

SPECIFICATIONS

Step One

Accuracy: ± 1 mm in water
 Repeatability: $\pm .5$ mm in water
 Dielectric range: > 20 constants
 Conductive range: > 100 micromhos
 Supply voltage: 12 - 36 VDC
 Consumption: Relay: 25 mA
 FET: 5mA, ± 1 mA (dry)
 19 mA, ± 1 mA (wet)
 Relay rating: 60 VDC/VAC @ 1A
 FET rating: 36 VDC max. @ 100 mA max.
 Switch output: Selectable NO or NC
 Temperature range: F: -40° to 194°
 C: -40° to 90°
 Pressure range: 150 psi (10 bar) @ 25°C ., derated @ 1.667
 psi (0.113 bar) per $^{\circ}\text{C}$. above 25°C .
 Sensor material: Polypropylene (PP) or Perfluoroalkoxy (PFA)
 Sensor rating: NEMA 6 (IP68)
 Mounting threads: Short: 3/4" NPT
 Long: 3/4" NPT
 Mounting gasket: Viton (3/4"), metric only
 Cable type: 8 ft. (2.5 m), 4-wire (relay) or 3-wire (FET),
 22 gauge with shield & PP or PFA jacket
 CE compliance: EN 50082-2 immunity
 EN 55011 emission

Capacitance Switch

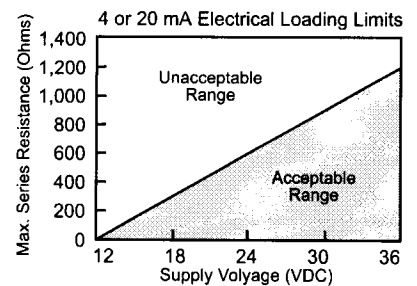
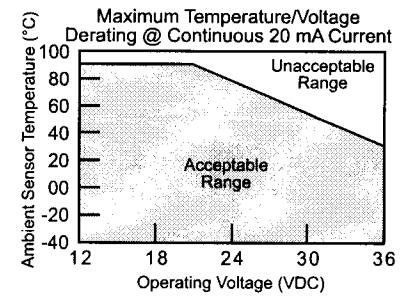
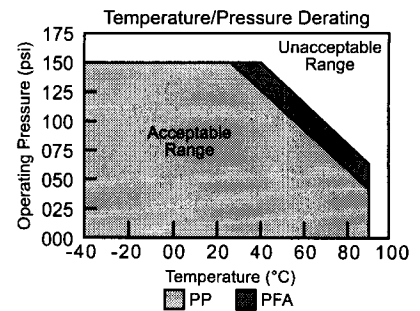
LVC - 10 -

Sensor _____

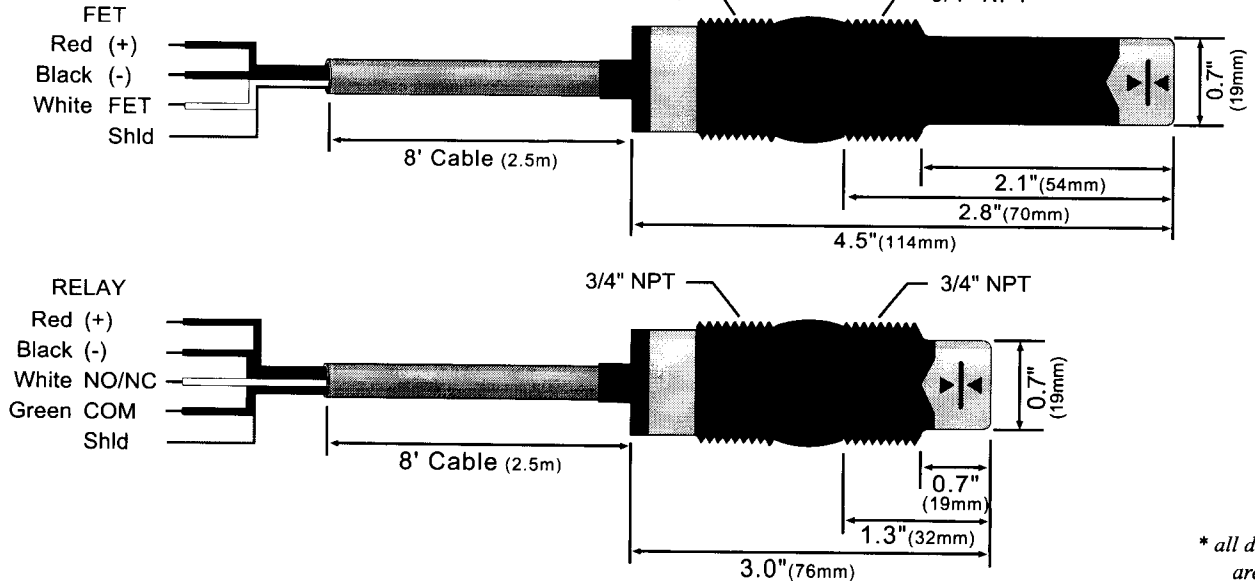
1 - Short, PP, NPN
 2 - Short, PFA, NPN
 3 - Long, PP, NPN
 4 - Long, PFA, NPN

