

MasterLogic-200
Thermocouple Input Module (Isolated type)

2MLF-TC4S

10310000717 Printed in Korea

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o Safety Precautions

- Safety Precautions is for using the product safe and correct in order to prevent the accidents and danger, so please go by them.
- The precautions explained here only apply to the 2MLF-TC4S module. For safety precautions on the PLC system, refer to the MasterLogic-200 CPU User's manual.
- The precautions are divided into 2 sections, 'Warning' and 'Caution'. Each of the meanings is represented as follows.

Warning If violated instructions, it can cause death, fatal injury or considerable loss of property.

Caution If violated instructions, it can cause a slight injury or slight loss of products

- The symbols which are indicated in the PLC and User's Manual mean as follows

Warning This symbol means paying attention because of danger of injury, fire, or malfunction.

Caution This symbol means paying attention because of danger of electrical shock.

- Store this datasheet in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

Warning

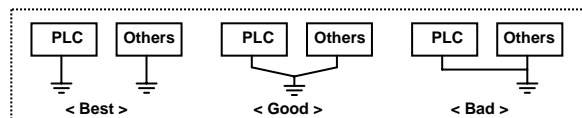
- Do not contact the terminals while the power is applied.
Risk of electric shock and malfunction
- Protect the product from being gone into by foreign metallic matter.
Risk of fire, electric shock and malfunction.

Caution

- Be sure to check the rated voltage and terminal arrangement for the module before wiring work.
Risk of electric shock, fire and malfunction
- Tighten the screw of terminal block with the specified torque range.
If the terminal screw looses, it can cause fire and electric shock.
- Use the PLC in an environment that meets the general specifications contained in this datasheet.
Risk of electrical shock, fire, erroneous operation and deterioration of the PLC.
- Be sure that external load does not exceed the rating of output module.
Risk of fire and erroneous operation.
- Do not use the PLC in the environment of direct vibration
Risk of electrical shock, fire and erroneous operation.
- Do not disassemble, repair or modify the PLC.
Risk of electrical shock, fire and erroneous operation.
- When disposing of PLC and battery, treat it as industrial waste.
Risk of poisonous pollution or explosion.

Precautions for use

- Do not install other places except PLC controlled place.
- Make sure that the FG terminal is grounded with class 3 grounding which is dedicated to the PLC. Otherwise, it can cause disorder or malfunction of PLC.



- Connect expansion connector correctly when expansion module are needed,
- Do not detach PCB from the case of the module and do not modify the module.
- Turn off power when attaching or detaching module.
- Cellular phone or walkie-talkie should be farther than 30cm from the PLC.
- Input signal and communication line should be farther than minimum 100mm from a high-tension line and a power line in order not to be affected by noise and magnetic field.

Before handling the product

Before using the product, read the datasheet and the User's manual through to the end carefully in order to use the product efficiently.

MasterLogic-200 Series User's Manual

Name	Code
MasterLogic-200 User's manual(Programming software)	10310000512
MasterLogic-200 Basic Instruction & Programming User's manual	10310000510

1. Introduction

Thermocouple conversion module designed for MasterLogic-200 PLC series is used to convert temperature(Type K,J,E,T,B,R,S,N) to the digital value of signed 16-bit binary data specified in PLC CPU.

2. General Specifications

General specifications of MasterLogic-200 PLC series are as specified in Table

No	Item	Specification	Related specifications		
1	Operating temp.	0℃ ~ +55℃			
2	Storage temp.	-25℃ ~ +70℃			
3	Operating humidity	5 ~ 95%RH (Non-condensing)			
4	Storage humidity	5 ~ 95%RH (Non-condensing)			
5	Vibration	For discontinuous vibration		Each 10 times in X,Y,Z directions IEC61131-2	
		Frequency	Acceleration		Amplitude
		10≤f< 57Hz	-		0.075mm
		57≤f≤150Hz	9.8m/s2(1G)		-
		For continuous vibration			
		Frequency	Acceleration		Amplitude
10≤f< 57Hz	-	0.035mm			
57≤f≤150Hz	4.9m/s2(0.5G)	-			
6	Shocks	* Max. impact acceleration:147m/s ² (15G) * Authorized time :11ms * Pulse wave : Sign half-wave pulse (Each 3 times in X,Y,Z directions)	IEC61131-2		
7	Noise	Square wave impulse noise	±1,500V		
		Electrostatic discharging	Voltage : 4kV(contact discharging)	IEC61131-2 IEC61000-4-2	
		Radiated electromagnetic field noise	27 ~ 500MHz, 10 V/m	IEC61131-2, IEC61000-4-3	
		Fast Transient /burst noise	Class Power module	Digital/Analog I/O communication interface	IEC61131-2 IEC61000-4-4
		Voltage	2kV	1 kV	
8	Ambient conditions	No corrosive gas or dust			
9	Operating height	2000m or less			
10	Pollution degree	2 or less			
11	Cooling method	Self-cooling			

