Automation for a Changing World

Delta Multi-Loop Modular Temperature Controller

DTM Series

www.deltaww.com

Smarter. Greener. Together.

Delta Multi-Loop Modular Temperature Controller DTM Series

With increasingly complex temperature control applications and customer requirements, Delta introduces Multi-loop Modular Temperature Controller DTM Series. It is designed for easy application and installation. Data collection by host and complete isolation between channels help 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 extension module and extension cassette. A fully extended DTM group consists of a host plus 7 measurement modules and 8 I/O extension 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

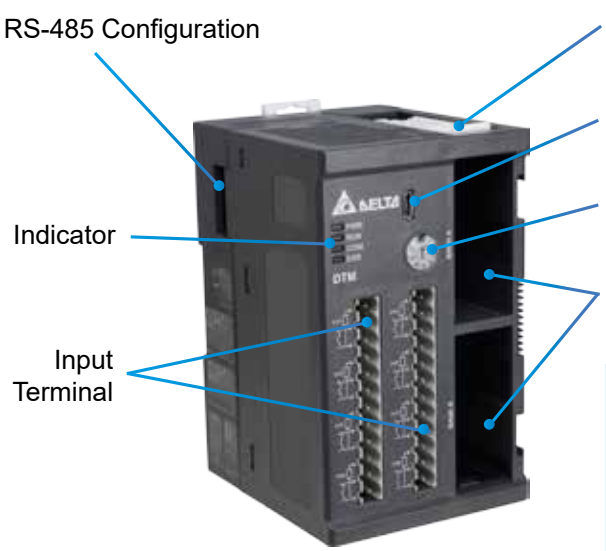
1. Modular design for easy wiring
2. Various extension modules for a wide range of applications
3. Data collection by host for higher data exchange efficiency
4. Supports RS-485 and Ethernet communication, as well as multi-point temperature control (64 points with host group / >1,000 points with RS-485 or Ethernet)
5. User-defined communication address
6. Complete isolation between channels

Table of Contents

Module Introduction

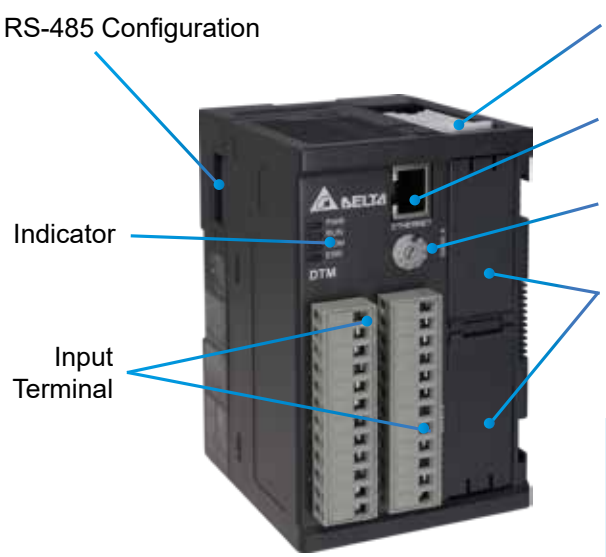
Host

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) X 11.3 (H) X 8 (D) cm

Ethernet Type
DTME08 / DTME04



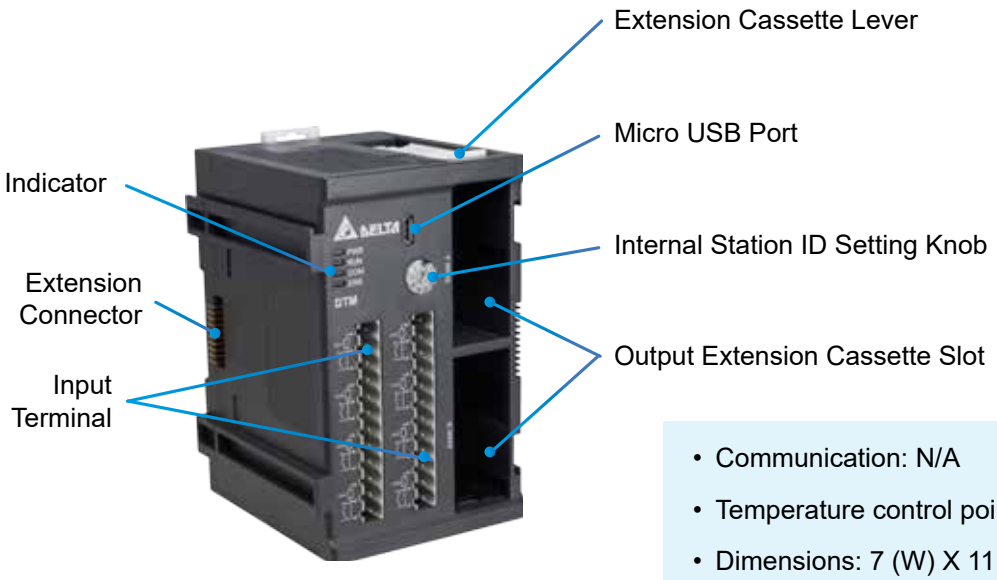
- Communication: RS-485 + Ethernet
- Supports up to 7 measurement modules + 8 I/O modules
- Temperature control points: 4 or 8
- Dimensions: 7 (W) X 11.3 (H) X 8 (D) cm

* The output extension cassette is not included for all measurement modules.

* The Ethernet Type is expected to be available in 2019. Delta reserves the right to further changes without prior notice.

Measurement Extension Module

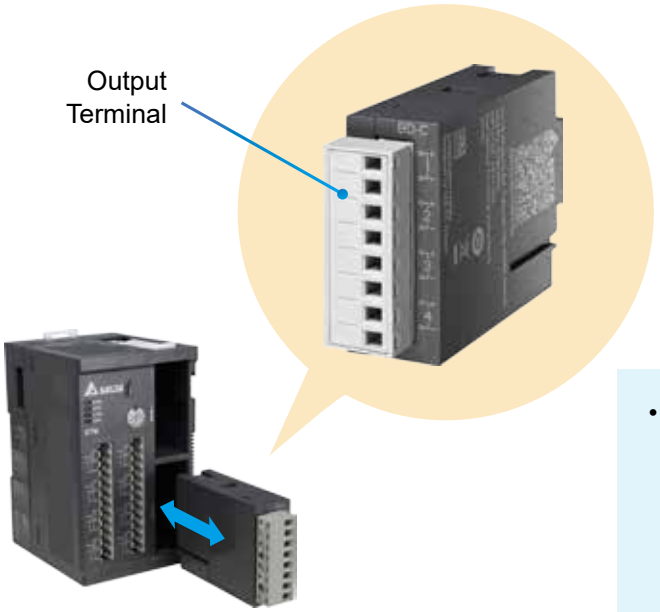
DTMN08 / DTMN04



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

* The output extension cassette is not included for all measurement modules.

