MC100-2PT/4PT Thermal Resistance Module User Manual

Thank you for using MC100 series PLC. 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 MC100 series PLC, convenient for on-site reference.

This manual is for the following MC100 series members:

MC100-2PT Thermal Resistance Module
MC100-4PT Thermal Resistance Module

Version：V1.2
Revision Date：2010-01-15
BOM Code：R29090039

For detailed product information, please refer to *MC100 Series PLC User Manual*, *X-Builder Programming Software User Manual*, and *MC200/MC100 Series PLC Programming Reference Manual*. For ordering the above user manuals, contact your Megmeet distributor or sales office.
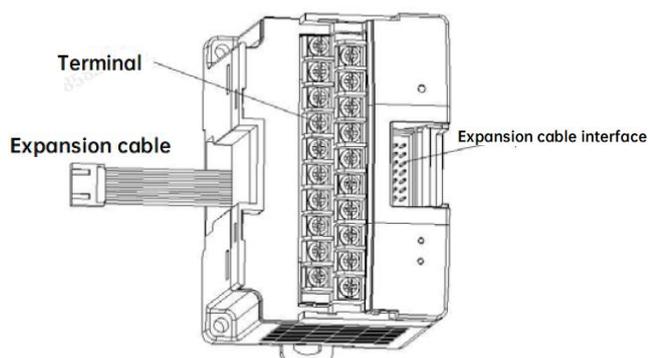
1. Appearance and Part Names


Fig. 1-1 Appearance and part name

2. Installation Description

2.1 Installation method

The PLC must be installed horizontally on the backplane of the electrical cabinet, and maintain a distance of more than 20cm from the peripheral equipment or cabinet wall. The installation in other directions is not conducive to the PLC heat dissipation, and there can be no heating equipment under the PLC. As shown in the picture below:

DIN rail mounting

Generally, you can mount the PLC onto a 35mm-wide rail (DIN). Open the DIN snap-fit at the bottom of the module and lock the bottom of the module onto the DIN rail; Rotate module close to the DIN guide rail and close the DIN snap-fit with a double-checking.
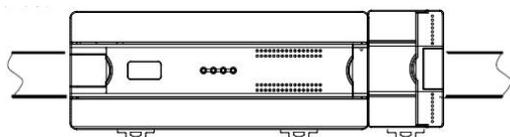
Screw fixing

Fixing the PLC with screws can stand greater shock than DIN rail mounting. M3 screws can be chosen to fix the PLC onto the backboard of the electric cabinet through the mounting holes on PLC enclosure, as the following figure.
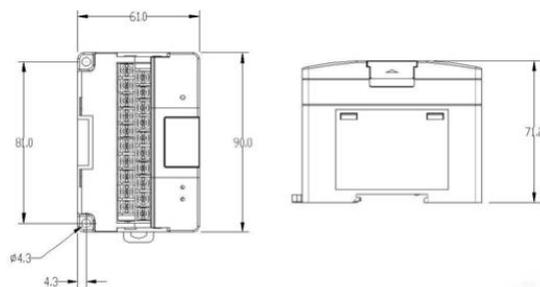

### 2.2 Cable connection and specification

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

Cable	Recommended NO.	Cross-Section
AC power line（L、N）	AWG12/AWG18	1.0—2.0mm^2
Ground line	AWG12	2.0mm^2
Input signal (X)	AWG18/AWG20	0.8—1.0mm^2
Input signal (Y)	AWG18/AWG20	0.8—1.0mm^2

Fix the prepared cable head onto the PLC terminals with screws correctly. Fastening torque: 0.5~0.8Nm.
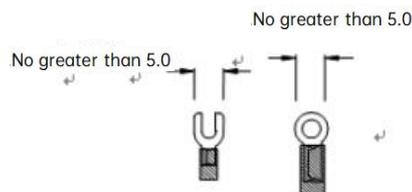
◆For the safety (to prevent electric shock and fire accidents) and lower noise, the ground terminal of the controller should be connected in accordance with the requirements from national electrical regulations, and the ground resistance should be less than 100 Ω . Single point grounding should be used when wiring multiple controllers, and the ground wire cannot form a loop. As shown in the diagram below:
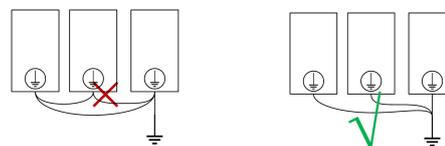
Note for wiring:

1. It is recommended to use a shielded twisted-pair cable for thermal resistance input. The cable should be far away from power cable or other cables that may generate electrical power interference.

1) The thermal resistance sensor (Pt100, Cu100 or Cu50) can use 2-, 3-, or 4-wire system, with a ascending measurement precision. When the cable is longer than 10m, the 4-wire system is recommended.

