



# ELC-PT04ANNN

## Instruction Sheet

Platinum Temperature Sensors Module

### WARNING

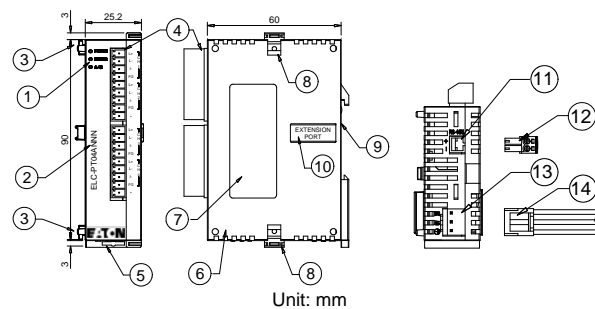
- This Instruction Sheet only provides descriptions for electrical specifications, general specifications, installation & wiring, troubleshooting and peripherals. For more information about the optional peripherals, please see ELC Application Manual.
- This is an OPEN TYPE Controller. The ELC should be kept in an enclosure away from airborne dust, humidity, electric shock risk and vibration. Also, it is equipped with protective methods such as some special tools or keys to open the enclosure, so as to avoid the hazard to users and the damage to the ELC. Do NOT touch terminals when power on.
- Never connect the AC main circuit power supply to any of the input/output terminals, as it will damage the ELC. Check all the wiring prior to power up. To avoid any electromagnetic noise, make sure the ELC is properly grounded.
- Warning – Do not disconnect while circuit is live unless area is known to be non-hazardous.
- Power, input and output (I/O) wiring must be in accordance with Class 1, Div. 2 wiring methods - Article 501-10(B)(1) of the National Electrical Code.
- Suitable for use in Class 1, Division 2, Groups A, B, C, D or Non-Hazardous locations only.
- Warning – Explosion hazard - Substitution of components may impair suitability for Class 1, Division 2.
- Warning – Explosion hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

### 1 INTRODUCTION

#### 1.1 Model Explanation and Peripherals

Thank you for choosing Eaton Logic Controller (ELC) series products. The ELC-PT04ANNN allows the connection of four platinum temperature sensors (PT100 3-WIRE 100Ω 3850 PPM/°C(DIN 43760 JIS C1604-1989)). The ELC transforms the sensors input into a 14 bit digital signal, which may then be manipulated using TO and FROM commands in the ladder logic program. There are 49 Controlled Registers (CR) in each module (each register is 16 bits). The Platinum Temperature Sensors Module of ELC-PT04ANNN can read/write the data of analog input module by using commands FROM / TO via the ELC program.

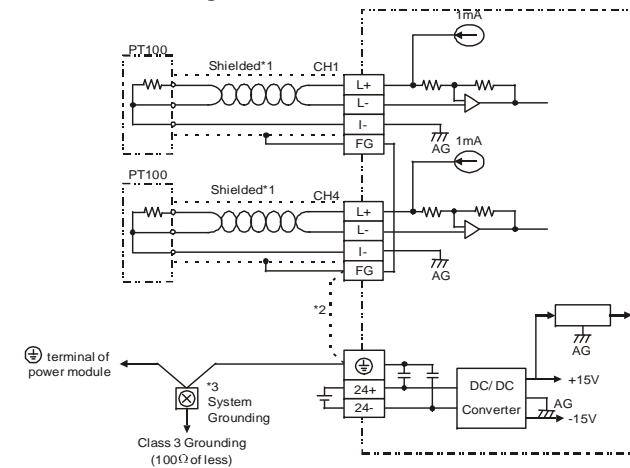
#### 1.2 Product Profile and Outline



Unit: mm

1. Status indicator (Power, RUN and ERROR)	2. Model Name
3. Extension unit clip	4. Input/output terminal
5. DIN rail clip	6. Mounting hole of the extension unit
7. Nameplate	8. Extension unit clip
9. DIN rail (35mm)	10. Extension port
11. RS-485 Communication port	12. 2 pin removable terminal (standard accessory)
13. DC power input	14. Power input cable (standard accessory)

### 1.3 External wiring



- Note 1:** Use only the wires that are supplied with your temperature sensor. ELC terminal screws should be tightened to 1.95 kg-cm (1.7 lb-in).
- Note 2:** Terminal FG is a grounding location for noise suppression.
- Note 3:** Please connect terminal of power supply module and terminal of ELC-PT04ANNN platinum temperature sensors module to system earth ground.
- Warning:** DO NOT connect wires to the No Connection terminals. Use Copper Conductor Only, 60/75 °C.

