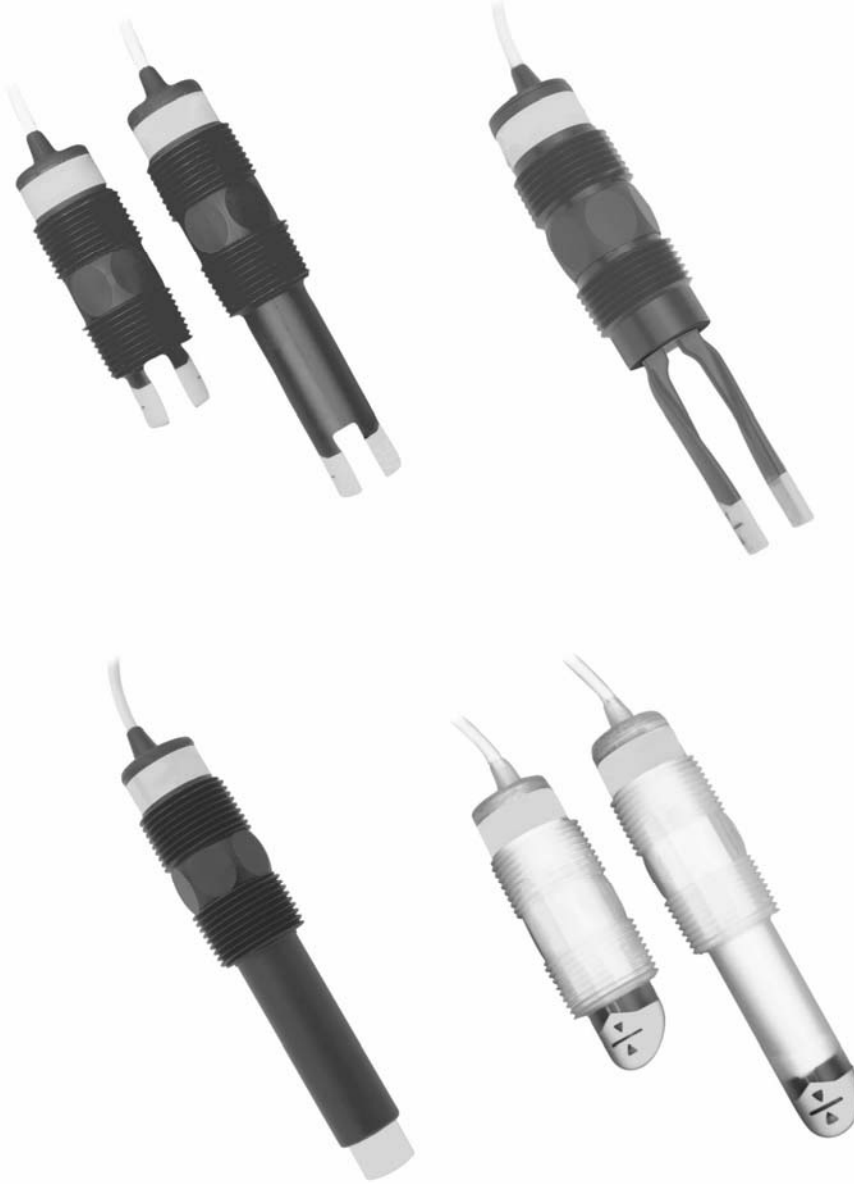


1 YEAR
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LVU-150 Series Ultrasonic
LTU-101A Series Tuning Fork
LVF-210A Series Optic Leak &
LVC-152 Series Capacitance
Powered Level Switches



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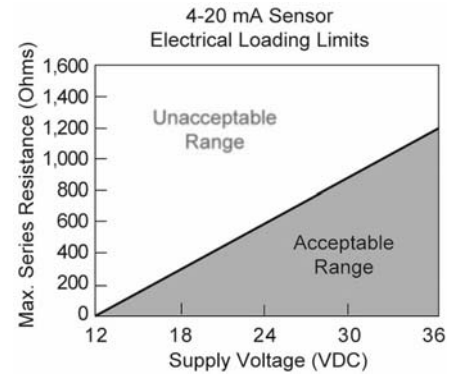
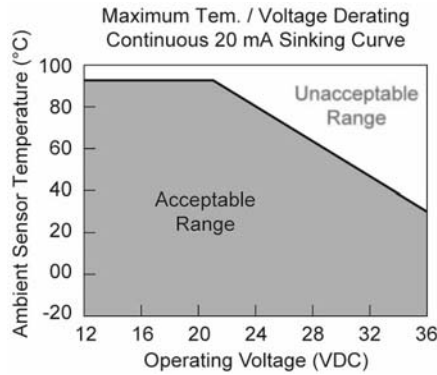
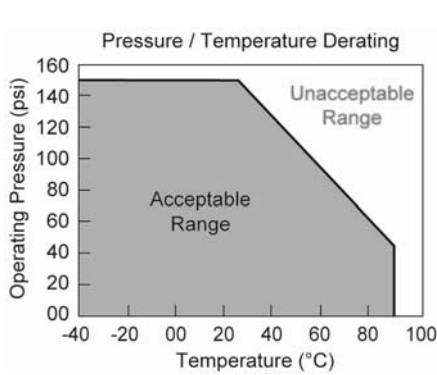
About Powered Level Switches: This manual contains information on two series of powered level switches; Ultrasonic (LVU-150 series), Tuning Fork (LTU-101A series) Optic Leak (LVF-210A series) and Capacitance (LVC-152 series). The switches all feature two outputs: 1) a 4 or 20 mA current switch and 2) a 60VA SPST dry contact relay. All four series are manufactured with thermoplastics, including the cable, making them submersible in design and ideal for corrosive applications. Package the switches with either Omega Engineering controllers (LVCN-100 series or LVCN-120 series) or interface directly to another controller or PLC.

