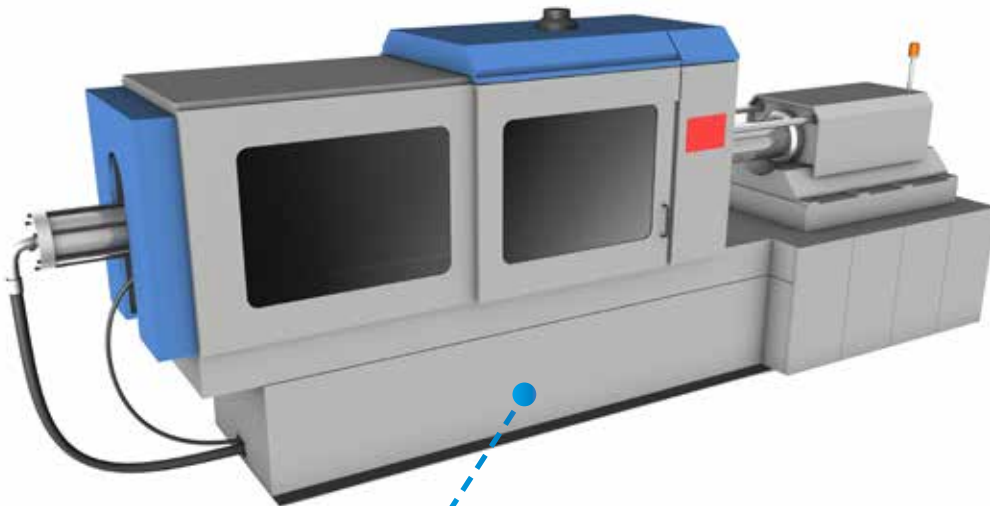
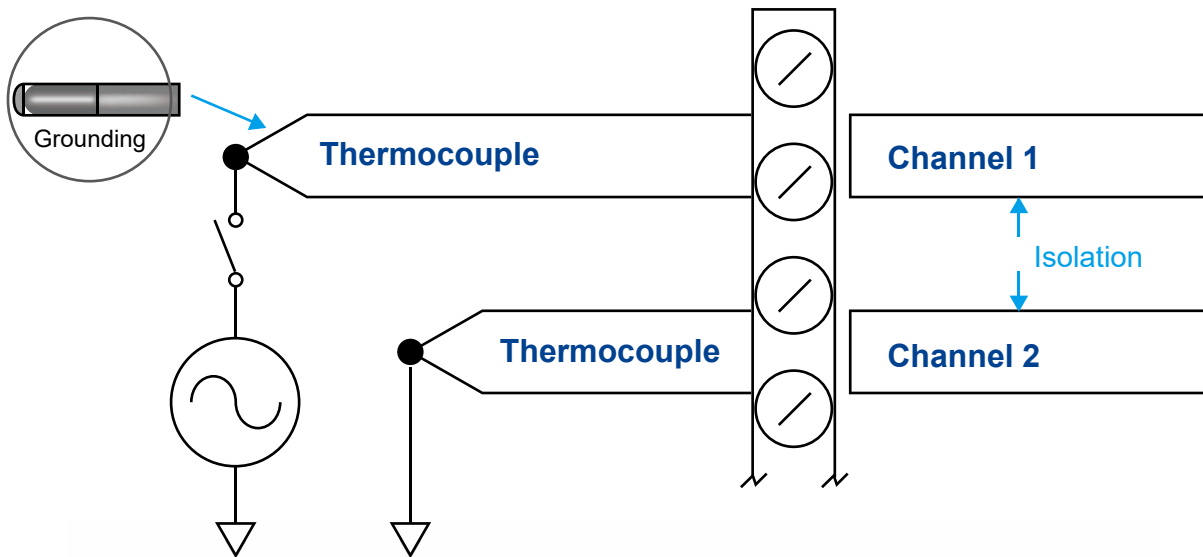
Creates parameter groups to rapidly collect and read all parameters



\*This is a software interface illustration. Please download the software from Delta's website. Delta reserves the right for updates or modifications without prior notice.