### 2 STANDARD SPECIFICATIONS

#### 2.1 Function Specifications

Platinum Temperature Module	Centigrade (°C)	Fahrenheit (°F)
Power supply voltage	24 VDC(20.4VDC~28.8VDC) (-15%~+20%)	
Analog input channel	4 channels per module	
Sensors type	3-WIRE PT100Ω 3850 PPM/°C(DIN 43760 JIS C1604-1989)	
Current excitation	1 mA	
Temperature input range	-200°C~600°C	-328°F~1,112°F
Digital conversion range	K-2,000~K6,000	K-3,280~K11,120
Resolution	14 bits(0.1°C)	14 bits(0.18°F)
Overall accuracy	±0.5% of full scale at 25°C(77°F), ±1% of full scale during 0~55°C (32~131°F)	
Response time	200 ms × channels	
Isolation method	Isolation between digital and analog circuitry. There is no isolation between channels.	
Isolation	Field to Digital Area: 500V Field to Analog Area: 500V Analog area to Digital Area: 500V Field to 24VDC: 500V	
Digital data format	2's complement of 16-bit, (13 Significant Bits)	
Average function	Yes (CR#2~CR#5 may be set and the range is K1~K100)	
Self diagnostic function	Yes	
Communication mode (RS-485)	MODBUS ASCII/RTU Mode. Communication baud rate of 4,800 / 9,600 / 19,200 / 38,400 / 57,600 / 115,200. For ASCII mode, date format is 7Bits, even, 1 stop bit (7,E,1). For RTU mode, date format is 8Bits, even, 1 stop bit (8,E,1). The RS-485 is disabled when the ELC-PT04ANNN is connected in series to an ELC.	
Connection to a ELC in series	When ELC-PT04ANNN modules are connected to an ELC, the modules are numbered from 0 ~ 7. 0 is the closest to the ELC and 7 is the furthest. The Maximum number of modules is 8 modules and they do not occupy any digital I/O points of the ELC.	
Maximum power consumption	2W at 24 VDC (20.4VDC~28.8VDC) (-15% ~ +20%)	
Noise Immunity	ESD(IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT(IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Digital I/O: 1KV, Analog & Communication I/O: 1KV RS(IEC 61131-2, IEC 61000-4-3): 26MHz~1GHz, 10V/m	
Grounding	The diameter of the grounding wire cannot be smaller than that of terminals 24V and 0V (if numerous ELCs are used at the same time, make sure that each ELC is grounded respectively to the ground poles)	
Vibration/Shock Immunity	International Standard Regulations: IEC61131-2, IEC 68-2-6 (TEST Fc)/ IEC61131-2 & IEC 68-2-27 (TEST Ea)	
Operation/Storage Environment	Operation: 0°C~55°C (temperature), 50~95% (humidity), pollution degree: 2; Storage: -25°C~70°C (temperature), 5~95% (humidity)	

Agency Approvals	UL508 UL1604, Class1,Div2 Operating temperature code: T5 European community EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC
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### 3 CR (CONTROLLED REGISTER)

