

Operators Manual

# Volt Litewire

Fiber Optic Coupled  
Voltmeter With Analog Output

Model 8-012

Model 8-013

Model 8-014





# Operators Manual

## True RMS Voltstik

### Distribution Voltmeter

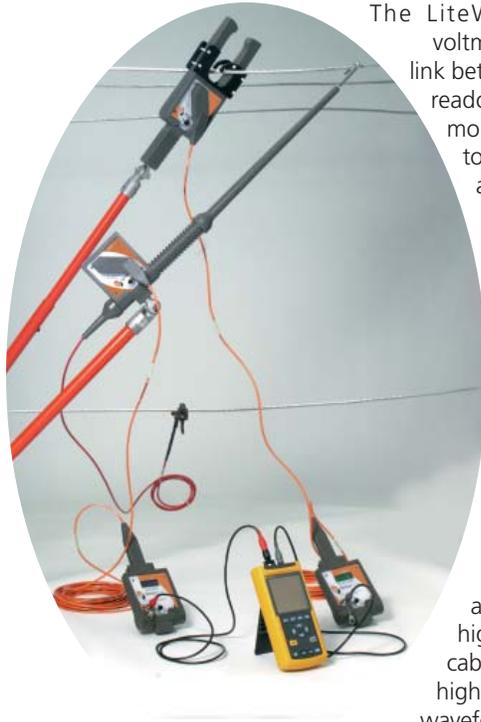
Model 8-012

Model 8-013

Model 8-014

Table of Contents	Page
Overview of Volt LiteWire	2
Safety Information	3
Specifications	4
Operating Instructions	5-6
Making Phase to Ground Measurements	7-8
Making Phase to Phase Measurements with Two Hotsticks	9-10
Battery Replacement	11
Handling Guidelines	12
Cleaning	13
Accessories	14
Warranty	17
Quality Assurance	Back Cover





The LiteWire is a two piece, True RMS voltmeter with a nonconductive fiber-optic link between the high voltage sensor and the readout at ground potential. The sensor is mounted on a hot stick and connected to a high voltage line, using the proper accessories. A fiber-optic cable connects the sensor to a receiver unit at ground potential. This receiver contains the digital readout and an analog output. The cases are water resistant and will withstand high physical impact.

The analog output is the unique feature of this instrument. It is a continuous reproduction of the high voltage waveform, accurate to about the 40th harmonic, but available as a 0-2 volt AC signal at ground. This allows the Fluke 43 to analyze the waveform direct from the high voltage conductor. The fiber-optic cable is physically rugged, but provides the high speed data path required for digital waveform transmission from the sensor to the display unit. It also is the high voltage insulator between the two units.

## Safety Information

The Volt Litewire is designed solely for use when attached to a suitable universal hot stick. All precautions appropriate for the line voltage should be taken. The hot stick should be considered the sole voltage isolation device between the line and the operator. The high voltage insulator on the right side of the Volt Litewire case is the sole high voltage isolation device between the two high voltage measurement points. This insulator must be kept clean and in good condition. This is the part of the instrument that isolates one high voltage potential from another. Dirt, moisture, or mechanical damage will reduce this insulator's ability to insulate high potentials and could result in flash over of the insulator. A small amount of alcohol on a rag may be used to remove dirt and grease. If physical damage is observed on the insulator, it should be sent back to the factory for test and repair. No support structures or other high voltage lines should be near any part of this insulator during measurements. Particular caution should be used to keep the Volt Litewire electrodes from compromising the spacing between phases or from high voltage to ground.

### CAUTIONS:



THE CHUCK AND THE ENTIRE METER COMPARTMENT OF THE VOLT LITEWIRE IS AT THE SAME POTENTIAL AS THE COMMON OR LEFT ELECTRODE. WHEN THE EXTENSION CABLE IS CONNECTED TO GROUND, NEUTRAL, OR ANOTHER PHASE KEEP THE CHUCK AND THE ENTIRE METER COMPARTMENT AWAY FROM THE PHASE YOU ARE MEASURING OR ANY OTHER HIGH VOLTAGE SOURCE. THE HIGH VOLTAGE PROBE (THE RIGHT SIDE OF THE INSTRUMENT) IS THE SOLE ISOLATION DEVICE BETWEEN THE TWO MEASUREMENT POINTS.