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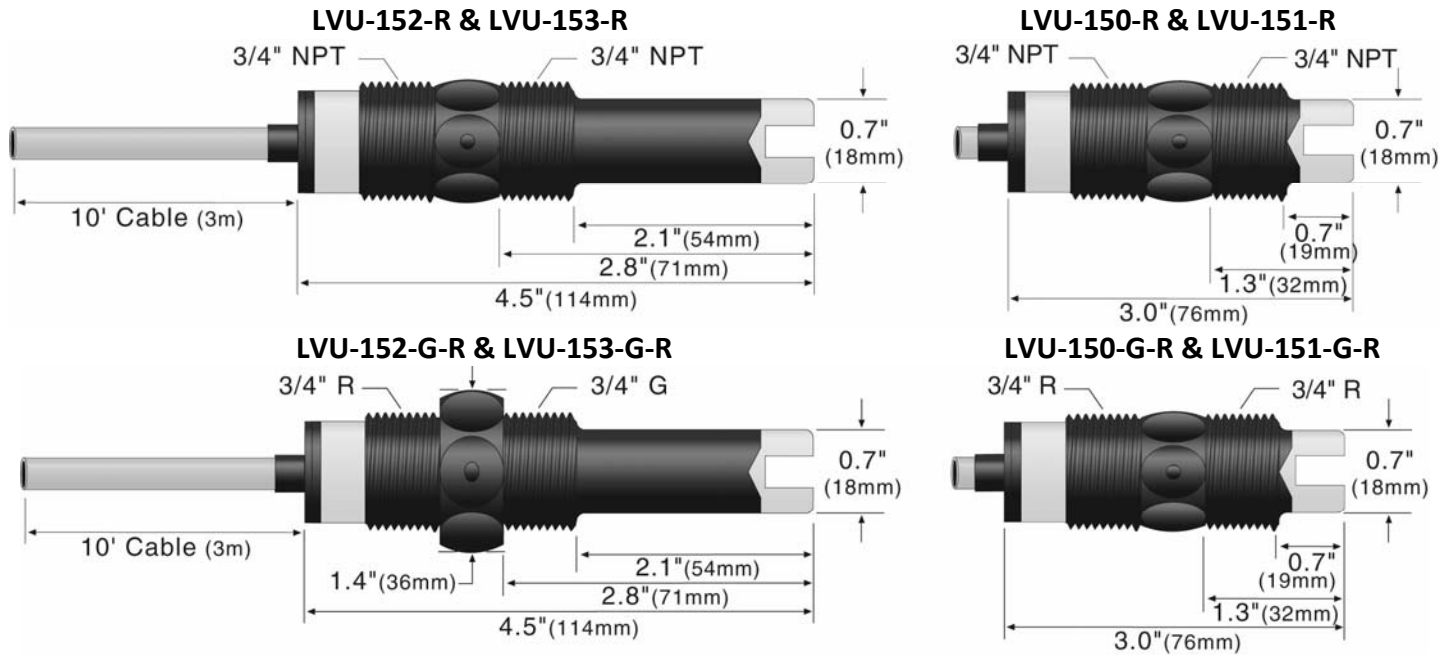
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Common Specifications:

Orientation:	Universal	Pressure:	150 psi (10 bar) @ 25 °C., derated @ 1.667 psi (.113 bar) per °C. above 25° C.
Accuracy:	± 1 mm in water	Sensor rating:	NEMA 6 (IP68)
Repeatability:	± 0.5 mm in water	Cable type:	4-conductor, #22 AWG (shielded)
Supply voltage:	12-36 VDC 12-30 VDC (LTU-101A only)	Cable length:	10' (3m) - Standard 25' (7.6m) or 50' (15.2m) - Special
Consumption:	25 mA maximum	Process mount:	3/4" NPT (3/4" G/R)
Contact type:	(1) SPST relay	Classification:	General purpose
Contact rating:	60VA	Mount. Gasket:	FKM (G version only)
Contact output:	Selectable NO/NC	CE compliance:	EN 61326 EMC / EN 61010-1 safety
Process temp.:	F: -40° to 176° C: -40° to 80°		



Ultrasonic Switch (LVU-150 series): The Ultrasonic level switch generates a 1.5 MHz ultrasonic wave from a miniature piezoelectric transducer located on one side of the gap in its sensing tip. Another piezo transducer located on the other side of the gap acts as a microphone, picking up the sound. When liquid enters the gap in the sensing tip, the audio level changes.



▲ The sensor should be installed so that the liquid will drip out of the gap when the sensor becomes dry.

LVU-150 Series Specifications:

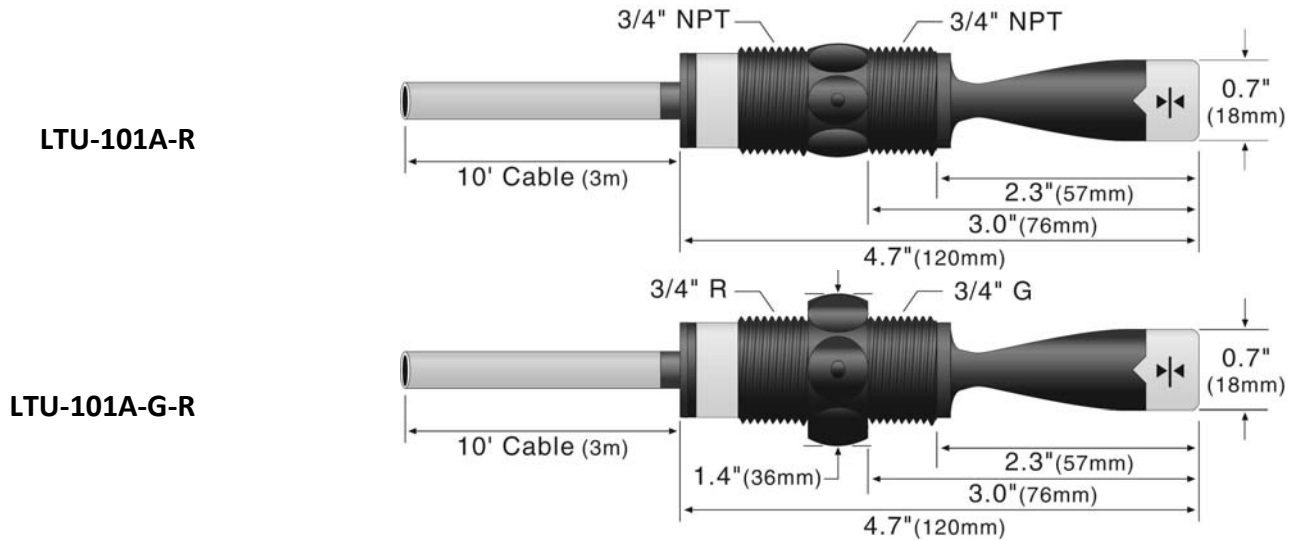
Sensor material: -150/-152: PP -151/-153: PFA	Cable jacket mat'l: -150/-152: PP -151/-153: PFA
--	---

Configurations:

Part Number	Length	Material (body)	Material (cable)	Cable Length
LVU-150-R	Short (3")	Polypropylene	Polypropylene	10'
LVU-150-G-R	Short (3")	Polypropylene	Polypropylene	10'
LVU-151-R	Short (3")	PFA	FEP	10'
LVU-151-G-R	Short (3")	PFA	FEP	10'
LVU-152-R	Long (4.5")	Polypropylene	Polypropylene	10'
LVU-152-G-R	Long (4.5")	Polypropylene	Polypropylene	10'
LVU-153-R	Long (4.5")	PFA	FEP	10'
LVU-153-G-R	Long (4.5")	PFA	FEP	10'

Note: all ultrasonic level switches are available with longer lengths cable of 25' and 50'. For 25' of cable, add (-25) to the end of the part number and for 50' of cable, add (-50) to the end of the part number. Example, LVU-150-R-25 will have 25' of cable.