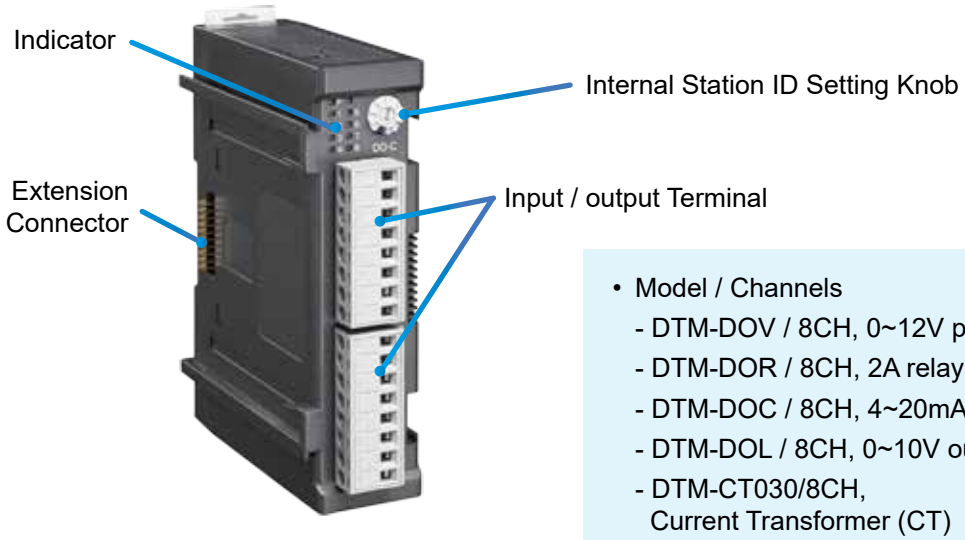
Output Extension Cassette



DTM-BDL installed on DTMR08

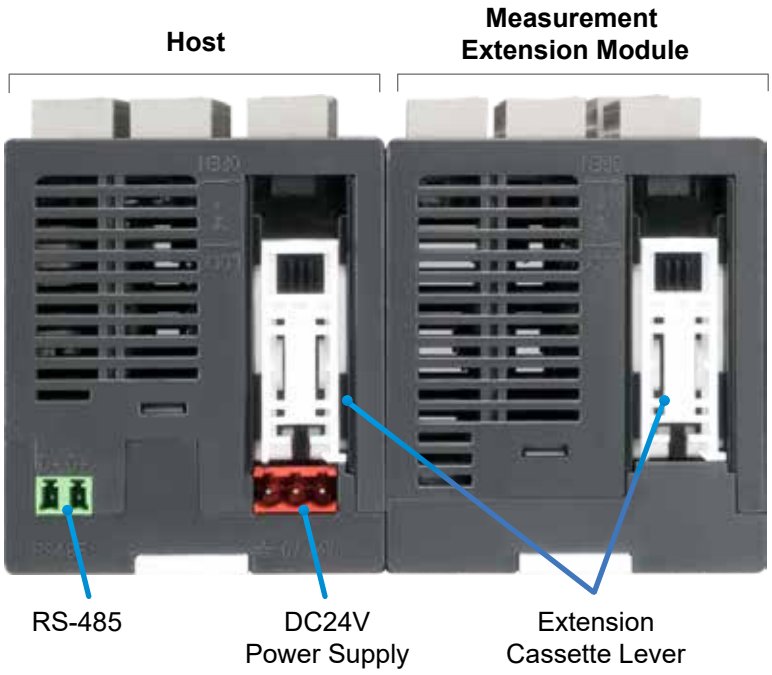
- Model / Channels
  - DTM-BDV / 4CH, 0~12V pulse voltage
  - DTM-BDR / 4CH, 2A relay contact
  - DTM-BDC / 4CH, 4~20mA output
  - DTM-BDL / 4CH, 0~10V output
- Dimensions: 2.5 (W) X 4.8 (H) X 7.7 (D) cm
- Please refer to the picture on the left for installation

I/O Extension Module



- Model / 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)
- Dimensions: 3 (W) X 11.3 (H) X 8 (D) cm

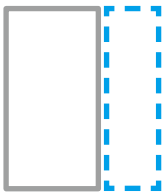
Module Bottom View



Module Installation

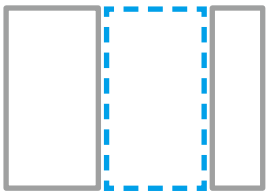
Features DIN RAIL for quick replacement and installation

Adding a Module



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

Replacing a Module

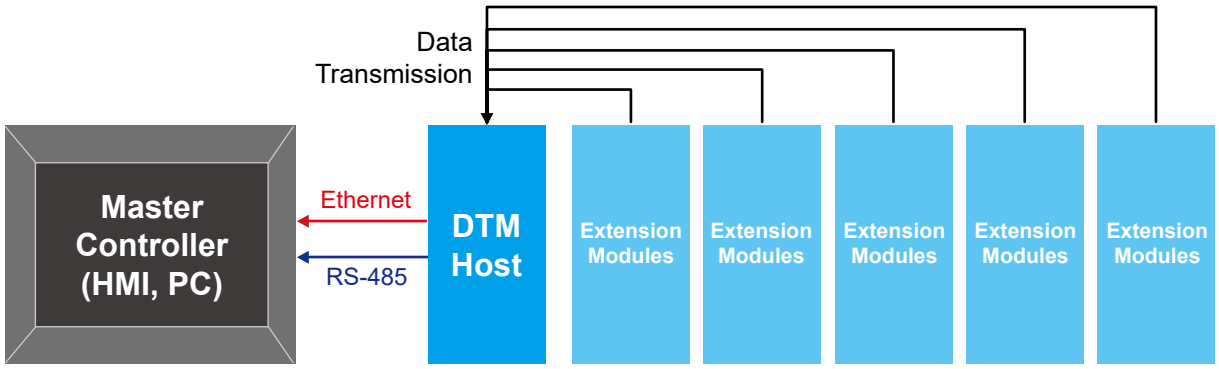


- Quick replacement and easy installation
- Pull out extension modules from the front without disconnecting other parts
- Small space requirement for easy maintenance

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



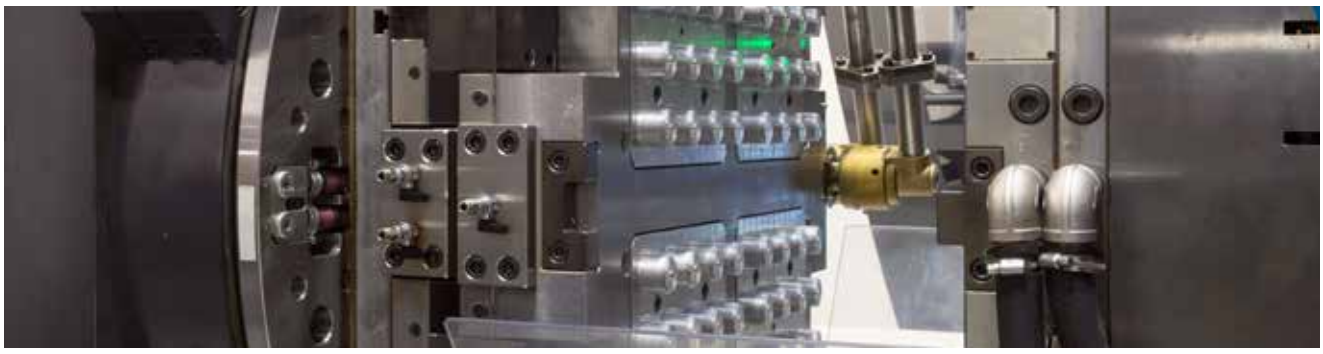
The host sends all data from the DTM group to the master controller

