Digitized Automation for a Changing World

Delta Multi-Loop Modular Temperature Controller DTN Series


www.deltaww.com

Delta Multi-Loop Modular Temperature Controller DTN Series

Temperature control is crucial for stabilizing efficiency and product quality. As customer requirements advance due to the rapid development of industry, Delta has applied its extensive experience and solid technological capabilities and introduced the new Multi-Loop Modular Temperature Controller DTN Series with a thin-type design. The DTN Series not only offers multi-point temperature control, but also saves horizontal mounting space to optimize space utilization, overcome cabinet limitations, and reduce production costs. With the employment of the Ethernet module, it builds a network connecting multiple DTN groups to achieve real-time multi-loop parameter management to satisfy the needs of advanced and complex applications.

The DTN series consists of a measurement module, I/O extension modules, and an Ethernet module. A fully extended DTN group consists of one host, 7 measurement modules, 8 I/O extension modules, and an Ethernet module for up to 64-point temperature control and section-compartmentalized heating. The DTN Series is suitable for rubber and plastics, lithium-battery, and other industries.

Table of Contents
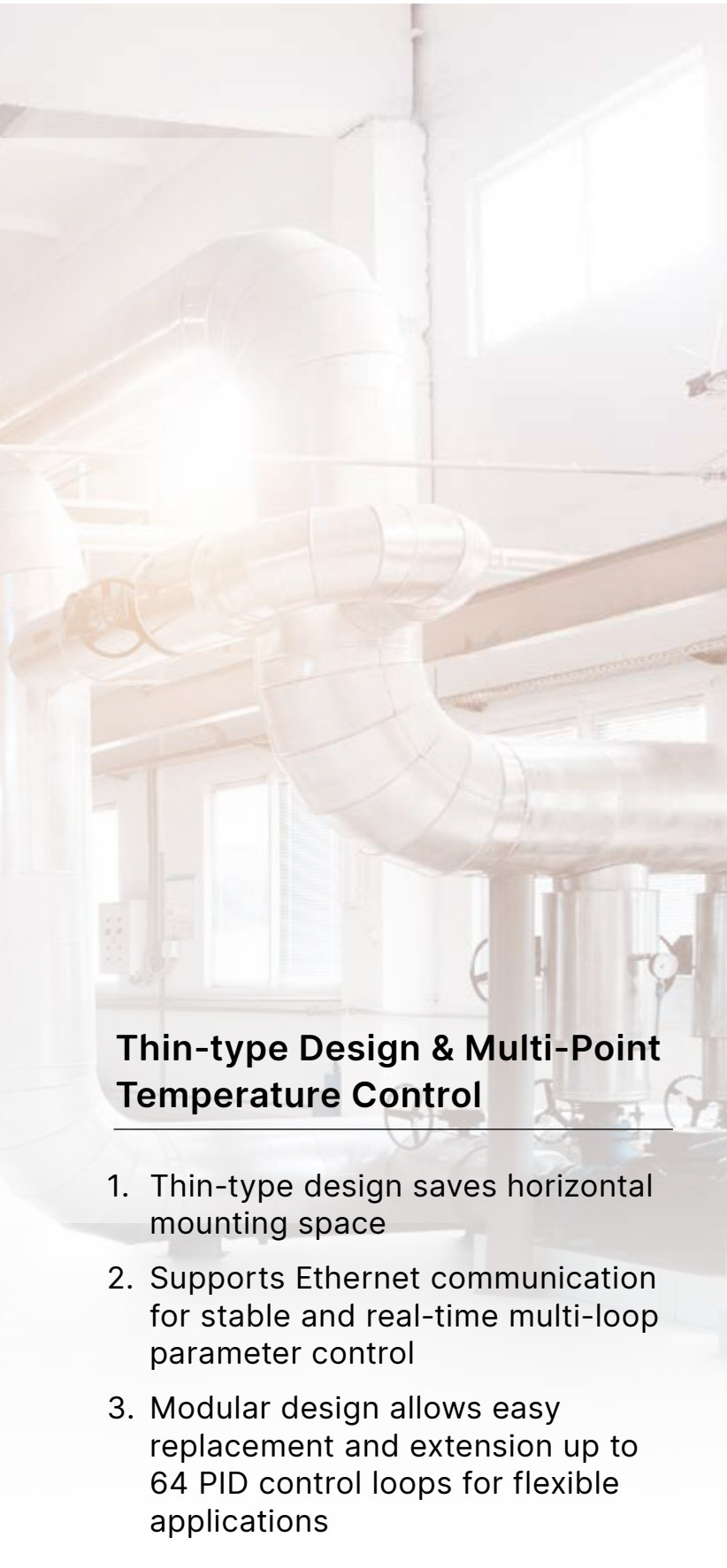
Thin-type Design & Multi-Point Temperature Control