Tuning Fork Switch (LTU-101A Series): The Tuning Fork switch operates at a nominal frequency of 400 Hz. As the switch becomes immersed in a liquid or slurry, a corresponding frequency shift occurs. When the measured frequency shift reaches the set point value, the switch changes state indicating the presence of a liquid or slurry medium. For optimum performance and proactive maintenance, the sensor automatically adjusts for coating, and if necessary, outputs a preventative maintenance alarm.



⚠ Do not squeeze the forks together. Doing so could damage or break the sensor and void the warranty.

When powering up the LTU-101A series, the start-up procedure requires the switch to cycle through a wet condition for 1/2 second in order to determine an initial resonance.

LTU-101A Series Specifications:

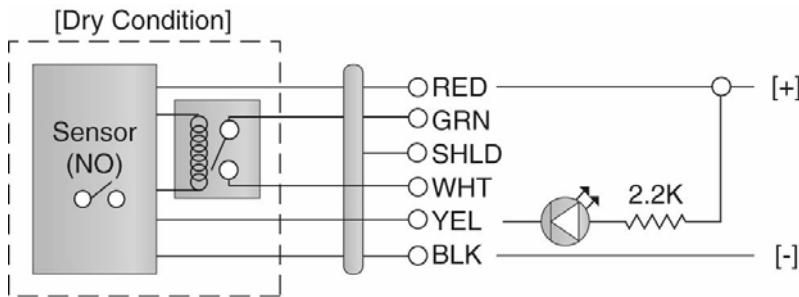
Sensor material:	PPS (glass fill) FKM cable grommet	Cable jacket mat'l:	PP
Maint. alarm:	NPN transistor, 10 mA max.	Cable type:	5-conductor, #24 AWG (shielded)

Configurations:

Part Number	Material (body)	Material (cable)	Thread (inside x outside)
LTU-101A-R	Polyphenylene Sulfide	Polypropylene	3/4" NPT x 3/4" NPT
LTU-101A-G-R	Polyphenylene Sulfide	Polypropylene	3/4" R x 3/4" G

Note: all tuning fork level switches are available with longer lengths cable of 25' and 50'. For 25' of cable, add (-25) to the end of the part number and for 50' of cable, add (-50) to the end of the part number. Example, LTU-101A-R-25 will have 25' of cable.

Maintenance Alarm (LTU-101A series Tuning Fork only): For optimum performance and proactive maintenance, the sensor automatically adjusts for coating, and if necessary, outputs a preventative maintenance alarm. The Yellow wire is a NPN transistor designed to switch when a build-up of material prevents the tuning fork switch from operating at its operational frequency. Use the Yellow wire to identify when the Tuning Fork switch requires cleaning. To wire the maintenance output wire to an LED, follow the wiring diagram below. The Yellow wire is connected to the LED and a 2.2kΩ resistor in series and referenced back to the (+) of the power supply.



Sensor Power

[RED & BLK wires] / 36 VDC Max.

8 ±1mA Dry / 22 ±1mA Wet

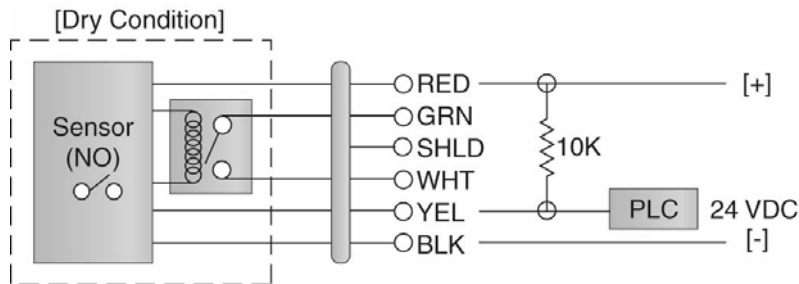
Relay Rating

[GRN & WHT wires] / 60 VA

Maintenance Alarm

[YEL wire] / NPN Transistor / 10mA Max.

To wire the maintenance output wire to a PLC, follow the wiring diagram below. The Yellow wire is connected to the PLC input with a 10 kΩ resistor parallel to the PLC input and the (+) of the power supply.



Sensor Power

[RED & BLK wires] / 36 VDC Max.

8 ±1mA Dry / 22 ±1mA Wet

Relay Rating

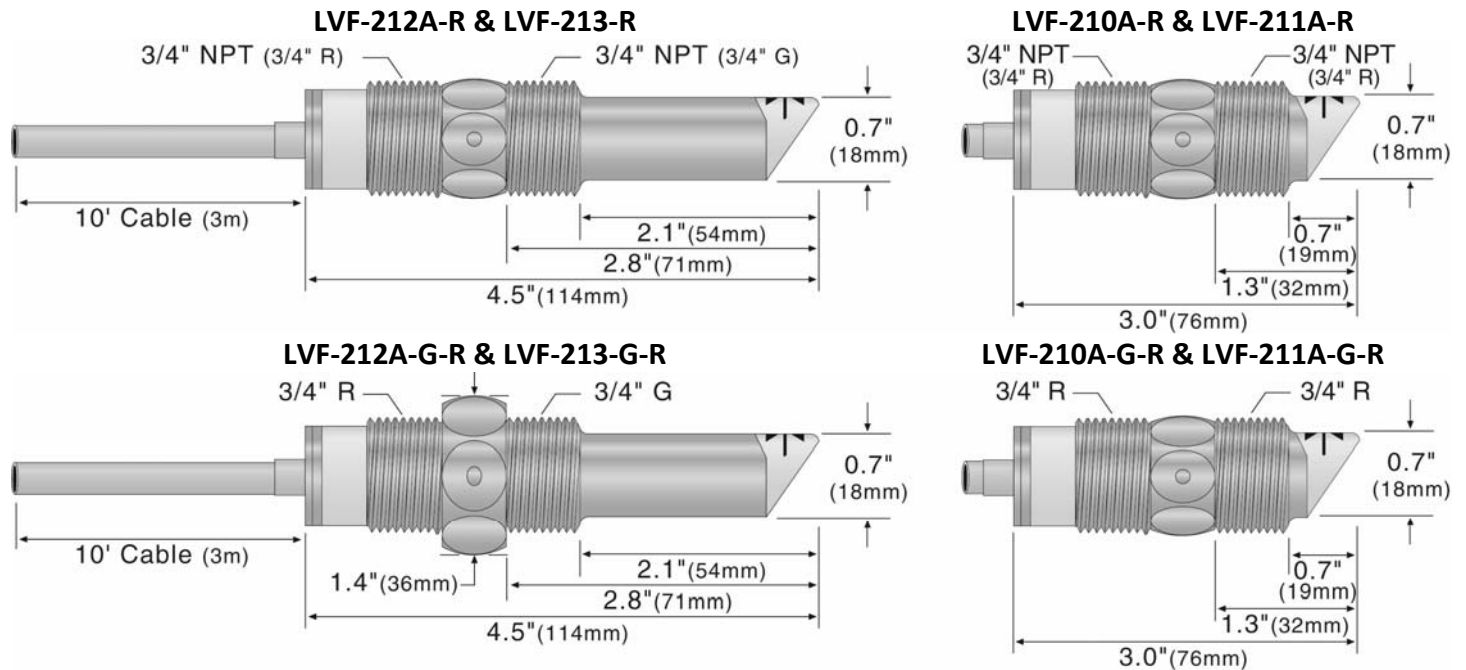
[GRN & WHT wires] / 60 VA

Maintenance Alarm

[YEL wire] / NPN Transistor / 10mA Max.