Optional Output _____

P - PNP
 R - 1A Relay



Dimensions



* all dimensions are Nominal

SAFETY PRECAUTIONS

Step Two

⚠ About this Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on all models of Intrusive RF Capacitance level switches from Omega, LVC-100 series. Please refer to the part number located on the switch label to verify the exact model which you have purchased.

⚠ User's Responsibility for Safety:

Omega manufactures a wide range of liquid level sensors and 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:

Because this is an electrically operated device, only properly-trained staff should install and/or repair this product. Use a proper sealant with all installations. Never overtighten the sensor within the fitting, beyond a maximum of 80 inch-pounds torque. Always check for leaks prior to system start-up. Do not install the LVC-100 series sensor within 6" of any metal.

⚠ Material Compatibility:

The LVC-100 series sensor is available in two different wetted materials. Models LVC-101 & -103 are made of Polypropylene (PP). Models LVC-102 & -104 are made of Perfluoroalkoxy, also known by the trade name Teflon, (PFA). Make sure that the model you have selected is compatible with the application liquid. To determine the chemical compatibility between the sensor and its application liquids, refer to an industry reference corrosion guide available from OMEGA

⚠ Wiring and Electrical:

The supply voltage used to power the LVC-100 series sensor should never exceed a maximum of 36 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

⚠ Flammable, Explosive and Hazardous Applications:

DO NOT USE THE LVC-100 SERIES GENERAL PURPOSE SWITCH IN HAZARDOUS LOCATIONS.

⚠ WARNING ⚠

Do not install the LVC-100 level switch on a metallic tank, or within 6" of any metallic object. Metal will adversely affect the dielectric sensitivity of the sensor.

The maximum current draw on the FET switch is 100 mA.

Omega's LVC-100 series sensors are not recommended for use with electrically charged application liquids. For the most reliable operation, the liquid being measured will need to be electrically grounded.

INTRODUCTION

Step Three

About Intrusive RF Capacitance Technology:

Omega's LVC-100 series generates a 300 kHz pulse-wave radio frequency signal from the capacitance electrode located in the sensing tip of each sensor. When liquid comes into contact with the sensing tip, the capacitance as measured by the sensor changes based on the dielectric constant of the liquid. Omega's sophisticated electronics convert the capacitance value into a simple two-wire, 4 or 20 mA, a three-wire FET switch output which indicates whether the sensor is wet or dry or a 4-wire NO or NC 1A relay output. In the dry state, the sensor delivers a two wire, 5 mA signal output. In the wet state, the sensor delivers a two wire, 19 mA signal output.

The sensor's operation may vary based on the dielectric properties of various application liquids. The LVC-100 series sensor is factory-calibrated to be used with liquids with a dielectric value between 20 and 80. For example, if the application liquid is acetal (with a dielectric constant of about 3.6), the sensor (as factory calibrated) will not detect its presence when it is wet. However, if the application liquid is glycol (with a dielectric constant of about 35) the sensor will reliably detect its presence when wet.

Warning: Do not install the LVC-100 series sensor within 6 inches of any metallic object. Metal will adversely affect the dielectric sensitivity of the sensor.

Omega's LVC-100 series sensors are not recommended for use with electrically charged application liquids. For most reliable operation, the liquid being measured may need to be electrically grounded.

Table of Common Dielectric Constants

NOTE: Liquids with a dielectric constant less than 20 will not be detected by an LVC-100 series sensor, as factory calibrated.

