MTCE Series Temperature Controller

User Quick Start Manual

Thank you for using MTCE 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 MTCE series products for the convenience of users to access the required information on site, and provide a brief introduction to relevant accessories, FAQs, etc. For detailed product information, please refer to *MTCE Series Temperature Controller User Manual*.

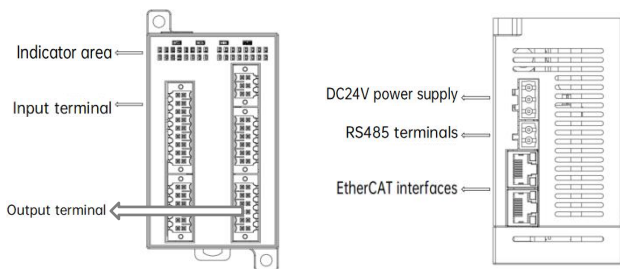This manual is suitable for the following members:

MTCE-10R-NT   MTCE-10T-NT

Version: 1.0

Revision date: 2024-04-30 Indicator area

1.　　Appearance and Part Name

1.1　Appearance and terminal

2.　　Model

The models of MTCE series temperature controller is as the following:

Model	Channels	Supported protocol	Input mode	Output mode
MTCE-10R-NT	10	Modbus, EtherCAT	RTD	Source output
MTCE-10T-NT	10	Modbus, EtherCAT	TC	Source output

3.　　Installation

3.1 Ambient temperature

Temperature range for　controller usage：-5℃~55℃. A well-ventilated place should be selected when the ambient temperature exceeds 55° 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.

DIN slot installation for the field with little vibration

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.

Screw installation for the field with high vibration

In the case of high vibration, screws must be used to fix the module. M3 screws can be used to fix the module on the backplane.

The dimensions of this module are shown in the figure below:
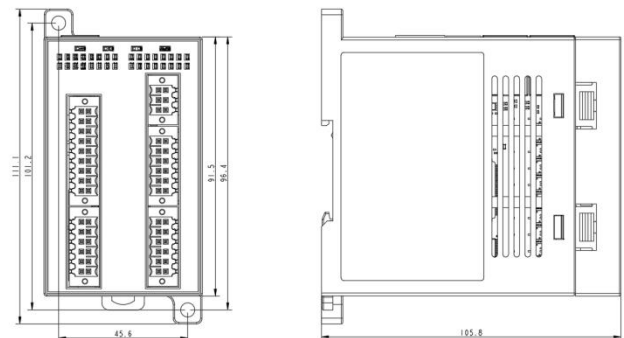
3.4 Cable connection and specification

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)	Side	12~30AWG	6.5mm	Screw
Communication terminal (2PIN)	Side	12~30AWG	6.5mm	Screw
Ethernet (RJ45)	Side	Network cable	\	Plug-in
Input terminal (6PIN)	Top surface	16~26AWG	10~15mm	Plug-in
Output terminal (6PIN)	Top surface	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 4 Ω . The single-point grounding should be adopted and there is no loop between ground wires when multiple modules are grounded, as shown below:
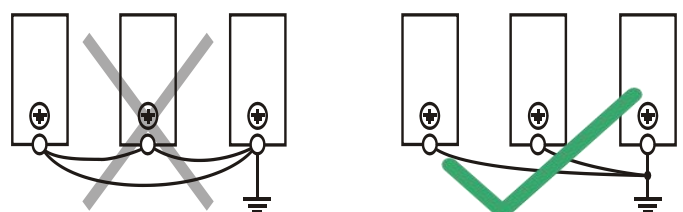
4. Terminal