Optic Leak Detection Switch (LVF-210A series): The Optic Leak Detector use principles of optical refraction to detect the presence or absence of fluid. A pulsed infrared light beam is internally generated by a light emitting diode and aimed at the slanted optical tip of the sensor. If the tip is dry, the light beam bounces at a 90 degree angle to a receiving photo transistor, indicating a dry condition. If the tip is immersed in liquid, the light beam will refract out into the liquid instead of being reflected to the photo transistor, indicating a wet condition.

▲ **The LVF-210A series is designed as a leak detection switch. The switch should be installed in applications where under normal conditions, it remains away from the liquid and will only come into contact during a leak.**



▲ **The Optic Leak Detector cannot detect the presence or absence of specular application liquids that reflect light (such as milk), or viscous liquids (such as paint) that form a coating on the sensor tip.**

LVF-210A Series Specifications:

Sensor material: -210A/-212A: PP -211A/-213A: PFA	Cable jacket mat'l: -210A/-212A: PP -211A/-213A: PFA
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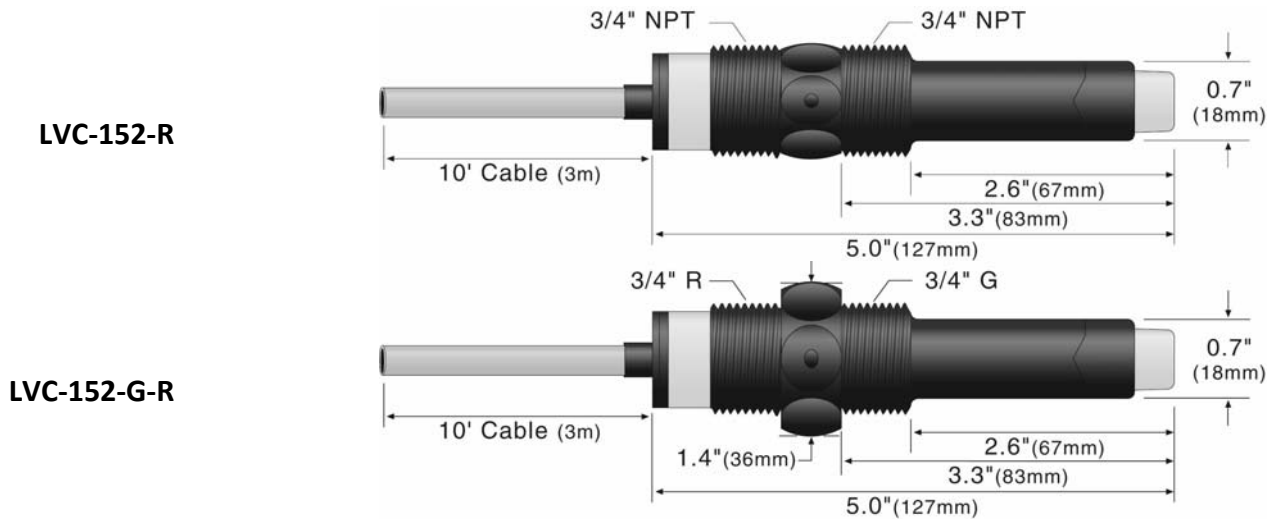
Configurations:

Part Number	Length	Material (body)	Material (cable)	Cable side	Sensor side
LVF-210A-R	Short (3")	Polypropylene	Polypropylene	(3/4" NPT)	(3/4" NPT)
LVF-210A-G-R	Short (3")	Polypropylene	Polypropylene	(3/4" R)	(3/4" R)
LVF-211A-R	Short (3")	PFA	PFA	(3/4" NPT)	(3/4" NPT)
LVF-211A-G-R	Short (3")	PFA	PFA	(3/4" R)	(3/4" G)
LVF-212A-R	Long (4.5")	Polypropylene	Polypropylene	(3/4" NPT)	(3/4" NPT)
LVF-212A-G-R	Long (4.5")	Polypropylene	Polypropylene	(3/4" R)	(3/4" R)
LVF-213A-R	Long (4.5")	PFA	PFA	(3/4" NPT)	(3/4" NPT)
LVF-213A-G-R	Long (4.5")	PFA	PFA	(3/4" R)	(3/4" G)

Note: all optic leak detection level switches are available with longer lengths cable of 25' and 50'. For 25' of cable, add (-25) to the end of the part number and for 50' of cable, add (-50) to the end of the part number. Example, LVF-210A-R-25 will have 25' of cable.

Capacitance Switch (LVC-152 series): The capacitance level switch generates a 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. The guard circuit rejects the negative effects of coating buildup on the probe by eliminating the coating signal path between the active and reference electrodes.

⚠ Avoid installing the LVC-152 series in metal fittings and keep the sensor 6" away from metal objects. It is possible for a large metal object to influence the sensor's operation.



⚠ The sensor's operation may vary based on the dielectric properties of various application liquids. The LVC-152 series sensor is factory-calibrated to be used with liquids with a dielectric value between 20 and 80. Liquids with a dielectric constant less than 20 will not be detected by an LVC-152 series sensor.

Table of Common Dielectric Constants: NOTE: Liquids with a dielectric constant less than 20 will not be detected by an LVC-152 series level switch.

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

LVC-152 Series Specifications:

Dielectric range: >20 constants	Sensor material: PP
Conductive range: >100 miromhos	Cable jacket mat'l: PP

Configurations:

Part Number	Length	Material (body)	Material (cable)	Cable side	Sensor side
LVC-152-R	Long (4.5")	Polypropylene	Polypropylene	(3/4" NPT)	(3/4" NPT)
LVC-152-G-R	Long (4.5")	Polypropylene	Polypropylene	(3/4" R)	(3/4" G)

Note: all capacitance level switches are available with longer lengths cable of 25' and 50'. For 25' of cable, add (-25) to the end of the part number and for 50' of cable, add (-50) to the end of the part number. Example, LVC-152-R-25 will have 25' of cable.

Testing Tip: The LVC-152 series sensor looks for changes in capacitance based upon the dielectric constant of the liquid. Although water has a high dielectric constant, the volume of a cup of water will not have enough change in capacitance to switch the sensor into a wet condition. One way to increase the capacitance for the cup of water is to dip your finger into the cup. The volume of water within your body will add to the water in the cup and will result in the sensor identifying a wet condition.

