

# Where Do I Find Everything I Need for Process Measurement and Control? OMEGA ... Of Course!

## TEMPERATURE

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

## PRESSURE / STRAIN FORCE

- Ω Transducers & Strain Gauges
- Ω Load Cells & Pressure Gauges
- Ω Displacement Transducers
- Ω Instrumentation & Accessories

## FLOW / LEVEL

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- Ω Air Velocity Indicators
- Ω Turbine / Paddlewheel Systems
- Ω Totalizers & Batch Controllers

## pH/CONDUCTIVITY

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

## DATA ACQUISITION

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

## HEATERS

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

## ENVIRONMENTAL MONITORING AND CONTROL

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

# DC Voltage Loggers

Model OM-SL-L320  
Model OM-SL-L410  
Model OM-SL-L430

## USER MANUAL

M-3438/0899



**OM-SEGA®**

## 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 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 should malfunction, 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 being 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 which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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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 OMEGA:

1. P.O. 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. P.O. number to cover the COST of the repair,
2. Model and serial number of 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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It is the policy of OMEGA 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 Engineering, Inc. 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, patient connected applications.

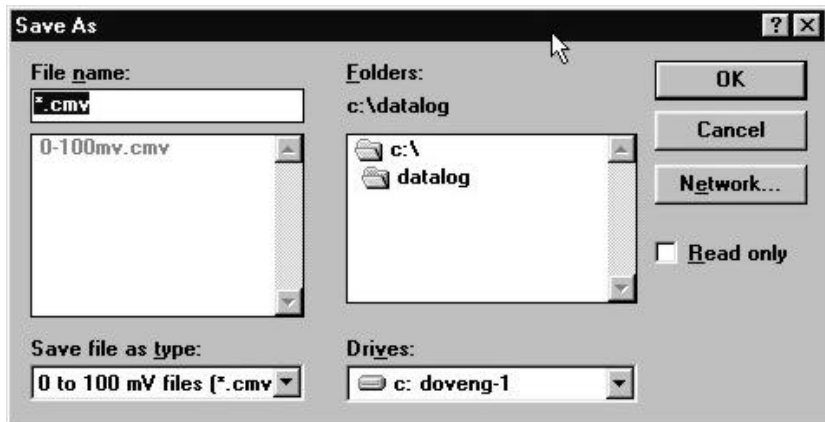


Figure 6

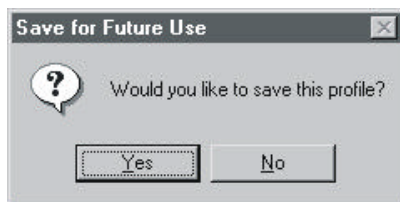


Figure 7

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## Cleaning

The body of the logger should be cleaned with a cloth moistened with soapy water. Rinse with a cloth moistened with clean water. Do not use solvent.

## Warning

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- Read the instruction manual completely and follow all the safety information before attempting to use or service this instrument.
- Use caution on any circuit: Potentially high voltages or currents may be present.
- Read the ~~safety~~ specifications section prior to using the data logger. Never exceed the maximum voltage ratings given.
- Safety is the responsibility of the operator.
- For maintenance, use only original replacement parts.
- NEVER open the back of the instrument while connected to any circuit or input.
- ALWAYS inspect the instrument and leads prior to use. Replace any defective parts immediately.
- NEVER use the Model OM-SL-L320, OM-SL-L410, OM-SL-L430 on electrical conductors rated above 30 V in overvoltage category III (CAT III).

## International Electrical Symbols



This symbol signifies that the loggers are protected by double or reinforced insulation. Use only specified replacement parts when servicing the instrument.



This symbol signifies CAUTION! and requests that the user refer to the user manual before using the instrument.



For more information about the Logger, refer to disk 2: USER GUIDE

## Creating a Scale for Use with Logger Connected to the Serial Port

Connect the data logger to the computer's serial port for downloading. See main manual for downloading instructions. Once the proper port is selected, data will appear in the update box at the top right hand side of the screen. This is an indication that the software has made connection to the logger. The *Scale* command will also appear on the task bar if the data logger detected

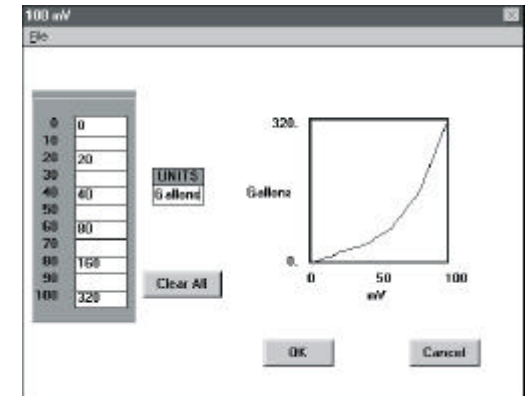


Figure 5

allows scale and engineering unit programming. Figure 5 will appear. The left side of the screen provides the scale and unit programming while the right side displays the profile of the programmed scale in relationship to the actual input to the data logger.

The operator may set the scale by programming as few as two points, the low end and the high end, or by entering as many points as necessary to define the scale up to 17 points for the 4-20 mA logger and up to 11 for the DC volt loggers. The points entered do not have to be linear but should be an accurate representation of the relationship of the DC signal to the scale points. To enter a scale value in any of the slots, click on the slot and type in a number up to 5 characters in length. The minus sign and decimal point may be used as valid characters (e.g. -25.4 would be a valid 5-character number).

Once the scale is defined, click in the Unit box to program the engineering units to be displayed on the graph. Up to 5 alphanumeric characters may be typed in this box.

If you wish to clear the entered data and start over, click on the *Clear All* button. The scale and unit information will be cleared from the screen.

Once you have entered the correct scale and unit data, click on *OK* to proceed. The screen in Figure 6 will appear giving you the opportunity to save the entered data for future use. Click on *Yes* to save the data or *No* to bypass saving the data and use one time only. If you click on *Yes*, a dialog box will open similar to Figure 7 where you can type in the name you wish to use for the file. Type in up to 8 characters, Click on *OK* to save the file and plot the graph with the new scale and unit data. Click on *Cancel* to discard it and return to the scale and unit programming screen.

## Creating a Library of Scale

From the main menu, select *File* and then *Scaling*. Select the type of logger to be scaled from the choices presented (See Figure 3). A window similar to the Figure 4 will appear as soon as you make your selection. This window shows the programmable scale points and the programmable units field.



Figure 3

The left screen provides the scale and unit programming while the right side displays the profile of the programmed scale in relationship to the actual input to the data logger. Scale values entered here will not effect the current graph should one be on screen. This window is strictly for creating templates to be used at a later date with newly downloaded loggers. Creating and storing the scales and units here will save you time later on, especially for frequently used scale settings. Two buttons are available from within this window, *Clear All* and *Close*. The *Clear All* button will clear all scale

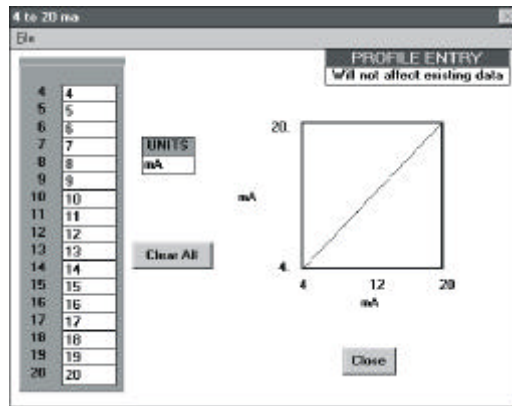


Figure 4

numbers entered and any units entered allowing you the opportunity to start over again. The *Close* button will bring you back to the main menu without saving the data. To enter a scale value in any of the slots, click on the slot and type in a number up to 5 characters in length. The minus sign and decimal point can be used as valid characters (e.g. -10.0 would be a valid 5 character number). As you enter numeric data in the scale slots, the scale profile will appear on the small graph in the right side of the window. Both linear and non-linear profiles are acceptable. Once the scale is defined, click in the *Units* box to program the engineering units to be displayed on the graph. Up to 5 alphanumeric characters may be typed in this box (e.g. PSIG or GPM etc.). After all the data is entered and you are satisfied with the template, click on *File* at the top left side of the window. A small window will drop down with three choices, *Open*, *Save* and *Print*. The *Open* choice is used to retrieve a previously stored template. The *Save* choice is used to save the current template you just created for future use. The *Print* choice lets you print a copy of the scale and unit programming window as seen on the screen.

## Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify OMEGA of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify OMEGA at once, giving a detailed description of any damage.

## Packaging

The Models OM-SL-L320, L410 and L430 include the following:

- User manual
- One 9 V battery
- Two 3½” disks containing the window-based download and graphic software and a generic user guide
- Six ft. long RS232 cable
- Set of velcro mounting pads

## Specifications

### ELECTRICAL

**Number of Channels:** 1

**Measurement Range:** OM-SL-L320: 0 - 25 mA DC  
 OM-SL-L410: 0 - 100 mV DC  
 OM-SL-L430: 0 - 10 V DC

**Input Connection:** OM-SL-L320: Two post screw terminal strip  
 OM-SL-L410 and OM-SL-L430: Recessed safety banana jacks

**Input Impedance:** OM-SL-L320: 100 Ω  
 OM-SL-L410 and OM-SL-L430: 1 MΩ

**\*Accuracy:** ± (1% + 2 cts)

**Resolution:** OM-SL-L320: 8 Bit (12.5 μA min. resolution)

Scale Range	Maximum Input	Resolution
100%	25.5 mA	0.1 mA
50%	12.75 mA	0.05 mA
25%	6.375 mA	0.025 mA
12.5%	3.1875 mA	0.0125 mA

\*Reference condition: 23°C ± 3K, 20 to 70% RH, Frequency 50/60Hz, No AC external magnetic Field, DC magnetic field ≤ 40A/m, battery voltage 9 V ± 10%.

OM-SL-L410: 8 Bit (50  $\mu$ V min. resolution)

Scale Range	Maximum Input	Resolution
100%	102 mV	0.4 mV
50%	51 mV	0.2mV
25%	25.5 mV	0.1 mV
12.5%	12.75 mV	0.05 mV

OM-SL-L430: 8 Bit (5 mV min. resolution)

Scale Range	Maximum Input	Resolution
100%	10.2 V	40 mV
50%	5.1 V	20 mV
25%	2.55 V	10 mV
12.5%	1.275 V	5 mV

**Sample Rate:**

4096/hr max; decreases by 50% each time memory is full

**Data Storage:** 8192 readings

**Data Storage Technique:** TXR™ Time Extension Recording™

**Power:** 9V Alkaline NEDA 1604, 6LF22, 6LR61

**Battery Life Recording:** Up to 1 year continuous recording @ 25°C

**Output:** RS-232 via DB9 connector; 1200 Bps

**INDICATORS**

**Operation Mode Indicator:** One Red LED

- Single Blink in stand-by mode
- Double Blink in RECORD mode
- Continuously on: Overload condition
- No Blinks in OFF mode

**CONTROLS:**

One button used to start and stop recording sessions and to turn the data logger ON and OFF.

**ENVIRONMENTAL**

**Operating Temperature:** -4 to + 158°F (-20 to +70°C)

**Storage Temperature:** -4 to + 174°F (-20 to +80°C)

**Relative Humidity:** 5 to 95% non-condensing

**Temperature Influence:** 5 cts max.

5. Next the setup program will offer C:\DATALOG as location where the software will be installed. Click on “Next” to use this directory or type in a new name, then click on “Next”.
6. A bar graph will appear showing the progress of installation. When installation is complete a message screen will appear stating that the program has been installed. Click on “OK”. You are now ready to use the data logger software.

**USING THE SOFTWARE**

Launch the software and connect the RS232 cable from your computer to the logger.

Select “FILE”, “Baud rate” and “1200”, then select “PORT”, Com1, Com2, Com3 or Com4 (see your computer manual). The logger must now communicate with your computer (ID number of the logger and number of points recorded displayed).

Select “File”, Scaling and the Range of your logger.

**Scale and Engineering Unit Programming**

The data logger Models L320, L410, and L430 allow the operator to program the values for scale and engineering units from within the software. This permits the user to display the recorded data on the graph or in the tabular listing directly, in the units appropriate to the measurement, rather than mathematically converting a voltage or a current to the proper scale and value after the graph is displayed.

Scales can be programmed from two locations in the software, the *File* menu and the *Scale* menu. To create a library of scales to use with DC volt and DC current loggers, use the File menu. This will allow the user to select a number of predefined scales. To create scales for loggers connected to the serial port for downloading, use the Scale menu.

The data logger software allows the operator to define up to 17 points along the scale for DC current measurement and up to 11 points for DC voltage measurement type data loggers. Any combination of points may be used to create the scale, which allows the user to plot both linear and non-linear data. (See figures 1 and 2 below).

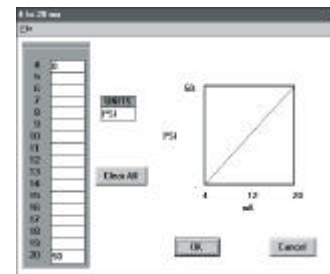


Figure 1

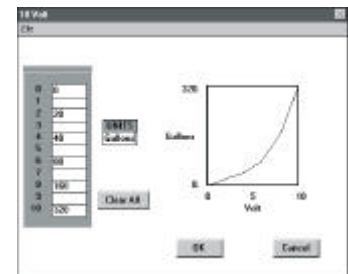


Figure 2

## Software

### MINIMUM COMPUTER REQUIREMENTS

**Processor:** 386 or higher

**RAM Storage:** 4 MB minimum

**Hard Drive Space:**

700K for application, approximately 400K for each stored file

**Environment:** Windows 3.1 or Windows 95

**Port Access:** 1 available 9 pin serial port  
1 parallel port for printer support

### INSTALLATION

Your data logger software is supplied on a single 3½" floppy disk. To install the program on your Windows based computer, proceed as follows: The software is Multilanguage. A prompt will ask you to select the language at the end of the installation process.

#### **Windows 3.1 Systems**

1. Insert the floppy disk containing the data logger software in your computer's floppy drive (usually Drive A).
2. From the Program Manager select "File" on the command line.
3. Select "Run" from the pull-down menu and type **a:setup** in the dialog box then click on "OK".
4. The set up program will temporarily load onto your computer.
5. Next the setup program will offer C:\DATALOG as location where the software will be installed. Click on "Next" to use this directory or type in a new name, then click on "Next".
6. A bar graph will appear showing the progress of installation. When installation is complete a message screen will appear stating that the program has been installed. Click on "OK". You are now ready to use the data logger software.

#### **Windows 95 Systems**

1. Insert the floppy disk containing the data logger software in your computer's floppy drive (usually Drive A).
2. Click on the "Start" button on the bottom left side of the screen.
3. Select "Run" from the menu and type **a:setup** in the dialog box then click on "OK".
4. The setup program will temporarily load onto your computer.

### MECHANICAL

**Size:** 2-7/8" W x 2-5/16" H x 1-5/8" D (73mm x 59mm x 41mm)

**Weight (with battery):** 5 oz. (140g)

**Mounting:** Base plate mounting holes or Velcro® pads

**Case Material:** Polystyrene UL V0

### SAFETY

**Working Voltage:** IEC 1010-1, 30V, Cat III

### ORDERING INFORMATION

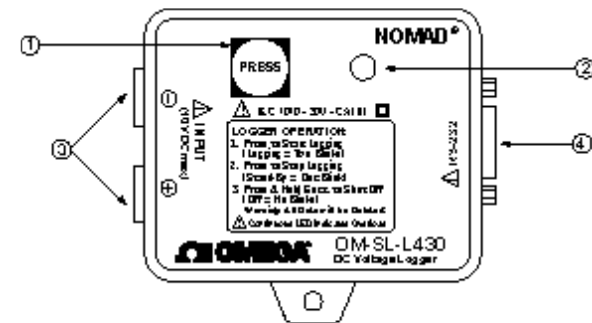
DC Voltage Logger, 4 - 20 mA DC ..... Model OM-SL-L320  
DC Voltage Logger, 0 - 100 mV DC ..... Model OM-SL-L410  
DC Voltage Logger, 0 - 10 V DC ..... Model OM-SL-L430

#### **Accessories:**

Replacement 6ft RS232 cable with DB9F ..... OM-SL-RS232-DB9

## Features

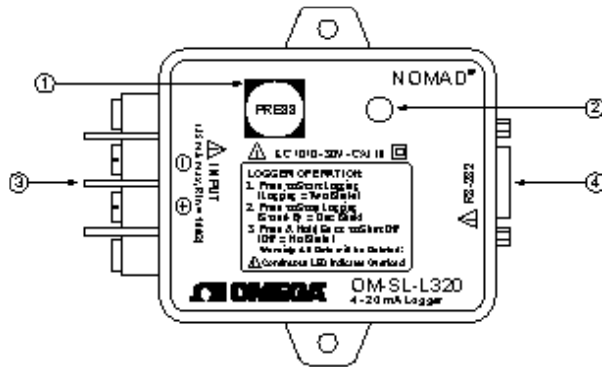
**Models OM-SL-L410 and L430:**



- (1) Start/Stop Button                      (3) Input Safety Plugs  
(2) Indicator Light                         (4) RS-232 Interface



## Model OM-SL-L320:



- (1) Start/Stop Button      (3) Input Terminal Strip  
(2) Indicator Light      (4) RS-232 Interface

## Indicators and Buttons

The data logger has only one button and one indicator. Both are located on the front panel.

The button is used to start and stop recordings and to turn the data logger on and off. The red LED indicates the status of the data logger; OFF, STANDBY or RECORDING. When the LED is lit continuously it indicates an overload condition.

## Inputs and Outputs

The left side of the data logger incorporates 4mm safety banana jacks for the Models L410 and L430 and a screw connector for the Model L320.

The right side of the data logger has a female 9 pin "D" shell serial connector used for data transmission from the data logger to your computer.

## Mounting

Your data logger is equipped with clearance holes in the base plate tabs for mounting. For less permanent mounting, the Velcro pads (supplied loose) can be attached to the data logger and the surface to which the logger will be mounted.

## Battery Installation

Under normal conditions, the battery will last up to a year of continuous recording unless the logger is restarted very frequently.

In the OFF mode, the logger puts almost no load on the battery. Use the OFF mode when the logger is not in use. Replace the battery once a year in normal use.

If the logger will be used at temperatures below 32°F (0°C) or is frequently turned on and off, replace the battery every six to nine months.

1. Make sure your logger is turned off (no blinking light) and all inputs are disconnected.
2. Turn the logger upside down. Remove the four Phillips head screws from the base plate, then take off the base plate.
3. Locate the two wire (red/black) battery connector and attach the 9 V battery to it. Make sure that you observe polarity by lining up the battery posts to the proper terminals on the connector.
4. Once the connector is plugged onto the battery, insert the battery into the holding clip on the circuit board.
5. If the unit is not in record mode after installing the new battery, disconnect it and press the button twice then reinstall the battery.
6. Reattach the base plate using the four screws removed in step two.

Your data logger is now recording (LED blinking). Press the test button for 5 seconds to stop the instrument.

**Note:** For long term storage, remove the battery to prevent discharge effects.

## Operation

Connect the logger to the circuit to be tested. Then press the start/stop button on the top of the unit to begin the recording session. The indicator light will double blink to indicate that the recording session has started. When the desired recording session has been completed, press the start/stop button to end the recording. The indicator light will single blink to indicate that the recording session has ended and the unit is in standby. Remove the logger from the circuit under test and transport it to the computer for data downloading. See section 2 and section 3 of the user guide for downloading instructions.