### 4.1 Terminal introduction

MTCE-10R-NT   MTCE-10T-NT
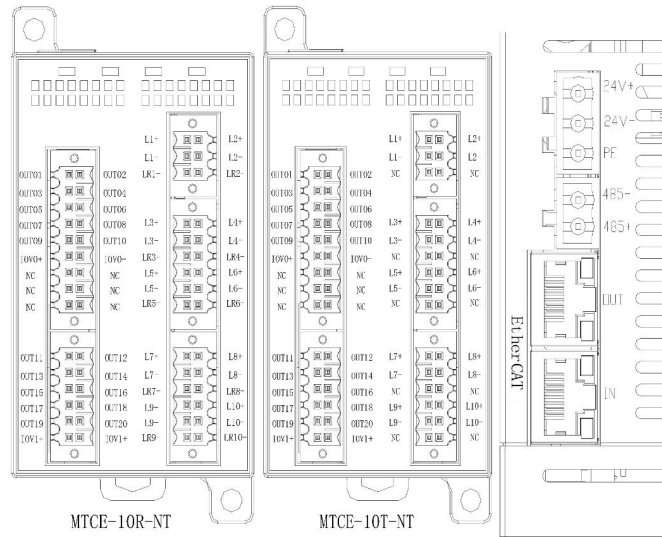
Remarks	Description
24V+, 24V-	Input power supply 24VDC
⏚	PE
485+, 485-	RS485 interface
EtherCAT IN	EtherCAT input
EtherCAT OUT	EtherCAT output
L1+~L10+	Positive RTD (TC) signal input of Channel 1~10
L1-~L10-	Negative RTD (TC) signal input of Channel 1~10
LR1-~LR10-	Negative RTD signal input of Channel 1~10
OUT01~OUT10	Transistor PNP output (Temp. Control) of Channel 1~10
OUT11~OUT20	Transistor PNP output (Alarm) of Channel 11~20
IOV0+	Transistor PNP output common port of Channel 1~10
IOV1+	Transistor PNP output common port of Channel 11~20
NC	Idle terminal

4.2 Wiring

MTCE-10T-NT   MTCE-10R-NT
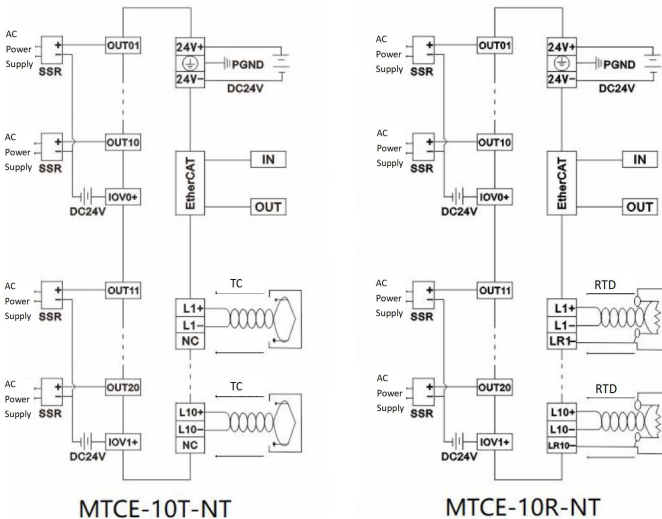
Wiring Requirements

①The TC (RTD) signal is recommended to be accessed via a shielded cable (connecting cable), which should be away from the power line or other cables that may produce electromagnetic interference. The user can use cables with a length of less than 100 meters to reduce the noise interference. And the characteristic adjustment can eliminate the measurement error from cable impedance.

②The thermal resistance must adopt the three-wire connection method.

③It is recommended to short-circuit the positive and negative terminals L + and L- of the unused channel to prevent the error-data detection.

④For the situation of excessive electrical interference, please connect the shielding wire (Compensation cable shielding end of TC, Connecting cable shielding end of RTD, Shielding end of RS485 communication wire) to the PE terminal of temperature controller.

⑤The temperature controller is well grounded.

⑥For EtherCAT communication, it is recommended to use Cat. 6 shielded cables or more than that to ensure communication transmission speed and obtain higher electrical shielding safety.

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	Indicate the current display channel
OT1	Output indicator OUT1	ON：Channel output is ON OFF：Channel output is OFF
OT2	Output indicator OUT2	ON：Channel output is ON OFF：Channel output is OFF
EV1	Alarm indicator ALM1	ON：Channel output is ON OFF：Channel output is OFF
EV2	Alarm indicator ALM2	ON：Channel output is ON OFF：Channel output is OFF

5. Electrical Specification

5.1 Power-supply Specification

Item	Unit	Min.	Rated	Max.	Remarks
Input voltage range	Vdc	19.2	24	28.8	Normal startup and operation
Input current	A	/	0.09	/	Rating and full load in normal temperature

5.2 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）

Item		Specification
	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℉)
	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.

Note：1 represents the dedicated parameter of TC products, 2 represents the dedicated parameter of RTD products.

