User's Guide

Shop online at
omega.com

CN1A Series
On/off Temperature Controller
Servicing North America:

U.S.A.: One Omega Drive, P.O. Box 4047
ISO 9001 Certified
Stamford, CT 06907-0047
TEL: (203) 359-1660
FAX: (203) 359-7700
e-mail: info@omega.com

Canada: 976 Bergar
Laval (Quebec) H7L 5A1, Canada
TEL: (514) 856-6928
FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®

Mexico: En Español: (001) 203-359-7803
e-mail: espanol@omega.com
FAX: (001) 203-359-7807
info@omega.com.mx

Servicing Europe:

Benelux: Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 3472121
Toll Free in Benelux: 0800 0993344
FAX: +31 (0)20 6434643
e-mail: sales@omegaeng.nl

Czech Republic: Frystateka 184, 733 01 Karviná, Czech Republic
TEL: +420 (0)59 6311899
Toll Free in Czech Republic: 0800-1-66342
FAX: +420 (0)59 6311114
e-mail: info@omegashop.cz

France: 11, rue Jacques Cartier, 78280 Guyancourt, France
TEL: +33 (0)1 61 37 2900
Toll Free in France: 0800 466 342
FAX: +33 (0)1 30 57 5427
e-mail: sales@omega.fr

Germany/Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
TEL: +49 (0)7056 9398-0
Toll Free in Germany: 0800 639 7678
FAX: +49 (0)7056 9398-29
e-mail: info@omega.de

United Kingdom: One Omega Drive, River Bend Technology Centre
ISO 9002 Certified
Northbank, Irlam, Manchester
M44 5BD United Kingdom
TEL: +44 (0)161 777 6611
Toll Free in United Kingdom: 0800-488-488
FAX: +44 (0)161 777 6622
e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.
CN1A series on/off temperature controller

FRONT PANEL FUNCTIONS

SET
When momentarily pressed, enables the set point to be viewed. When held for >4 secs, enables access to the set point. When adjusting the set point, scrolls from left to right across each digit. When in programming mode, scrolls through parameters and, for selected parameter, scrolls from left to right across.

When adjusting the set point, increments the value of each digit selected by the SET key. When in Programming mode, increments the variable of parameters or digits selected by the SET key.

START-UP PROCEDURE

With a suitable probe connected to the CN/A, when the supply is first applied, the display will go through the start-up routine of displaying the software issue (e.g. 5.2) followed by a display check (888) and then by the measured value (usually ambient temperature). It is advisable not to connect a load initially, as the Controller will attempt to control against the default values set at the factory.

After accessing the set point (by holding down SET for > 4 seconds) and adjusting it to the desired process value, the CN/A will display CDE. The code 410 must then be entered to access the other programmable parameters; otherwise, if no other adjustments are required, a further press of SET will return the display to the process value. For details of how to program the CN/A, see the program flowchart.

WIRING DIAGRAM

RTD (PT100)

Thermocouple +

INSTALLATION

Locate the instrument where it will not be subject to excessive temperature, shock or vibration.
Do not overtighten the two mounting collar fixingscrews when locating the controller into a panel.
Do not run thermocouple or other input wiring in the same conduit as power leads.
Make sure the input sensor (J, K, T, N thermocouple or RTD) matches the type of unit supplied.
Always use thermocouple extension cables of the same type as your thermocouple probe.
CHANGING THE SET POINT

1. To view the set point, press the SET key momentarily.

2. To change the set point, press and hold the SET key for at least 4 seconds until the first digit flashes. Press the ▼ key to increment digit. Press the SET key for 2nd and 3rd digits. Press the SET key to display C&E and again to return to the measured value.

PROGRAMMING PROCEDURE

1. At C&E press the ▼ key to display 000 with the first digit flashing.

2. Use the ▼ and SET keys to set the password (default 410). Press SET again to enter the program mode.

3. The SET key scrolls through the program parameters and the ▼ key will change a parameter. When in a parameter with a value the SET key scrolls across the digits from left to right.