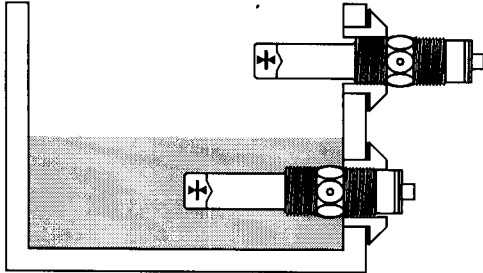
Acetone	21	Ethylene dichloride	11 to 17	N-butyl formate	2.4
Acetoaldehyde	22.2	Ethylene chloride	10.5	Nitrobenzene	26 to 35
Acetyl methyl hexyl ketone	28	Ethyl acetate	6.4	Nitrotoluene	25
Alcohol	16 to 31	Ethyl salicylate	8.6	Naphthalene	2.3 to 2.5
Ammonia	15 to 25	Ethyl stearate	2.9	Oils, vegetable	2.5 to 3.5
Acetic acid	4.1 to 6.2	Ethyl silicote	4.1	Oils, mineral	2.3 to 2.4
Butyl chloride	9.6	Formic acid	59	Oils, petroleum	1.8 to 2.2
Barium chloride	9 to 11	Ferric oleate	2.6	Oleic acid	2.5
Benzene	2.3	Freon	2.2	Propane, liquid	1.8 to 1.9
Benzine	2.3	Glycerine	47	Potassium nitrate	5.0 to 5.9
Barium nitrate	5.6	Glycol	30	Potassium chloride	5.0
Bromine	3.1	Glycol nitrite	27	Stearic acid	2.3
Chlorobenzene	4.7 to 6	Gasoline	2 to 2.2	Toluene	2.4
Chlorotoluene	4.7	Hydrochloric acid	4.6	Trichloroethylene	3.4
Chloroform	4.5 to 5.0	Isobutyric acid	2.7	Trichloroacetic acid	4.5
Chlorine, liquid	2.0	Isobutyl methyl ketone	13	Terephthalic acid	1.5 to 1.7
Carbon tetrachloride	2.2	Jet fuel	1.7	Thinner	3.7
Cyan	2.6	Lead carbonate	18	Urea	3.5
Cyclohexane	3.7	Lead nitrate	38	Vinyl chloride	2.8 to 6
D.I. Water	20	Methyl salicylate	9.0	Vinyl alcohol	1.8 to 2.0
Ethyl toluene	2.2	Methanol	33	Water, 20°C	80
Ethyl alcohol	23	Methyl alcohol	33 to 38	Water, 100°C	48
Ethylene glycol	37	Margarine, liquid	2.8 to 3.2		
Ethylene oxide	14	Methyl acetate	7.3		

INSTALLATION

Step Four

Through Wall Installation:

Omega's LVC-100 series sensors may be installed through the top, side or bottom of a tank wall. The sensor has male 3/4" NPT threads on either side of a 15/16" wrench flat. This enables the user to select the sensor's mounting orientation, installed outside of the tank in, or inside of the tank out.

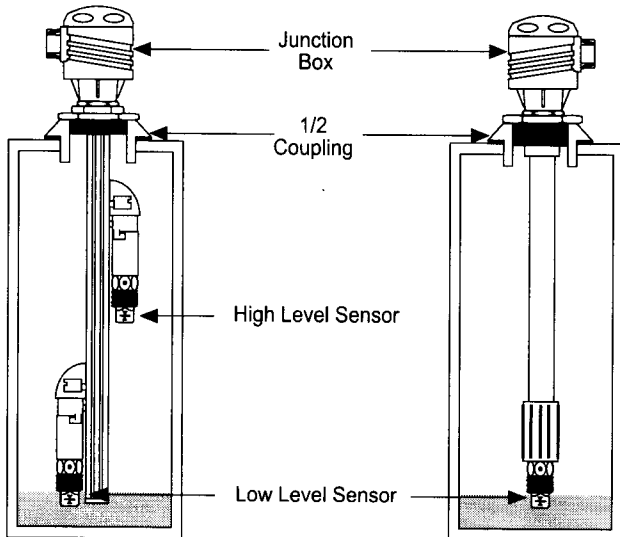


Smart Trak™ Installation:

Omega's LVM-10 series mounting system is an in-tank fitting which enables users to install up to four OMEGA sensors of any technology, to any depth, along the entire length of track. Smart Trak may be installed through the top wall of any tank using a standard 2" NPT tank adapter. If no tank top installation is available, Omega's side mount bracket, LVM-30, enables the LVM-10 to be installed directly to the side wall of a tank.

