

The logo for High Voltage, Inc. (HVZI) is rendered in large, bold, grey, 3D-style block letters. The letters are set against a background image of electrical equipment, including a current meter with a dial and labels like 'CURRENT METER', 'X100', 'X10', 'X1', and '250', a red 'STOP' button, and an 'OUTPUT ADJUST' knob. A registered trademark symbol (®) is located to the right of the 'I' in HVZI.

HVZI®

HIGH VOLTAGE, INC.
PRIMARY CABLE FAULT LOCATION
CDS SERIES PRODUCT CATALOG

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Options Available:

- Safety ground sticks (10 inch & 14 inch)
- Hand Safety Interlock Switch
- Foot Safety Interlock Switch
- Cable reels (100 feet to 330 feet)
- MC Output Adapters
- Time Domain Reflectometer/Cable Radar
- Acoustical/Magnetic Listening Devices
- SKD Series - Custom Fault Locating Skid Packages

HVI – THE CABLE TESTING & FAULT LOCATING EQUIPMENT

HVI has extensive knowledge and field experience in fault locating and cable testing along with the best tools for the job. Fault locating requires more than just a thumper. Efficient fault locating requires the convergence of knowledge, methodology, and the right hardware. A total approach is needed to get the job done quickly to minimize customer outage time and prevent further damage to the cable system. This includes knowledge of the cable systems design, construction, history, accurate maps, proper fault locating procedures and the right thumper which should include a high resistance fault burn down method, time domain reflectometer/cable radar compatibility, and a top level acoustic/electromagnetic listening device. HVI can assemble the best system and approach possible to meet all needs from 5kV – 230kV cable.

Q. Why Choose HVI Thumpers?

A. HVI Thumpers Offer All the Features Needed

When fault locating, remember this: do no harm. Don't harm your insulation and accessories by thumping your 15kV cable at 25kV for hours looking for a fault. Use proper methods and technologies. The goal should be to thump at the lowest possible voltage yet deliver the highest possible energy to find the fault. Locate the fault without making more. To do this you need a thumper with a variable hipot output, multiple full energy discharge outputs, and ample burn current to condition a fault to arc at a lower voltage. HVI thumpers offer all the features and power necessary. Don't handicap your fault locating efforts by spending the same or more for inferior equipment. HVI thumpers provide all the tools you need.

- **Fully Variable Hipot Output On All Three Voltage Settings** Needed to identify faulted cable, show breakdown voltage to help choose tap, burn fault and hipot cables after repair.
- **Highest Burn Current** Burns down high resistance faults to permit thumping at lower, less damaging voltage levels. This standard feature on all HVI thumpers may not even be an option from other manufacturers.
- **Three Output Voltage Taps All At Full Energy** Allows thumping at lower voltages. Noise of maximum joules @ 5kV = noise of maximum joules @ 20kV.
- **Variable Discharge Rate** 6 – 10 second discharge/thump rate. Faster and slower discharge rates are not advisable.
- **TDR/Radar Ready** Use your old TDR or buy a new one. A separate TDR is advantageous over an integrated TDR. This setup offers greater flexibility allowing use without the thumper in the field, downloading the saved waveforms, or for training purposes. This also allows for plug and play connections when its time to upgrade to the newest technologies.
- **Battery Operation** HVI thumpers are not battery operated. Thumpers of this class that are battery operated must sacrifice other necessary features like variable hipot outputs and burning capabilities, missing half of what a thumper should be. In addition, some have as long as 15 seconds between discharges, greatly slowing the fault location process. Also, battery life is short, assuming that you remembered to keep it charged between uses. Battery operation is not worth the sacrifice.