3. Performance Specifications

Performance specifications of thermocouple conversion module are as specified in Table

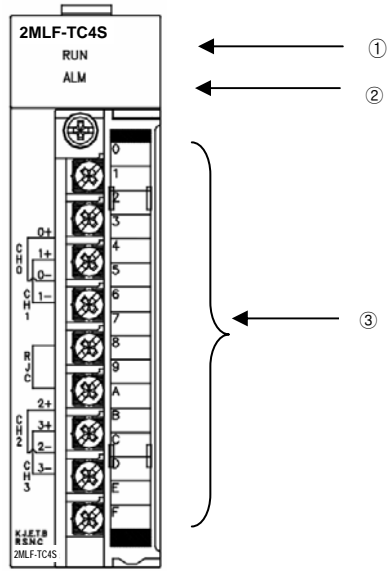
Item	Specification	
Number of channels	4	
Connectable thermocouple	K,J,E,T,B,R,S,N,C (JIS C1602-1995, ITS-90)	
Temperature input range	K	-250 ~ 1350℃
	J	-200 ~ 1200℃
	E	-250 ~ 1000℃
	T	-250 ~ 400℃
	B	400 ~ 1800℃
	R	-50 ~ 1750℃
	S	-50 ~ 1750℃
	N	-270 ~ 1300℃
C	0 ~ 2300℃	
Digital output	Temperature display (0.1℃)	0.1℃
	Scaling display (Defined by user)	0 ~ 65535
		-32768 ~ 32767
Accuracy	Accuracy	±0.1% (when ambient temperature is 25℃ ±5℃) (Some area of the measurable temperature is Max. 1%)
	Temperature coefficient	±100 ppm/℃ (when ambient temperature is 0℃ ~ 55℃)
conversion time	40ms / Channel	
Insulation method	Between channels	Isolation (Trans)
	Between terminal- PLC power supply	Isolation (Photo-Coupler)
Ambient temperature compensation	Automatic compensation by RJC sensor(PT100)	
	Compensation accuracy	±1.0℃
Functions	Average	Time average(320~6400ms)
		Count average(2~64000 times)
		Moving average (2~100)
	Alarm	Processing alarm
		Change rate alarm
Filter	Digital filter (160~64000ms)	
Max/Min display	Max/Min temperature display	
Terminal	18-point terminal	
Current consumption	5V: 610mA	
Weight	150g	

Notes

When thermocouple conversion module is released from the factory, Offset/Gain value is as adjusted for respective temperature input ranges, which is unavailable for user to change.

4. Respective Designations and Functions

Respective designations of the parts are as described below



No	Name	Description
①	RUN LED	▶ Displays the operation status of 2MLF-TC4S On: Operation normal Blinks: Error occurs (0.2s flickering) Off: DC 5V disconnected, module error
②	ALM LED	▶ Displays the operation status Off: normal Blinks: line disconnected (1s flickering)
③	Terminal	▶ Analog input terminal, whose respective channels can be connected with external devices.

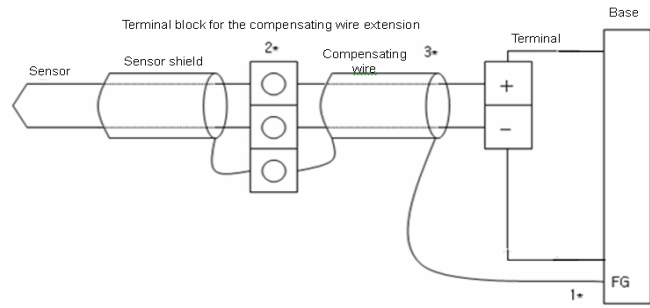
5. Precautions for Handling

- 1) Do not drop or impact the product.
- 2) Do not detach PCB from the case, it may cause malfunction.
- 3) During wiring or other work, do not allow any wire chips get inside the product.
- 4) Switch the external power off before mounting or removing the module and the cable.

6. Wiring

- ##### 6.1 Precautions for wiring
- 1) Use the compensating wire for sensor input wire and connect shielded wire to terminal FG and ground.
 - 2) Don't install the cable too close to hot device and material. Don't expose with oil for a long time. It will cause damage or abnormal operation due to short-circuit.
 - 3) Check the polarity when wiring the terminal.
 - 4) Wiring with high-voltage line or power line cause abnormal operation or trouble by inductive interference.
 - 5) It is available 9 kinds of thermocouple sensor (K / J / E / T / B / R / S / N / C).