ELC-PT04ANNN				EXPLANATION																																														
CR No.	Parameter Comm. address	Latched	Register name	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0																															
#0	H 4064	O	R	Model type	System used, data length is 8bits (b7~b0). ELC-PT04ANNN model code = H 8A																																													
#1				Reserved																																														
#2	H 4066	O	R/W	CH1 average number	The number of readings used for "average" temperature on channels CH1~CH4.																																													
#3	H 4067	O	R/W	CH2 average number																																														
#4	H 4068	O	R/W	CH3 average number																																														
#5	H 4069	O	R/W	CH4 average number	Setting range is K1~K100 and factory setting is K10.																																													
#6	H 406A	X	R	CH1 average deg.(°C)	Average degrees for channels CH1~CH4. (unit: 0.1 degrees C)																																													
#7	H 406B	X	R	CH2 average deg.(°C)																																														
#8	H 406C	X	R	CH3 average deg.(°C)																																														
#9	H 406D	X	R	CH4 average deg.(°C)																																														
#10~#11				Reserved																																														
#12	H 4070	X	R	CH1 average deg.(°F)	Average degrees for channels CH1~CH4. (unit: 0.1 degrees F)																																													
#13	H 4071	X	R	CH2 average deg.(°F)																																														
#14	H 4072	X	R	CH3 average deg.(°F)																																														
#15	H 4073	X	R	CH4 average deg.(°F)																																														
#16~#17				Reserved																																														
#18	H 4076	X	R	Present temp. of CH1(°C)	Present temperature of channels CH1~CH4. (unit: 0.1 degrees C)																																													
#19	H 4077	X	R	Present temp. of CH2(°C)																																														
#20	H 4078	X	R	Present temp. of CH3(°C)																																														
#21	H 4079	X	R	Present temp. of CH4(°C)																																														
#22~#23				Reserved																																														
#24	H 407C	X	R	Present temp. of CH1(°F)	Present temperature of channels CH1~CH4. (unit: 0.1degrees F)																																													
#25	H 407D	X	R	Present temp. of CH2(°F)																																														
#26	H 407E	X	R	Present temp. of CH3(°F)																																														
#27	H 407F	X	R	Present temp. of CH4(°F)																																														
#28~#29				Reserved																																														
#30	H 4082	X	R	Error status	Data register stores the error status, refer to fault code chart for details.																																													
#31	H 4083	O	R/W	Comm. address	Setting range is 01~255 and factory setting is K1																																													
#32	H 4084	O	R/W	Communication baud rate setting	Communication baud rate (4,800, 9,600, 19,200, 38,400, 57,600 and 115,200 bps). For ASCII mode, date format is 7Bits, even, 1 stop bit (7 E 1). For RTU mode, date format is 8Bits, even, 1 stop bit (8 E 1). b0: 4,800 bps (bit/sec) , b1: 9600 bps (bit/sec). (factory setting) b2: 19,200 bps (bit/sec). b3: 38,400 bps (bit/sec). b4: 57,600 bps (bit/sec). b5: 115,200 bps (bit/sec). b6~b13: Reserved. b14: switch between low bit and high bit of CRC code (For RTU mode) b15: RTU mode.																																													
#33	H 4085	O	R/W	Reset to factory setting	<table border="1"> <tr> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>b11</th> <th>b10</th> <th>b9</th> <th>b8</th> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> <tr> <td colspan="4">Def. f ERR LED</td> <td>CH4</td> <td>CH3</td> <td>CH2</td> <td>CH1</td> <td colspan="8"></td> </tr> </table> <p>Example: Setting of CH1</p> <ol style="list-style-type: none"> <li>b0 Reserved</li> <li>b1 Reserved</li> <li>b2: Set to 1 and ELC will be reset to factory settings.</li> </ol> <p>Definition of ERR LED: b12~b15=1111(factory settings)</p> <ol style="list-style-type: none"> <li>b12 corresponds to CH1: when b12=1, scale exceeds the range or external contact has no connection, ERR LED flashes.</li> <li>b13 corresponds to CH2: when b13=1, scale exceeds the range or external contact has no connection, ERR LED flashes.</li> <li>b14 corresponds to CH3: when b14=1, scale exceeds the range or external contact has no connection, ERR LED flashes.</li> <li>b15 corresponds to CH4: when b15=1, scale exceeds the range or external contact has no connection, ERR LED flashes.</li> </ol>														b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	Def. f ERR LED				CH4	CH3	CH2	CH1								
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Def. f ERR LED				CH4	CH3	CH2	CH1																																											
#34	H 4086	O	R	System Version	Display software version in hexadecimal. Example: H 010A = version 1.0A.																																													
#35~#48				System used																																														

#### Explanation:

- CR#0: The ELC model type.
- CR#1, CR#10, CR#11, CR#16, CR#17, CR#22, CR#23, CR#28, CR#29 are reserved.
- CR#2 ~ CR#5: Used to set the number of input readings used for the average temperature calculation. The available range is K1~K100 and factory setting is K10.

- CR#6 to CR#9: The average temperature (°C). The average temperature is calculated using multiple temperature readings. Example: If CR#2 is 10, the temperature in CR#6 will be the average of the last 10 readings on CH1.
- CR#12 to CR#15: The average temperature (°F). The average temperature is calculated using multiple temperature readings. Example: If CR#2 is 10, the temperature in CR#12 will be the average of the last 10 readings on CH1.
- CR#18 ~ CR#21: display present temperature (°C) of CH1~CH4 input signal.
- CR#24 ~ CR#27: display present temperature (°F) of CH1~CH4 input signal.
- CR#30 is a fault code register. Refer to the following chart.

