Operators Manual

Varcorder

Amp & Power Factor Recorder

SensorLink® Corporation

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Available Stock Codes:			
910-50HZ	910-60HZ	910 EURO	

Table of Contents

SPECIFICATIONS

Kit Number	6-910
Type	Recording Varcorder Kit
Kit Includes	3 ea Varcorders
	1 ea IrDA USB Cable
	1 ea Softlink Software
	1 ea Universal Hot stick Adaptors
	1 ea Soft Carrying Case
Range of Operation	
Voltage	69 kV
Current	1 to 2000 A
Resolution	
Amps 1 to 99.9 A	0.1 A
Amps 100 to 200 A	1 A
Power Factor	.01
Accuracy	
Amps	± 1%, ± 2 Counts
Power Factor	± .01 (from .71 lead to .71 lag)
Frequency, 50 Hz	47 to 53 Hz
Frequency, 60 Hz	57 to 63 Hz
Mechanical	
Weight	1.5 lbs, 0.68 kg
Dimensions	9.75 in x 4.75 in x 3 in (24.77 cm x 12.07 cm x 7.62 cm)
Sensor Opening	Up to 1.5 in, Up to 3.3 cm
Operating Temperature	-22 to +140˚ F, -30 to +60˚ C
	Lithium battery required for temperatures below -4°F (-20°C).
Storage Temperature	-40 to +158˚ F (-40 to +70˚ C)
Hotstick Mounting	Shotgun & Switch Stick Style Hot stick (Hot sticks not included)
Battery	9 Volt Alkaline or Lithium
Indoor/Outdoor Use	
Relative Humidity	90% Non - Condensing
Altitude	9800 ft, 3000 m
Software Requirements	Softlink by SensorLink
Processor	100 Mhz or Higher, 200 Mhz Recommended
RAM	32 MB, 64 MB Recommended
Drive Space	15 MB to Load Software, 10 MB Operating Space
Data Collection Space	32,000 Log intervals
EC Standards	Successfully passed international test standards indicated by CE

⚠️ Safety

The Varcorder is designed for use with a suitable shotgun or switch stick style hotstick. All precautions appropriate for the line voltage should be taken. The hot stick should be considered the sole voltage isolation device.

For safety purposes the cover plate, chuck, and entire Varcorder should be considered to be at the same potential. Putting the cover plate, chuck, or other parts of the Varcorder within the air gap of adjacent phases or ground could cause a phase to phase or phase to ground fault.

Powering the Unit

The Varcorder powers on and begins taking recordings when the battery is properly placed into the battery compartment.

Preventative Maintenance

Unit should be inspected for cracks in urethane. If cracks are present, unit should not be used. Ensure air vent on faceplate has not been covered. Note: The membrane on the inside of the faceplate is normal and designed to allow the unit to breath properly

Cleaning

The Varcorder can be cleaned by wiping with a small amount of alcohol on a rag.

Theory of Operation

The Varcorder deploys on a line to measure and record the True RMS Amps and Power Factor. The Varcorder uses the same current sensor technology as the original SensorLink Ampstik, which does not use magnetic materials and has no moving parts. The true Power Factor is calculated by measuring the electric field in comparison with the current reported from the amp sensor. The electric field does not show the actual voltage, but its waveform characteristics do allow the power factor to be accurately calculated. SoftLink software will calculate the VARs after the user applies a nominal phase to ground voltage constant.

Note: In order to accurately measure the power factor, direct connection to the bare conductor is required.

Low Temperature Applications

The Alkaline Battery and the IrDA transceiver are two components that limit the operation of the Varcorder to down to -4F / -20C. By substituting a Lithium long-life battery the Varcorder can collect data down to -40. Because the IrDA transmitter doesn't perform at these low temperatures, when collecting the data from the Varcorder the temperature needs to be above -4F/ -20C. Lithium batteries are the same long-life batteries used in smoke detectors. They sell by the brand names UltraLife and Energizer.

Battery

Replacing the battery

Changing the Battery: The Varcorder requires one 9V Alkaline battery. Remove the screw at the base of the unit and remove the cover plate. Snap the battery to the connector and insert into the battery slot. Replace the cover plate.

Expected Battery Life: The expected life of the battery in a Varcorder is varied by how often the Varcorder samples the line to collect data and the ambient temperature. Fresh non-rechargeable batteries are required so the reliability and life of the battery can be easily predicted. Predicting the life of rechargeable batteries is uncertain, especially after several recharges. The standard 9-volt Alkaline and Lithium batteries were chosen because they are inexpensive and are readily available throughout the world. The Lithium batteries recommended are commonly referred to as long-life smoke detector batteries and sell by the brand names UltraLife and Energizer. A new battery should be placed into the Varcorder before it deployed on the line to ensure the reliability of the battery life.

The following Table indicates the expected battery life at 68° F or 20° C

Sample Interval (Seconds)	Expected Life of a 9-volt Alkaline Battery (Days)	Expected Life of a 9-volt Lithium Battery (Days)
60	180	360
30	120	240
15	75	180
10	60	120
5	28	60

Alkaline operating time reduced to 25% at -4° F or -20° C
Lithium operating time reduced to 75% at -4° F or -20° C
Lithium operating time reduced to 50% at -40° F or -40° C

PLEASE NOTE: Once a fresh battery is inserted, the user has 5 minutes to start downloading the data before the Varcorder resets itself. The Varcorder will only save the logged data in its flash ram for 5 minutes. **We recommend that you do not remove the battery until you have downloaded all of the data.** A new battery should be placed into the Varcorder before it deployed on the line to ensure the reliability of the battery life.

Setup Varcorder: Battery and Operation

Battery Issues: The Recorder is designed to easily have a fresh 9-volt alkaline or lithium battery replaced each time it is setup and deployed. A fresh battery has greater than 9.2 VDC. As alkaline batteries have a short shelf life, care should be taken to make sure that fresh batteries are used.

What happens if the battery drops below five volts? The Recorder will stop operating when the battery fails to supply more than five volts. All the logged data is safely stored in flash memory. When a fresh battery is put into the Recorder, the user has five minutes to start downloading the data. The data will have accurate date and time stamps. The old data will be overwritten if the download is not started within five minutes.

When does the Recorder start logging data? The process starts as soon as the battery is placed in the Recorder. The process restarts when the "Clear all logged data from the Recorder… and synchronize logging to the hour" box is selected and uploaded to the Recorder.

What are the Sample Interval and Log Interval? The Sample Interval is how often the Recorder reads the current on the conductor. The Recorder will hold the sample current readings until it reaches the Log Interval, at which time the Recorder will take and average the sample measurements. This average becomes the logged data point.

How many days will the Recorder Log Data? The length of the Log Interval determines the length of time the Recorder will take to use all of the available logged data points. See the below chart for the number of days it will take to fill an Recorder with data, based on various Log Intervals. Note that in most cases the Recorder is limited by battery life more than the recording capacity.

Log Interval (seconds)	Log Interval (Minues)	Days Recording Until Full
3600	60	1333*
1800	30	667*
900	15	333*
600	10	222*
300	5	111
60	1	22
30	0.5	11
15	0.25	6
5	0.083	2
*Exceeds expected battery life		

Installation: Shotgun Style

Attaching the Varcorder to a line with a shotgun style hotstick:

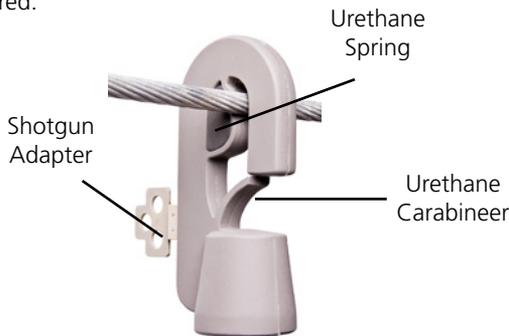***Step 1:*** Attach the Shotgun adapter to the Varcorder

Step 2: Grasp the Varcorder with the hotstick

Step 3: Place the Varcorder on the conductor

Step 4: Pull down on the unit to insure that the urethane spring is securely holding the Varcorder on the conductor

Step 5: Release the hotstick

Note: In order to accurately measure the power factor, direct connection to the bare conductor is required.

Urethane Spring

Shotgun Adapter

Urethane Carabineer

Removing the Varcorder from the line with a shotgun style hotstik:

Step 1: Attach the hotstick to the unit

Step 2: Disengage the line clasp

Step 3: Push against the urethane carabineer; it requires 15lbs of pressure on the carabineer to remove the Varcorder from the line

Installation: Switch Stick Style

Attaching the Varcorder to a line with a switch stick style hotstick:

Step 1: Attach the Switch Stick receiver to the Varcorder

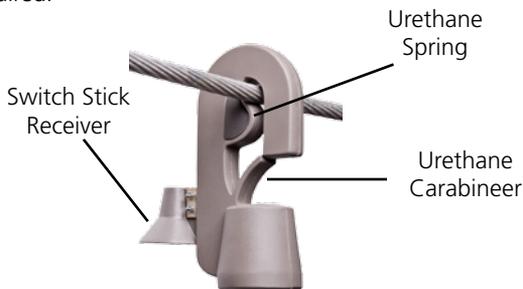**Step 2:** Attach the Switch Stick adapter the switch stick

Step 3: Insert the adapter into the receiver and then twist until the adapter locks into the receiver

Step 4: Place the Varcorder on the conductor

Step 5: Push down on the unit to insure that the urethane spring is securely holding the Varcorder on the conductor

Step 6: Unscrew the switch stick to release the Varcorder

Note: In order to accurately measure the power factor, direct connection to the bare conductor is required.

Urethane
Spring

Switch Stick
Receiver

Urethane
Carabineer

Removing the Varcorder from the line with a switch stick style hotstik:

Step 1: Insert the adapter into the receiver and then twist until the adapter locks into the receiver

Step 2: Disengage the urethane spring and pull against the urethane carabineer. It requires 15 lbs. of pressure on the carabineer to remove the Varcorder from the line.

Switch Stick Adapter

Softlink for Varcorder

SoftLink is a software application that allows the user to download, view, graph and import data from their Recorder. In order for a PC running SoftLink to communicate, the Recorder must be powered on, with the IR port on the unit in-line with the IrDA USB that is connected to the PC.

Please see the Transcorder Manual for instructions with Radio communication.

Softlink System Requirements

SoftLink installs on all computers running Windows XP, XP-Pro, Vista, Windows 7, and Windows 8. Softlink requires Microsoft .NET 4.0; the following installation process will install .NET 4.0 if not already installed.

Softlink Installation

Step 1: Softlink Installation Wizard will automatically load when the CD is place in the PC.
Step 1a: To launch the install manually, go to the Start Menu, select RUN, and type :\SETUP.EXE, OR - Click on browse, open the drive that your CD is located, and double click on file titled SETUP
Step 2: You must agree to the licensing agreement to proceed with the download
Step 3: A dialog box will appear to let you know when the download is complete
Step 4: To open Softlink, click on the Start Menu. Under Programs, select Softlink. Shortcut paths will automatically load during the install.

IrDA Driver Installation

For information on this install, please reference the IrDA manufactures' documentation available on their product CD, or www.actisys.com\downloads.

QUICK START GUIDE

[ACT-IR224UN-LN115GENERAL SETUP PROCEDURE]

1. Make sure IrDB usb is NOT plugged into the PC until the driver is installed.
2. Insert the installation CD and run the setup file.
3. Click "Next" to continue through the IrDA Driver Installer welcome screen.
4. When this Installation completes, click "Finish" to close the Wizard window.
5. Insert the IrDA cable into the USB port. A message will pop up stating: "Found new Hardware", then replaced with "New hardware successfully installed and ready to use."

Known Incompatabilities List:
Laptop docking stations - Causes the program to hang up or have no communication with the USB
USB Port Authority - Network security/group policy provisions restricting access to USB Ports
Installation Authority - Network security/group policy provisions restricting access to application installation
Network Installations - Applications stored on the server are not supported

Connect with IrDA

To communicate with a Recorder, follow these steps:

Step 1: Insert the IrDA cable into the PC's user port

Step 2: Position the Recorder so the IrDA Port, located at the bottom of the unit, is facing the IrDA Port on the PC

*Insure that only one Recorder is communicating by standing the other Recorders on their base

Step 3: Open Softlink from either the Desktop or Start Menu.
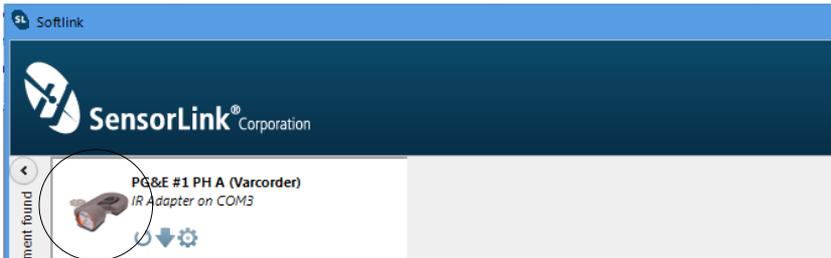
Softlink will automatically discover the IrDA and display the communication device in the upper left corner of the program.

Discover

Softlink will automatically discover an available Recorder within 20-30 seconds. Clicking the discover button instructs the IrDA to immediately find the Recorder and expedite communication to the Recorder.
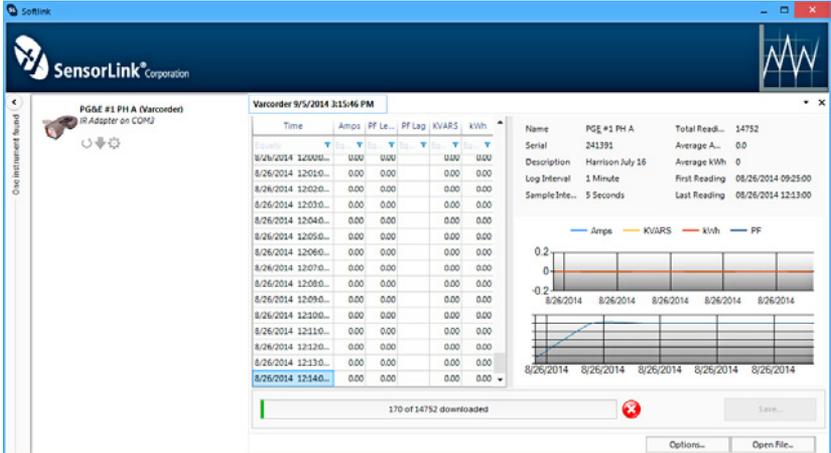

The description and photo displayed will change from the communication device to the unit when the Recorder has been discovered.

Download

Clicking the Download button instructs Softlink to begin downloading data from the Recorder.

The user is able to view the Recorder's configuration, data, and progress as it is downloading in both a chart view and graph view.


The download can be stopped at any time by selecting the red button.

PLEASE NOTE: Once a fresh battery is inserted, the user has five minutes to start downloading the data before the Varcorder resets itself. The Varcorder will only save the logged data in its flash ram for 5 minutes. **We recommend that you do not remove the battery until you have downloaded all of the data.** A new battery should be placed into the Varcorder before it is deployed on the line to ensure the reliability of the battery life.

Configure

Select the Configure button to setup Recorder preferences.
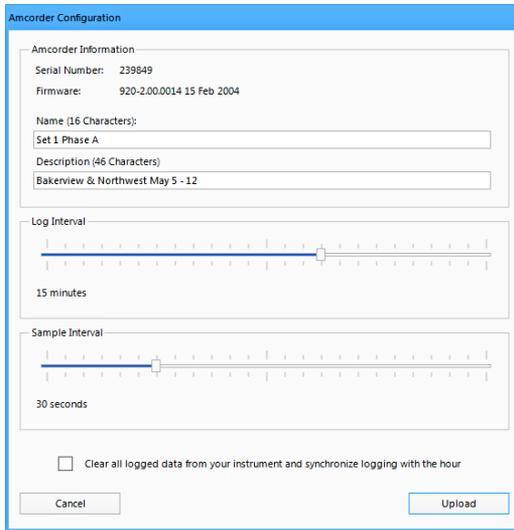
Name: Identify the Recorder with up to 16 characters.

Description: Enter a description of up to 46 characters. For example, you may want to note the Recorder's service location and the date range for the recordings.

Log Interval: Select how often to log data. The Recorder averages all samples taken since the previous logging and records the result. Typical sample and log interval synchronization are one minute and 15 minutes, respectively. The log interval must exceed the sample interval.

How many Log intervals are available in the Varcorder? 32,000

Sample Interval: Select how often the Recorder will sample current by sliding the cursor on the scroll bar. Battery life depends on this setting; see page four.

Synchronization: Selecting the "Clear all logged data from the Recorder… and synchronize logging to the hour" box will allow the Recorder to synchronize itself to the computer's clock. When multiple Recorders are setup and synchronized using the same log interval and the same computer, they will all log at the same time.

Clock is Set: If the Recorder is not synchronized before hanging on the line, the log times will be set, even though not evenly aligned to the hour.

Clock is Unset: If the Recorder's battery fails prior to any Softlink communication.

Legacy: Older version Recorders cannot be synchronized. To achieve log-time accuracy with these units, take them down before the battery fails, and download all data before re-hanging the unit. All log times prior to the first download are accurate to within a log interval, as long as the battery has not failed.

Options

The options button on the Download Screen allows the user to change certain preferences.
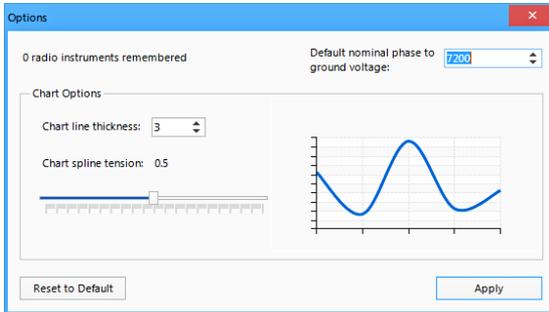
Radio instruments remembered: Softlink remembers Radio Transcorders that were used in previous downloads. Select "Reset to Default" for Softlink to forget the radios. See the Radio Transcorder User's Manual for further details.

Chart line thickness: The thickness of the graph lines can be changed by the user. Thickness is numbered 1 - 10, and defaults at three. The software will show a preview to the user as the value is changed.

Chart spline tension: The chart spline tension is used to smooth graph lines. The spline tension range is 0 - 1. Slide the scroll bar to change the spline tension. The software will show a preview to the user as the value is changed.

Default nominal phase to ground voltage: The default nominal phase to ground voltage can be changed so Softlink will always display this number when downloading from a Varcorder. To change the number, select the existing number and type the desired value, or use the up/down arrow keys to update the value.

Troubleshooting IrDA Communication

If the unit is having problems communicating, try the following:
- Position the IrDA three feet away from the Recorder.
- Examine the IrDA connection to the PC, and reconnect, if necessary.
- Verify the battery has greater than 5 Volts with a Voltmeter. If low, replace.
- IrDA USB cables are not universal; using an IrDA not supported by Softlink may not work. The IrDA you received with your kit has been tested to work with the Recorders.
- Try restarting Softlink by first exiting and then restarting.
- Try restarting your computer and then re-open Softlink.

Graphing

To graph the downloaded data, click the Graph Icon on the download screen.

A second screen will open and display the data in graphical format.
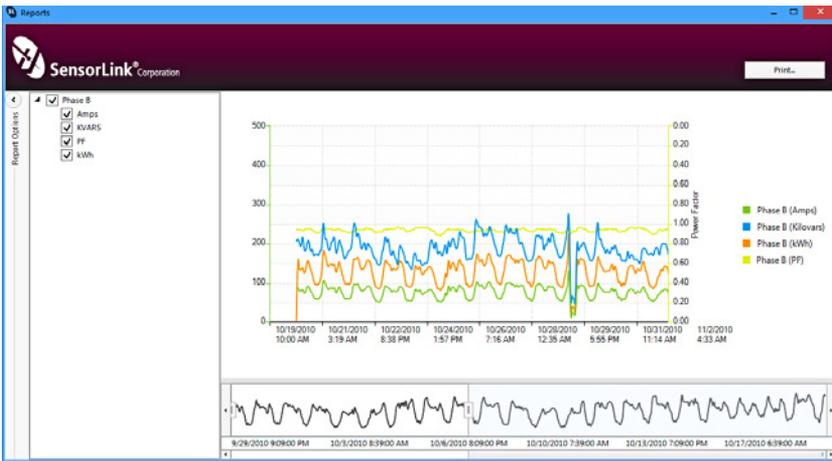
Report Options
Select the units and measurement parameters to graph by clicking in the selection boxes. Only selected measurement parameters will display on the graph.

Hide and Show Report Options
Click the left arrow to hide Report Options. Click the right arrow to show the hidden Report options.

Zoom Window
The bottom graph displays the entire time series. To view a section of time, adjust the left and right sliders. The upper graph will display the values between the slides.

Cursor Tool
Placing the cursor over the graph will display the date and time values of the measurements.

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 Corporation agrees to repair or replace, at SensorLink Corporation'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 Corporation in such a manner as to injure, in SensorLink Corporation'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 Corporation.

This Warranty is in lieu of any other warranty, expressed or implied. SensorLink Corporation 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 Corporation.

Quality Assurance Certification
Amp, Power Factor & VAR Recorder
Model 910

SensorLink Corporation 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 910 was/were 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 Numbers: _____

I hereby certify that the Model 910 Varcorder(s) have/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: _____

Softlink Softlink Version: _____

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