Digi-Bridge™
Operation / User Manual

Cable Insulation & Cable Jacket/Sheath Fault Location and Jacket/Sheath Testing Instrument

Rev 1.0.3

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REV	Change / Description	Rev By / Date
1.0	Original Copy without Revisions	CG 06/24/2021
1.0.1	Addition of Declaration of Conformity	CF 04/11/2022
1.0.2	Addition of 910 003B & DB Cable Lengths	CF 04/12/2022
1.0.3	Edited Scope of Delivery Items	CF 07/15/2022

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Purpose

This operating manual serves to ensure the proper use and operation of the Digi-Bridge test instrument. Please read and understand this manual in its entirety before operating the unit. Please contact HV Diagnostics or your local HV Diagnostics representative, should you have any questions or concerns before attempting to operate the instrument.

Legal Considerations

Warranty

HV Diagnostics, Inc. provides a one-year warranty from the original purchase date of the instrument for all necessary parts and labor. This warranty and our liability are limited to replacing or repairing, at our discretion, the defective equipment. Equipment that is returned to our company must be suitably packed and all shipped items must be prepaid and insured by the customer. This warranty does not include normal consumable items, such as lamps, fuses, batteries etc. No other warranties are expressed or implied. This warranty will be void in the event of abuse, exposing this product to conditions not within the required specifications, incorrect storage, transportation, operation, and use. Any unauthorized modification/s or repairs to this product or failure to perform the specified maintenance as indicated in this operation manual will also void this warranty.

Contact Information

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Your opinion matters!

Your comments and suggestions are important to us. We are dedicated to supporting your needs and requirements to improve our products and services. Please email any suggestions to the following email address.

sales@hvdiagnostics.com

Thank you for your feedback!

Safety Precautions and Prerequisites

Safety is paramount importance! Comply with all local and national safety guidelines and regulations. Only use this instrument forappropriate applications and ensure that operators possess the required training and qualifications. HV Diagnostics is not liable for any damage or injury to persons or property due to misuse, wrong operation, ignoring appropriate safe practices, or following incorrect standards and guidelines when using this instrument.

Operator Qualifications

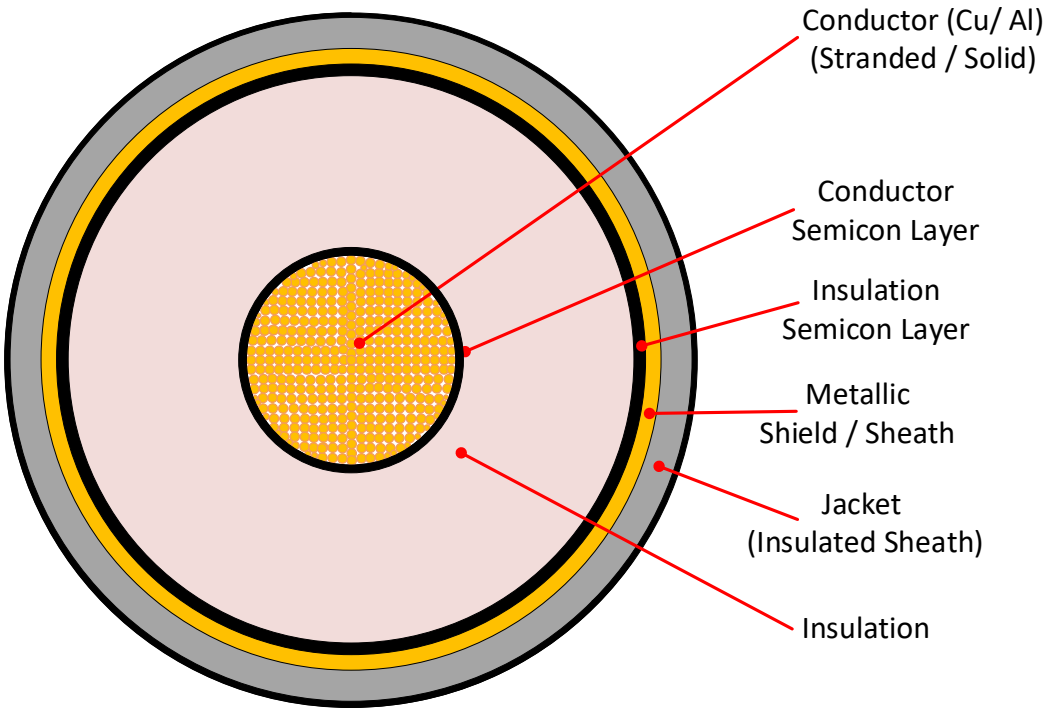
Operators of the Digi-Bridge test instrument must be qualified electrical technicians/engineers that are trained and experienced in high voltage environments and is aware of potential electrical hazards. It is also highly recommended that operators have completed an emergency rescue training program.

General Safety	
	NOTICE
	**User Manual** Before carrying out any high voltage tests with this instrument, read this User Manual in its entirety.
Work Safety	
	DANGER
	**Electric Shock Hazard** • Never assume that equipment is safe to handle without using the necessary safety equipment and grounding procedures. • This equipment is intended to be used near energized high voltage equipment, failure to follow instructions and comply with local safety regulations could result in injury or death. • Always follow safety procedures defined by your company, or by national or international guidelines and regulations. • Always treat exposed connectors and conductors as potential electric shock hazards. • Cover up or barrier off neighboring energized parts using approved insulating materials. • Always ensure adequate clearances. • Device Under Test (DUT) must be grounded, de-energized and isolated from all power/energy sources before connecting this test instrument to the DUT. • All auxiliary electrical apparatus such as switchgear, surge arresters, etc. must be isolated from the DUT. • All test leads, cables and connectors must be inspected for damage before use. Damaged equipment must not be used. • Ground connections must be made first and removed last. • DUT must be discharged and grounded with a visual ground before connecting and disconnecting the test leads. • Always confirm absence of voltage, using an independent and approved instrument and procedure. • Always protect against the re-energizing of a cable. • No instruction of procedure in this manual is intended to modify, or supersede any industry or company mandated safety practices.

	DANGER	
	**Authorized Personnel Only** **The test area must be secured to keep non-qualified personnel away from any parts that may become energized during testing!** • Signs must warn all persons of the high voltage test area. • Only qualified electrical technicians should have access to the test area. • Other persons must be accompanied by qualified electrical technicians and must be informed of the risks involved during a pre-job brief. • Suitable LOTO (Lock Out Tag Out) system should be in place to ensure the safety of all personnel.	
	NOTICE	
	**Equipment Handling** DUT must have clean connections. Testing instruments must only be repaired or modified by authorized HV Diagnostics personnel.	
	NOTICE	
	**If required, according to local safety regulations,** Wear high voltage gloves when handling high voltage test leads/cables and equipment.	
	WARNING	
	**This is a Class A product** used in commercial / industrial applications. **BATTERY (Optional):** This instrument may include the optional Integrated Battery. This is a Lithium Ion / LiFePO4 high-capacity battery: 7.5Ahr - 12Ahr and 24V. DO NOT Damage or Mishandle this Instrument and / or Battery DO NOT Disassemble or Reassemble or Puncture. DO NOT Heat up above 60 °C (140°F) DO NOT expose or dispose of in fire DO NOT directly short circuit. DO Recycle this Battery appropriately acc to local regulations.	

Definitions / Explanation of Terms Used

Figure 1: Cross Section of a Typical Shielded MV/HV Cable



Abbreviations/Definitions:

Direct Buried	A Cable that is buried in the earth and the Cable Jacket is in direct contact with the earth and is not in a conduit or sleeve.
DUT	Device Under Test – typically a cable.
Jacket / Sheath	The outer layer of a cable, that is generally of insulating material. (See diagram above).