Multi-Point Temperature Control via RS-485 and Ethernet

1. DTM offers multi-point control

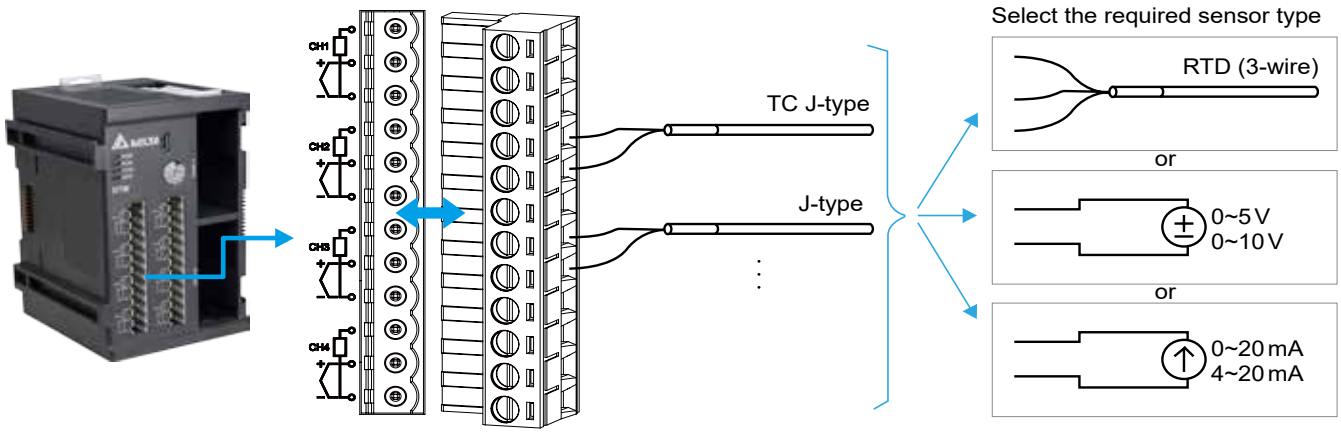
- 1 host controls up to 8 points; 1 host group controls up to 64 points
- DTM host provides 8 sets of sensor inputs to control 8 points simultaneously
- 1 host can support up to 7 measurement modules and 8 I/O modules to form a group

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



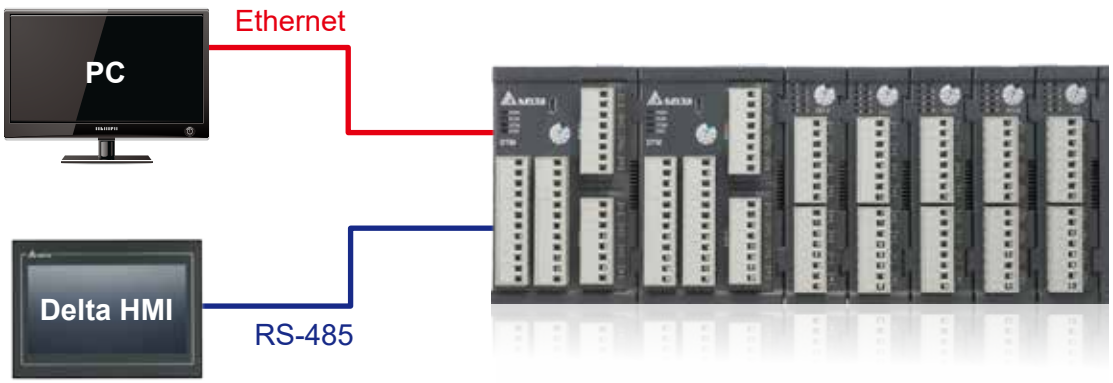
2. Various input channels

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

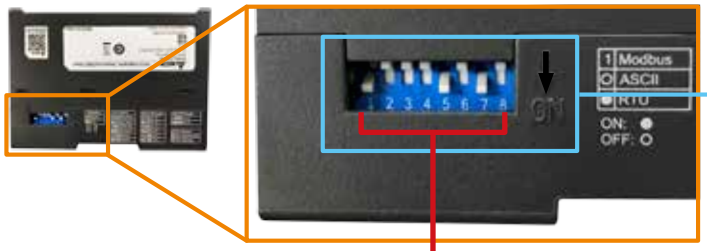


3. RS-485 and Ethernet introduction

- Ethernet: supports Modbus / TCP communication
- RS-485 :
  - Max. Baud rate 115,200bps
  - Supports ASCII and RTU
  - Offers external switches for communication protocol and address setup, easy to install and maintain



4. RS-485 configuration



Communication protocol setup (DIP switch)
All set to OFF before delivery
(ASCII, 38400, 7, E, 1)

Bit 1	Communication Code
OFF	ASCII
ON	RTU

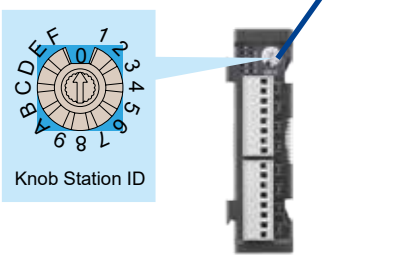
Bit 2	Bit 3	Bit 4	Communication Rate
OFF	OFF	OFF	38400
ON	OFF	OFF	57600
OFF	ON	OFF	115200
ON	ON	OFF	19200
OFF	OFF	ON	9600
ON	OFF	ON	4800

Bit 5	Bit 6	Bit 7	Protocol
OFF	OFF	OFF	7, E, 1
ON	OFF	OFF	7, O, 1
OFF	ON	OFF	7, N, 1
ON	ON	OFF	8, E, 1
OFF	OFF	ON	8, O, 1
ON	OFF	ON	8, N, 1
OFF	ON	ON	7, E, 2
ON	ON	ON	8, N, 2

Bit 8	Address Code
ON	Original communication address plus 64
OFF	Original communication address

Note: All external switch settings do not take effect until re-connecting to power

5. DTM host and module station ID configuration



Type	Knob Station ID	Station ID Address
Measurement Host	RS485 Station ID	1~F 0*1
	Internal Station ID*2	0*3
Measurement Extension Module	Internal Station ID	1~F 0*4
I/O Extension Module (DO)	Internal Station ID	1~F 0*4
I/O Extension Module (CT)	Internal Station ID	1~F 0*4

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.