1. Thin-type design saves horizontal mounting space

2. Supports Ethernet communication for stable and real-time multi-loop parameter control

3. Modular design allows easy replacement and extension up to 64 PID control loops for flexible applications

DELTA

Overview

Delta's Multi-Loop Modular Temperature Controller DTN Series features a thin-type design and supports Ethernet communication to save horizontal mounting space as well as simplify wiring.
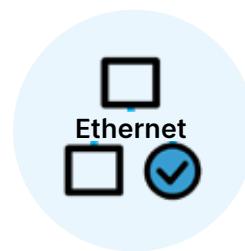Users can extend modules based on their actual needs and simultaneously control up to 64-point temperature to meet advanced complex requirements.
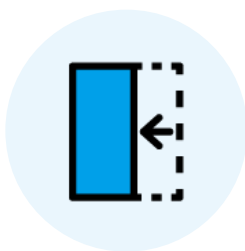
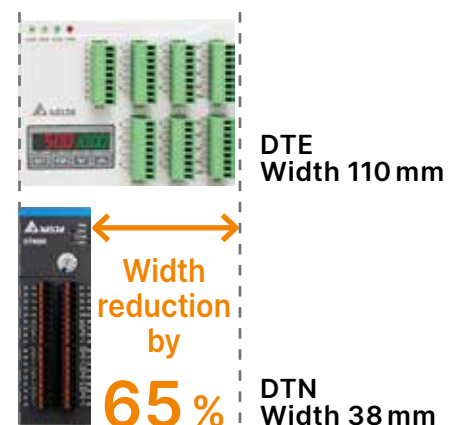|			
Thin-Type Design	**Modular Design Easy for Removal**	**Ethernet Communication**	**Multiple Input Channels**

Product Features

Thin-type design saves horizontal mounting space

- Reduces width by 65 % compared to the DTE Series
- Saves horizontal mounting space
- Overcomes the limitation of cabinet size

DTE Width 110 mm

Width reduction by 65 %

DTN Width 38 mm

Various Extension Modules for Flexible Applications

- The DTN Series consists of measurement, I/O extension, and Ethernet modules. One measurement module provides up to 8-point control loop, and a host group controls up to 64 points

- The second output and alarm point can be easily set as any address in the I/O extension module for convenient on-site wiring and a wide range of applications
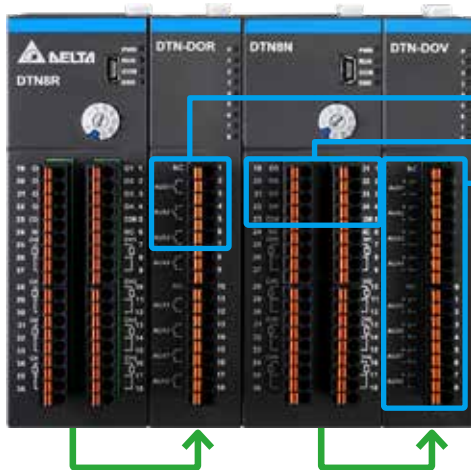
Auxiliary output for **[Alarm]** function

Primary output for **[Retransmission]** function

Auxiliary output for **[Control]** function

Each measurement module can connect with one I/O extension module and host the group. Users can define the **[Channel Source], [Output Function], and [Output Cycle]**

Fast Module Connection via RS-485 Communication

- Max. Baud rate 115,200 bps

- Supports ASCII and RTU

- Offers external switches for communication protocol and address set up, easy to install and maintain

Delta HMI
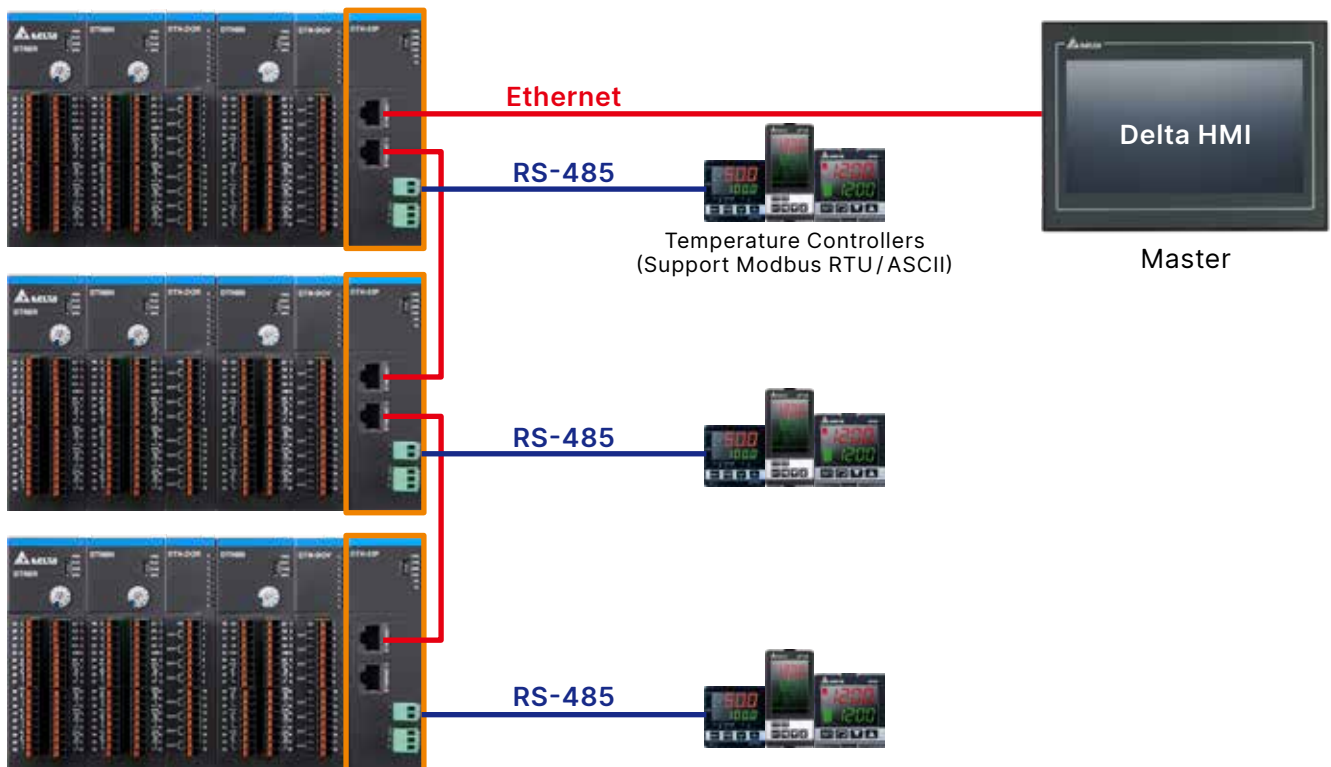
Master

RS-485

DTN Group 1

DTN Group 2

DTN Group 3

ΔNELTA

Product Features

Ethernet Communication for Fast and Stable Transition & Simple Wiring

- Internal communication interface, collecting data from all extension modules at any time for high communication efficiency
- Connects multiple Ethernet devices with dual ports to simplify wiring
- Supports Modbus TCP and Ethernet / IP
- Features Gateway function to support the temperature controllers with Modbus interface via RS-485

