DTM Software Operating Manual v1.3

Contents

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Chapter 6: Appendix

Chapter 1

DTM Model Introduction

1.1 DTM Series

Type	Measurement host	Measurement expansion modules
View		
Type	Expansion cartridges	I/O expansion module
View		

Maximum number: 1 measurement host + 7 measurement expansion modules + 8 I / O expansion modules

Installation sequence: measurement host ⇄ measurement expansion module ⇄ IO expansion module (must install the measurement expansion module first)

1.2 DTM Order Information

DTM [1] [2] [3]

Series name	DELTA DTM series temperature controller measurement host unit
[1] Communication Interface	R = USB + RS-485 E = Ethernet + RS-485
[2] Channel number	04 = 4 channels 08 = 8 channels
[3] Reservation	Blank

DTM [1] [2] [3]

Series name	DELTA DTM series temperature controller measurement expansion unit
[1] Communication Interface	N = None (N is a measurement expansion module without external communication)
[2] Channel number	Code 1 = N 02 = 2 channels 04 = 4 channels 08 = 8 channels
[3] Option	Code 2 = 02 -C = linear current output (source type) -L = linear voltage output -R = RELAY output -V = DC pulse voltage output

DTM - [1] [2]

Series name	DELTA DTM series temperature controller accessory
[1] Module type	BD = Expansion cassette DO = Output expansion module CT = CT sensor
[2] Function	Code 1 = BD / DO : -C = linear current output (source type) -L = linear voltage output -R = RELAY output -V = DC pulse voltage output
	Code 1 = CT : 030= 30Amp. (default input range) Standard product without CT sensor accessories (CT sensor is optional)

Notes:

1. The DTM mainframe and measurement expansion module are shipped with no expansion cassettes, which is optional by customers.

2. The DTM series are delivered with the required European terminals.

<div style="background:#eee;padding:10px;">

Chapter 2

Software Installation
</div>

2.1 PC Environmental Requirements

- **Operating system**

Windows 7 (64-bit)、Windows 10 (64-bit)

- **Suite version**

Microsoft .NET Framework version 4.5.2 or later

Visual Studio 2013 & 2017 Visual C ++ Distribution Kit

2.2 Software Installer

In order to set the parameters conveniently, our company provides free communication setting software. Please go to Delta website and enter the [Industrial Automation] area. Then go to the download center on the right side of the page, select the [Temperature Controller] product and the [Software] download category and start searching.

After searching, download [**DTM Soft**] software and unzip the file (zip).

Chapter 2: Software Installation

● **Installation steps**

1. Please run the Setup.exe file (application)

📁 DotNetFX452	2018/11/15 下午 04:...	檔案資料夾	
📁 vcredist_x86	2019/3/21 上午 09:01	檔案資料夾	
📁 Visual C++ 2013	2018/11/14 上午 10:...	檔案資料夾	
📁 Visual C++ 2017	2019/3/21 上午 09:01	檔案資料夾	
☑ 🍥 setup.exe	2019/3/19 下午 04:56	應用程式	787 KB
🎁 Setup.msi	2019/3/19 下午 04:56	Windows Installer ...	9,970 KB

During the execution process, it will be checked whether there is a required package version in the operating system. If it meets the requirements of the package version, it will directly jump to the DTM Soft installation screen in step 5.

2. Check if the Microsoft .NET Framework version is lower than 4.5.2 or the .NET Framework is not installed. The installation will be performed automatically.
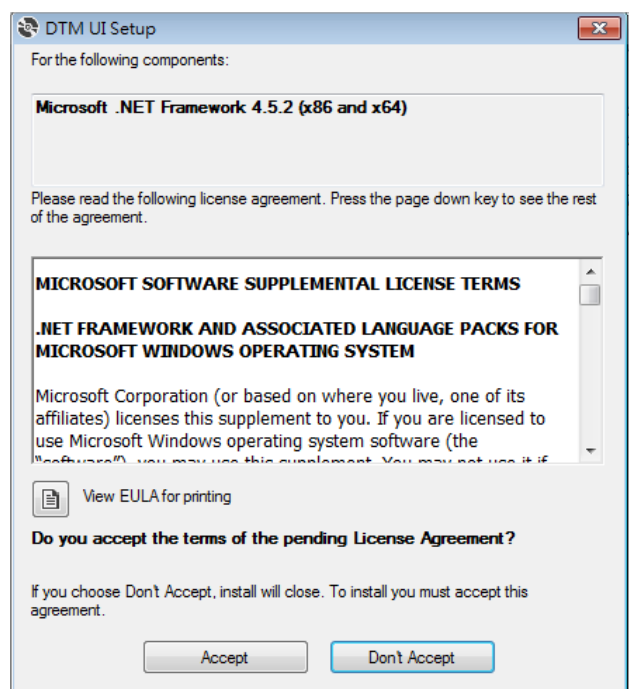
3. Check Visual Studio 2017 Visual C ++ Distribution Kit. If it is not installed, its distribution kit will be installed automatically.

4. Check Visual Studio 2013 Visual C ++ distribution package. If it is not installed, you can choose to install or exit in the prompt window. It will automatically link to the download and installation page.
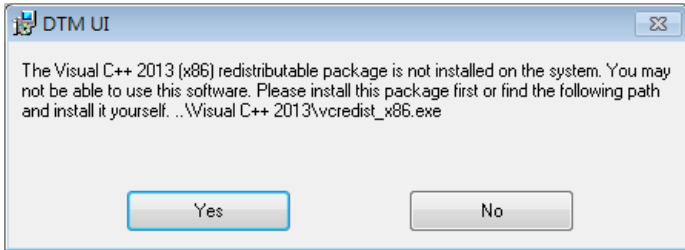
Selecting "Yes" will directly install VC ++ 2013. After the installation is complete, please run the Setup file again to install DTM Soft to the disk.
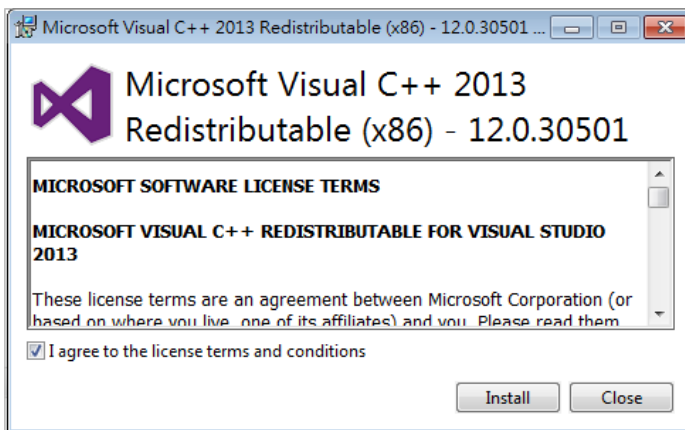
Chapter 2: Software Installation

5. After you have installed or completed the above suite installation, you will be taken to the DTM Soft installation page. Select the next installation path page.
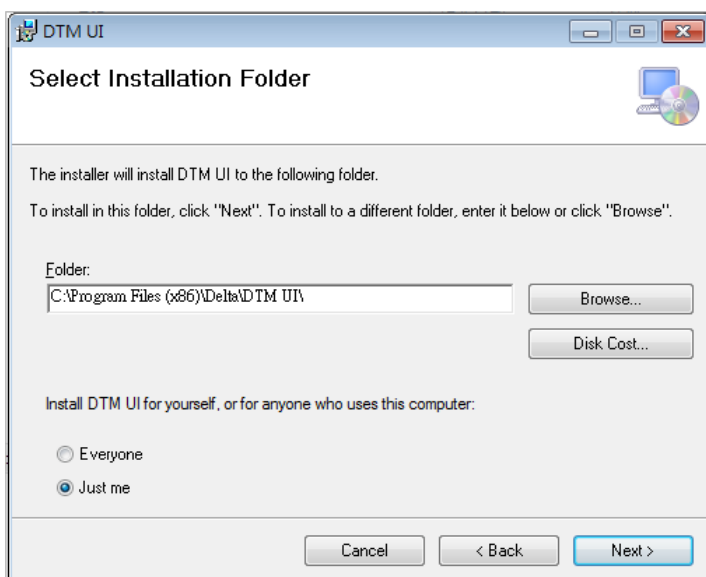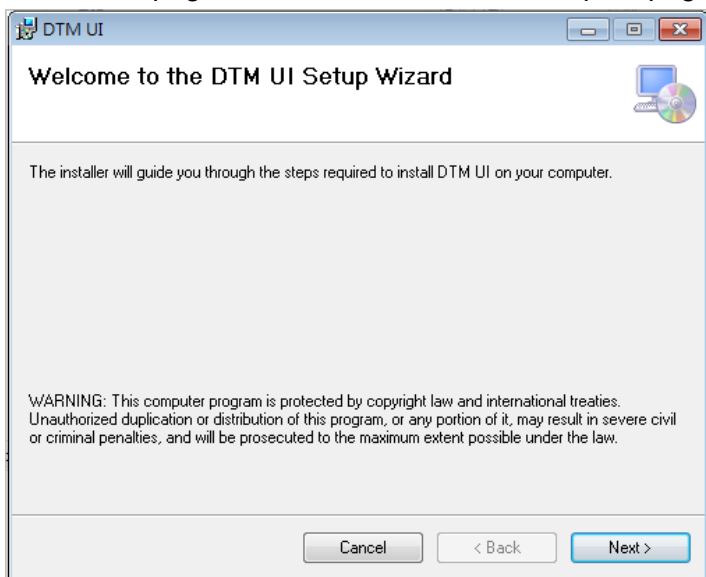
6. After the installation is complete, you can find the DTM Soft executable file shortcut on your desktop.

Chapter 3

Hardware Configuration

3.1 DTM Station Number Setting

DTM communication station number is divided into external station number and internal station number. The host has both internal and external station numbers. Other non-hosts only have internal station numbers.

DTMs external communication can define the RS485 external station number through the dial switch on the DTM host, while the internal station number is used to identify and communicate with each other within the DTM group, as shown below:

DTM Type	Measurement host	Measurement expansion modules	I/O expansion module
RS485 ID	1~F	NA	NA
Internal ID	0(Fixed)	1~F	1~F

⚠ Precautions

1. When the non-host model has the station number dial switch set to 0, it means it works in engineering mode.

   Don't set it to this mode.

2. When the host station number dial switch is set to 0, the RS-485 station number address is 16 (DEC).

3. The setting values of all external switches will take effect after the power is turned on again.

Chapter 3: Hardware Configuration

The following is a detailed description of the station number functions and addresses of different models:

Assume that the DTM group is configured as shown below. The RS485 station number is 3 and the internal station numbers are 0, 1, 3, 2, 2, and 3

DTM Type	Measurement host	Measurement expansion modules	Measurement expansion modules	I/O expansion module		
RS485 ID	3	NA	NA	NA	NA	NA
Internal ID	0(Fixed)	1	3	2	2	3
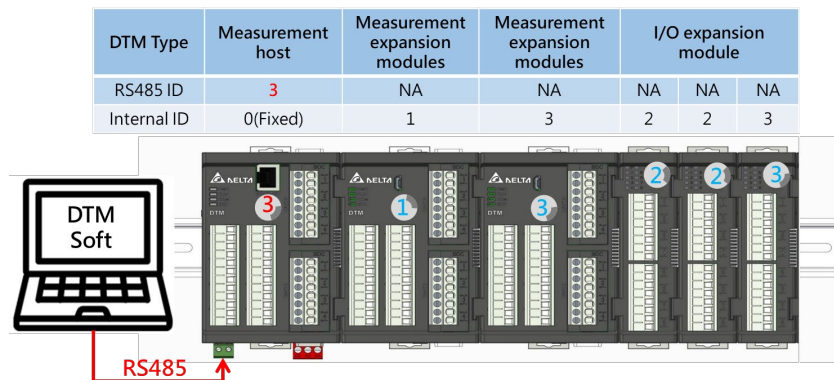
As shown in the figure above, the internal station numbers of expansion modules of the same type cannot be repeated, but the internal station numbers of different types of expansion modules can be repeated without affecting each other. (DOx and CT are different types)

3.2 DTM Protocol Settings

The communication protocol can be set through the DIP switch. You can refer to the following table to view the current communication settings. You can also use the **[Protocol Detection]** function inside the software to detect the current settings.

Protocol setting(DIP switch)
Default all OFF(ASCII,38400,7,E,1)
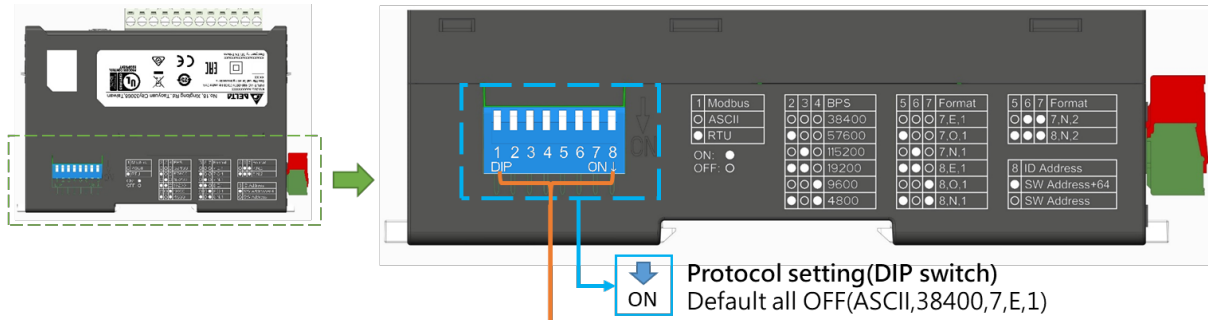
Bit 1	Data Type
OFF	ASCII
ON	RTU

Bit 2	Bit 3	Bit 4	Baud 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	Format
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, N, 2
ON	ON	ON	8, N, 2

Bit 8	Special code
ON	Address + 64
OFF	Address

Note :
1. Enable all of change after reboot。

⚠️ Precautions

1. Communication protocol setting, the DIP switches are all OFF (default ASCII, 38400, 7, E, 1)
2. When the DIP switch is reset, it will take effect after the power is turned on again.
3. When the communication code is RTU, the number of bits in the protocol format must be 8bit.

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Chapter 4

Software Connection

4.1 Software Initial Execution Procedure

After the installation is complete, click the **[DTM Soft]** software icon below to open the application and pop out the project setting window. You can enter the user interface by selecting **[New Project]**, **[Open Project]**, or **[Quick Entry]**.

DTM Soft
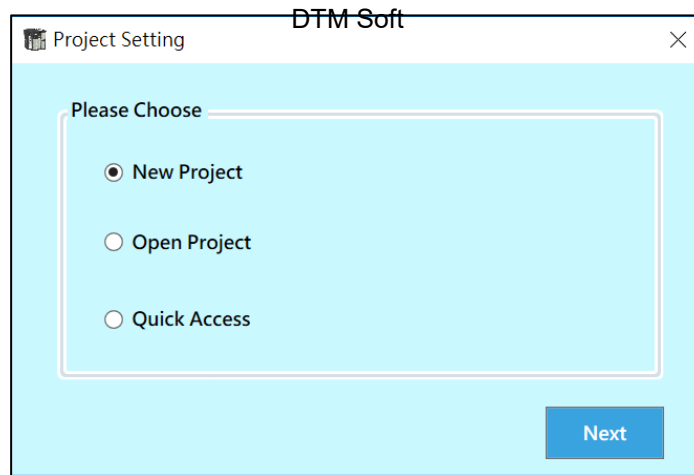
[Project Settings] Window Options
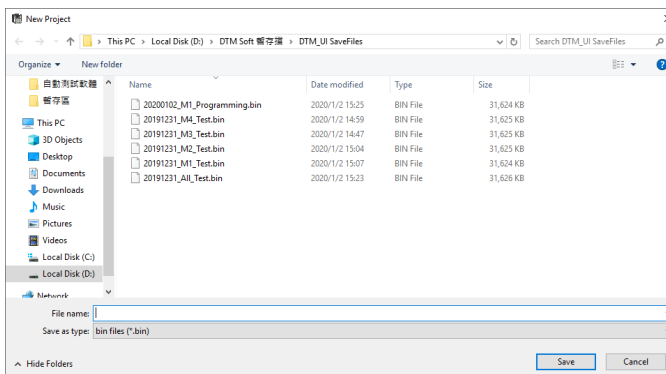
[New project] Popup window
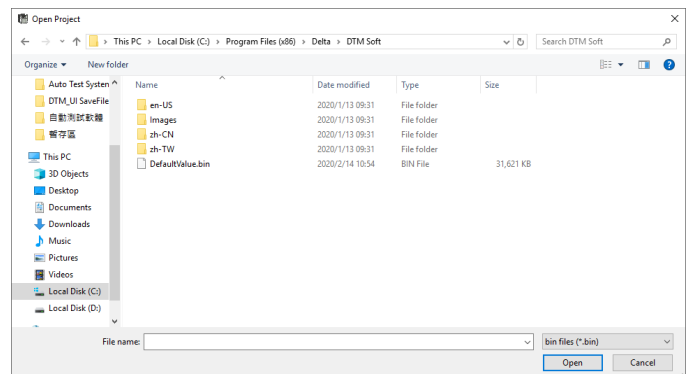
[Open project] Popup window

Chapter 4: Software Connection

If you select **[Quick Access]**, you will directly enter the user interface main program, as shown in the figure below:

Project Setting	Project Name
New/Open Project	As the created and saved file name
Quick Access	DefaultValue (Save as file in this mode)
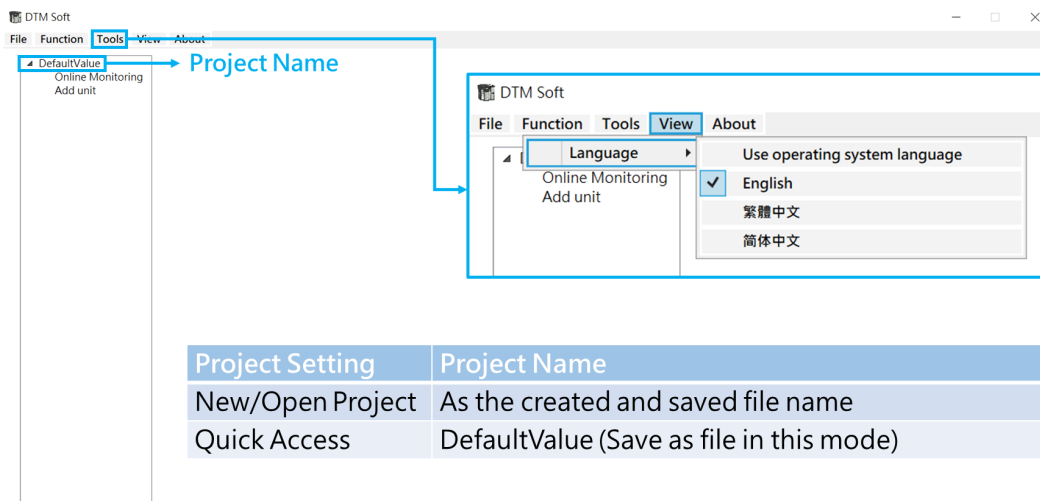
The project name is displayed in the status information column on the left. You can use **[Online Monitoring]** to instantly return the device unit settings and parameter settings, or **[Add Unit]** to manually add devices.

DTM Soft will detect the operating system language and determine the default software language. If you need to change the language, you can switch it through **[View]**> **[Language]** in the toolbar.

4.2 Connection Monitoring

Set the communication protocol through **[Online Monitoring]** and make communication connection.