6.2 Wiring Example



- *1) When the sensor and the compensating wire is shielded, the shield can be connected to PLC FG.
- *2) Use the extension terminal block of homogeneous temperature material to reduce the error.
- *3) Use the same type's compensating wire with the sensor.

7. Configuration of internal memory

7.1 I/O area of thermocouple converted data

Address	Description	R/W
UXY.00.0	Ch0 offset/gain adjustment error	R
UXY.00.1	Ch1 offset/gain adjustment error	R
UXY.00.2	Ch2 offset/gain adjustment error	R
UXY.00.3	Ch3 offset/gain adjustment error	R
UXY.00.D	Module offset/gain back-up error	R
UXY.00.E	H/W error	R
UXY.00.F	Module ready	R
UXY.01.0	Ch0 run	R
UXY.01.1	Ch1 run	R
UXY.01.2	Ch2 run	R
UXY.01.3	Ch3 run	R
UXY.01.4	Ch0 disconnection	R
UXY.01.5	Ch1 disconnection	R
UXY.01.6	Ch2 disconnection	R
UXY.01.7	Ch3 disconnection	R
UXY.01.8	Ch0 setting error	R
UXY.01.9	Ch1 setting error	R
UXY.01.A	Ch2 setting error	R
UXY.01.B	Ch3 setting error	R
UXY.02.0	Ch0 low-low processing alarm	R
UXY.02.1	Ch0 low processing alarm	R
UXY.02.2	Ch0 high processing alarm	R
UXY.02.3	Ch0 high-high processing alarm	R
UXY.02.4	Ch1 low-low processing alarm	R
UXY.02.5	Ch1 low processing alarm	R
UXY.02.6	Ch1 high processing alarm	R
UXY.02.7	Ch1 high-high processing alarm	R
UXY.02.8	Ch2 low-low processing alarm	R
UXY.02.9	Ch2 low processing alarm	R
UXY.02.A	Ch2 high processing alarm	R
UXY.02.B	Ch2 high-high processing alarm	R
UXY.02.C	Ch3 low-low processing alarm	R
UXY.02.D	Ch3 low processing alarm	R
UXY.02.E	Ch3 high processing alarm	R
UXY.02.F	Ch3 high-high processing alarm	R
UXY.03.0	Ch0 low alarm of change rate	R
UXY.03.1	Ch0 high alarm of change rate	R
UXY.03.4	Ch1 low alarm of change rate	R
UXY.03.5	Ch1 high alarm of change rate	R
UXY.03.8	Ch2 low alarm of change rate	R
UXY.03.9	Ch2 high alarm of change rate	R
UXY.03.C	Ch3 low alarm of change rate	R
UXY.03.D	Ch3 high alarm of change rate	R
UXY.04	Ch0 Temperature	R
UXY.05	Ch1 Temperature	R
UXY.06	Ch2 Temperature	R
UXY.07	Ch3 Temperature	R
UXY.08	Ch0 scaling value	R
UXY.09	Ch1 scaling value	R
UXY.10	Ch2 scaling value	R
UXY.11	Ch3 scaling value	R
UXY.12	Ch0 Minimum temperature	R
UXY.13	Ch0 Maximum temperature	R
UXY.14	Ch1 Minimum temperature	R
UXY.15	Ch1 Maximum temperature	R
UXY.16	Ch2 Minimum temperature	R
UXY.17	Ch2 Maximum temperature	R
UXY.18	Ch3 Minimum temperature	R
UXY.19	Ch3 Maximum temperature	R
UXY.20		R
UXY.21	Ch0 data uploading time	R
UXY.22		R
UXY.23	Ch1 data uploading time	R
UXY.24		R
UXY.25	Ch2 data uploading time	R
UXY.26		R
UXY.27	Ch3 data uploading time	R

Address	Description	R/W
UXY.29.0	Ch0 Max/Min temperature display enable/disable	R/W
UXY.29.1	Ch1 Max/Min temperature display enable/disable	R/W
UXY.29.2	Ch2 Max/Min temperature display enable/disable	R/W
UXY.29.3	Ch3 Max/Min temperature display enable/disable	R/W
UXY.29.4	Ch0 alarm enable/disable (Processing/Change rate)	R/W
UXY.29.5	Ch1 alarm enable/disable (Processing/Change rate)	R/W
UXY.29.6	Ch2 alarm enable/disable (Processing/Change rate)	R/W
UXY.29.7	Ch3 alarm enable/disable (Processing/Change rate)	R/W
UXY.29.8	Ch0 cold junction compensation enable(0)/disable(1)	R/W
UXY.29.9	Ch1 cold junction compensation enable(0)/disable(1)	R/W
UXY.29.A	Ch2 cold junction compensation enable(0)/disable(1)	R/W
UXY.29.B	Ch3 cold junction compensation enable(0)/disable(1)	R/W