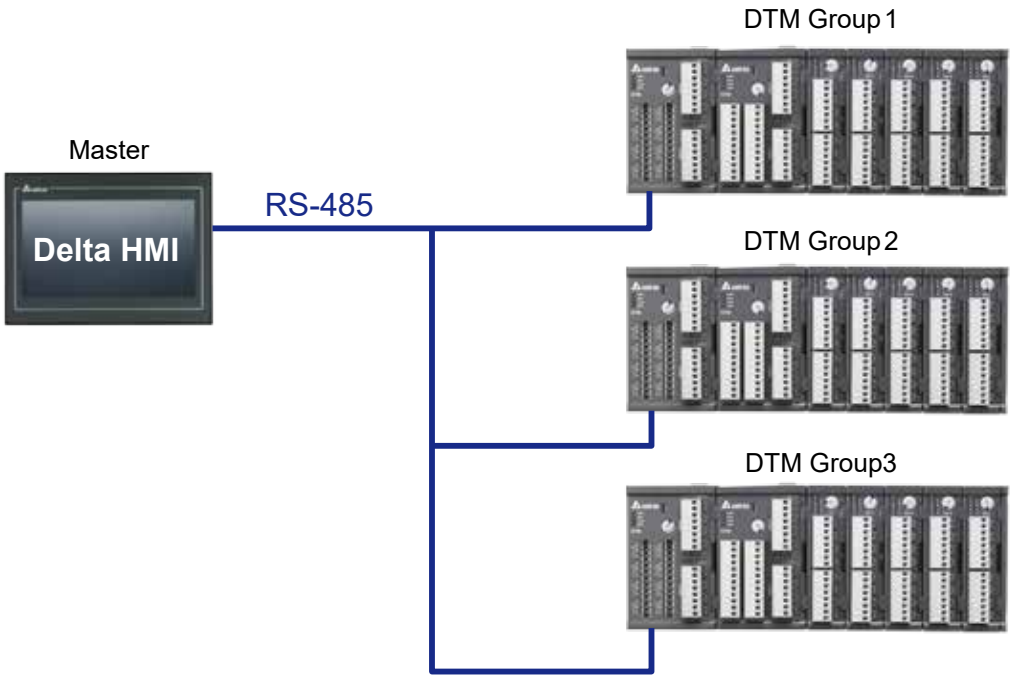
*3. The host internal station ID is preset to 0 and cannot be changed.

*4. Please do not set the internal station ID to 0, which indicates engineering mode for this model.

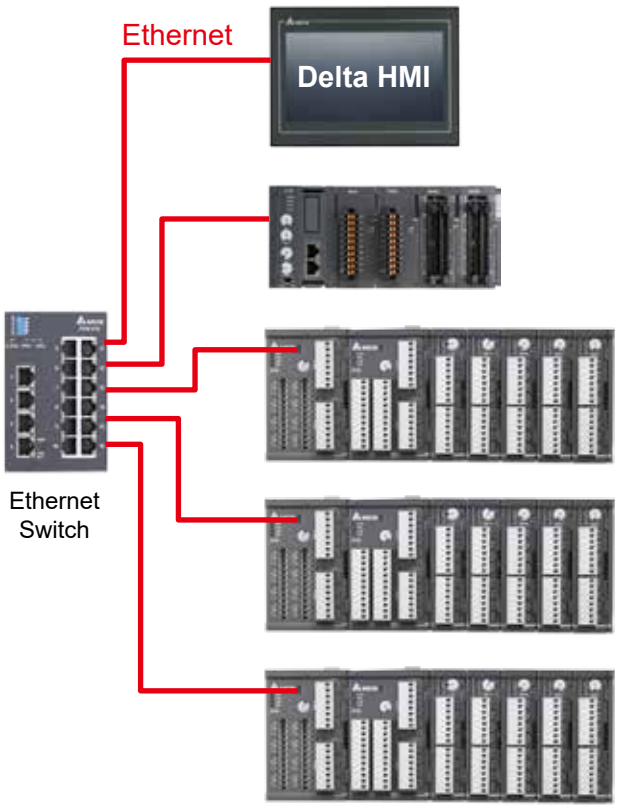
5. The same internal station ID cannot be used for extension modules of the same type, while it can be used for that of different types, without affecting each other.

6. All external switch settings do not take effect until re-connecting to power.

6. DTM RS-485 connection diagram



7. DTM Ethernet connection diagram



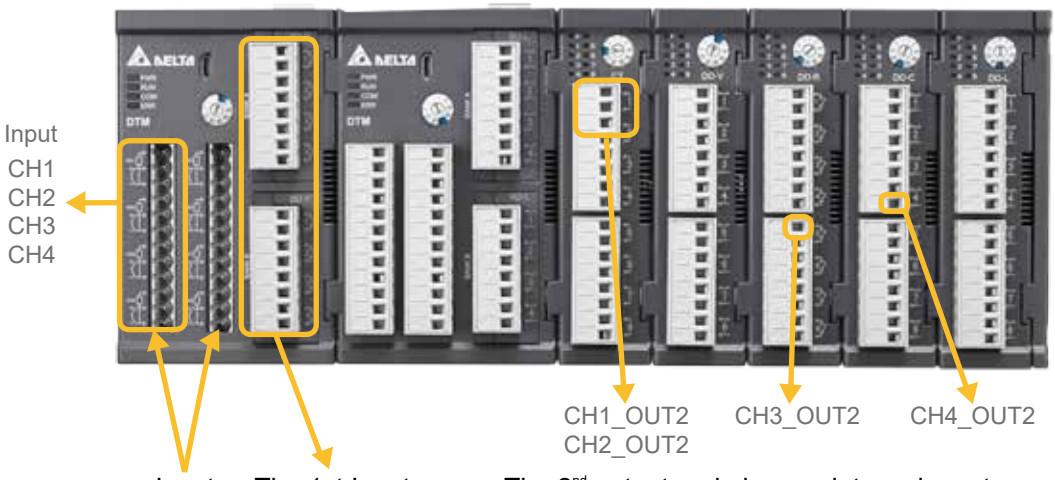
Ethernet Communication Features

- Supports Modbus communication protocol
- MDI/MDI-X auto detection
- Communication rate up to 10/100 Mbps (auto detection)
- Sends alarm by E-mail
- Supports virtual serial port

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	10/100 Mbps auto detection
Network protocol	ICMP, IP, TCP, UDP, DHCP, HTTP, SMTP, Modbus OVER TCP/IP, Delta system configuration

8. I/O extension module address allocation

Allows users to set the output address (output 2 and alarm address) for each sensor input in software, for convenient on-site wiring



The 2nd output and alarm point can be set as any address in the I/O extension module as required