5.3 Communication Specification

Name	Protocol	Port remark	Mode
COM0	Modbus	RS485+, RS485-	RS485
WAN	EtherCAT	IN, OUT	EtherCAT

5.4 Indicator Description

Name	Status	Description
PWR (Power supply indicator)	ON	Connect to 24V power supply
RUN (Running indicator)	Flash quickly (10Hz~15Hz)	Work normally without error
	Flash slowly (0.5Hz~1Hz)	Error occurs, please refer to #3612
SF (System error indicator)	ON	The input channel is disconnected
	OFF	The input channel is connected
BF (EtherCAT error indicator)	ON	EtherCAT communication fails
	OFF	EtherCAT communication works
OUT01~OUT20	ON	Channel output corresponds to ON
	OFF	Channel output corresponds to OFF

6. EtherCAT Communication Function

As an EtherCat slave station, the product can connect to the master station that supports the EtherCat protocol and coe sub-protocol, and the slave station ID is allocated by the master.

This product supports FreeRun mode, and supports 21 PDOs by default. Each PDO can be configured as Enabled or Not enabled.

Address description of EtherCAT/COE

Primary index	Sub-index	Type	Name	Description	Property
0X7000	1~10 corresponds to Ch1~CH10	UINT8	Ctrl-Word	Control value	W
0X7001	1~10 corresponds to Ch1~CH10	UINT8	Input Type	Input type	W
0X7002	1~10 corresponds to Ch1~CH10	UINT8	Self Mv Percent	Self-tuning output percentage	W
—	—	—	—	—	—
0X7100	1~10 corresponds to Ch1~CH10	INT16	SV	Set temperature	W
0X7101	1~10 corresponds to Ch1~CH10	INT16	PV_offset	Actual temperature offset	W
0X7102	1~10 corresponds to Ch1~CH10	UINT16	ManuPWMOutput	Output MV value manually	W
0X7103	1~10 corresponds to Ch1~CH10	UINT16	Control period	Control period	W
0X7104	1~10 corresponds to Ch1~CH10	UINT16	Seat Heat P	Set the Temp. Ctrl P value	W
0X7105	1~10 corresponds to Ch1~CH10	UINT16	Seat Heat I	Set the Temp. Ctrl I value	W
0X7106	1~10 corresponds to Ch1~CH10	UINT16	Seat Heat D	Set the Temp. Ctrl D value	W
0X7107	1~10 corresponds to Ch1~CH10	UINT16	Alarm Value	Alarm Value	W
0X7108	1~10 corresponds to Ch1~CH10	UINT16	Alarm Mode	Alarm Mode	W
—	—	—	—	—	—
0X7050	1~10 corresponds to Ch1~CH10	UINT8	Status	Status value	R
—	—	—	—	—	—
0X7150	1~10	UINT8	Practical	Current term.	R

	corresponds to Ch1~CH10		temperature (0.1)	value	
0X7151	1~10 corresponds to Ch1~CH10	INT16	Use Heat P	Temp. Ctrl P value	R
0X7152	1~10 corresponds to Ch1~CH10	INT16	Use Heat I	Temp. Ctrl I value	R
0X7153	1~10 corresponds to Ch1~CH10	INT16	Use Heat D	Temp. Ctrl D value	R
0X7154	1~10 corresponds to Ch1~CH10	INT16	Out Mv	Heat MV	R
0X7155	1~10 corresponds to Ch1~CH10	UNT16	Warning state	Alarm status	
—	—	—	—	—	—
0X8150	1	UINT16	Heat output	Heat output flag	R
0X8150	2	UINT16	Cool output	Cool output flag	R
0X8150	3	INT16	Cool temperature	Cool temperature Note: Cool temperature is present in the TC module, not the RTD module	R
—	—	—	—	—	—
0XFA00	1	UINT16	Soft Version	Soft version	R
0XFA00	2	UINT16	Big-little	Data big-little endian	RW
—	—	—	—	—	—

7. RS485 Communication Function

The communication specification is as following.