4. See the program flowchart and parameter table for full program parameter information.

ERROR HANDLING

Each time the UNA is powered-up, the software checks the two portions of memory which contain the user parameters and calibration constants. If the controller is subjected to excessive electrical noise, either or both of these sets of parameters may become corrupted. In this case the following corrective actions must be taken:

USER PARAMETER CORRUPTION

Once corrupted, the controller will immediately switch its output off and then reset the user parameters to the default values, warning the operator by flashing SET on the display. By pressing SET the display will change to C&E and the default password (410) can be entered to access the set-up routine. Please refer to the program flowchart for programming details. The default values can also be set at any time by pressing both keys when C&E is displayed. The display will change to DEE press ▼ key to display ‘no’ and again for ‘yes’. Then press the SET key.

CALIBRATION CORRUPTION

The calibration routines can be entered by pressing both buttons for more than 4 sec’s the display will read CAL. Press the ▼ key twice to display ‘yes’. Press Set this number is the ambient temperature in Celsius adjust if necessary. On the final SET the display shows "CLL" set input simulator to 0°C and press SET. The display should show a value close to 0 and after pressing SET again it should be closer. Press SET and the display will show "CLH" set the input simulator to 90°C and press SET. The display will now show the high value and after pressing SET again it should be closer to 900. This procedure can be repeated until correct, then with either "CLL" or "CLH" on the display press both keys together until the unit re-starts. The PT100 version is similar except there is no ambient temperature setting and it should be calibrated at 0°C(100 Ohms) and 300°C (212 Ohms).

Note: This procedure should only be attempted by trained personnel and only where the premises has the facilities for simulating calibrated temperature references. Otherwise the unit should be returned to the Omega Engineering.
SPECIFICATION

Supply voltage: 10 - 32Vac/dc @ 60mA max.
              90 - 260Vac, 50/60 Hz @ 1.5VA max.

Sensor options: J, K, T, N T/couples, PT100.

Scale ranges:  J T/c = -99 to 700°C (999°F)
               T T/c = -99 to 300°C (570°F)
               K/N T/c = -99 to 999°C or F
               PT100 = -99 to 400°C (700°F)

Gain accuracy:  T/c = +/- 0.25% of scale range
                Others = +/- 0.6% of scale range

Offset accuracy: T/c = +/- 5°C
                 PT100 = +/- 2°C

Outputs: Control: 3A @ 240Vac, SPCO relay
         Alarm: 3A @ 240Vac, SPNO relay

Approvals: Conforms to CE generic standards
            EN50081-1 and EN50082-1 for emc
            and EN61010-1 for low voltage