MAINTAIN ALL PERSONNEL A MINIMUM OF 2 METERS AWAY FROM THE EXTENSION CABLE.



SECURE WITH A PLASTIC WIRE TIE ANY SLACK PORTIONS OF THE EXTENSION CABLE NOT REQUIRED FOR COMPLETING A MEASUREMENT.



THE VOLT LITEWIRE SHOULD ONLY BE USED BY PERSONNEL TRAINED IN SAFE METHODS OF UTILIZING HOT STICKS IN PRIMARY VOLTAGE ENVIRONMENTS.



THE SAFETY CONSIDERATIONS OF HOW TO USE THE VOLT LITEWIRE SHOULD BE PART OF THE TAIL GATE SAFETY MEETING EVERY TIME THE VOLT LITEWIRE IS USED.

## Specifications

Model Number	8-012	8-013	8-014
Range of Operation Voltage	0-20kVAC	0-30kVAC	0-40kVAC
Resolution Voltage 0-20kVAC Voltage 20+kVAC	10V 100V	10V 100V	10V 100V
Voltstick Weight	5.1 lbs 2.32 kg	5.3 lbs 2.40 kg	5.5 lbs 2.50 kg
Accuracy Analog Output	±2% 100 mv per kV (2 volts=20kV)	50 mv per kV (1.5 volt=30kV)	50 mv per kV (2 volt=40kV)
Output impedance	6000 ohms minimum		
Frequency response	2500 Hz which is above the 40th harmonic at 50 or 60 Hz.		
Operation Controls Electrodes Frequency	One button operation Detachable 60 Hz (57 to 63 Hz) or 50 Hz (47 to 53 Hz) Models Available		
Mechanical Display Housing Hotstick mounting Battery Operating Temperature	3.5 Digit Display Shock & water resistant molded urethane Universal chuck adapter (Hotstick not included) Two each of 9 volt alkaline or lithium -30 to +60 degrees ° C * -22 to +140 degrees ° F *		
Options	10 Ft (3.28m) Extension Cable    Model 7-032-10 20 Ft (6.56m) Extension Cable    Model 7-032-20 30 Ft (9.84m) Extension Cable    Model 7-032-30 40 Ft (13.12m) Extension Cable    Model 7-032-40		
Hard Carrying Case	Model 7-042		

\* A lithium battery is required for temperatures below -4° F and -20° C

## OPERATING INSTRUCTIONS

The LiteWire is controlled by the single push button switch located on the front panel of each unit, and is operated as follows:

**1. Connecting the Fiber-optic Link:**

- Work with one end at a time
- Uncover the dust cap on the male connector
- Uncover the dust cap on the female receiver, located on the sensor display
- Line-up the male connector and insert into the female receiver
- Twist to lock into place
- Repeat the process on the opposite end of the fiber (see Handling Guidelines on pages 12-13)

**2. Connecting the units:**

Configure the units for phase-to-ground or phase-to-phase measurements per the instructions on pages 6-10.

**3. Press each switch momentarily to turn on each unit of the Volt LiteWire.**

The lower unit will activate the digital display when it is turned on. If the upper unit is not on or is not responding, horizontal lines will appear in the digital display. If these lines are observed, press the upper unit button again and it should turn on. If both units are on, digits will appear in the digital display. If digits do not appear, the upper unit is not responding. Check that the fiber optic cable is properly plugged into the lower unit and that it is not damaged, or replace the upper unit battery.

If digits are showing in the digital display, the Voltage LiteWire is in the normal measurement mode. Connect the Extension Cable to the Left or Common side of the voltage sensor and the Insulated Electrode with hook on the Right or Hot side of the voltage sensor. The unit should never be left unattended while hanging from the conductor. See page six for illustrations of proper connections for various measurements. A full list of accessories is printed on page 14.

Once the sensor and extension cable are connected the display will indicate the voltage potential between the two points and the potential will be continuously displayed. The digital display is auto ranging and the voltage may always be read directly from the display.