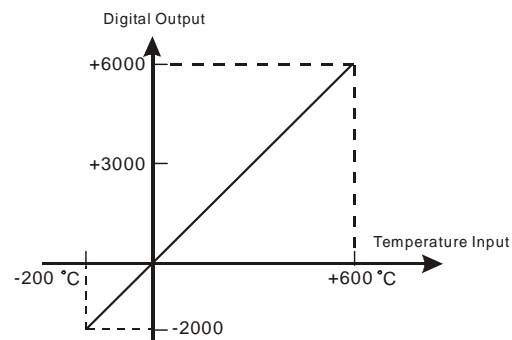
Fault description	Content	b15~b8	b7	b6	b5	b4	b3	b2	b1	b0
Power source abnormal	K1(H1)	Reserved	0	0	0	0	0	0	0	1
Analog input value error	K2(H2)		0	0	0	0	0	0	1	0
Setting mode error	K4(H4)		0	0	0	0	0	1	0	0
Offset/Gain error	K8(H8)		0	0	0	0	1	0	0	0
Hardware malfunction	K16(H10)		0	0	0	1	0	0	0	0
Digital range error	K32(H20)		0	0	1	0	0	0	0	0
Average times setting error	K64(H40)		0	1	0	0	0	0	0	0
Command error	K128(H80)		1	0	0	0	0	0	0	0

Note: Each fault code will have corresponding bit (b0~b7). Two or more faults may happen at the same time. 0 means normal and 1 means having fault.

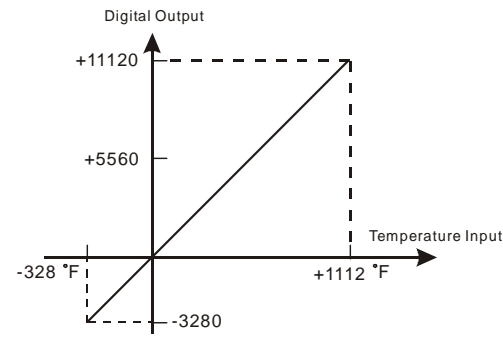
- CR#31: RS-485 communication address. Setting range is 01~255 and factory setting is K1.
- CR#32: RS-485 communication baud rate: 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200. b0:4,800bps, b1:9,600bps (factory setting), b2:19,200bps, b3:38,400 bps, b4:57,600 bps, b5:115,200 bps, b6~b13: Reserved, b14: switch between low bit and high bit of CRC code (only for RTU mode) b15: ASCII / RTU mode. For ASCII mode, date format is 7Bits, even, 1 stop bit (7 E 1). For RTU mode, date format is 8Bits, even, 1 stop bit (8 E 1).
- CR#33: b0~b11: Used to reset the settings of CH1~CH4 to factory defaults. b12~b15: definition of ERR LED, factory setting is b12~b15=1111.
- CR#34: software version.
- CR#35~ CR#48: Reserved for internal system use.
- The corresponding parameters address H4064~H4086 of CR#0~CR#34 may provide users to read/write data via RS-485 communication.
  - Communication baud rate: 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 bps.
  - Communication format: ASCII mode is 7Bit, even bit, 1 stop bit (7 E 1). Communication format of RTU mode is 8Bit, even bit, 1 stop bit (8 E 1).
  - Function code: 03H—read data from register. 06H—write a WORD into register. 10H—write many WORDs into register.

**4 TEMPERATURE/DIGITAL CHARACTERISTIC CURVE**

Temperature mode: (Centigrade)



Temperature mode: (Fahrenheit)



**5 INITIAL ELC START-UP**

LED display:

- Upon power-up, the ERROR LED will light for 0.5 seconds the POWER LED will light continuously.
- No errors= POWER LED on and ERROR LED off.
- Low Voltage error (lower than 19.5V), ERROR LED will blink continuously till the power supply rises above 19.5V.
- ELC-PT04ANNN connected to ELC in series = RUN LED on ELC will be lit and A/D LED or D/A LED should blink.
- After receiving the first RS-485 command the A/D LED or D/A LED will blink.
- If the input or output exceeds the upper or lower bounds, then the ERROR LED will blink.

Example:

