

# Operators Manual

## Amp Litewire

Fiber Optic Coupled Ammeter

With Analog Output

Models 8-015

8-016



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With Analog Output

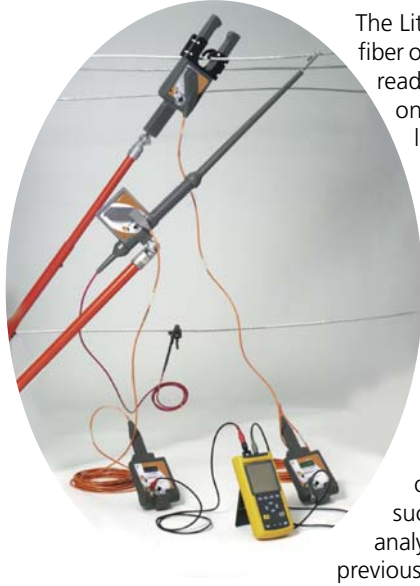
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The LiteWire is a two piece, True RMS ammeter with a fiber optic link between the high voltage sensor and the readout at ground potential. The sensor is mounted on a hot stick and slipped over a high voltage line. A fiber optic cable connects the sensor to a receiver unit at ground potential, which contains the digital readout and an analog output. The instrument has no moving parts and does not require clamping onto the wire. The cases are water resistant and will withstand high physical impact.

The analog output is the unique feature of this instrument. It is a reproduction of the high voltage current waveform, accurate to about the 40th harmonic, but available as a 0-2 volt AC signal at ground. This allows the use of many sophisticated low voltage instruments, such as scopes, waveform acquisition recorders, analyzers, and other analysis instruments which would previously not be usable at high voltage.

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 LiteWire is designed for use when attached to a suitable universal hot stick. All precautions appropriate for the line voltage should be taken. The sensor unit of the LiteWire is not designed to be a high voltage insulator. The sensor should not bridge between conductors or between a conductor and ground. Be careful not to allow the universal chuck adaptor or the metal parts of the hot stick to bridge between high voltage and ground or between two high voltage points.**

**The fiber optic cable is a high voltage insulator and will isolate equipment and personnel in the same manner as a fiber glass hot stick. It should be maintained and tested in the same manner as the hot stick. Cleaning and inspection should be done in the same manner and schedule as hot sticks. Testing should be done in the same manner as hot stick tests. Length of cable between line and operator should follow the same rules as used for hot sticks.**

## Specifications

Range	0-2000 Amps True RMS
Accuracy	±1.5%
Display Resolution	0-200 Amperes: 0.1 Amps 200-2000 Amperes 1 Amp
Analog Output	1 mv RMS per amp on both the low range and the high range. Output connector is BNC. No DC offset voltage.
Output impedance	6000 ohms minimum
Frequency response	3000 Hz or to the 50th harmonic
Weight:	
Model# 8-015	5.3 lbs (2.40 kg)
Model# 8-016	6.0 lbs (2.73 kg)
Jaw Width	
Model# 8-015	1.89 inches (4.85 cm)
Model# 8-016	3.86 inches (9.84cm)
LCD display	3.5 Digit
Battery	9 volt battery power — One battery in each unit. Low battery indicator on display for both batteries. Battery life between 6 to 8 hours of continuous operation.
Temperature Range	-22 to +140 ° F (-30 to +60 ° C) *
Fiber Optic Isolation	150 kV Max

\* 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. Press each switch once to turn on each unit of the 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 LiteWire is in the normal measurement mode. To use the LiteWire in this mode, place the current carrying wire into the sensor and observe the display. The current in the wire will be continuously displayed. The digital display is auto ranging and the current may always be read directly from the display. No sample and hold mode is necessary since the readings can be observed at the operator's location.

At the same time that the digital display is responding, an analog replica of the high voltage current waveform is available at the BNC connector. This signal may be read with any instrument that is capable of reading 0-2 volt AC and having an input impedance of 6000 ohms or greater. A portable oscilloscope, waveform recorder, or power analyzer may be used.

A detachable hook, ordered separately, is available to allow the LiteWire and its hotstick to hang temporarily from overhead wires. The unit should never be left unattended while hanging.

**2. Press the upper unit switch a second time to lock the unit into high range.**

It may be necessary to have the unit in the high current range before a high current transient takes place. This prevents the LiteWire from missing the transient while it is trying to switch ranges.

NOTE: The LiteWire meters will automatically turn themselves off if there is no signal detected during a time out period. This feature is designed to save battery power. If an automatic time out occurs the units will have to be manually restarted. The transmitter will turn off first and the receiver will always turn off one minute after losing communications with the transmitter.

Upon initial power up of the units, if there is no signal detected within a one minute time period, the transmitter unit will automatically turn itself off. If a signal is detected within the one minute time period, the unit will continue to operate as long as the signal is detected, or as long as the battery will operate the unit.

**3 To extend the time out period to ten minutes of inactivity,**

Push the "power on/off" button of the transmitter two additional times after power up. Select which range you wish to operate in, auto-range (low/high-range) or high range (exclusive). The timer function is controlled only by the transmitter unit. Once the unit has been toggled into the extended time mode it will remain there. To return to the one minute time out mode the transmitter unit will have to be powered off and back on again.

Either unit may be manually turned off by holding its button down for 4-8 seconds.

## DIRECTIONAL PROPERTIES



The Amp sensor on the LiteWire is direction sensitive. In order to insure proper phase relationship when comparing to a voltage reference; place the Amp LiteWire so that the face of the instrument is facing the load. Another indication of improper orientation would be indicated by the phase angle indication on the Bar Graph Screen of the Fluke 43. The proper phase angle should be 0 to  $\pm 90^\circ$  when measuring the fundamental. When the sensor is positioned in an improper orientation the phase angle will read  $\pm 91^\circ$  to  $\pm 180^\circ$ .

## 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 7 for cleaning instructions.

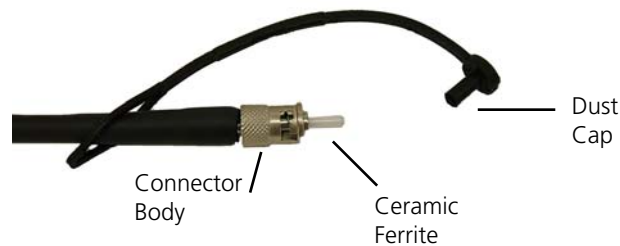
### **Guide Four:**

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 7 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.



## Sensorlink Corporation Warranty

SensorLink 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.

SensorLink's sole liabilities, and buyer's sole remedies, under this agreement shall be limited to a refund of the purchase price, or at SensorLink's sole discretion, to the repair or replacement of any instrument that proves, upon SensorLink's examination, to be defective, when returned to the factory, transportation prepaid by the buyer, within one year from the date of original shipment. SensorLink shall in no way be liable for damages consequential or incidental to defects in any instrument, for failure of delivery in whole or in part, for injuries resulting from its use, or for any other cause.

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 Corporation.

**Quality Assurance Certification**  
**Model 8-015 and 8-016**  
**Amp LiteWire**

SensorLink certifies that its calibration measurements are traceable to the National Institute of Standards and Technology (NIST), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

This document certifies the following Model 8-015/8-016 was tested at the SensorLink Corporation High Voltage Laboratory, Acme, WA, USA to the appropriate standard and comply with the requirements of that standard.

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

Model Numbers \_\_\_\_\_

I hereby certify that the Model 8-015/8-016 Amp LiteWire 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: \_\_\_\_\_

