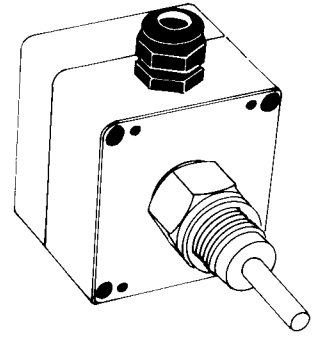




**LV820, LV850, & LV860**  
**Electronic Level Switches**  
**Operator's Manual: M1027/1292**

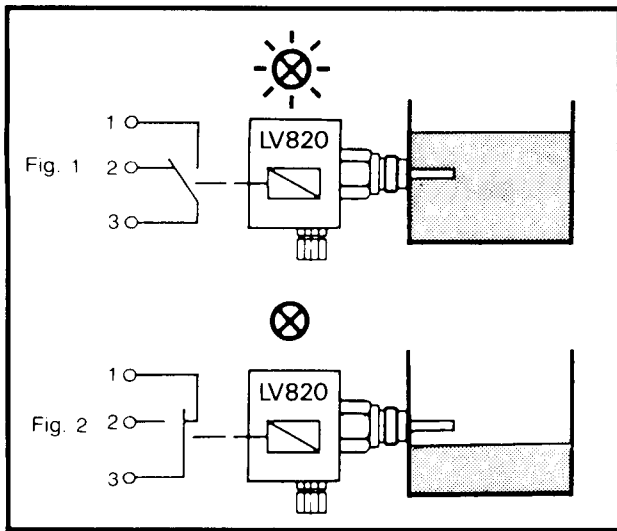


**GENERAL DESCRIPTION**

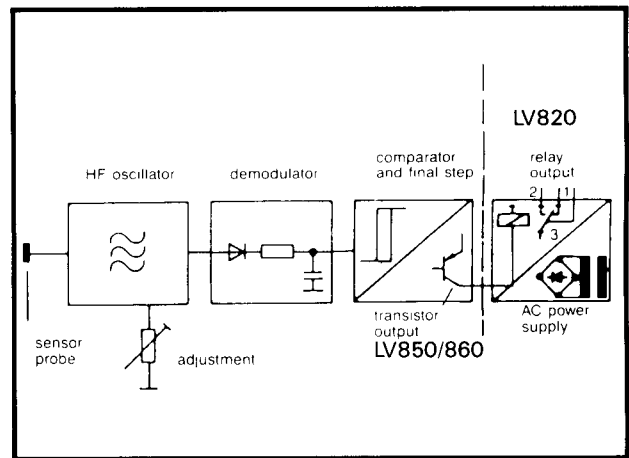
The OMEGA® LV820, LV850, and LV860 Level Sensors are electronic devices used to detect the presence of a material at a given level in a tank, bin, or other container. The level sensors operate on the capacitance principle. A tunable oscillator circuit is ON when the probe is immersed, keeping the output conductive (relay output LV820, transistor output LV850, LV860). The indicator LED is then lit. When the level drops below the sensor position, the LED will extinguish and the output relay will drop out (contacts 3-2 open, 3-1 closed). The transistor output of the LV850/860 is now non-conductive.

**OPERATION**

The operation of the LV820 is shown in the following diagram. Models LV850 and LV860 operate identically, except the relay output 1, 2, 3 is replaced by a transistor output.



Operating Principle



Basic Block Diagram

**INSTALLATION AND CALIBRATION**

The Level Sensors have stainless steel NPT 3/4 inch threaded fittings with a HEX shape to properly apply mounting torque (1 1/4" wrench) for a tight fit. **DO NOT APPLY TORQUE VIA THE LV820 BLUE BOX!**

Make the proper electrical connections via the cable supplied with the LV850/860, or your own cable and the screwless terminal block within model LV820.

Raise the liquid level to completely immerse the probe. Adjust the sensitivity potentiometer counterclockwise (-) until the LED extinguishes. Slowly turn clockwise (+) until LED is ON; at this setting, turn adjustment one additional full turn clockwise to compensate for tolerances. The Level Sensor is now calibrated.

Close the cover. Note: Different media require re-adjustment.

## MATERIAL SENSING WITH CAPACITIVE SENSORS

Capacitive sensors detect liquids, powders, or solid materials by measuring a change in capacitance. The amount of change in capacitance is dependent on the dielectric constant of the material being sensed. The larger the dielectric constant, the easier the material to detect. This means that materials with a high dielectric constant can be detected at greater distances than those with low constants or that materials with high dielectric constants can be detected through the walls or containers made of material with lower constants. An example of this is water (80) through the wall of a glass container (10).

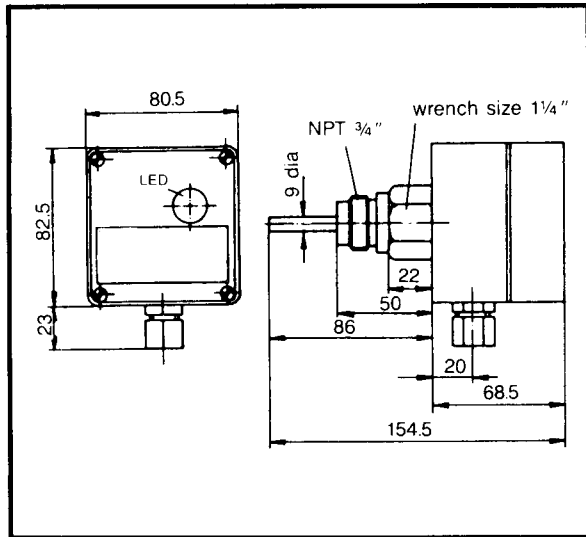
Applications rules:

1. Products with constants of 1.2 or greater can be detected.
2. The higher the constant, the easier the material can be detected.
3. Materials with high constants can be detected through a container with low constant.
4. Larger concentrations of materials are easier to detect than small samples.
5. Liquids and powders should be detected by immersion detection methods (sensor actually is immersed into liquids).
6. Solid materials should be detected by non-contact detection methods.

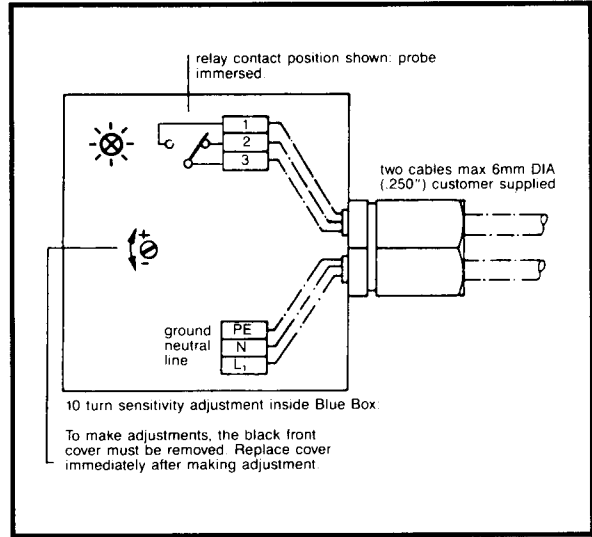
## INDUSTRIAL PRODUCTS AND THEIR DIELECTRIC CONSTANTS

| MATERIALS                | DIELECTRIC CONSTANTS | MATERIALS                 | DIELECTRIC CONSTANTS |
|--------------------------|----------------------|---------------------------|----------------------|
| Acetone                  | 19.5                 | Salt                      | 6                    |
| Acrylic Resin            | 2.7–4.5              | Sand                      | 3-5                  |
| Air                      | 1.000264             | Shellac                   | 2.5–4.7              |
| Ammonia                  | 15–25                | Shell Lime                | 1.2                  |
| Aniline                  | 6.9                  | Silicon Varnish           | 2.8–3.3              |
| Aqueous Solutions        | 50–80                | Soybean Oil               | 2.9–3.5              |
| Benzene                  | 2.3                  | Styrene Resin             | 2.3–3.4              |
| Carbon Dioxide           | 1.000985             | Sugar                     | 3.0                  |
| Carbon Tetrachloride     | 2.2                  | Sulfur                    | 3.4                  |
| Cement Powder            | 4                    | Tetraflouroethylene Resin | 2.0                  |
| Cereal                   | 3–5                  | Toluene                   | 2.3                  |
| Chlorine Liquid          | 2.0                  | Turpentine                | 2.2                  |
| Ebonite                  | 2.7–2.9              | Urea Resin                | 5-8                  |
| Epoxy Resin              | 2.5–6                | Vaseline                  | 2.2–2.9              |
| Ethanol                  | 24                   | Water                     | 80                   |
| Ethylene Glycol          | 38.7                 | Wood (Dry)                | 2-6                  |
| Fired Ash                | 1.5–1.7              | Wood (Wet)                | 10-30                |
| Flour                    | 2.5–3.0              |                           |                      |
| Freon R22 & 502          | 6.11                 |                           |                      |
| Gasoline                 | 2.2                  |                           |                      |
| Glass                    | 3.7–10               |                           |                      |
| Glycerine                | 47                   |                           |                      |
| Marble                   | 8.5                  |                           |                      |
| Melamine Resin           | 4.7–10.2             |                           |                      |
| Mica                     | 5.7–6.7              |                           |                      |
| Nitrobenzine             | 36                   |                           |                      |
| Nylon                    | 4-5                  |                           |                      |
| Paraffin                 | 1.9–2.5              |                           |                      |
| Paper                    | 1.6–2.6              |                           |                      |
| Perspex                  | 3.5                  |                           |                      |
| Petroleum                | 2.0–2.2              |                           |                      |
| Phenol Resin             | 4-12                 |                           |                      |
| Polyacetal               | 3.6–3.7              |                           |                      |
| Polyester Resin          | 2.8–8.1              |                           |                      |
| Polypropylene            | 2.0–2.2              |                           |                      |
| Polyvinyl Chloride Resin | 2.8–3.1              |                           |                      |
| Porcelain                | 5-7                  |                           |                      |
| Powdered Milk            | 3.5–4                |                           |                      |
| Pressboard               | 2-5                  |                           |                      |
| Rubber                   | 2.5–35               |                           |                      |

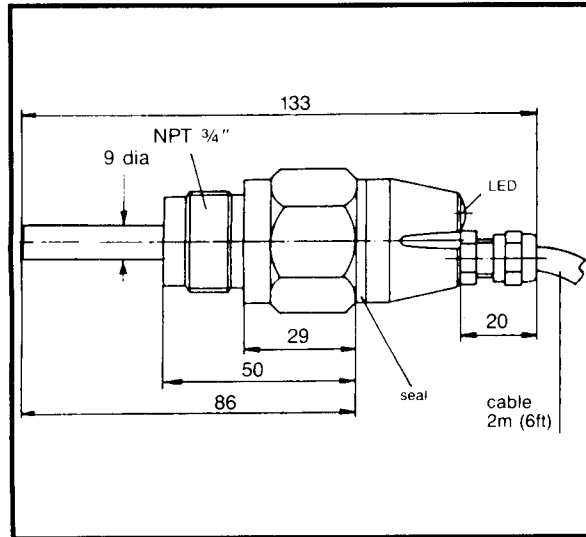
**LV820 Physical Dimensions in mm**



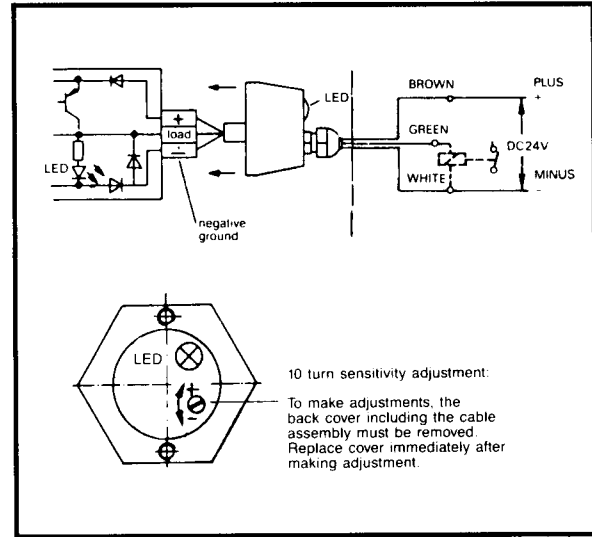
**LV820 Wiring Diagram**



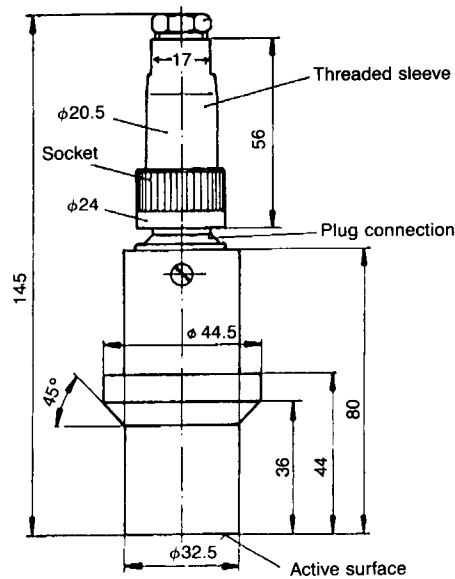
**LV850 Physical Dimensions in mm**



**LV850/860 Wiring Diagram**



**LV860 Physical Dimensions in mm**





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## REMOVING ELECTRONIC ASSEMBLY

It is possible to remove the electronic control portion while the probe remains installed in the tank. To do so:

1. Disconnect supply voltage.
2. Lower liquid level below probe.
3. Remove cover of Level Sensor.
4. Disconnect cables.
5. For the LV850/860: Remove screw and plastic washer holding electronics in housing.  
For the LV820: Remove 2 screws in bottom of Blue Box.
6. Carefully pull electronic assembly.

To re-install, reverse the above directions.

## SPECIFICATIONS

|   | LV850/860   | LV820   |
|---|---|---|
| <b>SUPPLY VOLTAGE:</b>                                      | DC 24V ±15% reverse polarity protected  | AC 115V +10-15%   |
| <b>POWER CONSUMPTION:</b>                                   | 1 Watt max.   | 4 VA max.   |
| <b>OUTPUT:</b>  | PNP transistor, DC 24V/0.3A Cont. load max., 1.5 V drop approx. Integral suppression diode for short circuit protection | Relay, SPDT contacts max 5A at AC240V or DC24V. Higher DC contact voltages up to DC100V are permissible but load must not exceed 120W |
| <b>AMBIENT TEMPERATURE:</b>                                 | -4°F to +185°F (-20°C to +85°C)   | -4°F to +185°F (-20°C to +85°C)   |
| <b>MEDIUM TEMPERATURE:</b>                                  | -4°F to +185°F (-20°C to +85°C) up to 212°F (100°C) intermittent  | -4°F to +185°F (-20°C to +85°C) up to 212°F (100°C) intermittent  |
| <b>ENVIRONMENTAL PROTECTION:</b>                            | Electronic portion splash water/dust proof  | Electronic portion splash water/dust proof  |
| <b>PROBE PRESSURE RESISTANCE:</b>                           | 10 bar (147 PSI)/<br>2 bar (30 PSI)   | 10 bar (147 PSI)  |
| <b>TERMINATIONS:</b>  | Cable, 6 ft. (2m)   | Terminal block  |
| <b>MATERIALS:</b>   |   |   |
| <b>Probe:</b>   | Tefzel (1)  | Tefzel (1)  |
| <b>Fitting:</b>   | V2A (2)   | V2A (2)   |
| <b>Cover:</b>   | Delrin (3)  | Alu, black anodized   |
| <b>Housing:</b>   | Teflon (LV860)  | ABS (4)   |
| <b>SWITCH POINT HYSTERESIS (probe mounted horizontally)</b> | 0.35 in. (9mm) max. equivalent to probe diameter  | 0.35 in. (9mm) max. equivalent to probe diameter  |

- (1) Tefzel: Ethylene—tetrafluoroethylene (ETFE)  
 (2) V2A: Stainless steel DIN 1.4305 equivalent to AISI 303  
 (3) Delrin: Polyoxymethylene (POM)  
 (4) ABS: Terpolymer (DIN 7728—Abselex)

## UNPACKING INSTRUCTION

Remove the Packing List and verify that you have received all equipment. If you have any questions about the shipment, please call the OMEGA Customer Service Department at 1-800-622-2378 or (203) 359-1660.

When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipping is necessary.

## WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service 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 our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our 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. However, 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 or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

**We are glad to offer suggestions on the use of our various products. Nevertheless, OMEGA only warrants that the parts manufactured by it 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.**

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SPECIAL CONDITION: Should this equipment be used in or with any nuclear installation or activity, buyer will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the equipment in such a manner.

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BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, YOU MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OUR 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.

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 you are having with the product.

FOR **NON-WARRANTY** REPAIRS OR **CALIBRATION**, consult OMEGA for current repair/calibration charges. Have the following information available BEFORE contacting OMEGA:

1. Your P.O. number to cover the COST of the of the repair/calibration,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems you are having with the product.

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