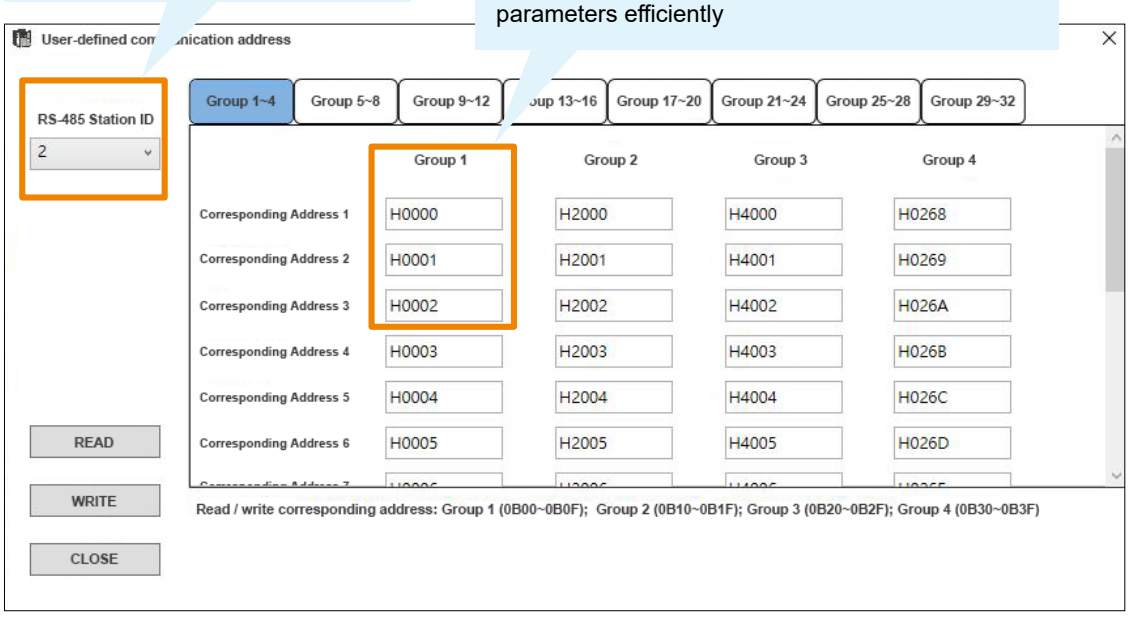
*Allows users to decide which output to use when a single input has different outputs

User-Defined Communication Address

- Allows users to define communication addresses based on their preference or ease of access for a flexible operation interface. It can also collect required parameters systematically for higher communication efficiency

User-defined functions:
Only host station IDs are available for data collection by host

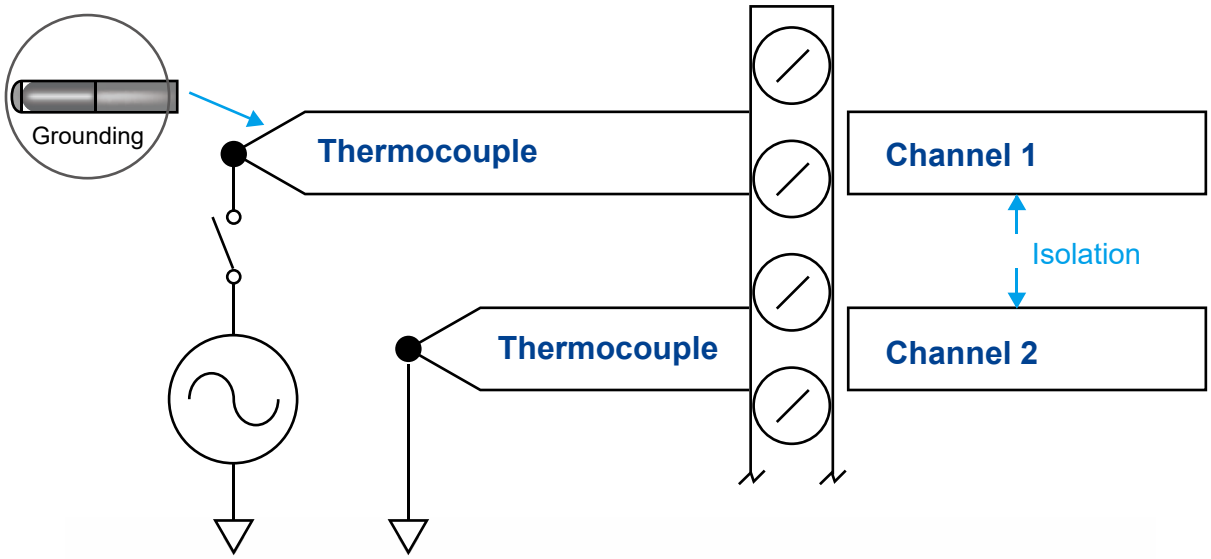
Create parameter groups:
Reads parameter groups by creating parameters in corresponding group addresses to collect required parameters efficiently

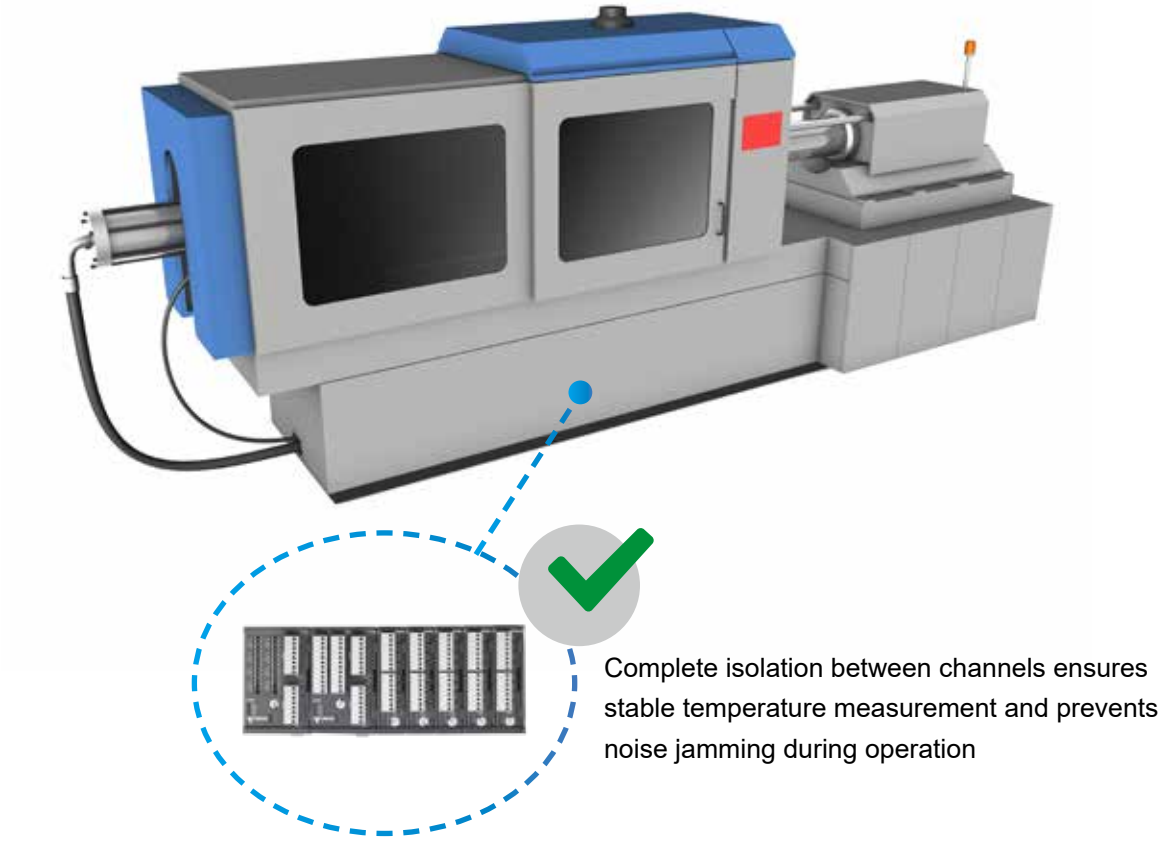


*The figure above shows the software interface. Please download the software from Delta's website. Should there be any inconsistencies, the latest version shall prevail. Delta reserves the right to make modifications at any time without prior notice