! About Manual: PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on all models of Omega Engineering Powered Level Switches: LVU-150 series, LTU-101A series, LVF-210A series and LVC-152 series. Please refer to the part number located on the sensor label to verify the exact model which you have purchased.

! User's Responsibility for Safety: OMEGA ENGINEERING manufactures a wide range of liquid level switches and technologies. While each of the these switches are designed to operate in a wide variety of applications, it is the user's responsibility to select a switch 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 over tighten the sensor within the fitting, beyond a maximum of 80 inch-pounds torque. Always check for leaks prior to system start-up.

! Material Compatibility: The LVU-150 series and LVF-210A series sensors are available in two different wetted materials. Models LVU-150, LVU-152, LVF-210A and LVF-212A are made of Polypropylene (PP). Models LVU-151, LVU-153, LVF-211A and LVF-213A are made of Perfluoroalkoxy (PFA). The LTU-101A series is made of PPS (40% glass filled) and the LVC-152 series is made of PP. 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 such as the Compass Corrosion.

! Wiring and Electrical: The supply voltage used to power the sensor should never exceed a maximum of 36 volts DC (30VDC for LTU-101A series). 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 LVU-150 SERIES, LTU-101A SERIES, LVF-210A SERIES or LVC-152 SERIES GENERAL PURPOSE SWITCH IN HAZARDOUS LOCATIONS.

! Warning !

The rating for the relay is 60 VA.

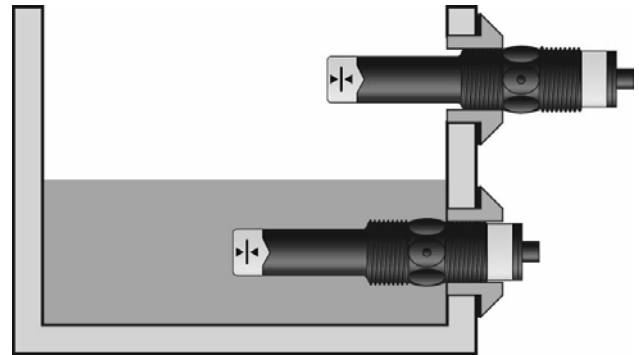
Omega Engineering's powered level switches are not recommended for use with electrically charged application liquids. For most reliable operation, the liquid being measured may need to be electrically grounded.

Always install the 3/4" FKM gasket with all versions of the powered sensors with metric (G) threads. The metric (G) threaded version will not seal unless the gasket is installed.

Make a Fail-Safe System: Design a fail-safe system that accommodates the possibility of switch and/or power failure. OMEGA ENGINEERING recommends the use of redundant backup systems and alarms in addition to the primary system. Adding a redundant high level float switch to the system is a cost effective means to prevent costly tank overflows.

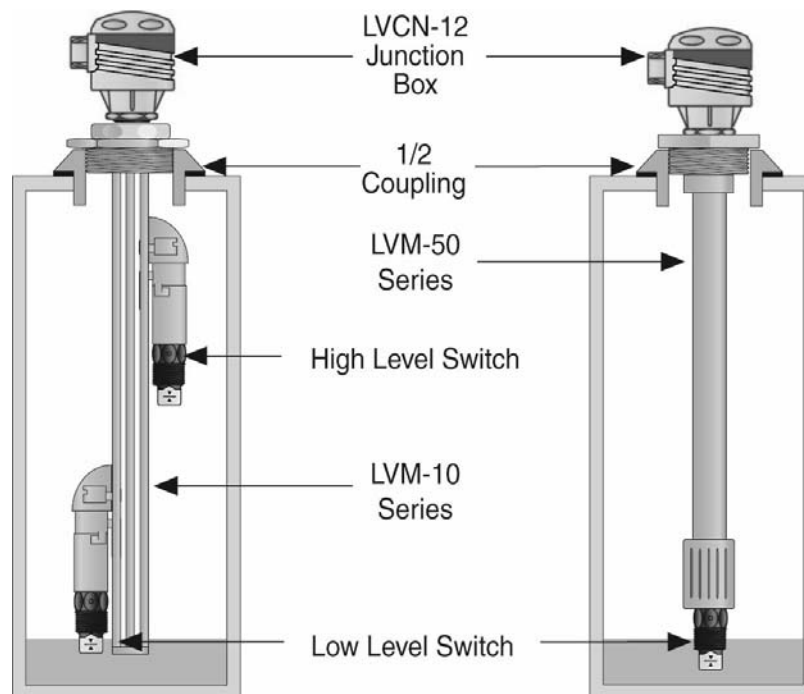
All of the powered level sensors have a single internal relay. The normally open (NO) or normally closed (NC) operation is user selected based on the desired system control. Always design a fail-safe system that accommodates for the possibility of functional and/or power failure to the instrument. The "normal" relay state is where the relay coil is de-energized and the relay indicator is OFF. Therefore, if power is cut OFF to the switch it will de-energize the relay. Make sure that the de-energized state is the safe state in your system design. As such, if switch power is lost, a pump will turn OFF if it is connected to the normally open side of the relay.

Through Wall Installation: Omega Engineering's powered level switches may be installed through the top, side or bottom of a tank wall. The sensor has male 3/4" NPT (R/G) 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.



Top Wall Installation: The powered level switches may be installed through the top wall of a tank. Omega Engineering's level track mounting system LVM-10 series is an in-tank fitting which enables users to install up to four OMEGA ENGINEERING sensors of any technology, to any depth, along the entire length of track. The LVM-10 series 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 Engineering's side mount bracket, LVM-30, enables the LVM-10 series to be installed directly to the side wall of a tank. *Do not use the PFA bodied sensors with LVM-10 series.*

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

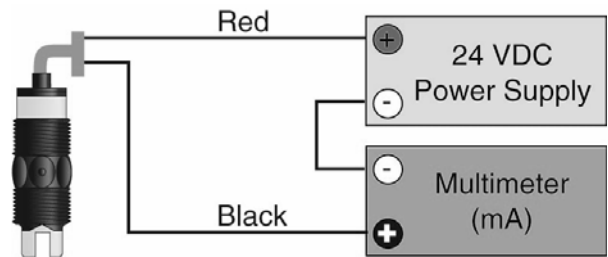


Supply Voltage: The supply voltage to the powered level switch should never exceed a maximum of 36 VDC (30 VDC with LTU-101A series). Omega Engineering controllers have a built-in 13.5 VDC power supply which provides power to all of Omega Engineering's electrically powered sensors. Alternative controllers and power supplies, with a minimum output of 12 VDC up to a maximum output of 36 VDC (30 VDC with LTU-101A series), may also be used with the powered level switch.

Required Cable Length: Determine the length of cable required between the powered level switch 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, 14 to 20 gauge shielded four conductor cable.

