MDT Series Temperature Controller

User Quick Start Manual

Thank you for using MDT series temperature controller. Before using the product, please carefully read this manual so as to better understand it, fully use it, and ensure safety. This quick start manual is to offer you a quick guide to the design, installation, connection and maintenance of MDT series products for the convenience of users to access the required information on site, and provide a brief introduction to relevant accessories, FAQs, etc.

This manual is suitable for the following members:

MDT-01R-R *MDT-01T-R*

MDT-01R-T *MDT-01T-T*

MDT-02R-R *MDT-02T-R*

MDT-02R-T *MDT-02T-T*

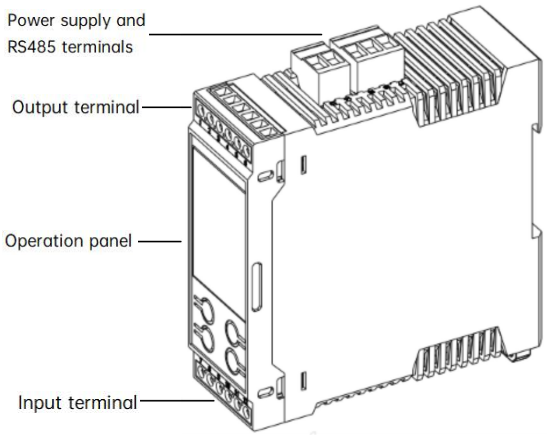
Version: A04

Revision date: 2023-12-28

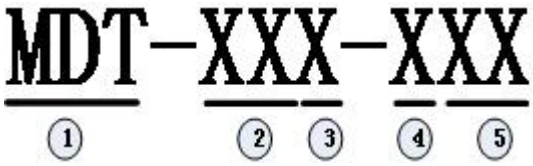
For detailed product information, please refer to *MDT Series Temperature Controller User Manual*, *MDT Series Temperature Controller Instructions*. For ordering the above user manuals, contact your Megmeet distributor or download from MEGMEET website (www.megmeet.com).

1. Appearance and Part Name

1.1 Appearance and terminal



2. Model



① MDT: Megmeet's MDT series temperature controller

② XX: Temperature control channel 01 and 02

③ X: Input mode R: RTD input
T: TC input

④ X: Output mode R: Relay output
T: Transistor output
C: DC current output
L: Linear voltage output
V: Voltage pulse output
N: None

⑤ XX: Reserved for special models

3. Installation

3.1 Ambient temperature

Temperature range for controller usage: -0℃~55℃. A well-ventilated place should be selected when the ambient temperature exceeds 45° C for a long time.

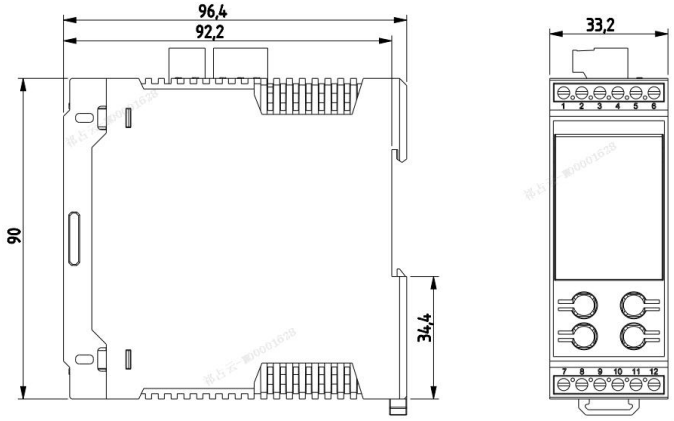
3.2 Installation site

- Place without corrosion, flammable and explosive gas and liquid.
- Solid place without vibration.
- This controller is designed for II standard installation environment and 2-level pollution occasions.

3.3 Installation method

The controller, without heating equipment under it, must be installed horizontally on the backplane of the electrical cabinet in vertical direction, and keep a distance of more than 20cm from the peripheral equipment or cabinet wall for heat dissipation. Mounted by 35mm-width DIN slots, the module can be connected with the snap-fit, which you can push it along the front direction of the module to fasten modules tightly. Then, users can open the DIN snap-fit at the bottom of the module and lock the bottom onto the DIN rail; Rotate module close to the DIN guide rail and close the DIN snap-fit with a double-checking.