Complete Isolation Between Channels

- Complete isolation between channels prevents electricity leakage of the heating device and damage to the electric circuit of the thermocouple input channels
- 8 sets of input channels are completely isolated to ensure a stable measurement signal and avoid interference





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

Applications

Glass Thermal 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 when all the outputs are turned on at the same time, the transient peak current or output loads can overlap with each other during drive output.

Benefits:

The DTM Series features output current off-peak function, which helps to prevent simultaneous load output of all temperature control points, reducing the power supply system's transient output current load and ensuring stable operation.

In addition, the DTM Series offers time-sharing output current for stable power supply and higher productivity.

Injection Molding Machine Runner Control Application

Description:

For the injection molding machine runner control application, temperature control is critical during feeding, molding, cooling and demolding. During extrusion, the condition of each heating point may vary with their position (e.g., the closer to the outlet, the higher the pressure), and the resulting partial under-temperature or over-temperature may affect the product yields; In addition, multi-point control is usually required for runner control.

Benefits:

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

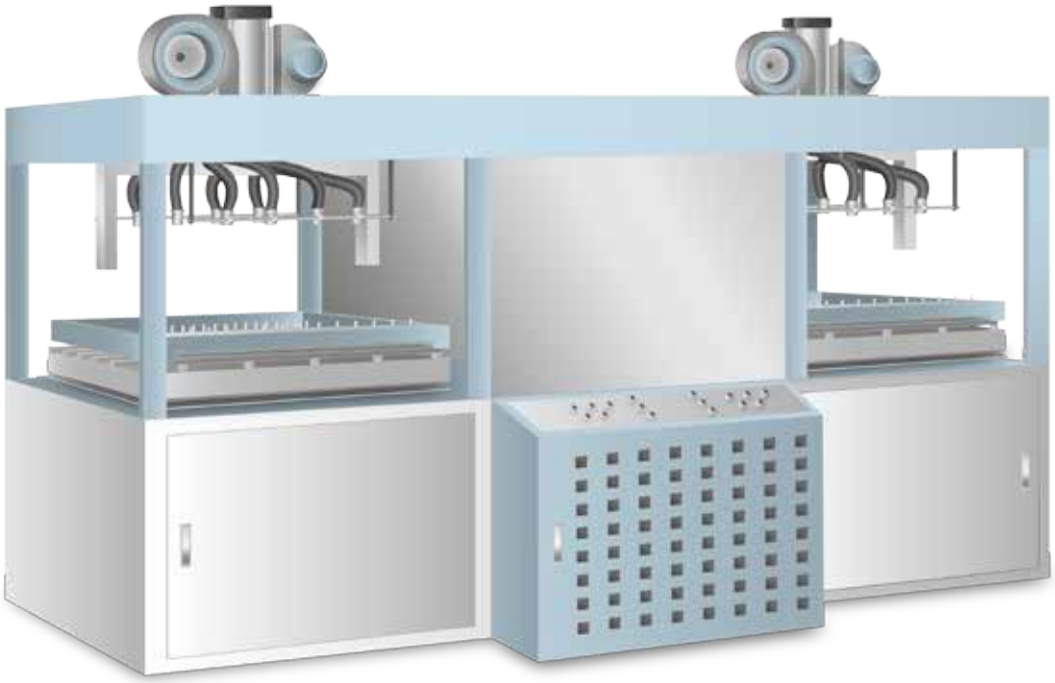
Ceramic Heating Plate of Vacuum Forming Machine

Description:

A vacuum forming machine usually has hundreds of ceramic heating plates which requires temperature control. Insulation deterioration of ceramic heating plates after prolonged use may lead to electrical leakage, thus causing unstable temperature measurement results or even temperature controller damage.

Benefits:

The DTM Series is designed with complete isolation between channels to eliminate unstable temperature measurement results caused by electrical leakage. Data collection by the host, powerful communication as well as accurate multi-point temperature control help to enhance stable operation and improve product yield of vacuum forming machine.



Specifications

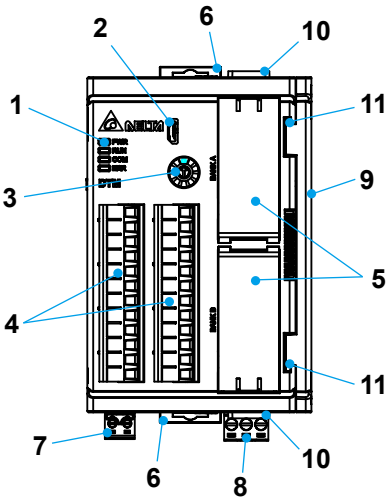
Host & Measurement Extension Module

Input Power Supply	DC 24V
Operating Voltage Range	90% ~ 110% rated voltage
Power Consumption	Max. 6W + 5W × number of measurement extension modules connected in parallel (max. 7) + 3W × number of IO extension modules connected in parallel (max. 8). Please install in the order of host, measurement extension module, IO extension module
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	Relay: SPST, max. rated load: AC 250, resistive load: 2A
	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	Please refer to the ordering information as below, and choose the CT based on your requirement: 1. 30A CT, model: DT3-CT30A; 2. 100A CT, model: DT3-CT100A, both with a resolution of 0.1A
Outputs (Optional)	3 types of outputs are available: control output, alarm output and proportional output (needs to be used with the corresponding model)
Alarm (Optional)	13 alarm modes are available (needs to be used with the corresponding model)
Communication	RS-485 digital communication, Baud rate 4800/9600/19200/38400/57600/115200bps
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, 10m/s² for 10 mins in X, Y, Z direction
Shock Resistance	Max. 300m/s², 3 times in each of 3 axes, 6 directions
Operating Ambient Temperature	0°C ~ 50°C
Storage Temperature	-20°C ~ 65°C
Operating Altitude	< 2,000 m
Operating Ambient Humidity	35% ~ 85% RH (non-condensing)

