CDCN442
Concentration Conductivity Meter
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.
Index

Specifications ......................................................... 3
Mechanical Description .................................................. 4
Dimensional .......................................................... 5
Typical Installation ...................................................... 6
Electrical Installation .................................................... 7
Interconnection Barr ..................................................... 8
Electrical Schematic .................................................... 9
Equipment Operation .................................................. 10
Equipment Operation - Concentration Set Up ........................ 14
Equipment Operation - Concentration Calibration ................... 16
Equipment Operation - Concentration Read .......................... 17
Equipment Operation - Conductivity Set Up .......................... 18
Equipment Operation - Conductivity Calibration ...................... 20
Equipment Operation - Conductivity Read ............................ 21
Cell Maintenance ..................................................... 22
Communication Protocol .................................................. 23
Troubleshooting ...................................................... 24
## Specifications

### General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Material</td>
<td>Cast Aluminum SAE 323(BASE) ABS(Frontal Lid)</td>
</tr>
<tr>
<td>Finishing</td>
<td>Electrostatic Epoxy Paint</td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>Terminal Barr</td>
</tr>
<tr>
<td>Cable Inlet</td>
<td>Cable knockout 3/8&quot; (4x)</td>
</tr>
<tr>
<td>Assembly</td>
<td>2&quot; Tube, Flat Surface or Panel</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP-68</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>3.5 VA</td>
</tr>
<tr>
<td>Weight</td>
<td>1.3Kg.</td>
</tr>
<tr>
<td>Electrical Power</td>
<td>90 thru 240 Vac (50/60 Hz)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>5 thru 40 ºC</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>20 thru 80%</td>
</tr>
</tbody>
</table>

### Analyzer/Transmitter

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Alphanumeric 2 lines x 16 characters</td>
</tr>
<tr>
<td>Conductivity Ranges</td>
<td>5 thru 2000 mS/cm</td>
</tr>
<tr>
<td>Concentration Range</td>
<td>Consult list on page 11</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>0 thru 200 ºC (Others upon request)</td>
</tr>
<tr>
<td>Automatic Temperature</td>
<td>0 thru 200 ºC (Others upon request)</td>
</tr>
<tr>
<td>Compensation</td>
<td></td>
</tr>
<tr>
<td>Output Signal</td>
<td>Analogic 4 - 20 mA w/ adjustable output range, Digital RS485 bilateral thru software up to 36 equipments 2 Km apart.</td>
</tr>
<tr>
<td>Galvanic Isolation</td>
<td>2000 VAC (by opto coupler)</td>
</tr>
<tr>
<td>Line Resistance</td>
<td>1KOhm</td>
</tr>
</tbody>
</table>

### Controller

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuation Type</td>
<td>Frequency Modulation, P+Di</td>
</tr>
<tr>
<td>Set-Point</td>
<td>1 independent from 0 thru 100% of scale</td>
</tr>
<tr>
<td>Output</td>
<td>1 control ON-OFF</td>
</tr>
<tr>
<td>Actuation Type</td>
<td>Frequency Modulation, P+Di</td>
</tr>
</tbody>
</table>

### Sensor

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Toroidal (Electrodeless)</td>
</tr>
<tr>
<td>Body Material</td>
<td>PVDF (Kynar)</td>
</tr>
<tr>
<td>Range</td>
<td>10 mS thru 2 S</td>
</tr>
<tr>
<td>Temperature (@ Atm. Pr.)</td>
<td>0 thru 100ºC</td>
</tr>
<tr>
<td>Max. Pressure (@ 25ºC)</td>
<td>10 Kgf/cm²</td>
</tr>
<tr>
<td>Insertion length</td>
<td>100mm</td>
</tr>
<tr>
<td>Process Connection</td>
<td>Threaded Point 2&quot; (CIP and others upon request)</td>
</tr>
</tbody>
</table>

### Accessories

- supplied with the equipment: installation hardware (2x), Instruction Manual, SS Clamps with nuts and washers.
3. Mechanical Description

This equipment is offered in SAE-323 aluminum with lower oxidation level, anti corrosion treatment and electrostatic epoxy paint finishing and frontal lid in ABS. Built in small and light size, complying with IP-68 Standard.

Under the same case you will find: Local Indicator, Analyzer, Transmitter and Controller.

The mounting of the instrument can be done on 2” Tube or in Flat Surface or Panel (DIN144).

The electrical connection is possible through a terminal block located internally at the lower portion of the case and the cable knockouts are located in the bottom of the case, 4x 3/8” BSP.

1 - Frontal Lid in ABS.
2 - Display alphanumeric 2 lines x 16 characters.
3 - 3 keys Tactile Membrane Keyboard:
   - <SELECT> = Select the desired operation, flashing option.
   - <ENTER> = Enter the program commands for analysis, confirm above Selected Function.
   - <ESCAPE> = Move back one step at every touch.
4 - Cable knockouts (4) 3/8” BSP.
5 - Aluminum Case (SAE-323)
6 - Installation Hardware for Wall Mounting, 2” tube and panel.
4. Dimensional

Note: Dimensions in millimeters
The **CDCN442** can be installed in 3 different ways: Panel, 2” Tube and Flat Surface.
For installation purpose the instrument is offered with the following hardware: 2 Installation Support, 4 SS screws ¼” x ½”, 4 plain SS washers ¼”, 2 "U" SS clamps, 2 SS screws and 2 SS plain ¼”.
These hardware allow 3 different ways for installation, to know:

a) **Installation in 2” tube:** Uses 2 installation support + 2 "U" clamps with nuts and washers.

b) **Installation in Panel:** Uses 2 installation support; the edges will be placed against the internal surface of the panel, 4 screws. ¼” x ½” will be used to hold it in place.

c) **Installation in Flat Surface (Wall Mount):** Uses 2 installation support and "U" clamps holes are also used to hold the instrument in place at flat surface.
6. Electrical Installation

1- Remove the equipment from the box and inspect for any possible damage caused by the transportation;
2- Install the instrument in an area that offers easy access and handling, exempt of vibrations, following the installation procedures Topic 5 - Typical Installation - page 6;
3- Avoid exposing the equipment to direct to solar rays and if necessary provide a covering;
4- Verify if the electrical installation is correct, if security hardware is available (circuit breakers);
5- Proceed with the equipment installation.

Electrical installation

1- Remove the front lid of the equipment
2- Insert the cables through the cable knockouts, certify that the connections are correct, verifying thru the identification drawing and the electrical schematic;
3- The wires must be correctly positioned in order to avoid humidity access to the equipment case,

⚠️ Never mend the Toroidal Cell cables! This may cause reading errors!

Important Recommendations

1.1. The electrical power of the equipment, must be independent from other system components. Being so, the cable that powers the Control Valves, Solenoids, Alarms and others, must be connected directly to the Distribution box and "never" at the connection barr of the equipment.

1.2. **Verify** if the cable knockouts of the equipment and probes are firmly attached to its respective interconnection cables. This procedure is necessary in order to preserve the enclosure protection (IP-68).

1.3. **Be careful with Humidity !!**. It diminishes the impedance, generating reading errors. Verify the cable knockouts and if necessary, dry the interconnection barr using a hair dryer.

1.4. **Never cut or mend the cell cables**.

1.5. ON-OFF outputs are **thyristor** type, offering many advantages for the equipment, such as: spark free, quicker commutation, noise practically zero, exempt of RF interference and many more. Outputs can commutate any charge, since they are powered by **alternate tension (VAC)**, **limited to 250V / 1A**.
Slots | Connections
--- | ---
1 & 2 | Electrical Power 90-240 Vac - 50/60 Hz
3 | Grounding
4 & 5 | Set Point 1 Output (SP 1)
6, 7 & 8 | Digital Rs485 Output
9 & 10 | Transmission Output 4 - 20mA
11 thru 16 | Toroidal Cell Connection

Fuses | Connections
--- | ---
F1 | General Fuse (1A / 250V)
F2 | Set Point 1 Fuse (1A / 250V)

CDE-442 Cell Connection to the Interconnection Barr

The CDE-442 cable cell offers terminal pin type, in order to be screwed in a connector Conexell Type 6 pins. For the connection, insert the cell cable and screw the terminals at the connector obeying the numerical sequence identified below.

After connecting the cell at CN1 at the interconnection board, tie the cable knockout firmly.
CONNECTORS DESCRIPTION

F2 = 1A / 250V (S P1)
F1 = 1A / 250V (GENERAL)

Note: it is important to use independent phases and cables for equipments and control or alarm valves.

ELECTRICAL DISTRIBUTION BOX

8. Electrical Schematic

9.
## Important Information

1-While at **Reading**, it is possible to obtain the following information:
   - When `<SELECT>` key is pressed, it is possible to obtain the Set Point and transmission values.
   - If `<ENTER>` key is pressed the equipment will go to **STAND BY**. While in **STAND BY** the outputs will be turned off, that means, the Current Output will go to 4mA and the contact to NO (Normally Open). The outputs must be programmed by the user during Set Up Mode.

2- `<ESCAPE>` key is recognized, only when pressed and held for about 5 seconds. This time is necessary to certify the desire to exit this operation.

3- When a power failure occurs, the equipment, when powered again, will return to prior conditions, the Outputs and the indication will follow the conditions prior to the power failure.

4- During certain steps of the analysis program, it is allowed to adjust certain values, such as: Calibration, Reading Time, Set-Point, Hystereses, 4mA and 20mA values.

## Operation Mode

The equipment is offered for many process element analysis. For this, equipment leaves factory with a pre-recorded memory with all elements listed below, allowing the user to select the desired element suitable for the desired application.

For Conductivity application the offered range is from 5 through 2000 mS/cm. For Concentration, verify below table showing all elements and its respective ranges for selection. User can also select during Set Up Operation the Unit being used g/L or %.

<table>
<thead>
<tr>
<th>Element</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>HNO\textsubscript{3}</td>
<td>0 thru 280 g/L</td>
</tr>
<tr>
<td>HF</td>
<td>0 thru 300 g/L</td>
</tr>
<tr>
<td>NaOH</td>
<td>0 thru 150 g/L</td>
</tr>
<tr>
<td>NaOH</td>
<td>150 thru 500 g/L</td>
</tr>
<tr>
<td>H\textsubscript{2}SO\textsubscript{4}</td>
<td>0 thru 300 g/L</td>
</tr>
<tr>
<td>H\textsubscript{2}SO\textsubscript{4}</td>
<td>350 thru 800 g/L</td>
</tr>
<tr>
<td>H\textsubscript{2}SO\textsubscript{4}</td>
<td>940 thru 998 g/L</td>
</tr>
<tr>
<td>H\textsubscript{2}CrO\textsubscript{4}</td>
<td>0 thru 100 g/L</td>
</tr>
<tr>
<td>NaCL</td>
<td>0 thru 260 g/L</td>
</tr>
<tr>
<td>K\textsubscript{2}CO\textsubscript{3}</td>
<td>0 thru 315 g/L</td>
</tr>
<tr>
<td>Na\textsubscript{2}SO\textsubscript{4}</td>
<td>0 thru 220 g/L</td>
</tr>
<tr>
<td>HCL</td>
<td>200 thru 350 g/L</td>
</tr>
</tbody>
</table>

As the equipment analysis program was developed obeying a standard structure, it is supplied as an example the Conductivity flow and also for Concentration for NaOH. For other elements, the only change would be the reading range.
9. Equipment Operation (cont.)

Set Up Operation

The menus are self-explanatory with its respective options, that are selected by pressing <SEL> key. When the selected option flashes, press <ENT> key to confirm the selected option.

If a mistake is made, press <ESC> key to go back (one step at every touch) and modify the option, except while during Reading Mode, when <ESC> key needs to be held for about 5 seconds in order to exit this mode.

The equipment offers a non-volatile memory (E2PROM), in order to store operations functions (resolution, reading, Calibration and more). Even when turned off from power, all functions chosen during set up will remain stored.

Before starting any work with the equipment, it is recommended to verify the SET UP parameters, to certify that you have chosen the correct options for the operation.

When at the FUNCTION SELECT menu, press <SEL> key in order to select the desired function, flashing option, then press <ENT> key. In order to access the SET UP, press <SEL> key until SET function flashes, then press <ENT> key to confirm the option chosen. A Password will be requested, press in sequence <SEL>, <ENT>, <ESC> then follow step by step the options shown at the screen. In case the user desires to change the flashing option, press <SEL> key until the desired option flashes then press <ENT> key to confirm the option.

In order to move to the next screen, user must press <ENT> key.

Read Operation

At this operation user will have options to CALIBRATE and READ. In case the desire is to CALIBRATE the Sensor, press <SEL> key until Cal option flashes, then press <ENT> key to confirm the option chosen. From this point on the program will guide the user step by step on how to proceed with the perfect calibration. In case the desire is to Read, press <SEL> key until option Read flashes, then press <ENT> key to confirm, then the Display show the following form:

1- The "Prompt" is a signal that flashes every time a reading is performed, depending upon the time between readings, that can be selected during Set Up Mode.
2- The measured value and the element unit.
3- Sample Temperature.
4 - Read Element.
1) The CDCN442 equipment software, offers self-explanatory menus interacting with the user. The dialog between the Analysis Program and the user, is achieved thru a 2x6 alphanumeric display. The main menus and hidden options menus are displayed to the user. The hidden option menus, are displayed using arrows where one of them will flash and in order to access the hidden options, press <SELECT> key and to confirm the option chosen press <ENTER> key. Always use <SELECT> key in order to change the option at the menu, then use <ENTER> key to confirm the option chosen. 

Note: at this manual the hidden options are displayed on the side of the function, as shown below:

![Image](select_option.png)

Note: at this manual the active Menus will be displayed in Blue color.

2) If a mistake or error happens and it is necessary to change data or to return to a previous screen, press <ESCAPE> key.

Find below an example.

![Image](select_option_2.png)

Say the user had selected Option 2 but he made a mistake and wants to change to Option 1. Press <ESCAPE> key and the screen will move bak to prior screen.

3) In certain program steps, where value adjustments are offered, the symbols “<” (decrease) and “>” (increase), follow steps as shown below:

![Image](calibrat_point.png)

Press <SELECT> key in order to alternate between options decrease (<) or increase (>) from the value displayed, then confirm by pressing <ENTER> key.

![Image](calibrat_point_2.png)

Press <SELECT> key alter the value. When reached the desired value, press <ENTER> key accept the value and move to next step.

4) The equipment stores the configuration on a non-volatile memory (E²PROM). Even when turned off, the last working conditions will be sustained.
When powering the equipment, the display will show the model and software version then the application where the equipment was last being used at the process. Finally the Process Reading will be displayed.

The read value obtained for NaOH from the sample, just after being powered (instantaneous read).

Press <ENTER> key to go to Stand By, press again to go back to Reading Mode...

Press and hold <Escape> key in order to move back to the Main Menu where the arrows indicate hidden options

Press <SELECT> key, in order to access the Set Up or Calibration option (hidden options). Confirm the chosen option by pressing <ENTER> key.

Select Set Up option, press <ENTER> key then follow the flow diagram from item 9.1 on page 14.

Select the Calibration option, then follow the flow from item 9.2 on page 16.
**Concentration Set Up Menu**: allows user to prepare the equipment for process concentration analysis, as desired by the user.
9.1 Equipment Operation - Concentration Set Up

From page 14

Configure Control? Yes

Control On-Off

Set-Point 100g/L

Acting Direct

Hystereses 0g/L

Burnout Control Open

WAIT

.................

Go to page 14
10. Equipment Operation - Concentr. Calibration

Choose Calibration, then, press <ENTER> key.