Transmission

DTN Host

Measurement Extension Module

Ethernet Module DTN-EIP

Master Control (HMI, PC, etc.)

Ethernet

RS-485

Temperature Controllers (Support Modbus RTU / ASCII)

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

Ethernet

RS-485

Temperature Controllers (Support Modbus RTU / ASCII)

Delta HMI

Master

RS-485

RS-485
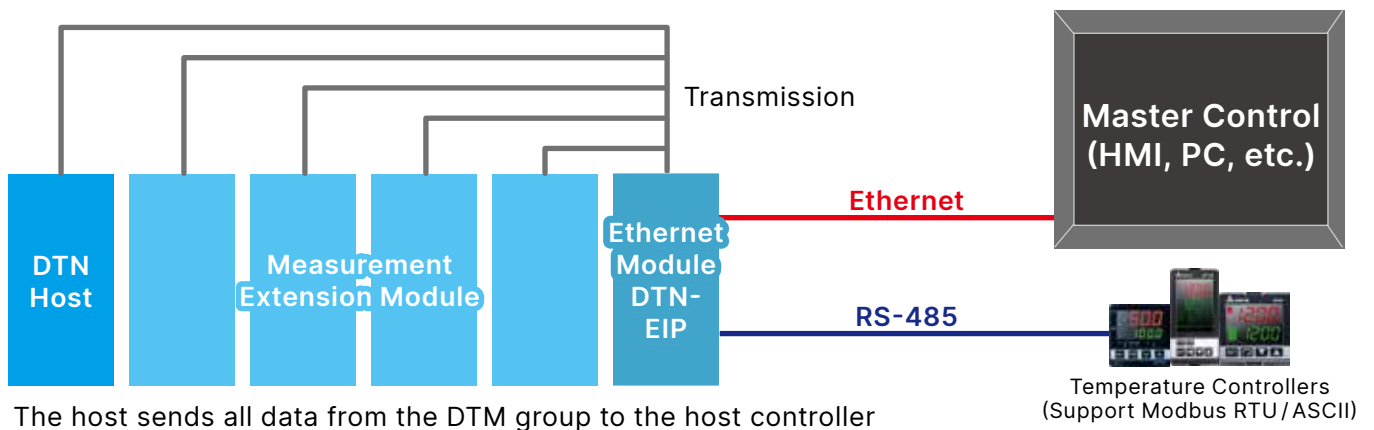
Product Features

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

DC Power Supply	Input sensor and display module
	RS-485 Communication
	Voltage pulse, analog current, and analog voltage output
	Relay output
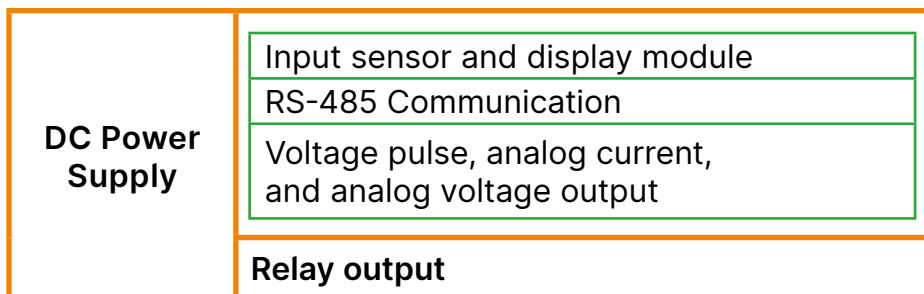
——— Reinforced Insulation ——— Functional Insulation

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

Applications

Ceramic Heating Plate of Vacuum Forming Machine

Description:

A vacuum forming machine usually has hundreds of ceramic heating plates which require 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 DTN 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 yield of a vacuum forming machine.
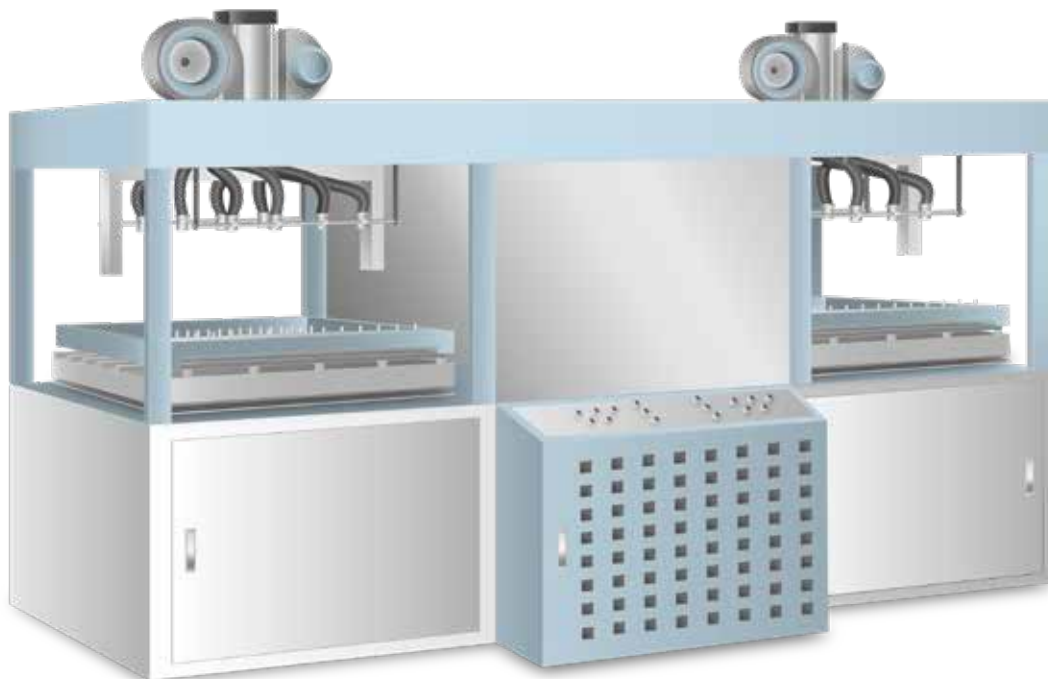
Solar Energy Laminating Machine