1. **RS485/USB**

Default RS485 communication protocol**: 38400, 7, E, 1, ASCII**

The user can first confirm the currently used communication port through **[Detect ComPort]**. If known, they can directly select **[Communication Port]** and press the **[Not Connected]** button to start searching for connected devices.
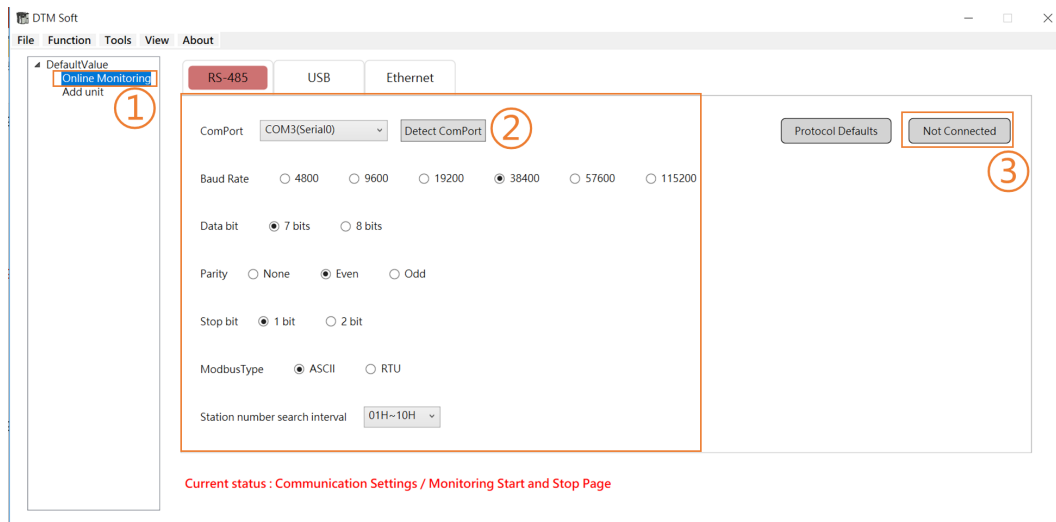
A progress prompt screen will appear in the detection communication (as shown below on the left), and will be prompted after the connection is successful (as shown below).
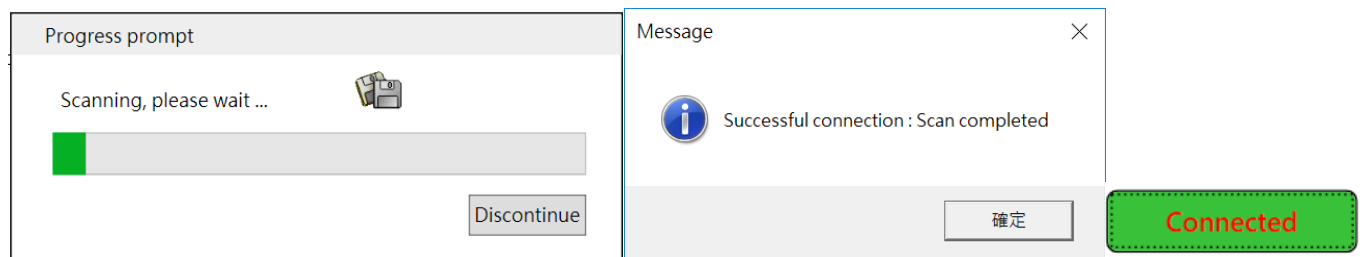
After the scan is completed, it will be listed according to the host RS485 station number and internal station number. The button that originally displayed **[Not connected]** will be changed to **[Connected]** , As shown in the figure on the right above, this button is also used to disconnect when offline.

Chapter 4: Software Connection

2. Ethernet

The default value of DTM IP Address is "**192.168.1.5**". If you want to change the IP address, please use **DCISoft** software. For the setting method, please refer to the detailed manual.
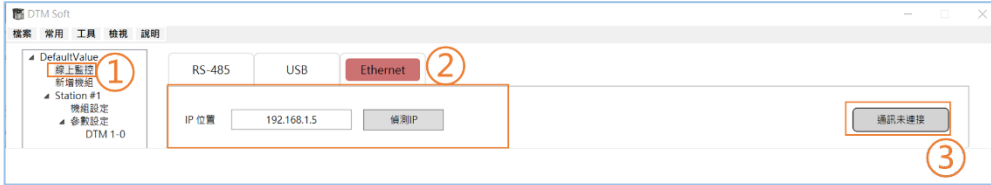
If you forget the changed IP Address, you can use the detection IP to find the IP Address of the currently online DTME Series. The search range will be **192.168.1.1 ~ 192.168.1.255.**

When the IP is detected, a progress prompt screen will appear (as shown in the left picture below), and it will be prompted after the detection is successful (as shown in the middle picture below).

Press the **[Not Connected]** button to connect, it will be changed to **[Connected]** as shown in the figure on the right above, and the offline will also be disconnected through this button.

Assume that the DTM group is set as shown below. Refer to the status list on the left to explain the name definition as follows:
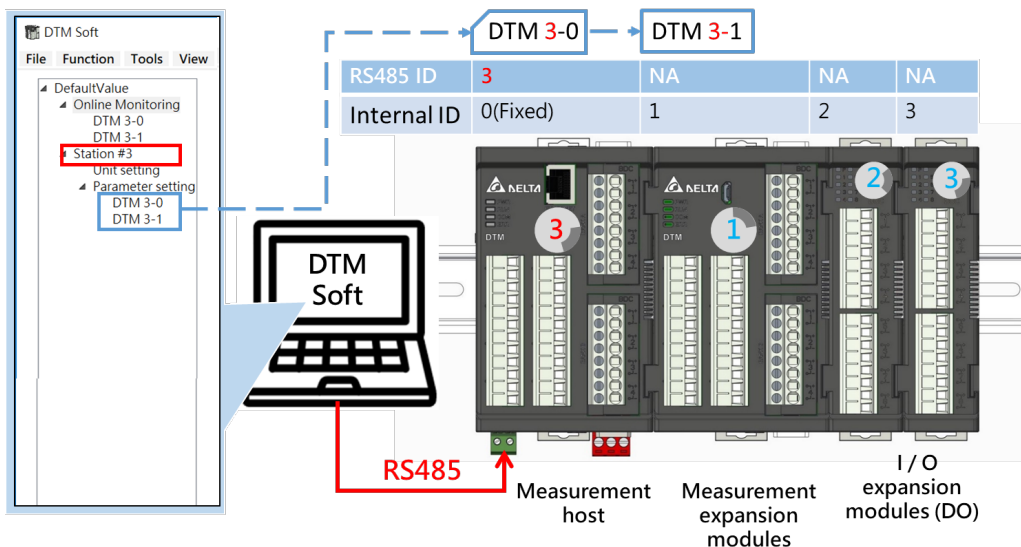
- **Online monitoring:** communication setting page.

DTM X-Y shown **[X** is host RS485 station number**; Y** is internal station number (0 is meaning host)**],** please refer to **<3.1 DTM station number setting>** for details.

● **Station #X:** According to the host RS485 station number X partition.

Unit setting: You can click this field to view the current expansion situation, but you cannot change it.

● **Parameter setting:**

DTM X-Y shown [**X** is host RS485 station number; **Y** is internal station number (0 is meaning host)], please refer to **<3.1 DTM station number setting>** for details.

The list on the left side of the above **DTM Soft** interface only lists the measurement hosts and measurement expansion modules that can be parameterized. It does not show the currently connected I / O expansion modules. To view this information, go to **[Unit Settings]**, as shown in the figure below.
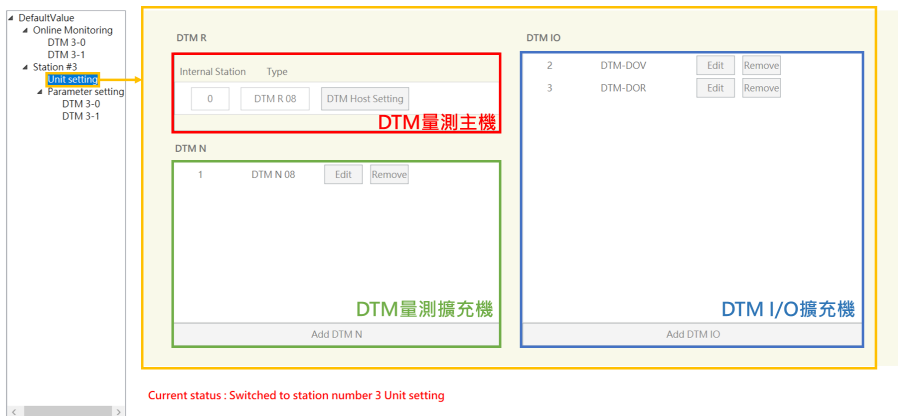
Precautions

1. The parameter changes on the **[Online Monitoring]** page in the main connection will be directly updated in the machine.

Click **[DTM X-Y]** in the left column of **[Online Monitoring]** to monitor the current parameters of **[DTM X-Y]** (controllable part settings). The lower part of the window shows which machine is currently switched to, and the right column will display the following three pagination:

Chapter 4: Software Connection

1) **Monitoring page:** It is used to observe the situation of the selected host. Common parameters are displayed on this page in real time, and parameters of some functions can be edited at the same time.

DefaultValue
 ▲ Online Monitoring
   DTM 3-0
   DTM 3-1
 ▲ Station #3
   Unit setting
   ▲ Parameter setting
     DTM 3-0
     DTM 3-1

	Monitoring	CT Monitoring	Programming							
Channel	PV	SV	OUT1 (%)	OUT2 (%)	Control status	Auto-tune	ALM1	ALM2	PB / Ti / Td	
Ch1	36.0 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch2	36.0 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch3	34.5 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch4	32.8 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch5	37.9 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch6	37.9 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch7	36.3 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30
Ch8	34.7 ℃	0.0	0.0	0.0	Run ⌄	OFF			30.0 120	30

Current status : In the monitoring connection, switched to DTM 3-0

2) **CT monitoring page:** It can monitor the current value sensed by CT1 and CT2 and alarm status.

DefaultValue
 ▲ Online Monitoring
   DTM 3-0
   DTM 3-1
 ▲ Station #3
   Unit setting
   ▲ Parameter setting
     DTM 3-0
     DTM 3-1

	Monitoring	CT Monitoring	Programming							
Channel	PV	SV	OUT1 (%)	OUT2 (%)	CT1 (A)	CT2 (A)	ALM1	ALM2	ALM3	Control status
Ch1	36.0 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch2	36.0 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch3	34.5 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch4	32.8 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch5	37.9 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch6	37.9 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch7	36.3 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄
Ch8	34.7 ℃	0.0	0.0	0.0	0.0	0.0				Run ⌄

Current status : In the monitoring connection, switched to DTM 3-0

3) **Programming page:** Display the current **[Programming_PID]** control steps and remaining time.

Current status : In the monitoring connection, switched to DTM 3-0

 Precautions

1. The **[Program end / pause / step skip / stop]** option in the **[Execute / Stop]** column above will only be open for selection when the control mode is **[Programming_PID]**.

Chapter 5

UI Description

5.1 Parameter Setting

5.1.1 Input

Parameter setting-input: Set the parameters such as sensor type, upper and lower limits on this page. The number of channels will display the corresponding number according to the type (2/4/8)**.**

| Input | Output | Control | Alarm | Programming | PID Group | IO Position | CT Mode |

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Input type	K	K	K	K	K	K	K	K
SV upper limit	1300.0	1300.0	1300.0	1300.0	1300.0	1300.0	1300.0	1300.0
SV lower limit	-200.0	-200.0	-200.0	-200.0	-200.0	-200.0	-200.0	-200.0
Offset	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ggain	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Digital filtering factor	8	8	8	8	8	8	8	8
Digital filtering range	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Event Input	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Channel disable	Enable	Enable	Enable	Enable	Enable	Enable	Enable	Enable

Note: Please refer to Section 6.1 for input sensor types.

Chapter 5: UI Description

5.1.2 Output

Parameter setting-output: Set the output control to **[Heating]** or **[Cooling]**, **[OUTx cycle time, range 0.1 ~ 60, unit: sec]** and **[OUTx upper / lower limit, unit:%]** on this page.

Input	Output	Control	Alarm	Programming	PID Group	IO Position	CT Mode

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
OUT1 control action	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄
OUT1 cycle time	20.0	20.0	20.0	20.0	5.0	5.0	5.0	5.0
OUT1 upper limit	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OUT1 lower limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sensor fail OUT1 power level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OUT2 control action	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄	Heating ⌄
OUT2 cycle time	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
OUT2 upper limit	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OUT2 lower limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[Sensor fail OUTx power level]: You can set the control proportional output for OUT1 and OUT2 when the input sensor is abnormal.

[AO upper / lower limit adjust]: Only available when the output type is selected as analog current output(4 ~ 20mA) or linear voltage output(0 ~ 10V).

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5.1.3 Control

Parameter setting-control: Set the temperature value here **[Control mode: ON / OFF, PID, PID_ programming]**, **[Auto/Manual switch]** and other parameters.

In **[Auto Mode]:** (green box below)

1. Select **PID control** mode, then you can set parameters such as proportional band, integration time, and derivative time for control. (Red box below)

2. Select **ON / OFF** control mode, you can adjust the output sensitivity by setting the hysteresis.

   (Orange box below)

In **[Manual Mode]**: (Blue box below)

Temperature control can only be performed by writing manual output operation amount, **[% OUTx power (Manual)]**.

Input	Output	Control	Alarm	Programming	PID Group	IO Position	CT Mode

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
SV (Read / Write)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% OUT1 power (Manual)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% OUT2 power (Manual)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control mode	PID	ON/OFF	Programi	PID	PID	PID	PID	PID
Auto / Manual Switch	Auto	Auto	Auto	Manual	Manual	Manual	Auto	Auto
OUT1 control hysteresis	0	0	0	0	0	0	0	0
OUT2 control hysteresis	0	0	0	0	0	0	0	0
Deadband	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SV ramp rate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Output power offset	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PID Group	Group1	Group1	Group1	Group1	Group1	Group1	Group1	Group1
Proportional band	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Integral time	120	120	120	120	120	120	120	120
Derivative time	30	30	30	30	30	30	30	30
Proportional band (Cooling)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Integral time (Cooling)	120	120	120	120	120	120	120	120
Derivative time (Cooling)	30	30	30	30	30	30	30	30
cooling way	Same	Same	Same	Same	Same	Same	Same	Same

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5.1.4 Alarms

Parameter Setting-Warning: Set the related parameters of the alarm mode here.

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
ALM1 action	None				None	None	None	None
ALM1 delay	0.0				0.0	0.0	0.0	0.0
ALM1 peak value	Disable				Disable	Disable	Disable	Disable
ALM1 hold	Disable				Disable	Disable	Disable	Disable
ALM1 Invert	Disable				Disable	Disable	Disable	Disable
ALM1 standby	Disable				Disable	Disable	Disable	Disable
ALM1-H	4.0				4.0	4.0	4.0	4.0
ALM1-L	4.0				4.0	4.0	4.0	4.0
ALM1 max.	0.0				0.0	0.0	0.0	0.0

Tabs: Input | Output | Control | Alarm | Programming | PID Group | IO Position | CT Mode

Dropdown list (ALM1 action):
- None
- Dev. high/low (Deviation band)
- Dev. high (Deviation high)
- Dev. low (Deviation low)
- Abs. high/low (Absolute band)
- Abs. high (Absolute high)
- Abs. low (Absolute low)
- Dev. high with hyst. (Hysteresis high)
- Dev. low with hyst. (Hysteresis low)
- CT1
- P soak (programming soak)
- P ramp up (programming ramp up)
- P ramp down (programming ramp down)
- P run (programming run)
- P hold (programming hold)
- P stop (programming stop)
- P end (programming end)
- CT2

5.1.5 Programming

Parameter Setting-Programming: Set each pattern of programming PID control, including **[End step]**, **[Cycle count]**, **[Link pattern]**, **[Step-x SV]** and **[Step-x time]** and other parameters; It will be ended the programming but keep on the last set value if Link pattern being set to **End(programming)**. If Link pattern being set to **Stop(programming)** will end all programming control and turn off the output.

Input	Output	Control	Alarm	Programming	PID Group	IO Position	CT Mode

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Waitint SV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waitint time	0	0	0	0	0	0	0	0
Start slope	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Start pattern	0	0	0	0	0	0	0	0
Start step	0	0	0	0	0	0	0	0

Pattern 0
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Pattern 5
Pattern 6
Pattern 7
End(programming)
Stop (Programming)

Parameter Name	Pattern 0	Pattern 1	Patter		Pattern 4	Pattern 5	Pattern 6	Pattern 7
End step	7	7	7		7	7	7	7
Cycle count	0	0	0		0	0	0	0
Link pattern	End(prog ∨	End(prog ∨	End(prog ∨	End(prog ∨	End(prog ∨	End(prog ∨	End(prog ∨	End(prog ∨

5.1.6 PID Group

Parameter setting-PID group: Set the heating curve characteristic parameters of **PID group (1 ~ 4)**.

Input	Output	Control	Alarm	Programming	PID Group	IO Position	CT Mode

Group1	Group2	Group3	Group4	→	Refer to [Control] PID group switching 1 ~ 4

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
SV	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
proportional band	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
integral time	120	120	120	120	120	120	120	120
derivative time	30	30	30	30	30	30	30	30
proportional band(cooling)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
integral time(cooling)	120	120	120	120	120	120	120	120
derivative time(cooling)	30	30	30	30	30	30	30	30

5.1.7 I/O Expansion Module Addresses Assignment-Output & Alarm

Parameter setting- I/O Expansion Module Addresses Assignment-Output & Alarm: When the user connects the expansion device, please set the corresponding I/O addresses of the expansion module on this page.

The I/O expansion module addresses assignment requires the following prerequisites:

➤ Cannot assign output channels between different DTM groups.

➤ The output of the expansion cassette can only be assigned by the installed host or the measurement expansion module itself.

The illustration of the above description is as follows:
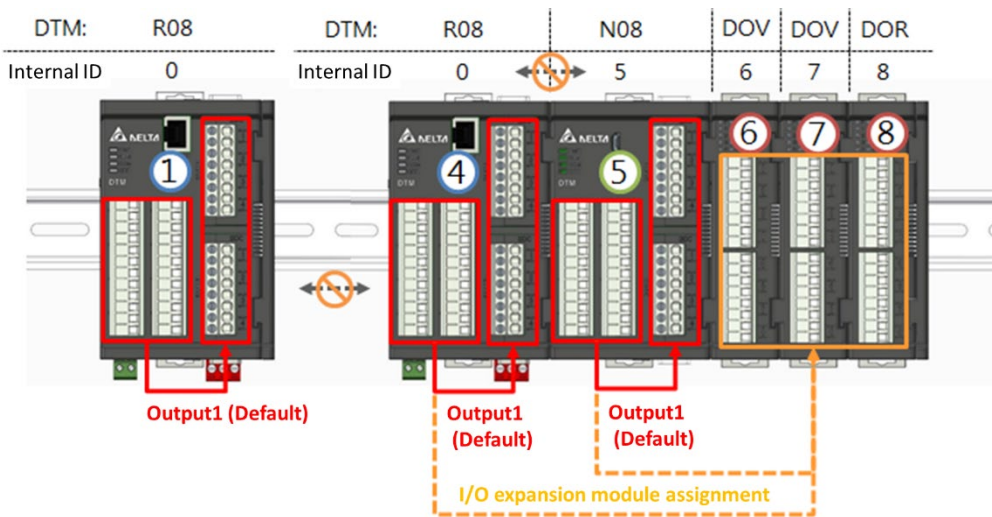
I/O expansion module addresses assignment steps:

1. Select the machine, as shown in the figure below, first select the group with Modbus station number 4 for setting, and then set the measurement expansion module with station number 5

2. Assign the addresses of the I/O expansion module for Output 1, Output 2, Alarm 1, etc., as follows.

➤ y-CHz : y=internal station number; z= Number of channels

➤ If y = 0, it indicates the output expansion cassette that DTM measurement host or DTM measurement expansion module is equipped with.