(Note：The communication specification do not support to change)

Supported protocol	Baud rate	Parity	Data bit	Stop bit	Station No.
Modbus Slave	38400	Even	8	1	1

8. Buffer Memory（BFM）

Function	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	CH9	CH10						
Process Value (PV)	1500	1501	1502	1503	1504	1505	1506	1507
	1508	1509						
Heating control output (Manipulated Value)	1532	1533	1534	1535	1536	1537	1538	1539
	1540	1541						
Current execution segment of multi-segment control	1564	1565	1566	1567	1568	1569	1570	1571
	1572	1573						
Channel status word	1596	1597	1598	1599	1600	1601	1602	1603
	1604	1605						
First order delay digital filter setting	1628	1629	1630	1631	1632	1633	1634	1635
	1636	1637						
Input type	1660	1661	1662	1663	1664	1665	1666	1667
	1668	1669						
Set Value (SV)	1692	1693	1694	1695	1696	1697	1698	1699
	1700	1701						
Cycle of control output	1852	1853	1854	1855	1856	1857	1858	1859
	1860	1861						
Temp.Comp: Compensation value	1788	1789	1790	1791	1792	1793	1794	1795
	1796	1797						
Temp.Comp: Gain value	1820	1821	1822	1823	1824	1825	1826	1827
	1828	1829						
Heat proportional band	1884	1885	1886	1887	1888	1889	1890	1891
	1892	1893						
Heat integral time	1916	1917	1918	1919	1920	1921	1922	1923
	1924	1925						
Heat derivative time	1948	1949	1950	1951	1952	1953	1954	1955
	1956	1957						
Manually output the set value	2044	2045	2046	2047	2048	2049	2050	2051
	2052	2053						
Adjustment sensitivity settings	2076	2077	2078	2079	2080	2081	2082	2083
	2084	2085						
Self-tuning deviation settings	2108	2109	2110	2111	2112	2113	2114	2115
	2116	2117						
1st stage temperature setting	2140	2141	2142	2143	2144	2145	2146	2147
	2148	2149						
2nd stage temperature setting	2172	2173	2174	2175	2176	2177	2178	2179
	2180	2181						
3rd stage	2204	2205	2206	2207	2208	2209	2210	2211

Parameter								
temperature setting	2212	2213						
4th stage temperature setting	2236	2237	2238	2239	2240	2241	2242	2243
	2244	2245						
5th stage temperature setting	2268	2269	2270	2271	2272	2273	2274	2275
	2276	2277						
6th stage temperature setting	2300	2301	2302	2303	2304	2305	2306	2307
	2308	2309						
7th stage temperature setting	2332	2333	2334	2335	2336	2337	2338	2339
	2340	2341						
8th stage temperature setting	2364	2365	2366	2367	2368	2369	2370	2371
	2372	2373						
1st execution time set value	2396	2397	2398	2399	2400	2401	2402	2403
	2404	2405						
2nd execution time set value	2428	2429	2430	2431	2432	2433	2434	2435
	2436	2437						
3rd execution time set value	2460	2461	2462	2463	2464	2465	2466	2467
	2468	2469						
4th execution time set value	2492	2493	2494	2495	2496	2497	2498	2499
	2500	2500						
5th execution time set value	2524	2525	2526	2527	2528	2529	2530	2531
	2532	2533						
6th execution time set value	2556	2557	2558	2559	2560	2561	2562	2563
	2564	2565						
7th execution time set value	2588	2589	2590	2591	2592	2593	2594	2595
	2596	2597						
8th execution time set value	2620	2621	2622	2623	2624	2625	2626	2627
	2628	2629						
Start segment of repetition	2652	2653	2654	2655	2656	2657	2658	2659
	2660	2661						
End segment of repetition	2684	2685	2686	2687	2688	2689	2690	2691
	2692	2693						
Number of repetition controlled by multiple segment	2716	2717	2718	2719	2720	2721	2722	2723
	2724	2725						
ALM 1 Set value	2748	2749	2750	2751	2752	2753	2754	2755
	2756	2757						
ALM 2 Set value	2780	2781	2782	2783	2784	2785	2786	2787
	2788	2789						
ALM 3 Set value	2812	2813	2814	2815	2816	2817	2818	2819
	2820	2821						
ALM 4 Set value	2844	2845	2846	2847	2848	2849	2850	2851
	2852	2853						
Heating and cooling	3036	3037	3038	3039	3040	3041	3042	3043