Description:

A solar panel is large in size, so it is not easy to achieve uniform temperature distribution with a single-point heating control. To avoid ineffective adhesion of the pressing effect, the solar energy lamination machine usually employs multi-point configuration to meet temperature control requirements.

Benefits:

The DTN Series features multi-channel design and is capable of simultaneous multi-point temperature control to ensure adhesion performance. It also has the advantages of compact size, simple wiring, saving costs, and more.

Woodworking Edge Banding Machine

Description:

The woodworking edge banding machine uses temperature control to heat hot-melt glue and preheat boards and edge banding materials. With precise temperature control, it prevents the hot-melt glue from curing early as well as optimizes adhesion by preheating boards and banding materials in the low-temperature area.

Benefits:

The automatic multi-side edge banding machine requires multi-point temperature control while the DTN Series adopts a multi-channel modular design capable of precise multi-point temperature control to ensure glue curing timing and enhance adhesion.
Moreover, the DTN Seres is thin in width to save mounting space; and it supports Ethernet communication to reduce wiring and costs.
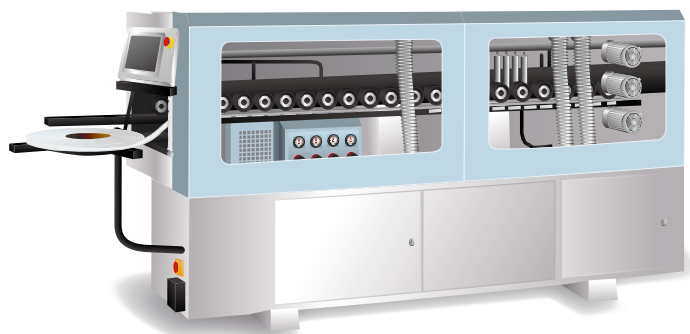
Appearance

Host DTN8R Series
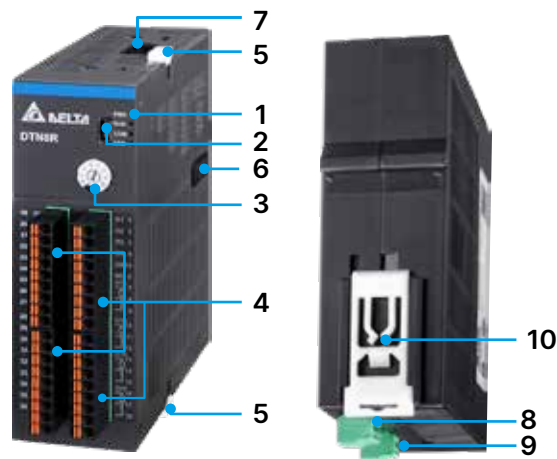
No.	Name	No.	Name
1	LED Indicators	7	Protocol switch
2	Mini USB connector (only for DTN-DU)	8	Power input terminal
3	Modbus station address knob	9	RS-485 terminal
4	I/O terminals	10	DIN RAIL bracket
5	Extension bracket	11	-
6	Connector cover	12	-

Measurement Extension Module DTN8N Series
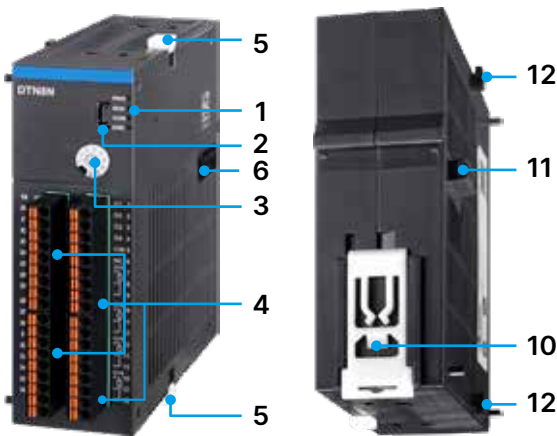
No.	Name	No.	Name
1	LED Indicators	7	-
2	Mini USB connector (only for DTN-DU)	8	-
3	Modbus station address knob	9	-
4	I/O terminals	10	DIN RAIL bracket
5	Extension bracket	11	Extension connector
6	Connector cover	12	Extension guideway