➤ If y = 1 ~ F, it means I / O output expansion module.

➤ Setting method: After typing y-z, press Enter or change the field, it will automatically bring in the display y-CHz.

5.1.8 I/O Expansion Module Addresss Assignment-CT

CT has its limitations in use. First, set the corresponding input channel of the CT, and then act according to the output of the corresponding input channel. The setting limitations for CT1 and CT2 are different because of the corresponding output models. The details are as follows:

1) CT1 is used with **[Output 1]**. At this time, [Output 1] must be set in the expansion cassette. The DTM-CT030 station number corresponding to CT1 can be selected within **1 ~ F**.

2) CT2 is used with **[Output 2]**. At this time, [Output 2] can be set on the expansion cassette or I / O expansion module. When [Output 2] is configured on the I / O expansion module, The station number of the DTM-CT030 corresponding to CT2 must be the same as the station number of the IO expansion module configured with [Output 2], and it only can be set from **9 ~ F**; When [Output 2] is configured in the expansion cassette (usually applied to measurement models with 4 channels), CT2 and CT1 can correspond to the same DTM-CT030 at the same time, and its station number can be selected from **1 to F**.
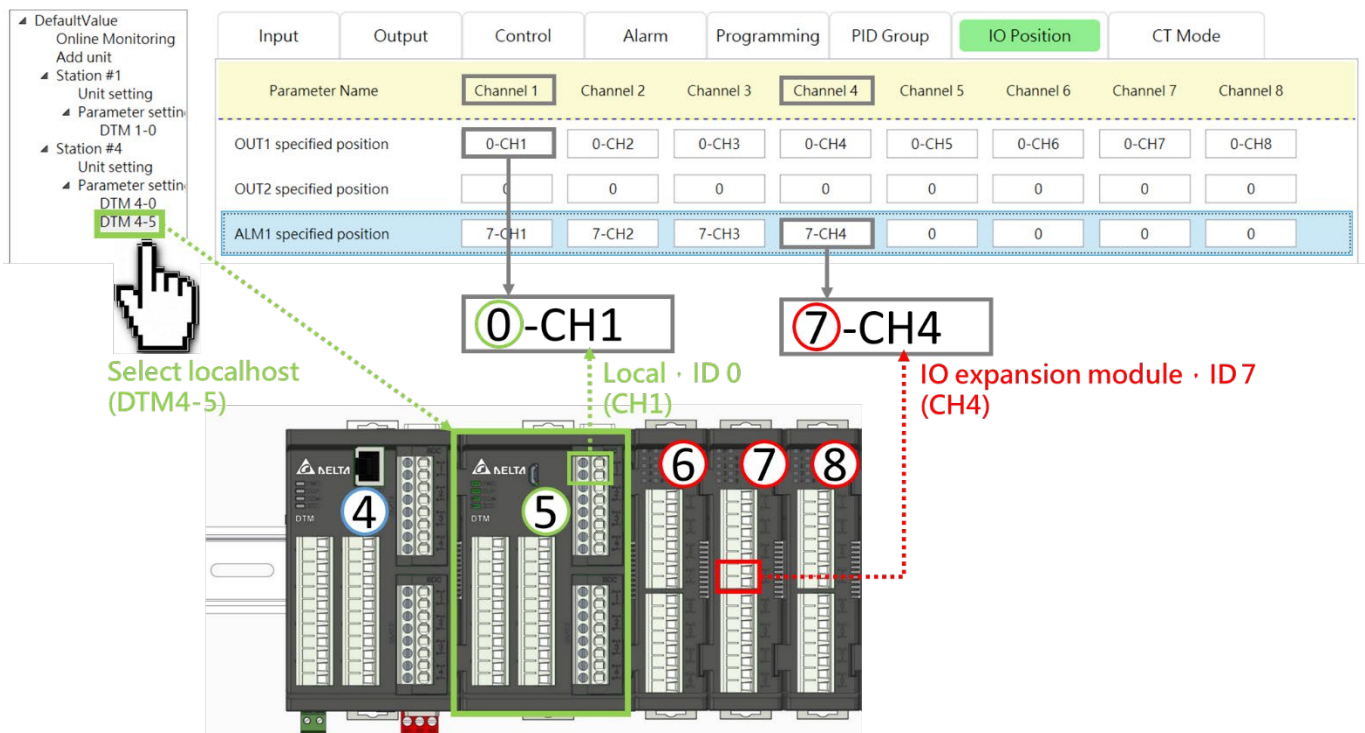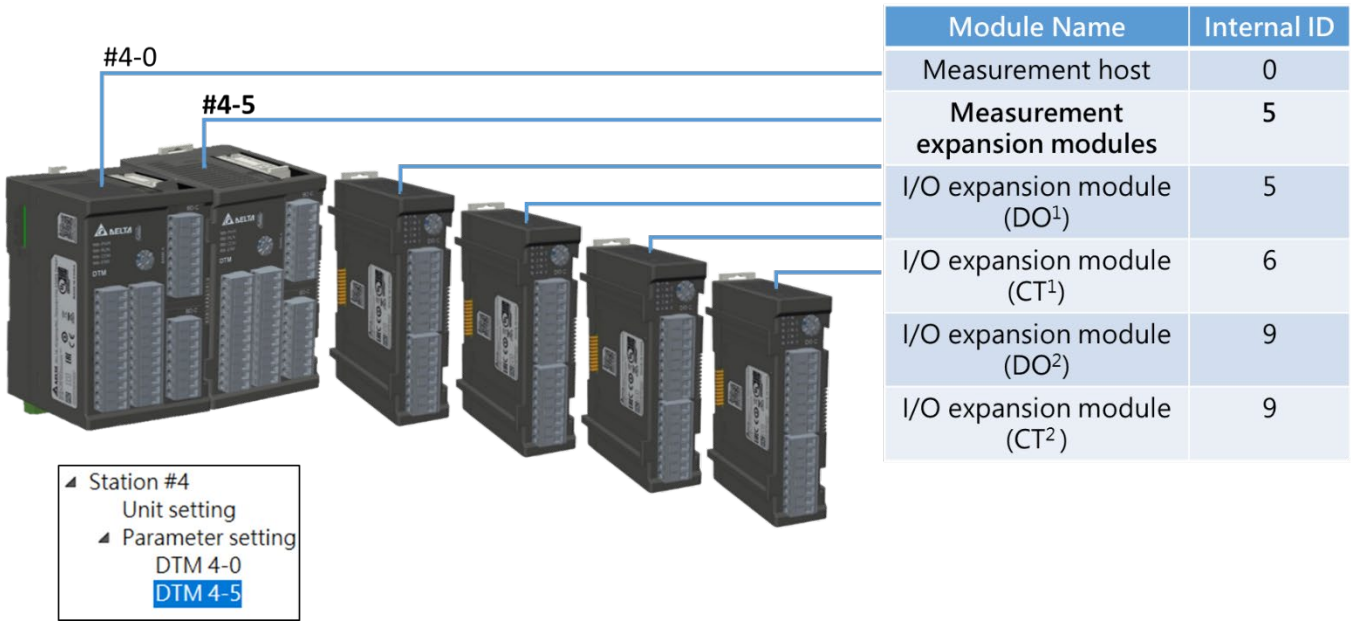

⚠ Precautions

1. When using CT mode, please go to the **[Alarm]** page of the corresponding parameter setting in advance and change the **[Alarm Mode]** option of the CT to be used to **[CT1/ CT2 Alarm]** , When detected CT current meets the alarm conditions, the alarm will be activated.

2. The CT current detection value is updated only when the output action is ON; when it is OFF, the CT current display is retained at the previous measurement value.

3. **[CT mode]** can select **[CT030]** (30A) or **[CT100]** (100A) current converter, but you must first select CT1 or CT2 alarm in the alarm mode selection, and specify the corresponding CT channel in the IO expander position setting page , the **[CT mode]** selection will be active.

The following describes the setting method through the I/O and CT expansion module example architecture diagram and UI setting interface:

Module Name	Internal ID
Measurement host	0
Measurement expansion modules	5
I/O expansion module (DO^1)	5
I/O expansion module (CT^1)	6
I/O expansion module (DO^2)	9
I/O expansion module (CT^2)	9

The settings of each module in the DTM group are as follows:

1. Host Modbus station number is 4 (internal station number is 0).

2. The internal station number of the measurement expansion module is 5, with two expansion cassettes assigned to **[Output 1]**

3. The first DTM-DOV^1 internal station number 5.

4. The internal station number 9 of the second DTM-DOV^2 is set as the **[Output 2]** of the measurement expansion module, and the DTM-CT030^2 is used to perform its **[Output 2]** current detection.

5. The first DTM-CT030^1 with internal station number 6 is used to measure the output current of [Output 1] of the measurement expansion module.

6. The internal station number 9 of the second DTM-CT030^2 must be the same as the station number of the **[Output 2]** module of the measurement expansion module.

CT^1 setting instructions, DTM Soft UI screen is as follows:

Input	Output	Control	Alarm	Programming	PID Group	IO Position	CT Mode

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
OUT1 specified position	0-CH1	0-CH2	0-CH3	0-CH4	0-CH5	0-CH6	0-CH7	0-CH8
OUT2 specified position	0	0	0	0	0	0	0	0
ALM1 specified position	0	0	0	0	0	0	0	0
ALM2 specified position	0	0	0	0	0	0	0	0
ALM3 specified position	0	0	0	0	0	0	0	0
CT1 specified position	6-CH1	6-CH2	6-CH3	6-CH4	6-CH5	6-CH6	6-CH7	6-CH8
CT2 specified position	0	0	0	0	0	0	0	0
EVT specified position	0	0	0	0	0	0	0	0

IO designation method : Enter the station number first, then input the channel number. For example: 0-CH1 is the CH1 of the measurement unit.

Module Name	Internal ID
DTM R 08	0
DTM N 08	5
DTM-DOV(DO^1)	5
DTM-CT030(CT^1)	6
DTM-DOV(DO^2)	9
DTM-CT030(CT^2)	9
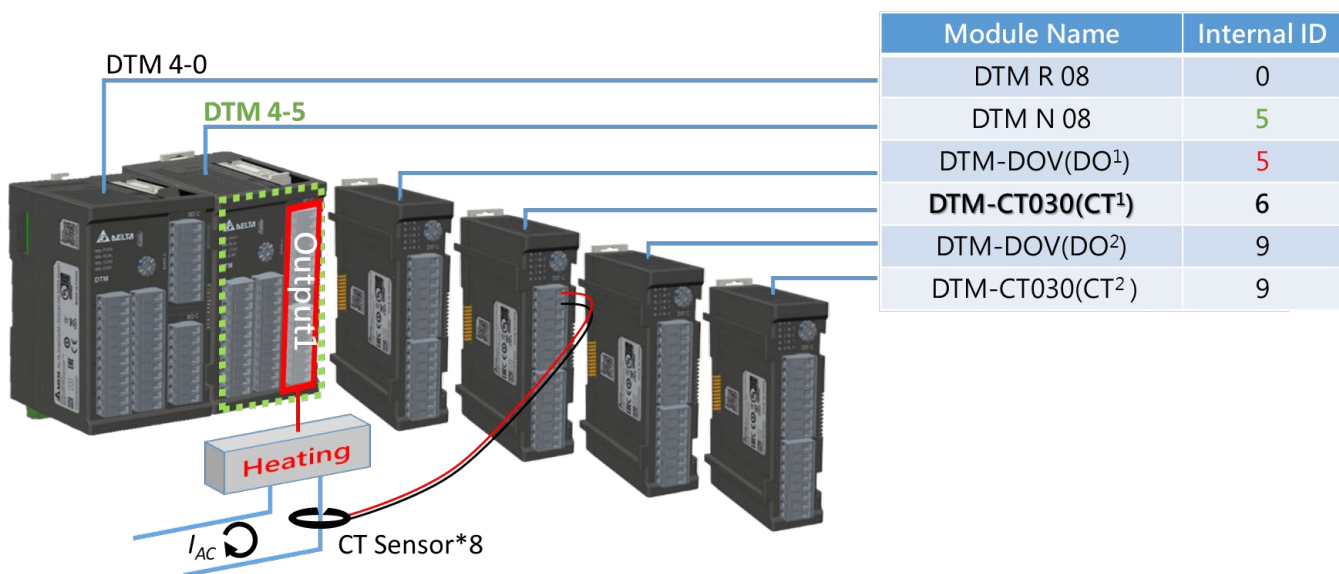
As above UI interface, when CT1 is set, the settings of [Output 2] and CT2 are started. First, set the field of **[Output 2 corresponding station number-channel]** to I / O expansion module 9-CH1 ~ 9-CH8. (According to DTM-DOV2 internal station number 9), and then set the field of **[CT2 corresponding station number-channel]** to 9-CH1 ~ 9-CH8 (according to DTM-CT0302 internal station number 9), when [Output 2] is specified In the IO expansion module, the matched CT2 must have the same station number and be in the range of 9 ~ F. If this condition is met, the CT2 current detection can be performed during the [Output 2] action.
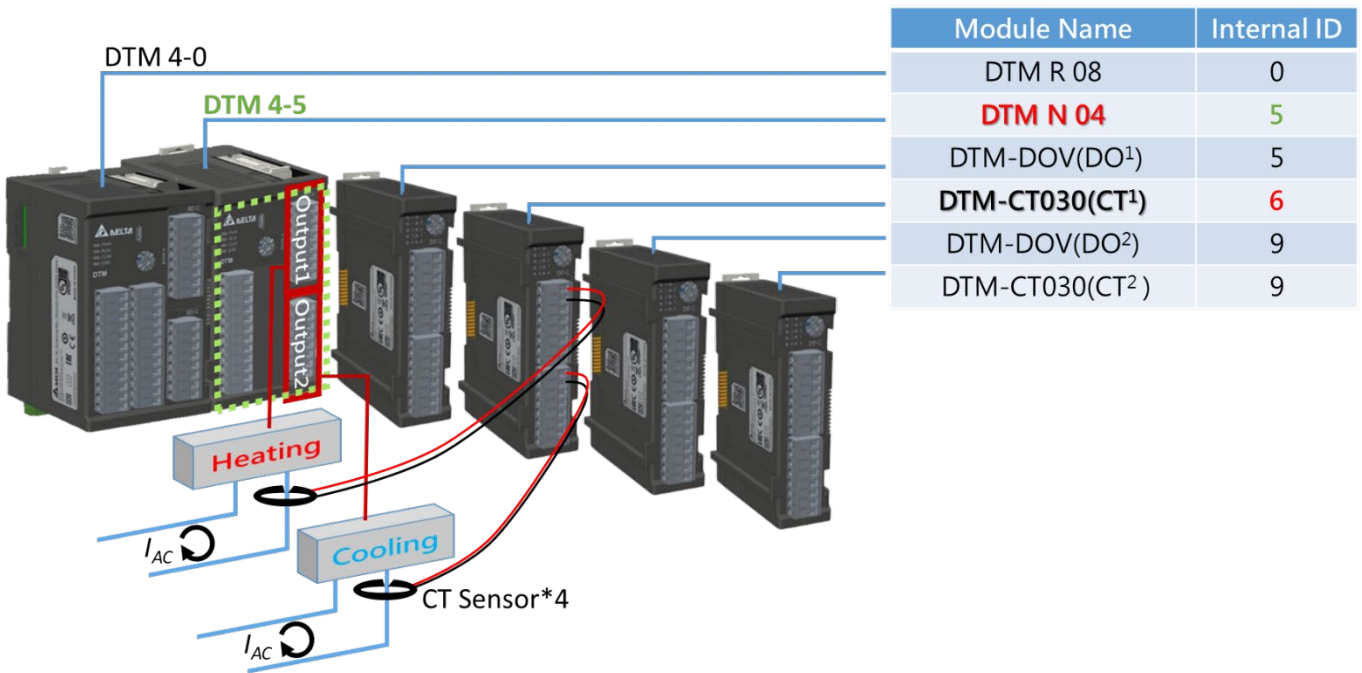
When output 2 is in the expansion cassette, CT^2 setting instructions, DTM Soft screen is as follows:

Parameter Name	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
OUT1 specified position	0-CH1	0-CH2	0-CH3	0-CH4				
OUT2 specified position	0-CH5	0-CH6	0-CH7	0-CH8				
ALM1 specified position	0	0	0	0				
ALM2 specified position	0	0	0	0				
ALM3 specified position	0	0	0	0				
CT1 specified position	6-CH1	6-CH2	6-CH3	6-CH4				
CT2 specified position	6-CH5	6-CH6	6-CH7	6-CH8				
EVT specified position	0	0	0	0				

Tabs: Input | Output | Control | Alarm | Programming | PID Group | IO Position | CT Mode

Tree: DefaultValue — Online Monitoring — Add unit — Station #1 — Unit setting — Parameter setting — DTM 1-0 — Station #4 — Unit setting — Parameter setting — DTM 4-0 — DTM 4-5

IO designation method : Enter the station number first, then input the channel number. For example: 0-CH1 is the CH1 of the measurement unit.

Module Name	Internal ID
DTM R 08	0
DTM N 04	5
DTM-DOV(DO[1])	5
DTM-CT030(CT[1])	6
DTM-DOV(DO[2])	9
DTM-CT030(CT[2])	9

When output 2 is assigned to expansion cassette, the DTM UI screen of CT2 setting instructions is as follows:

As shown in the architecture diagram above, when the measurement model used is 4 channels type, the two expansion cassettes loaded on the measurement machine can be set to [Output 1] and [Output 2] respectively.

At this time, CT2 and CT1 can be designated on the same DTM-CT030. For the setting method, refer to the UI interface setting method above. Set the field of **[Output 2 corresponding station number-channel]** to the expansion cassettes 0-CH5 ~ 0-CH8. , And then set the field of **[CT2 Corresponding Station Number-Channel]** to 6-CH5 ~ 6-CH8, then CT2 current detection can be performed during the [Output 2] action.