## Complete Isolation between Channels

- Complete isolation between channels prevents the heating device from electricity leakage, which may cause damage to the electric circuit of thermocouple input channels.
- 8 sets of input channels are completely isolated to ensure stable measurement signal transmission and avoid interference



Complete isolation between channels ensures stable temperature measurement and prevents noise jamming during operation

# Applications

## Thermal Glass Bending Machine

### Description:

Glass thermal bending machines using traditional temperature controllers may suffer from downtime or damage due to an overcurrent of the power supply system. This is because the transient peak currents or output loads overlap with each other after all outputs are enabled at the same time.

### Benefits:

The DTM Series features **peak current suppression function**, which prevents simultaneous load output of all temperature control points, reducing the power supply system's transient output current for stable operation.



## Injection Molding Machine Runner Control Application

### Description:

Temperature control is critical during feeding, molding, cooling and demolding. During extrusion, the temperature of each heating point may vary with positions (e.g., the closer to the extruded outlet, the greater the pressure.). This may cause under-temperature or over-temperature of certain portions and affect product yields. Therefore, multi-point control is required for a runner.

### Benefits:

The DTM Series provides accurate and timely multi-point temperature control with data transmission via RS-485, thus improving product yield rates.



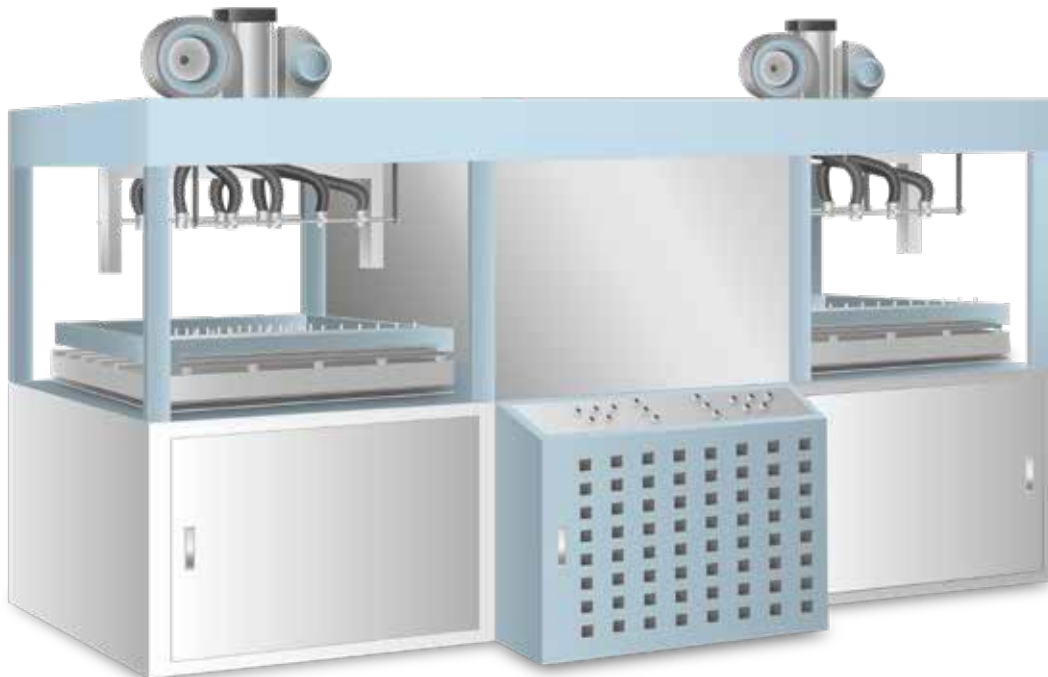
## Ceramic Heating Plate of Vacuum Forming Machine

### Description:

A vacuum forming machine usually has hundreds of ceramic heating plates, and each plate requires precise temperature control. Insulation of the plates deteriorates after long-term use and may cause electrical leakage and unstable temperature measurement. What's worse, the temperature controller may be damaged.