Host DTN4R / DTN2R Series

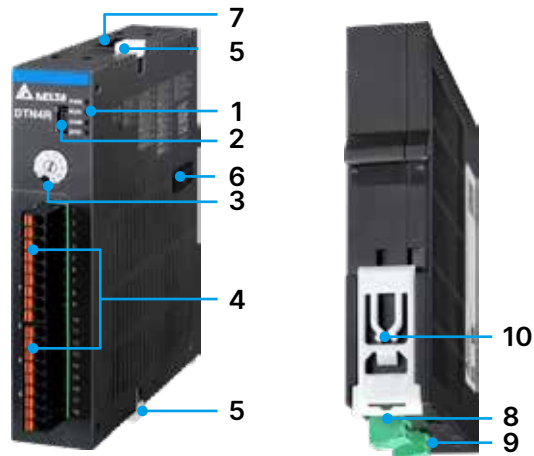| No.	Name	No.	Name
1	LED Indicators	7	Protocol switch
2	Mini USB connector (only for DTN-DU)	8	Power input terminal
3	Modbus station address knob	9	RS-485 terminal
4	I/O terminals	10	DIN RAIL bracket
5	Extension bracket	11	-
6	Connector cover	12	-

I/O Extension Module
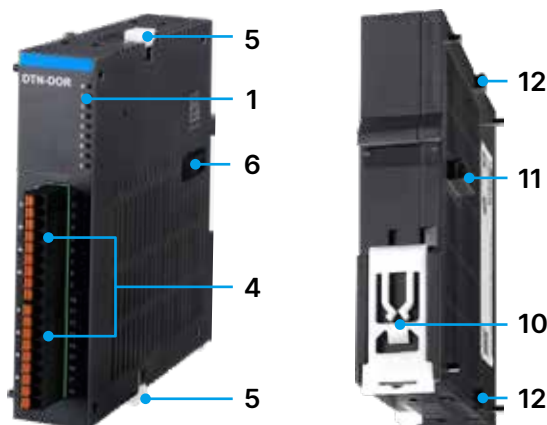
No.	Name	No.	Name
1	LED Indicators	7	-
2	-	8	-
3	-	9	-
4	I/O terminals	10	DIN RAIL bracket
5	Extension bracket	11	Extension connector
6	Connector cover	12	Extension guideway

Ethernet Module DTN-EIP Series
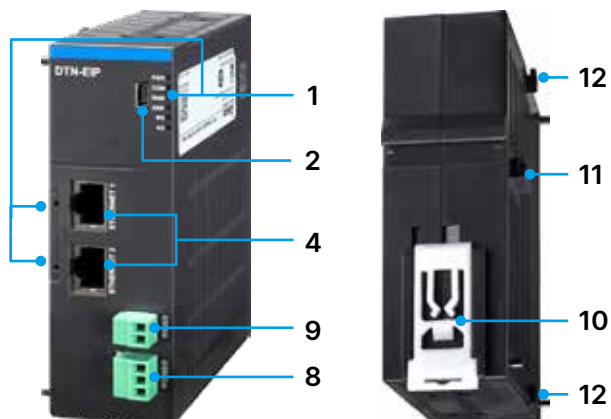
Expected to launch in 2023 Q1

No.	Name	No.	Name
1	LED Indicators	7	-
2	Mini USB connector (only for DTN-DU)	8	Power input terminal
3	-	9	RS-485 terminal
4	RJ45	10	DIN RAIL bracket
5	-	11	Extension connector
6	-	12	Extension guideway

Specifications

Electrical Specifications

DTN8RPTx / DTN8RTCx / DTN4RPTx / DTN4RTCx / DTN2RTCV / DTN8NPTx / DTN8NTCx	
Input Power Supply	DC 24 V, isolated switching power
Operating Voltage Range	90 % - 110 % rated voltage
Power Consumption (Max.)	8-channel measurement host: 5.5W, 4-channel measurement host and 2-channel measurement host: 3.5W, 8-channel measurement module: 5.5W; I/O extension module DTN-DOV: 4W, DTN-DOR: 3W; Module max.: (Host+ output extension module) × 1 + (8-channel measurement extension module + output extension module) × 7 = (DTN8RTCV + DTN-DOV) × 1 + (DTN8NTCV+DTN-DOV) × 7 = (5.5 W + 4 W) × 1+(5.5 W + 4 W) × 7=76 W
Weight (Max.)	8-channel host & 8-channel measurement module 270 g; 4-channel host & 2-channel host & I/O extension module 200 g
Mounting Methods	DIN rail The host is the source of power supply. Measurement extension modules and I/O extension modules cannot be powered up alone. Measurement modules install on the right side of the host or other measurement modules; up to 7 units. Supports continuous installation I/O extension modules install on the right side of the host or other measurement modules; up to 8 units. Does not support continuous installation. Maximum number of modules = (Measurement host + output extension module) × 1 + (Measurement extension module + output extension module) × 7
Input Sensor Support	Input Type = DTNyyTCx* Thermocouple: K, J, T, E, N, R, S, B, L, U, TXK
	Input type = DTNyyPTx* Platinum temperature resistance measurement: Pt100, JPt100, Ni120, Cu50
Sampling Frequency	DTN2RTCV model: 0.1 seconds; Remaining models: 0.4 seconds / All input channels
Control Methods	PID, ON / OFF

Output Accessories Types	Host & Measurement Extension Modules	Voltage pulse output: Voltage pulse DC 12 V ± 10 %, max. rated output current 20 mA
		Analog Current Output: 4-20 mA (load impedance ≦ 500 Ω)
		Analog Voltage: 0-10 V (load impedance ≧ 1,000 Ω)
	Output Extension Module	Relay output: Single blade, single gate, maximum load of AC 250V, 2A resistive load
		Voltage pulse out: Voltage pulse DC 12 V ± 10 %, max. rated output current 20 mA

Outputs (optional)	3 types of outputs: control output, alarm output, and retransmission (needs to be used with optional corresponding models)
Alarm (optional)	8 alarm modes are available (need to be used with optional corresponding models)
Communication Functions	RS-485 DIP Switch: supports baud rates of 4,800 - 115,200 bps
Communication Protocol	Adopts Modbus communication protocol, and supports RTU / ASCII communication format
Internal Connection	Features internal connection terminals for 24 V power supply and communication signal transmission
Vibration Resistance	10 ~ 55 Hz, 10 m / s² for 10 mins in X, Y, Z directions
Shock Resistance	Max. 300 m / s², 3 times in 3 axes and 6 directions
Operating Ambient Temperature	0 ~ + 50 °C

* x=Output type; yy=Type. Please refer to the model name description.