5.2 Offline Setting

DTM Soft offline mode-communication format setting: as shown in the figure below, when you want to perform offline mode **[Upload]**, you must set the communication method first by RS-485、USB or Ethernet.
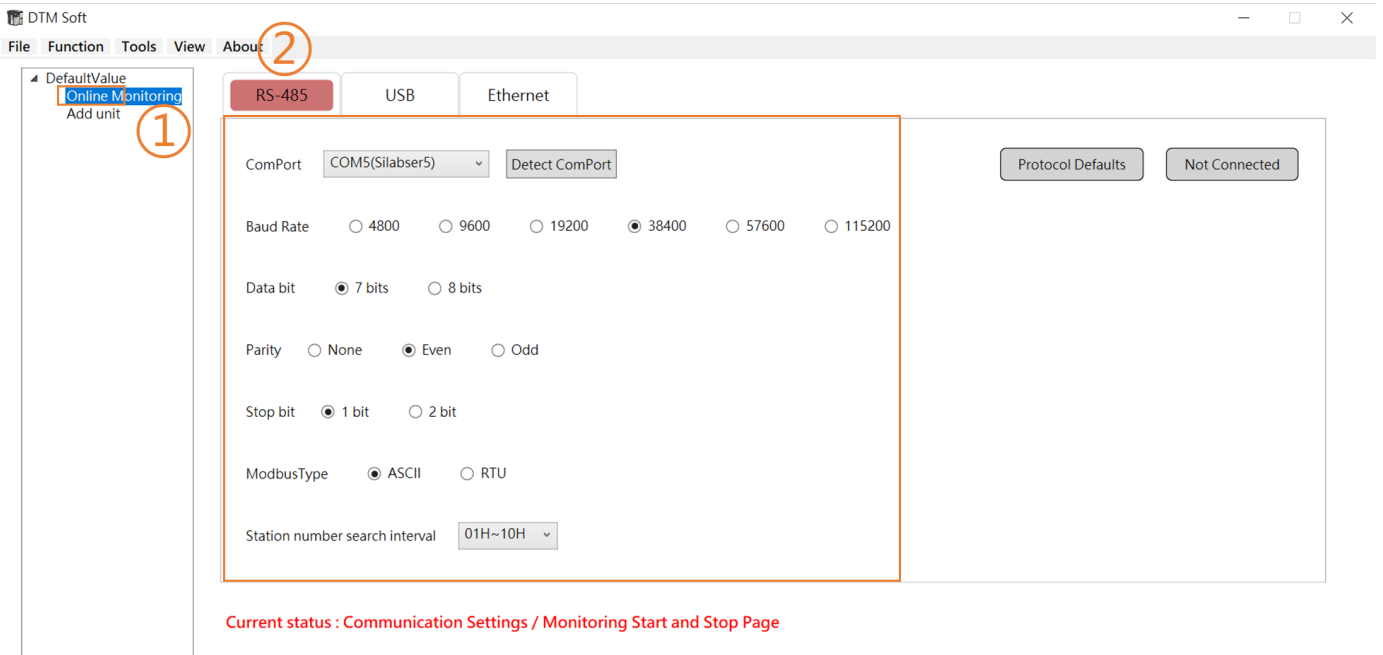
DTM Soft offline mode-common field function: as shown in the table below, after setting the communication format, click **[Function]** on the list and select the action of **[Upload / Download]**.

List	Function	Remark
Upload：DTM → PC	Upload controller data to computer software interface	When downloading, each station number of its "online configuration" must have the same corresponding station number in the project before the project can be downloaded to the DTM (even if only some machines are downloaded)。
Download：PC → DTM	Download the parameters set by DTM Soft software interface to the controller	
Parameters Copy	Copy between channels or controllers for parameter types	

Note: The online configuration represents the measurement host and measurement expansion module included in each group。

Chapter 5: UI Description

DTM Soft Offline Mode-Upload: When you click **[Upload]**, it will scan according to the set communication method (RS-485、USB or Ethernet) and Modbus station number interval.
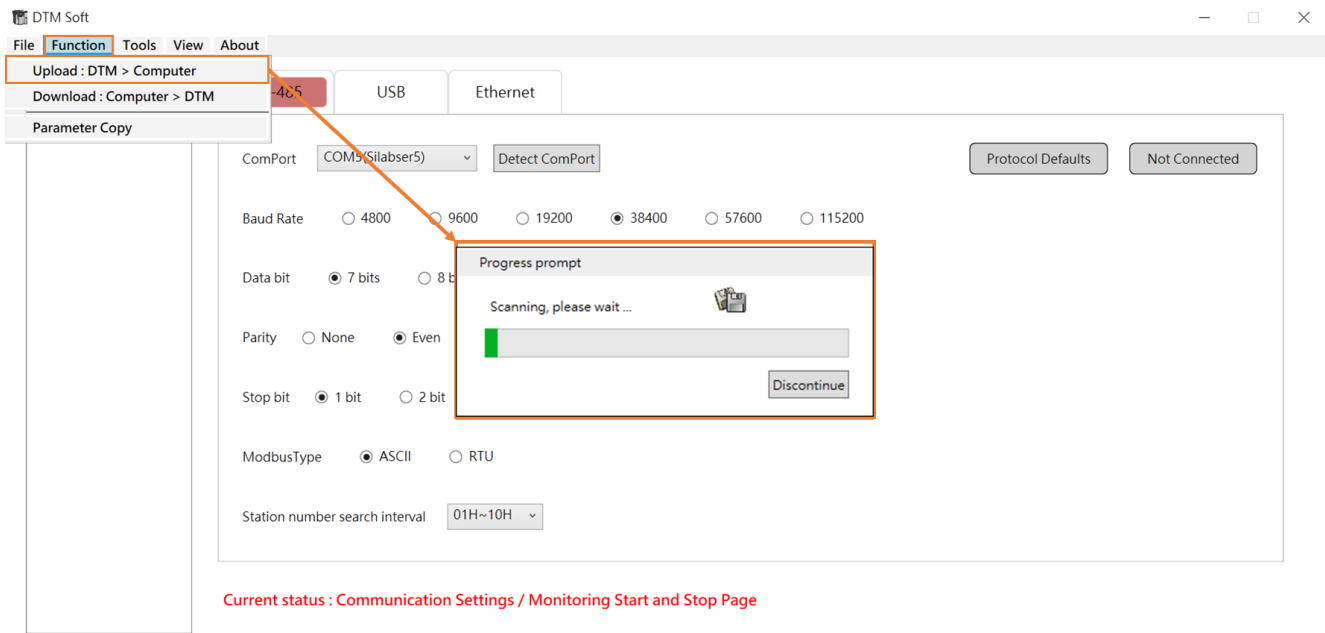
DTM Soft Offline Mode-Upload: DTM units with the same communication format will be listed after scanning is completed.
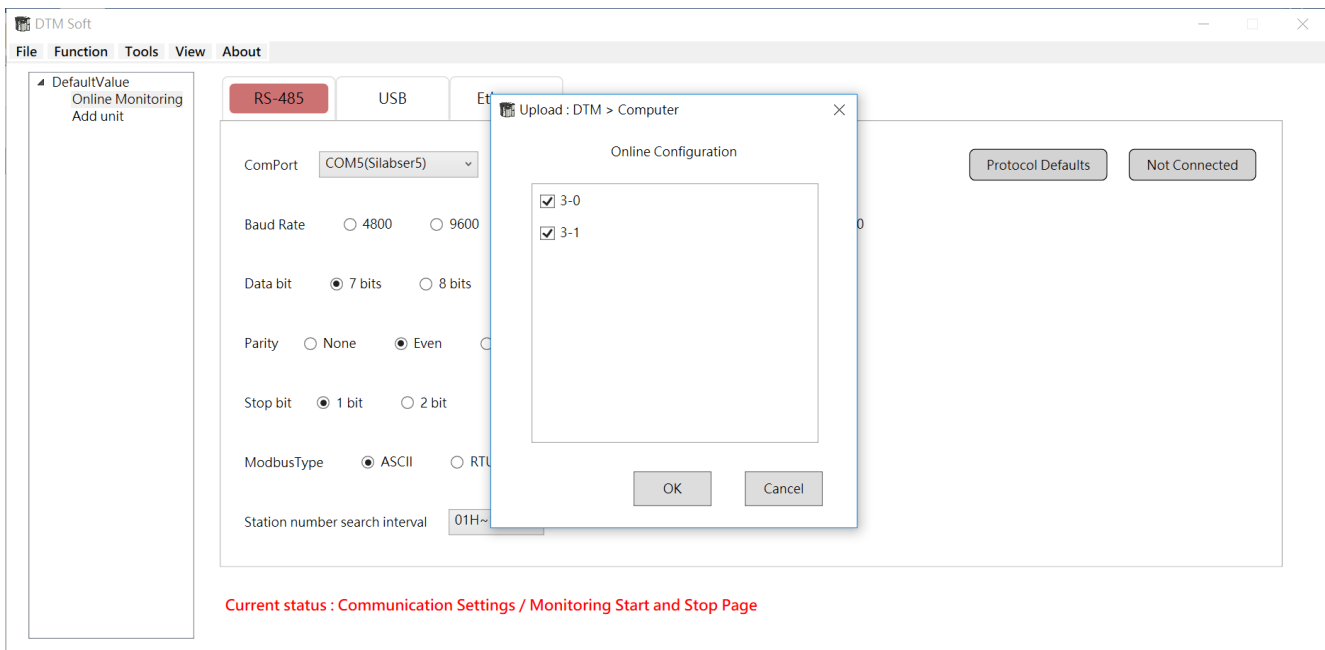
[Online Configuration] Description**:**

1.   On-line configuration is the measurement host and the connected measurement expansion unit that are searched through communication, and upload all their parameters to the memory of the UI software.

DTM Soft Offline Mode-Upload: After the upload is completed, the following prompt window will appear, and the uploaded measurement host and measurement expansion module will be displayed in the left column. All parameters will be filled in the parameter pages in the DTM Soft UI. After uploading, you can click the desired units to edit the parameters or save the uploaded parameters as a project file for future use.
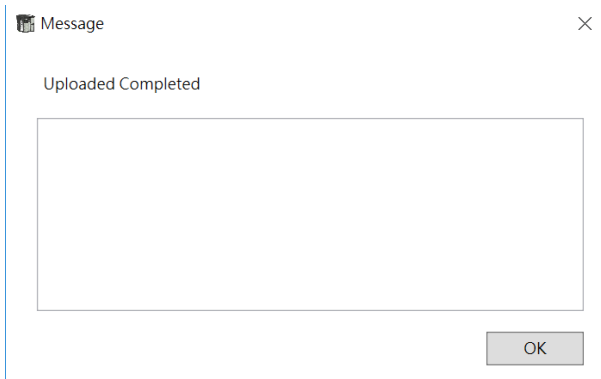
DTM Soft offline mode-parameter copy: Separately explain the channel / units parameter copy function.

Channel-to-channel copying: After selecting certain machine station numbers, copy the channel to the current machine.

1. First select the source of the copy and set it according to its external / internal station number and channel.

2. Then select the paste target, and set it according to its channel and parameter type.

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Inter-unit copy: When some machine stations are selected, the current machine will be copied to other selected machines.

1. First select the source of the copy, and set it according to its entirety and station number.

2. Then select the target to paste, and set it according to its entirety and station number.

Please note that only DTMs with the same number of channels are allowed to perform this function when copying between units.

DTM Soft Offline Mode-Add Unit: If not connected, you can add a new unit in offline mode, set it with Modbus station number and model, and can key into a detailed master station description. (Annotation text will be displayed when the cursor points to the left column of Station #)
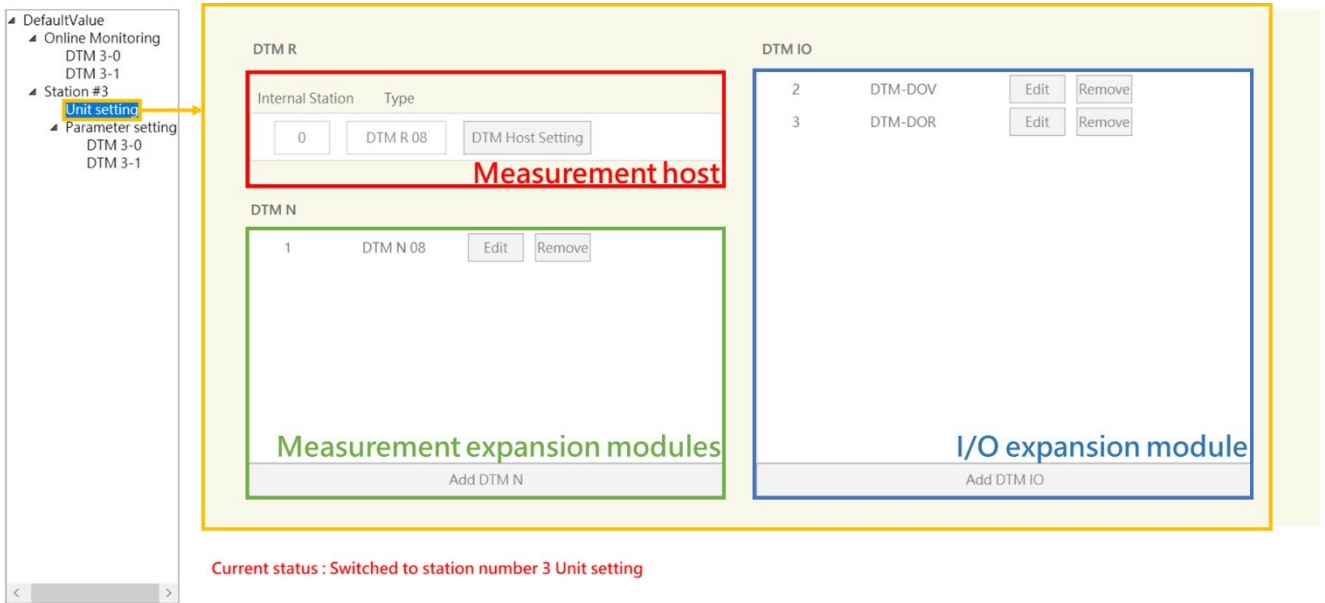
After entering the Modbus station number of the master station, select the model and fill in the master station description and click **[Next]**. The connection status column on the left will list the unit settings and parameter settings.
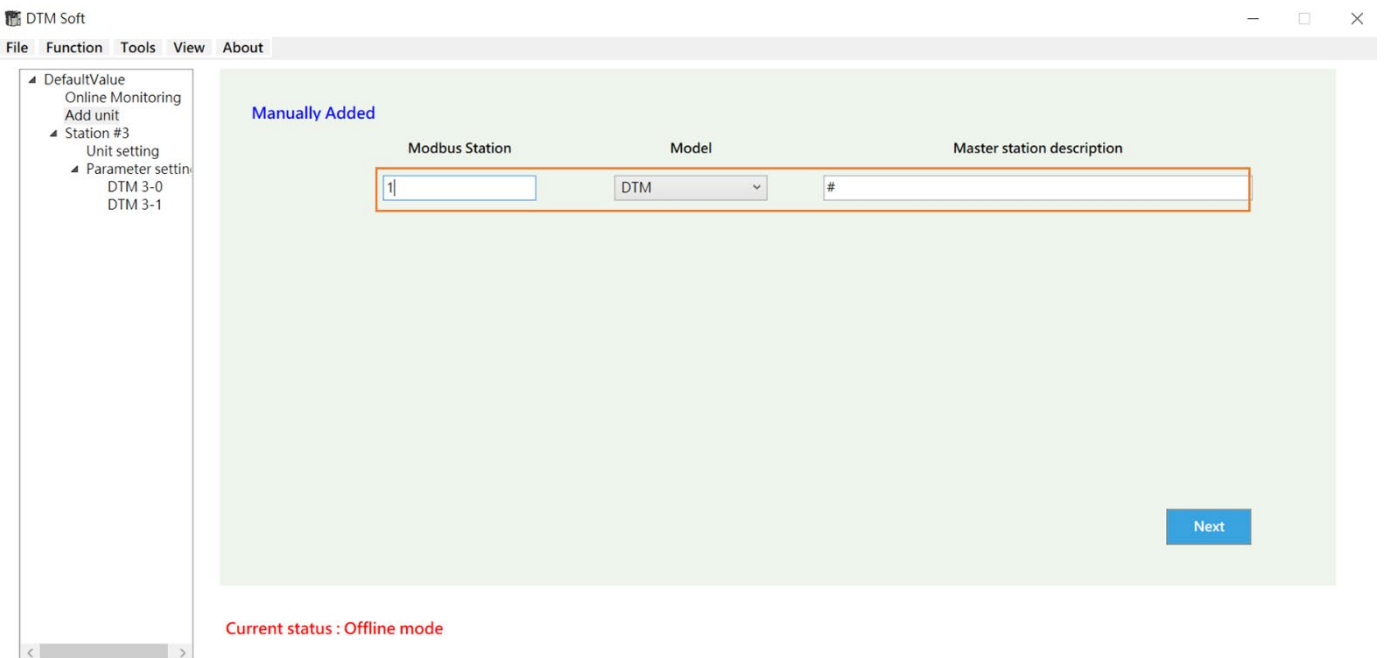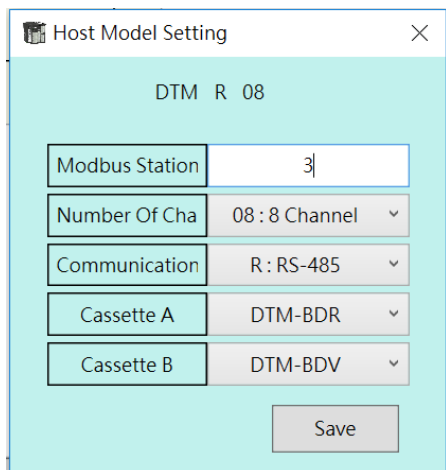
Chapter 5: UI Description

DTM Soft Offline Mode-Unit Settings:

As shown in the figure below, you can add or edit the unit settings in offline mode; DTM R is the measurement host, DTM N is the measurement expansion module, and DTM I/O is the I/O expansion module.

Click **[DTM Host Settings]** to pop out the setting window below:
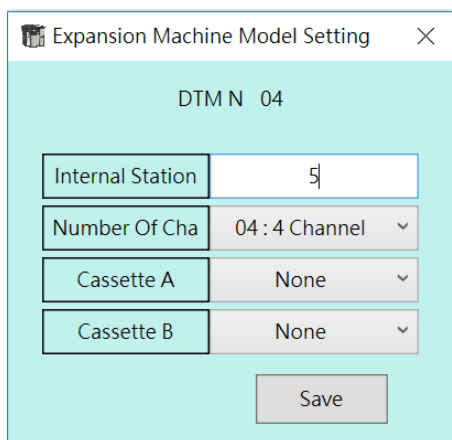
Host Model Setting	✕
DTM R 08	
Modbus Station	3
Number Of Cha	08 : 8 Channel ⌄
Communication	R : RS-485 ⌄
Cassette A	DTM-BDR ⌄
Cassette B	DTM-BDV ⌄
	Save

Click **[Add DTM N]** or click the **[Edit]** button in the DTM N field to pop out the setting window below:

Expansion Machine Model Setting	✕
DTM N 04	
Internal Station	5
Number Of Cha	04 : 4 Channel ⌄
Cassette A	None ⌄
Cassette B	None ⌄
	Save

The cassette settings have the following options **(DTM-BDR, DTM-BDV, DTM-BDC, DTM-BDL)**.

Click **[Add DTM IO]** or click the **[Edit]** button in the DTM I/O field to pop out the setting window below:
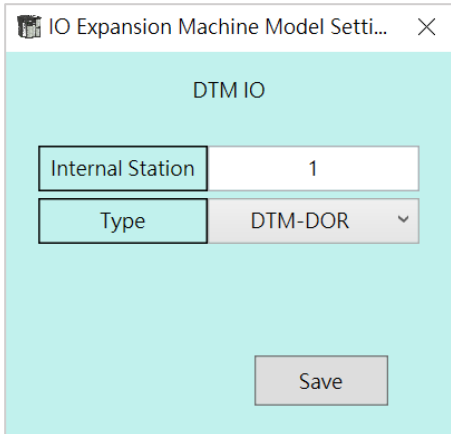
DTM I/O model setting has the following options (DTM-DOR, DTM-DOV, DTM-DOC, DTM-DOL, DTM-CT030).

DTM Soft Offline Mode-Download: Scans in the communication search area before downloading.