The dimensions of this module are shown in the figure below:



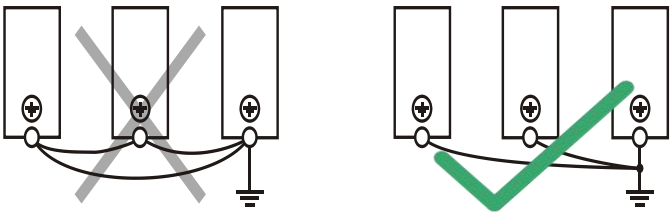
3.4 Cable connection and specification

It is recommended to use stranded copper conductors and prefabricate insulated ends to ensure connection quality. The following table lists the sectional areas and models of the recommended cables.

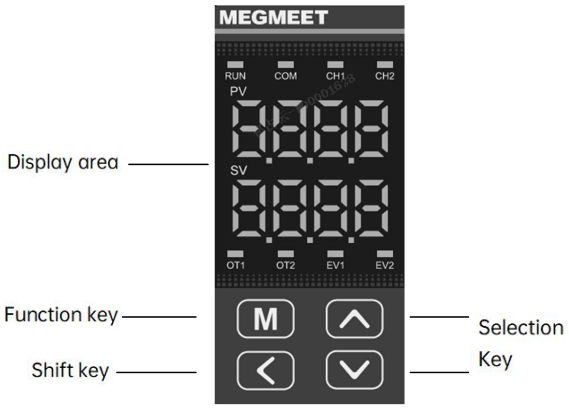
Cable	Location	Allowed cable No.	Recommended stripping length	Installation method
Power terminal (3PIN)	Upper side	12 ~ 30AWG	6.5mm	Screw
Communication terminal (2PIN)	Upper side	12 ~ 30AWG	6.5mm	Screw
Input terminal (6PIN)	Lower side	16 ~ 26AWG	10 ~ 15mm	Plug-in
Output terminal (6PIN)	Lower side	16 ~ 26AWG	10 ~ 15mm	Plug-in

For the security(prevent electric shock and fire accidents) and lower noise, the grounding terminal should be grounded in strict accordance with

the requirements of the national electrical regulations, and the grounding resistance should be less than 100 Ω. The single-point grounding should be adopted and there is no loop between ground wires when multiple modules are grounded, as shown below:



4. Operation Panel



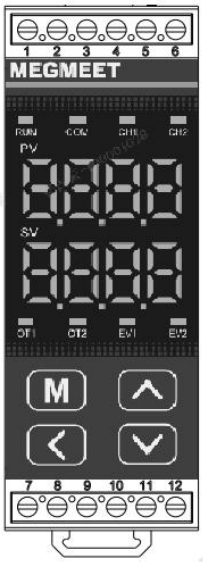
Display Area

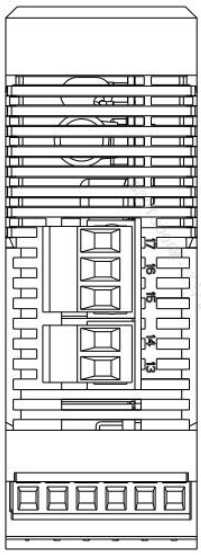
Name	Function	Description
RUN	Running indicator	Flash quickly（10Hz～15Hz）：Normal Flash slowly（0.5Hz～1Hz）：Error
COM	Communication indicator	Flash：Communication is normal OFF：No communication
CH1	CH1 indicator	Indicate the current display channel
CH2	CH2 indicator	
OT1	Output indicator OUT1	ON：Channel output is ON OFF：Channel output is OFF
OT2	Output indicator OUT2	
EV1	Alarm indicator ALM1	ON：Channel output is ON OFF：Channel output is OFF
EV2	Alarm indicator ALM2	

Key

Key	Function	Description
M	Cancel & Confirm	After modifying the parameters, cancel the settings by short press, or confirm the settings by long press.
<	Menu switch Shift selection Channel switch	1) Short press: a) Switch the menu sequentially b) Move the cursor position after activating the menu 2) Long press：switch the channel
∨	Parameter selection	1) Complete the parameter setting with M-key long press, and cancel the setting with short press. 2) Once the menu is selected, press ∨ or ∧ to activate the menu.
∧	Parameter selection	