Appropriate Applications

Appropriate DUT's (Device under test)

DUT Type	Examples
• HV, MV and LV Cables with short circuit of resistive insulation faults. • Jacket / Sheath Testing. • Cables with Jacket / Sheath Faults.	Extruded cables (XLPE / EPR) Laminated Cables (PILC) Cable Jackets / Sheaths Insulated Cables Shielded Cables

Introduction

The Digi-Bridge is a fully automatic, highly accurate high voltage cable insulation and jacket/sheath testing AND fault location test instrument.

Housed in a rugged IP65 pelican type injection molded case, the one-piece fully integrated Digi-Bridge can be used for both cable insulation and cable sheath integrity testing. Its main function, however, is the precise fault pre-location using the tried and tested bridge fault location technique to locate failures in cable insulation and/or the cable jacket-sheaths.

The Digi-Bridge is particularly useful when traditional thumper impulse reflection (TDR) techniques do not work - for example short circuits and resistive type cable faults. In addition, the instrument can be used for cable/jacket fault pinpointing using the step voltage gradient method for direct buried cables.

This extremely portable test instrument has an integrated discharge device to discharge the cable after testing and optional long lasting, integrated, rechargeable battery allowing both AC (main power) or DC (battery) operation.

Important Features of the Digi-Bridge

- 12kV Output Voltage!
- Fully Automatic and Manual Fault Location modes are available.
- Large 30µF Output Discharge Capacity! Ability to Test Very Long Cables.
- Very Accurate Fault Pre-Location Techniques for Short Circuit and Resistive Faults.
- Optional Long-Lasting Battery Operation – > 10 hours.
- Bright Sunlight Visible Color LCD Display.
- Cable/Jacket Testing, Fault Pre-Location & Pinpointing in a Single Instrument.
- Automatic Integrated Discharge Device of Cable.
- Active Voltage Monitoring to Verify Discharge.
- Active Filtering to help eliminate noise and interference.

- Compact and Lightweight, yet Rugged & Highly Portable.
- Easy to Use, Intuitive, Graphical User Interface that Guides the User and Shows the Optimum Connection Hookup.
- Locate Cable Faults When Traditional Thumper Reflection Methods Do Not.
- Removable Shielded HV Test Leads for Safer, Easier, More Flexible Test Setup.
- Test Lead ID Detection – will not allow High Voltage output if correct Test Lead not connected.
- Full Output Current available at all Voltages.
- USB Output / Interface.

Technical Specifications

Technical Data		
Output Voltage	(Adjustable)	0 - 12 kV DC
Voltage Indication		+/- 1% +/- 100 V
Output Current	(@ all voltages)	0 - 10.5 mA
Current Indication		+/- 1% +/- 10 µA
Insulation Resistance		0.1 MΩ - 1 GΩ
Accuracy	(Bridge Fault Location)	+/- 0.1%
Bridge Methods		Murray & Glaser
Bridge Current		0 – 10.5 mA
Fault Pinpointing Mode	(Pulsed)	0.2 kV - 12 kV
Max. Discharge Capacity		30 µF
LCD Display (Color)	(Sunlight Visible)	480 x 272 px
Power Supply		AC 85-264 V / 50-60 Hz (150 VA)
Battery		(optional)LiPo/LiFePO4
Battery Life		> 10 hrs in HV Mode
Interfaces		USB Port
Operating Temperature		-20°C to 50°C / -4°F to 122°F
Storage Temperature		-40°C to 60°C / -40°F to 140°F
Relative Humidity		Non-Condensing
Dimensions		41.7x22x33.4 cm / 16.4x8.71x13.15 in
Weight		12.8 kgs / 28.0 lbs
IP Rating		IP65 (with lid closed)
***Due to continuous development, this information may change without notice.**		

Scope of Delivery - Digi-Bridge:

PN 910 001 (no Battery) or 910 001B (with battery)

Part Number	Item	Image	Number of pieces
910 001 - Key	Power On Key & Spare Power On Key		2
910 001- Bag	Digi-Bridge Accessories Bag		1
Country Dependent	Mains Power Cord		1
910 103	HV Test lead for DC Hipot Jacket-Sheath Testing and Pinpointing 10ft / 3m		1
910 104	HV Test Lead for Bridge Mode 10ft / 3m		1

Part Number	Item	Image	Number of pieces
910 110	Alligator Clamp with Integrated Banana Sockets		4
700 505	Grounding Cable 8 AWG, 6mm² 13ft / 4m		1
910 112	Jumper Cables w/ Alligator Clamps 8 AWG, 6mm² 4ft / 1.2m		2
910 111	Large Jumper w/ Alligator Clamps 2 AWG, 6mm² 4ft / 1.2m		1

Optional Accessories

Part Number	Item	Image	Number of pieces
910 003	A-Frame Receiver (used for Voltage Gradient Method) *Includes A-Frame Transport Bag (910 003B)		1
910 401	Battery for Digi-Bridge.		1
702 005 DB	Transport Case for Digi-Bridge and Accessory Bag		1

Digi-Bridge Hardware Interface

No.	Name	Description
1	Key Switch [On/Off]	Powers On and Off the unit and allows a user to Lock Out the unit to prevent unauthorized use. -To Lock Out the unit: Remove key from unit while it is powered OFF. -To Power Up the unit: Turn key to the right and then release. -To Power Down/Off the unit: Turn key to the Left and then release.
2	HV Switch [I/O] Push Button	Activates high voltage. To activate the HV output, the User needs to press this button I/O button within 5 seconds after receiving a Ready to Start HV notification on the screen. When HV is ON, this button also turns the HV OFF.
3	Navigation Knob	Enables user to select options and functions shown on display. - To Scroll selection up or down: Rotate - To enter selection: Click (push in)
4	USB Port	USB Port is used to pull reports & perform FW updates on the unit
5	Battery Charge status LED	This light will indicate the state of the internal battery. Flashing Green – Charging Solid Green – Fully Charged and AC is connected Solid Red – There is a battery error or charging error. No LED – Not charging / Battery not present

No.	Name	Description
6	Emergency OFF button	Activates emergency shutdown of the high voltage output. High Voltage operation is only possible if the Emergency OFF button is not activated. -To activate the Emergency OFF: Press down -To deactivate Emergency OFF: Turn Slightly to Release (pops up)
7	HV Status RED LED GREEN LED	 Red light indicates: -High voltage is ON – DUT and Cable are Energized. -DUT is not discharged (residual voltage > 100 V) Green light indicates: -High voltage is OFF (always use a secondary visual method to ensure the DUT is completely discharged).
8	HV Output Connector	Serves as a convenient high voltage connection interface to connect the Digi-Bridge to one of the HV test leads. There is two HV Test Leads – one for Jacket / Sheath Testing and Fault Pinpointing modes AND one for the Bridge Fault Location mode. Do Not Connect (Mate) or Disconnect (Unmate) an HV Test lead when the high voltage is ON (HV LED Status above showing Red) **To Connect Test Lead:** The plug connection is tabbed to only allow the plug to be connected in one orientation. Screw the HV test lead into the HV output connector by turning the outer circular shell until the connector is completely seated into the receptacle. **HINT**: Pressing down on the main part of the cable / connector often helps to loosen or tighten the outer circular shell.
9	Power Supply Input	Power Supply input for instrument AC 85-265V 50/60 Hz power source.
10	Grounding Stud Connector	Serves as connection point from the instrument to ground/earth. **Unit must always be grounded to a suitable ground! First Connection to be made, last connection to be removed. "First one on, last one off."**

Application Functionality Notes: 3 Modes of Operation

General Test Setup of the Instrument:

There are various test setups and hookup configurations of the Digi-Bridge depending on the intended mode of operation.

In all cases, DO NOT FORGET TO GROUND THE TEST INSTRUMENT.