Note: The download limitation, the number of controllers in **[Project Configuration]** needs to be greater than or equal to the number in **[Online Configuration]**, at the same time each internal station number in **[Online Configuration]** must have the same station number in **[Project Configuration]** for the download action to begin.
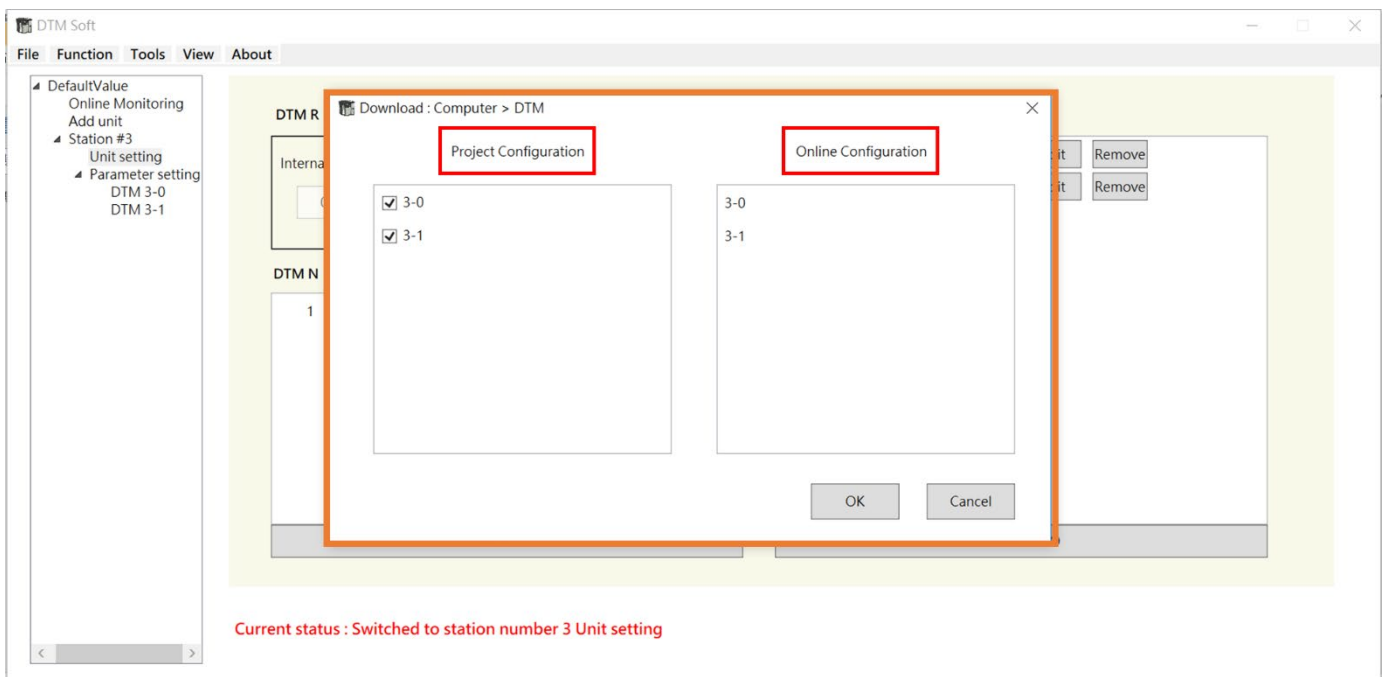
5.3 Other Function

DTM Soft software tool: as shown below, when you want to use other functions, select **[Tool]** from the list to select the function.
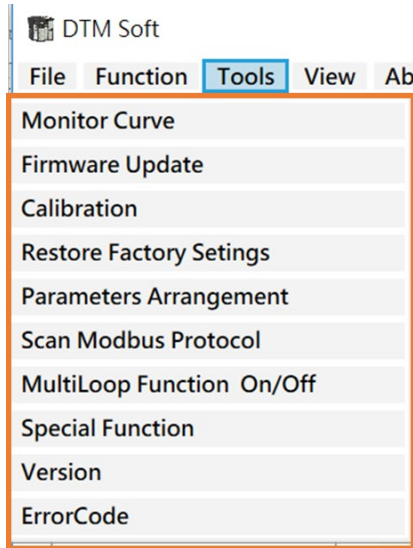
Name	Function
Monitor Curve	Draw / record the graph by selecting the required value
Firmware Update	Update firmware via RS485/USB
Calibration	Auto tuning the temperature error adjustment / gain value
Restore Factory Settings	Restore to default value, must be reboot
Parameters Arrangement	Edit the same address for the classified address
Scan Modbus Protocol	Search for specific communication formats when offline
MultiLoop Function On/Off	Switch on to enable the Special Function
Special Function	Setting of the [One to Many] function
Version	Check the firmware version of current machine

5.3.1 Monitor Curve

DTM Soft- Monitor Curve: It is used for online monitoring of the parameter value changes of the selected channel, and can be recorded and archived.
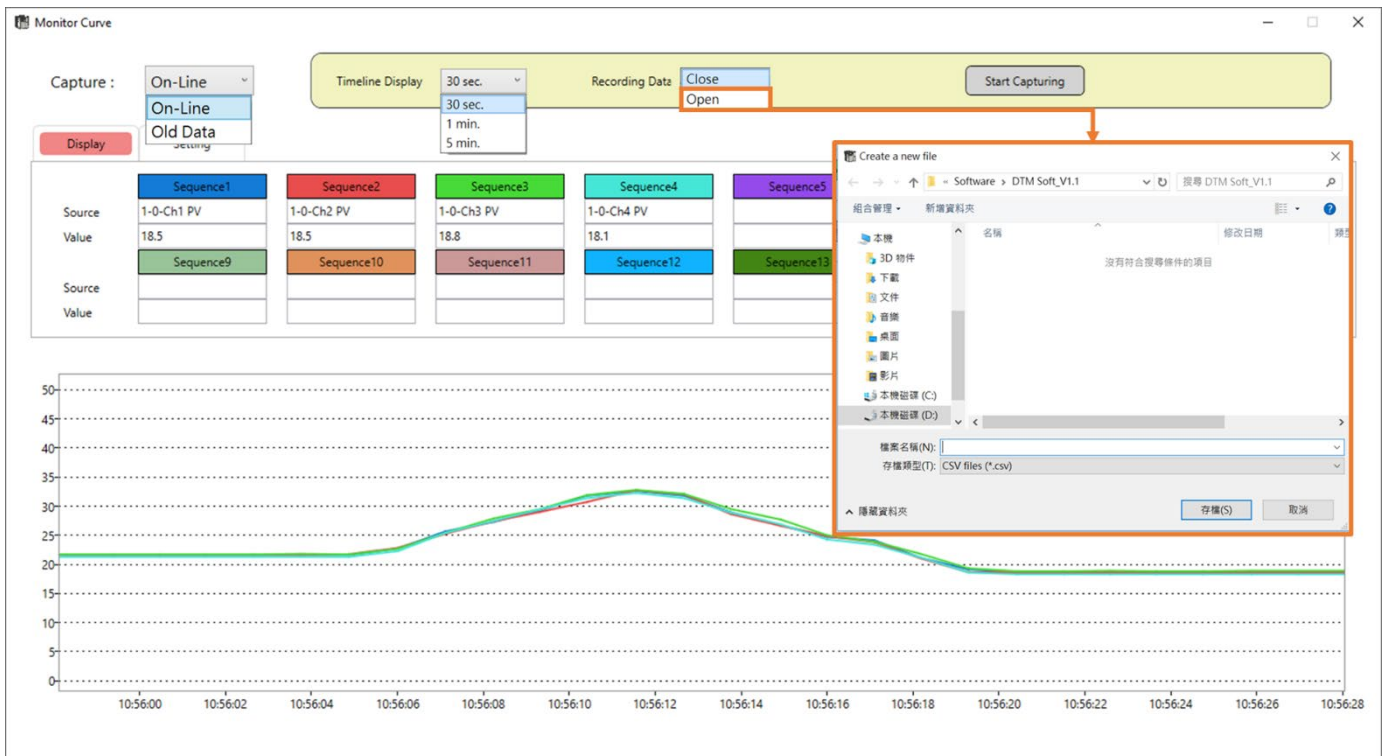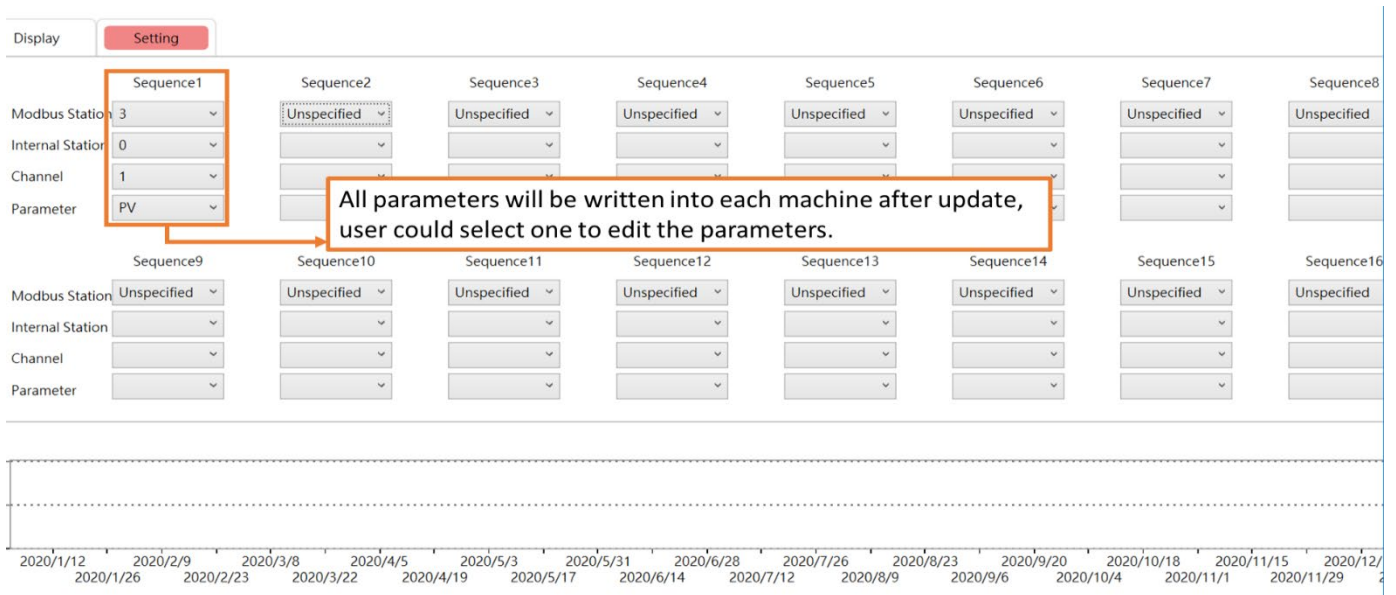
You can also read the historical data, load the data after opening the old file, and click the control button, as shown below.
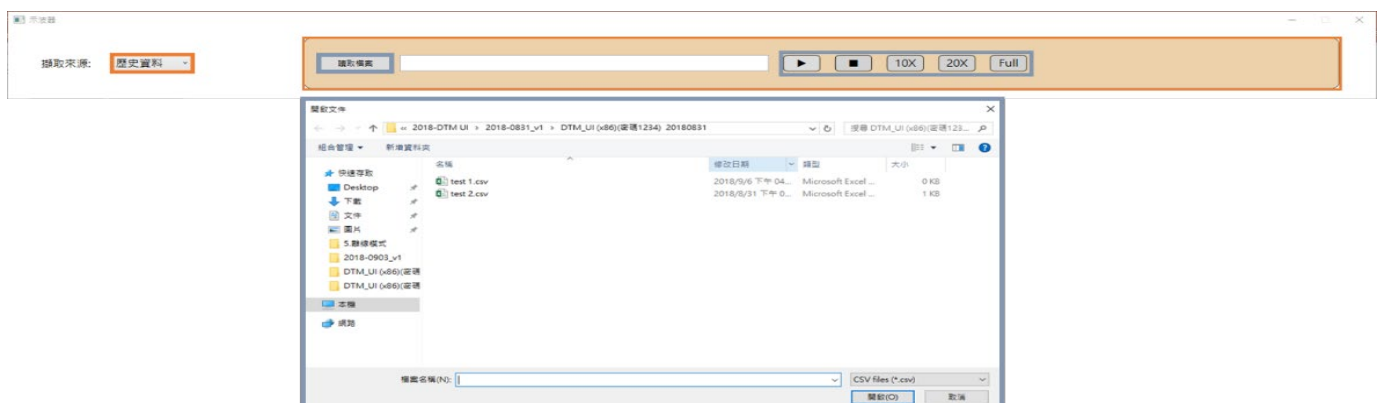
Chapter 5: UI Description

5.3.2 Firmware Update

DTM Soft- Firmware Update: Click **[Tool]** in the upper left list → select **[Firmware Update]**, you need to go offline and power off the DTM first.

DTM Soft- Firmware Update –USB: (Only applicable for measurement host and measurement expansion unit)

1. Plug in with the USB cable → powered by USB → open the update window

2. Select **COMPORT** → Select **[USB]** in **MODEL** field

3. Click **OPENFILE,** then select firmware version → Click **UPDATE** → Show success window after completion (UPDATE SUCCEEDED)

4. After the update, power on again and select **[DTM Firmware Version Detection]** in DTM Soft **[Tools]** to confirm the version
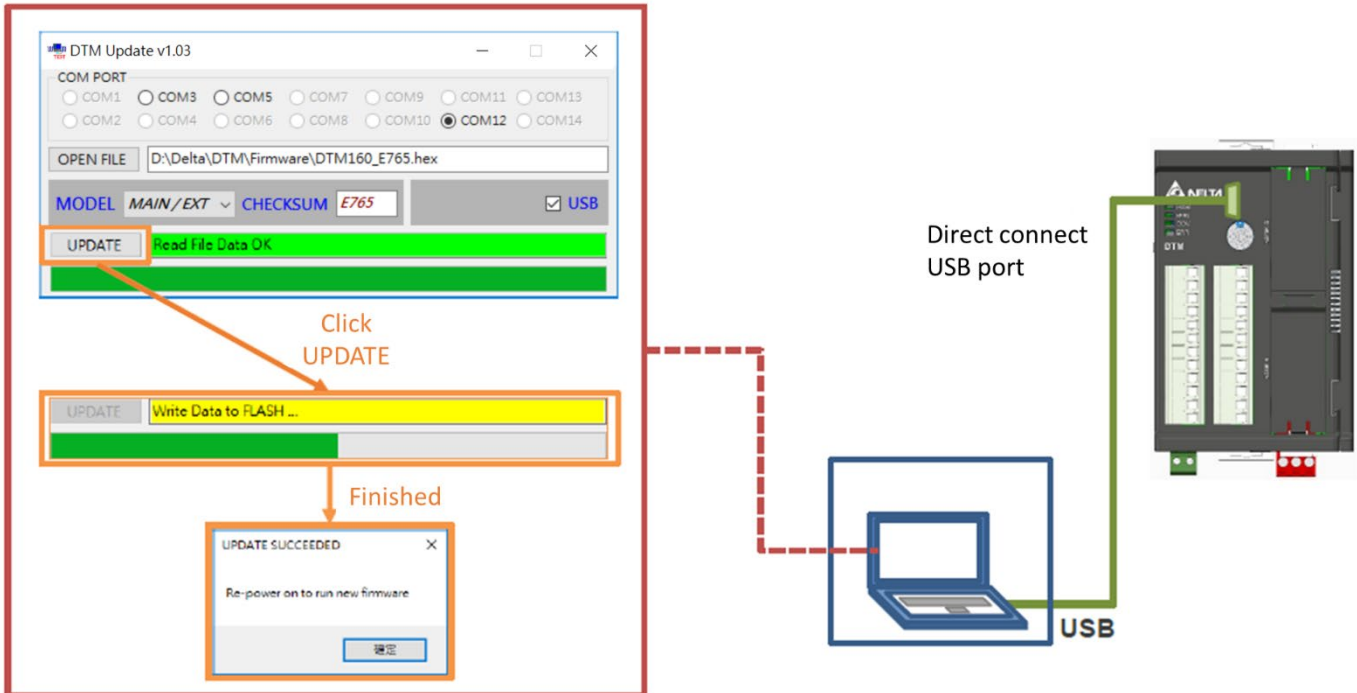
DTM Soft Firmware update-RS485:

1. Dip switch Bit1 & 8 to on → connect RS485 → Power on (24V) → Open the update window

2. Select COMPORT → MODEL select **[Measurement Host: MAIN; Measurement expansion module: EXT; I/O expansion module: OP or CT or EV]** → MODELADDR select station number

3. Click OPENFILE to select firmware version → Click UPDATE → Show success window after completion (UPDATE SUCCEEDED)

4. After update, power on again and select **[DTM Firmware Version Detect]** in DTM Soft **[Tools]** to confirm the version
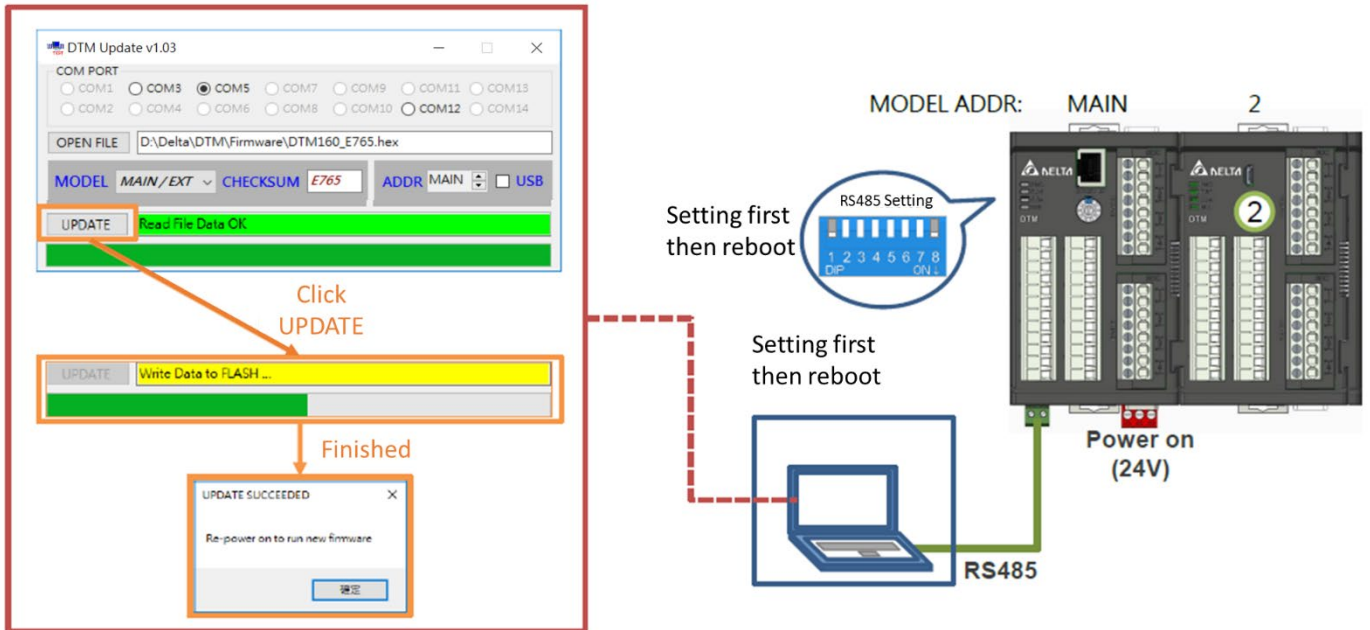
5.3.3 Temperature Calibration

DTM Soft Temperature Calibration: click **[Tools]** in the upper left list → select **[Temperature Calibration]**

the window shown in the lower left will appear.

The temperature correction uses the temperature value measured by the temperature controller channel itself and the temperature value measured by the third party at the same position to perform two-point comparison, and automatically calculates the error and gain values among the encoding parameters:
Ex:
When the measured value of channel 1^A is 30 ℃, the third-party measurement is 32 ℃
When the measured value of channel 1^B is 100 ℃, the third-party measurement is 105 ℃.