A Controlled Energy Thumper With Burn Capability is a Necessity

Due to the known problems associated with DC cable testing, most utilities worldwide have abandoned DC testing of solid dielectric cable (many have switched to VLF AC testing), or greatly reduced their test voltage levels, yet they then thump cables at voltages of 2 – 3 times normal line to-ground voltage. They find the fault but make more in the process. This is avoided by using HVI thumpers with three output voltage taps, and high burn currents used to reduce fault impedances to permit lower voltage thumping. HVI thumpers can thump at voltages below normal line-to-ground voltage yet still deliver maximum joule energy, thereby minimizing damage to the cable system and still supplying the required noise for rapid location.

$$\text{Energy} = \text{Watt Seconds} = \text{Joules} = \frac{1}{2} CV^2 = \text{Fault Arc Intensity} = \text{Noise} = \text{Electro-Magnetic Discharge}$$

PROBLEM: To deliver the full joules of energy possible to a fault, the capacitors within a thumper must be charged to the maximum voltage. With the wrong thumper, this often results in thumping a cable at an excessive voltage, causing significant damage to insulation and accessories. Since the applied voltage is a square function ($\frac{1}{2} CV^2$), if the thumper is at $\frac{2}{3}$ voltage, only 45% of the joules are delivered to the fault. At half voltage only 25% energy is delivered, making the fault hard to hear. Either fault locating takes far longer than necessary or the crew gets impatient and turns the voltage all the way up to get the loudest bang. The fault is found but other benign issues within the cable system are transitioned into growing electrical trees which will be your next in service failure. This practice can and should be avoided.

SOLUTION: Use a multi-tapped, “controlled energy” thumper like those from HVI. With three output voltage taps and ample burn current to condition faults, fault location can be performed at voltages far lower than before. Find your fault quickly while avoiding damage. Wouldn't you rather thump at 5kV instead of 20kV, as long as the discharge energy, or noise, was equal? The measure of a good thumper is not the maximum voltage it can discharge, but the minimum voltage still capable of delivering the full energy. For instance, our 5/10/20 kV output model is a far better choice than the 12.5/25kV model from others.

Model CDS-2010U / CDS-2010UF

Cable Fault Locators

The High Voltage Inc **CDS-2010U / CDS-2010UF** are designed for fault location on cable systems rated up to 35kV, where the line to neutral voltage is approximately 20kv. With 1000 joules available at 5/10/20 kV, the CDS-2010U / CDS-2010UF offers a powerful impulse ideal for using acoustic and electro-magnetic detection instruments and is a true controlled/constant energy thumper. Equipped with a built in high voltage coupler, the CDS-2010U / CDS-2010UF are TDR/cable radar ready for arc reflection and current impulse methods. With up to 400 mA of burn current, high resistance faults can be rapidly reduced permitting fault location at less damaging voltage levels. Find your fault without causing the next one!

There are no better thumpers. The CDS-2010F / CDS-2010UF offers best in class features: Full impulse energy at 5/10/20kV, variable hipot/burn in all 3 taps (400 mA @ 5 kV tap, 200 mA @ 10 kV tap, 100 mA @ 20 kV tap), EPR high voltage output cable that stays flexible even in cold weather, TDR/Radar ready, and extremely durable and portable design with small footprint for years of reliable operation. Available in 120 Vac, 20 A input and 230 Vac, 15 A input (F suffix).



Input: 120Vac, 60Hz, 25A (CDS-2010U)
230Vac, 50/60Hz, 15A (CDS-2010UF)

Hipot Output: 0 - 5/10/20kVdc

Hipot Burn Current: 400/200/100mA

Discharge Output: 1000 Joules at max voltage in each tap

Discharge Rate: 6-10 seconds

TDR Interface: Arc Reflection
Current Pulse

Size: 27in w x 27in d x 48in h
686mm w x 686mm d x 1219mm h

Weight: 260lb
118kg

Output Termination: 50ft HV, Return, and Ground

Optional Cable Reels: 100 to 330ft of HV, Return and Ground on Reels

Other Features: Rugged Transit Protected Meters
External Interlock
Emergency Off Mushroom Switch
Internal Heater to limit condensation
Integrated Coupler/Filter/TDR Interface for:
Arc Reflection Method
Current Impulse Method

