CN3440 SERIES
Universal Temperature & Process Controllers
Installation Guide
WARRANTY/DISCLAIMER

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
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2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA’s policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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CONTENTS

1 INTRODUCTION .................................. 2

2 PREPARATION ................................. 3
  2.1 Checking the Code Number ......... 3

3 MECHANICAL INSTALLATION .......... 4
  3.1 Siting .......................................... 4
  3.2 Mounting ...................................... 5

4 ELECTRICAL INSTALLATION ............ 6
  4.1 Access to Terminals ..................... 6
  4.2 Setting the Input Selector Links ... 6
  4.3 Setting the Isolated Output Link ... 6
  4.4 Cable Glands and
     Conduit Fixings ............................. 8
     4.4.1 Cable Glands
        (IEC – 20mm) ......................... 8
     4.4.2 Conduit Adaptors
        (N. American – 0.5in) ........ 8
     4.4.3 Cable Glands
        (N. American – 0.5in) ........ 9
  4.5 Connections Summary ................. 10
  4.6 Input Connections .......................... 12
     4.6.1 Thermocouple
        (THC) Inputs ........................ 12
     4.6.2 3-lead Resistance
        Thermometer (RTD)
        Inputs .............................. 12
     4.6.3 2-lead Resistance
        Thermometer (RTD)
        Inputs .............................. 12
     4.6.4 Links for Unused Inputs .. 12
  4.7 Output Connections ..................... 14
  4.8 Relay Connections ...................... 14
  4.9 Motorized Valve Connections .... 14
  4.10 Logic Input Connections .......... 15
  4.11 Power Supply Selection and
      AC Connections ........................ 16

5 INSTALLATION RECORD ................. 17
The instrument documentation is shown in Fig. 1.1. The **Standard Manuals**, including the specification sheet, are supplied with all instruments. The **Modbus Supplement** is supplied with instruments configured for Modbus Serial Communication.

This manual includes an **Installation Record** which should be completed as a log of the electrical installation. The record is useful when carrying out initial instrument programming and can be retained for future reference.
2 PREPARATION

2.1 Checking the Code Number – Fig. 2.1

Fig. 2.1 Location of Code Number Label
EC Directive 89/336/EEC

In order to meet the requirements of the EC Directive 89/336/EEC for EMC regulations, this product must not be used in a non-industrial environment.

3.1 Siting – Figs. 3.1 and 3.2

**A – Close to Sensor**

**B – At Eye-level Location**

**C – Avoid Vibration**

**D – Use Screened Cables**

Caution. Select a location away from strong electrical and magnetic fields. If these cannot be avoided, particularly in applications where ‘walkie talkies’ are used, connect using screened cables within earthed metal conduit.

**A – Within Temperature Limits**

**B – Within Humidity Limits**

**IP66/NEMA4X**

**C – Within Protection Rating Limits**

**Fig. 3.1 General Requirements**

**Fig. 3.2 Environmental Requirements**
3.2 Mounting – Figs. 3.3 and 3.4

The instrument is designed for wall-/pipe-mounting – see Fig. 3.4. Overall dimensions are shown in Fig. 3.3.

![Fig. 3.3 Overall Dimensions](image)

**Fig. 3.3 Overall Dimensions**

![Fig. 3.4 Wall-/Pipe-mounting Details](image)

**Fig. 3.4 Wall-/Pipe-mounting Details**
**Warning.** Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common mode voltages are switched off.

**Note.**
- Always route signal leads and power cables separately, preferably in earthed metal conduit.
- It is strongly recommended that screened cable is used for signal inputs and relay connections. Connect the screen to the ground stud.

**Information.** Use cable appropriate for the load currents. The terminals accept cables up 12AWG (2.5mm²).

4.1 **Access to Terminals – Fig. 4.1**
For access to terminals – refer to Fig. 4.1, steps 1 to 6.

4.2 **Setting the Input Selector Links – Fig. 4.2A**
Plug-in links on the microprocessor p.c.b. are positioned according to the type of Process Variable Input, Remote Set Point Input and Valve Position Feedback Inputs used.

Remove the instrument front panel – see Fig. 4.1, steps 1 to 6.

Referring to Fig. 4.2A, set the link positions for the input type required.

4.3 **Setting the Isolated Output Link – Fig. 4.2B**
A plug-in link (PL7) on the microprocessor p.c.b. is positioned according to the isolated output required, either a current proportioning control output (programmable in range 0 to 20mA) or a 12V logic output (minimum load 400Ω). Referring to Fig. 4.2B – steps 1 and 2, set the link for the output type required.

To use a 12V logic output, the control type must be set to Time Proportioning Control – see Fig. 3.1 of the Programming Guide.

Fig. 4.1 Access to Terminals and Processor Board
A – Input Types

B – Isolated Output Types

1. Identify Link PL7
2. Set links for output type required

Fig. 4.2 Setting the Selector Links
4.4 Cable and Conduit Fixings

4.4.1 Cable (IEC – 20mm) – Fig. 4.3

Warning.
- Rigid conduit must NOT be fitted to the controller.
- Controller adaptors must incorporate a face seal.
- Torque settings for the hubs and outer nuts on the specified adaptors is 20ft. lbs minimum, 25ft. lbs. maximum.

Information.
- Suitable adaptors for controller (mandatory for FM installations):
  - APPLETON ST-50 PLUS STG-50 or STB-50 PLUS STG-50.
  - Reusable ONLY with replacement ferrule STF-50.
  - O.Z. GEDNEY 4Q-50, 4Q50T or 4Q-50TG.
4.4.3 Cable Glands (N. American – 0.5in) – Fig. 4.5

**Warning.**
- Controller glands must be fitted with a face seal.
- Torque settings (hubs only) – 20ft. lbs minimum, 25ft. lbs. maximum.
- Outer nuts – hand tight plus a half turn only.

**Information.**
- Suitable Cable Glands: (mandatory for FM installations):
  - O.Z. GEDNEY
    - SR-50-375 or SR-504
  - APPLETON
    - CG 3150 or CG-3150S (and STG-50 sealing ring).
  - THOMAS & BETTS
    - 2521.
- When fitting cable glands to the controller, start with an outer gland and also temporarily fit a gland at the opposite end, to aid location of the transmitter gland plate. Fit and tighten glands consecutively from initial gland.
4.5 Connections Summary – Fig. 4.6

Information.
Input impedances:
- Low voltage (mV) > 10MΩ
- Voltage > 10MΩ
- Current 10Ω.

Fig. 4.6 Terminal Block Identification
<table>
<thead>
<tr>
<th>Terminal Number</th>
<th>AC Supply</th>
<th>Process Variable Input or 2-wire Tx Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
<td>24V, 115V or 230V a.c.</td>
</tr>
<tr>
<td>2</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>N/O</td>
<td>Relay 1 Output</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>Motorized Valve Control Relay (open)</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>– see Fig. 4.17</td>
</tr>
<tr>
<td>6</td>
<td>N/O</td>
<td>Relay 2 Output</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
<td>Motorized Valve Control Relay (close)</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>– see Fig. 4.17</td>
</tr>
<tr>
<td>9</td>
<td>N/O</td>
<td>Relay 3 Output</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>Alarm Relays</td>
</tr>
<tr>
<td>11</td>
<td>N/C</td>
<td>– see Fig. 4.17</td>
</tr>
<tr>
<td>12</td>
<td>3rd lead/2-wire TX</td>
<td>Process Variable Input or 2-wire Tx Power Supply</td>
</tr>
<tr>
<td>13</td>
<td>Input 1+</td>
<td>– see Figs. 4.7 to 4.9, 4.12 and 4.14</td>
</tr>
<tr>
<td>14</td>
<td>Input 1–</td>
<td>– see Fig. 4.13</td>
</tr>
<tr>
<td>15</td>
<td>3rd lead</td>
<td>Remote Set Point Input – see Figs. 4.7 to 4.12 and 4.14</td>
</tr>
<tr>
<td>16</td>
<td>Input 2+</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Input 2–</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Tx+</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Tx–</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Rx+</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Rx–</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>+</td>
<td>Retransmission Output/Cool Output – see Fig. 4.15</td>
</tr>
<tr>
<td>24</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>+</td>
<td>Current Proportioning Control Output/Heat Output Fig. 4.15</td>
</tr>
<tr>
<td>26</td>
<td>–</td>
<td>or 12V Logic Control Output Fig. 4.16</td>
</tr>
<tr>
<td>27</td>
<td>3rd lead</td>
<td>Position Feedback Input – see Figs. 4.18, 4.19A and 4.19B</td>
</tr>
<tr>
<td>28</td>
<td>Input 3+</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Input 3–</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Logic Input 1 – see Figs. 4.20 and 4.21</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Logic Input 2 – see Figs. 4.20 and 4.21</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Common</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1 Electrical Connections
4.6 Input Connections
Make connections to each input, as shown in Figs 4.4 to 4.14, first removing any factory-fitted wire links not required.

4.6.1 Thermocouple (THC) Inputs – Fig. 4.7

* Note. Automatic Cold Junction Compensation (ACJC) is active when an input is programmed for use with thermocouples. Use the correct compensating cable between the THC and the terminals – see Table 4.2.

If an external fixed cold junction is used, the connections to the instrument must be made with copper cable. The input must be programmed for mV input signals and the appropriate THC linearizer selected – see Sections 4.5 and 4.6 of the Programming Guide.

<table>
<thead>
<tr>
<th>Type of Thermocouple</th>
<th>BS1843</th>
<th>ANSI MC 96.1</th>
<th>DIN 43714</th>
<th>BS4937 Part No.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni-Cr/Ni-Al (K)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Brown</td>
<td>+ Yellow</td>
<td>+ Red</td>
<td>+ Green</td>
<td></td>
</tr>
<tr>
<td>– Blue</td>
<td>– Red</td>
<td>– Green</td>
<td>– White</td>
<td></td>
</tr>
<tr>
<td>Case Red</td>
<td>Case Yellow</td>
<td>Case Green</td>
<td>Case Green</td>
<td></td>
</tr>
<tr>
<td>Nicrisil/Nisil (N)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Orange</td>
<td>+ Orange</td>
<td>+ Red</td>
<td>+ Pink</td>
<td></td>
</tr>
<tr>
<td>– Blue</td>
<td>– Red</td>
<td>– White</td>
<td>– White</td>
<td></td>
</tr>
<tr>
<td>Case Orange</td>
<td>Case Orange</td>
<td>—</td>
<td>Case Pink</td>
<td></td>
</tr>
<tr>
<td>Pt/Pt-Rh (R and S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ White</td>
<td>+ Black</td>
<td>+ Red</td>
<td>+ Orange</td>
<td></td>
</tr>
<tr>
<td>– Blue</td>
<td>– Red</td>
<td>– White</td>
<td>– White</td>
<td></td>
</tr>
<tr>
<td>Case Green</td>
<td>Case Green</td>
<td>Case White</td>
<td>Case Orange</td>
<td></td>
</tr>
<tr>
<td>Cu/Cu-Ni (T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ White</td>
<td>+ Blue</td>
<td>+ Red</td>
<td>+ Brown</td>
<td></td>
</tr>
<tr>
<td>– Blue</td>
<td>– Red</td>
<td>– White</td>
<td>– White</td>
<td></td>
</tr>
<tr>
<td>Case Blue</td>
<td>Case Blue</td>
<td>Case Brown</td>
<td>Case Brown</td>
<td></td>
</tr>
<tr>
<td>Fe/Con (J)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Yellow</td>
<td>+ White</td>
<td>+ Red</td>
<td>+ Black</td>
<td></td>
</tr>
<tr>
<td>– Blue</td>
<td>– Red</td>
<td>– White</td>
<td>– White</td>
<td></td>
</tr>
<tr>
<td>Case Black</td>
<td>Case Black</td>
<td>Case Blue</td>
<td>Case Black</td>
<td></td>
</tr>
</tbody>
</table>

* Case Blue for intrinsically safe circuits

Table 4.2 Thermocouple Compensating Cables

4.6.2 3-lead Resistance Thermometer (RTD) Inputs – Fig. 4.8

The three leads must have equal resistance, not exceeding 50Ω each.

4.6.3 2-lead Resistance Thermometer (RTD) Inputs – Fig. 4.9

If long leads are necessary it is preferable to use a 3-lead RTD. If the RTD is to be used in a hazardous area a 3-lead RTD must be used.

4.6.4 Links for Unused Inputs

To reduce susceptibility to electro-magnetic interference, ensure that the three terminals on each unused input are shorted together with sleeved wire links.
4 ELECTRICAL INSTALLATION...