After filling in the temperature correction value, click **[write]**, then UI will automatically calculate the **[temperature error adjustment / gain value]**, and write it directly into the corresponding parameter.
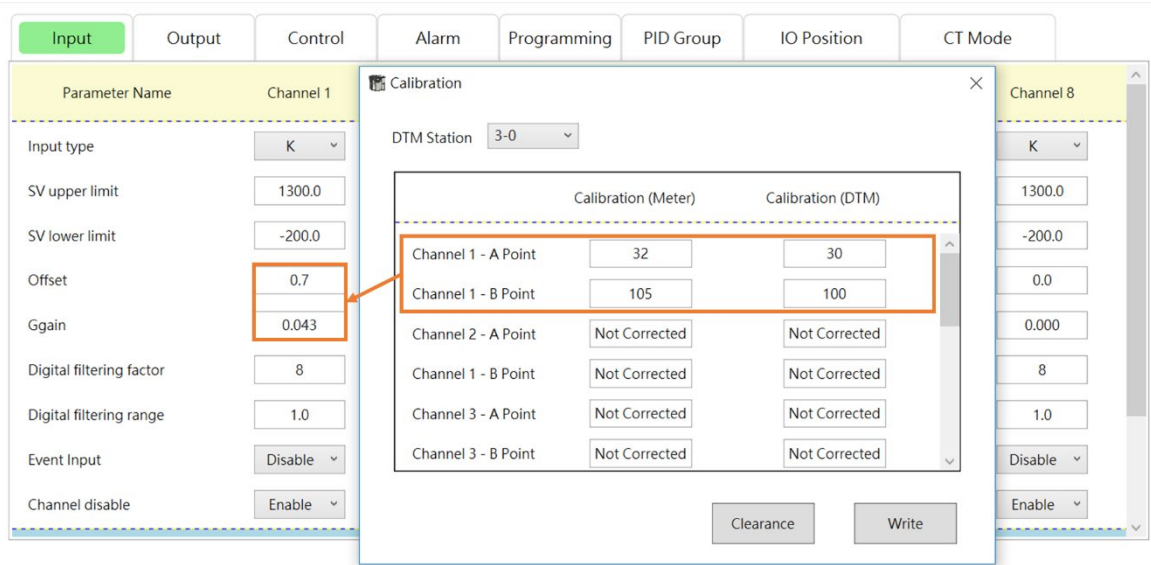
Precautions for temperature correction:
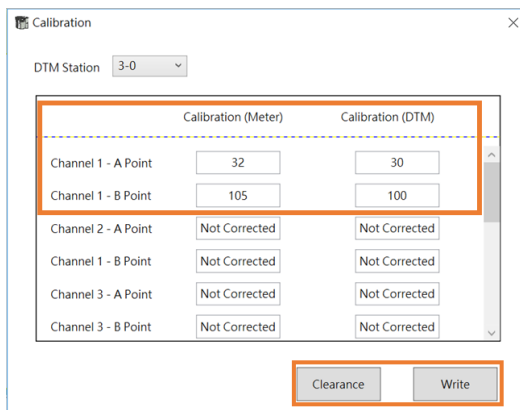
Clear :
Clear temperature error adjustment / gain values for all channels
Write :
If you want to re-calibrate for the second time, the 【Calibration】 field must enter the PV value measured after the first calibration.
Ex:
30 ℃ → 31.5 ℃ after calibration, the third-party measurement is 32 ℃
100 ℃ → 104 ℃ after calibration, the third-party measurement is 105 ℃
The channel 1[A] is changed to 31.5 ° C for Calibration(DTM), and Calibration(Meter) = 32 ° C
The channel 1[B] is changed to 105 ° C for Calibration(DTM), and Calibration(Meter) = 104 ° C

5.3.4 Restore Factory Settings

DTM Soft-Restore factory settings: After restoring the factory settings, the parameters will be restored to the factory settings. It is recommended to check whether the project is archived before performing the factory reset.
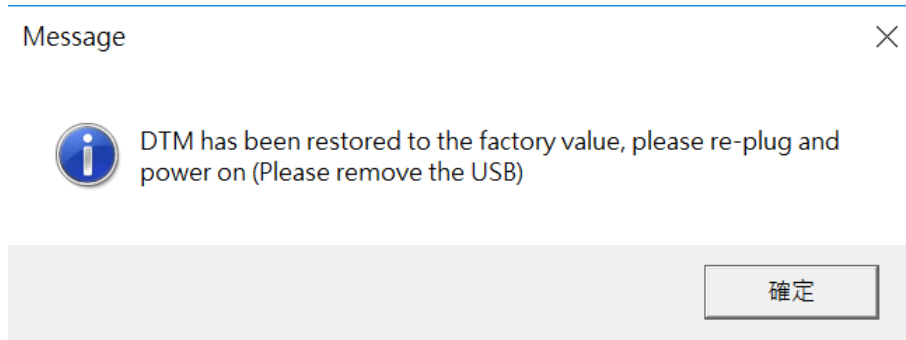
5.3.5 Function Address Customization

DTM Soft- Function address customization: The function address customization is also the communication address customization. The purpose is to allow the users to use the customized communication address to read multiple parameters to be collected at one time, thereby improving the communication performance with other devices.

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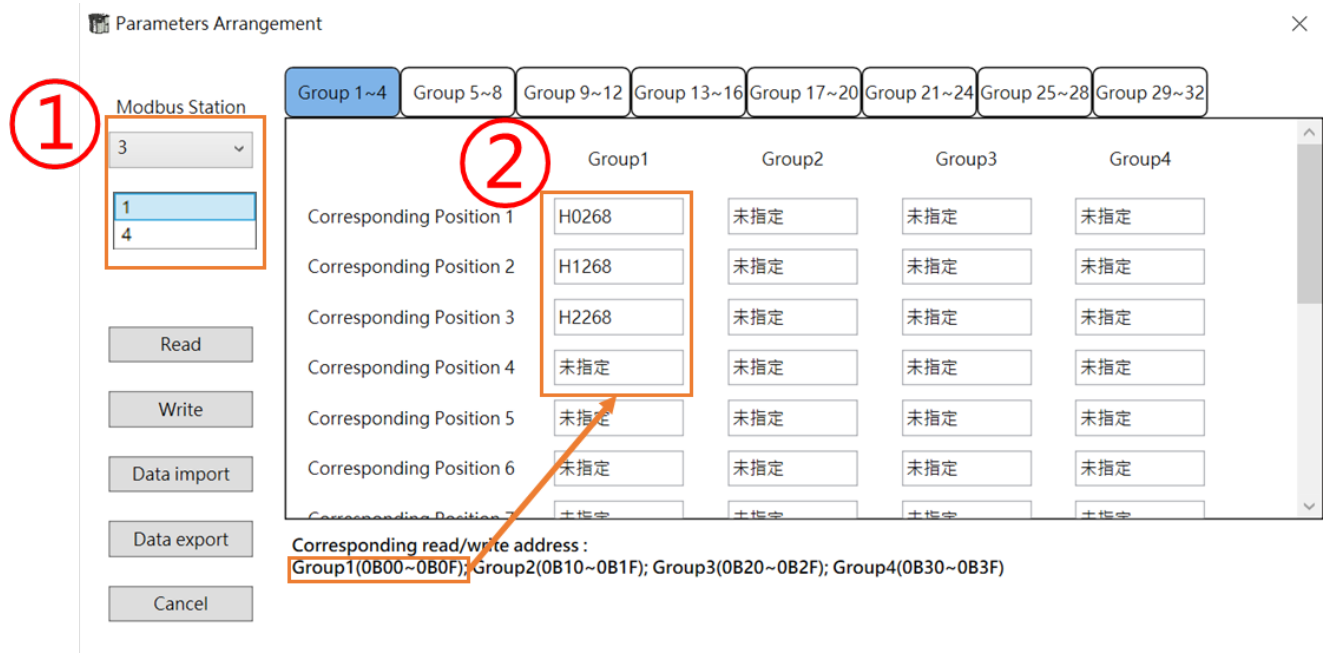
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1. The function address customization can only be performed on the measurement host, so the selection of the station number will only be the host station number of the DTM group.

2. The customer can set the desired parameters on the corresponding group address, and then just read the group address, and collect the required parameters at one time.

> **Ex:** Assume that the measurement host Modbus station number 4 is selected
> Corresponding to address 1 write H 0268 (PV value of channel 1 of host 0)
> Corresponding to address 2 write H 1268 (PV value of channel 1 of slave 1)
> Corresponding to address 3 write H 2268 (PV value of channel 1 of slave 2)

Corresponding addresses 1 ~ 3 are group addresses 0B00 ~ 0B02. The user can read the PV values of channel 1 of this 1 host and 2 slaves by issuing the 04030B000003 instruction.

Functional Address Customization-Example:

For example, as shown below, multiple data collections that previously required multiple instructions can be completed. After the address is customized, only one instruction is required.
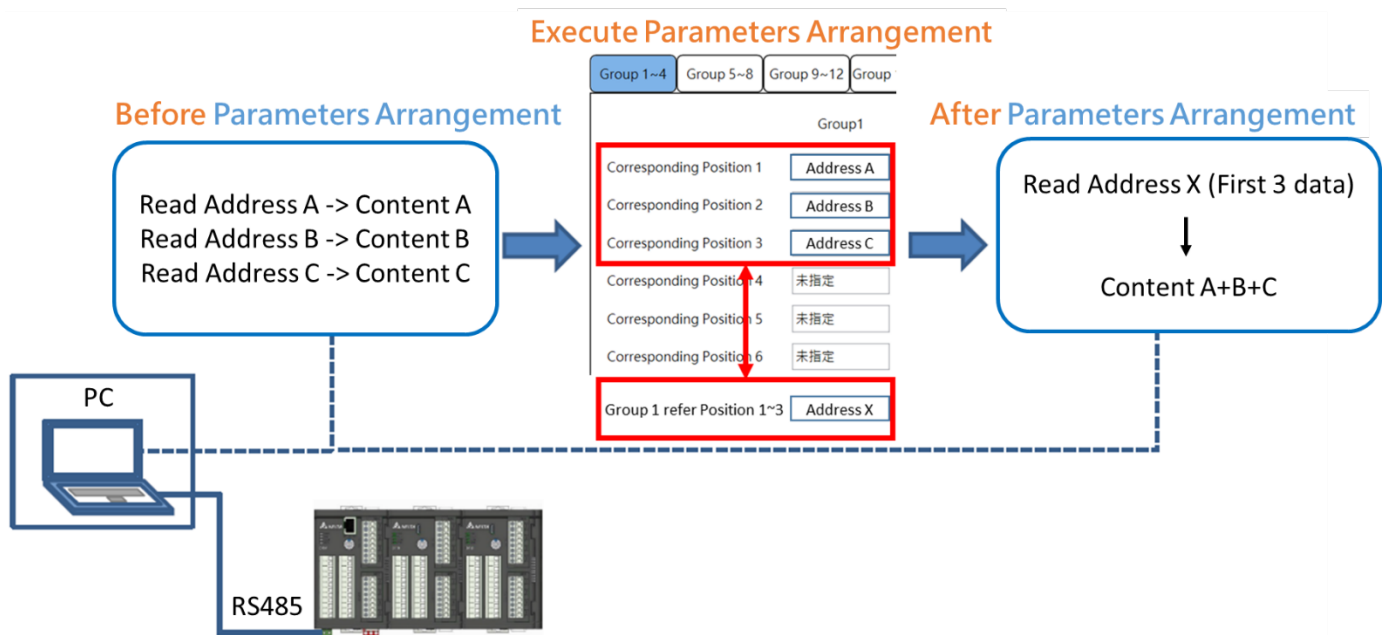
⚠ Precautions

It is strongly recommended that when using the function address customization method to write a large amount of data at one time, the order of parameter positions is continuously filled in with the parameter address of the same station number, and then the parameter address in the next station number is continuously filled into. Do not continuously fill in the parameter address of different station numbers frequently, otherwise it will seriously affect the efficiency of DTM internal communication bus data exchange. For example, if you want to read/write multiple 8-channel SV, please fill in the custom fields according to the channel 1 ~ channel 8 of the measurement host, and then fill in the channel 1 ~ 8 of the next measurement expansion unit.

5.3.6 Special Function-Only for Special Version Firmware

DTM Soft- special function: One-to-many special function allows customers to use one point temperature input corresponding to multiple point output control. The output of the same group can be set to output ratio between different output channels. Please click **[Tools]** in the toolbar to select **[Special Features]** to enter the setting window, as shown below.
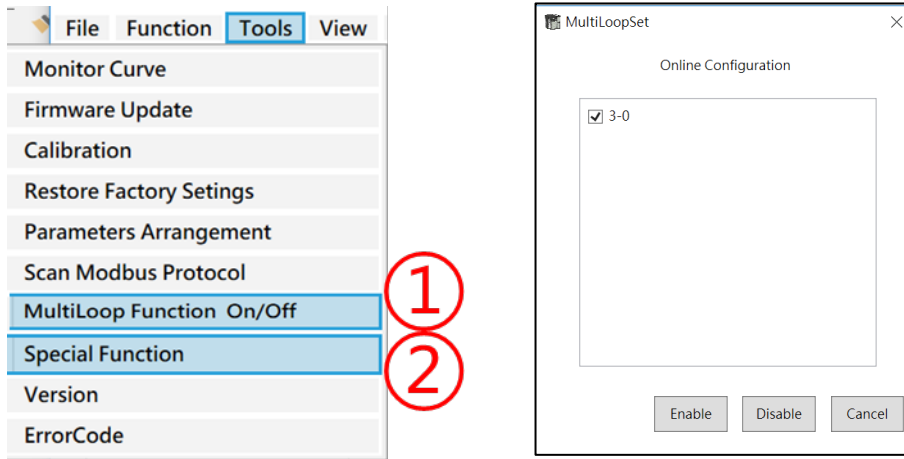
The following figure illustrates the example. The connected measurement host 3-0 and measurement expansion module 3-1, I / O expansion module station number are 2, 3.
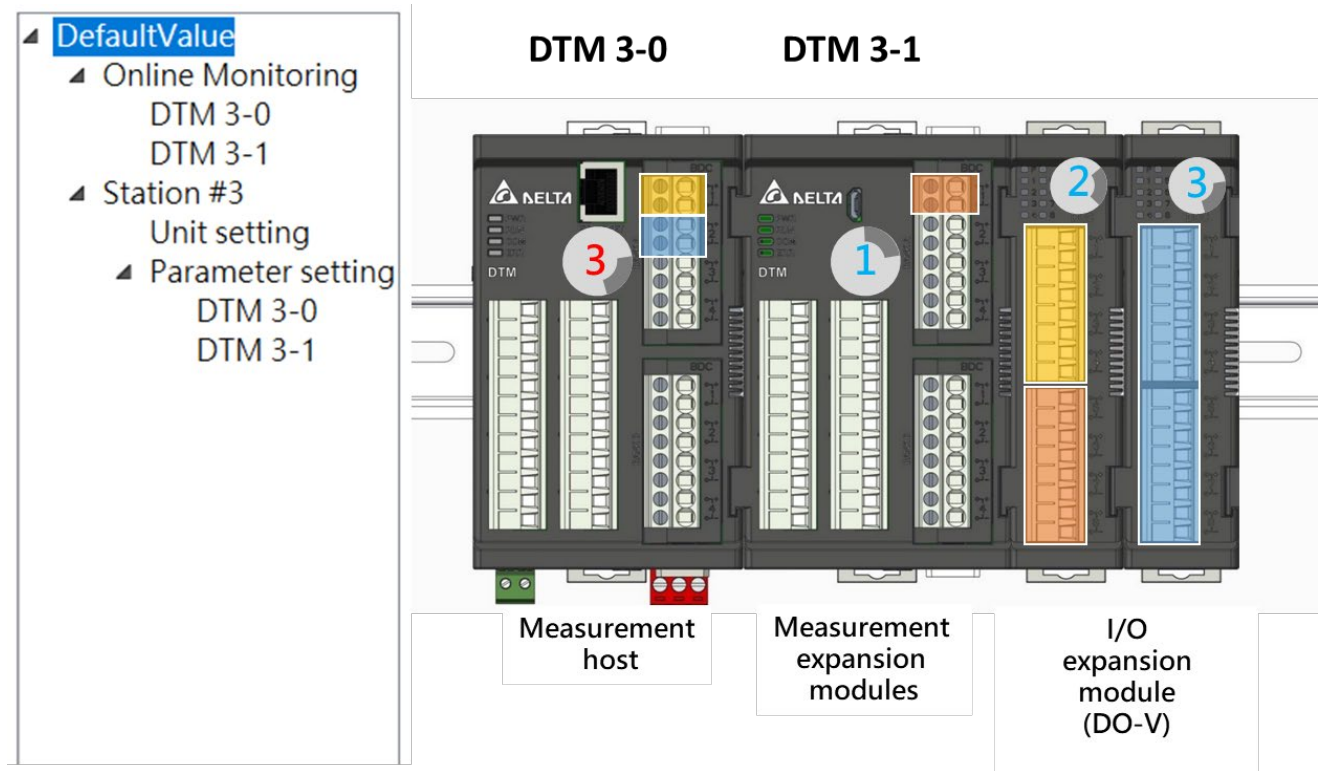
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After opening the special function window, first explain the **[One to Many]** page. This page sets the input channel of the measurement host (or measurement expansion module) corresponding to the output channel of the IO expansion module.

1. The Modbus station number field will display a list of measuring machines that support this function.
2. The IO field is for users to choose the IO expansion module to be set.
3. The figure below assigns the channels 1 ~ 4 of the IO expansion module with station number 2 to input 1 of DTM3-0.
4. The figure below assigns the channels 5 ~ 8 of the IO expansion module with station number 2 to input 1 of DTM3-1.
5. After the input is completed, select **[Write]** to write the set value to DTM.
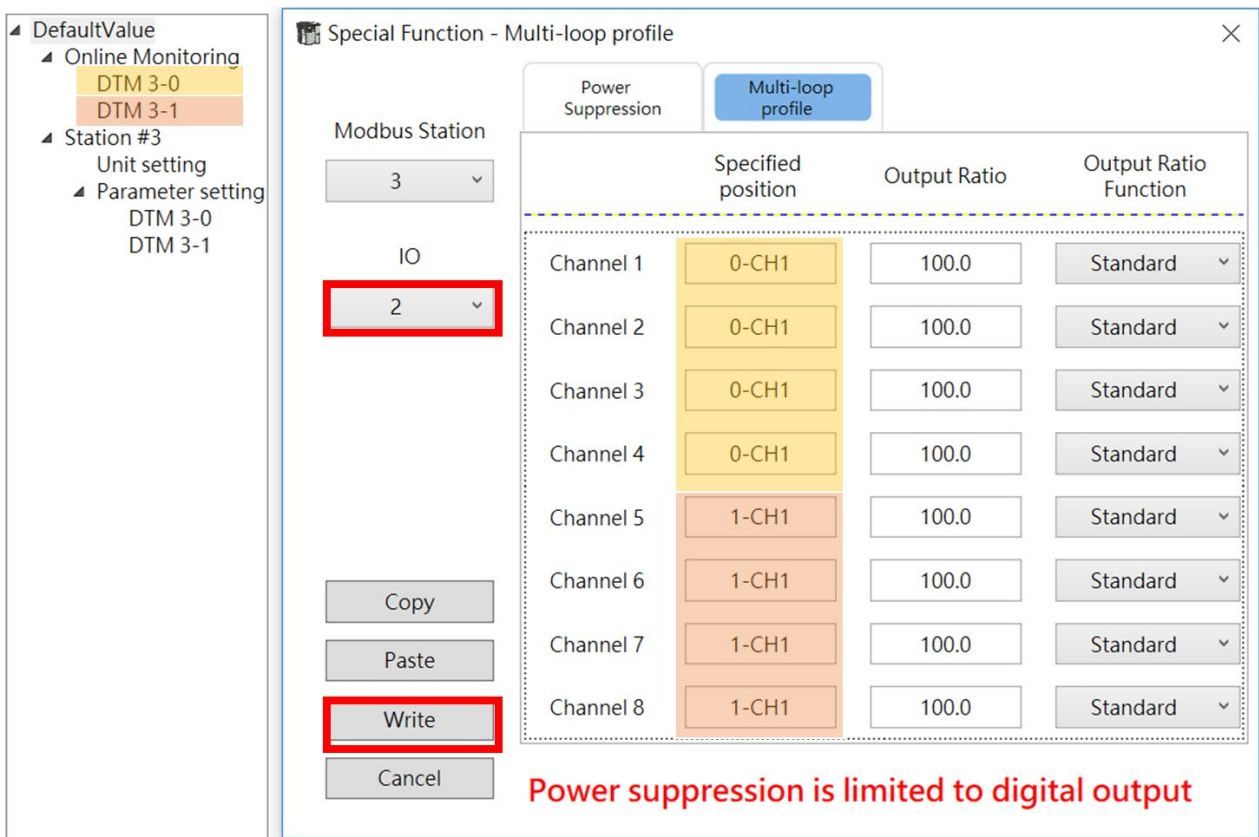
6. The figure below assigns the channels 1 ~ 8 of the IO expansion module with station number 3 to input 2 of DTM3-0.
7. After the input is completed, select **[Write]** to write the set value to DTM.

![Precautions warning triangle] **Precautions**

On the **[One-to-many]** page, set the **[Output Ratio]**, and apply the following formula with the control mode output in **[Control]** to obtain the actual output:

Actual output (%) = control output * output ratio / 100

As shown below, the actual output will be 50.0*100.0/100.0=50.0%

Then for the **[Power Suppression]** page description, please note that this function only provides the use of DO-V and DO-R IO expansion modules, and directly sets the settings for all connected IO expansion modules. The parameters will be updated immediately after modification.

[Power Suppression Setting] option is disabled by default, which means that all the set output channels can be output at the same time during the control cycle. When selecting 1/2, 1/4, or 1/8 times, it means that the output channel divided into four groups, two groups, one group. In each control cycle, there will be only one channel as output in the same group at the same time to control the overall power.

Chapter 5: UI Description

The following figure illustrates how to output sequentially in the case of a **[unified period]** with different power suppression settings in the case of a I/O expansion module.

1/2 times power suppression function, unified cycle

1/4 times power suppression function, unified cycle

1/8 times power suppression function, unified cycle
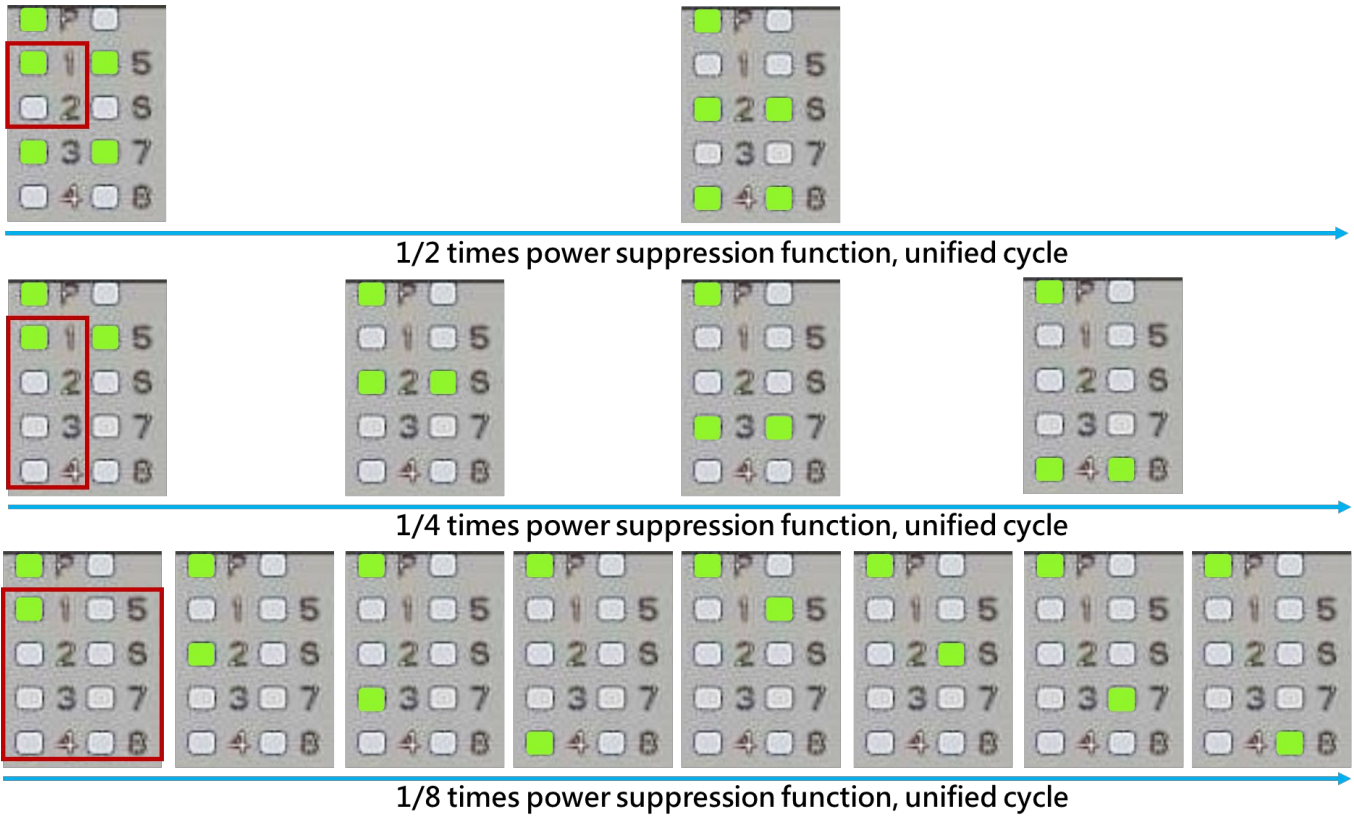
[Power Suppression Setting] is enabled, the **[Unified Period]** setting will take effect (the default value is 0 seconds and the maximum value is 60 seconds). If this parameter is not set, the original output control cycle setting will be referred to. **[Unified period]** will avoid output phase shift and achieve the effect of synchronous output, as shown below.

Output 1 control cycle

Output1

Output 2 control cycle

Output2

Phase offset, output is not synchronized

Unified Period

Output1

Unified Period

Output2

Turn on power suppression and set uniform time to force output synchronization
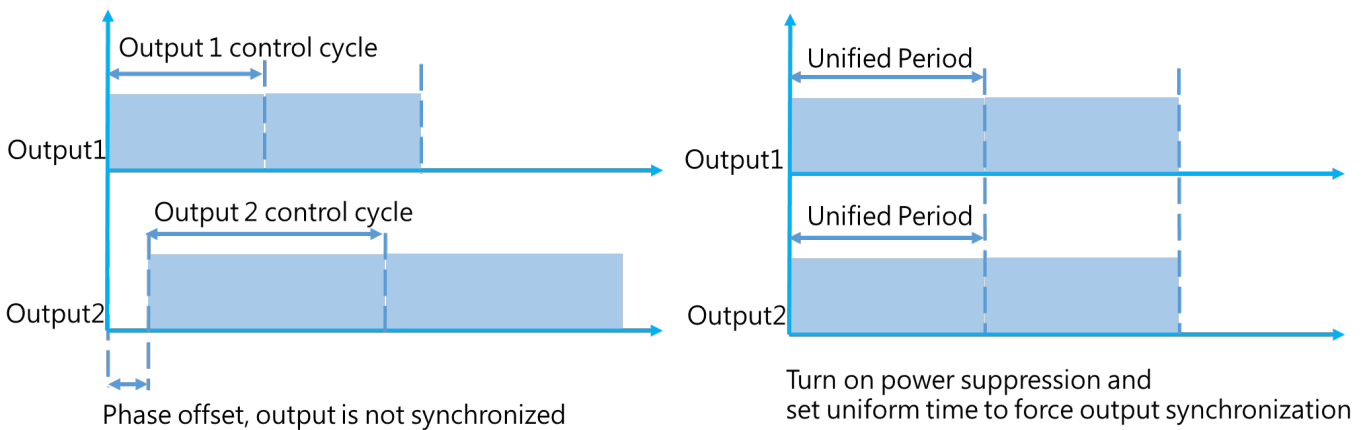
Chapter 6

Appendix

6.1 Temperature Sensor Type and Temperature Range

Input sensor type	Communication register value	Temperature range	Input sensor type	Communication register value	Temperature range
Thermocouple K type	0	-200 - 1300°C	Thermocouple TXK type	10	-150 - 800°C
Thermocouple J type	1	-100 - 1200°C	Platinum measurement resistance (JPt100)	11	-20 - 400°C
Thermocouple T type	2	-200 - 400°C	Platinum measurement resistance (Pt100)	12	-200 - 850°C
Thermocouple E type	3	0 - 600°C	Resistance temperature sensor (Ni120)	13	-80 - 300°C
Thermocouple N type	4	-200 - 1300°C	Resistance temperature sensor (Cu50)	14	-50 - 150°C
Thermocouple R type	5	0 - 1700°C	Analog voltage input (0-5V)	15	-999-9999
Thermocouple S type	6	0 - 1700°C	Analog voltage input (0-10V)	16	-999-9999
Thermocouple B type	7	100 - 1800°C	Analog current input (0-20m A)	17	-999-9999
Thermocouple L type	8	-200 - 850°C	Analog current input (4-20m A)	18	-999-9999
Thermocouple U type	9	-200 - 500°C	Analog voltage input (0-50m V)	19	-999-9999

6.2 RS485 Communication

1. The DIP switch, the host station address and the expansion module station address must be set before the host is powered on.

2. Support communication baud rate of 4800, 9600, 19200, 38400, 57600, 115200bps. For more information about communication formats, see Communication parameter hardware settings

3. Function code (Function): H03 = read the register content, up to 64 words; H06 = write a word to the register; H10 = write multiple words to the register, up to 64 words

4. For detailed information about the register, please refer to the DTM online version operation manual. Download from Delta website: *www.deltaww.com/*

The address and content of the communication function are shown in the table below. x indicates internal station number , x = 0 indicates for the host

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
SV(R/W)	unit: 01	Hx000	Hx001	Hx002	Hx003	Hx004	Hx005	Hx006	Hx007
SV high limit	Range: SV low limit~ Input high limit	Hx008	Hx009	Hx00A	Hx00B	Hx00C	Hx00D	Hx00E	Hx00F
SV low limit	range: Input low limit~ SV high limit	Hx010	Hx011	Hx012	Hx013	Hx014	Hx015	Hx016	Hx017
Input Offset	Unit: 0.1°C range: -999 ~ +999	Hx018	Hx019	Hx01A	Hx01B	Hx01C	Hx01D	Hx01E	Hx01F
Input Gain	range: -999 ~ +999	Hx020	Hx021	Hx022	Hx023	Hx024	Hx025	Hx026	Hx027
Input sensor type	Corresponding to input sensor type	Hx028	Hx029	Hx02A	Hx02B	Hx02C	Hx02D	Hx02E	Hx02F
Digital filtering factor	range: 0 ~ 50 default:8	Hx030	Hx031	Hx032	Hx033	Hx034	Hx035	Hx036	Hx037
Digital filtering range	unit: 0.1°C range: 1 ~ 100 default: 10 (1.0°C)	Hx038	Hx039	Hx03A	Hx03B	Hx03C	Hx03D	Hx03E	Hx03F
ALM1 action	refer to Chapter 4	Hx040	Hx041	Hx042	Hx043	Hx044	Hx045	Hx046	Hx047
ALM1 delay	unit: 1s range: 0~100	Hx048	Hx049	Hx04A	Hx04B	Hx04C	Hx04D	Hx04E	Hx04F
ALM1 option	Bit3: PV peak value Bit2: hold Bit1: invert Bit0: standby	Hx050	Hx051	Hx052	Hx053	Hx054	Hx055	Hx056	Hx057
ALM2 action	refer to Chapter 4	Hx058	Hx059	Hx05A	Hx05B	Hx05C	Hx05D	Hx05E	Hx05F
ALM2 delay	unit: 1s range: 0~100	Hx060	Hx061	Hx062	Hx063	Hx064	Hx065	Hx066	Hx067

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
ALM2 option	Bit3: PV peak value Bit2: hold Bit1: invert Bit0: standby	Hx068	Hx069	Hx06A	Hx06B	Hx06C	Hx06D	Hx06E	Hx06F
ALM3 action	refer to Chapter 4	Hx070	Hx071	Hx072	Hx073	Hx074	Hx075	Hx076	Hx077
ALM3 delay	unit: 1s range: 0~100	Hx078	Hx079	Hx07A	Hx07B	Hx07C	Hx07D	Hx07E	Hx07F
ALM3 option	Bit3: PV peak value Bit2: hold Bit1: invert Bit0: standby	Hx080	Hx081	Hx082	Hx083	Hx084	Hx085	Hx086	Hx087
ALM1-H	Alarm when temperature over upper limit	Hx088	Hx089	Hx08A	Hx08B	Hx08C	Hx08D	Hx08E	Hx08F
ALM1-L	Alarm when temperature under lower limit	Hx090	Hx091	Hx092	Hx093	Hx094	Hx095	Hx096	Hx097
ALM2-H	Alarm when temperature over upper limit	Hx098	Hx099	Hx09A	Hx09B	Hx09C	Hx09D	Hx09E	Hx09F
ALM2-L	Alarm when temperature under lower limit	Hx0A0	Hx0A1	Hx0A2	Hx0A3	Hx0A4	Hx0A5	Hx0A6	Hx0A7
ALM3-H	Alarm when temperature over upper limit	Hx0A8	Hx0A9	Hx0AA	Hx0AB	Hx0AC	Hx0AD	Hx0AE	Hx0AF
ALM3-L	Alarm when temperature under lower limit	Hx0B0	Hx0B1	Hx0B2	Hx0B3	Hx0B4	Hx0B5	Hx0B6	Hx0B7
Automatic control mode	0: PID 1: ON-OFF 2: programmable PID	Hx0B8	Hx0B9	Hx0BA	Hx0BB	Hx0BC	Hx0BD	Hx0BE	Hx0BF
Control mode transfer	0: Automatic 1: Manual	Hx0C0	Hx0C1	Hx0C2	Hx0C3	Hx0C4	Hx0C5	Hx0C6	Hx0C7
OUT1 control action	0: heating(default) 1: cooling	Hx0C8	Hx0C9	Hx0CA	Hx0CB	Hx0CC	Hx0CD	Hx0CE	Hx0CF
OUT2 control action	0: heating(default) 1: cooling	Hx0D0	Hx0D1	Hx0D2	Hx0D3	Hx0D4	Hx0D5	Hx0D6	Hx0D7
OUT1 control hysteresis	unit: 0.1(PV unit) range: 0 ~ 9,999	Hx0D8	Hx0D9	Hx0DA	Hx0DB	Hx0DC	Hx0DD	Hx0DE	Hx0DF
% OUT1 power (Manual)	unit: 0.1 %	Hx0E0	Hx0E1	Hx0E2	Hx0E3	Hx0E4	Hx0E5	Hx0E6	Hx0E7
OUT1 upper limit	unit: 0.1% range: OUT lower limit ~100%	Hx0E8	Hx0E9	Hx0EA	Hx0EB	Hx0EC	Hx0ED	Hx0EE	Hx0EF
OUT1 lower limit	unit: 0.1% range: 0 ~OUT upper limit %	Hx0F0	Hx0F1	Hx0F2	Hx0F3	Hx0F4	Hx0F5	Hx0F6	Hx0F7
OUT1 cycle time	unit: 0.1s	Hx0F8	Hx0F9	Hx0FA	Hx0FB	Hx0FC	Hx0FD	Hx0FE	Hx0FF

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	range: 1 ~ 600 default:5s (RELAY: default 20s)								
Sensor fail OUT1 power level	unit: 0.1 %	Hx100	Hx101	Hx102	Hx103	Hx104	Hx105	Hx106	Hx107
OUT2 control hysteresis	unit: 0.1(PV unit) range: 0 ~ 9,999	Hx118	Hx119	Hx11A	Hx11B	Hx11C	Hx11D	Hx11E	Hx11F
% OUT2 power (Manual)	range: 0.1 %	Hx120	Hx121	Hx122	Hx123	Hx124	Hx125	Hx126	Hx127
OUT2 upper limit	unit: 0.1% range: OUT lower limit ~100%	Hx128	Hx129	Hx12A	Hx12B	Hx12C	Hx12D	Hx12E	Hx12F
OUT2 lower limit	unit: 0.1% range: 0 ~OUT upper limit %	Hx130	Hx131	Hx132	Hx133	Hx134	Hx135	Hx136	Hx137
OUT2 cycle time	unit: 0.1s range: 1 ~ 600 default: 5s (RELAY: default 20s)	Hx138	Hx139	Hx13A	Hx13B	Hx13C	Hx13D	Hx13E	Hx13F
Sensor fail OUT2 power level	unit: 0.1 %	Hx140	Hx141	Hx142	Hx143	Hx144	Hx145	Hx146	Hx147
Output power offset	unit: 0.1% range: 0 ~ 1,000	Hx170	Hx171	Hx172	Hx173	Hx174	Hx175	Hx176	Hx177
Deadband	-99.9 ~ 999.9	Hx178	Hx179	Hx17A	Hx17B	Hx17C	Hx17D	Hx17E	Hx17F
cooling way	0: as the same as heat 1: linear 2: air cooling 3: water cooling	Hx180	Hx181	Hx182	Hx183	Hx184	Hx185	Hx186	Hx187
OUT1 to station-channel[*1]	Bit7~4:station number Bit3~0:channel location	Hx190	Hx191	Hx192	Hx193	Hx194	Hx195	Hx196	Hx197
OUT2 to station-channel[*1]	Bit7~4: station number Bit3~0: channel location	Hx198	Hx199	Hx19A	Hx19B	Hx19C	Hx19D	Hx19E	Hx19F
ALM1 to station-channel[*1]	Bit7~4: station number Bit3~0: channel location	Hx1A0	Hx1A1	Hx1A2	Hx1A3	Hx1A4	Hx1A5	Hx1A6	Hx1A7
ALM2 to station-channel[*1]	Bit7~4: station number Bit3~0: channel location	Hx1A8	Hx1A9	Hx1AA	Hx1AB	Hx1AC	Hx1AD	Hx1AE	Hx1AF
ALM3 to station-channel[*1]	Bit7~4: station number Bit3~0: channel location	Hx1B0	Hx1B1	Hx1B2	Hx1B3	Hx1B4	Hx1B5	Hx1B6	Hx1B7
CT1 to station-	Bit7~4: station	Hx1C0	Hx1C1	Hx1C2	Hx1C3	Hx1C4	Hx1C5	Hx1C6	Hx1C7