Parameter								
overlapped or insensitive belts	3044	3045						
Cooling control output (MV)	288	288	288	288	288	288	288	288
	288	288	288	288	288	288	288	288
Cool proportional band	2940	2941	2942	2943	2944	2945	2946	2947
	2948	2949						
Cool integral time	2972	2973	2974	2975	2976	2977	2978	2979
	2980	2981						
Cool derivative time	3004	3005	3006	3007	3008	3009	3010	3011
	3012	3013						
Under-regulation inhibition coefficient	3068	3069	3070	3071	3072	3073	3074	3075
	3076	3077						
Heat proportional band adjustment factor	3164	3165	3166	3167	3168	3169	3170	3171
	3172	3173						
Heat integration time band adjustment coefficient	3196	3197	3198	3199	3200	3201	3202	3203
	3204	3205						
Heat differential time band adjustment coefficient	3228	3229	3230	3231	3232	3233	3234	3235
	3236	3237						
Cool proportional band adjustment factor	3260	3261	3262	3263	3264	3265	3266	3267
	3268	3269						
Cool integration time band adjustment coefficient	3292	3293	3294	3295	3296	3297	3298	3299
	3300	3301						
Cool differential time band adjustment coefficient	3324	3325	3326	3327	3328	3329	3330	3331
	3332	3333						
Set the rate of change limit to increase	3356	3357	3358	3359	3360	3361	3362	3363
	3364	3365						
Set the rate of change limit to decrease	3388	3389	3390	3391	3392	3393	3394	3395
	3396	3397						
Temperature control object characteristics	3420	3421	3422	3423	3424	3425	3426	3427
	3428	3429						
PID algorithm selection	3452	3453	3454	3455	3456	3457	3458	3459
	3460	3461						
PID output upper limit setting	3484	3485	3486	3487	3488	3489	3490	3491
	3492	3492						
PID output lower limit setting	3516	3517	3518	3519	3520	3521	3522	3523
	3524	3525						

PID output dead zone	3548	3549	3550	3551	3552	3553	3554	3555
	3556	3557						
Manual/ Auto mode switchover	3580	3581	3582	3583	3584	3585	3586	3587
	3588	3589						
Error status word (System error)	3612							
Address of set value range error	3616							
Cold-junction temperature	3620							
Control start or stop	3628							
Self-tuning start or stop	3636							
Factory reset	3640							
Change setting allowed	3644							
Multi-segment control execution flag of CH1~CH10	3648							
ALM 1 Mode setting	3652							
ALM 2 Mode setting	3656							
ALM 3 Mode setting	3660							
ALM 4 Mode setting	3664							
Dead zone	3672							
Alarm delay	3676							
Cooling output status	3684							
Parameter saving	3688							
Software version	3692							
Module identification code								
PID parameter hidden switch	4582							
Module disconnection mode	3696							
Self-tuning output	4586	4587	4588	4589	4590	4591	4592	4593
	4594	4595						
AUX output	4618	4619	4620	4621	4622	4623	4624	4625
	4626	4627						
PID group selection	5735	5736	5737	5738	5739	5740	5741	5742
	5743	5744						

9. 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 9-1 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 between 24V+ terminal and 24V- terminal is in normal range
POWER LED flashes intermittently	Unstable power supply	
	Module is damaged	
RUN LED is OFF	Remote stopping by upper machine equipment	Turn on the machine remotely
	System error shutdown	Check it with assistant
RUN LED flashes slowly	A system error may occur	Check the 3612 of BFM
Input status indicator is inconsistent with input terminal status	Circuit On-resistance is too large	Shorten the length of the wire, and do not use the too-fine wire
	Poor signal circuit connection	Check the connection
The output cannot be turn OFF	Poor external wiring	
	Transistor is damaged	
Output status indicator is inconsistent with output terminal status	Transistor is damaged with aging, or indicator light is damaged	The transistor ports with frequent action, can switch with the idle ports
Serial port cannot communicate properly	Poor cable connection, or wiring signal attribute error, such as TXD and RXD confusion	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
	The serial port cannot control other devices	Set the communication protocol for master and slave device to be

		consistent
EtherCAT is unable to communicate properly	Loose connection of network cable	Ensure that the cable is securely connected to the RJ45 network port or replace the cable
	Slave configuration error	1. Check that the XML file imported by the master is correct. 2. Check the slave address number

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.

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