Fig. 4.7 Thermocouple Input Connections

Remote Set Point  
Process Variable

Sleeved Link

Fig. 4.8 3-lead Resistance Thermometer Input Connections

Remote Set Point  
Process Variable

Red
White
Red

Fig. 4.9 2-lead Resistance Thermometer Input Connections

Remote Set Point  
Process Variable

Sleeved Link

White
Red

Fig. 4.10 3-lead Resistance Remote Set Point Input Connections

Remote Set Point  
Process Variable

Sleeved Link

Fig. 4.11 2-lead Resistance Remote Set Point Input Connections

Remote Set Point  
Process Variable

Fig. 4.12 Current Input Connections

Remote Set Point
Process Variable

Sleeved Link

Fig. 4.13 2-wire Transmitter Power Supply Input Connections

Remote Set Point  
Process Variable

Fig. 4.14 Voltage Input Connections

Remote Set Point
Process Variable

Fig. 4.15 Current Proportioning Control and Retransmission Output Connections

Remote Set Point
Process Variable

Fig. 4.16 Logic Control Output Connections

Remote Set Point
Process Variable

12V Logic Output for ON/OFF or Time-proportioning Control

Retransmission O/P or 'Cool' Analogue O/P in Heat/Cool

Current Proportioning Control Output

12V Logic Output for ON/OFF or Time-proportioning Control
4.7 Output Connections
Make connections as shown in Figs 4.15 and 4.16.

4.8 Relay Connections – Fig. 4.17
For relay functions refer to the following table.

<table>
<thead>
<tr>
<th>Relay 1</th>
<th>Relay 2</th>
<th>Relay 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>On/Off Control</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>Time Prop.(Heat)</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>Time Prop.(Cool)</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Motorized Valve</td>
<td>Open</td>
<td>Close</td>
</tr>
<tr>
<td>Alarm</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

4.9 Motorized Valve Connections – Figs. 4.18 and 4.19

Note. Link must be connected at the motorized valve drive terminals and not the Controller terminals.
4.10 Logic Input Connections – Figs. 4.20 and 4.21
Each logic input can be programmed to perform one of a number of functions – see Section 3.10 of the Programming Guide.

Fig. 4.20 Standard Logic Input Functions

Fig. 4.21 Additional Logic Input Functions for Profile Selection

* Note. Only one function may be performed by each input at any one time.
4.11 Power Supply Selection and AC Connections – Fig. 4.22

A – Selecting the Supply Voltage

B – Power Supply Connections

Fig. 4.22 Power Supply Selection and AC Connections
<table>
<thead>
<tr>
<th>Connection/Terminal Number</th>
<th>Power Supply</th>
<th>Relay 1 Output</th>
<th>Relay 2 Output</th>
<th>Relay 3 Output</th>
<th>Process Variable Input</th>
<th>Remote Set Point Input</th>
<th>Modbus Serial Communications Option 1 only</th>
<th>Retransmission Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>3rd Link Positions</td>
<td>3rd Link Positions</td>
<td>Termination Resistors</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>Link Positions</td>
<td>Link Positions</td>
<td>Linked-out</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>mA mV/THC/RTD V 2-wire</td>
<td>mA mV/THC/RTD V</td>
<td>Linked-in</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Tick Box)</td>
<td>(Tick Box)</td>
<td>(Tick Box)</td>
<td>(Tick Box)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>230V AC</td>
<td>Output Type:</td>
<td>Output Type:</td>
<td>Output Type:</td>
<td>Output Type:</td>
<td>Output Type:</td>
<td>Output Type:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>115V AC</td>
<td>Output Function:</td>
<td>Output Function:</td>
<td></td>
<td></td>
<td></td>
<td>Output Function:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Output Type:**
- Relay 1 Output: 
- Relay 2 Output: 
- Relay 3 Output: 
- Process Variable Input: 
- Remote Set Point Input: 
- Modbus Serial Communications Option 1 only: 
- Retransmission Output: 

**Output Function:**
- Relay 1 Output: 
- Relay 2 Output: 
- Relay 3 Output: 
- Process Variable Input: 
- Remote Set Point Input: 
- Modbus Serial Communications Option 1 only: 
- Retransmission Output:
### Connection/Terminal Number

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
<th>Control Output</th>
<th>Position Feedback Input</th>
<th>Logic Input 1</th>
<th>Logic Input 2</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Output</td>
<td></td>
<td>25 +</td>
<td>26 –</td>
<td>27 3rd</td>
<td>28 +</td>
<td>29 –</td>
</tr>
<tr>
<td>Position Feedback Input</td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Link Positions (Tick Box)</td>
<td></td>
<td></td>
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**...4 ELECTRICAL INSTALLATION**
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The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

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