

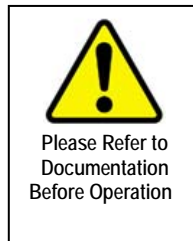


VLF-34E

SERIES

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## Safety, Operation, and Procedure Instructions for the VLF Series of AC Hipots



### Danger- Lethal Voltages:

#### Equipment to be used by trained personnel only

This Operator Manual contains instructions for the operation of a High Voltage power source. The operator of this equipment must use good judgement and follow all safety precautions noted in this guide to ensure the protection of himself and others in close proximity to the test area. **Failure to follow the instructions could result in injury or death. Proper grounding of the test set must be done prior to connecting this unit to a power source.**

# VLF Operator Manual

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## About the Operator Manual

### Important

*This Operator Manual describes the features and safe operation of a High Voltage AC Test Set. The instructions are intended to be clear and simple, but the operator must be trained and qualified according to the customer's established procedures for the use of this type of equipment.*

This Operator Manual is organized to provide information on the **VLF Series** in steps that familiarize the new operator with the entire scope of operation of this test set.

Section 1: Specifications and Controls.

Section 2: Setup and Operation.

Section 3: Performing Special Operations.

The Functions, Features, and Specifications of the VLF Series of AC Hipots are also discussed in the VLF Brochure available from High Voltage, Inc.

## General Information

This section familiarizes the operator with the features and specifications of the

**VLF-34E AC Hipot** manufactured by **HIGH VOLTAGE, INC.**

## Features and Specifications

Input Voltage: 115 Vac – 230 Vac, 50 Hz/60Hz, 5A max

Input Fuse: 5x20mm, 250Vac, Type F

2.5A-250V Input

5.0A-120V Input

HV Output:

0-34 kVac peak/0-24 kVac rms – Sinusoidal

DC: +/- 34 kV

Square wave: 34 kV

Sheath Tester

Voltage Measurement Range	1 - 34 kV peak/1 - 25 kV rms
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Accuracy & Resolution	1% & 0.1 kV peak
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Current Measurement Range	0 - 15 mA rms
---------------------------	---------------

Accuracy & Resolution	1% & 1 $\mu$ A
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Duty: Continuous

Frequency: 0.1 Hz to 0.01 Hz

Load Rating:

0.5  $\mu$ F @ 0.1 Hz @ 34 kV

1.0  $\mu$ F @ 0.05 Hz @ 34 kV

5.0  $\mu$ F @ 0.01 Hz @ 34 kV

$\mu$ F rating increases at lower voltages

Ex: 0.77  $\mu$ F @ 0.1 Hz @ 22 kV peak

Metering: Voltage kV peak or RMS

Current: mA peak or RMS

Calculated: Capacitance, Resistance, Flashover voltage,  
Time to Failure

Size/Weight: 19.7" x 12.0" x 18", 45 lbs.  
500mm x 305mm 458mm, 21 kg.

Case: Hard "Pelican" type case with extendable  
handle and wheels

HV lead: 20' RG8/U, Ground 20' #2

Fault: Smart Fault Management  
or shutdown on Fault

Reports: Test Records stored in non-volatile  
memory or via USB memory stick

PC Interface: USB, xbee(r) wireless, RS-232/422

PC Software: Remote Control & Test Reports

System Requirements: Windows compatible Hardware

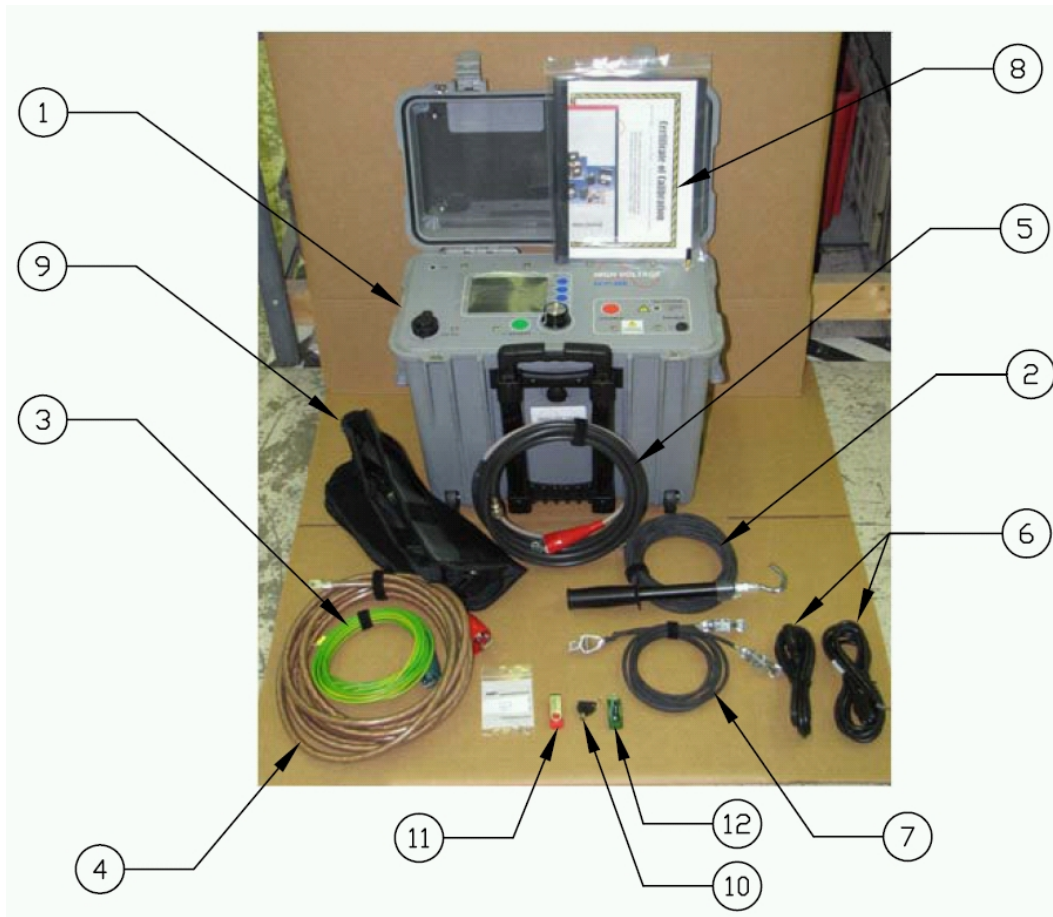
500 Mhz or faster processor

At least 512MB of RAM

Windows XP, Vista, Windows 7

CAUTION: Disconnect all power before servicing.  
There are no user serviceable parts.  
Service should be performed by Qualified personnel

## What's in the Box



1. VLF-34E
2. Ground Stick with 20 ft. of ground wire
3. Green/Yellow Lead with Green Boot
4. 20ft. 2 AWG Cable
5. 20ft. HV Output Lead
6. Input Line Cords
7. Safety Ground Lead "Y" Assembly
8. Manual
9. Bag
10. Enable Key
11. USB w/ Software and Manual
12. X Stick



## Operating Environment

Indoor/Outdoor-fair weather

Case Lid Open – IPX0

Case Lid Closed IPX2

Altitude: 100% of rating; Sea-level, up to 5000ft.(approx.1500M). The output power is de-rated 10% above 5000 ft. altitude, 20% above 12,000 ft.( approx. 3600M), and 30% above 15,000 ft.(approx. 4500M)

Storage Temperature: -20°C to 70°C(-4°F to 158°F)

Operating Temperature: -5°C to 45°C(22°F to 113°F) Output power is de-rated linearly by 15% from 30 to 45°C ambient.

Maximum Relative Humidity: 80% up to 31°C(88°F), decreasing linearly to 50% at 40°C(104°F)

Mains supply fluctuation: +/-10% of rated voltage

Installation: Category II

Pollution: Degree 2

### *Safety Symbol Identification*



Warning! Please refer to documentation before operation



Protective Earth Terminal



Warning: Hazardous Voltage

## SETTING UP THE EQUIPMENT

The setup of this equipment has been minimized by careful consideration of the operator during design. The **VLF-34E** single-piece construction and light weight lends itself to convenient portability for AC testing in the field.

**Select a location** for the unit that will allow easy viewing of the control panel at a safe distance from the test object (within 20 ft.) on a level area.

**Note:** The mains outlet that is utilized to power this equipment must be within 3 meters of the device, and shall be easily accessible and easily disconnected.

1. Be sure that main power switch lower left side of case is off.
2. Secure a ground test lead to the ground stud on the right side of the case

**-CAUTION -**

**No switches or Disconnect devices in the earth conductor.  
Disconnection of the protective earth conductor, will impair the  
protection provided by the system**

3. Wire the input power cord to a grounding-type plug rated for a minimum of 250V, 10A and compatible to the local power receptacles.
4. Connect the input line cord (maximum length 3 meters) to mains outlet.
5. Connect the safety ground stick to a solid earth ground.
6. Insert the coaxial output cable into the High voltage output dry-well on the right side of the case and stretch out for later connection to the test cable or load.

7. **Insert the EXT INTLK plug into the socket on the left side panel.** The plug may also be wired to a normally open contact of a safety switch for added protection.

**- IMPORTANT NOTE -**

**DO NOT BLOCK THE COOLING VENTILATION OPENINGS**

The setup of the VLF AC Test Set does not address the need for proper safety grounding of the load (test sample or cable). The grounding requirements vary for different types of tests. Please consult the local electrical codes where applicable or reference the guidelines for grounding found under OPERATING THE EQUIPMENT.

## Operating the Equipment

This section provides step-by-step instruction on various test methods. Many facilities have their own in-house test procedures, and this manual is not to supercede these. The purpose of this section is to explain the capabilities of this test set in real-world applications. ***Only trained personnel should attempt to operate this equipment.***

**Dangerous voltages and currents are produced during the testing of cables, only trained individuals should operate this type of equipment and access to the test area must be restricted during testing to avoid endangering others.**

**OPERATING THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE PROTECTION PROVIDED BY THIS EQUIPMENT**

When testing cables, either single or three phase, there are certain extra steps that must be observed to ensure safe operation.

### *AC Testing of High Voltage Cables*

1. Ensure that all the steps listed in Setting Up the Equipment have been accomplished. Take special note to ground the test set to a solid earth ground.

#### ***Caution!!***

***Before making any cable connections, ensure that the cable being tested has been properly identified, de-energized, and grounded!***

2. Make sure that all insulators, stress cones, and pot heads are clean and free of moisture. This will prevent flashover and minimize leakage.

**Note: Be aware that any lightning arrestor or transient suppressing device must be disconnected if the clamping voltage is below the test voltage being performed. Failure to clear these devices from the cable may result in a false failure indication of the test cable.**

3. Isolate the far end of the conductors under test for the test voltage; that may mean separating some of the conductors in a multi-conductor cable from each other *and* their shields.

*The shields of all cables must be securely tied to ground at the nearest end of the cable.*

4. Any conductors or wires in the cable or the vicinity not being tested must be grounded to avoid a buildup of charge and possible shock hazard.
5. Voltage must be applied according to specifications from the cable manufacturer or any other applicable test standards
6. Prior to connecting anything to the test sample, be sure the test sample is identified, de-energized and grounded until ready to test.
7. Connect the input power cable to a grounded, 50/60 Hz source as noted in **SETTING UP THE EQUIPMENT**. A generator is an acceptable power source.
8. Connect the output lead to the test sample. Be sure that there is enough clearance to grounded objects for the expected test voltage. The minimum clearance in air is 10 kV ac/inch.
9. Turn on the **MAIN POWER** switch near input power receptacle.



**\*\*\* CAUTION \*\*\***

**POTENTIALLY LETHAL  
VOLTAGES MAY BE PRESENT**

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**STORED ENERGY LEVELS IN THE CABLE GREATLY  
INCREASE THE RISK OF FATAL INJURY IF CONTACT  
IS MADE WITH THE LOAD WHILE AT ANY VOLTAGE.**

10. Clear the test area of unauthorized personnel and use safety barricades to warn others of potential danger during the high voltage test.



### Line LED

Indicates input power is present

### USB Data

Transfer test results via USB flash drive to PC app for test report  
Save results directly, if USB flash drive is present while the test is performed

### Menu Selection

Rotate the selector knob to scroll through menu items. To select and adjust a menu item push the knob or push the green accept button. When the test parameter is adjusted to the desired level push the knob or the green select button to return to the menu items.

### Main Menu Screen

#### Last Test Setup

Repeats last test performed

#### Saved Test Setup

Pick a preprogrammed test profile or sequence from memory

A profile is a test with up to 5 steps

A sequence is two or more profiles run in succession

#### New Test Setup

Set up test parameters on the fly

#### Advanced

Setup Sequences

Setup Profiles

Review Test Results

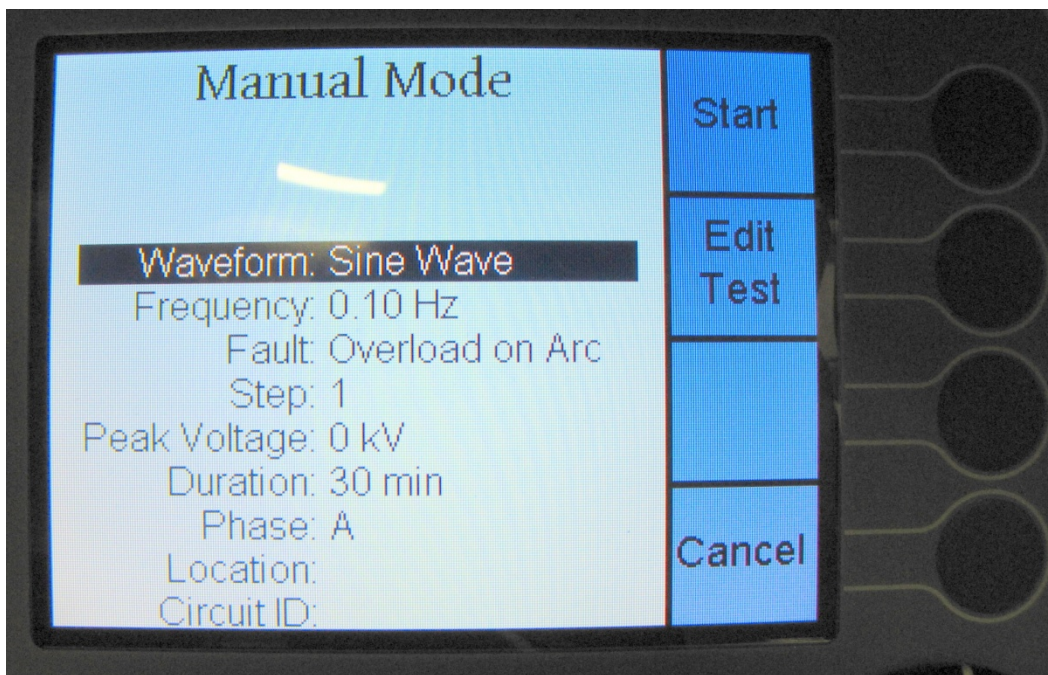
### HV Status LED

Green indicates voltage on DUT (Device Under Test) is less than 250 Volts

Yellow indicates Caution High Voltage is about to be applied

Red High Voltage is present

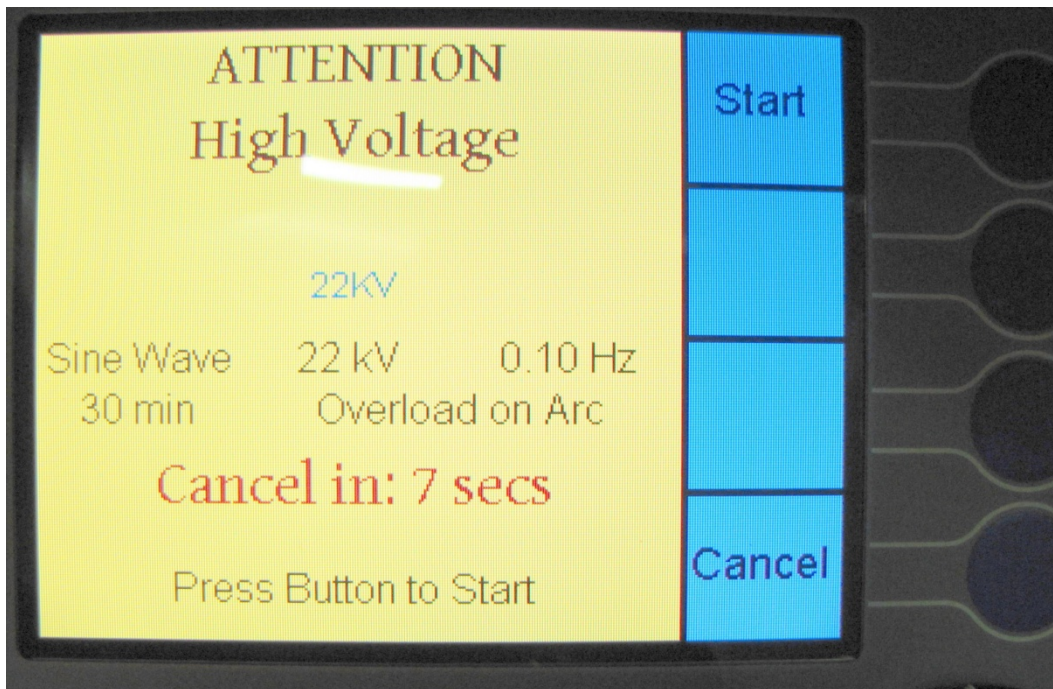
Select new test setup to enter manual mode. Use the scroll knob to cycle through the test parameter options. Once your test is set to your parameters press start, top right button. The screen will turn yellow confirm your settings and press star again. The screen turns red and the test will start.



### Manual Mode

- Waveform
  - Sin Wave
  - Square Wave
  - DC +/-
- Frequency
  - Auto
  - 0.1 – 0.01 Hz
- Step
  - 1-5
- Voltage
  - 0-34 kV
- Duration
  - 15, 30, 60 mins
- Phase
  - A, B, C
- Location
  - Alphanumeric entry
- Circuit ID
  - Alphanumeric entry

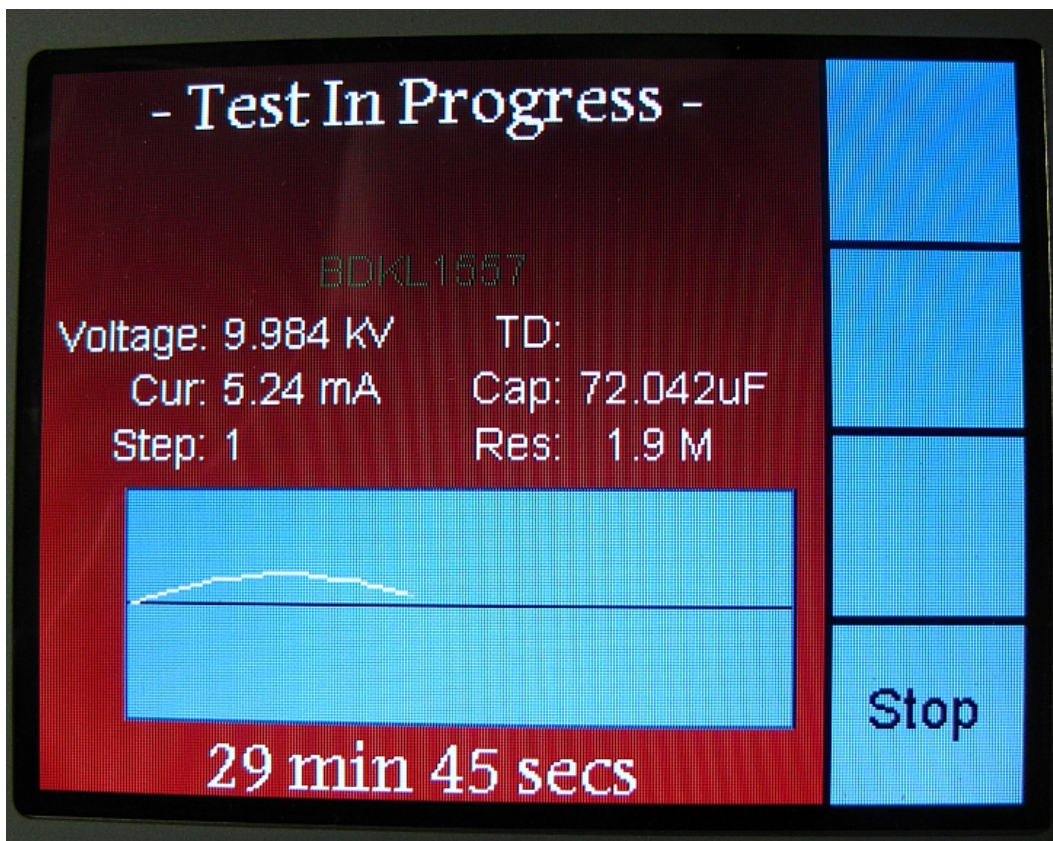




#### Confirmation Screen

Confirm test parameters

Press Start (Round Blue Button top right of screen)



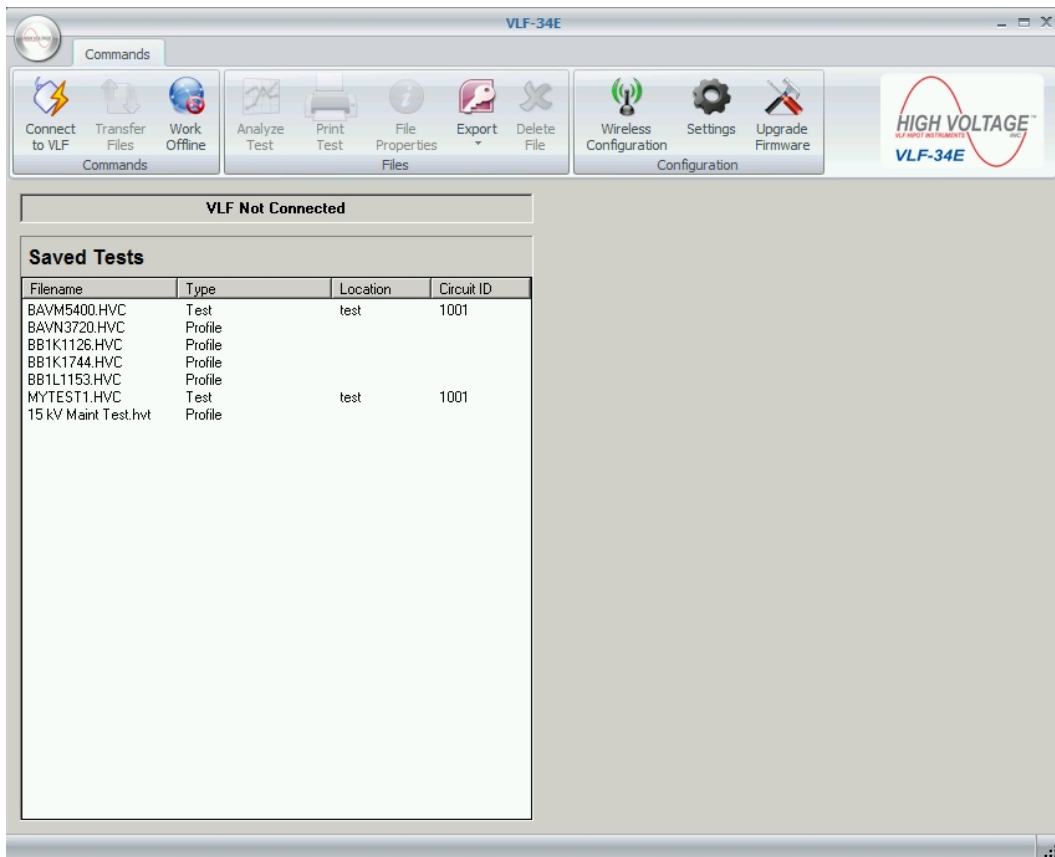
### VLF34E Connection to PC Application

Insert Xstick (green USB Thing) into USB port on your PC

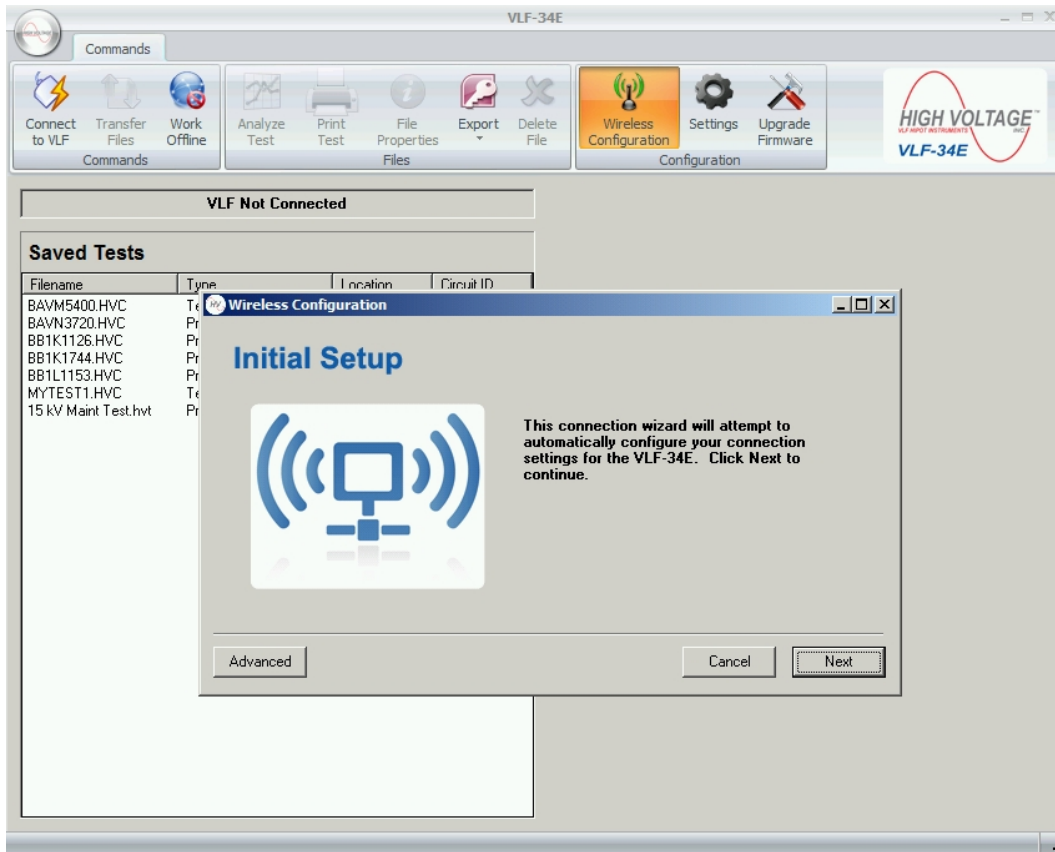
Install the xstick drivers, USB stick (red has HVINC Logo) with unit if asked for drivers

Copy VLF-34E PC App exe file to your PC (it's on the red USB stick)

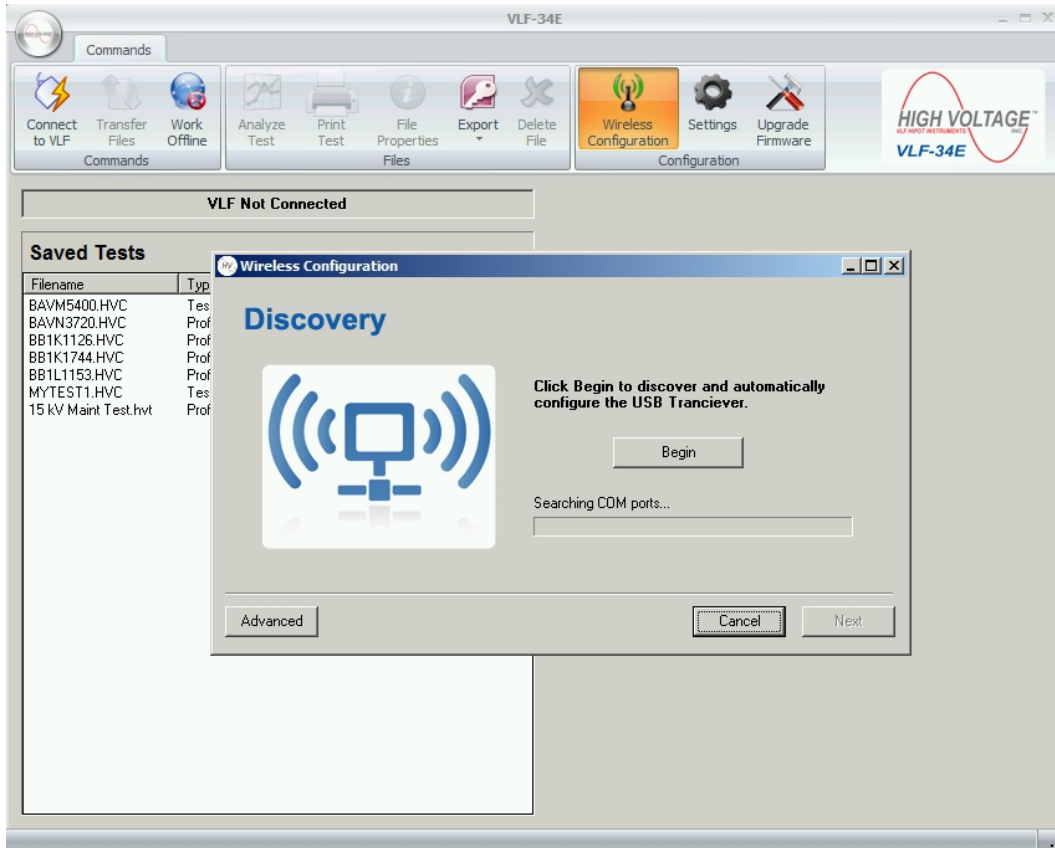
Open VLF-34E PC Application



Click Wireless Configuration Button



Click Next



**Click Begin**

After the wireless communication have been configured click next

**Click the Connect to VLF Button**

**PC Application Uses**

Creating Test Profiles / Sequences

Test Reports

Live test monitoring

Wireless Remote Control

## Appendix A

The Light Tree Terminal Block J5-5 and J5-6 is for an external interlock or a remote emergency off switch.

J5-1 Light tree common

J5-2 Light tree green normally open

J5-3 Light tree yellow normally open

J5-4 Light tree red normally open

J5-5 Interlock or emergency off

J5-6 Interlock or emergency off

## **RETURNED MATERIAL**

If for any reason it becomes necessary to return any equipment or materials to High Voltage, Inc., the Service Department of High Voltage, Inc. must be notified, and authorization received, prior to the shipment of the equipment. When notified, the following information must be provided:

MODEL:

SERIAL NO:

PART NO:

REASON FOR RETURN:

SUSPECTED DEFECT:

CAUSE OF DEFECT:

With the above information provided, High Voltage, Inc. will determine if the return of the equipment is appropriate. If deemed appropriate, a Return Authorization Number will be issued. At that time, the Purchaser will be instructed how to mark and return the equipment.

The above procedure must be adhered to in order to ensure prompt service. No equipment should be returned without the prior knowledge and authorization of High Voltage, Inc.

## **REPLACEMENT PARTS ORDERING**

To order replacement parts, first refer to the Parts List for the product in question. Every part is issued a part number. It will be necessary for this part number and the product model and serial number to be provided. When calling High Voltage, Inc. request the Service Department.

THESE TERMS AND CONDITIONS OF SALE AND LIMITED WARRANTY OF HIGH VOLTAGE, INC. ("High Voltage") SHALL BE GOVERNED BY AND CONSTRUED ACCORDING TO THE INTERNAL LAWS OF THE STATE OF NEW YORK, USA, WITHOUT GIVING EFFECT TO ITS CONFLICT OF LAWS PROVISIONS. THE RIGHTS AND OBLIGATIONS OF ALL PARTIES AND ALL PERSONS OR ENTITIES CLAIMING HEREUNDER SHALL NOT BE GOVERNED BY THE PROVISIONS OF THE 1980 U.N. CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS.

1. **ACCEPTANCE.** All orders become effective only when accepted by High Voltage's written order acknowledgment at Copake, New York, USA. Unless modified in writing by an authorized representative of High Voltage, or modified in High Voltage's Quotation or order Acknowledgment, these Terms and Conditions and Limited Warranty shall solely control Purchaser's order. High Voltage expressly rejects any additional or different provisions, terms or conditions proposed by Purchaser at any time.

2. **SCHEDULING.** High Voltage's shipping date specified in High Voltage's quotation or purchase order acknowledgment is approximate and High Voltage shall use reasonable commercial efforts to effect timely shipment. Furthermore, High Voltage shall not be liable for any delay in the performance of orders or contracts or in the delivery or shipment of goods or for any damages suffered by Purchaser by reason of such delay when such delay is, directly or indirectly, caused by, or in any manner arising from Purchaser's fault, fires, floods, accidents, riots, acts of God, war, governmental interference or, embargoes, strikes, labor difficulties, shortage of labor, fuel, power, materials or supplies, transportation delays, or any other cause or causes (whether or not similar in nature to any of these hereinbefore specified) beyond the control of High Voltage.

3. **CANCELLATIONS.** Prior to shipment, Purchaser may request cancellation or delayed delivery of an order or part thereof, but such shall be conditioned upon written consent of High Voltage and upon payment to High Voltage of cancellation or delayed delivery charges to be determined by High Voltage.

4. **SALE AND DELIVERY.** Unless otherwise agreed in writing, sale and delivery of the goods hereunder shall be made EXW or FCA (Incoterms® 2010) at High Voltage's option, High Voltage's dock at Copake, New York, USA, at which time all risk of loss or damage shall pass to Purchaser. All shipments and packaging shall be made in the manner determined by High Voltage, unless otherwise requested by Purchaser, in which case any resultant additional changes and expenses shall be paid by Purchaser.

5. **TAXES.** Any and all sales, use, excise and similar taxes, and duty and all other charges levied or imposed by governmental authority, foreign and domestic, upon any goods sold or contracted to be sold shall be paid by Purchaser and added to the purchase price unless appropriate tax exemption certificates are supplied to High Voltage in form satisfactory to High Voltage.

6. **PAYMENTS.**

a. All payments shall be in US Dollars without discount unless otherwise specified in High Voltage's order acknowledgment. Credit card payments are accepted only if specified in High Voltage's order acknowledgment.

b. Terms of payment are net thirty (30) days from date of invoice, unless otherwise agreed by High Voltage in its order acknowledgment. Delinquent payments are subject to a service charge on the unpaid balance from invoice date equal to the lower of 1-1/2% per month or the maximum rate permitted by law until all amounts are paid in full. If the financial responsibility of Purchaser becomes unsatisfactory to High Voltage for any reason, or if Purchaser has been in default to High Voltage under any order, High Voltage may require full payment in cash before shipment of goods.

c. If Purchaser so requests and makes arrangements prior to shipment

which meet High Voltage's full satisfaction, High Voltage in its discretion may accept irrevocable letters of credit in its favor issued by a United States bank which is satisfactory to High Voltage.

7. **INFRINGEMENT, ETC.** On goods manufactured to Purchaser's specifications, Purchaser shall and does indemnify and hold High Voltage harmless against any claims, damages, liabilities, costs and expenses (including attorneys' fees) arising out of or resulting from actual or alleged infringement of patent, copyright, trademark or other proprietary rights, or claim of unfair trade or unfair competition arising from or occasioned by the use, possession, sale or delivery of any such goods sold by High Voltage.

8. **REPRODUCTION RIGHTS.** Drawings, specifications, reports, photographs and other data relating to all orders and all proprietary rights and interests therein and the subject matter thereof shall be and remain the property of High Voltage. Purchaser agrees that it shall not use High Voltage's drawings, specifications or other materials covered by this order, or any similar article from any other source, or reproduce the same or otherwise appropriate them, without the prior written authorization of High Voltage.

9. **LIMITED WARRANTY.**

a. High Voltage warrants to the original Purchaser of any new goods that the goods are free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment by High Voltage. The obligation of High Voltage under this Limited Warranty is limited, in High Voltage's exclusive option, to repair, replace with new or reconditioned parts or issue credit for goods, parts or materials which prove to be defective. Costs incurred by Purchaser for labor or other expenses to repair or replace such goods, parts and/or materials shall be the sole responsibility of Purchaser. High Voltage shall not be responsible for any damage or lack of performance resulting from: (i) defects due to accident, negligence, alteration, modification, faulty installation, abuse or misuse, whether by Purchaser, Purchaser's agents or employees, or by others than High Voltage (ii) attempted or actual dismantling, disassembly, service or repair by any person, firm or corporation not specifically authorized in writing by High Voltage, or (iii) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

b. High Voltage expressly disclaims any warranty whatsoever of (i) consumables, and of (ii) parts, components, software (including but not limited to object code and source code and software user instructions), accessories, and materials not prepared, compiled or manufactured by High Voltage, and Purchaser must deal directly with such other supplier. High Voltage may elect to assist Purchaser in settling such claim against such other supplier, but any such assistance shall not prejudice High Voltage's position as to its own liability.

c. Compliance with the following Limited Warranty Claim Procedure is a condition precedent to the obligation of High Voltage under this Limited Warranty:

i. Purchaser must notify High Voltage in writing as soon as is reasonably possible, but within the applicable warranty period, of any alleged defect in material, workmanship, or operation of any goods covered under this Limited Warranty. Such notice must describe in detail the defect, any and all defective parts, and the alleged cause of the defect. No goods may be returned to High Voltage without High Voltage's prior written permission, which permission may be withheld by High Voltage in its sole discretion.

ii. At the exclusive option of High Voltage, Purchaser may be directed in writing to dismantle the goods at the Purchaser's cost and expense and ship the goods prepaid to High Voltage (refer to "Returns" Section 10 for provisions regarding the return of any goods to High Voltage). If High Voltage elects to inspect the goods at Purchaser's site, and to repair, replace,

*[Section 9.c.ii. continued on page 2]*



or ship the defective goods to High Voltage's factory, Purchaser, at its own cost and expense, shall provide the facilities for such work as needed to inspect and evaluate and possibly repair/replace the goods. If inspection discloses that the defect is not one for which High Voltage is liable, then Purchaser shall promptly reimburse High Voltage for all expenses incurred.

iii. Upon receipt of the defective goods, or following access to the same, High Voltage shall inspect and evaluate the goods and determine the validity of Purchaser's claim.

iv. The validity of any warranty claim, Purchaser's compliance with the Limited Warranty and Limited Warranty Claim Procedure, and the obligation to replace, repair, or issue credit for any goods are solely and exclusively to be determined by High Voltage and any determination shall be final and binding.

d. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, STATUTORY OR EXPRESSED OR IMPLIED ON THE PART OF HIGH VOLTAGE, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT; FURTHERMORE, HIGH VOLTAGE MAKES NO WARRANTY REGARDING NON-INTERRUPTION OF USE OR SOFTWARE FREEDOM FROM BUGS. HIGH VOLTAGE NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM, OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS SALE OR LIMITED WARRANTY ON HIGH VOLTAGE'S BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATION EXCEPT THOSE MADE HEREIN HAS BEEN MADE TO PURCHASER.

10. **RETURNS.** No goods may be returned to High Voltage without High Voltage's prior written permission, which permission may be withheld by High Voltage in its sole discretion. Any request for return authorization must be in writing and include, as applicable, model number, serial number, part number, reason for return, alleged defect, and apparent cause of alleged defect. Except as specifically provided in Section 9 Limited Warranty, if High Voltage consents to return of goods: (a) all return shipments are to be via prepaid freight and with all other charges prepaid, (b) if goods are returned to High Voltage within sixty (60) days from the date of original shipment for reasons other than an error by High Voltage in filling the Purchaser's order, Purchaser shall only be entitled to receive a credit in an amount equal to the payment received by High Voltage for the goods minus (i) handling charges, and (ii) a restocking fee determined solely by High Voltage which shall not exceed twenty five percent (25%) of the invoiced amount, and (c) if goods are returned to High Voltage after sixty (60) days from the date of original shipment for reasons other than an error by High Voltage in filling the Purchaser's order, Purchaser shall only be entitled to receive a credit in the amount equal to the payment received by High Voltage for the goods minus (x) a handling fee, and (y) a restocking fee in excess of twenty five percent (25%) which shall be determined by High Voltage.

11. **SECURITY INTEREST.** In order to induce High Voltage to ship goods without full payment, Purchaser grants a security interest to High Voltage in any and all of Purchaser's right, title and interest in the goods, and Purchaser agrees to comply with any reasonable request of High Voltage to perfect such security interest. Purchaser hereby further authorizes High Voltage to perfect High Voltage's security interest in said goods and consents to filing one or more financing statements without the signature of Purchaser.

12. **ARBITRATION.** Any controversy arising out of or relating to this document, or any breach thereof, including, without limitation, any claim that this document is voidable or void, shall be submitted to final and binding arbitration before, and in accordance with, the Commercial Rules of the American Arbitration Association then in effect, and judgment upon the award may be entered in any court have jurisdiction thereof; provided, however, that this clause shall not be construed to limit any rights which

High Voltage may have to apply to any court of competent jurisdiction for equitable, injunctive or provisional relief. This arbitration provision shall be deemed self-executing, and in the event that either party fails to appear at any properly noticed arbitration proceeding, an award may be entered against such party notwithstanding said failure to appear. Such arbitration shall be conducted before a single arbitrator under the aegis of the American Arbitration Association in Columbia County, State of New York. The arbitrator shall have the authority to award expenses to the successful party.

13. **LIMITATION OF LIABILITY.** TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, AND NOTWITHSTANDING ANYTHING ELSE IN THIS DOCUMENT OR OTHERWISE, INCLUDING THAT HIGH VOLTAGE WAS WARNED THAT DAMAGES WOULD OCCUR OR WERE LIKELY TO OCCUR, HIGH VOLTAGE SHALL NOT BE LIABLE WITH RESPECT TO ANY SUBJECT MATTER OF THIS DOCUMENT UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR (i) ANY AMOUNTS IN EXCESS IN THE AMOUNT PAID TO HIGH VOLTAGE FOR THE PARTICULAR GOODS OR PART THEREOF WHICH GAVE RISE TO THE APPLICABLE CAUSE OF ACTION OR CLAIM, OR (ii) ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST OR CORRUPTED DATA, OR (iii) COST OF PROCUREMENT OF SUBSTITUTE GOODS, SOFTWARE, TECHNOLOGY OR SERVICES. HIGH VOLTAGE SHALL HAVE NO LIABILITY FOR ANY FAILURE OR DELAY DUE TO MATTERS BEYOND ITS REASONABLE CONTROL.

14. **SEVERABILITY.** These Terms and Conditions and Limited Warranty are the entire understanding between Purchaser and High Voltage with respect to the subject matter hereof and supersede all prior agreements, dealings and negotiations. No modification, alteration or amendment shall be effective unless made in writing and signed by a duly authorized representative of High Voltage. No waiver of any breach hereof shall be held to be a waiver of any other or subsequent breach. Nothing contained in this document shall be construed as requiring the commission of any act contrary to law. Whenever there is any conflict between any provision of this document and any present or future statute, ordinance or regulation contrary to which the parties have no legal right to contract, the latter shall prevail, but in such event the provision of this document thus affected shall be curtailed and limited only to the extent necessary to bring it within the requirements of the law. In the event that any part, article, section, paragraph, sentence or clause of this document shall be held to be indefinite, invalid or otherwise unenforceable, the entire document shall not fail on account thereof, and the balance of the document shall continue in full force and effect. If any arbitration tribunal or court of competent jurisdiction deems any provision hereof (other than for the payment of money) unreasonable, said arbitration tribunal or court may declare a reasonable modification thereof, and this document shall be valid and enforceable, and the parties hereto agree to be bound by and perform the same as thus modified.

15. **BASIS OF BARGAIN.** Each party recognizes and agrees that the warranty disclaimers and liability and remedy limitations in this document are material, bargained for bases of their agreement and that they have been taken into account and reflected in determining the respective obligations of the parties.

[End]