At the same time that the digital display is responding, an analog replica of the high voltage waveform is continuously available at the BNC connector. Connect the analog output of the Volt LiteWire to the banana to BNC adapter that is in the voltage input of the Fluke 43.

4. In order to put the display of the Volt LiteWire into high range or extend the automatic power off from two minutes to ten minutes, (while away from High Voltage) press the upper unit switch a second time.

It may be necessary to have the unit in the high range before a high voltage transient takes place. This prevents the LiteWire from missing the transient while it is trying to switch ranges. When autoranging is again desirable, press the upper unit switch again and the LiteWire returns to the auto range mode. Repeated button pushes cycle between autorange and high range.

Pressing the upper unit switch a second time also causes the LiteWire's auto power off timer to extend its time out from two to ten minutes. This may be necessary if longer setup time is necessary before a transient event takes place. The auto power off timer does not begin its time out while voltage is being sensed by the unit.

After two or ten minutes, the upper unit will shut off and this will be indicated by horizontal lines appearing on the display. After one additional minute of the upper unit being off, the lower unit will shut off and the display will go blank. Either unit may be manually turned off by holding its button down for three to five seconds.

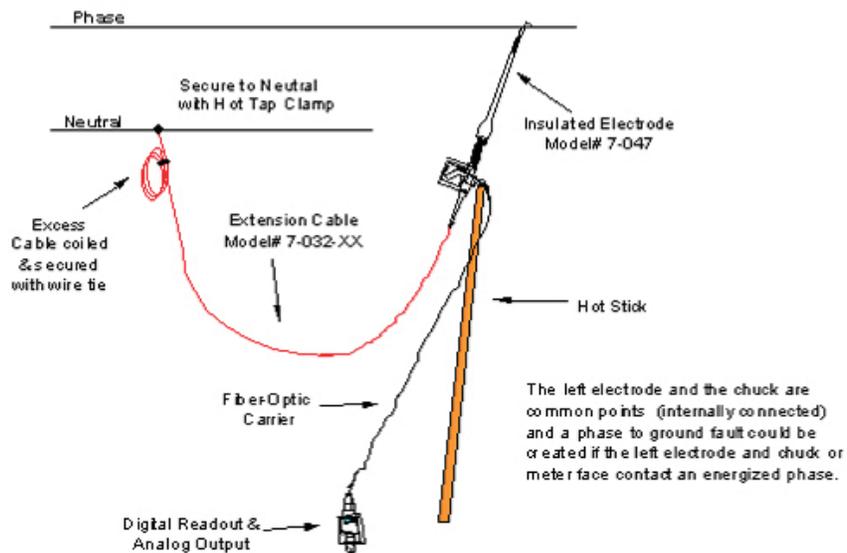
## MAKING PHASE TO GROUND MEASUREMENTS

The following meter and accessories are required to make a phase to ground measurement:

- One Volt LiteWire rated for the nominal voltage of the conductor.  
Model# 8-012 (20KV), 8-013 (30KV), or 8-014 (40KV)
- One Fiber Optic Cable
- One Insulated Electrode Part# 7-047, 7-036, or 7-037
- One Extension Cable long enough to reach phase to ground. Part#  
7-032-10 Coiled(10'), 7-032-20 (20'), 7-032-30 (30'), or 7-032-40 (40')
- One Hot Tap Clamp (not provided by SensorLink)
- One Hotstick with universal chuck (not provided by SensorLink)

1. Attach one end of the fiber optic cable to the Transmitter, and the other end of the fiber optic cable to the Receiver.
2. Attach the Volt LiteWire to a hotstick.
3. Attach the Insulated Electrode on the High Voltage or right side (right side when looking at the face of the instrument) and a straight or hooked probe into the end of the Insulated electrode.  
*Note: Insulated Electrode Part# 7-047 can be substituted with parts 7-036 and 7-037.*
4. Attach Extension Cable to the common or left side of the Voltstik. The other end of the Extension Cable should then be attached to a known ground source.

Use a standard hot tap clamp for this connection.