Switch Pak™ Installation:

Omega's Switch Pak LVM-50 series mounting system is an in-tank fitting which enables users to install one OMEGA sensor, of any technology, to a specific depth. The Omega sensor may be installed onto the 3/4" NPT adapter at the end of the Switch Pak. Switch Pak may be installed through the top wall of any tank using a standard 2" NPT tank adapter. Omega's side mount bracket, model LVM-30, may also be used if top wall installation is not available.



Do not install the LVC-100 level switch on a metallic tank, or within 6" of any metallic object. Metal will adversely affect the dielectric sensitivity of the sensor.

ELECTRICAL

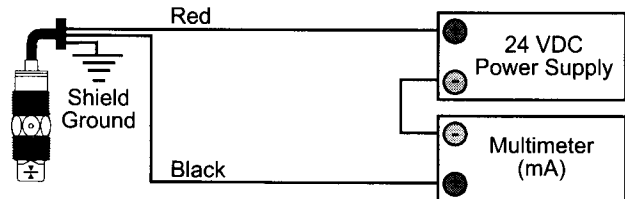
Step Five

Supply Voltage: The supply voltage to the LVC-100 series sensor should never exceed a maximum of 36 VDC. Omega controllers have a built-in 13.5 VDC power supply which provides power to all of Omega's electrically powered sensors. Alternative controllers and power supplies, with a minimum output of 12 VDC up to a maximum output of 36 VDC, may also be used with the LVC-100 series sensor.

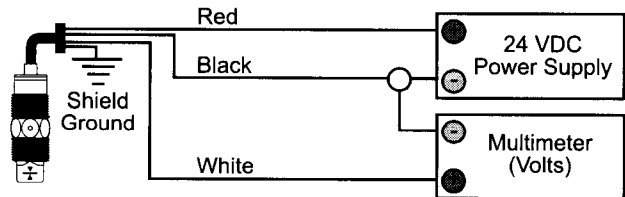
Required Cable Length: Determine the length of cable required between the LVC-100 series sensor and its point of termination. Allow enough slack to ensure the easy installation, removal and/or maintenance of the sensor. The cable length may be extended up to a maximum of 1000 feet, using a well-insulated, 20 gauge shielded wire.

Wire Stripping: Using a 10 gauge wire stripper, carefully remove the outer layer of insulation from the last 1-1/4" of the sensor's cable. Unwrap and discard the exposed foil shield from around the signal wires, leaving the drain wire attached if desired. With a 20 gauge wire stripper, remove the last 1/4" of the colored insulation from the signal wires.

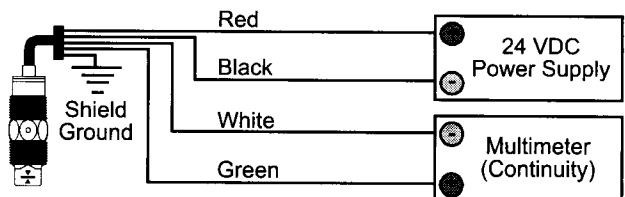
Signal Outputs (Current sensing): The standard method used by Omega controllers; this technology uses only two wires (Red and Black). The sensor draws 5 mA when it is dry, and 19 mA when wet. NC/NO status must be set by the controller. The White wire is not used.



Signal Outputs (FET switching): Allows the sensor to switch a small load on or off directly, using all three wires. Model LVC-10_ is a NPN type switch, which toggles the negative side of the load; model LVC-10_-P is a PNP type switch for applications where the switch must be on the positive side of the load. In both FET models, the NO/NC status is set by the polarity of the voltage feeding the Red and Black wires, and the White wire connects to the load.



Signal Output (Relay switching): Allows the sensor to switch a small load on or off directly, using an internal 1A relay (60 VAC/60 VDC). Only model LVC-10_-R uses the relay and features 4 wires (red, black, white and green) and a shield wire. The NO/NC status is set by the polarity of the voltage feeding the red and black wires. The green wire is the common for the relay and the white wire is the NO or NC, depending on the polarity of red and black.