### Benefits:

The DTM Series is designed with complete isolation between channels to eliminate unstable temperature measurement due to electrical leakage. Data collection by the host, powerful communication as well as accurate multi-point temperature control enhances stable operation and improves product yields of vacuum forming machines.



# Specifications

## Host and Measurement Modules

Input Power Supply	DC 24V
Operating Voltage Range	90% ~ 110% rated voltage
Power Consumption	<ul style="list-style-type: none"> <li>• Host: 6W, 4 channels and 8 channels are available</li> <li>• Measurement module (max. 7 modules in parallel): 5W</li> <li>• The measurement module DTMN02-N series: 3W</li> <li>• I/O module (max. 8 modules in parallel): 3W</li> </ul>
Installation Requirement	<p>Follow the sequence below for installation:            (1) CPU, (2) Measurement modules (max. 7 pcs), (3) I/O modules (max. 8 pcs).            When using DTMN02-x, be sure to install DTMN08 or DTMN04 before installing DTMN02-x.            Only one DTMN02-x module can be added and mounted to a DTM group.</p>
Input Sensor Support	Thermocouple: K, J, T, E, N, R, S, B, L, U, TXK
	Platinum RTD: Pt100, JPt100, Ni120, Cu50
	Analog input: 0~10V, 0~5V, 0~50mV, 0~20mA, 4~20mA
Sampling Rate	0.1 sec./all 8 sets of input
Control Methods	PID, programmable PID, ON/OFF, manual
Output Types	SPST relay, max. rated load AC 250V, 2A resistive load
	Voltage pulse DC 12V ± 10%, max. rated output current 20mA
	Analog current: 4~20mA (load impedance ≤ 500Ω)
	Analog voltage: 0~10V (load impedance ≥ 1,000Ω)
Input Types	<p>Choose a current transformer (CT) below for your need.            (1) 30A CT model: DT3-CT30A (2) 100A CT model: DT3-CT100A            The resolution for both CT is 0.1A.</p>
Outputs (Optional)	3 types of outputs: control output, alarm output, and proportional output (needs to be used with optional corresponding models)
Alarm (Optional)	13 alarm modes are available (need to be used with optional corresponding models)
Communication Functions	<p>RS-485 DIP Switch: supports baud rates of 4,800/9,600/19,200/38,400/57,600/115,200 bps            Ethernet RJ45 port: supports 10/100Mbps, MDI/MDI-X automatic detection            Mini-USB port: supports USB 2.0 full speed only for the CPU</p>
Communication Protocol	<p>RS-485 DIP Switch: supports the Modbus protocol with RTU/ASCII communication format            Ethernet RJ45 Port: support Modbus TCP and Ethernet/IP, compliant with IEEE802.3, IEEE802.3u            Mini USB Port: supports USB2.0 communication standard</p>
Internal Connection	Features internal connection terminals for 24V power supply and communication signal transmission
Vibration Resistance	10~55Hz, 10m/s <sup>2</sup> for 10 mins in X, Y, Z directions
Shock Resistance	Max. 300m/s <sup>2</sup> , 3 times in 3 axes and 6 directions
Operating Ambient Temperature	0°C ~ 50°C
Storage Temperature	-20°C ~ 65°C
Operating Altitude	< 2,000m
Operating Ambient Humidity	35% ~ 85% RH (non-condensing)