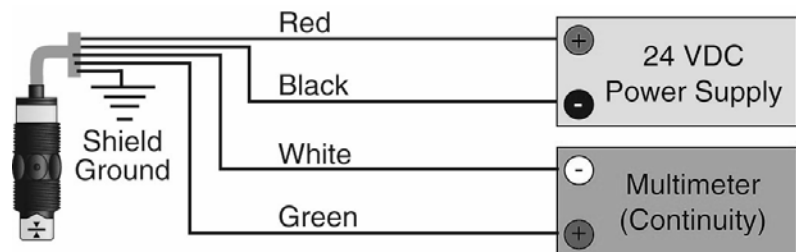
Wire Stripping: Using a 10 gauge wire stripper, carefully remove the outer layer of insulation from the last 1-1/4" of the sensor's cable. Unwrap and discard the exposed foil shield from around the signal wires, leaving the drain wire attached if desired. With a 20 gauge wire stripper, remove the last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

Signal Outputs (Current sensing): The standard method used by Omega Engineering controllers; this technology uses only two wires (Red and Black). The sensor draws 5 mA when it is dry (8mA with LTU-101A series), and 22 mA when wet. NC/NO status must be set by the controller. The White and Green wires are not used.

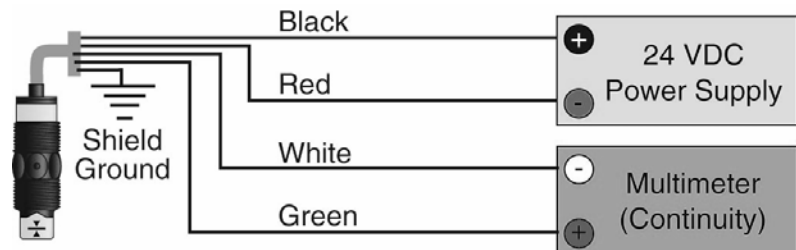


Signal Output (Relay switching): Allows the sensor to switch a small load on or off directly, using an internal 1A relay (60 VAC/60 VDC). The sensor uses the relay and features 4 wires (red, black, white and green) and a shield wire. The NO/NC status is set by the polarity of the voltage feeding the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

Normally Open Wiring:

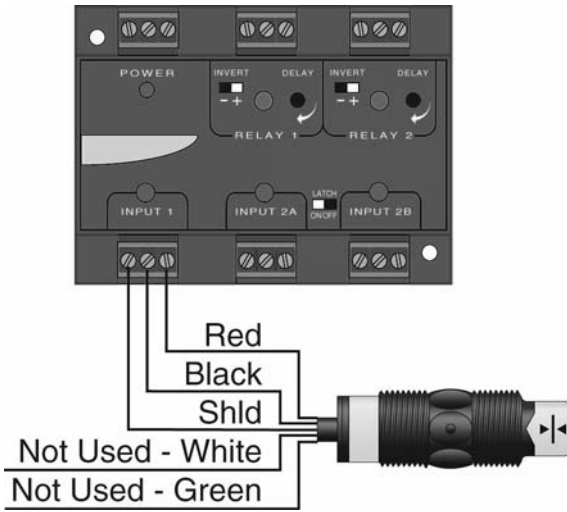


Normally Closed Wiring:

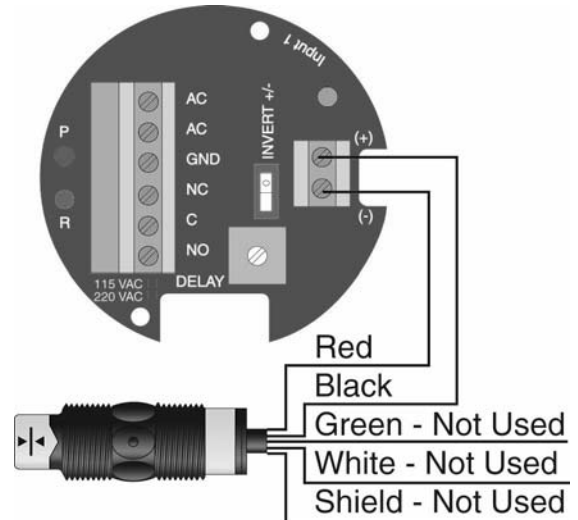


Wiring to a OMEGA ENGINEERING Controller

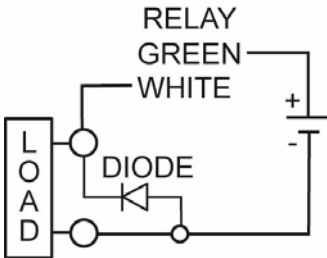
LVCN-120 Series Controller (4 or 20 mA output):
LVCN-120 Shown



LVCN-100 Series Controller (4 or 20 mA output):
LVCN-20 shown



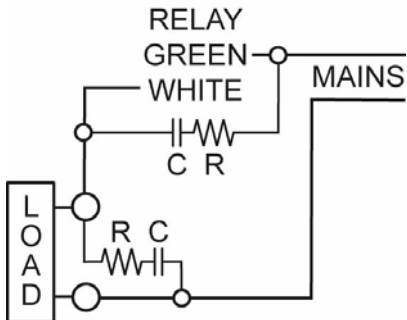
Switching Inductive Loads: The use of suppressors (snubbers) is strongly recommended when switching inductive loads to prevent disrupting the microprocessor’s operation. The suppressors also prolong the life of the relay contacts. Suppression can be obtained with a catch diode for DC circuits and a resistor-capacitor (RC) for AC circuits.



Catch Diode

- Always use stepper relays between the sensor and external loads. For DC circuits use a catch diode such as 1N4148, shown on left.

Refer to the following circuits for RC network assembly and installation:



Choose R and C as follows:

- R: 0.5 to 1 Ohms for each volt across the contacts
- C: 0.5 to 1 μ F for each amp through closed contacts

Notes:

1. Use capacitors rated for 250 VAC.
2. RC networks may affect load release time of solenoid loads. Check to confirm proper operation.
3. Install the RC network at the meters relay screw terminals. An RC network may also be installed across the load. Experiment for best results.