The 3 Main Modes of operation are:

BRIDGE CABLE / JACKET FAULT PRE-LOCATION MODE

The Digi-Bridge utilizes the classical Bridge methods of very accurate fault pre-location, providing fast and accurate distances to a fault according to IEEE1234.

Unlike some other bridge fault location instruments on the market that use the voltage drop method, requiring more current and power to achieve the same level of accuracy, the Digi-Bridge uses the traditional bridge techniques, requiring a lot less power to accurately locate the fault.

With an integrated high voltage DC source, it allows the automatic pre-location of low resistive as well as high resistive cable faults in both the cable insulation and / or the cable jacket/sheaths. This enables pre-location of faults in shielded transmission class, distribution class and unshielded LV control and lighting cables.

There are many variations of the setup, but the principles are the same. The Bridge method uses one or preferably two identical adjacent healthy conductors to create a circuit that allow the unit to determine the distance to the fault. The benefit of the Digi-bridge instrument is that it will choose the preferred method for the user and then show the user the correct connection hookup diagram on its display.

Unlike some cable fault location instruments, the Digi-Bridge can be used to locate faults in all types of MV and HV cable constructions and lengths and with various types of insulation shielding including copper tape, concentric neutral, flat strap, and longitudinally corrugated shields.

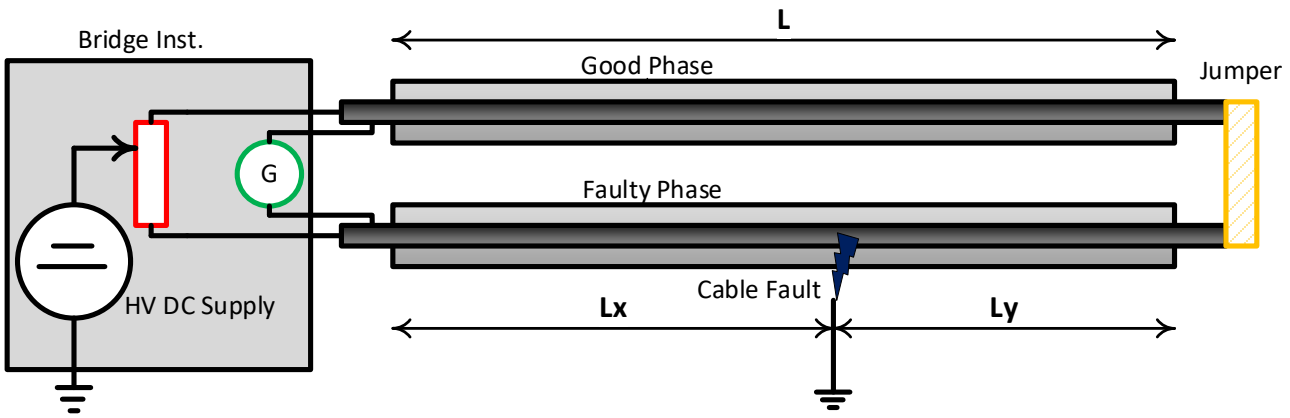
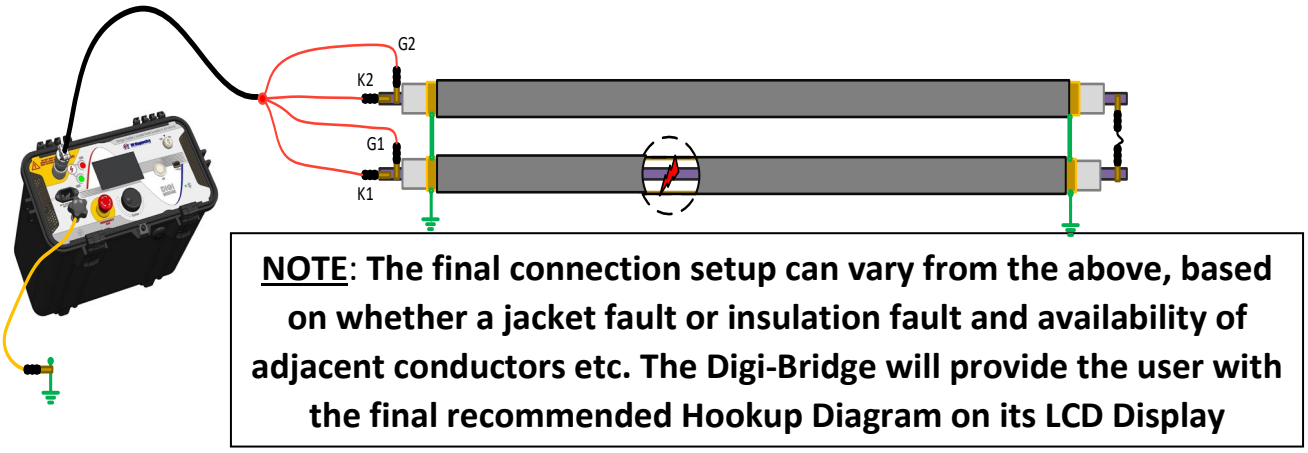


Figure 2: The Classical Bridge Method of Fault Location:

G=Galvo

Lx=Distance to Fault from Test Instrument L = Lx + Ly = Cable Length



<u>NOTE</u>: The final connection setup can vary from the above, based on whether a jacket fault or insulation fault and availability of adjacent conductors etc. The Digi-Bridge will provide the user with the final recommended Hookup Diagram on its LCD Display

Figure 3: A Typical Setup.

Important Notes / Considerations when using the Bridge Fault Location Technique:

- This method of fault location is not suitable for arcing type faults, or for faults that have resistances greater than 50Megaohms or when the resultant steady state fault current is very low.

- Ideally the actual Length and route of the cable should be known. The Digi-Bridge will give the user a distance to the fault that is based on this length provided. If no length is entered into the instrument, the Distance to the Fault will be given as a % of cable length.

- Unless you have access to both ends of a cable/s, like a cable on a reel, you will need to have at least one healthy adjacent similar cable (of same length, cross section, and conductor material) for the bridge method to work effectively.

- Always Check that the healthy cable/s and the faulty cable for continuity down the full length of the cable, to make sure there is not an open circuit in the cable. The Bridge technique will not work on a cable with an open circuit.

- If you have more than one fault exists in the cable, the calculated distance to fault accuracy will be compromised. If these multiple faults on a cable are near each other, then this method can still be accurate.

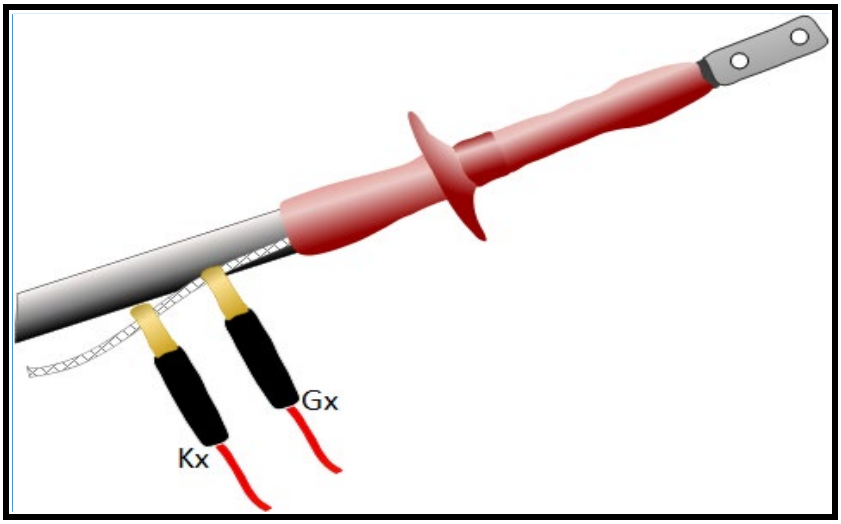
- It is important to choose the **best, most appropriate test setup** for the fault location exercise. The instrument will guide the user to the best possible setup for optimum accuracy, based on a few simple questions, and then will show the user a graphical image of the preferred test configuration/setup**. It is important for the user to then follow this setup.**

- The connection to the cable to be tested is important for both the faulty and healthy cable/s. Ensure that the K1 or K2 connection is **always further away** from the cable under test (DUT) than the **G1 or G2 connection** as shown below.

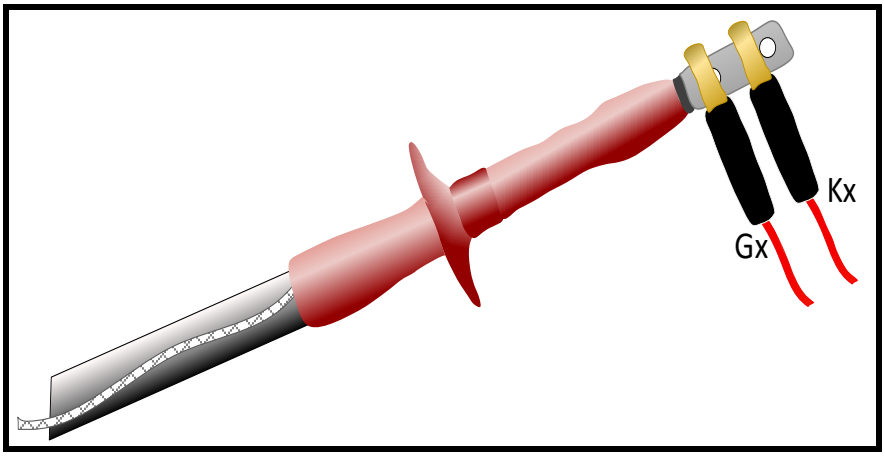
- Although there is significant filtering in the Digi-Bridge test instrument, induced and or stray DC or AC currents and voltages in the cables under test, can affect the fault location measurement.

- **ALWAYS CONNECT G1 AND K1 TO THE CABLE WITH THE FAULT**

- Jumpers used on the far end of the cable should be those supplied with this instrument. PN 910 111 or 910 112. It is important that these jumpers make **very good electrical contact** with the cable conductors and are of large cross section to offer a **very low resistance.** Use a wire brush if necessary to clean the conductor to lower any contact resistance.



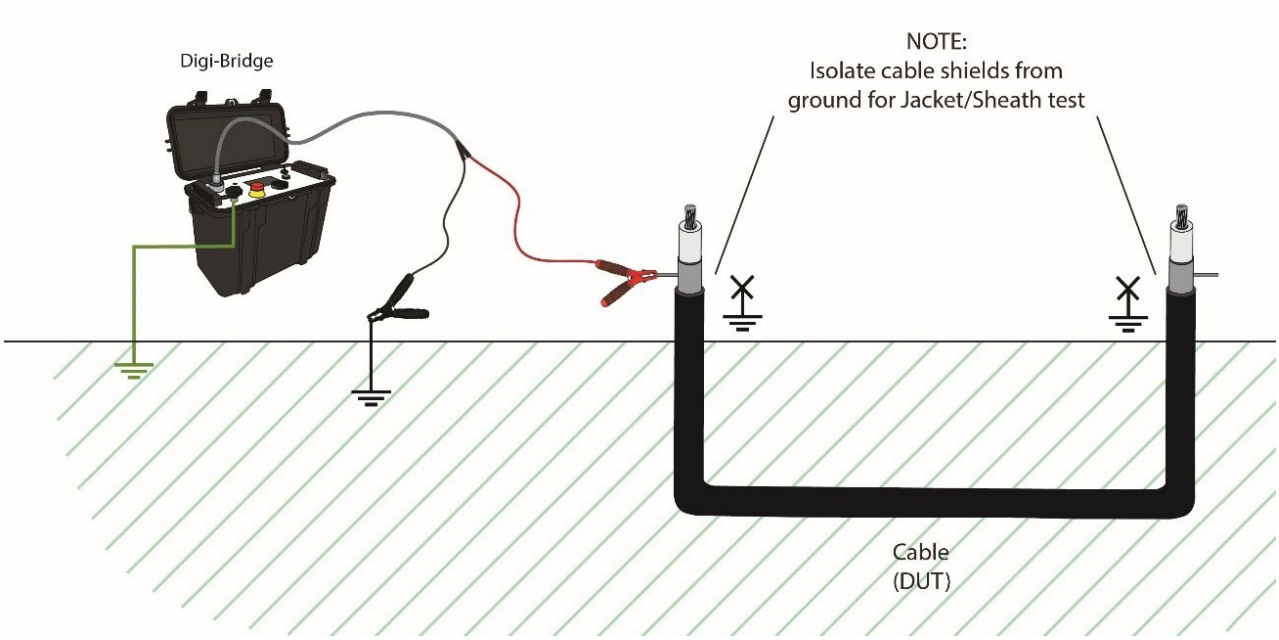
Test Lead Connections when connected to the **Shield / Neutral** of a cable showing correct connection of the G and K Connection leads.



Test Lead Connections when connected to the **Conductor** of a cable showing correct connection of the G and K Connection leads.

CABLE & JACKET/SHEATH TESTING MODE

The Digi-Bridge allows the testing of the insulation or jacket / sheath of the cable according to IEEE P532. The user enters the maximum DC test voltage and time, and the unit measures the resultant current and resistance. The voltage is applied between the metallic shield and the earth ground. The instrument also tries to determine if the cable fails the test, due to arcing using an arc detection algorithm embedded in the functionality of the instrument.



Typical Hookup Diagram for Jacket/Sheath Testing

Important Notes / Considerations when using the Jacket/ Sheath Testing Mode:

- The cable metallic shields/neutrals need to be isolated from ground for this test as shown above.

- For this test to be effective, the cable needs to be direct buried or have an outer semi-conductive jacket (over an insulating one) or a conductive carbon layer on the outside of the cable.

- The test instrument ground connector must be connected to ground/mother earth. Use an earthing rod if a good ground is not available.

- The cable jacket either supports the voltage or it does not.
  Ideally a cable jacket should have less than 1.5mA / mile or 0.3mA / 1000ft OR 1mA / km or 0.1mA / 100m - of cable jacket length.

- The final current should also be stable and not fluctuate.

- The jacket / sheath test voltage is normally provided by the cable manufacturer. Typically, a voltage of between 50-100V/mil of cable insulated jacket thickness is used for the test voltage. This is typically 2 – 5 kV for MV cables and 5 to 12kV for HV Cables. Consult the cable manufacture and cable accessory manufacturer/s if in doubt.

- The cable test voltage is typically held for 1 minute.

FAULT PIN-POINTING MODE

In fault pinpointing mode, the Digi-Bridge applies a predefined DC voltage pulse pattern to the cable shield with a simultaneous audio output.

This method works for pinpointing of direct buried cables jacket faults. It does not work for overhead or cable in conduit as it uses the currents returning through the earth and the associated step voltage drops, to locate the fault.

The step voltages created at the faulted zone can then be detected by using the special optional **A frame Receiver**.

The user needs to know the **route** of the cable under test. The user needs to traverse the route of the cable probing the ground with the A Frame in the orientation as shown below. When the user approaches the jacket fault zone, a deflection in the needle on the A Frame meter will be seen. Adjust the sensitivity to suite the conditions. The needle will deflect in one direction as one approaches the fault and then it will deflect the other direction when the user passes by the faulted zone. The A frame meter will show a Null (no deflection or very little) over the faulted area itself as it moves from one polarity to the other.