## Performance

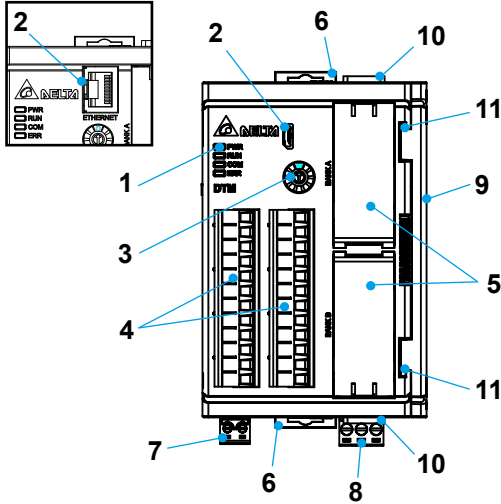
Temperature Display Accuracy	Thermocouple: $\pm(0.3\% \text{ FS} / +1^{\circ}\text{C})$
	Platinum RTD: $\pm(0.2\% \text{ FS} / +1^{\circ}\text{C})$
Analog Input Accuracy	0 ~ 5 V <sub>DC</sub> : $\pm(0.3\% \text{ of reading} / +0.03 \text{ V})$
	0 ~ 10 V <sub>DC</sub> : $\pm(0.3\% \text{ of reading} / +0.03 \text{ V})$
	0 ~ 20 mA: $\pm(0.3\% \text{ of reading} / +0.05 \text{ mA})$
	4 ~ 20 mA: $\pm(0.3\% \text{ of reading} / +0.04 \text{ mA})$
	0 ~ 50 mV: $\pm(0.3\% \text{ of reading} / +0.1 \text{ mV})$
CT Input Accuracy	CT Input: $\pm(5\% \text{ FS})$

## I/O Modules and Extension Cassettes

Input Power Supply	DV 24 V by host internal connection terminal
Operating Voltage Range	90% ~ 110% rated voltage
Power Consumption	The power supply for extension cassettes is from CPUs or measurement modules. The power consumption of I/O module (max. 8 pcs in parallel) is 3W. Please install in the sequence of CPU, measurement modules, I/O modules.
Control Methods	PID, programmable PID, ON/OFF, manual
Output Types	SPST relay, max. rated load AC 250V, 2A resistive load
	Voltage pulse DC 12V $\pm 10\%$ , max. rated output current 20mA
	Analog current: 4 ~ 20 mA (load impedance $\leq 500 \Omega$ )
	Analog voltage: 0 ~ 10V (load impedance $\geq 1,000 \Omega$ )
Input Types	Choose a current transformer (CT) below for your need. (1) 30A CT model: DT3-CT30A; (2) 100A CT model: DT3-CT100A. The resolution for both CT is 0.1A.
Output (Optional)	3 types of outputs: control output, alarm output, and proportional output (needs to be used with optional corresponding models)
Alarm (Optional)	13 alarm modes are available (needs to be used with the optional corresponding models)
Communication	RS-485, supports baud rates of 4,800/9,600/19,200/38,400/57,600/115,200 bps
Communication Protocol	Modbus protocol, RTU/ASCII format
Internal Connection	Features internal connection terminals for 24V power supply and communication signal transmission
Vibration Resistance	10 ~ 55Hz, 10 m/s <sup>2</sup> for 10 mins in X, Y, Z directions
Shock Resistance	Max. 300 m/s <sup>2</sup> , 3 times in 3 axes and 6 directions
Operating Ambient Temperature	0°C ~ 50°C
Storage Temperature	-20°C ~ 65°C
Operating Altitude	< 2,000m
Operating Ambient Humidity	35% ~ 85% RH (non-condensing)
Pollution Degree	2

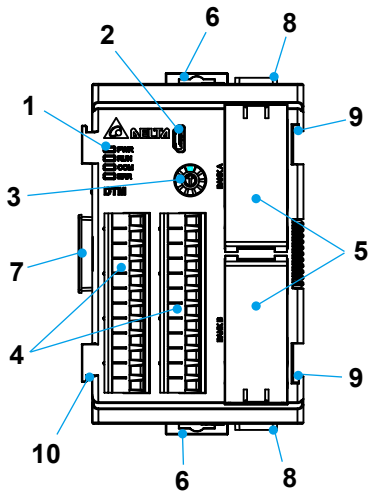
# I/O Ports

## Host



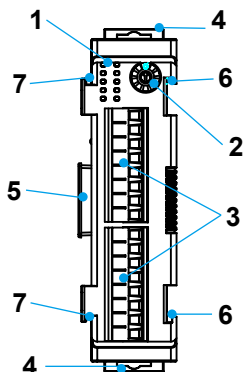
No.	Name	No.	Name
1	LED indicators	7	RS-485 terminal
2	Mini USB/RJ45 port	8	Power input terminal
3	Communication station ID knob	9	Side cover
4	Sensor input terminal	10	Cassette bracket
5	Extension output cover	11	Extension guide slot
6	DIN rail bracket		