2) To reduce the measurement error and avoid EMI, the cable should be shorter than 100 meters. The measurement error is due to the connecting

cable's impedance, and the error may differ with different channels even within the same module. Consequently we need to adjust the characteristics of each channel. Refer to *5. Characteristics Setting* for details.

2. The analog power supply can use the auxiliary output 24Vdc power supply of the main module, or other required power supply.

3. Grounding terminal PG of the module is well grounded.

4. Do not use the empty pin on the terminal.
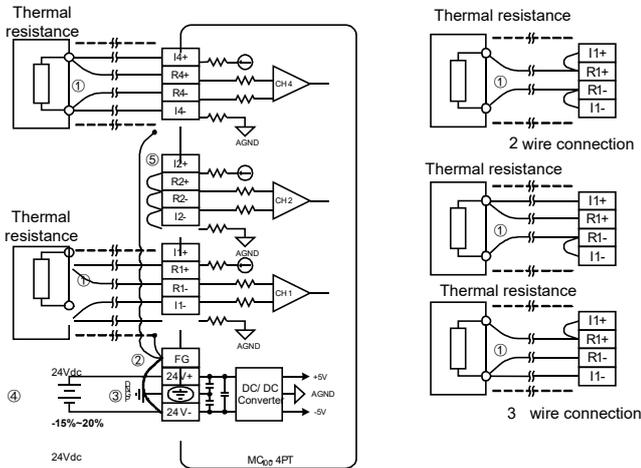
3. Technical Specification

3.1 Environmental Temperature

◆ Temperature range for PLC usage: -5℃~55℃. A well-ventilated place should be selected when the ambient temperature exceeds 55° C for a long time.

◆ 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.

3.2 Performance Specification

Table 3-1 Performance specification

Item	Description		
Conversion speed	(15 ± 2%) ms × 4 channel (no conversion for unused channels)		
Input signal	Thermal resistance signal type: PT100, Cu100, Cu500 Channel: 2/4		
Rated temperature range	Pt100	-150℃ ~ 600℃	-238°F ~ 1112°F
	Cu100	-30℃ ~ 120℃	-22°F ~ 248°F
	Cu50	-30℃ ~ 120℃	-22°F ~ 248°F
Digital output	12-bit A/D conversion. The temperature readings are stored as 16-bit binary		
	Pt100	-1500 ~ 6000	-2380 ~ 11120
	Cu100	-300 ~ 1200	-220 ~ 2480
	Cu50	-300 ~ 1200	-220 ~ 2480
Resolution	Pt100	0.2℃	0.38°F

|	Cu100	0.2℃	0.38°F
	Cu50	0.2℃	0.38°F
Accuracy	±1% of full range		
Isolation	Between analog circuit and digital circuit: photocoupler. Between analog circuit and input 24Vdc power: internal isolation. Between analog channels: none		
Analog circuit	24Vdc (-15% ~ +20%), Max. ripple voltage 5% 55mA (from basic module or external power supply)		
Digital circuit	5Vdc, 72mA (from basic module)		

4. Terminal Introduction

Table 4-1 describes the definitions of MC100-2DA/4DA terminals.

Remark	Description
24V+	Positive 24V analog power
24V-	Negative 24V analog power
FG	Shielding ground
⏚	GND
R1+, R2+	Positive thermal-resistor signal input of CH1,CH2
R1-, R2-	Negative thermal-resistor signal input of CH1,CH2
R3+, R4+	Positive thermal-resistor signal input of CH3,CH4
R3-, R4-	Negative thermal-resistor signal input of CH3,CH4
I1+, I2+	Positive current signal of CH1,CH2
I1-, I2-	Negative current signal of CH1,CH2
I3+, I4+	Positive current signal of CH3,CH4
I3-, I4-	Negative current signal of CH3,CH4
·	NC

MC100-2PT:
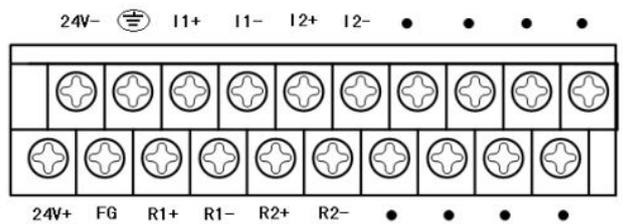
MC100-4PT:
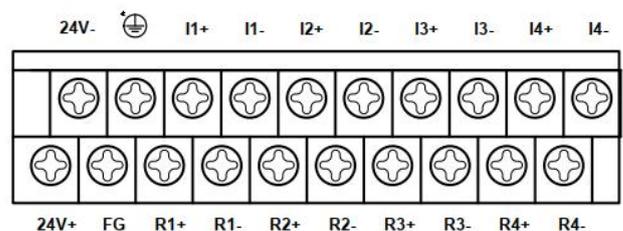
5. Characteristic Setting