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
channel[1]	number Bit3~0: channel location								
CT2 to station-channel[1]	Bit7~4: station number Bit3~0: channel location	Hx1C8	Hx1C9	Hx1CA	Hx1CB	Hx1CC	Hx1CD	Hx1CE	Hx1CF
Control status	0: Stop 1: Run 2: Program ends 3: Program pause	Hx248	Hx249	Hx24A	Hx24B	Hx24C	Hx24D	Hx24E	Hx24F
Auto-tuning	0: Stop 1: In progress	Hx250	Hx251	Hx252	Hx253	Hx254	Hx255	Hx256	Hx257
PV value	unit: 0.1	Hx268	Hx269	Hx26A	Hx26B	Hx26C	Hx26D	Hx26E	Hx26F
SV value(R)	unit: 0.1	Hx270	Hx271	Hx272	Hx273	Hx274	Hx275	Hx276	Hx277
% OUT1 power (Automatic)	unit: 0.1 %	Hx278	Hx279	Hx27A	Hx27B	Hx27C	Hx27D	Hx27E	Hx27F
% OUT2 power (Automatic)	unit: 0.1 %	Hx280	Hx281	Hx282	Hx283	Hx284	Hx285	Hx286	Hx287
Channel status	enable=1; disable=0 Bit7: auto-tune Bit6: OUT1 Bit5: OUT2 Bit4: ALM1 Bit3:℉ Bit2:℃ Bit1: ALM2 Bit0: ALM3	Hx288	Hx289	Hx28A	Hx28B	Hx28C	Hx28D	Hx28E	Hx28F
CT1 value[2]	unit: 0.1 A	Hx2C8	Hx2C9	Hx2CA	Hx2CB	Hx2CC	Hx2CD	Hx2CE	Hx2CF
CT2 value[3]	unit: 0.1 A	Hx2D0	Hx2D1	Hx2D2	Hx2D3	Hx2D4	Hx2D5	Hx2D6	Hx2D7
Proportional band	unit: 0.1(℃ or ℉) range:0 ~ 9,999	Hx2E1	Hx2E9	Hx2F1	Hx2F9	Hx301	Hx309	Hx311	Hx319
Integral time	unit: s default: 0 ~ 9,999	Hx2E2	Hx2EA	Hx2F2	Hx2FA	Hx302	Hx30A	Hx312	Hx31A
Derivative time	unit: s default: 0 ~ 9,999	Hx2E3	Hx2EB	Hx2F3	Hx2FB	Hx303	Hx30B	Hx313	Hx31B
Cooling side proportional band	unit: 0.1(℃ or ℉) range:0 ~ 9,999	Hx2E4	Hx2EC	Hx2F4	Hx2FC	Hx304	Hx30C	Hx314	Hx31C
Cooling side integral time	unit: s default: 0 ~ 9,999	Hx2E5	Hx2ED	Hx2F5	Hx2FD	Hx305	Hx30D	Hx315	Hx31D
Cooling side derivative time	unit: s default: 0 ~ 9,999	Hx2E6	Hx2EE	Hx2F6	Hx2FE	Hx306	Hx30E	Hx316	Hx31E
PID Group	0~3: group1~4 4: Automatic switch	Hx3E8	Hx3E9	Hx3EA	Hx3EB	Hx3EC	Hx3ED	Hx3EE	Hx3EF
SV ramp rate	unit: 0.1℃/min range: 0 ~ 3,000	Hx3F0	Hx3F1	Hx3F2	Hx3F3	Hx3F4	Hx3F5	Hx3F6	Hx3F7
ALM1 max.	Record highest alarm value	Hx980	Hx981	H982	Hx983	Hx984	Hx985	Hx986	Hx987

PLC1.ir

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
ALM1 min.	Record lowest alarm value	Hx988	Hx989	Hx98A	Hx98B	Hx98C	Hx98D	Hx98E	Hx98F
ALM2 max.	Record highest alarm value	Hx990	Hx991	Hx992	Hx993	Hx994	Hx995	Hx996	Hx997
ALM2 min.	Record lowest alarm value	Hx998	Hx999	Hx99A	Hx99B	Hx99C	Hx99D	Hx99E	Hx99F
ALM3 max.	Record highest alarm value	Hx9A0	Hx9A1	Hx9A2	Hx9A3	Hx9A4	Hx9A5	Hx9A6	Hx9A7
ALM3 min.	Record lowest alarm value	Hx9A8	Hx9A9	Hx9AA	Hx9AB	Hx9AC	Hx9AD	Hx9AE	Hx9AF

Name	Address	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Channel disable (0 : disable, 1 : enable)	Hx258	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Temperature scale (0 : ℉ 、 1 : ℃)	Hx259	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Cold junction compensation select[*4]	Hx260	**Host:** H0000:CH1 ~ CH8 are all used **internal cold junction compensation** (factory default). H0001: CH1 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH1 as the external cold junction compensation. H0002: CH2 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH2 as the external cold junction compensation. H0003: CH3 is the external cold junction temperature, and the remaining channels are all used the value of CH3 as the external cold junction compensation. H0004 = CH4 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH4 as the external cold junction compensation. H0005 = CH5 is the external cold junction temperature, and the remaining channels are all used the temperature of CH5 as the external cold junction compensation. H0006 = CH6 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH6 as the external cold junction compensation. H0007 = CH7 is the external cold junction temperature, and the remaining channels are all used all compensated by using the temperature value of CH7 as the external cold junction. H0008 = CH8 is the external cold junction temperature, and the remaining channels are all used all based on the temperature value of CH8 as the external cold junction compensation. **Measurement Expansion module:** H0000: CH1 ~ CH8 are all used **internal cold junction compensation**. (factory default) H0009: CH1 ~ CH8 are all compensated by the **external cold junction** temperature transmitted from the DTM host. H0001: CH1 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH1 as the external cold junction compensation. H0002: CH2 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH2 as the external cold junction compensation.								

		H0003: CH3 is the external cold junction temperature, and the remaining channels are all used the value of CH3 as the external cold junction compensation.
		H0004: CH4 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH4 as the external cold junction compensation.
		H0005: CH5 is the external cold junction temperature, and the remaining channels are all used the temperature of CH5 as the external cold junction compensation.
		H0006: CH6 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH6 as the external cold junction compensation.
		H0007: CH7 is the external cold junction temperature, and the remaining channels are all used compensated by using the temperature value of CH7 as the external cold junction.
		H0008: CH8 is the external cold junction temperature, and the remaining channels are all used the temperature value of CH8 as the external cold junction compensation.

Notes:

1) *Write content H00yz according to DTM-DOx, DTM-CTx series accessory station number (y: 1 ~ F) and channel (z: 0 ~ 7), and so on. Example: If you want to assign " output 2 of input CH1" of the measurement expansion module with internal station number address 2 to the "CH1 terminal" of DTM-DOx series accessories of internal station number address 4, write the content "H0040" into address H2198*

2) *When using CT1, first CT1 corresponds to output 1, and output 1 must be assigned to use [expansion cassette], and output 1 corresponds to the same host or measurement expansion module, and the corresponding DTM-CT030 station number can choose 1 ~ F。*

3) *When using CT2, first CT2 corresponds to output 2. Output 2 can be designated to use [Expansion Cassette] or [I / O Expansion Module]. When [Expansion Cassette] is specified for output 2, output 2 must correspond to the same host or measurement expansion module, and the corresponding DTM-CT030 station number can be selected from 1 ~ F, or the same DTM-CT030 as CT1. ; When [IO Expansion Module] is specified for output 2, output 2 must correspond to the same IO expansion module, and the corresponding DTM-CT030 station number can only select 9 ~ F, and cannot be the same DTM-CT030 as CT1. Only a second DTM-CT030 can be installed, and the corresponding IO expansion module must be the same as the second DTM-CT030 station number。*

4) *Example: to use the CH1 temperature value of host as the external cold junction compensation of other channels, write the content [H0001] into the address [H0260]. The selection of CH1's input can be PT100 or thermocouple type. x indicates the internal station number of the host or measurement expansion module.*

6.3 Expansion Cassette Series Accessories Operation Instructions

Output adjustment settings for DTM-BDC and DTM-BDL models that can be calibrated:

Analog output current adjustment scale: 1µA / scale; analog output voltage adjustment scale: 1mV / scale

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
AO lower limit adjust (expansion cassette)	4~20mA or 0~10V fine tune	Hx228	Hx229	Hx22A	Hx22B	Hx22C	Hx22D	Hx22E	Hx22F
AO upper limit adjust (expansion cassette)	4~20mA or 0~10V fine tune	Hx230	Hx231	Hx232	Hx233	Hx234	Hx235	Hx236	Hx237

Notes：

1) x is the station number of DTM-BDC and DTM-BDL, x = 0 represents the host.

2) The 8 physical output points of the DTM host and the measurement expansion module itself (equipped with two expansion cassettes) are preset for control output 1.

3) The output must be used with the input. When there is no signal at the input, the output will not work.

6.4 DTM-Dox Series Accessories Operation Instructions

DTM-DOx series accessories use DTM host or measurement expansion module to set the internal station number and channel of output DTM-DOx corresponding to output 1 and 2, so that DTM-DO series accessories perform output operations.

Output adjustment value setting for DTM-DOC and DTM-DOL models with correctable I / O expansion modules:

Analog output current adjustment scale: 1µA / scale; analog output voltage adjustment scale: 1mV / scale

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
AO lower limit adjust (I/O expansion module)	4~20mA or 0~10V fine tune	Hx789	Hx78A	Hx78B	Hx78C	Hx7C9	Hx7CA	Hx7CB	Hx7CC
AO upper limit adjust (I/O expansion module)	4~20mA or 0~10V fine tune	Hx78D	Hx78E	Hx78F	Hx790	Hx7CD	Hx7CE	Hx7CF	Hx7D0

Notes:

1)   x is the station number of DTM-DOC and DTM-DOL, x = 0 represents the host.

2)   The output must be used with the input. When there is no signal at the input, the output will not work.

6.5 DTM-CT Series Accessories Operation Instructions

DTM-CT series accessories are only used for current measurement. The current value of the CT sensor (unit: 0.1A) can be read through the following address. The y below represents the DTM-CT station number.

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CT current when OUT being ON or OFF	unit: 0.1A range: 0 ~ 9,999	Hy2C0	Hy2C1	Hy2C2	Hy2C3	Hy2C4	Hy2C5	Hy2C6	Hy2C7

Name	Address	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CT sensor mode 0: 30A、1: 100A	Hy841	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7

Notes: y is the internal station number of DTM-CT030.

6.6 Programmable Control Parameter Setting

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Step remaining time(sec)	Unit: sec	Hx2B0	Hx2B1	Hx2B2	Hx2B3	Hx2B4	Hx2B5	Hx2B6	Hx2B7
Step remaining time(min)	Unit: min	Hx2B8	Hx2B9	Hx2BA	Hx2BB	Hx2BC	Hx2BD	Hx2BE	Hx2BF
Pattern status	0 ~ 7	Hx290	Hx291	Hx292	Hx293	Hx294	Hx295	Hx296	Hx297
Step status	0 ~ 7	Hx298	Hx299	Hx29A	Hx29B	Hx29C	Hx29D	Hx29E	Hx29F
Wait SV		Hx400	Hx401	Hx402	Hx403	Hx404	Hx405	H406	Hx407
Wait time		Hx408	Hx409	Hx40A	Hx40B	Hx40C	Hx40D	H40E	Hx40F
Start slope		Hx410	Hx411	Hx412	Hx413	Hx414	Hx415	H416	Hx417
Start pattern	0 ~ 7	Hx418	Hx419	Hx41A	Hx41B	Hx41C	Hx41D	Hx41E	Hx41F
Start step	0 ~ 7	Hx420	Hx421	Hx422	Hx423	Hx424	Hx425	Hx426	Hx427

Name	Description	Pattern 0	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Pattern 7
End step	0 ~ 7 = N，indicates that this pattern is executed from step 0 to step N	Hx428	Hx429	Hx42A	Hx42B	Hx42C	Hx42D	Hx42E	Hx42F
Cycle count	0 ~ 199, indicates that this pattern is executed 1~200 times	Hx430	Hx431	Hx432	Hx433	Hx434	Hx435	Hx436	Hx437
Linked pattern	0 ~ 8, 8 indicates the end of the program, 0 ~ 7 indicates the next pattern number to be executed after this pattern ends.	Hx438	Hx439	Hx43A	Hx43B	Hx43C	Hx43D	Hx43E	Hx43F

Name	Description	Pattern0	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Pattern 7
Step0 setting	Step0 SV Step0 time	Hx440 Hx441	Hx442 Hx443	Hx444 Hx445	Hx446 Hx447	Hx448 Hx449	Hx44A Hx44B	Hx44C Hx44D	Hx44E Hx44F
Step1 setting	Step1 SV Step1 time	Hx450 Hx451	Hx452 Hx453	Hx454 Hx455	Hx456 Hx457	Hx458 Hx459	Hx45A Hx45B	Hx45C Hx45D	Hx45E Hx45F
Step2 setting	Step2 SV Step2 time	Hx460 Hx461	Hx462 Hx463	Hx464 Hx465	Hx466 Hx467	Hx468 Hx469	Hx46A Hx46B	Hx46C Hx46D	Hx46E Hx46F
Step3 setting	Step3 SV Step3 time	Hx470 Hx471	Hx472 Hx473	Hx474 Hx475	Hx476 Hx477	Hx478 Hx479	Hx47A Hx47B	Hx47C Hx47D	Hx47E Hx47F
Step4 setting	Step4 SV Step4 time	Hx480 Hx481	Hx482 Hx483	Hx484 Hx485	Hx486 Hx487	Hx488 Hx489	Hx48A Hx48B	Hx48C Hx48D	Hx48E Hx48F
Step5 setting	Step5 SV Step5 time	Hx490 Hx491	Hx492 Hx493	Hx494 Hx495	Hx496 Hx497	Hx498 Hx499	Hx49A Hx49B	Hx49C Hx49D	Hx49E Hx49F
Step6 setting	Step6 SV Step6 time	Hx4A0 Hx4A1	Hx4A2 Hx4A3	Hx4A4 Hx4A5	Hx4A6 Hx4A7	Hx4A8 Hx4A9	Hx4AA Hx4AB	Hx4AC Hx4AD	Hx4AE Hx4AF
Step7 setting	Step7 SV Step7 time	Hx4B0 Hx4B1	Hx4B2 Hx4B3	Hx4B4 Hx4B5	Hx4B6 Hx4B7	Hx4B8 Hx4B9	Hx4BA Hx4BB	Hx4BC Hx4BD	Hx4BE Hx4BF

6.7 PID Group Parameter Setting

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
PID Group1 SV	unit: 0.1	Hx500	Hx508	Hx510	Hx518	Hx520	Hx528	Hx530	Hx538
PID Group1 proportional band	unit: 0.1 range: 0 ~ 9,999	Hx501	Hx509	Hx511	Hx519	Hx521	Hx529	Hx531	Hx539
PID Group1 integral time	range: 0 ~ 9,999	Hx502	Hx50A	Hx512	Hx51A	Hx522	Hx52A	Hx532	Hx53A
PID Group1 derivative time	range: 0 ~ 9,999	Hx503	Hx50B	Hx513	Hx51B	Hx523	Hx52B	Hx533	Hx53B
PID Group1 cooling proportional band	unit: 0.1 range: 0 ~ 9,999	Hx504	Hx50C	Hx514	Hx51C	Hx524	Hx52C	Hx534	Hx53C
PID Group1 cooling integral time	range: 0 ~ 9,999	Hx505	Hx50D	Hx515	Hx51D	Hx525	Hx52D	Hx535	Hx53D
PID Group1 cooling derivative time	range: 0 ~ 9,999	Hx506	Hx50E	Hx516	Hx51E	Hx526	Hx52E	Hx536	Hx53E
Reservation 1		Hx507	Hx50F	Hx517	Hx51F	Hx527	Hx52F	Hx537	Hx53F
PID Group2 SV	unit: 0.1	Hx540	Hx548	Hx550	Hx558	Hx560	Hx568	Hx570	Hx578
PID Group2 proportional band	unit: 0.1 range: 0 ~ 9,999	Hx541	Hx549	Hx551	Hx559	Hx561	Hx569	Hx571	Hx579
PID Group2 integral time	range: 0 ~ 9,999	Hx542	Hx54A	Hx552	Hx55A	Hx562	Hx56A	Hx572	Hx57A
PID Group2 derivative time	range: 0 ~ 9,999	Hx543	Hx54B	Hx553	Hx55B	Hx563	Hx56B	Hx573	Hx57B
PID Group2 cooling proportional band	unit: 0.1 range: 0 ~ 9,999	Hx544	Hx54C	Hx554	Hx55C	Hx564	Hx56C	Hx574	Hx57C
PID Group2 cooling integral time	range: 0 ~ 9,999	Hx545	Hx54D	Hx555	Hx55D	Hx565	Hx56D	Hx575	Hx57D
PID Group2 cooling derivative time	range: 0 ~ 9,999	Hx546	Hx54E	Hx556	Hx55E	Hx566	Hx56E	Hx576	Hx57E
Reservation 2		Hx547	Hx54F	Hx557	Hx55F	Hx567	Hx56F	Hx577	Hx57F
PID Group3 SV	unit: 0.1	Hx580	Hx588	Hx590	Hx598	Hx5A0	Hx5A8	Hx5B0	Hx5B8
PID Group3 proportional band	unit: 0.1 range: 0 ~ 9,999	Hx581	Hx589	Hx591	Hx599	Hx5A1	Hx5A9	Hx5B1	Hx5B9
PID Group3 integral time	range: 0 ~ 9,999	Hx582	Hx58A	Hx592	Hx59A	Hx5A2	Hx5AA	Hx5B2	Hx5BA
PID Group3	range: 0 ~ 9,999	Hx583	Hx58B	Hx593	Hx59B	Hx5A3	Hx5AB	Hx5B3	Hx5BB

Name	Description	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
derivative time									
PID Group3 cooling proportional band	unit: 0.1 range: 0 ~ 9,999	Hx584	Hx58C	Hx594	Hx59C	Hx5A4	Hx5AC	Hx5B4	Hx5BC
PID Group3 cooling integral time	range: 0 ~ 9,999	Hx585	Hx58D	Hx595	Hx59D	Hx5A5	Hx5AD	Hx5B5	Hx5BD
PID Group3 cooling derivative time	range: 0 ~ 9,999	Hx586	Hx58E	Hx596	Hx59E	Hx5A6	Hx5AE	Hx5B6	Hx5BE
Reservation 3		Hx587	Hx58F	Hx597	Hx59F	Hx5A7	Hx5AF	Hx5B7	Hx5BF
PID Group4 SV	unit: 0.1	Hx5C0	Hx5C8	Hx5D0	Hx5D8	Hx5E0	Hx5E8	Hx5F0	Hx5F8
PID Group4 proportional band	unit: 0.1 range: 0 ~ 9,999	Hx5C1	Hx5C9	Hx5D1	Hx5D9	Hx5E1	Hx5E9	Hx5F1	Hx5F9
PID Group4 integral time	range: 0 ~ 9,999	Hx5C2	Hx5CA	Hx5D2	Hx5DA	Hx5E2	Hx5EA	Hx5F2	Hx5FA
PID Group4 derivative time	range: 0 ~ 9,999	Hx5C3	Hx5CB	Hx5D3	Hx5DB	Hx5E3	Hx5EB	Hx5F3	Hx5FB
PID Group4 cooling proportional band	unit: 0.1 range: 0 ~ 9,999	Hx5C4	Hx5CC	Hx5D4	Hx5DC	Hx5E4	Hx5EC	Hx5F4	Hx5FC
PID Group4 cooling integral time	range: 0 ~ 9,999	Hx5C5	Hx5CD	Hx5D5	Hx5DD	Hx5E5	Hx5ED	Hx5F5	Hx5FD
PID Group4 cooling derivative time	range: 0 ~ 9,999	Hx5C6	Hx5CE	Hx5D6	Hx5DE	Hx5E6	Hx5EE	Hx5F6	Hx5FE