Optional Upgrade 3 Range Current Meter



**Compare the CDS Series
on pages 7-8**

The Network Systems Thumper

The High Voltage Inc **CDS-36** series of primary cable fault locators are ideal for Network Systems or other situations involving cables rated up to 69kV, oil insulated cables, and/or long cable lengths. Available with either 1600 or 3200 joules, the CDS-36 series offers a powerful impulse ideal for using acoustic and electro-magnetic detection instruments. The CDS-3616U / CDS-3616UF offers 1600 Joules at 9/18/36 kV while the CDS-3632U / CDS-3632UF offers 3200 Joules at 9/18/36kV, true controlled/constant energy thumpers. Equipped with a built in high voltage coupler, the CDS-36 series are TDR/cable radar ready for arc reflection and current impulse methods. With up to 280 mA of burn current, high resistance faults can be rapidly reduced permitting fault location at less damaging voltage levels. Find your fault without causing the next one! There are no better thumpers.



Thumper Specification Review

Don't handicap your fault finding efforts by buying a thumper with only half the features necessary. For the same money, you can buy a full featured thumper. When specifying, require:

- At least two full joule output voltage settings, preferably three, with at least 1000 joules of energy
- A variable hipot output with high burn current of at least 200mA
- Variable discharge rate from 6 – 10 seconds
- A remote TDR/radar, not one built-in, for flexibility, versatility, ease in service, and ease in use

- Input:** 120Vac, 60Hz, 25A
(CDS-3616U, CDS-3632U)
230Vac, 50/60Hz, 15A
(CDS-3616UF, CDS-3632UF)
- Hipot Output:** 0 - 9/18/36kVdc
- Hipot Burn Current:** 280/140/70mA
- Discharge Output:** 1600 Joules at max voltage in each tap
(CDS-3616U)
3200 Joules at max voltage in each tap
(CDS-3632U)
- Discharge Rate:** 6-10 seconds
- TDR Interface:** Arc Reflection
Current Pulse
- Size:** 25in w x 29in d x 44.5in h
(30"w with attached cable reel)
635mm w x 737mm d x 1130mm h
- Weight:** 375lb/170kg (CDS-3616U, CDS-3616UF)
450lb/204kg (CDS-3632U, CDS-3632UF)
- Output Termination:** 100ft HV, Return, and Ground
- Optional Cable Reels:** 100 to 300ft HV, Return, and Ground on Reels
- Other Features:** Rugged Transit Protected Meters
External Interlock
Emergency Off Mushroom Switch
Window to view Groundig Solenoid
Internal Heater to limit condensation
Integrated Coupler/Filter/TDR Interface for:
Arc Reflection Method
Current Impulse Method
- Optional Upgrade** 3 Range Current Meter

**Compare the CDS Series
on pages 7-8**

Model VT33 / VT33F

VLF Thumper Combination

With cable diagnostic testing becoming more common, the need for cable fault location will rise. If you're in the market for a thumper, why not get one with a VLF hipot built-in to test the AC integrity of the cable following repair. The **VT33 / VT33F** is our lightest portable primary cable fault locator and the only one with an included ac VLF hipot. Designed for cables rated up to 25 kV, it incorporates both a 0 to 13 kV, up to 760 joule thumper and a 0 to 33 kV ac, 0.1Hz VLF hipot capable of testing a 1 uF load, approximately 10,000 feet of shielded power cable. The VLF hipot is also designed to burn the fault, quickly reducing the resistance of the fault, lowering the breakdown voltage. Thumping at lower voltages reduces the risk of creating more faults. The VT33 produces a discharge every 8 seconds for pinpointing the fault with an acoustic / magnetic detector. Like all HVI cable fault locators, The **VT33 / VT33F** is TDR-ready and works with most popular brands of Time Domain Reflectometer also known as "cable radar".



Input: 120Vac, 60Hz, 10A (VT33)
230Vac, 50/60Hz, 5A (VT33F)

Hipot Output: 0-33kVac peak @ 0.1Hz, 1uF max load

Hipot Burn Current: VLF Burner - Arcs cable every few seconds

Discharge Output: 760 Joules at 13kVdc

Discharge Rate: 8 seconds fixed

TDR Interface: Arc Reflection

Size: 28in w x 26in d x 44in h
711mm w x 660mm d x 1118mm h

Weight: 245lb
111kg

Output Termination: 50ft HV, Return, and Ground

Optional Cable Reels: 100 to 330ft HV, Return, and Ground on Reels

Other Features: Rugged Transit Protected Meters
External Interlock
Emergency Off Mushroom Switch
Window to view Grounding Solenoid
Internal Heater to limit condensation
Integrated Coupler/Filter/TDR Interface for:
Arc Reflection Method
Current Impulse Method



**Compare the CDS Series
on pages 7-8**

Compare CDS Series



CDS-2010U



CDS-3616U

	CDS-2010U	CDS-3616U
Input:	120Vac, 60Hz, 25A (CDS-2010U) 230Vac, 50/60Hz, 15A (CDS-2010UF)	120Vac, 60Hz, 25A (CDS-3616U) 230Vac, 50/60Hz, 15A (CDS-3616UF)
Hipot Output:	0 - 5/10/20kVdc	0 - 9/18/36kVdc
Hipot Burn Current:	400/200/100mA	280/140/70mA
Discharge Output:	1000 Joules at max voltage in each tap	1600 Joules at max voltage in each tap
Discharge Rate:	6-10 seconds	6-10 seconds
TDR Interface:	Arc Reflection Current Pulse	Arc Reflection Current Pulse
Size:	27in w x 27in d x 48in h 686mm w x 686mm d x 1219mm h	25in w x 29in d x 44.5in h (30" w with attached cable reel) 635mm w x 737mm d x 1130mm h
Weight:	260lb 118kg	375lb 170kg
Output Termination:	50ft HV, Return, and Ground	100ft HV, Return, and Ground
Optional Cable Reels:	100 - 330 ft HV, Return, and Ground on Reels	100 - 300 ft HV, Return, and Ground on Reels
Other Features:	Rugged Transit Protected Meters External Interlock Emergency Off Mushroom Switch Internal Heater to limit condensation Integrated Coupler/Filter/TDR Interface for: Arc Reflection Method Current Impulse Method	Rugged Transit Protected Meters External Interlock Emergency Off Mushroom Switch Window to view Grounding Solenoid Internal Heater to limit condensation Integrated Coupler/Filter/TDR Interface for: Arc Reflection Method Current Impulse Method
Optional Upgrade:	3 Range Current Meter	3 Range Current Meter



CDS-3632U



VT33

CDS-3632U

VT33

120Vac, 60Hz, 25A (CDS-3632U)
230Vac, 50/60Hz, 15A (CDS-3632UF)

120Vac, 60Hz, 10A (VT33)
230Vac, 50/60Hz, 5A (VT33F)

0 - 9/18/36kVdc

0-33kVac peak @ 0.1Hz, 1uF max load

280/140/70mA

VLF Burner - Arcs cable every few seconds

3200 Joules at max voltage in each tap

760 Joules at 13kVdc

6-10 seconds

8 seconds fixed

Arc Reflection
Current Pulse

Arc Reflection

25in w x 29in d x 44.5in h
(30" w with attached cable reel)
635mm w x 737mm d x 1130mm h

28in w x 26in d x 44in h
711mm w x 660mm d x 1118mm h

450lb
204kg

245lb
111kg

100ft HV, Return, and Ground

50ft HV, Return, and Ground

100 - 330 ft HV, Return, and Ground on Reels

100 - 300 ft HV, Return, and Ground on Reels

Rugged Transit Protected Meters
External Interlock
Emergency Off Mushroom Switch
Window to view Grounding Solenoid
Internal Heater to limit condensation
Integrated Coupler/Filter/TDR Interface for:
Arc Reflection Method
Current Impulse Method

Rugged Transit Protected Meters
External Interlock
Emergency Off Mushroom Switch
Window to view Grounding Solenoid
Internal Heater to limit condensation
Integrated Coupler/Filter/TDR Interface for:
Arc Reflection Method
Current Impulse Method

3 Range Current Meter

Accessories

HVI can provide all the accessories needed to put together a complete fault locating system. Fault locating is an approach, not just a thumper. Don't spend a lot of money on a thumper but not the extra few thousand for a top level listening device to make your efforts more effective. Don't thump for hours wasting time and damaging your cable when a TDR trace can show you the fault location in two minutes. With the right accessories, sectionalizing and pin point location of the fault have never been faster. Consult with HVI on the accessories most appropriate for your situation. We have our favorites but can supply anything needed. For a TDR, nearly any model now available works great.



TDR: Time Domain Reflectometer: TDR-1669 from Radar Engineers

Radar Engineers Model 1669 is a portable Time Domain Reflectometer ("cable radar") from Radar Engineers specially designed for use with thumpers connected to an arc reflection filter for "pre-locating" high resistance (pinhole) faults in buried primary power cables. This product integrates seamlessly with the CDS Series and the VT-33 thumper for pre-locating faults using the arc reflection method. The Model 1669CI offers the Current Pulse method of fault location as well as the standard Arc Reflection method.

The 1669 also locates low resistance faults, splices, and opens on a stand-alone basis. Digital radar captures and holds the fault trace at the instant of the thump. Software then automatically positions a marker at the fault, and the distance to the fault is indicated on the screen. Model 1669 is also packaged in a rugged weather resistant plastic case and can be bolted to most hand trucks.



SDAD Super Directional Acoustic Detector from Aquatronics

The SDAD from Aquatronics is an acoustic and magnetic/ballistic detector used in conjunction with a cable fault locator/thumper to help quickly isolate faults in underground primary cables. The SDAD's main features are direction to fault to help you get to the failure faster, ballistic impulse bar graph to keep you on the cable path, and depth indication after you have located the fault.



X35: Electromagnetic Field Analyzer

The X35 from Technology Enhancement Corporation is designed to ease the process of fault location on a primary network system. The X35 detects the impulses from a primary cable fault locator/thumper and are displayed on easy to read LCD screen. This allows you to interrogate the faulted network system while remaining above ground and along the cable path, sectionalizing between manholes without opening them.



Cable Reels CRR-100T

Cable reel with 100 ft (30 meters) of high voltage output cable terminated with an MC connector and 100 ft (30 meters) of ground cable terminated every 10 ft for ground connection. Other lengths available up to 330 ft (100 meters), consult factory or your local sales rep or exclusive sales agency for more information.



Load Break Elbow LBE-36

Customer supplied load break elbow that is fitted with 12 inches of cable and a female MC connector. Designed for use with our CDS series of thumpers, VLF series of VLF Hipots, and E-Series of VLF Hipots.



15/25kV Stinger 88-049

15kV/25kV bushing probe with a female MC connector. Hotsitck compatible. Designed for use with our CDS series of thumpers, VLF series of VLF Hipots, and E-Series of VLF Hipots.



MC Vice Grip 88-050

Vise grip clamp fitted with a female MC connector. Designed for use with our CDS series of thumpers, VLF series of VLF Hipots, and E-Series of VLF Hipots.



Hotline Clamp 88-051

Hotline clamp fitted with a female MC connector. Hotsitck compatible. Designed for use with our CDS series of thumpers, VLF series of VLF Hipots, and E-Series of VLF Hipots.



SKD Series - Custom Fault Locating Skid Packages

HVI can combine all of the cable testing, diagnostic, and fault location equipment you need onto a compact and organized metal skid. Storage slots for your CDS Thumper, Cable Reels, VLF Hipot, Tan Delta Bridge, Partial Discharge Detection Equipment, Time Domain Reflectometer, Listening Device and accessories keep everything secure and organized while in transit and at the jobsite. Our Skid Packages also allow for easy installation into a vehicle, very handy if you do not have a dedicated vehicle for you thumper system. These skid packages are custom fit for your HVI equipment and accessories, designed how and where you need them.



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