The input channel characteristic of MC100-2PT/4PT is the linear relationship between the channel's analog input quantity AI and digital input quantity DI. It can be set by the user. Each channel can be considered as the model shown in Figure 5-1. As it is of linear characteristic, the channel characteristic can be defined by just two points: Q0 (AI0, DI0) and Q1 (AI1, DI1), where DI0 is the channel's digital input corresponding to analog input AI0, and DI1 is the channel's digital input corresponding to analog input AI1.
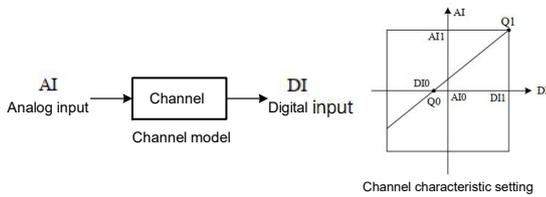

Figure 5-1　MC100-2PT/4PT channel characteristic

To simplify the operation process without affecting functions, AI0 and AI1 are respectively fixed to 0 and the maximum value in the current mode. That is to say, in Figure 5-1, AI0 is 0 and AI1 is 6000 (Unit: 0.1℃)　in the current mode. AI0 and AI1 will change according to the mode and users cannot change their values.
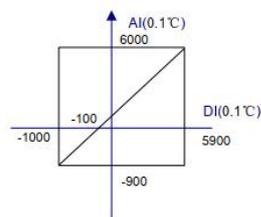
If you just set the channel mode（BFM#600）without changing the value of DI0 and DI1, the channel characteristic should be as shown in Figure 5-2. The AI in Figure 5-2 is default.

You can change the channel characteristic by changing DI0 and DI1. The setting range of DI0 is −1000 ~ 1000 (0.1℃), the setting range of DI1 is 5000~7000 (0.1℃). If the setting is outside this range, MC100-2PT/4PT will not accept it, but maintain the original valid setting. If the measured value of MC100-2PT in actual use is higher than 10 °C (41°F), adjust by setting the two points P0(-100,0) and P1(5900,6000) can eliminate the error. Figure 5-3 provides for your reference an example of changing channel characteristics.
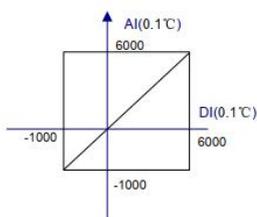
Default (No adjustment)　　　DI0=-100; DI1=5900

Fig. 5-2　　　　　　　　Fig.5-3

6. Application Example

Example: Connect the CH1 of MC100-2PT/4PT module to Pt100 thermal resistance to output Celsius data, CH2 to Cu100 thermal resistance to output Celsius data. Set the average sampling times to 4. When the MC100-2PT/4PT measurement value is lower than 10℃（82°F）, the D1001, and D1002 are used to receive the conversion result from average value.
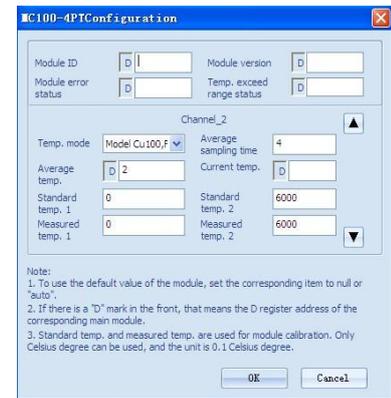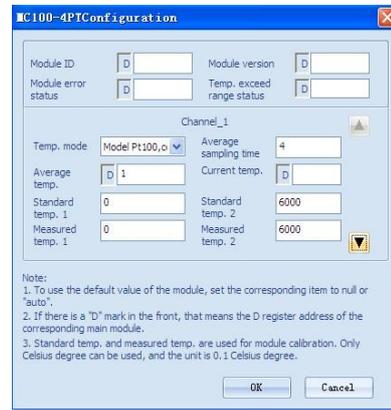

Fig 6-1　Application example

7. Routine Inspection

1. Check that the wiring of analog output meets the requirements.

2. Check that the extension cable of MC100-2PT/4PT is properly inserted in the extension port.

3. Check that the 5V and 24V power supplies are not overloaded. Note: The digital circuit is powered by the basic module through extension cable.

4. Check the application, make sure the operation method and parameter range are correct.

5. Set the MC100 basic module to RUN state.

8. Inspection Upon Fault

In case of abnormality, check the following items:

● The status of the POWER indicator

ON: the extension cable is properly connected;

OFF: check the extension cable connection and the basic module.

● The wiring of analog input

● The status of the 24V indicator

ON: 24Vdc power supply normal;

OFF: 24Vdc power supply possibly faulty, or MC100-2PT/4PT faulty.

● The status of the RUN indicator

Flash quickly: MC100-2PT/4PT in normal operation;

Flash slowly or OFF: Check the information in X-Builder configuration page.

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.