## MAKING PHASE TO GROUND MEASUREMENTS (CONTINUED)

4. Turn on the Volt LiteWire. See instructions on page four.
5. The Volt LiteWire is now ready for measurement. Place the probe that is on the end of the Insulated Electrode directly on the conductor to be measured. You can use the serrated edges of the probe to saw through any built up corrosion. The voltage reading should be on the digital readout and the waveform is now ready for analysis by the Fluke 43.

For instructions on how to operate the Fluke 43. See the Fluke 43 Users Manual

### CAUTIONS:



THE CHUCK AND THE ENTIRE METER COMPARTMENT OF THE VOLT LITEWIRE IS AT THE SAME POTENTIAL AS THE COMMON OR LEFT ELECTRODE. WHEN THE EXTENSION CABLE IS CONNECTED TO GROUND, NEUTRAL, OR ANOTHER PHASE KEEP THE CHUCK AND THE ENTIRE METER COMPARTMENT AWAY FROM THE PHASE YOU ARE MEASURING OR ANY OTHER HIGH VOLTAGE SOURCE. THE HIGH VOLTAGE PROBE (THE RIGHT SIDE OF THE INSTRUMENT) IS THE SOLE ISOLATION DEVICE BETWEEN THE TWO MEASUREMENT POINTS.



MAINTAIN ALL PERSONNEL A MINIMUM OF 6 FEET (2 METERS) AWAY FROM THE EXTENSION CABLE.



SECURE WITH A PLASTIC WIRE TIE ANY SLACK PORTIONS OF THE EXTENSION CABLE NOT REQUIRED FOR COMPLETING A MEASUREMENT.

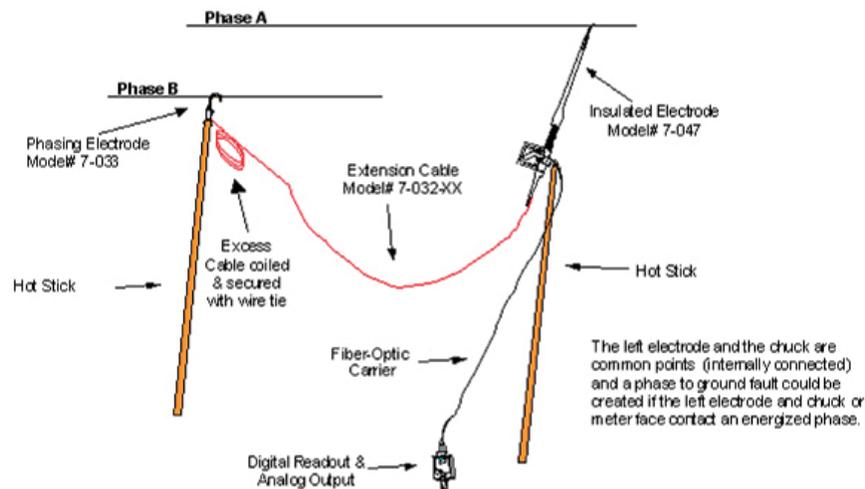
## Making Phase to Phase Measurements With two Hot Sticks

The following meter and accessories are required to make a phase to phase measurement:

- One Volt LiteWire rated for the nominal phase to phase voltage of the conductor. Model# 8-012 (20KV), 8-013 (30KV), or 8-014 (40KV)
- One Fiber Optic Cable
- One Insulated Electrode Part# 7-047, 7-036, or 7-037
- One Extension Cable long enough to reach phase to phase Part# 7-032-10 (10'), 7-032-20 (20'), 7-032-30 (30'), or 7-032-40 (40')
- One Phasing Electrode Part# 7-033
- Two Hotsticks with universal chucks (not provided by SensorLink)

1. Attach one end of the fiber optic cable to the Transmitter, and the other end of the fiber optic cable to the Receiver.
2. Attach the Volt LiteWire to a hotstick.
3. Attach the Insulated Electrode on the High Voltage or right side (right side when looking at the face of the instrument) and a straight or hooked probe into the end of the Insulated electrode.