## Measurement Module



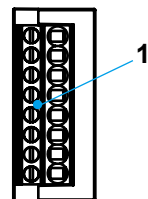
No.	Name	No.	Name
1	LED indicators	6	DIN rail bracket
2	Mini USB connector	7	Press cover
3	Internal station ID knob	8	Output cassette cover
4	Sensor input terminal	9	Extension guide slot
5	Extension output cover	10	Extension guideway

## I/O Module/DTMN02-x Measurement Module



No.	Name
1	LED indicators
2	Internal station ID knob
3	Input/output terminal
4	DIN rail bracket
5	Connector cover
6	Extension guide slot
7	Extension guideway

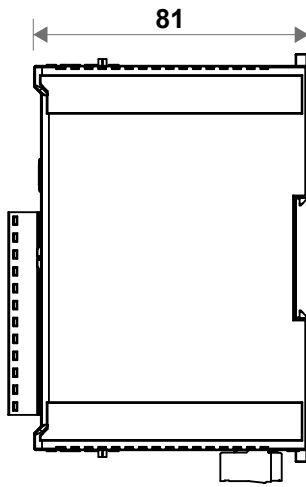
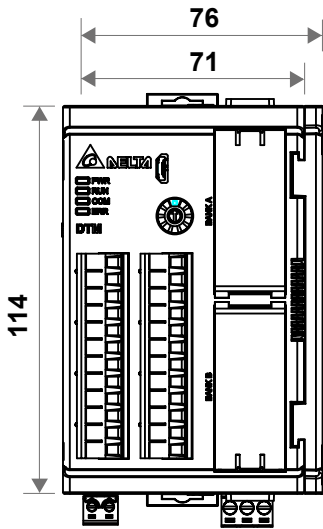
## Extension Cassette



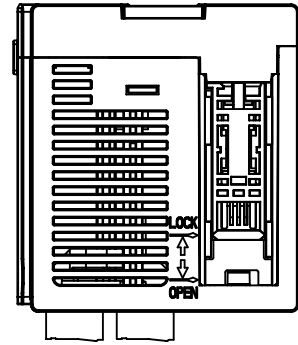
No.	Name
1	Output terminal

# Dimensions

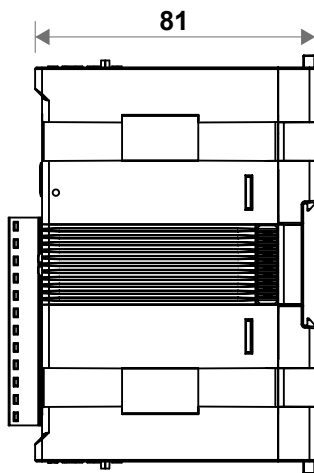
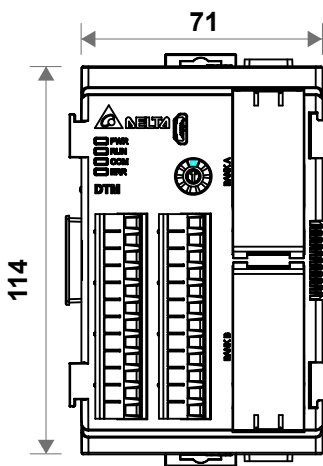
## Host



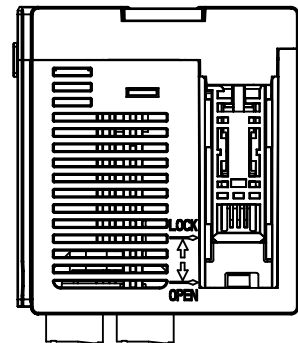
Unit: mm



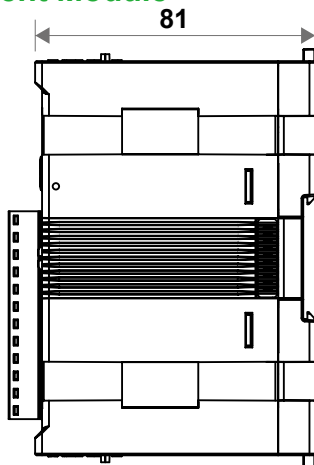
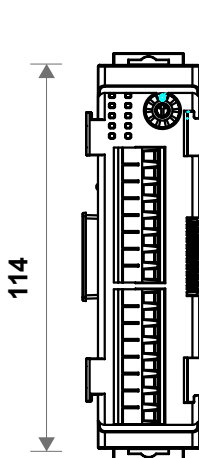
## Measurement Module



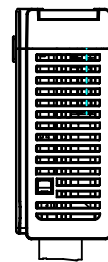
Unit: mm



## I/O Module /DTMN02-x Measurement Module





Unit: mm





## Ordering Information


### Host

Exterior Design	Communication	Model	Specification
	RS-485	DTMR04	4-channel
		DTMR08	8-channel
	RS-485 + Ethernet	DTME04	4-channel
		DTME08	8-channel


### Measurement Modules

Exterior Design	Name	Model	Specification
	Measurement Module	DTMN04	4-channel
		DTMN08	8-channel
		DTMN02-V	2 IN-4 OUT, 0/12V pulse voltage
		DTMN02-R	2 IN-4 OUT, 2A relay contact
		DTMN02-C	2 IN-4 OUT, 4~20mA output
		DTMN02-L	2 IN-4 OUT, 0~10V output

### Extension Cassettes

Exterior Design	Name	Model	Specification
	Extension Cassette	DTM-BDV	4-channel, 0/12V pulse voltage
		DTM-BDR	4-channel, 2A relay contact
		DTM-BDC	4-channel, 4~20mA output
		DTM-BDL	4-channel, 0~10V output

### I/O Modules

Exterior Design	Name	Model	Specification
	I/O Module	DTM-DOV	8-channel, 0/12V pulse voltage
		DTM-DOR	8-channel, 2A relay contact
		DTM-DOC	8-channel, 4~20mA output
		DTM-DOL	8-channel, 0~10V output
		DTM-CT030	8-channel, CT input (CT not included)

### Current Transformers (CT)

Name	Model	Specification
CT	DT3-CT100A	100 A CT
	DT3-CT30A	30 A CT

### Cable

Name	Model	Specification
Mini USB cable	UC-PRG015-01A	1.5 m

## Delta Temperature Controller DT Series

### Multi-Loop Modular Temperature Controller DTM

Various input channel, multi-point temperature control, available in RS-485 Type and Ethernet Type



### Standard Temperature Controller DTA

Basic single channel input and output



### Advanced Temperature Controller DTB

Linear voltage control output and dual-loop control output



### Modular Temperature Controller DTC

Modular design for series connection to monitor multiple points, save installation space, and connect flexibly per output requirements



### Valve Controller DTV

Suitable for DTV control applications, easy setting and built-in Modbus for efficient data collection



### Multi-channel Modular Temperature Controller DTE

Supports up to 8 sets of thermocouple or 6 sets of platinum RTD, multiple output modules available



### Advanced Intelligent Temperature Controller DT3

Modular design with various control modes, heater disconnection detection, and remote input



### Intelligent Temperature Controller DTK

Simple design with high-speed data collection for basic application



# Global Operations

## ASIA (Taiwan)



Taoyuan Technology Center (Green Building)



Taoyuan Plant 1



Tainan Plant (Diamond-rated Green Building)

## ASIA (China)



Wujiang Plant 3



Shanghai Office



**ASIA (Japan)**



Tokyo Office



**ASIA (India)**



Rudrapur Plant (Green Building)

**EUROPE**



Amsterdam, the Netherlands

**AMERICA**



Research Triangle Park, U.S.A.

▲ 6 Factories   ■ 117 Branch Offices   ● 13 R&D Centers   ■ 915 Distributors





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