Ambient range: -10 to 50°C non-condensing

Memory back-up: EEPROM

Weight: 150 gms

DIMENSIONS

Panel cut-out 1.772 X 1.772 (45 x 45)
Dimensions in inches (mm)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Display Code</th>
<th>Default Value</th>
<th>Range or options</th>
<th>Function/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale units</td>
<td>°C</td>
<td>°C</td>
<td>°C, °F</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>HY</td>
<td>HY1</td>
<td>HY0 to HY9</td>
<td>Determines the band over which the On/Off control function operates. For HY0 the controller operates as a latch forcing the output permanently off when the set value has been reached, until the supply is removed.</td>
</tr>
<tr>
<td>Sensor Type</td>
<td>H(K)</td>
<td>K</td>
<td>K, J, T, N</td>
<td>Ensures compatibility of the controller with the applied sensor. This parameter is automatically skipped for PT100 models.</td>
</tr>
<tr>
<td>Control Action</td>
<td>rEw</td>
<td>REV</td>
<td>REV, DIR</td>
<td>Selects the type of control action: reverse for heating, in which the output is on below the set-point (SP), and direct for cooling, where the output is on above the set-point (SP).</td>
</tr>
<tr>
<td>Deviation Alarm</td>
<td>dEv</td>
<td>00</td>
<td>00 to 99</td>
<td>Sets the value, above or below the SP, at which the alarm output is activated. For this mode, the alarm always tracks the SP. When set to 00 the deviation alarm function is inactive.</td>
</tr>
<tr>
<td>High Alarm</td>
<td>RH</td>
<td>999</td>
<td>SP to 999</td>
<td>Sets a value above which the Alarm output is activated. This value is independent of the SP.</td>
</tr>
<tr>
<td>Low Alarm</td>
<td>RL</td>
<td>-99</td>
<td>-99 to SP</td>
<td>Sets a value below which the Alarm output is activated. This value is independent of the SP.</td>
</tr>
<tr>
<td>Alarm Action</td>
<td>RL*</td>
<td>0</td>
<td>0 to 9</td>
<td>This parameter provides three functions:- 1) To determine the status of the Alarm contacts when an Alarm condition is satisfied: (Note: the de-energised state of the alarm relay is normally open (N-O)). 2) To decide the symmetry of the Deviation Alarm. For AL0 to AL3 the Deviation Alarm band is 2 X dEv setting. For AL4 to AL9 the Alarm band is asymmetrical and dependent upon the Control Action. 3) To decide whether the Alarm output is active immediately, at power-up, or inhibited until after the process has first reached the SP.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Contact status in alarm state</th>
<th>Alarm action</th>
<th>Deviation Alarm Band</th>
<th>Function/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL0</td>
<td>Closed</td>
<td>Inhibited</td>
<td>Symmetrical</td>
<td></td>
</tr>
<tr>
<td>AL1</td>
<td>Open</td>
<td>Inhibited</td>
<td>Symmetrical</td>
<td></td>
</tr>
<tr>
<td>AL2</td>
<td>Closed</td>
<td>Immediate</td>
<td>Symmetrical</td>
<td></td>
</tr>
<tr>
<td>AL3</td>
<td>Closed</td>
<td>Immediate</td>
<td>Symmetrical</td>
<td></td>
</tr>
<tr>
<td>AL4</td>
<td>Closed</td>
<td>Inhibited</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>AL5</td>
<td>Open</td>
<td>Inhibited</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>AL6</td>
<td>Closed</td>
<td>Immediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>AL7</td>
<td>Closed</td>
<td>Immediate</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>AL8</td>
<td>Closed</td>
<td>Inhibited</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>AL9</td>
<td>Open</td>
<td>Inhibited</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

| Set-point High | SPH        | 999 | SP to 999 | Sets the limit above which the SP cannot be adjusted. |
| Set-point Low  | SPL        | -99 | -99 to SP | Sets the limit below which the SP cannot be adjusted. |
| Reset          | rES        | 00  | -99 to +99 | Sets a +ve or -ve offset to compensate for sensor differences or unavoidable process errors; such as displacement between sensor and desired control point temperatures. |
| Password       | PRS        | 410 | -99 to 999 | Provides a means of restricting access to program parameters by unauthorised personnel. When set to any number >500, the Set-point can be viewed but not adjusted. Warning!! If the password is amended then forgotten, see paragraph "USER PARAMETER CORRUPTION". |
**Programming Notes:**

1) SPH and SPL are used to fix the set point limits.

2) For a description of the parameters, see the table (left).

3) If no keys are pressed for 30 seconds, the \( ^{\circ}N/A \) will automatically return to the control mode without entering the new parameters.

4) The SET key may be held for > 4 secs at any time during programming to enter only fully modified parameters.
OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA’S WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA’s customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA’s Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA’S WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA’s control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a “Basic Component” under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

**RETURN REQUESTS/INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. **BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA’S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS).** The assigned AR number should then be marked on the outside of the return package and on any correspondence.

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 CMEGA:
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:
1. Purchase Order number to cover the COST of the repair,
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.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2005 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.
Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course! Shop online at omega.com

TEMPERATURE
- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE
- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL
- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY
- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION
- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS
- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL
- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments