1 YEAR
WARRANTY

User's Guide

LVCN-40 Series
Level Indicator

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INTRODUCTION / TABLE OF CONTENTS **Step One**

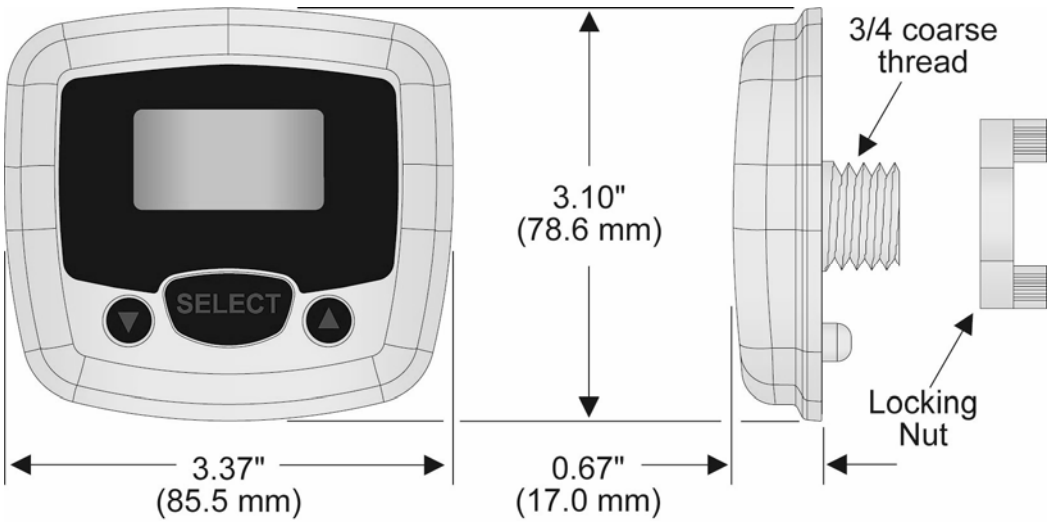
The general purpose indicator displays tank level or volume in engineering units with 1-4 relay status indicators, and is compatible with any LVCN-414, LVCN-210 & LVCN-318 Series level sensor that's been configured with LVCN-414-SW 6.0 software and updated to V50 firmware or higher. Powered by the LVCN-414, LVCN-210 & LVCN-318 Series sensor, the field mount indicator may be located up to 4.5m (15') from the sensor. LVCN-40 Series requires no programming. The indicator repeats the measured value, applicable relay status and set point configuration of the attached sensor. If the level sensor's relay set points require changing, they can be easily made through the field indicator.

Table of Contents

SPECIFICATIONS / DIMENSIONS **Step Two**

Display type:	LCD, 6-digit with 4 relay indicators	Supply voltage:	Provided by the level sensor
Display units:	Engineering units, liquid volume or height	Operating temp.:	F: -4° to 140° C: -20° to 60°
Display output:	-9999.9 to 99999.9	Cable type:	4-conductor, #22 AWG
Character height:	0.374" (9.5 mm)	Cable length:	4' (1.2m)
Decimal point:	Fixed	Cable material:	Polyurethane
Dot indication:	Relay status	Enclosure rating:	NEMA 4 (IP65) when mounted
User interface:	Three button	Enclosure mat'l:	Polycarbonate
Sensor input:	Any LVCN-414, LVCN-210 & LVCN-318 Series sensor	Enclosure type:	Panel mount
		Button mat'l:	Silicon rubber
		Compliance:	CE, RoHS

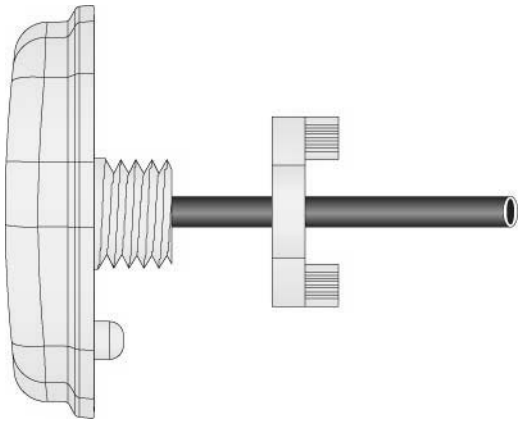
Dimensions



Included Components

LVCN-40 Series comes with a 4' (1.2m) cable, locking nut and the Manual.

LVCN-40 Series Front View



LVCN-40 Series Side View

About this Manual: PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the LVCN-40 Series level indicator from OMEGA ENGINEERING. Please refer to the part number located on the switch label to verify the exact model configuration, which you have purchased.

User's Responsibility for Safety: OMEGA ENGINEERING manufactures a broad range of level sensing technologies. While each of these sensors is designed to operate in a wide variety of applications, it is the user's responsibility to select a sensor model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury.

Proper Installation and Handling: Only professional staff should install and/or repair this product. Install the level indicator with the included locking nut and never over tighten the indicator within the installation. Always check for leaks prior to system start-up.

Wiring and Electrical: A supply voltage of 12 to 28 VDC is used to power the LVCN-40 Series and the LVCN-414, LVCN-210 & LVCN-318 Series sensor. Electrical wiring of the transmitter should be performed in accordance with all applicable national, state, and local codes.

Material Compatibility: The enclosure is made of Polycarbonate (PC) with the Cable made of Polyurethane and the Buttons made of silicon rubber. Make sure that the model, which you have selected, is chemically compatible with the application media.

Enclosure: While the level indicator housing is liquid-resistant the LVCN-40 Series is not designed to be operational when immersed. It should be mounted in such a way that the enclosure and level indicator do not come into contact with the application media under normal operational conditions.

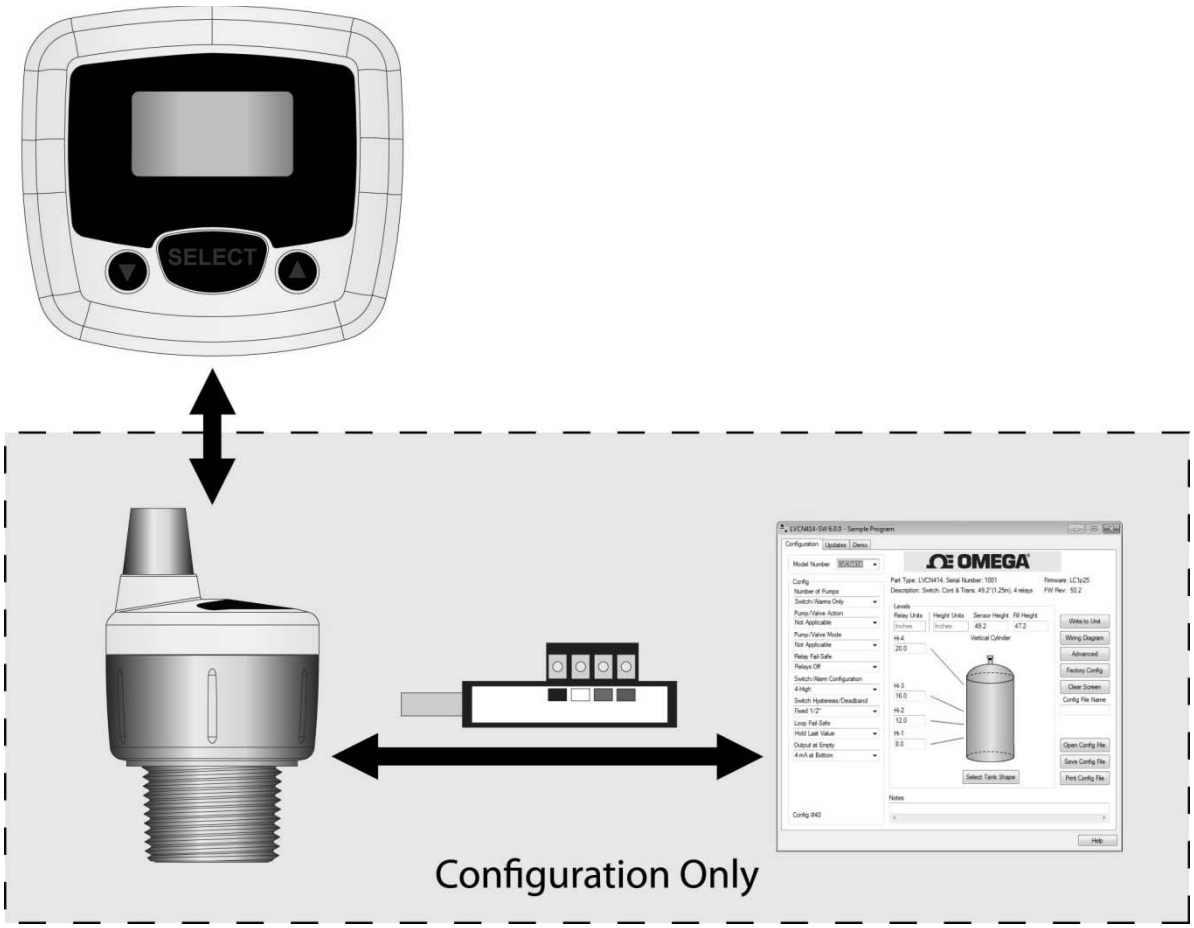
Make a Fail-Safe System: Design a fail-safe system that accommodates the possibility of LVCN-414, LVCN-210 & LVCN-318 Series/LVCN-40 Series and/or power failure. OMEGA ENGINEERING recommends the use of redundant backup systems and alarms in addition to the primary system.

Flammable, Explosive or Hazardous Applications: ***LVCN-40 Series should not be used within classified hazardous environments.***

Safety

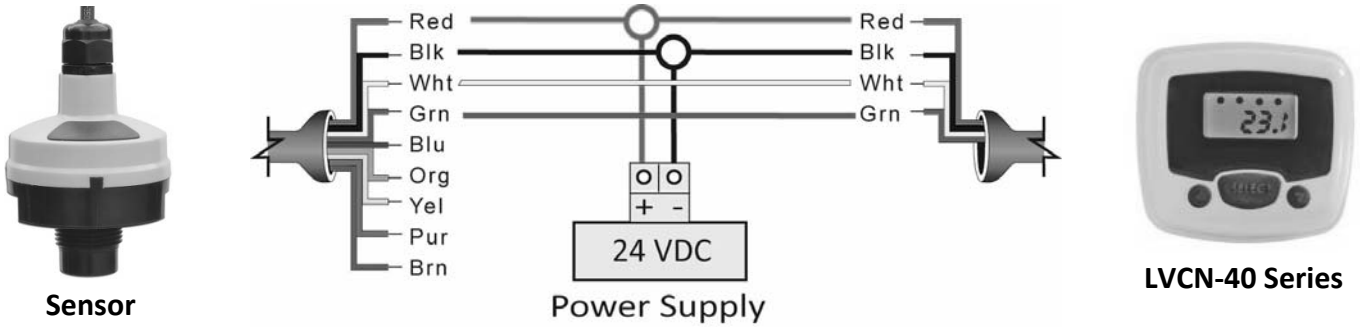
- Installation should be done by properly trained staff
- Supply voltage should never exceed a maximum of 28 VDC
- Make sure the sensor is chemically compatible with your application
- Design a fail-safe system that accommodates the possibility of sensor and/or power failure
- This sensor should not be used in classified hazardous environments

LVCN-40 Series does not require any configuration. LVCN-40 Series level indicator will automatically read the configuration of the attached LVCN-414, LVCN-210 & LVCN-318 Series sensor and display the level per the sensor's configuration. The sensor does require configuration with the LVCN-414-SW 6.0 software (especially if any relays are to be used). For a copy of the LVCN-414-SW 6.0 software, please go to http://www.Omega.com/ftp, click on the **Flow, Level, pH, Environmental, and Pressure** Section, select **Products** and then click on the **LVCN414** folder. Before attaching LVCN-40 Series to any sensor, configure the LVCN-414, LVCN-210 & LVCN-318 Series sensor to LVCN-414-SW 6.0 software via the Fob. Once the sensor is configured, remove the Fob and attach the LVCN-40 Series.



Note: *Please refer to LVCN-414, LVCN-210 & LVCN-318 Series manual for the wiring, configuration with the LVCN-414-SW 6.0 software and installation of the sensor.*

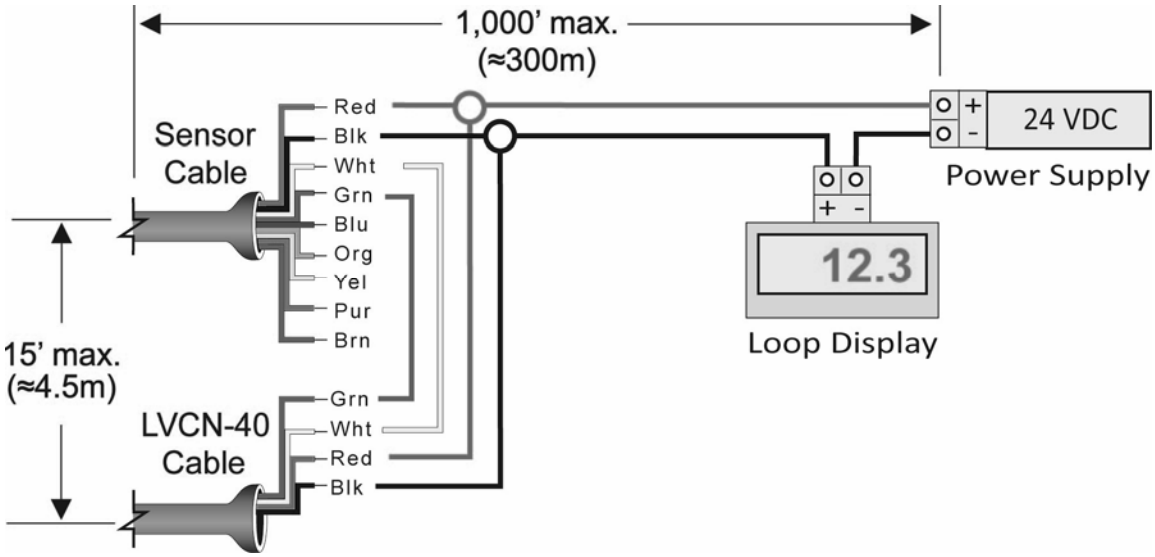
Wiring LVCN-40 Series to any LVCN-414, LVCN-210 & LVCN-318 Series Sensor: LVCN-40 Series and associated level sensor require a 12 to 28 VDC power supply to operate. The maximum cable distance between LVCN-40 Series and the sensor is 15' (4.5m). Follow the below steps to wire LVCN-40 series with the sensor:



Wiring identical for all series of LVCN-414, LVCN-210 & LVCN-318 Series Sensors.
Use only the Red, Black, Green and White wires.

1. Connect the Red and Black wires of both LVCN-40 Series and the sensor to the 12-28 VDC power supply.
2. Connect the Green and White wires of LVCN-40 Series to the corresponding Green and White wires of the sensor.
3. Isolate the Green and White wires from active power to prevent a short of the configuration circuit.

Adding a Loop Powered Display



General Safety

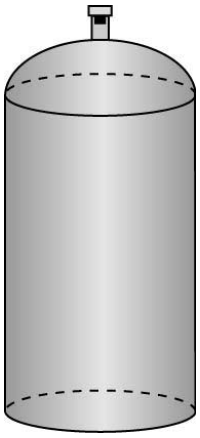
- Where personal safety or significant property damage can occur due to a spill, the application must have a redundant backup safety system installed.
- Wiring should always be done by a licensed electrician.
- Supply voltage should never exceed 28 VDC.
- Protect the sensor from electrical spikes by isolating the power.
- Design a fail-safe system for possible indicator and/or power failure.
- Never use the sensor in environments classified as **Hazardous**.

Level Height vs. Volume: The latest version of LVCN-414-SW 6.0 software has a new feature which allows the sensor to be configured to read either the height of the liquid or the volume of the liquid. This selection is made under the Sensor Output Units selection of either Volume (volume of liquid) or Distance (height of liquid). See the chart below for the engineering unit options available for both Distance and Volume.

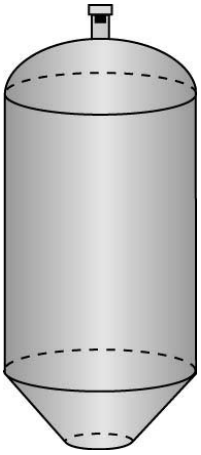
Units of Measurement	
Distance	**Volume**
Inches	Gallons
Cm	Liters
Feet	
Meters	

There are 6 different tank shapes that you can select with LVCN-414-SW 6.0 Software.

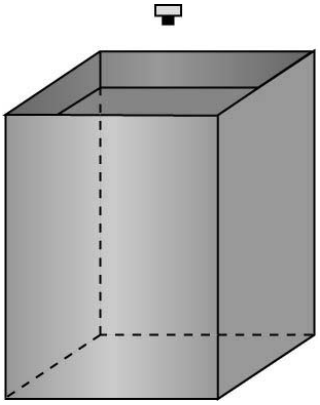
Vertical Cylinder Tank



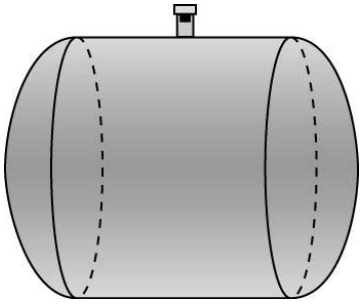
Vertical Cylinder Tank with Cone Bottom



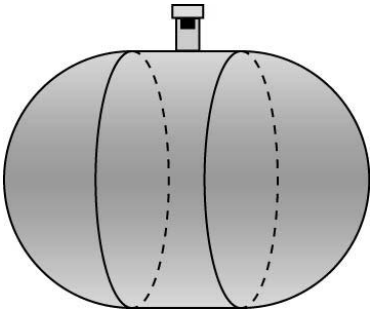
Rectangular Tank



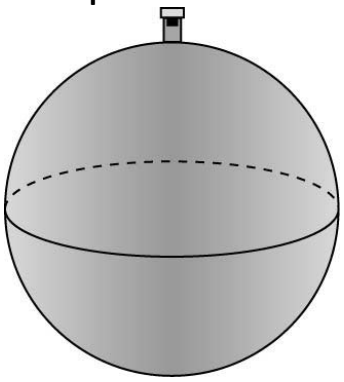
Horizontal Cylinder Tank with End Caps



Horizontal Cylinder Tank with Spherical End Caps

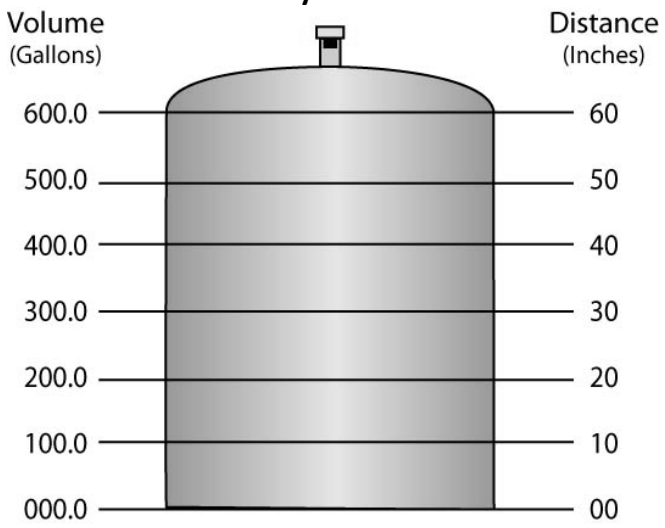


Spherical Tank



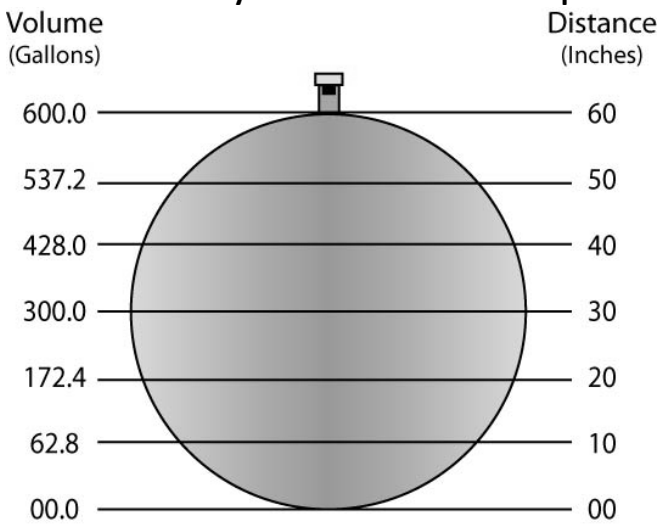
Linear vs. Non-Linear: Two of the shapes (Vertical Cylinder Tank and Rectangular Tank) will always provide a linear output, regardless of selecting Distance or Volume. The remaining four shapes (Vertical Cylinder Tank with Cone Bottom, Horizontal Cylinder Tank with End Caps, Horizontal Cylinder Tank with Spherical End Caps and Spherical Tank) will have a linear output when Distance is selected, but will have a non-linear output when volume is selected.

Vertical Cylindrical Tank



In the above illustration, 10” of liquid will always be equal to 100 gallons of liquid (1” = 10 gallons).

Horizontal Cylinder Tank with End Caps



In the above illustration, 10” of liquid does not equal 100 gallons. The 10” at the bottom represents a rise of 62.8 gallons where the change between 10” and 20” represents an increase of 109.6 gallons.

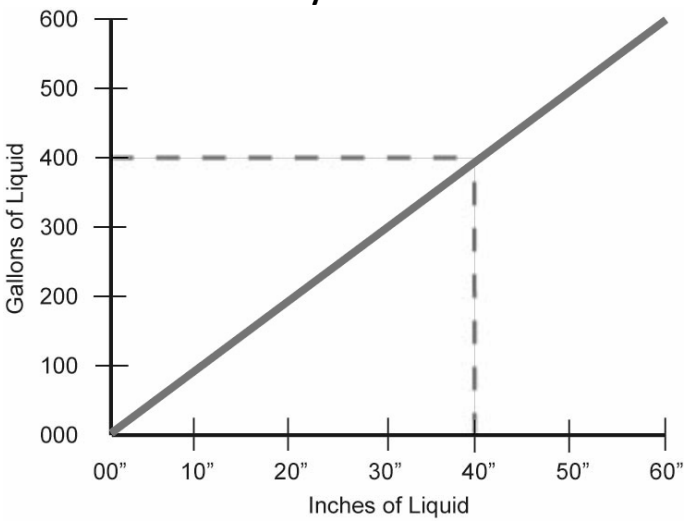
When volume is selected, the 4-20 mA output from the sensor will be proportional to the volume of the tank, not the height of the tank. This means that the current output will track the volume of the tank (in gallons or liters) within a non-linear tank (Vertical Cylinder Tank with Cone Bottom, Horizontal Cylinder Tank with End Caps, Horizontal Cylinder Tank with Spherical End Caps or Spherical Tank).

When connecting the 4-20 mA output to a display, the current signal will follow the volume of the tank. The display will also reflect the volume of the tank and not the height of the liquid.

Example #1 (Volume Output): In the illustrations above, @ 20” of liquid, the display will show 200.0 gallons in the Vertical Cylindrical Tank. However, in the Horizontal Cylinder Tank with End Caps, the same level of 20” would show 172.4 gallons.

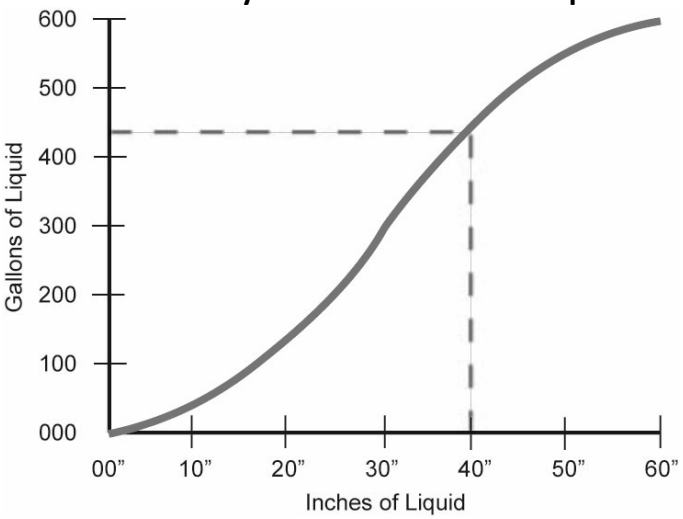
Example #2 (Current Output): in the illustrations below, the 4mA signal is set at 0" (0.0 gallons) and the 20 mA signal is set to 60" (600.0 gallons). In the Vertical Cylindrical Tank, 40" of liquid will output a current signal of 14.67mA. However, in the Horizontal Cylindrical Tank with End Caps, 40" of liquid will output a current signal of 15.41mA. A simple loop display set with 4mA = 0 gallons and 20 mA = 600 gallons will show two different volumes based upon the tank shape configuration. Vertical Cylindrical Tank will show 400.0 gallons while Horizontal Cylindrical Tank with End Caps will show 428.0 gallons.

Vertical Cylindrical Tank



- 10" of liquid will always be equal to 100 gallons of liquid (1" = 10 gallons).

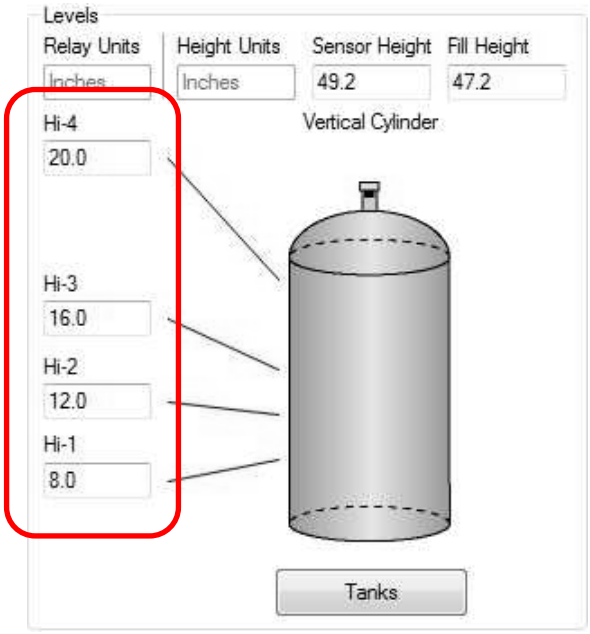
Horizontal Cylinder Tank with End Caps



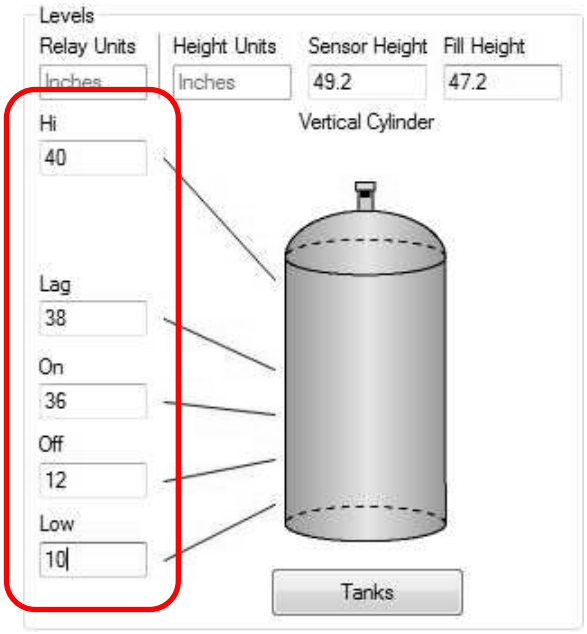
- 1" of liquid does not equal 10 gallons. The 10" at the bottom represents a rise of 62.8 gallons where the change between 10" and 20" represents an increase of 109.6 gallons.

Relay Settings: LVCN-40 Series not only displays the level reading of the LVCN-414, LVCN-210 & LVCN-318 Series sensor (Height or Volume), but LVCN-40 Series also allows you to adjust the settings for relays. LVCN-40 Series will not allow changes to Sensor Height or Fill-Height, just the relay settings.

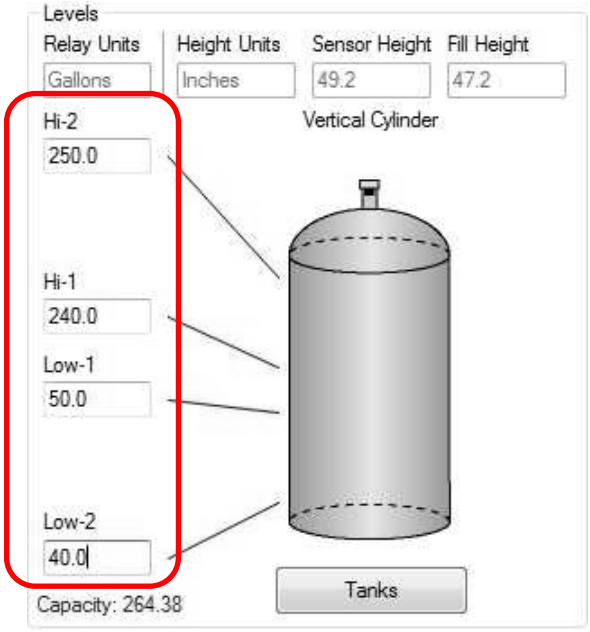
The sensor configured to read inches of liquid plus 4 high alarm relays.



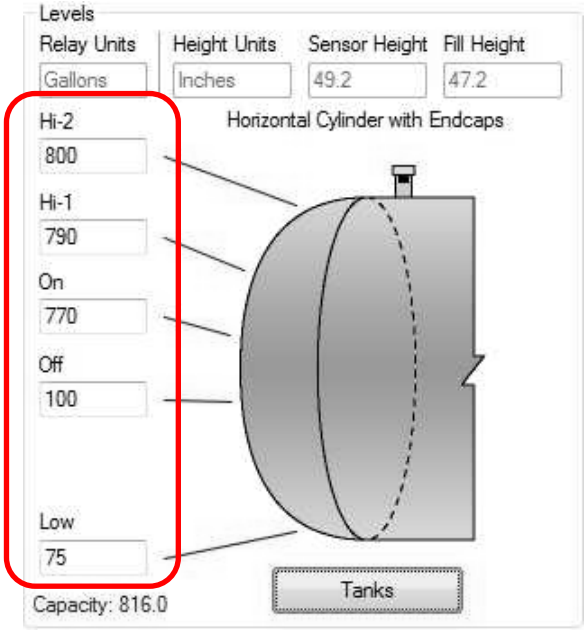
The sensor configured to read inches of liquid plus duplex relays and high and low alarm relays.



The sensor configured to read gallons of liquid plus 2 high alarm and 2 low relays.



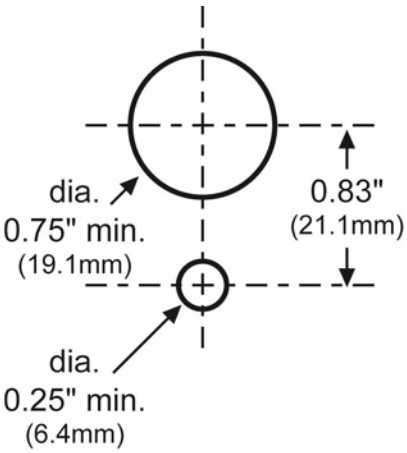
The sensor configured to read gallons of liquid plus an auto empty relays and high and low alarm relays.

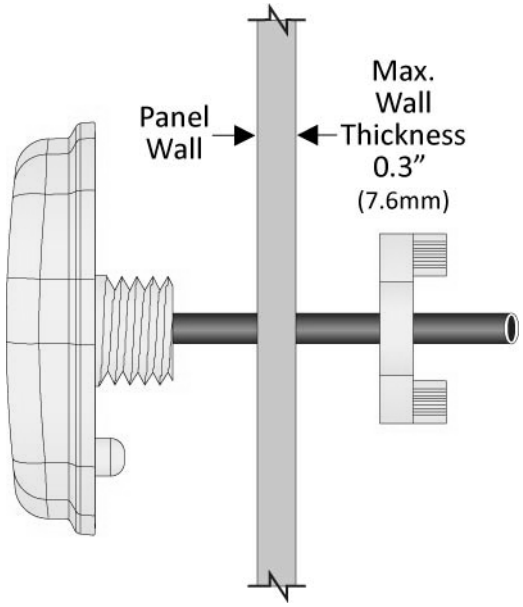


LVCN-40 Series is designed for typical panel mount installations, either located within an instrument panel or through the wall of a NEMA box enclosure.

Panel Mount: The maximum cable distance between LVCN-40 Series and LVCN-414, LVCN-210 & LVCN-318 Series sensor is 15' (4.5m). Follow the below steps to install the indicator in a panel or NEMA box enclosure located near the sensor:

1. Drill (1) large 0.75" (19.1mm) diameter hole in the panel for the cable and nipple.
2. Drill (1) small 0.25" (6.4mm) diameter hole 0.83" (21.1mm) below the large hole that will prevent the installed indicator from rotating off center.
3. Run the indicator cable through the large top hole and locking nut (on the rear side of the panel).
4. Properly align the indicator with the flat gasket and holes on the panel. Then press the indicator in place against the panel.
5. Tighten the locking nut down over the nipple and route the cable for termination.

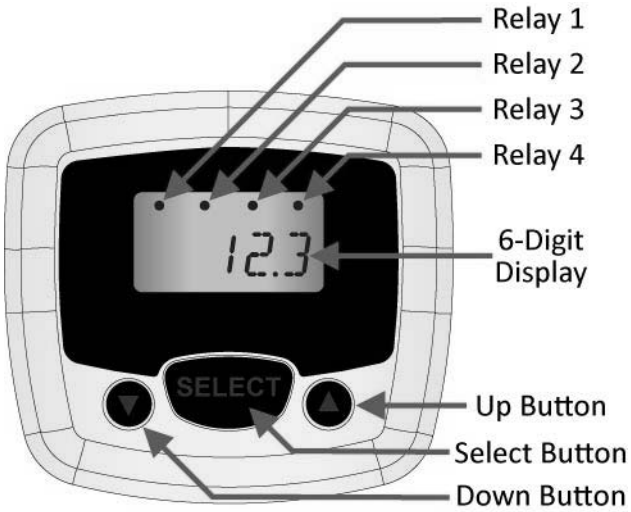




GETTING AROUND LVCN-40 SERIES **Step Eight**

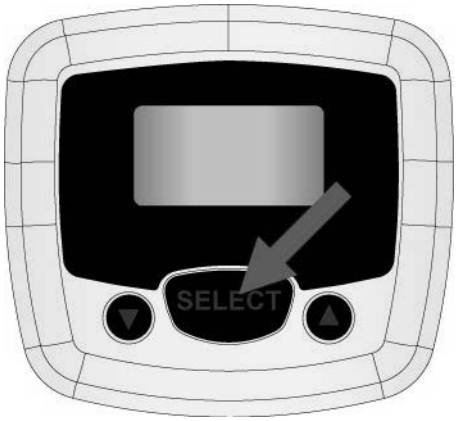
LVCN-40 Series features a 6-digit display with relay indicators and a three-button user interface. The indicator displays the measured value and relay status of the connected sensor (if the sensor has relays and they are configured for use).

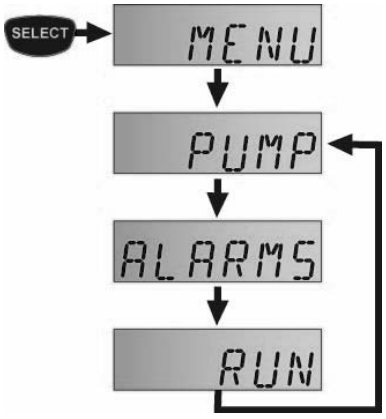
- **Relay 1-4** – Indicates when the sensor's relay is energized. ***Note:*** *Not all LVCN-414 series sensor models have relays.*
  - If the sensor does not have any relays, then the indicators will remain off.
- **6-digit Display** – Shows the liquid level in height (inches, cm, feet or meters) or the volume of liquid (gallons or liters).
  - The selection of height vs. volume is set in the LVCN-414-SW 6.0 software.
- **Up Button** – Used to increase a set point value.
- **Select Button** – Used to enter the Menu and accept values.
- **Down Button** – Used to decrease a set point value.



Note: *To increase the scrolling speed of the display, hold down the SELECT button while simultaneously pressing the UP or DOWN button.*

Entering the MENU: If desired, users can change the sensor's relay ALARM, VALVE or PUMP ON-OFF set points using LVCN-40 Series. To enter the menu LVCN-40 Series MENU functions, press and hold the SELECT button for 5 seconds. The MENU will then scroll between the configured PUMP, ALAMRS and RUN modes. ***Note:*** *If the relays are configured for PUMPS and ALARMS, then both will appear in the menu.* If the relays are configured for Alarms only, then PUMP will not appear. If the relays are configured for PUMPS only (also for valves), then ALARMS will not appear.

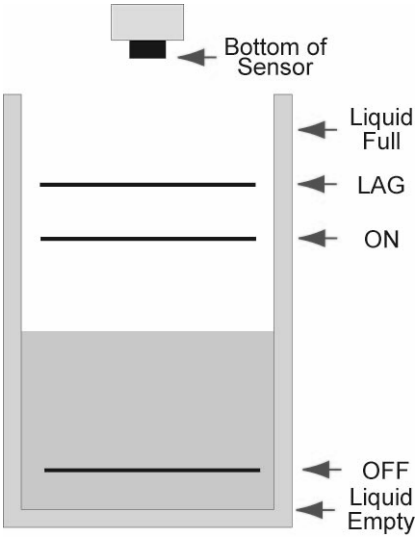


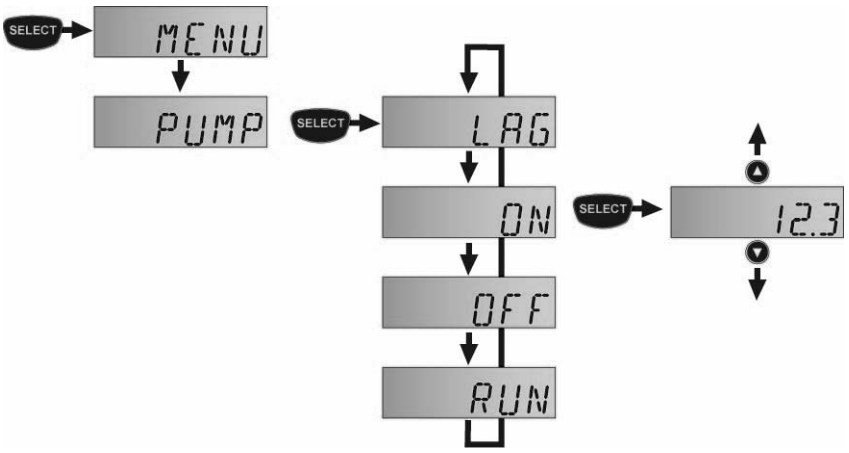


- To change a pump set point value, press **SELECT** when PUMP appears.
- To change an Alarm set point value, press **SELECT** when ALARMS appear.
- To exit the menu and return to run mode, press **SELECT** when RUN appears.

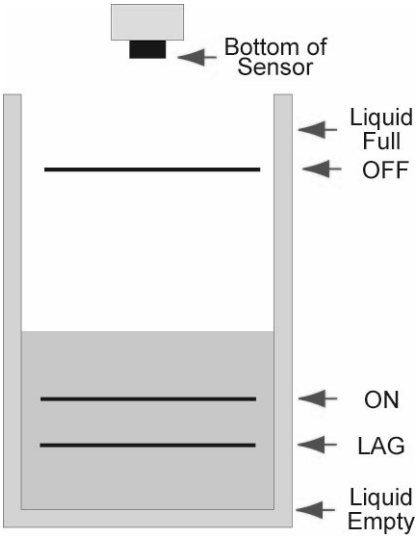
Changing a Pump Set Point: Sensors (LVCN-414, LVCN-210 & LVCN-318 Series) with relays have (1-4) channels active on the LVCN-40 Series. If after accessing the MENU, PUMP appears in the display, then at least (1) relay is configured for pump or valve control. Simplex pump control has (1) ON and (1) OFF setting. Duplex pump control (2-pumps) has a third additional LAG setting. ***Note:*** *Prior to making any changes, we recommend that you write down all existing set point values.* The example below highlights a duplex pump system in an automatic empty or automatic fill operation with (1) LAG, (1) ON and (1) OFF set point. Use the following steps to change your simplex or duplex pump control settings.

Automatic Empty Operation





Automatic Fill Operation



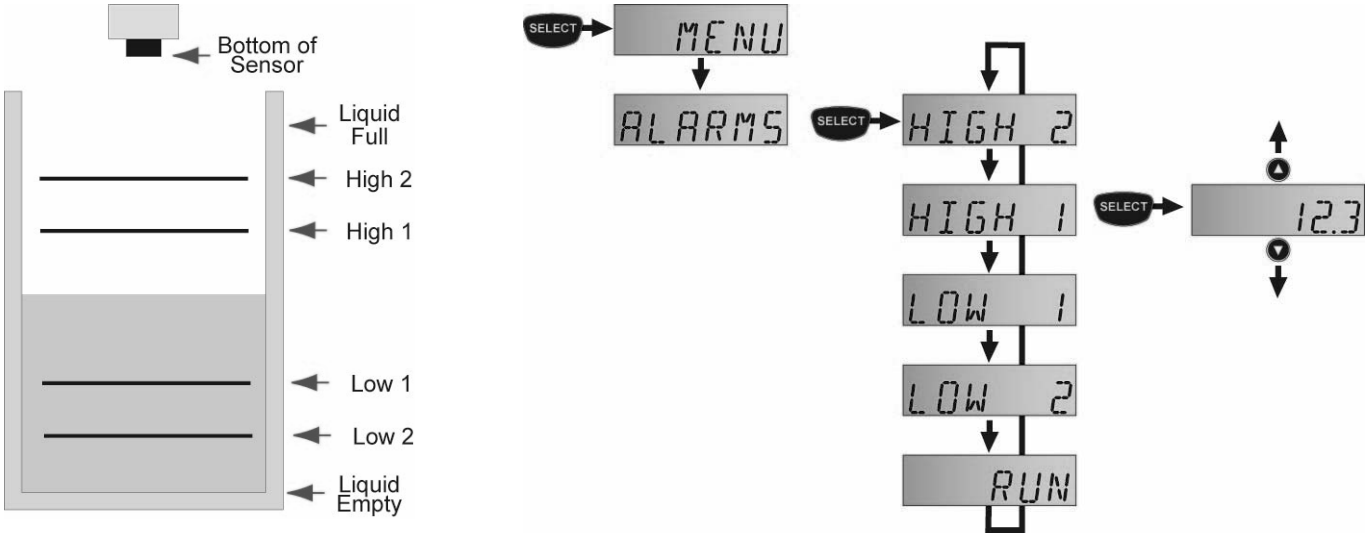
Steps to Change Pump Set Points

1. Hold SELECT for 5 seconds to enter the MENU.
2. Press SELECT when PUMP appears.
3. Press SELECT when the set point (ON, OFF, LAG) you want to change appears.
4. Press the UP and DOWN buttons to increase or decrease the set point to the desired value. To scroll faster, hold SELECT while pressing UP or DOWN.
5. To enter the set point, hold SELECT for 2 seconds.
6. To change another set point, press SELECT when the set point appears.
7. To exit the MENU, press SELECT when RUN appears.

Tech Tips

- Never place a relay set point (ON, OFF, LAG) at the liquid empty or liquid full position. You should have at least some distance or volume buffer separating them. For example, in a 500 gallon tank, the relay set points could be placed at ≥ 10 gallons or ≤ 490 gallons.

Changing an Alarm Set Point: Sensors (LVCN-414, LVCN-210 & LVCN-318 Series) with relays have (1-4) channels active on the LVCN-40 Series. If after accessing the MENU, ALARMS appears in the display, then at least (1) relay is configured as an alarm. The Alarm settings may be in any combination of LOW and/or HIGH alarms (4-HIGH, 1-LOW & 3-HIGH, 2-LOW & 2-HIGH, etc.). *Note: Prior to making any changes, we recommend that you write down all existing set point values.* The example below highlights a 2-LOW and 2-HIGH alarm operation with (4) set points. Use the following steps to change your alarm settings.



Steps to change Alarm settings:

1. Hold SELECT for 5 seconds to enter the MENU.
2. Press SELECT when ALARMS appears.
3. Press SELECT when the set point (HIGH2, HIGH 1, LOW1, LOW2) you want to change appears.
4. Press the UP and DOWN buttons to increase or decrease the set point to the desired value. To scroll faster, hold SELECT while pressing UP or DOWN.
5. To enter the set point, hold SELECT for 2 seconds.
6. To change another set point, press SELECT when the set point appears.
7. To exit the MENU, press SELECT when RUN appears.

Hints:

- Never place a relays set point (High 1, Low 1) at the liquid empty or liquid full position. You should have at least some distance or volume buffer separating them. For example, in a 500 gallon tank, the relay set points could be placed at ≥ 10 gallons or ≤ 490 gallons.

Display Descriptors: The following are the display's operational descriptors, meaning and corrective action:

WARMUP	WARMUP is seen when power is first applied to the sensor and LVCN-40 Series. WARMUP indicates that the display is waiting for the sensor to acquire and send a valid level reading.
MENU	Indicates the menu for configuration of relay set points.
PUMP	PUMP is the identifier for the relay set points affecting Pump or Valve operations.
OFF	OFF is the relay set point that turns OFF the pump.
ON	ON is the relay set point that turns ON the pump.
LAG	LAG is the set point that turns ON the lag pump.
ALARM	Alarm is the identifier for the relay set points affecting Alarm operations.
HIGH #	HIGH # is the relay set point that energizes a high alarm relay.
LOW #	LOW # is the relay set point that energizes a low alarm relay.
CHECK WIRES	Not All four wires are properly connected to the sensor. Check the wiring between the LVCN-40 Series and the level sensor.
UPDATE FW REV	The attached sensor is not running a version of the firmware (50.0 or higher) that is compatible with LVCN-40 Series. Connect the LVCN-414, LVCN-210 or LVCN-318 Series to the LVCN-414-SW 6.0 software and update the firmware.

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), 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. 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.

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