Specifications

Electrical Specifications

DTN8RPTx / DTN8RTCx / DTN4RPTx / DTN4RTCx / DTN2RTCV / DTN8NPTx / DTN8NTCx	
Storage Temperature	- 20 ~ + 65 °C
Operating Altitude	< 2,000 m
Operating Ambient Humidity	35 ~ 85 % RH (non-condensing)
Pollution Degree	2

| DTN-EIP	
Input Power Supply	DC 24 volts, isolated switching power supply
Operating Voltage Range	90 % - 110 % rated voltage
Power Consumption (Max.)	5 W
Installation Method	DIN RAIL. Ethernet modules install on the rightmost side of the DTN module
Weight (Max.)	200 g
Internal Connection	Features internal connection terminals for communication signal transmission
Vibration Resistance	10 ~ 55 Hz, 10 m / s² for 10 mins in X, Y, Z directions
Shock Resistance	Max. 300 m / s², 3 times in 3 axes and 6 directions
Ambient Operating Temperature	0 ~ +50 °C
Storage Temperature	-20 ~ +65 °C
Operating Altitude	< 2,000m
Operating Ambient Humidity	35 to 85 % RH (non-condensing)
Pollution Degree	2

Specifications

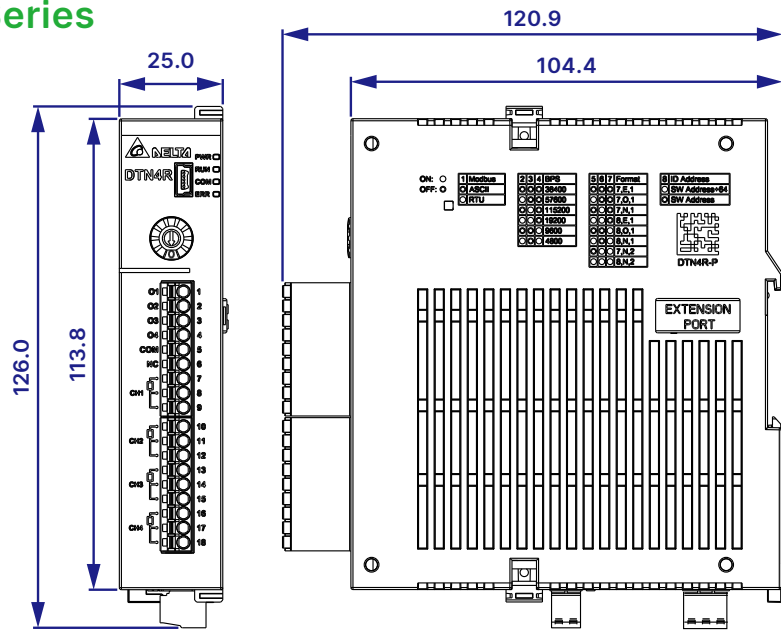| DTN-EIP		
LAN	**Communication Protocol**	ICMP, IP, DHCP, BOOTP, EtherNet/IP Adapter, Modbus TCP
	Communication Speed	10/100 Mbps Auto-Detection
	Communication Mode	IEEE 802.3, IEEE 802.3u
	Communication Cable	Category 5e shielding 100M
	Communication Interface	RJ-45 with Auto MDI/MDIX
	Number of Ethernet Ports	2
Modbus TCP	**Device Type**	Server
	Supported Topology	Star, linear
	Supported Function Codes	03H, 06H, 10H
	Max. Connection	16 (calculated separately from EtherNet/IP)
	Max. Data Length for a Single Connection	100 Words
EtherNet/IP	**Device Type**	Adapter
	Max. Connections	8 (Separate from Modbus TCP, all EIP types combined)
	Supported Topology	Star, linear, ring (DLR Ring Node)
EtherNet/IP Implicit Message (I/O Connection)	**Packet Transmission Interval (Requested packet interval, RPI)**	5~1,000 ms
	Max. Communication Capability (Packets per second)	400 pps
EtherNet/IP Explicit Message	**Type**	Class 3 (Connected Type) UCMM (Unconnected Type)
	Supported Object	Please refer to the DTN-EIP online manual for details
RS-485	**Device Type**	Host
	Supported Topology	Bus (Multi-drop)
	Communication Method	Half-duplex
	Communication Protocol	Modbus ASCII Master, Modbus RTU Master
	Transmission Speed (bps)	4,800/9,600/19,200/38,400/57,600/115,200
	Data Bit	7 or 8
	Parity Bit	None, Even, Odd
	Stop Bit	1 or 2
RS-485 Parameter Timing Collection	**Max. Parameter Number**	100
	Collection interval	0.1~10 sec

Dimensions

Host
DTN8R Series

Unit (mm)
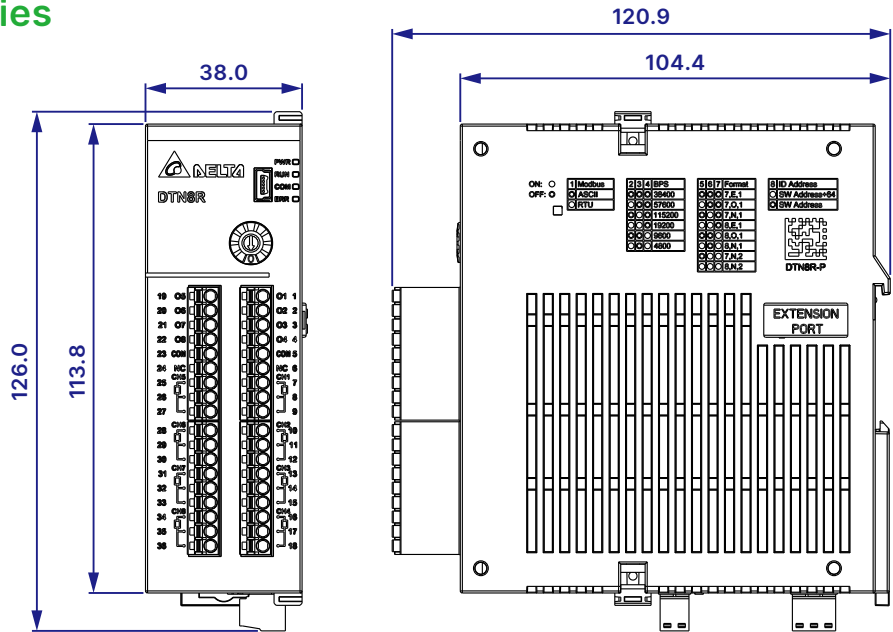
Host
DTN4R / DTN2R Series

Unit (mm)

Dimensions

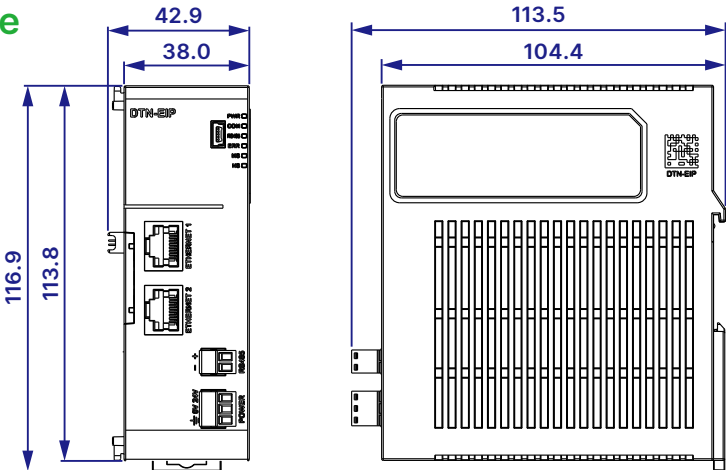## Measurement Module DTN8N Series

43.2
38.0
120.9
104.4
119.9
113.8

EXTENSION PORT

DTN8N

DTN8N-P

I/O Extension Module

30.2
25.0
120.9
104.4
119.9
113.8

DTN-DOR

EXTENSION PORT

DTN-DOR

Ethernet Module

42.9
38.0
113.5
104.4
116.9
113.8

DTN-EIP

ETHERNET 1
ETHERNET 2
RS485
POWER

DTN-EIP

Model Name Description

```
        DTN   2R   PT   V
```

Series Name

DTN: Measurement Modules of
  Delta's Temperature Controller
  DTN Series

Model

2 R: 2-channel host
4 R: 4-channel host
8 R: 8-channel host
8N: 8-channel measurement extension module

* 2-channel measurement host only supports DC voltage pulse output

Output Types

V: DC Voltage Pulse Output
  (Source Type)*

C: Linear Current Output
  (Source Type)

L: Linear Voltage Output

Input Types

PT: Platinum RTD
TC: Thermocouple

```
        DTN  -  DOR
```

Series Name

DTN: Accessories of
  Delta's Temperature Controller
  DTN Series

Model

DU: Display Setting Module
EIP: Ethernet Module
DOR: Relay Output Extension Module
DOV: DC Voltage
    Pulse Output Extension Module
    (Source Type)

Ordering Information

Hosts

Appearence	Channel Number	Input Type	Model	Specifications
	8	Platinum RTD	DTN8RPTV	0 / 12 V Pulse Voltage
			DTN8RPTC	4~20 mA Output
			DTN8RPTL	0 ~ 10 V Output
		Thermocouple	DTN8RTCV	0 / 12 V Pulse Voltage
			DTN8RTCC	4~20 mA Output
			DTN8RTCL	0 ~ 10 V Output
	4	Platinum RTD	DTN4RPTV	0 / 12 V Pulse Voltage
			DTN4RPTC	4~20 mA Output
			DTN4RPTL	0 ~ 10 V Output
		Thermocouple	DTN4RTCV	0 / 12 V Pulse Voltage
			DTN4RTCC	4~20 mA Output
			DTN4RTCL	0 ~ 10 V Output
	2	Thermocouple	DTN2RTCV	0 / 12 V Pulse Voltage

Measurement Modules

Appearence	Channel Number	Input Type	Model	Specifications
	8	Platinum RTD	DTN8NPTV	0 / 12 V Pulse Voltage
			DTN8NPTC	4~20 mA Output
			DTN8NPTL	0 ~ 10 V Output
		Thermocouple	DTN8NTCV	0 / 12 V Pulse Voltage
			DTN8NTCC	4~20 mA Output
			DTN8NTCL	0 ~ 10 V Output

Accessories

Appearance	Modular Type	Model	Specifications
	I/O Extension Module	DTN-DOR	8-channel, Relay Contact
		DTN-DOV	8-channel, 0 / 12 V Pulse Voltage
	Ethernet Module	DTN-EIP	EtherNet / IP Adapter, Modbus TCP

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Smarter. Greener. Together.

Industrial Automation Headquarters

Taiwan: Delta Electronics, Inc.
Taoyuan Technology Center
No.18, Xinglong Rd., Taoyuan District,
Taoyuan City 33068, Taiwan
TEL: +886-3-362-6301 / FAX: +886-3-371-6301

Asia

China: Delta Electronics (Shanghai) Co., Ltd.
No.182 Minyu Rd., Pudong Shanghai, P.R.C.
Post code : 201209
TEL: +86-21-6872-3988 / FAX: +86-21-6872-3996
Customer Service: 400-820-9595

Japan: Delta Electronics (Japan), Inc.
Industrial Automation Sales Department
2-1-14 Shibadaimon, Minato-ku
Tokyo, Japan 105-0012
TEL: +81-3-5733-1155 / FAX: +81-3-5733-1255

Korea: Delta Electronics (Korea), Inc.
1511, 219, Gasan Digital 1-Ro., Geumcheon-gu,
Seoul, 08501 South Korea
TEL: +82-2-515-5305 / FAX: +82-2-515-5302

Singapore: Delta Energy Systems (Singapore) Pte Ltd.
4 Kaki Bukit Avenue 1, #05-04, Singapore 417939
TEL: +65-6747-5155 / FAX: +65-6744-9228

India: Delta Electronics (India) Pvt. Ltd.
Plot No.43, Sector 35, HSIIDC Gurgaon,
PIN 122001, Haryana, India
TEL: +91-124-4874900 / FAX: +91-124-4874945

Thailand: Delta Electronics (Thailand) PCL.
909 Soi 9, Moo 4, Bangpoo Industrial Estate (E.P.Z),
Pattana 1 Rd., T.Phraksa, A.Muang,
Samutprakarn 10280, Thailand
TEL: +66-2709-2800 / FAX: +66-2709-2827

Australia: Delta Electronics (Australia) Pty Ltd.
Unit 2, Building A, 18-24 Ricketts Road,
Mount Waverley, Victoria 3149 Australia
Mail: IA.au@deltaww.com
TEL: +61-1300-335-823 / +61-3-9543-3720

Americas

USA: Delta Electronics (Americas) Ltd.
5101 Davis Drive, Research Triangle Park, NC 27709, U.S.A.
TEL: +1-919-767-3813 / FAX: +1-919-767-3969

Brazil: Delta Electronics Brazil Ltd.
Estrada Velha Rio-São Paulo, 5300 Eugênio de
Melo - São José dos Campos CEP: 12247-004 - SP - Brazil
TEL: +55-12-3932-2300 / FAX: +55-12-3932-237

Mexico: Delta Electronics International Mexico S.A. de C.V.
Gustavo Baz No. 309 Edificio E PB 103
Colonia La Loma, CP 54060
Tlalnepantla, Estado de México
TEL: +52-55-3603-9200

EMEA

EMEA Headquarters: Delta Electronics (Netherlands) B.V.
Sales: Sales.IA.EMEA@deltaww.com
Marketing: Marketing.IA.EMEA@deltaww.com
Technical Support: iatechnicalsupport@deltaww.com
Customer Support: Customer-Support@deltaww.com
Service: Service.IA.emea@deltaww.com
TEL: +31(0)40 800 3900

BENELUX: Delta Electronics (Netherlands) B.V.
Automotive Campus 260, 5708 JZ Helmond, The Netherlands
Mail: Sales.IA.Benelux@deltaww.com
TEL: +31(0)40 800 3900

DACH: Delta Electronics (Netherlands) B.V.
Coesterweg 45, D-59494 Soest, Germany
Mail: Sales.IA.DACH@deltaww.com
TEL: +49(0)2921 987 0

France: Delta Electronics (France) S.A.
ZI du bois Challand 2, 15 rue des Pyrénées,
Lisses, 91090 Evry Cedex, France
Mail: Sales.IA.FR@deltaww.com
TEL: +33(0)1 69 77 82 60

Iberia: Delta Electronics Solutions (Spain) S.L.U
Ctra. De Villaverde a Vallecas, 265 1º Dcha Ed.
Hormigueras – P.I. de Vallecas 28031 Madrid
TEL: +34(0)91 223 74 20

Carrer Llacuna 166, 08018 Barcelona, Spain
Mail: Sales.IA.Iberia@deltaww.com

Italy: Delta Electronics (Italy) S.r.l.
Via Meda 2–22060 Novedrate(CO)
Piazza Grazioli 18 00186 Roma Italy
Mail: Sales.IA.Italy@deltaww.com
TEL: +39 039 8900365

Russia: Delta Energy System LLC
Vereyskaya Plaza II, office 112 Vereyskaya str.
17 121357 Moscow Russia
Mail: Sales.IA.RU@deltaww.com
TEL: +7 495 644 3240

Turkey: Delta Greentech Elektronik San. Ltd. Sti. (Turkey)
Şerifali Mah. Hendem Cad. Kule Sok. No:16-A
34775 Ümraniye – İstanbul
Mail: Sales.IA.Turkey@deltaww.com
TEL: + 90 216 499 9910

MEA: Eltek Dubai (Eltek MEA DMCC)
OFFICE 2504, 25th Floor, Saba Tower 1,
Jumeirah Lakes Towers, Dubai, UAE
Mail: Sales.IA.MEA@deltaww.com
TEL: +971(0)4 2690148