Important Notes / Considerations when using the Fault Pinpointing Mode:

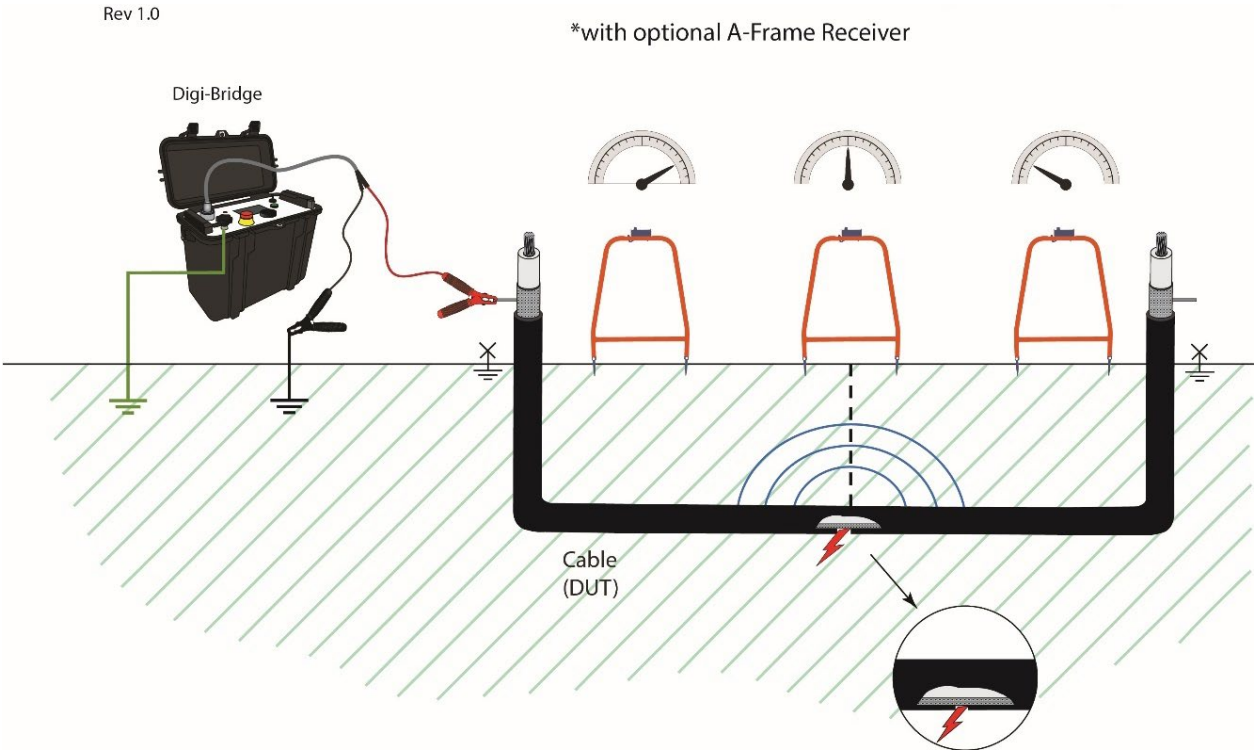
- The user should note the **initial impulse deflection direction** as this is the deflection that points in the direction of the fault. The needle will naturally rebound in the opposite direction after this initial deflection – ignore this part of the impulse.

- The cable with the jacket sheath fault must have its metallic / shield neutral lifted from ground as shown below (as for the Jacket Test Mode).

- The user can locate multiple jacket faults with this method.

- High resistance faults may have a weak signal. Turn the sensitivity up on the Receiver to boost the signal. Pouring water on the ground stakes will also increase the sensitivity.

- **When a fault is located under concrete,** prepare the A Frame Receiver by dissolving ¼ cup of salt in a gallon of water and soaking two sponges in the salt water. Wrap sponges over A Frame spikes and hold with rubber bands. Continue procedure normally, moving across the concrete and locating with the saltwater sponges.



NOTES:

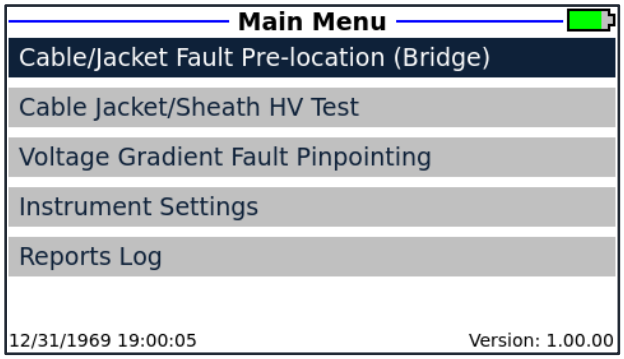
1. *Once you have completed location in one direction, turn the A frame perpendicular to that and begin locating the fault in the perpendicular direction. This will provide an exact location of the fault in the ground.*

2. *The A frame Receivers sensitivity can be adjusted in the event the currents are very small (or too large) and difficult to detect.*

The User Interface

Main Menu Screen:

After powering up the instrument, this is the first menu that appears.



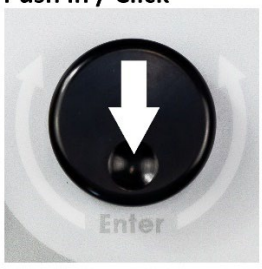
Element	Symbol/Item	Description
Title	– Main Menu –	After powering up the inst., the first display after the intro logo is the "Main Menu"
Date and Time	2/12/2021 13:59:57	Indicates **Date** and **Time**. User can change the format in "Instrument Settings > options"
Battery		Indicates remaining battery charge
Firmware	Version: 0.10.01	Current Firmware version on the instrument

Display Navigation

The navigation knob enables the user to select or change options shown on the instrument's vibrant color display menu screen.

Rotate

Push in / Click

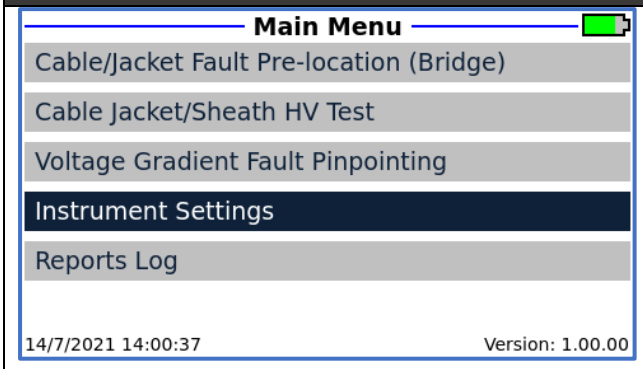
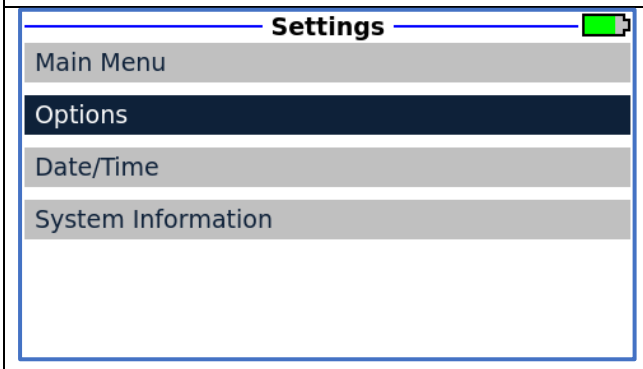
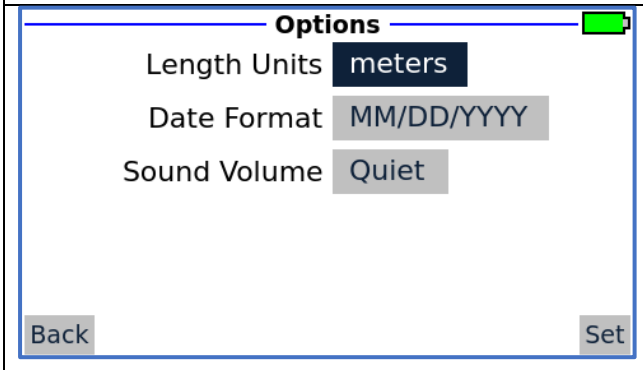


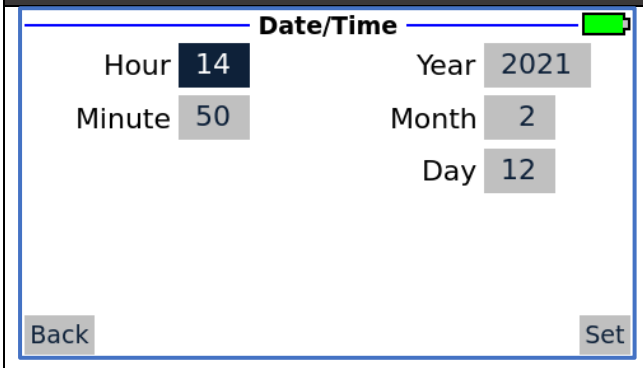
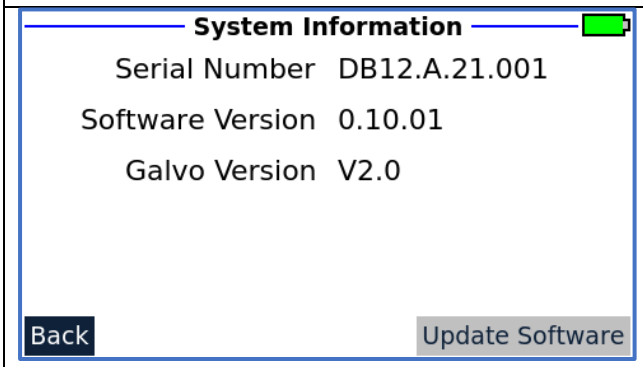
Rotate to Scroll / Move: Active Menu Item will be highlighted.

Press / Push to Select highlighted Menu Item

Instrument Setup “Instrument Settings”

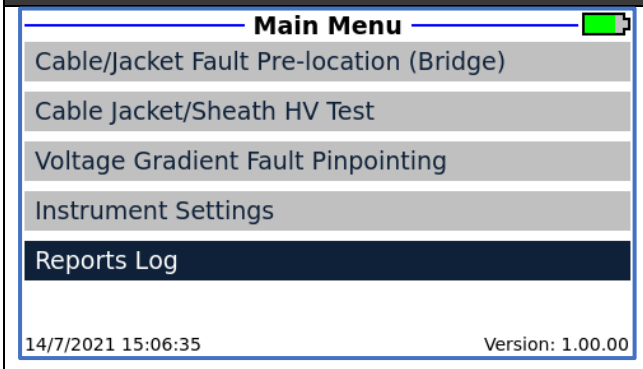
Selecting instrument settings allow the user to change some of the default formats and settings. Settings can be modified anytime and are stored by the unit. You will find the selection option “Instrument Settings” in the Main Menu.

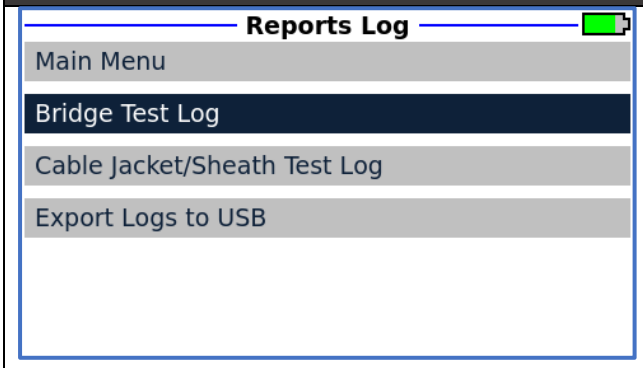
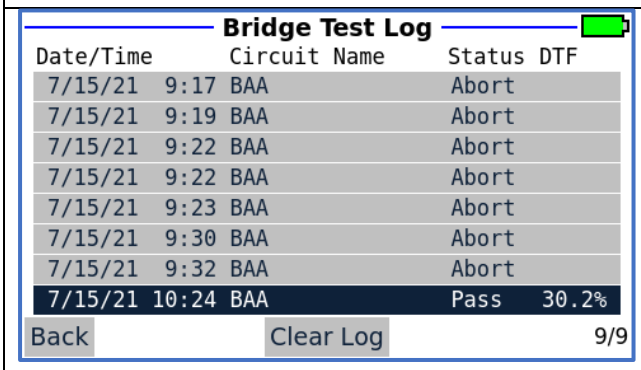
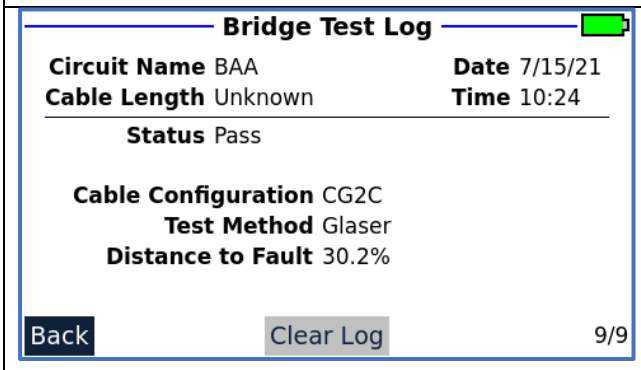
Screen Shot	Description
	Select “Instrument Settings” from the Main Menu:
	Select the “Options” menu option.
	In the “Options” menu, you can change the “Length Units” from *meters* to *feet*. You can change the Date Format from DD/MM/YYYY to MM/DD/YYYY. User can also change the Sound Volume from Silent (mute) to Quiet to Load.

Screen Shot	Description
	In the “Date/Time” menu you can also change the date and time. This will update the system clock. Press Set to store.
	In the “System Information” menu you can view the serial number of the unit, and the Firmware Version of the Main instrument software and that of the internal Galvo. Click “Update Software” to update the Firmware on the system.

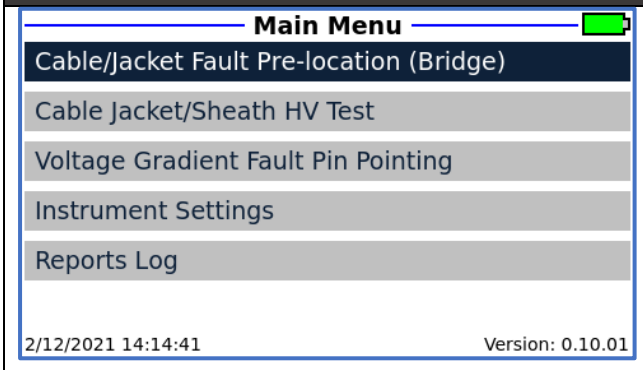
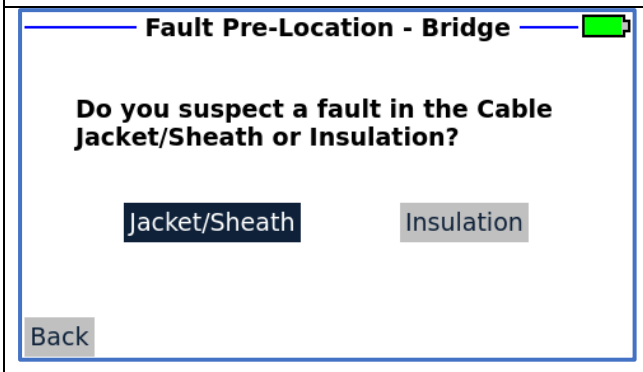
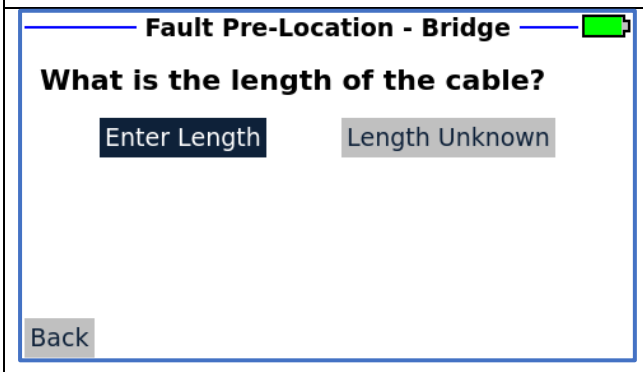
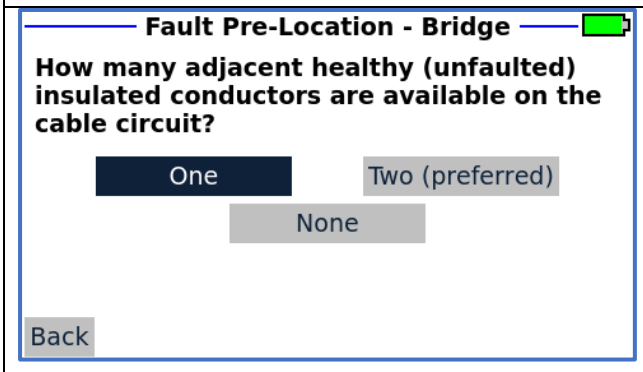
Test Reporting:

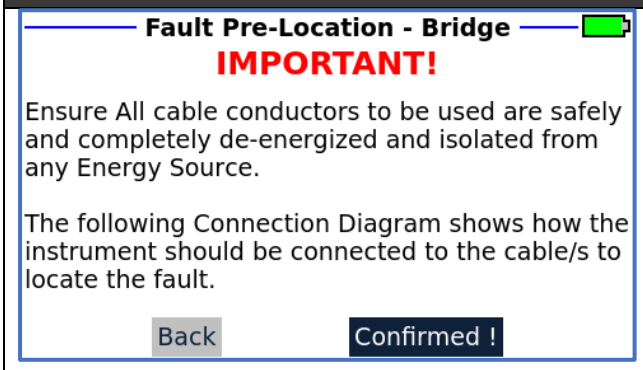
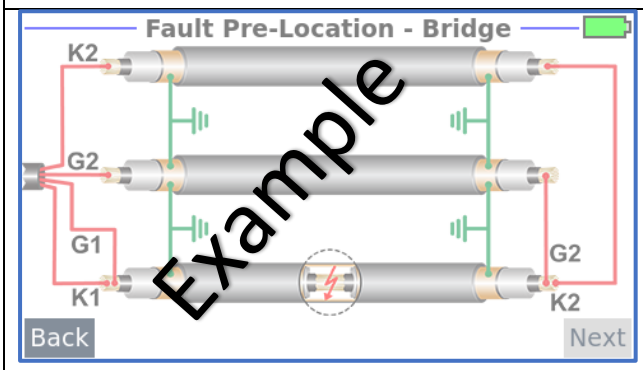
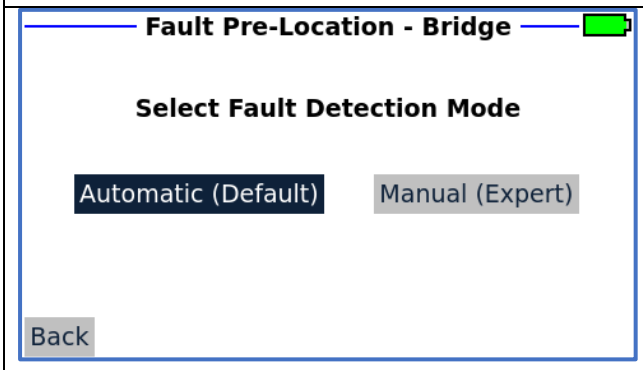
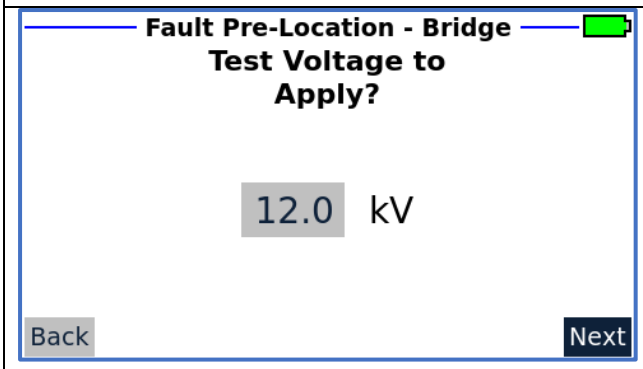
The report log allows the user to view, and / or download the reports to a USB stick.

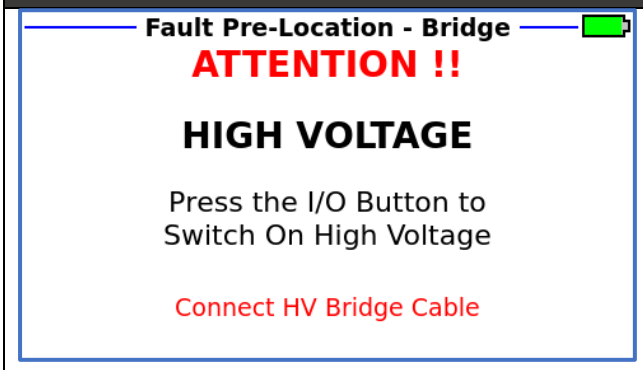
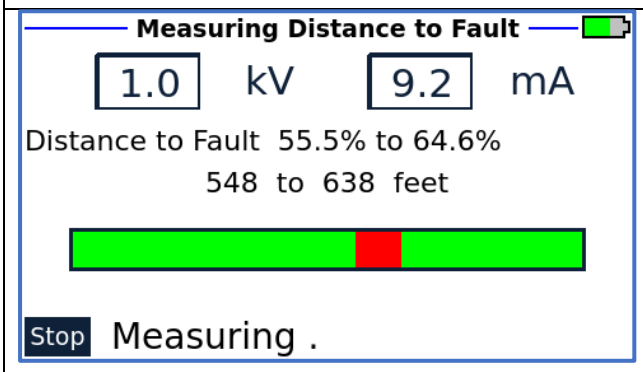
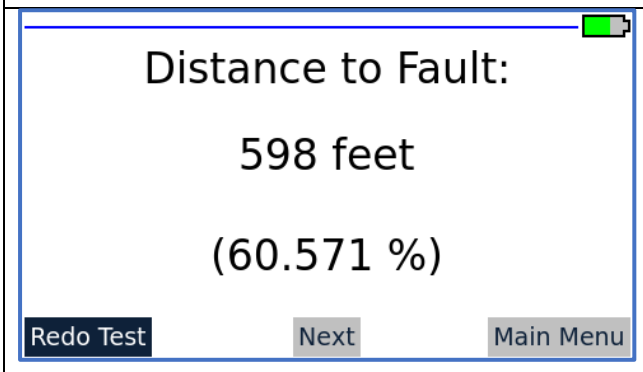
Screen Shot	Description
	Selecting the Reports Log from the Main Menu allows the User to View the Bridge Test Data, Cable Jacket/Sheath Test Data or Export the data to a USB stick.