Follow screen instructions.

Press <ENTER> key

Verify the Standard conditions being used!
If good, press <ENTER>
9.3 Equipment Operation - Concentration Read

**NOTE:** during read Mode, pressing and holding <ESCAPE> key will instruct the program analysis to exit the mode, moving back to the Main Menu. This action will not halt the Reading Operation while user performs another operation, reading will still be performed by the instrument. If user desires to halt Reading Operation, first place the instrument in Stand-By pressing <ENTER> key, then press and hold <ESCAPE> key to exit reading and access other program area.
**Conductivity Set Up Menu**: allows user to prepare the equipment for process conductivity analysis, as desired by the user.

1. **Configure**: Enables the user to set up the equipment for conductivity analysis.
2. **Select**: Allows the user to choose a language for the setup.
3. **Configure**: Enables the user to set up the analyzer.
4. **Function**: Selects the conductivity function.
5. **Range**: Sets the range of conductivity measurement.
6. **Resolution**: Sets the resolution of the conductivity measurement.
7. **Calibration**: Sets the calibration point.
8. **New Cell**: Indicates whether a new cell is being used.
9. **Display**: Enables the user to display conductivity readings.
10. **Reading Mode**: Sets the reading mode to continuous or average.
11. **Reading Time**: Sets the reading time.
12. **Configure Transmis.**: Enables the user to configure transmission settings.
13. **Thermostatize**: Sets the temperature of the cell.
14. **Adjust**: Adjusts 4-20mA and 20mA values.
15. **Place Ammeter**: Connects an ammeter to the equipment.
16. **Ready?**: Confirms the equipment is ready for use.

**Options**:
- RS485: Configure RS485? Yes
- Bits per Second: Configure 9600
- Data Bits: Configure 8
- Parity: Even
- Eqpto. Network Number: 1
- Configure 4-20mA: Value 4mA 10.0mS/cm
- Burnout 4-20mA: 20mA
- Adjust 4-20mA? Yes
- Place Ammeter: @ Output 4-20mA
- Thermostatize Cell: 25.0°C
- Thermostatize Cell: 25.0°C
- Adjust: 4mA
- Adjust: 20mA
9.4 Equipment Operation - Conductivity Set Up

Configure Control? Yes

Control On-Off

Set-Point 10.0 mS/cm

Acting Direct

Hystereses 0.0 mS/cm

Burnout Control Open

WAIT

Go to page 18
9.5 Equipment Operation - Conduct. Calibration

Choose Calibration, then, press <ENTER> key.

Place Cell @ 111.9 mS/cm

Follow screen instructions.

Ready?

Press <ENTER> key

CALIBRATING

Yes

Cell is OK?

No

Attention!!! Verify Cell

Verify Standard <ENTER>

Verify Cell physical and function conditions.

Verify the Standard conditions being used! If good, press <ENTER>
9.6 Equipment Operation - Conductivity Read

- Press \(<SELECT>\) key in order to adjust the value read.

Read Value

Current Value referring to read will be displayed.

Press \(<SELECT>\) key

If during Set Up Manual Calibration was chosen, Press \(<Select>\) key in order to adjust the value read.

Press \(<SELECT>\) key

NOTE: during read Mode, pressing and holding \(<ESCAPE>\) key will instruct the program analysis to exit the mode, moving back to the Main Menu
If \(<ENTER>\) key is pressed, the equipment will go to Stand-by Mode.

NOTE: during read Mode, pressing and holding \(<ESCAPE>\) key will instruct the program analysis to exit the mode, moving back to the Main Menu. This action will not halt the Reading Operation while user performs another operation, reading will still be performed by the instrument. If user desires to halt Reading Operation, first place the instrument in Stand-By pressing \(<ENTER>\) key, then press and hold \(<ESCAPE>\) key to exit reading and access other program area.
It is recommended a visual inspection of the cell periodically and if noticed the cell is dirty, please wash it using neutral detergent and wash it thoroughly.
After the cleaning please proceed with the cell calibration.
1) Proprietary:

Order:
ESC   ID   P   CR   LF
0x1B   0x50   0x0D   0x0A   Hexadecimal

The ID is configured at the instrument from 1 to 32.