Performance

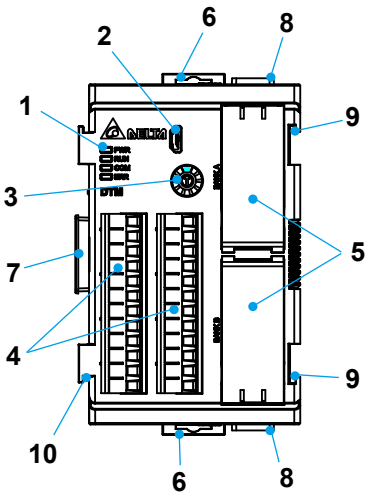
Temperature Display Accuracy	Thermocouple:	±(0.3% FS, +1°C)
	Platinum RTD:	±(0.2% FS, +1°C)
Analog Input Accuracy	0 to 5 V_{DC}:	±(0.3% of reading, +0.03V)
	0 to 10 V_{DC}:	±(0.3% of reading, +0.03V)
	0 to 20mA:	±(0.3% of reading, +0.05mA)
	4 to 20mA:	±(0.3% of reading, +0.04mA)
	0 to 50mV:	±(0.3% of reading, +0.1mV)
CT Input Accuracy	CT Input:	±(5% FS)

Host



No.	Name	No.	Name
1	LED indicator	6	DIN RAIL bracket
2	Micro USB connector	7	RS-485 terminal
3	Communication station ID knob	8	Power input terminal
4	Sensor input terminal	9	Side cover
5	Extension output cover	10	Cassette bracket
		11	Extension guide slot

Measurement Extension Module

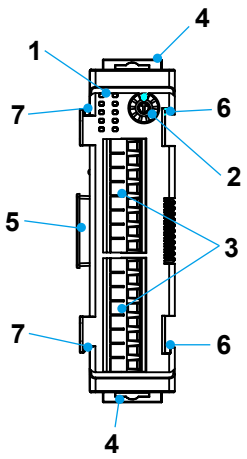


No.	Name	No.	Name
1	LED indicator	6	DIN RAIL bracket
2	Micro USB connector	7	Press cover
3	Internal station ID knob	8	Output cassette cover
4	Sensor input terminal	9	Extension guide slot
5	Extension output cover	10	Extension guideway

I/O Extension Module, Extension Cassette

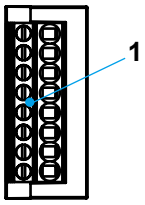
Input Power Supply	DV 24V by host internal connection terminal
Operating Voltage Range	90% ~ 110% rated voltage
Power Consumption	The cassette's power consumption is already included in the host or measurement extension module. 3W × number of I/O extension modules connected in parallel (max. 8. Please install in the order of host, measurement extension module, IO extension module)
Control Methods	PID, programmable PID, ON/OFF, Manual
Output Types	Relay: SPST, max. rated load: AC 250, resistive load: 2A
	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	Please refer to the ordering information as below, and choose the CT based on your requirement: 1. 30 A CT, model: DT3-CT30A; 2. 100A CT, model: DT3-CT100A, both with a resolution of 0.1A
Output (Optional)	3 types of outputs are available: control output, alarm output and proportional output (needs to be used with the corresponding model)
Alarm (Optional)	13 alarm modes are available (needs to be used with the corresponding model)
Communication	RS-485 digital communication, Baud rate 4800/9600/19200/38400/57600/115200bps
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, 10m/s² for 10 mins in X, Y, Z direction
Shock Resistance	Max. 300m/s², 3 times in each of 3 axes, 6 directions
Operating Ambient Temperature	0°C ~ 50°C
Storage Temperature	-20°C ~ 65°C
Operating Altitude	< 2,000 m
Operating Ambient Humidity	35% ~ 85% RH (non-condensing)
Pollution Degree	2

