portable

VLF HIPOT INSTRUMENTS

High Voltage, Inc.
The World's Source for Cable Testing & Fault Locating Technology

1000 units shipped to 70 countries

affordable

ISO 9001 : 2008

HIGH VOLTAGE® INC.
VLF HIPOT INSTRUMENTS

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HIGH VOLTAGE INC.

VLF HIPOT INSTRUMENTS

HVI – The World's VLF Source

Nearly 70 countries served since 1998

- ***Greatest Model Selection***
- ***Highest Voltages Available***
- ***Highest Power Ratings Delivered***
- ***Only VLF Thumper Produced***
- ***Rugged oil filled non-electronic design offers extreme reliability and ease of field service if ever necessary***

HVI offers more models and higher voltage models than any other vendor in the world. Models range from 28kV – 200kV, offering from 0.4μF to 50μF of load capability.

VLF-28CM	0-28 kVac, 0.1 Hz, load rated to 0.4 μF
VLF-4022CM	0-44 kVac, 0.1 Hz - 0.02 Hz, load rated to 5.5 μF
VLF-50CM	0-50 kVac, 0.1 Hz - 0.01 Hz, load rated to 50 μF
VLF-6022CM	0-62 kVac, 0.1 Hz - 0.02 Hz, load rated to 5.5 μF
VLF-65CMF	0-65 kVac, 0.1 Hz - 0.01 Hz, load rated to 22 μF
VLF-90CMF	0-90 kVac, 0.1 Hz - 0.02 Hz, load rated to 2.75 μF
VLF-12011CMF	0-120 kVac, 0.1 Hz - 0.01 Hz, load rated to 5.5 μF
VLF-200CMF	0-200 kVac, 0.1 Hz - 0.02 Hz, load rated to 3.75 μF
VT33	VLF Thumper, 0 – 33kVac, 1uF @ 0.1Hz 13kV @ 760 joules discharge, TDR ready

The HVI VLF technology is protected under U.S. Patent # 6,169,406

Very Low Frequency AC Testers

AC testing of cables and electrical apparatus is now easier than ever.

Since the introduction of the High Voltage, Inc. line of portable and affordable VLF hipots, there is a practical method of AC field-testing various loads, particularly cables and rotating machinery. High Voltage, Inc. offers a full line of VLF AC Hipots from 28 kVac to 200 kVac with models that can test up to 50μF of load, cables over 50 miles in length and the largest of generators/motors. Use VLF for AC stress tests and/or as a voltage source for **Tan Delta** and **Partial Discharge** cable diagnostic testing.

SINCE 1998, HVI has produced the most rugged and reliable VLF products available. Our electro-mechanical control and our oil filled HV power supply designs are **extremely dependable**, and if necessary, more easily field serviced than the electronic designs of others. **The HVI design has a proven record with nearly 1100 units in service in 70 countries.** The HVI VLF design offers the best of everything, with manual, easy to use controls but also sophisticated data collection. Electric utilities and industrials have long recognized the benefit of our technology. HVI knows how to build long lasting field test equipment.

The HVI VLF design produces a **sine wave output** that meets all requirements of world standards, permitting it to be used as a voltage source for **Tan Delta** and **Partial Discharge** cable diagnostic testing. Non sine wave producing VLF designs are limited in this ability and may reduce the users' options in the future to use the VLF for diagnostic testing. Stick to the HVI sine wave producing VLF.

Why Buy HVI VLF Products?

The HVI Design – Portable, Affordable, Rugged, Reliable, Proven

What is VLF?

VLF stands for Very Low Frequency. A VLF hipot is an AC output high voltage instrument. HVI VLF products provide sinusoidal AC voltage but at 0.1 Hz - 0.01 Hz, compared to the 50/60 Hz output of conventional AC test sets. It is still an AC voltage with sinusoidal polarity reversals every half cycle. The VLF instrument is used to provide a simple go/no-go, or pass/fail, withstand test. Also, HVI VLF instruments can be used as the voltage source for performing off-line **Partial Discharge** and **Tan Delta** cable diagnostic testing.

Why VLF?

VLF test sets are used to field test high capacitance loads like cables and motors/generators. The lower the frequency of an AC source, the lower the current and power required to apply a voltage to a capacitive load like a cable. At 0.1Hz, it requires 600 times less power to test a cable than at 60Hz. The HVI VLF instruments permit users to field test long cables and large generators with a portable and affordable test set. A 100 lb VLF instrument can do the job of a multi-ton 60Hz AC test set. Cables should be tested with AC voltage. With the HVI VLF products, it can be down with a practical, economical, and easy to use package.

When and Where Is VLF Used – Cable & Rotating Machinery

The principal use of VLF is testing medium and high voltage shielded power cables. A long cable may have many microfarads of capacitance. To AC high voltage test this cable requires the use of VLF technology. An AC voltage test is the best way to verify the AC integrity of a cable. If a cable can't hold 2 – 3 times normal voltage, it is not healthy and an in-service failure is likely. Use the VLF to cause defects to fail during the test. Find the fault, make the repair or replacement, and be left with a better cable. It is especially valuable for **verifying a cable after installation or repair:** far better than using a DC hipot, 5kV megohmmeter, hot stick adaptor, or soak test, none of which provide meaningful information about a cables ability to withstand several times normal AC voltage. IEEE 400, IEEE 400.2, VDE 0276, CENELEC HD 620/621, and IEC 60060-3 standards define VLF cable testing.

VLF is also very useful for testing large rotating machinery, since it provides a portable and affordable method of field testing coils and is sanctioned by the IEEE 433 standard.

Partial Discharge & Tan Delta VLF Cable Diagnostic Testing

The VLF hipot by itself provides a withstand, or proof test. It can also be used as the voltage source for off-line partial discharge and tan delta cable diagnostic testing. HVI can serve the needs of the industry for cable testing better than any other. Contact HVI for additional information on other cable testing methods and products available.

Benefits of HVI VLF AC Hipots

For more information on VLF testing, download our VLF FAQ from our website: www.hvinc.com

- *Portable and affordable*
- *All models feature a true sinewave output*
- *Waveform is independent of load capacitance between 0.01 μF and maximum load*
- *Highest load ratings available*
- *Highest voltage models available*
- *Simple and easy operation*
- *AC testing does not degrade good cable insulation*
- *Harmful space charges are not injected into the cable insulation*
- *No traveling waves are generated during testing*
- *BNC scope output for waveform viewing*
- *Rugged and reliable design less prone to failure from transients*
- *Much easier to service compared to units with solid state design*

VLF-28CM(F)

Our smallest VLF model, the VLF-28CM approaches the size and cost of a DC hipot and is designed for quick & easy short-run cable testing. It can test up to 0.4 μF of load, or up to 4000 feet (1200 m) of a typical 15 kV class cable. Small, light, inexpensive. Now there is no reason not to use VLF.

Input:	120 volts, 60 Hz, 5 A peak, 2.5 A average or 230 volts, 50/60 Hz, 3A peak, 2A average (F suffix)
Output:	0 – 28 kVac peak, 0.1 Hz, sinusoidal
Duty:	Continuous
Load Rating:	0.4μF
Metering:	Voltmeter: -30 – 0 – +30 kVac Charging Current meter: 0 – 50 mA peak
HV Cable Output:	Shielded EPR output cable - 20 ft. (6 m)
Size & Weight:	15″ w x 11.5″ d x 22″ h, 75 lbs. 381 mm w x 292 mm d x 559 mm h, 34 kg

VLF-4022CM(F)

This model, with its 44 kVac peak output, is suitable for all testing on 25 kV cable and Maintenance testing on 35 kV cable. Its high load capacity enables it to test up to approximately 10 miles of cable (at .02 Hz), depending on type. This model includes a charging current and load capacitance meter, and a center zero peak kilovolt output meter.

Two-piece easy portability

Input:	120 volts, 60 Hz, 10 A peak, 5 A average or 230 volts, 50/60 Hz, 6 A peak, 2.5 A average (F suffix)
Output:	0 – 44 kVac peak, 0.1/0.05/0.02 Hz sinusoidal
Duty:	Continuous
Load Rating:	1.1μF @ 0.1 Hz, 2.2μF @ 0.05 Hz, & 5.5μF @ 0.02 Hz
Metering:	Voltmeter: Center Zero -45 – 0 – +45 kVac peak Charging Current meter: 0 – 100 mA peak Load capacitance meter: 0 – 6 Microfarads
Cable Lengths:	Shielded RG/8U output cable - 20 ft. (6 m) Interconnect cable - 10 ft. (3 m)
Size & Weight:	Controls: 22″ w x 11.25″ d x 15.25″ h, 50 lbs. 559 mm w x 286 mm d x 387 mm h, 23 kg HV Tank: 14.5″ w x 10.5″ d x 19″ h, 72 lbs. 368 mm w x 267 mm d x 483 mm h, 33 kg

VLF-6022CM(F)

This model, with its 62 kVac peak output, is suitable for testing cables rated up to 35 kV. Its high load capacity enables it to test up to approximately 10 miles of cable (at .02 Hz), depending on type. This model includes an enhanced features package: a charging current and load capacitance meter, test dwell timer, and polarity indicating lights.

Network Systems & Wind Farm Model

Two-piece easy portability

Input:	120 volts, 60 Hz, 15 A peak, 7.5 A average or 230 volts, 50/60 Hz, 8 A peak, 4 A average (F suffix)
Output:	0-62 kVac peak, 0.1 Hz - 0.02 Hz
Duty:	Continuous
Load Rating:	1.1 μF @ 0.1 Hz, 2.2 μF @ 0.05 Hz, & 5.5 μF @ 0.02 Hz
Metering:	Voltmeter: 0–65 kVac peak Charging Current meter: 0 – 100 mA peak Load capacitance meter: 0 – 6 Microfarads Settable test duration timer
Cable Lengths:	Shielded EPR output cable - 20 ft. (6 m) Interconnect cable - 10 ft. (3 m)
Size & Weight:	Controls: 26″ w x 13″ d x 16″ h, 75 lbs. 660 mm w x 330 mm d x 406 mm h, 34 kg HV Tank: 15″ w x 10.25″ d x 21.5″ h, 120 lbs. 381 mm w x 260 mm d x 546 mm h, 54 kg

VLF-50CMF

The **VLF-50CMF** is the highest power VLF unit we offer. It is rated for 5 μF at 0.1 Hz and can increase its output to 50 μF at 0.01 Hz, capable of testing up to 50 miles of 15 kV and 25 kV cable. It is ideal for very long cable runs, like long feeders, wind farm applications, submarine cables, and others. It comes as pictured, including a cable reels with 100' of high voltage and ground cable.

Remove the wheels for van mounting. Simple installation – ready to go.

Input:	230V +/-10%, 50/60 Hz, single phase, 30 A peak, 25 A avg.	
Output:	Sinusoidal 0-50 kVac peak, 0.1, .05, .02 and .01 Hz frequency	
Duty:	Continuous	
Test Capacitance:	5.0μF @ .1 Hz, 10.0μF @ .05 Hz, 25.0 μF @ .02 Hz, 50.0μF@.01 Hz Minimum capacitance to achieve full output – .01 μF	
Kilovoltmeter:	3.5 in., 0-60 PEAK KILOVOLTS 2% FS Accuracy	
Current Load:	3.5 in., 0-200 MILLIAMPERES 5% FS Accuracy	
Capacitance Meter:	0-6 μF with x1 & x10 ranges	
Sizes:	Remote Control:	17" w x 11" d x 9.5" h, 20 lbs. 432mm w x 280mm d x 241mm h, 9 kg
	Power Section:	20" w x 14" d x 27" h, 160 lbs. 508mm w x 356mm d x 686mm h, 73 kg
	HV Tank size:	13.5" w x 19" d x 23" h, 310 lbs. 343mm w x 483mm d x 584mm h, 141 kg
	Complete Trolley:	28" w x 60" d x 51" h, 775lbs 711mm w x 1524mm d x 1295mm h, 352 kg
Output cable length:	Shielded X-Ray/Ground on reels - 100ft.	

CE

VLF-50CMF

VLF-65CMF
Wind Farm Model

Remove wheels for van mounting

VLF-65CMF

The **VLF-65CMF**, 65 kVpeak output, is a higher power model designed to test very long cables rated up to 35kV. It offers the complete controls package including Cable Burn mode. Its cable reels provide 100' (30m) of HV and ground cable.

Input:	230 V, 50/60 Hz, 30A peak, 25A average	
Output:	0-65 kVac peak, 0.1/0.05/0.02/0.01 Hz sinusoidal	
Duty:	Continuous	
Load Rating:	2.2 μF @ 0.1 Hz, 4.4μF @ 0.05 Hz 11 μF @ 0.02 Hz & 22 μF @ 0.01 Hz	
Metering:	Voltmeter: 0-75 kVac peak Charging Current Meter: 0 – 200 mA peak Load capacitance meter: 0 – 6 microfarads User programmable test duration timer	
Cable Lengths:	Shielded EPR output cable - 100 ft. (30m) Ground cable 100 ft. (30m)	
Sizes & Weight:	Controls:	17" w x 11" d x 9.5" h, 20 lbs. 432mm w x 280mm d x 241mm h, 9 kg
	Regulator:	20" w x 14" d x 27" h, 160 lbs. 508mm w x 356mm d x 686mm h, 73 kg
	HV Tank:	15" w x 18" d x 22" h, 215 lbs. 381mm w x 457mm d x 559mm h, 98 kg
	Overall:	30" w x 60" d x 51" h, 704 lbs. 762mm w x 1524mm d x 1295mm h, 320 kg

CE

VLF-90CMF

The **VLF-90CMF** offers 90kVac peak output voltage, suitable for testing cables rated 45 – 50kV. It is load rated for 0.55μF @ 0.1Hz, capable of testing up to 2 miles of cable, five times that at 0.02Hz. Pictured with optional hand truck.

Input:	230 V, 50/60 Hz, 20A peak, 15A average	
Output:	0-90 kVac peak, 0.1/0.05/0.02 Hz sinusoidal	
Duty:	Continuous	
Load:	.55 μF @ 0.1 Hz 1.1 μF @ 0.05 Hz 2.75 μF @ 0.02 Hz	
Metering:	Voltmeter: 0-100 kVac peak Current Meter: 0 – 100 mA peak Load capacitance: 0 – 6 microfarads User programmable test duration timer	
Cable Lengths:	Shielded EPR output cable – 20 ft. (6m) Interconnect cable - 10 ft. (3m)	
Sizes & Weights:	Control:	26" w x 13" d x 16" h, 75 lbs. 660 mm w x 330 mm d x 406 mm h, 34 kg
	HV Tank:	15" w x 21" d x 29" h, 293 lbs. 381 mm w x 533 mm d x 737 mm h, 133 kg

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Only portable unit at 90 kV

VLF-12011CMF

The **VLF-12011CMF** provides a 120kVac peak output voltage, suitable for VLF hipot testing 69kV cable and as a voltage source for partial discharge and tan delta testing of 115kV cable. In addition to the standard controls described, this model also contains a Cable Burn mode. Cable reels provide 100' (30m) of HV and ground cable.

Input:	230 volts, 50/60 Hz, 30A peak, 25A average	
Output:	0-120 kVac peak, 0.1/0.05/0.02/0.01 Hz sinusoidal	
Duty:	Continuous	
Load Rating:	.55 μF @ 0.1 Hz, 1.1μF @ 0.05 Hz 2.75 μF @ 0.02 Hz, 5.5μF @ 0.01 Hz	
Metering:	Voltmeter: 0-120 kVac peak Charging Current Meter: 0 – 100 mA peak Load capacitance meter: 0 – 6 microfarads User programmable test duration timer	
Cable Lengths:	Shielded EPR output cable 100 ft. (30m) Ground cable 100 ft. (30m)	
Sizes & Weight:	Controls:	17" w x 11" d x 9.5" h, 20 lbs. 432mm w x 280mm d x 241mm h, 9 kg
	Regulator:	20" w x 14" d x 27" h, 160 lbs. 508mm w x 356mm d x 686mm h, 73 kg
	HV Tank:	26" w x 20" d x 22" h, 390 lbs. 660mm w x 508mm d x 559mm h, 177 kg
	Overall:	30" w x 60" d x 51" h, 853 lbs. 762mm w x 1524mm d x 1295mm h, 388 kg

CE

VLF-200CMF

The **VLF-200CMF** provides a 200kVac peak output voltage, suitable for performing VLF hipot tests on 138kV cable and as a voltage source for tan delta and partial discharge testing on 230kV cable. The controls offer all the features of our other VLF models along with VLF Cable Burning. Trailer mount optional.

Input:	230V Single phase, 80A peak, 50/60Hz	
Output:	0 – 200 kVac peak, 100mA. Bushing output with no cable provided	
Load:	.75 μF @ 0.1Hz, 1.5 μF @ 0.05Hz, 3.75 μF @ 0.02Hz	
Duty:	Continuous	
Metering:	Voltage: 0 – 200 kVac peak 3.5" analog display Current: 0 – 200 mAac 3.5" analog display	
Controls:	HV On/Off, Motorized Voltage Control, Zero Start Interlock, External Interlock, Digital Dwell Timer, Capacitance Measuring Circuit, Cable Burn Mode, Fixed 120% Overload, Automatic Data Logger	
Size/Weight:	Controls:	24"w x 25.5"d x 71"h, 650lbs. 61cm h x 65cm w x 180cm h, 295kg
	HV Tank:	59"w x 37"d x 87"h, 3700lbs 155cm w x 93cm d x 220cm h, 1678kg

CE

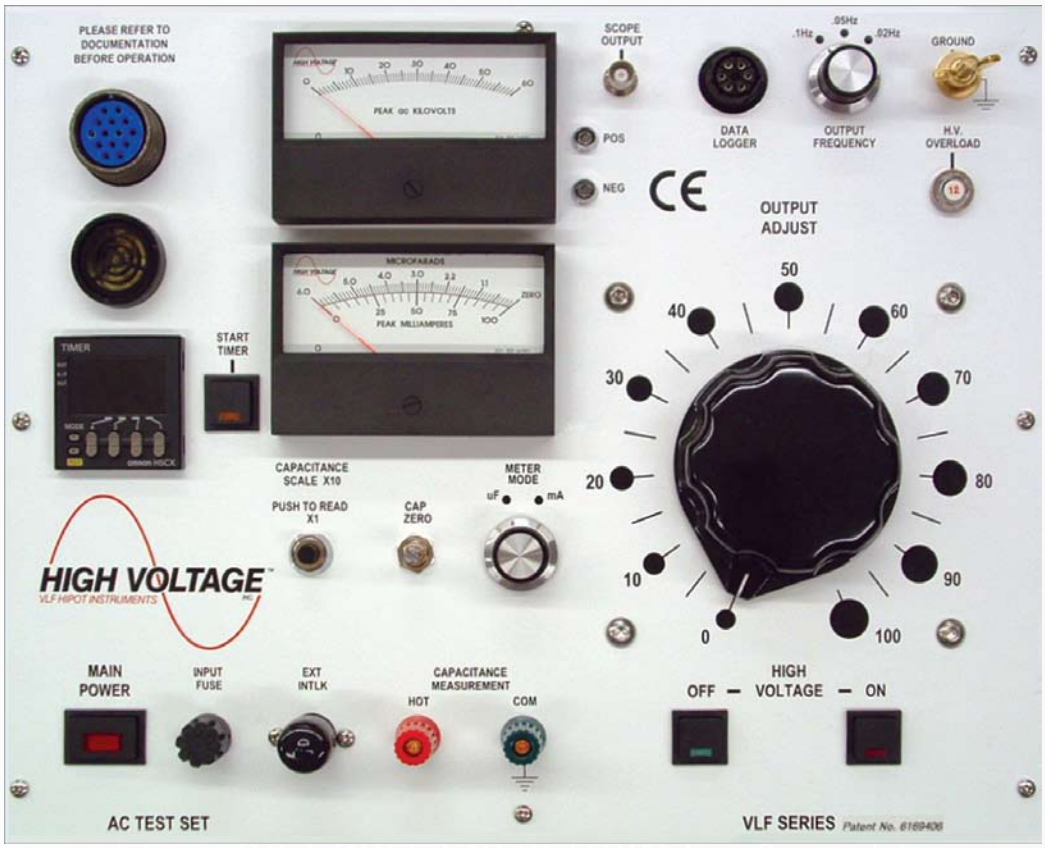
The Testing Service & Electrical Contractor Model

VT33(F) VLF Fault Locator Combination

The **VT33** is the worlds only combination VLF hipot and cable fault locator, or thumper. It is the complete tool for AC testing and fault locating cables rated up to 25kV. It offers a 33kVac peak VLF output, VLF Cable Burn mode, and a 760 joule discharge output. It is fully TDR/radar ready.

Input:	VT33: 120V, 60 Hz, 10A VT33F: 230V, 50/60 Hz, 5A
VLF Hipot Output:	0 – 33 kVac peak @ 0.1 Hz
Load Capability:	1 μF or more than 1 mile (1.6 km) of 15 kV & 25 kV cable
Discharge Output:	0 – 13 kVdc @ 760 joules
Discharge Rate:	Every 8 seconds
VLF Burner:	Arcs cable every few seconds using cable energy to burn.
TDR Interface:	Arc Reflection & Current Impulse
Size & Weight:	28"w x 26"d x 44"h, 245 lbs. 711mm w x 660mm d x 1118mm h, 111kg
Cable Outputs:	50' (15m) shielded HV cable & ground

Simple to use, manual controls. No programming necessary. Automatic Data Logger option. Simple to use yet full data capture.



VLF-6022CM
Front Panel

Selecting a VLF Model

There are three main considerations when selecting the appropriate model : voltage, µF rating, µF rating at 0.1Hz.

Voltage: What is the voltage rating of the cables to be tested? Below is a summary of the IEEE test voltages recommended. While IEEE400.2 does not include HV cable classes, field experience shows the test voltage used is 1.5 – 2 times normal line-to-ground.

Cable Rating	Installation	Acceptance	Maintenance
phase to phase	phase to ground	phase to ground	phase to ground
kVrms	kVrms (kVpk)	kVrms (kVpk)	kVrms (kVpk)
5	9 (12)	10 (14)	7 (10)
8	11 (16)	13 (18)	10 (14)
15	18 (25)	20 (28)	16 (22)
25	27 (38)	31 (44)	23 (33)
35	39 (55)	44 (62)	33 (47)
*46	51 (72)	58 (81)	43 (61)
*69	76 (106)	86 (119)	65 (89)

*Proposed in the next revision of IEEE400.2

µF Rating: VLF hipots are rated by the capacitance of the loads they can test. To select the appropriate VLF model, either the load capacitance must be known or the cable length if the µF/km or pF/ft is known.

µF Rating at 0.1Hz: If the VLF is to be used as a voltage source for performing Tan Delta and Partial Discharge testing, then the load rating at 0.1Hz is important, as this is the frequency that these tests are performed. If the VLF is to be used for hipoting, then any frequency from 0.1Hz - 0.01Hz can be used, unless otherwise specified.

VLF Cable Burning

The VLF-50CMF, VLF-65CMF, VLF-12011CMF, & the VLF-200CMF models are equipped with a Cable Burn mode. A VLF burner is one of the most effective methods of reducing a cable fault's impedance, or arc-over voltage, in order to permit the use of lower voltage and energy rated fault locators – thumpers. For instance, the VLF-12011CM can be used to burn down faults on 138kV cable to lower the arc-over voltage to where the HVI CDS-3632U thumper can easily fault locate, with its 9/18/36 kV @ 3200 joules discharge rating.

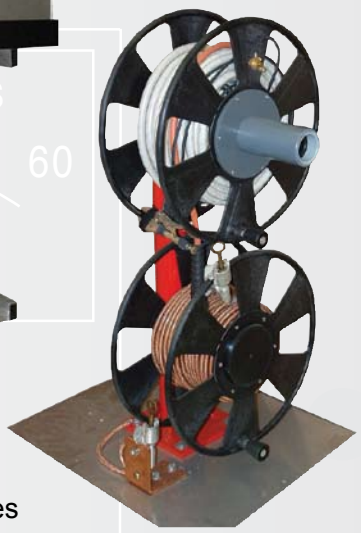
The VLF hipot applies its voltage to the faulted cable. The voltage output raises to the arc-over level and the cable arcs. The current of the VLF and the stored energy in the cable discharges into the fault. This process continues, but now in the opposite polarity, as the sine wave output of the VLF continues. This arcing of the cable fault repeatedly in opposite polarities, discharging the stored energy in the cable, rapidly reduces the fault voltage.

Accessories

The ADL-1 data logger is designed to monitor, record, and wirelessly download all test data from an HVI Very Low Frequency tester to a computer. Users of HVI VLF products now have the best of both worlds: economical and simple to operate VLF testers along with full test data collection. Use a laptop on-site to watch and record the test or store all results in the ADL-1 for later downloading. Windows compatible only.

Current HVI VLF units can be modified to use the ADL-1. One interface cable connects the data logger to the VLF. The ADL-1 comes equipped with 802.11g wireless communications, which is backwards compatible with 802.11a & b, and an Ethernet connection. Internal memory can record approximately 40 hours of testing.

Hand Truck for VLF-4022CM(F), VLF-6022CM(F), & VLF-90CMF



Cable Reels 100' HV & Ground Cables

VLF Testing & Fault Locating Modules – Van Ready

HVI can mix and match its VLF and Thumper products to deliver a module that covers all your VLF test and fault locating needs into one easily mounted package. Just drop into a van or truck and you're done – instant test van.

Pictured is one containing our VLF-6022CM (0-60 kV), Automatic Data Logger for VLF, our CDS-3632U thumper (9/18/36 kV @ 3200 Joules), TDR/Radar, & Fault Pinpointing device – a complete package for your cable needs. This model is perfect for Network Systems and Wind Farm cables.

Cable Fault Locators – Constant Energy

CDS-2010U	CDS-3632U
0 – 5/10/20 kV Hipot/Thump	0 – 9/18/36 kV Hipot/Thump
0 – 400/200/100 mA Burn	0 – 280/140/70 mA Burn
Full 1000 Joules on each tap	Full 3200 Joules on each tap
6 – 10 Second Discharge Rate	6 – 10 Second Discharge Rate
Use any TDR	Use any TDR

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