Answer:
L > > VVVVV V mS C C C C C m A

Example of answer for an un-stable value
L > 20 mS 1 2 . 0 0 m A

Example of answer for a stable value
L > > 20 mS 1 2 . 0 0 m A

Note: a) When the answer comes a C instead of a L, it means that the equipment is under calibration function (is being operated in location by the user, executing the calibration operation at the instrument).
b) When the answer comes an S instead of a L, it means that the equipment is under Set Up function and it is being operated in location by the user.

2) RS485 – It is a “physical location”, where the proprietary protocol will be “transported”.

As factory default, this communication comes configured as:

Speed = 9600
Parity = none
Number of Bits = 8
Stop Bit = 1
ID = 1
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Verify</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment does not power on</td>
<td>Electrical Power General Fuse F1 If power is present at Pins 1 &amp; 2 from CN2 connector</td>
<td>Verify the circuit breaker; Replace fuse; Verify terminal barr, Connector &amp; Power Cable</td>
</tr>
<tr>
<td>Set-Point does not operate or fails</td>
<td>Set Up – verify if Set Point 1 was selected. Contacts 4 &amp; 5 from CN2 Fuse F2 (Set-Point)</td>
<td>Enable Set Point 1 thru the Set Up Menu; Verify if wires for Set – Point, Are properly connected; Replace Set Point Fuse.</td>
</tr>
<tr>
<td>Output Current 4–20mA, does not operate.</td>
<td>Set Up – verify if 4-20mA values were adjusted.</td>
<td>Enable and adjust 4-20mA values thru Set Up Menu.</td>
</tr>
<tr>
<td>Equipment does not read correctly</td>
<td>Keyboard does not function properly Calibrated with a wrong Standard Solution value; If cell is damaged; Cell cable damaged.</td>
<td>Replace keyboard; Re-do calibration using a new Standard Solution. Replace Cell. Replace Cable.</td>
</tr>
<tr>
<td>Serial port does operate</td>
<td>if Serial port is on.</td>
<td>Enable RS485 thru the Set Up menu.</td>
</tr>
<tr>
<td>Symptom</td>
<td>Verify</td>
<td>Action</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>Equipment does not power on</strong></td>
<td>Electrical Power</td>
<td>Verify the circuit breaker</td>
</tr>
<tr>
<td></td>
<td>If Pins1&amp;2 from the terminal barr are powered</td>
<td>General Fuse F1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify the equipment connectors and power cable</td>
</tr>
<tr>
<td><strong>Suspicious Calibration</strong></td>
<td>Standard Solution Expiration Date</td>
<td>Use a new Standard Solution</td>
</tr>
<tr>
<td></td>
<td>Fungus presence at Standard Solution</td>
<td>Use a new Standard Solution</td>
</tr>
<tr>
<td></td>
<td>If the Set Up operation was performed correctly</td>
<td>Re-do Set Up operation</td>
</tr>
<tr>
<td><strong>Equipment does not allow new calibrations</strong></td>
<td>If the Standard Solution value is compatible with the calibration curve values</td>
<td>Replace Standard Solutions. Contact Customer Service.</td>
</tr>
<tr>
<td><strong>Equipment does not read correctly</strong></td>
<td>If the keyboard is working properly</td>
<td>Replace keyboard</td>
</tr>
<tr>
<td></td>
<td>Damaged cell, broken or damaged cable</td>
<td>Replace Cell</td>
</tr>
<tr>
<td><strong>Serial Port not working properly</strong></td>
<td>If Serial Port is on</td>
<td>Access the Set Up Menu and verify if RS485 is enabled</td>
</tr>
</tbody>
</table>
WARRANTY/DISCLAIMER

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), 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 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.

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 2007 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
- Wires: 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

M-4516/0209