I/O Extension Module



No.	Name
1	LED indicator
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

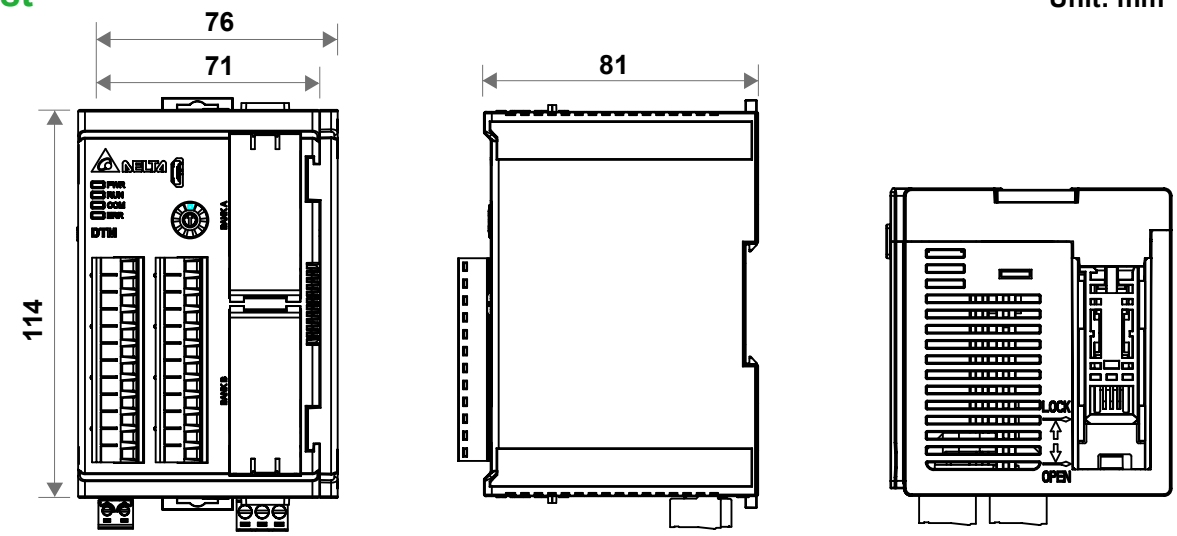


No.	Name
1	Output terminal

Dimensions

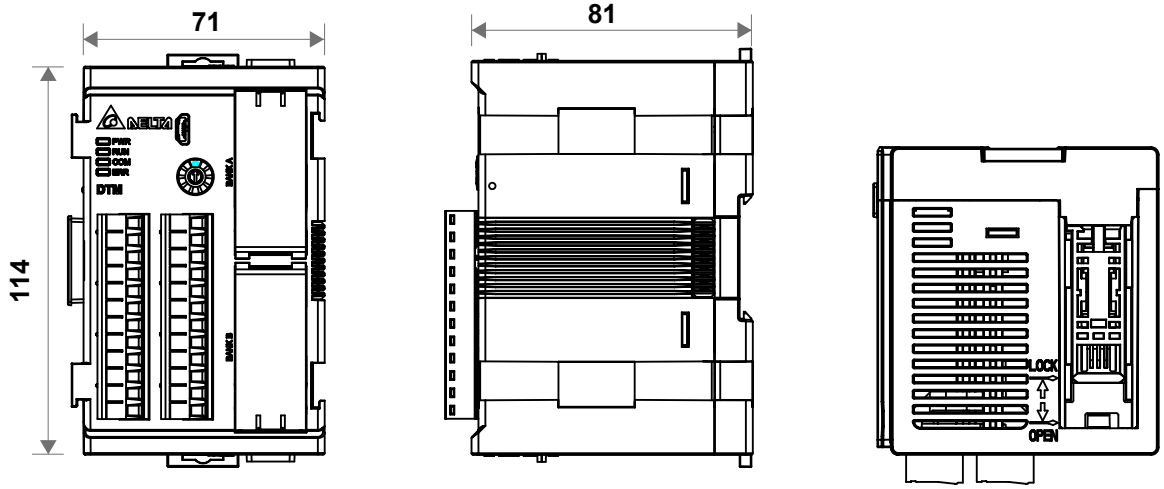
Host

Unit: mm



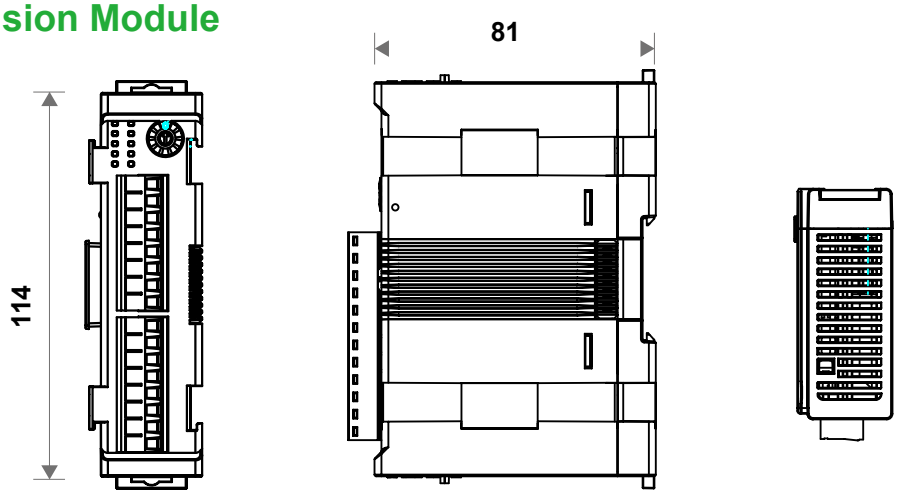
Measurement Extension Module

Unit: mm



I/O Extension Module

Unit: mm



Ordering Information

* Models available in 2019

Host

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

Measurement Extension Module

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

Extension Cassette

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 Extension Module

Exterior Design	Name	Model	Specification
	I/O Extension 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)

CT

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

Delta Temperature Controller DT Series

Delta 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

Side-by-side modular design to monitor multi-points, flexible combination based on 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

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 and heater disconnection detection function, remote input

Intelligent Temperature Controller DTK

Simple design with high-speed data collection for basic applications

Global Operations

ASIA (Taiwan)

Taoyuan
Technology Center
(Green Building)

Taoyuan Plant 1

Tainan Plant
(Diamond-rated Green Building)

ASIA (China)

Wujiang Plant 3

Delta Electronics

Tokyo Office

ASIA (India)

Rudrapur Plant
(Green Building)

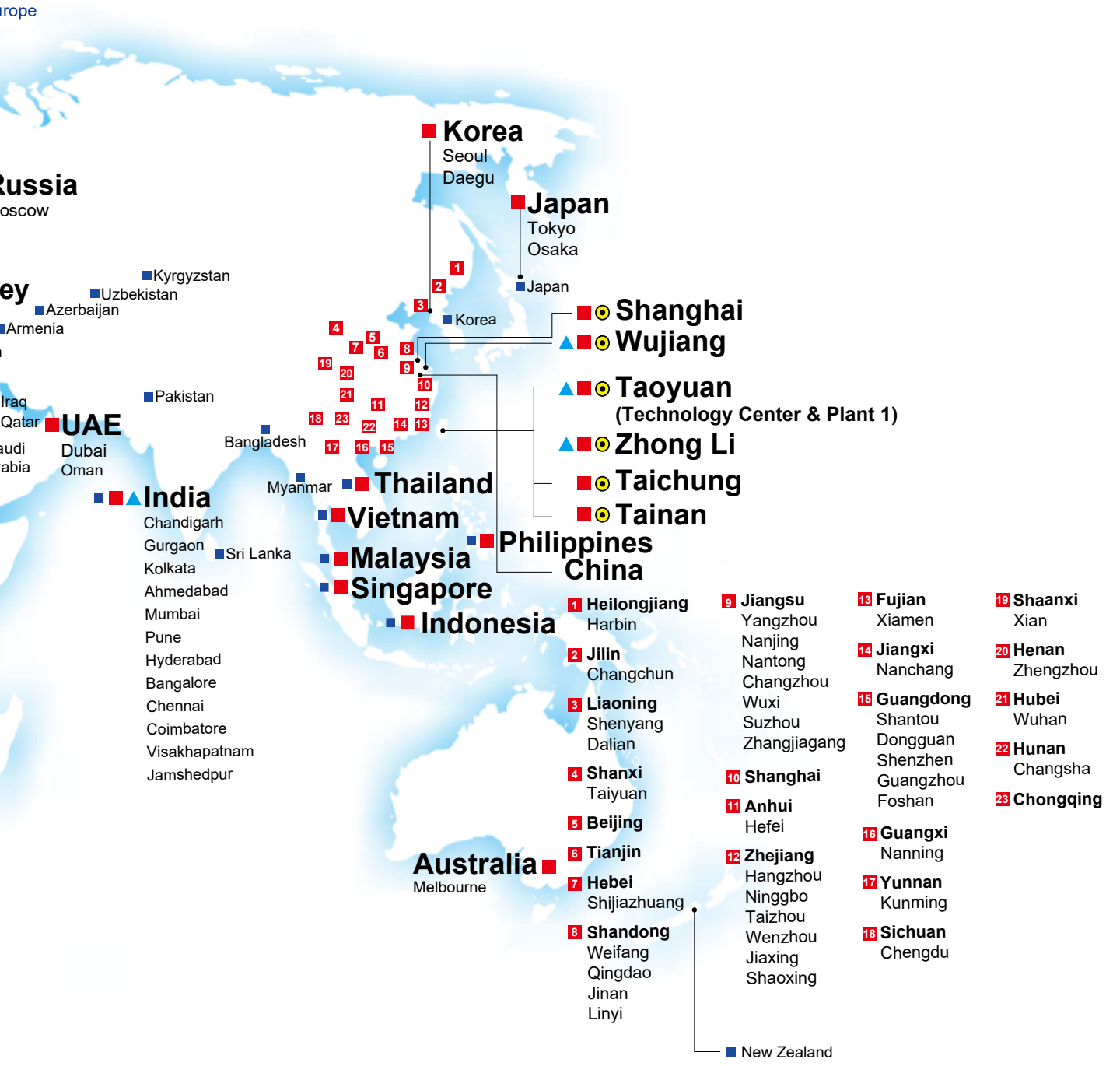
EUROPE

Amsterdam, Netherlands

AMERICA

Research Triangle Park

▲ Factories 5 ■ Branch Offices 102 ⊙ R&D Centers 6 ■ Distributors 824



Smarter. Greener. Together.

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