### 1.3 External wiring

#### 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 air borne 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.

### 1.4 Standard Specifications

#### 2.1 Function Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum Temperature Modules</td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>24 VDC(20±4VDC<del>28.8VDC) (±15%</del>±20%)</td>
</tr>
<tr>
<td>Analog input channel</td>
<td>4 channels per module</td>
</tr>
<tr>
<td>Sensors type</td>
<td>3-WIRE (PT100) - 3850 PPM/°C (53705 JIS C1604-1989)</td>
</tr>
<tr>
<td>Current excitation</td>
<td>1 mA</td>
</tr>
<tr>
<td>Temperature input range</td>
<td>-200°C~600°C</td>
</tr>
<tr>
<td>Digital conversion range</td>
<td>0-2.000-0.000-6.320-1.12F</td>
</tr>
<tr>
<td>Resolution</td>
<td>14 bits(1°C)</td>
</tr>
<tr>
<td>Overall accuracy</td>
<td>±0.5% of full scale at 25°C(77°F), ±1% of full scale of temperature 0-55°C (32-131°F)</td>
</tr>
<tr>
<td>Response time</td>
<td>200 ms &lt; channels</td>
</tr>
<tr>
<td>Isolation method</td>
<td>Isolation between digital and analog circuitry. There is no isolation between channels.</td>
</tr>
<tr>
<td>Isolation</td>
<td>Field to Digital Input: 500V</td>
</tr>
<tr>
<td>Field to Analog Input: 500V</td>
<td></td>
</tr>
<tr>
<td>Analog area to Digital Input: 500V</td>
<td></td>
</tr>
<tr>
<td>Field to 24VDC: 500V</td>
<td></td>
</tr>
<tr>
<td>Digital Data format</td>
<td>2’s complement of 16-bit. (13 Significant Bits)</td>
</tr>
<tr>
<td>Average function</td>
<td>Yes (CR#2=000 may be set and the range is K1=1000)</td>
</tr>
<tr>
<td>Self diagnostic function</td>
<td>Yes</td>
</tr>
<tr>
<td>Communication mode (RS-485)</td>
<td>MODBUS ASCII/RTU Mode. Communication baud rate of 4.8, 9,600 / 9, 19.200 / 38.400 / 57.600 / 115.200 (bps). For ASCII mode, data format is 8B/8B, even, 1 stop bit (8E, 1). For RTU mode, data format is 8B/8B, even, 1 stop bit (8E, 1). The RS-485 is disabled when the ELC-PT04ANNN is connected in series to an ELC.</td>
</tr>
<tr>
<td>Connection to a ELC in series</td>
<td>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.</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>2W at 24 VDC (20±4VDC<del>28.8VDC) (±15</del>±20%)</td>
</tr>
<tr>
<td>Noise Immunity</td>
<td>ESD(IEC61131-2, IEC 61000-4-2, IEC 61000-4-4): 8KV Air Discharge EFT(IEC61131-2, IEC 61000-4-4): 400V Power Line, 20V Digital I/O, 10V Analog &amp; Communication I/O, 10V</td>
</tr>
<tr>
<td>Grounding</td>
<td>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 pole)</td>
</tr>
<tr>
<td>Operation/Storage Environment</td>
<td>Operation (-15°C<del>60°C), Temperature: 50</del>95% (humidity), pollution degree: 2, Storage: -25°C<del>70°C, Temperature: 5</del>95% (humidity)</td>
</tr>
</tbody>
</table>

#### Note 1

- Only use 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 no connection suppression.

#### Note 3

- PT100 supplied with your temperature sensor. ELC terminal screws should be tightened to 1.95 kg-cm (1.7 lb-in).

#### Note 4

- Note 1: Mahogany Temperature Sensors Module

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**Explanation:**

- **CR05:** The ELC model type.
- **CR10:** CR10, CR810, CR811, CR815, CR817, CR222, CR223, CR828, CR249 are reserved.
- **CR22 - CR55:** 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.
4. 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#8 will be the average of the last 10 readings on CH1.
5. 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.
6. CR#18 ~ CR#21: display present temperature (°C) of CH1~CH4 input signal.
7. CR#24 ~ CR#27: display present temperature (°F) of CH1~CH4 input signal.
8. CR#30 is a fault code register. Refer to the following chart.

Temperature mode: (Fahrenheit)

Temperature Input

Digital Output

-3280

+5560

Temperature mode: (Centigrade)

Temperature Input

Digital Output

-2000

+3000

Operands:

m: Number of special module (m=0~7)  
m2: Number of CR (Control Register) of special module (m2=0~48) that will be read  
D: Location to save read data  
E: Data words to read at one time (m2=0~48)  

Explanations:

ELC uses this instruction to read CR data of special modules.

Operands:

m: Number of special module (m=0~7)  
m2: Number of CR (Control Register) of special module that will be written to (m2=0~48)  
S: Data to write in CR  
E: number of words to write one time (m2=0~48)  

Explanations:

ELC uses this instruction to write CR data of special modules.

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

Example:

Explanation:
1. Reading the model type of extension module K0 (should be H8A for ELC-PT04ANNN model type).
2. The averaging number for CH1~CH4 will be D10~D13. (°C)
3. If the model type is ELC-PT04ANNN Reading the average temperature (°C) of CH1~CH4 (4 data) from CR#12~CR#15 and save them into D20~D23.
4. Reading the average temperature (°F) of CH1~CH4 (4 data) from CR#12~CR#15 and save them into D24~D27.
5. Reading the present temperature (°C) of CH1~CH4 (4 data) from CR#18~CR#21 and save them into D30~D33.
6. Reading the present temperature (°F) of CH1~CH4 (4 data) from CR#24~CR#27 and save them into D34~D37.