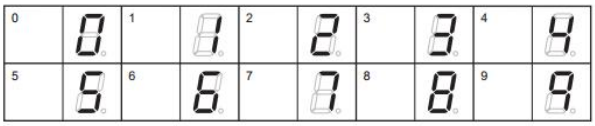
5. Terminal Introduction



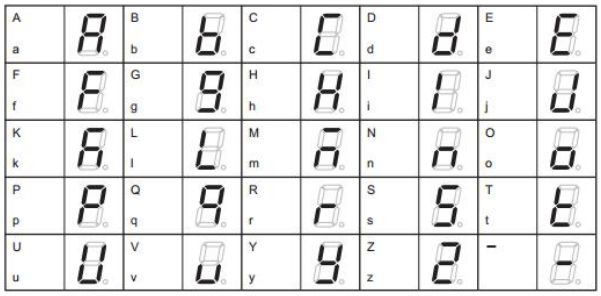


LED digit and letter display

The numbers are shown as follows.



The letters are shown as follows. There are English letters that cannot be displayed.



Note:

The number of 2 is the same as the letter of Z, 5 is the same as S, and 9 is the same as Q.

1) All menus have passwords, except for menu 0 and menu 1.

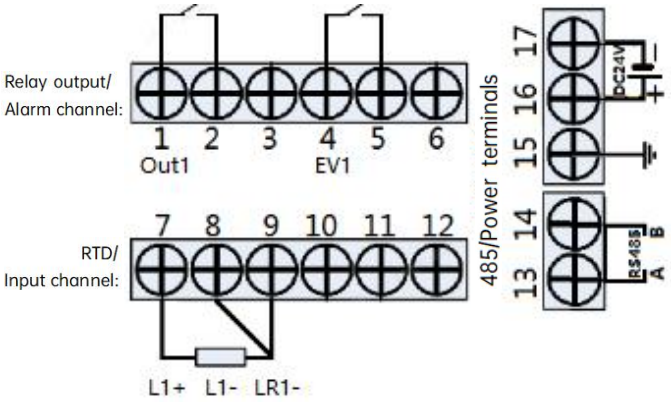
2) After setting the password, you need to enter the password to clear the menu.

3) After returning to the main menu in case of 5 Minutes No Operation, you are required to enter the password again .

4) When entering the password, the first line of the menu shows ' LoCk ', and the password is entered in the second line.

Menu ID	Menu	Name	Signal ID		Menu Para.	Content
0	NA	Main menu	#701~#702 #909~#910		PV，SV	1) 1st line: PV，2nd line: SV 2) Press and hold < to switch channels，indicator indicates the selected channel
1	r-S	Run-Stop	#1603	#1604	Run/stop setting	StoP rUn
2	InPt	Input Type	#901	#902	Input type selection	Refer to *Sensor*
3	StAn	Station Number	#4601		MODBUS station number	1~247
4	bAUd	Baud	#4600		RS485 baud rate	24：2400 48：4800 96：9600 384：38400 576：57600 1152：115200
5	Pty	Parity	#4600		RS485 parity mode	nonE odd EvEn
6	StoP	Stop Bit	#4600		RS485 Stop bit	1：1 Stop Bit 2：2 Stop Bits
7	Ht-P	Heat Proportion	#925	#926	Heat proportional band	Refer to *BFM Parameter*
8	Ht-I	Heat Integration	#933	#934	Heat integration time	Refer to *BFM Parameter*
9	Ht-D	Heat Differentiation	#941	#942	Heat differential time	Refer to *BFM Parameter*
10	CtPd	Control Period	#917	#918	Control output period setting	Refer to *BFM Parameter*
11	PvoF	PV OFFSET	#1619	#1620	Temperature compensation value setting	Refer to *BFM Parameter*
12	FoF	First Order Filter	#801	#802	First-order digital filter setting	Refer to *BFM Parameter*
13	A1Md	Alarm1 Mode	#600		Alarm 1 mode	*Refer to Alarm Type*
14	A1SV	Alarm1 SetValue	#606	#610	Alarm 1 set value	Refer to *BFM Parameter*

MDT-01R-R:



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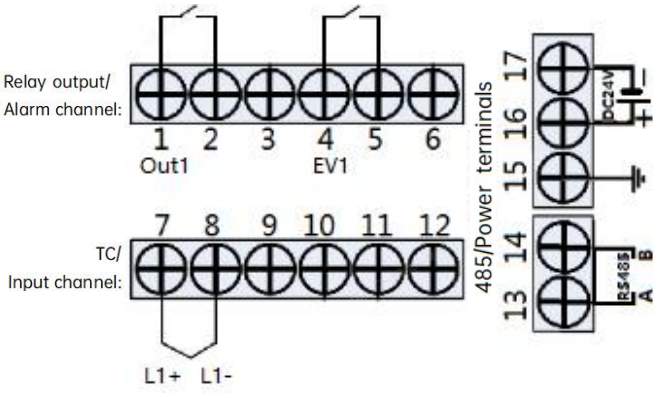

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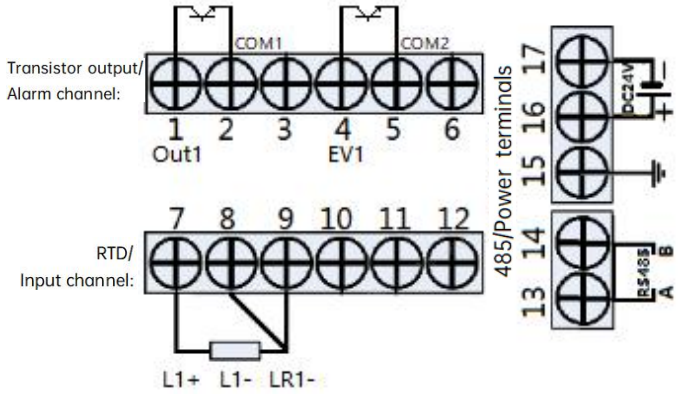
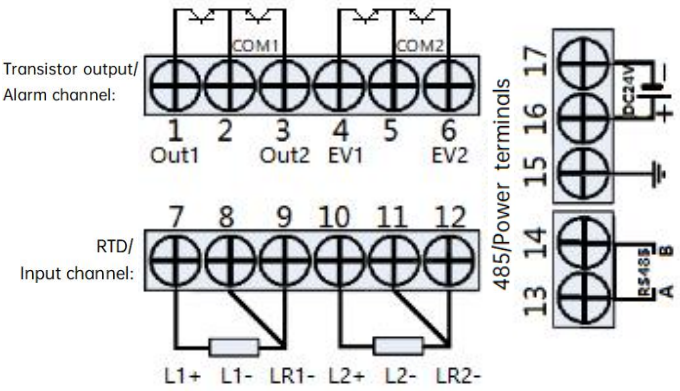
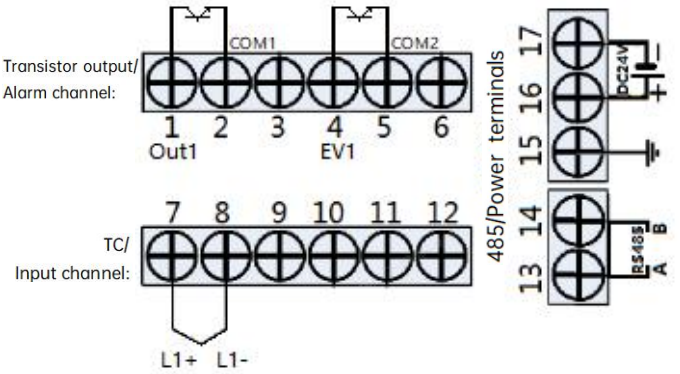


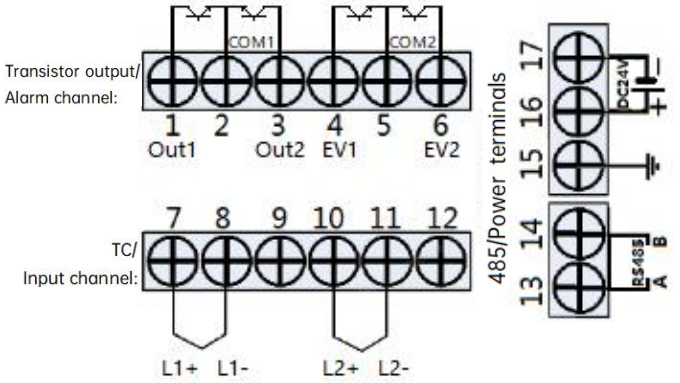
MDT-02R-T:



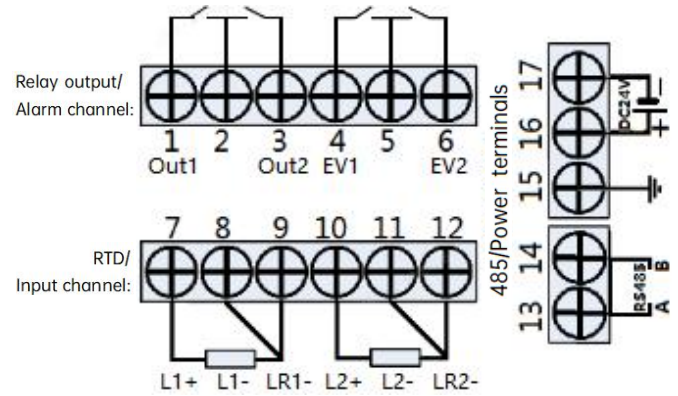
MDT-01T-T:



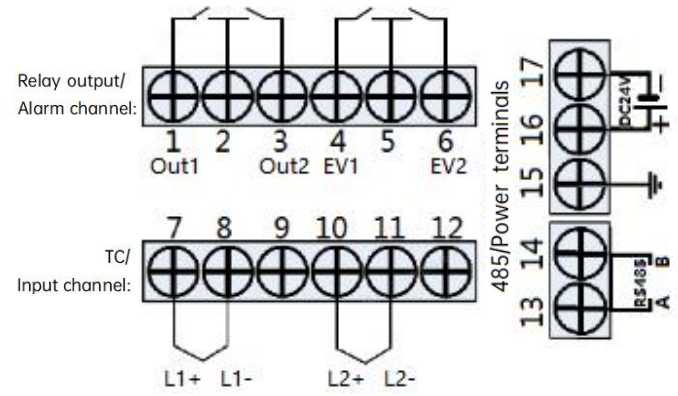
MDT-02T-T:



MDT-02R-R:



MDT-02T-R:



6. Electrical Specification

6.1 Power-supply Specification

Item	Unit	Min.	Rated	Max.	Remarks
Input voltage range	Vdc	20	24	30	Normal startup and operation
Input current	A	/	0.08	/	Rating and full load in normal temperature

6.2 Performance Specification

Item		Specification
Input signal	TC type	K、J、E、N、T、R、S、B
	RTD type	PT100、CU100、JPT100、Cu50、Ni120
Output mode	Transistor output with OC gate	Loop-power voltage: 5V ~ 24V; Max. loop-power voltage: 30V; Loop current: 0.3A/24Vdc; Open-circuit leakage current: < 0.1mA/30Vdc; Min.load: 5mA (5Vdc ~ 24Vdc)
	Relay output	Max. loop voltage: ≤AC250V/≤DC30V Max. loop current: 2A
Sampling cycle		100MS
Control cycle	Fast	1 ~ 100, Unit: 0.1s, specific value is determined by the control object characteristics
	Slow	1 ~ 100, Unit: 1s, specific value is determined by the control object characteristics
Control mode		ON/OFF, Manual, PID
Temperature range	Type K	- 100℃ ~ 1200℃ (- 148℉ ~ 2192℉)
	Type J	- 100℃ ~ 1200℃ (- 148℉ ~ 1112℉)
	Type E	- 100℃ ~ 850℃ (- 148℉ ~ 1562℉)

Item		Specification
	Type N	- 100℃ ~ 1200℃ (- 148℉ ~ 2192℉)
	Type T	- 200℃ ~ 300℃ (- 328℉ ~ 572℉)
	Type R	0℃ ~ 1600℃ (32℉ ~ 2912℉)
	Type S	0℃ ~ 1600℃ (32℉ ~ 2912℉)
	Type B	400℃ ~ 1800℃ (752℉ ~ 3272℉)
	Pt100	- 150℃ ~ 600℃ (- 238℉ ~ 1112℉)
	JPt100	- 150℃ ~ 500℃ (- 238℉ ~ 932℉)
	Cu100	- 30℃ ~ 120℃ (- 22℉ ~ 248℉)
	Cu50	- 30℃ ~ 120℃ (- 22℉ ~ 248℉)
	Ni120	- 80.0℃ ~ 280.0℃ (- 112.0℉ ~ 536.0℉)
Precision	TC	±0.3% of full range
	RTD	±0.5% of input range
Environmental compensation error		<1℃ (External cold-junction compensation)
Isolation		The sampling channel is isolated from the power supply and the output; Channels are isolated from each other, and communication is isolated from power supply.

6.3 Communication Specification

Name	Protocol	Port remark	Mode
Communication port	Modbus RTU slave	A，B	RS485

7. Buffer Memory (BFM)

MODBUS supports the function codes of 01, 03, 05, 06 and 16. The Code 01 and Code 05 operate on the bit register, while the Code 03, Code 06 and Code 16 operate on the integer register. The value of 0 will be obtained from a undefined register. It can read and write up to 100 BFM units at a time.

Parameter name	Parameter description	BFM address	
		CH1	CH2
Process Value (PV)	Channel measurement value	#701	#702
Heating control output (Manipulated Value)	The control output value of each channel calculated by the control algorithm.	#709	#710
Cooling control output (Manipulated Value)		#717	#718
Current execution segment of multi-segment control	The segment number that multi-segment setting is being executed. 0 : Not in execution status or execution is completed.	#725	#726
Cooling output status	Express in Bit, 0: Invalid; 1: Valid 1) Bit0: Cooling output status of Channel 1 2) Bit1: Cooling output status of Channel 2 3) Bit2~15: Reserved, fixed to 0	#733	
Error status word	Refer to *Status Word*	#735	
Address of set value range error	0: Normal; Other: Set a wrong BFM address	#736	
Cold-junction temperature	Measurement value of cold-junction temperature	#737	
Channel status word	Refer to *Status Word*	#738	#739
Factory reset	Set to 1 to restore the factory configuration, and clear automatically after completing	#200	
Change setting allowed	0: Changing prohibited; 1: Changing allowed	#201	
Display	0: No decimal; 1: 1 decimal(default) 1) Scroll display when PV exceeds 4 decimals 2) No scroll display for SV because its decimal point is fixed. 3) SV range: -999~9999(No decimal); -99.9~999.9(1 decimal	#243	
First order delay digital filter setting		#801	#802
D0	The channel characteristics are set by two-point method : 1) D0 and D1 represent the digital output of the channel, A0 and A1 represent the actual input temperature value. 2) A0 is fixed to 0, A1 is fixed to the maximum measurement value in the current mode. The channel characteristics can be changed by changing D0 and D1. Note : A0 and A1 are determined by the sensor type. Why the BFM parameters is public?	#809	#810
D1		#817	#818
A0		#825	#826
A1		#833	#834
Temp.Comp: Compensation value	Comp. value: -99.9~99.9 Gain value: -0.999~0.999 Display value = measurement value * (1+Gain value/1.000) + compensation value When the error is fixed and the temperature is different, you	#1619	#1620
Temp.Comp: Gain value		#1621	#1622

	only need to set the compensation value. When the temperatures and errors are are different, it is necessary to calculate the error linear situation first, and then adjust it in the way of compensation value + gain value.		
Control start or stop	0: Stop, 1: Start	#1603	#1604
Input type	Select the input type and temperature mode of each channel. Setting to 0 means that the channel is closed, and the corresponding channel does not perform A / D conversion.	#901	#902
Set value（SV）	Set the target temperature value of each channel, and the unit is determined according to the input type selection unit (# 901 ~ # 902).	#909	#910
Cycle of control output	Set the control output cycle for each channel	#917	#918
Heat proportional band		#925	#926
Heat integral time		#933	#934
Heat derivative time		#941	#942
Cool proportional band		#957	#958
Cool integral time		#965	#966
Cool derivative time		#973	#974
Heating and cooling overlapped or insensitive belts	0: None Range: -Input range ~ +Input range	#981	#982
Under-regulation inhibition coefficient	Water-cooled default: 10; Air-cooled default: 25	#989	#990
CH1～CH8 Auto-tuning setting	The lower 2 bits are valid; 0: Close self-tuning or complete self-tuning; 1: Start self-tuning 1) Bit0: Channel 1 self-tuning 2) Bit1: Channel 2 self-tuning 3) Bit2~15: Reserved，fixed to 0	#999	
Control mode	0: Manual；1: ON/OFF；2: PID	#1000	#1001
Heating/ cooling operation	0: Cooling；1: Heating；2: Water-cooling PID；3: Air-filled type PID；4: Position the proportion PID When the position proportional PID is selected, the MV of the temperature control output is the variation of the PID output value.	#1008	#1009
Manually output the set value	Set the constant output duty cycle of each channel.	#1016	#1017
Adjustment sensitivity settings	ON/OFF control mode is valid.	#1024	#1025
Self-tuning deviation settings	Range：± Input range	#1032	#1033
Heat proportional band adjustment factor		#1101	#1102
Heat integration time band adjustment coefficient		#1109	#1110
Heat differential time band adjustment coefficient		#1117	#1118
Cool proportional band adjustment factor		#1125	#1126
Cool integration time band adjustment coefficient		#1133	#1134
Cool differential time band adjustment coefficient		#1141	#1142
Set the rate of change limit to increase	0: No limit	#1149	#1150
Set the rate of change limit to decrease	0: No limit	#1157	#1158
Temperature control object characteristics	0: Slow rise and cool down. The units of control output cycle, integration time and differential time are seconds.	#1165	#1166

	1: Quick rise and cool down. The units of control output cycle, integration time and differential time are hundred microseconds.		
PID algorithm selection	0: Fuzzy PID algorithm; 1: Intelligent PID algorithm	#1173	#1174
PID output upper limit setting		#1181	#1182
PID output lower limit setting		#1189	#1190
PID output dead zone		#1197	#1198
Manual/ Auto mode switchover	0: Close auto switchover; 1: Open auto switchover	#1205	#1206
Channel 1 Aux Out	0: Link channel 1 warning mode 1: Close output 2: Open output 3: Channel 1 cooling output 4: Channel 1 heating output	#1309	
Channel 2 Aux Out	0: Link channel 2 warning mode 1: Close output 2: Open output 3: Channel 1 cooling output 4: Channel 1 heating output	#1310	
1st stage temperature setting	The temperature set value of each segment in each channel. The unit is determined according to the input type. When the mode is Celsius, the unit is 0.1 °C, and when the mode is Fahrenheit, the unit is 0.1 °C.	#400	#419
2nd stage temperature setting		#401	#420
3rd stage temperature setting		#402	#421
4th stage temperature setting		#403	#422
5th stage temperature setting		#404	#423
6th stage temperature setting		#405	#424
7th stage temperature setting		#406	#425
8th stage temperature setting		#407	#426
1st execution time set value	The execution time of each segment in each channel. The first-segment execution time of each channel cannot be set to 0 during multi-segment settings.	#408	#427
2nd execution time set value		#409	#428
3rd execution time set value		#410	#429
4th execution time set value		#411	#430
5th execution time set value		#412	#431
6th execution time set value		#413	#432
7th execution time set value		#414	#433
8th execution time set value		#415	#434
Start segment of repetition	Set the start segment number that needs to be repeated when setting the multi-segment setting for each channel.	#416	#435
End segment of repetition	Set the end segment number that needs to be repeated when setting the multi-segment setting for each channel. The end number cannot be less than the start one, otherwise it will cause execution error.	#417	#436
Number of repetition controlled by multiple segment	All the segments between the start and the end will be executed repeatedly during the multi-segment execution, and the number of executions is the number of repetitions + 1.	#418	#437
Multi-segment control execution flag of CH1 ~ CH2	Multi-stage setting function starts, the lower 2 bits are valid. 0 : No multi-stage control; 1 : Enable the multi-stage control. 1) Bit0 : Enable Channel 1 multi-section setting function. 2) Bit1 : Enable Channel 2 multi-section setting function. 3) Bit2 ~ 15 : Reserved, fixed to 0. When the multi-segment setting is being executed, writing 0 will stop the setting; writing 1, it will be re-executed from the first segment.	#552	
ALM 1 Mode setting	Alarm enable, to determine the enabled alarm type.	#600	
ALM 2 Mode setting		#601	

	# 600 sets the No.1 alarm type, # 601 sets the No.2 alarm type. There are 14 types of alarms, and two types can be selected at the same time (Refer to *Alarm Type*).		
Dead zone	Set the alarm dead zone for each channel and alarm mode.	#604	
Alarm delay	If the measured value in the alarm range is still within the alarm range after operating the set number of delayed alarms, the alarm is issued.	#605	
ALM 1 Set value	The set value of ALM 1 ~ 2 in channel 1 ~ 2. For different channels, the same alarm needs to set different values, which is determined by the input type.	#606	#610
ALM 2 Set value		#607	#611
Parameter saving	0 : No saving ; 1 : Enable the parameter saving. When setting 1, save the setting parameters, and automatically clear after saving.	#700	
Software version		#4094	
Module identification code	0xD100: MDT-01-RR 0xD101: MDT-01-RT 0xD110: MDT-01-TR 0xD111: MDT-01-TT 0xD200: MDT-02-RR 0xD201: MDT-02-RT 0xD210: MDT-02-TR 0xD211: MDT-02-TT	#4095	
RS485 communication parameter	Bit0~3: Baud rate 0000: 9600 0001: 2400 0010: 4800 0011: 19200 0100: 38400 0101: 57600 0110: 115200 Bit4: Data bit 0: 8 bits 1: 7 bits Bit5: Stop bit 0: 1 bit 1: 2 bits Bit6~7: Parity mode 00: None 01: Odd 10: Even Bit8~15: Reserved	#4600	
RS485 device address	1~247; Default: 1	#4601	

System Error Status Word (735)

Bit status	ON (1)	OFF (0)
Bit0	System error	No error
Bit1	Reserved	
Bit2	Hardware failure	The hardware is normal
Bit3	Internal parameter error	The data backup is normal
Bit4	Cooling PV error	Cooling is normal
Bit5	Digital range error in AD conversion	Normal
Bit6	Set value recovery failure	Normal
Bit7	Reserved	
Bit8	CH1 decoupling	Normal
Bit9	CH2 decoupling	Normal
Bit10-Bit15	Reserved	

Channel Status Word (738-739)

Bit status	ON (1)	OFF (0)
Bit0	ALM 1 Alarm	ALM 1 No alarm
Bit1	ALM 2 Alarm	ALM 2 No alarm
Bit2-Bit3	Reserved	
Bit4	Initialization complete	Initializing
Bit5	Self-tuning status	Self-tuning is not started or has been completed
Bit6	Control status	Non-control status
Bit7	The temperature reaches the set value and is stable	Incomplete control
Bit8-Bit15	Reserved	

8. Common problems and solutions

When the module cannot work normally, please check in turn:

(1) The connection of power circuits and the status of related switches and protective appliances to ensure the module has been reliable power supply;

(2) Whether the connection of terminals is firm;

(3) Whether the 24Vdc power supply is overloaded;

(4) Check the application to ensure that the correct operation method and parameter range are selected, and pay attention to the BFM zone with special sequence, which needs to be operated accordingly.

Table 8-1 Common problem and solution

Phenomenon	Possible reason	Countermeasures
POWER and other LED indicator are OFF	Out of voltage or low voltage	Check the power supply
	The power switch is off or the fuse is blown	Check the switch, cable and fuse
	Abnormal power connection	
	Power plate is damaged	Check and confirm: whether the voltage
POWER LED	Unstable power supply	

flashes intermittently	Module is damaged	between 24V+ terminal and 24V- terminal is in normal range
RUN LED is OFF or ON constantly	Module shutdown or crash	Replace the module
RUN LED flashes slowly	A system error may occur	Check the 735、738、739
	Decoupling error	
The output cannot be turn OFF	Short circuit occurs in external wiring	Check the connection
	Output transistor is damaged	Replace the module
Output status indicator is inconsistent with output terminal status	Output transistor is damaged with aging, or indicator light is damaged	
Serial port cannot communicate properly	Poor cable connection, or wiring signal attribute error, such as A0 and B0 reversing	Correct the signal wiring
	The characteristics settings of communication master and slave machine are inconsistent, such as baud rate, parity, number of data bit, address	Set the communication parameters to be consistent
		Set the communication protocol for master and slave device to be consistent

Notice

1. The warranty range is confined to the PLC only.

2. Warranty period is 18 months, within which period Megmeet conducts free maintenance and repairing to the PLC that has any fault or damage under the normal operation conditions.

3. The start time of warranty period is the delivery date of the product, of which the product SN is the sole basis of judgment. PLC without a product SN shall be regarded as out of warranty.

4. Even within 18 months, maintenance will also be charged in the following situations:

- Damages incurred to the PLC due to mis-operations, which are not in compliance with the User Manual;
- Damages incurred to the PLC due to fire, flood, abnormal voltage, etc;
- Damages incurred to the PLC due to the improper use of PLC functions.
- Remove the PLC personally.

5. The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.

6. If you have any question, please contact the distributor or our company directly.

Shenzhen Megmeet Electrical Co.,Ltd

Add: 5th Floor, Block B Unisplendour Information Harbor, Langshan Road, Shenzhen, 518057, China
Tel：400-666-2163 (+86) 0755-86600500
Fax：(+86)0755-86600999
Zip：518067
Website：www.megmeet.com