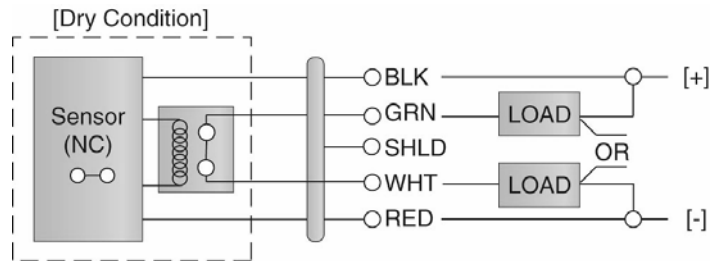
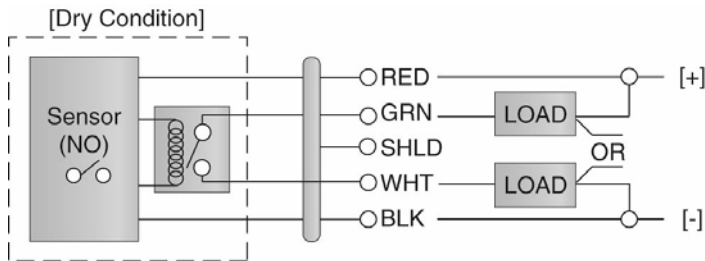
Wiring the Relay Output: The sensor requires 12 - 36 VDC (30 VDC max. for LTU-101A series) power to operate the sensor and switch the relay. All illustrations below identify a Dry switch state as the normal position of the relay.

Switching a Normally Open DC Load:

The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by connecting the Green to (+) VDC power or White to (-) VDC power (see illustration below).

Switching a Normally Closed DC Load:

The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by connecting the Green to (+) VDC power or White to (-) VDC power (see illustration below).



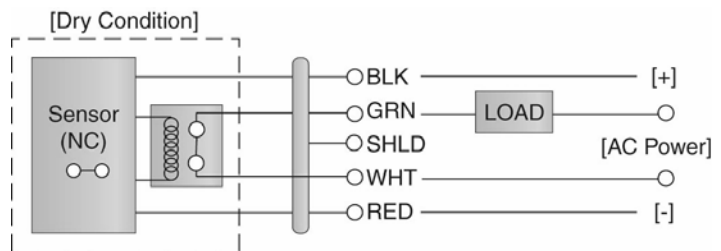
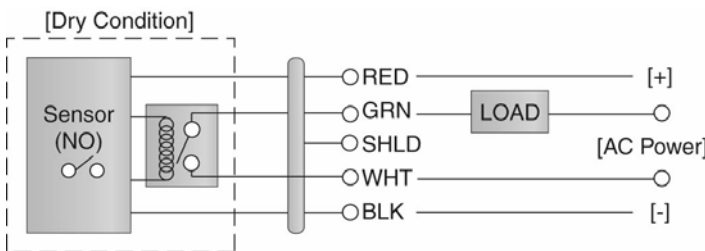
<p><u>Sensor Power</u> [RED & BLK wires] / 36 VDC Max. 5 ±1mA Dry / 22 ±1mA Wet 8 ±1mA Dry (LTU-101A series only)</p>	<p><u>Relay Rating</u> [GRN & WHT wires] / 60 VA</p>
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Switching a Normally Open AC Load:

The Red wire connects to Positive (+) of the DC power supply and the Black wire connects to Negative (-). The LOAD can be attached to the Green wire and the Hot of the VAC power. Connect the White to the Neutral of the VAC power (see illustration below).

Switching a Normally Closed AC Load:

The Black wire connects to Positive (+) of the DC power supply and the Red wire connects to Negative (-). The LOAD can be attached to the Green wire and the Hot of the VAC power. Connect the White to the Neutral of the VAC power (see illustration below).

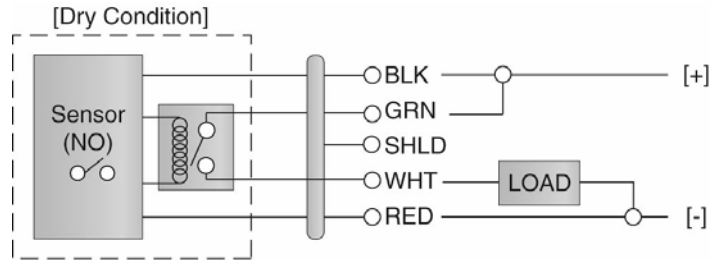
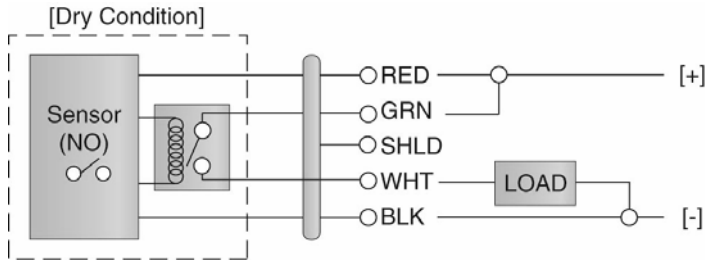


<p><u>Sensor Power</u> [RED & BLK wires] / 36 VDC Max. 5 ±1mA Dry / 22 ±1mA Wet 8 ±1mA Dry (LTU-101A series only)</p>	<p><u>Relay Rating</u> [GRN & WHT wires] / 60 VA</p>
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Wiring as a P-Channel or N-Channel output: The sensor can be substituted for either a P-Channel (PNP, sourcing) output or a N-Channel (NPN, sinking) output.

Normally Open DC Load as a P-Channel Output:
 The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The Green wire is jumped to the Red wire while the White wire is connected to the LOAD. Jumper the LOAD to the Negative (-) to complete the circuit.

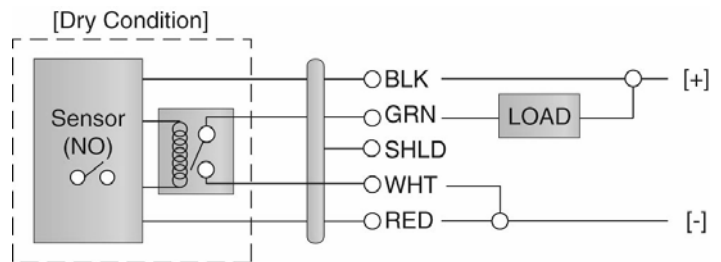
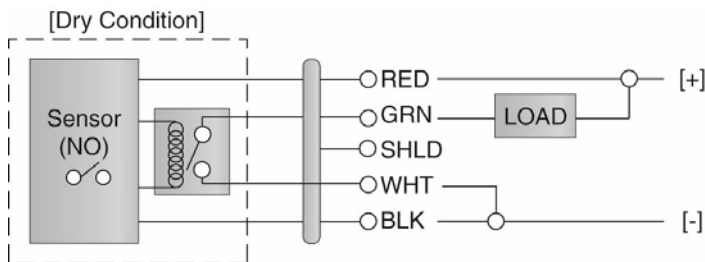
Normally Closed DC Load as a P-Channel Output:
 The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The Green wire is jumped to the Black wire while the White wire is connected to the LOAD. Jumper the LOAD to the Negative (-) to complete the circuit.



<p><u>Sensor Power</u> [RED & BLK wires] / 36 VDC Max. (30 VDC Max. for LTU-101A series) 5 ±1mA Dry / 22 ±1mA Wet 8 ±1mA Dry (LTU-101A series only)</p>	<p><u>Relay Rating</u> [GRN & WHT wires] / 60 VA</p>
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Normally Open DC Load as a N-Channel Output:
 The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The White wire is jumped to the Black wire while the Green wire is connected to the LOAD. Jumper the LOAD to the Positive (+) to complete the circuit.