*Note: Insulated Electrode Part 7-047 can be substituted with parts 7-036 and 7-037.*



## **MAKING PHASE TO PHASE MEASUREMENTS (Continued)**

4. Attach Extension Cable to the common or left side of the Volt LiteWire. The other end of the Extension Cable should then be attached to a Phasing Electrode Part # 7-033 which is then attached to another hotstick.
5. Turn on the Volt LiteWire. See instructions on page four.
6. The Volt LiteWire is now ready for measurement. Place the probe that is on the end of the Insulated Electrode directly on the conductor to be measured. You can use the serrated edges of the probe to saw through any built up corrosion. The voltage reading should be on the digital readout and the waveform is now ready for analysis by the Fluke 43.

See the Fluke 43 Users Manual for instructions on how to operate the Fluke 43.

### **CAUTIONS:**

-  Maintain all personnel a minimum of 6 feet (2 meters) away from the extension cable.
-  Secure with a plastic wire tie any slack portions of the Extension Cable not required for completing a measurement.
-  The chuck and the entire meter compartment of the Voltstik is at the same potential as the common or left electrode. When the extension cable is connected to ground, neutral, or another phase keep the chuck and the entire meter compartment away from the phase you are measuring or any other High Voltage source. The high voltage probe (the right side of the instrument) is the sole isolation device between the two measurement points.

## LOW BATTERY INDICATIONS AND REPLACEMENT

The LiteWire is powered by two 9V batteries, one in the upper unit and one in the lower unit. When the word "LOBAT" appears on the display, the battery in the upper unit should be replaced. When the word "LOBAT" flashes on the display, the battery in the lower unit should be replaced. The unit will continue to operate for an hour or more after one of these indicators appears.

To replace the battery, remove the four screws on the battery cover at the rear of the unit. Carefully insert a screwdriver blade in the notch and pry the cover out, being careful not to damage the cover seal. Pull the battery out of the compartment and separate the battery from the battery connector. To avoid breaking the battery leads do not pull on the battery only. Install a fresh battery and reinsert the battery in its compartment. ***Do not pinch the wires between the battery and compartment; put wires in slot above the battery.*** Reinstall the cover by gently pressing it into place while pulling out on the edges of the compartment, and reinstall the four cover screws. Take care to avoid overtightening the screws. Always reuse the screws provided and do not damage or lose the O-ring seal on each screw.

## HANDLING GUIDELINES



Male Connector  
(End of Cable)



Female Receiver  
(Mounted on Instrument)

### **Guide One:**

Never touch the ceramic ferrite end face of the male connector.

### **Guide Two:**

Cover the fiber optic connector when not in use. Unprotected connector ends are most often damaged by impact, such as hitting the floor. The provided tethered boot will protect the connector's polished ferrule end from impact damage that might crack or chip the polished surface. Please contact Sensorlink Corporation for a replacement if the provided boot is lost or broken.

### **Guide Three:**

The fiber end face and ferrule must be absolutely clean before it is inserted into a transmitter or receiver. Dust, lint, oil (from touching the fiber end face), or other foreign particles obscure the end face, compromising the integrity of the optical signal being sent over the fiber. From the optical signal's point-of-view, dirty connections are like dirty windows. Less light gets through a dirty window than a clean one. See page 13 for cleaning instructions.

### **Guide Four:**

As residue can build up in the boot, it is important that the connector is thoroughly cleaned before mating, even if it was cleaned before the protection boot was installed. It is hard to conceive of the size of a fiber optic connector core. The core of your fiber is 62.5 microns, about half the size of a sheet of paper. Fiber optic connectors need to be clean and some debris cannot be seen by the naked eye. It is not unreasonable that users develop the discipline to clean the connectors everytime they are mated. See page 13 for cleaning instructions.

## CLEANING

The fiber optic cable can be cleaned by wiping with a small amount of alcohol on a rag. The fiber optic cable should be cleaned and handled in the same manner as a fiberglass hotstick.

It is critically important for fiber optic connectors to be free of dust and dirt to maintain optimum performance. Cleaning should be done as often as possible. Especially if used in a dusty and or dirty environment. A simple and effective way to guarantee cleanliness is to clean the ends of your fiber optic cables each time they are disconnected.