7.2 Parameters by PUT/PUTP instruction

Address		Description	R/W
Dec	Hex		
0	0H	Channel enable/disable	R/W
1	1H	Ch0 sensor type	R/W
2	2H	Ch1 sensor type	R/W
3	3H	Ch2 sensor type	R/W
4	4H	Ch3 sensor type	R/W
5	5H	Temperature unit	R/W
6	6H	Ch0 filter constant	R/W
7	7H	Ch1 filter constant	R/W
8	8H	Ch2 filter constant	R/W
9	9H	Ch3 filter constant	R/W
10	AH	Ch0 average processing method	R/W
11	BH	Ch1 average processing method	R/W
12	CH	Ch2 average processing method	R/W
13	DH	Ch3 average processing method	R/W
14	EH	Ch0 average constant	R/W
15	FH	Ch1 average constant	R/W
16	10H	Ch2 average constant	R/W
17	11H	Ch3 average constant	R/W
18	12H	Scaling type	R/W
19	13H	Ch0 minimum value of scaling range	R/W
20	14H	Ch0 maximum value of scaling range	R/W
21	15H	Ch1 minimum value of scaling range	R/W
22	16H	Ch1 maximum value of scaling range	R/W
23	17H	Ch2 minimum value of scaling range	R/W
24	18H	Ch2 maximum value of scaling range	R/W
25	19H	Ch3 minimum value of scaling range	R/W
26	1AH	Ch3 maximum value of scaling range	R/W
27	1BH	Ch0 high-high temperature of processing alarm	R/W
28	1CH	Ch0 high temperature of processing alarm	R/W
29	1DH	Ch0 low temperature of processing alarm	R/W
30	1EH	Ch0 low-low temperature of processing alarm	R/W
31	1FH	Ch1 high-high temperature of processing alarm	R/W
32	20H	Ch1 high temperature of processing alarm	R/W
33	21H	Ch1 low temperature of processing alarm	R/W
34	22H	Ch1 low-low temperature of processing alarm	R/W
35	23H	Ch2 high-high temperature of processing alarm	R/W
36	24H	Ch2 high temperature of processing alarm	R/W
37	25H	Ch2 low temperature of processing alarm	R/W
38	26H	Ch2 low-low temperature of processing alarm	R/W
39	27H	Ch3 high-high temperature of processing alarm	R/W
40	28H	Ch3 high temperature of processing alarm	R/W
41	29H	Ch3 low temperature of processing alarm	R/W
42	2AH	Ch3 low-low temperature of processing alarm	R/W
43	2BH	Ch0 processing alarm hysteresis	R/W
44	2CH	Ch1 processing alarm hysteresis	R/W
45	2DH	Ch2 processing alarm hysteresis	R/W
46	2EH	Ch3 processing alarm hysteresis	R/W
47	2FH	Change rate alarm type	R/W
48	30H	High limit of ch0 change rate	R/W
49	31H	Low limit of ch0 change rate	R/W
50	32H	High limit of ch1 change rate	R/W
51	33H	Low limit of ch1 change rate	R/W
52	34H	High limit of ch2 change rate	R/W
53	35H	Low limit of ch2 change rate	R/W
54	36H	High limit of ch3 change rate	R/W
55	37H	Low limit of ch3 change rate	R/W
56	38H	Specify detecting period of ch0 change rate	R/W
57	39H	Specify detecting period of ch1 change rate	R/W
58	3AH	Specify detecting period of ch2 change rate	R/W
59	3BH	Specify detecting period of ch3 change rate	R/W

7.3 Parameters by GET/GETP instruction

Address		Description	R/W
Dec	Hex		
60	3CH	Ch0 setting error(flag)	R
61	3DH	Ch1 setting error(flag)	R
62	3EH	Ch2 setting error(flag)	R
63	3FH	Ch3 setting error(flag)	R
64	40H	Ch0 temperature change rate	R
65	41H	Ch1 temperature change rate	R
66	42H	Ch2 temperature change rate	R
67	43H	Ch3 temperature change rate	R
68	44H	Ch0 disconnection information	R
69	45H	Ch1 disconnection information	R
70	46H	Ch2 disconnection information	R
71	47H	Ch3 disconnection information	R
3732	E94H	Ch0 cold junction compensation temperature	R
3733	E95H	Ch1 cold junction compensation temperature	R
3734	E96H	Ch2 cold junction compensation temperature	R
3735	E97H	Ch3 cold junction compensation temperature	R

8. External Dimensions

Unit : mm