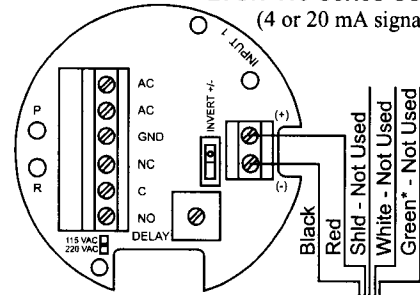


WIRING

Step Six

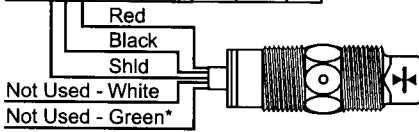
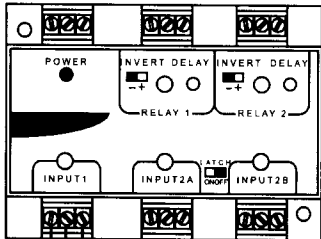
Wiring to an Omega Controller

LVCN-110 Series Controller (4 or 20 mA signal output)



* Green wire only on LVC-10_-R

LVCN-120/-130/-140 Series Controller (4 or 20 mA signal output)



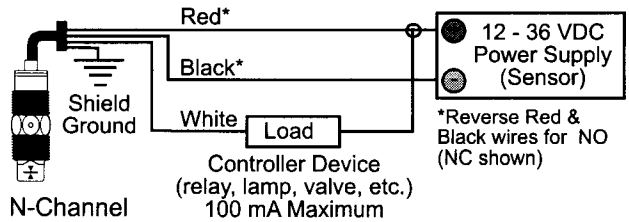
* Green wire only on LVC-10_-R

WIRING

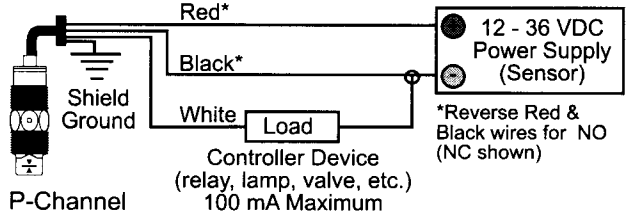
Step Seven

Models LVC-10_ & LVC-10_-P Only

Wiring direct to a load, NC operation (FET signal output)



N-Channel



P-Channel

Wiring direct to load, Normally Open operation:

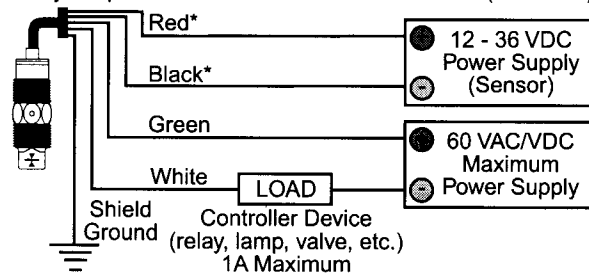
LVC-10_ and LVC-10_-R (FET outputs only):

This is the same as the wiring for Normally Closed operation, except the polarity of the Red and Black connections to the sensor is reversed. *The other connections remain the same; the sensor and device power supplies remain tied in the same polarity as before.* This method will turn the load on when the sensor is wet.

Models LVC-10_-R Only

Wiring direct to a load, NO operation (Relay signal output)

Relay Output *Reverse Red & Black wires for NC (NO shown)



Wiring direct to load, Normally Closed operation:

LVC-10_-R (Relay outputs only):

This is the same as the wiring for Normally Open operation, except the polarity of the Red and Black connections to the sensor is reversed. *The other connections remain the same; the sensor and device power supplies remain tied in the same polarity as before.* This method will turn the load on when the sensor is dry.

MAINTENANCE

Step Eight

General:

The LVC-100 series sensor itself requires no periodic maintenance except cleaning as required. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

Cleaning Procedure:

1. **Power:** Make Sure that all power to the sensor, controller and/or power supply is completely disconnected
2. **Sensor Removal:** In all through-wall installations, make sure that the tank is drained well below the sensor prior to removal. Carefully, remove the sensor from the installation.
3. **Cleaning the Sensor:** Use a soft bristle brush and mild detergent, carefully wash the LVC-100 series sensor. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface sensor. Do not use incompatible solvents which may damage the sensor's Polypropylene or PFA plastic body.
4. **Sensor Installation:** Follow the appropriate steps of installation as outlined in the installation section of this manual.

Step Nine