### Recommended Equipment:

- Kimwipes® or any lens-grade, lint-free tissue. The type sold for eyeglasses work quite well.
- Denatured alcohol. Note: Use only industrial grade 99% pure isopropyl alcohol. Commercially available isopropyl alcohol is for medicinal use and is diluted with water and a light mineral oil. Industrial grade isopropyl alcohol should be used exclusively.
- Canned dry air.
- *(Optional)* Microscope

### Recommended Process:

- 1 Fold the tissue twice so it is four layers thick.
- 2 Saturate the tissue with alcohol.
- 3 Clean the sides of the connector ferrule. Place the connector ferrule in the tissue, and apply pressure to the sides of the ferrule. Rotate the ferrule several times to remove all contamination from the ferrule sides.
- 4 Move to a clean part of the tissue. Be sure it is still saturated with alcohol and that it is still four layers thick. Put the tissue against the end of the connector ferrule. Put your fingernail against the tissue so that it is directly over the ferrule. Now scrape the end of the connector until it squeaks. It will sound like a crystal glass that has been rubbed when it is wet.
- 5 *(Optional)* Use the microscope to verify the quality of the cleaning. If it isn't completely clean, repeat the steps with a clean tissue. Repeat until you have a cleaning technique that yields good, reproducible results.
- 6 Mate the connector immediately if possible! If not possible, be sure to replace protective boot.
- 7 Air can be used to remove lint or loose dust from the port of a transmitter or receiver to be mated with the connector. Never insert any liquid into the ports.

## ACCESSORIES

<p>Standard Straight Probe Part# 7-031</p>	
<p>Standard Hook Probe Part# 7-030</p>	
<p>10 foot Extension Cable Part# 7-032-10 20 foot Extension Cable Part# 7-032-20 30 foot Extension Cable Part# 7-032-30 40 foot Extension Cable Part# 7-032-40</p>	
<p>Phasing Electrode Part# 7-033</p>	
<p>Insulated Electrodes Part# 7-036, 24 inch Part# 7-047, 18 inch with Female Threads for Part# 7-031 or 7-030</p>	





## **SensorLink® Corporation Warranty**

SensorLink Corporation warrants each instrument it manufactures to be free from defects in materials and workmanship under normal use and service for the period of one year after date of shipment. Within this period, SensorLink agrees to repair or replace, at SensorLink's option, any instrument that fails to perform as specified. This Warranty shall not apply to any instrument that has been:

- 1) Repaired, worked on, or altered, including removal of the front panel, by persons unauthorized by SensorLink in such a manner as to injure, in SensorLink's sole judgment, the performance, stability, or reliability of the instrument;
- 2) Subjected to misuse, negligence, or accident; or
- 3) Connected, installed, adjusted, or used otherwise than in accordance with the instructions furnished by SensorLink.

This Warranty is in lieu of any other warranty, expressed or implied. SensorLink reserves the right to make any changes in the design or construction of its instruments at any time, without incurring any obligation to make any change whatever in units previously delivered.

If a failure occurs, contact the manufacturer for a Return Authorization and instructions for return shipment. This warranty constitutes the full understanding of the manufacturer and buyer, and no terms, conditions, understanding, or agreement purporting to modify or vary the terms hereof shall be binding unless hereafter made in writing and signed by an authorized official of SensorLink.

**Quality Assurance Certification**  
**20KV, 30KV, 40KV Volt LiteWire Meter**  
**Model 8-012, 8-013, 8-014**

SensorLink Corporation certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

This document certifies the following Volt LiteWire Meter was tested at the SensorLink Corporation High Voltage Laboratory, Ferndale, WA, USA to the appropriate standard and comply with the requirements of that standard.

Serial Numbers \_\_\_\_\_

Model Number \_\_\_\_\_

I hereby certify that the Volt LiteWire Meter listed above has passed all tests defined in the SensorLink Corporation standard. I also certify that I have reviewed the standard and test procedure and that they are sufficient in determining compliance with the standard.

Signed \_\_\_\_\_

Date \_\_\_\_\_

06/05  
DOPM-801-200  
Manual Revision V44



**SensorLinK® Corporation**

1360 Stonegate Way  
Ferndale, WA 98248 USA  
phone: 360/595.1000  
fax: 360/595.1001  
[www.sensorlink.com](http://www.sensorlink.com)