Normally Closed DC Load as a N-Channel Output:
 The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The White wire is jumped to the Red wire while the White wire is connected to the LOAD. Jumper the LOAD to the Positive (+) to complete the circuit.



<p><u>Sensor Power</u> [RED & BLK wires] / 36 VDC Max. (30 VDC Max. for LTU-101A series) 5 ±1mA Dry / 22 ±1mA Wet 8 ±1mA Dry (LTU-101A series only)</p>	<p><u>Relay Rating</u> [GRN & WHT wires] / 60 VA</p>
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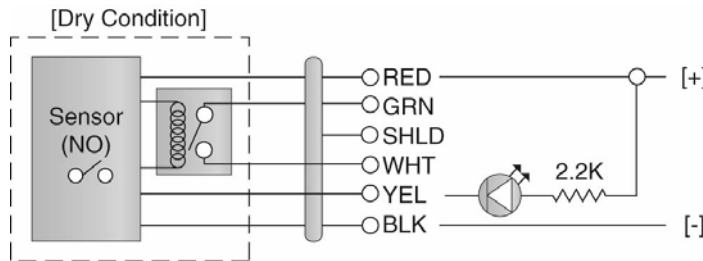
General: The powered level switch requires no periodic maintenance except cleaning as required. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

Cleaning procedure:

1. **Power:** Make sure that all power to the switch, controller and/or power supply is disconnected.
2. **Switch 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 switch:** Use a soft bristle brush and mild detergent, carefully wash the level switch. 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 PP, PFA, PVDF or PPS plastic body.
4. **Sensor installation:** Follow the appropriate steps of installation as outlined in the Installation.

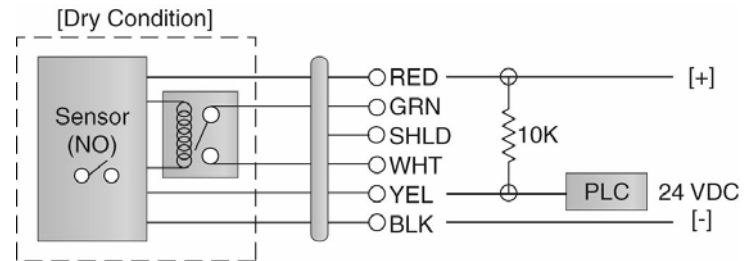
Maintenance Output to LED (LTU-101A series only):

To wire the maintenance output wire to an LED, follow the wiring diagram below. The Yellow wire is connected to the LED and a 2.2kΩ resistor in series and referenced back to the (+) of the power supply.



Maintenance Output to PLC (LTU-101A series only):

To wire the maintenance output wire to a PLC, follow the wiring diagram below. The Yellow wire is connected to the PLC input with a 10 kΩ resistor parallel to the PLC input and the (+) of the power supply.



Sensor Power

[RED & BLK wires] / 30 VDC Max.
8 ±1mA Dry / 22 ±1mA Wet

Relay Rating

[GRN & WHT wires] / 60
VA

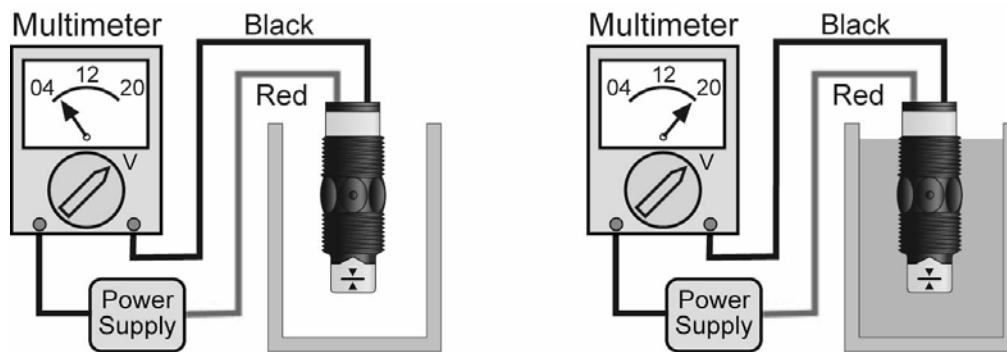
Maintenance Alarm

[YEL wire] / NPN Transistor / 10mA Max.

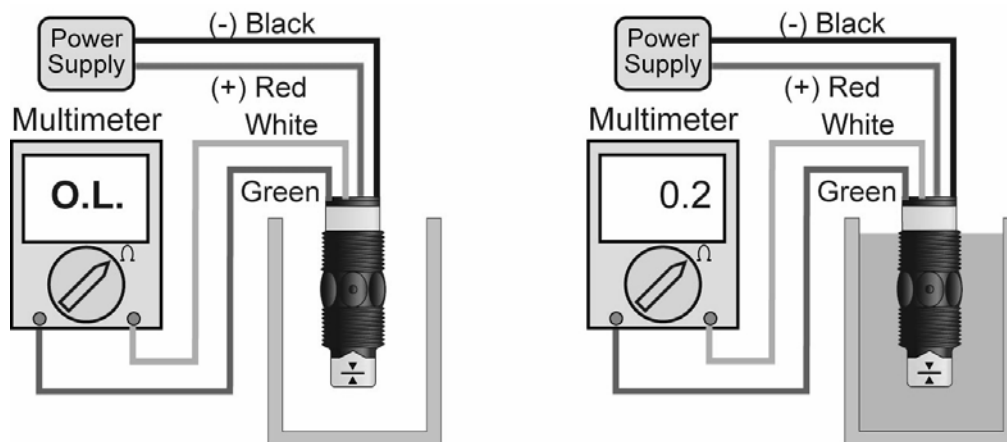
Testing the installation:

1. **Power:** Turn on power to the controller and/or power supply.
2. **Immersing the switch:** Immerse the sensing tip in its application liquid, by filling the tank up to the switch's point of actuation. An alternate method is to hold a cup filled with liquid up to the switch's tip.
3. **Test:** With the switch being fluctuated between wet and dry states, the switch indicator light in the controller should turn on and off. If the controller doesn't have an input indicator, use a voltmeter or ammeter to ensure that the switch produces the correct signal (see below).
4. **Point of actuation:** Observe the point at which the rising or falling fluid level causes the switch to change state, and adjust the installation of the switch if necessary.

Example: Testing the LVU-150 series with a Multimeter set to read current (mA). When wired NO [Red to (+)], the meter will read 5mA, ± 1 mA when dry and will read 20mA, ± 1 mA when wet.



Example: Testing the LVU-150 series with a multimeter set to read resistance (ohms). When wired NO [Red to (+)], the meter will read O.L. when dry and will read some small amount of resistance (ex. 0.2 Ohms) when wet.



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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