Screen Shot	Description
	The instrument will Store up to 50 Bridge Test and 50 Sheath Test Reports
	Example of a Bridge Test Log. DTF = Distance to Fault
	Example Report: showing a Bridge Test Report

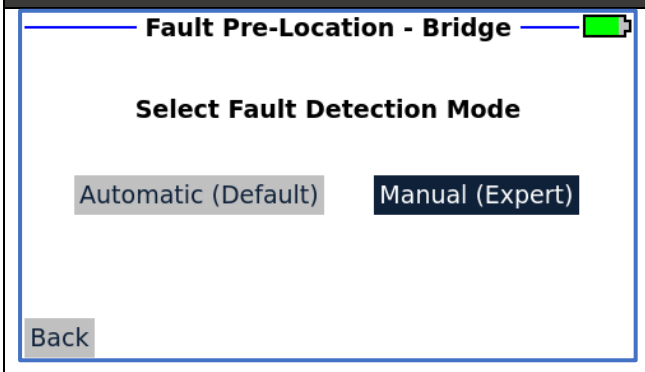
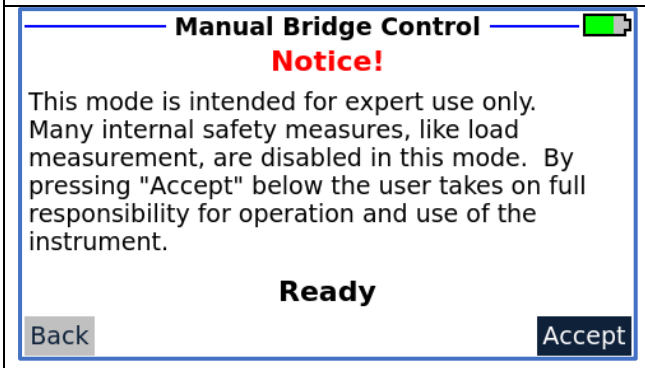
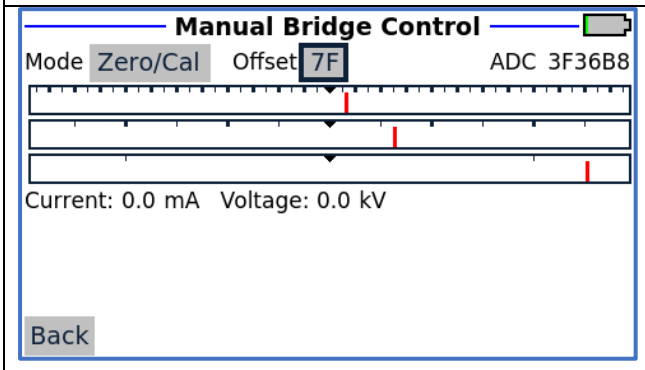
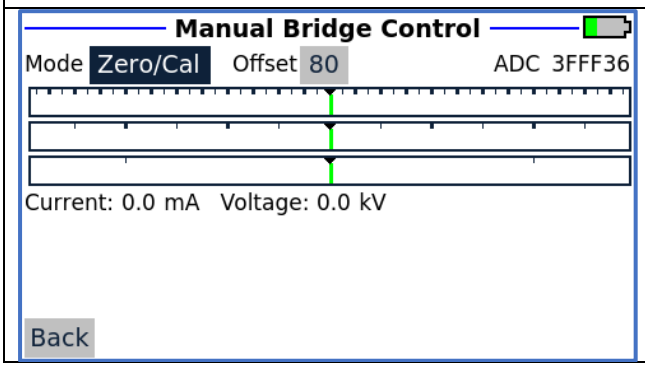
Cable Insulation or Cable Jacket Fault Pre-Location (Bridge) MODE 1

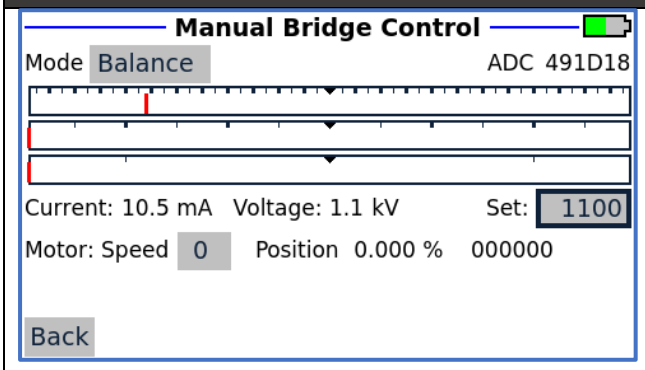
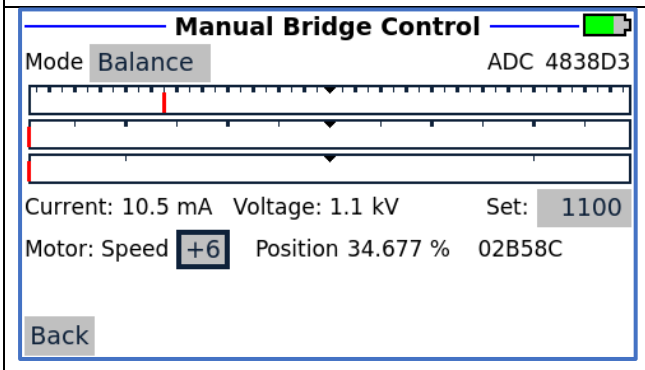
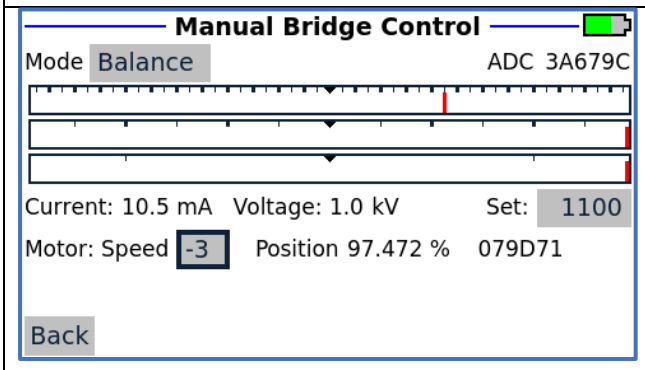
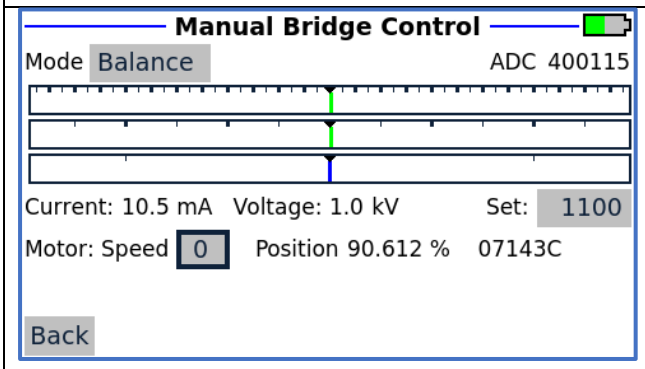
Screen Shot	Description
	In the Main Menu, select the test mode. Here we are selecting Cable/Jacket Fault Pre-location (Bridge) Mode.
	The user to select Cable Jacket / Sheath OR Cable Insulation depending what fault they are looking to locate.
	Ideally the user enters the length of the cable or if the length is not known, user selects “Length Unknown”. If the cable length is unknown, a percentage value will be provided to the fault from the near end. If the length is known, the footage or meterage to the fault from the near end will be provided.
	This menu allows the user to choose how many adjacent healthy conductors are available. This allows the instrument to determine which test hookup/setup is best to most accurately locate the fault.

Screen Shot	Description
	This screen gives the user a quick reminder to proceed with safety. The next screen will assist the user with the correct cable setup to use.
	There are various ways to set up your test and this illustrates just ONE possible test set up. Follow the correct setup shown on the Digi-Bridge that may be difference to what is shown here.
	There are Two Fault Location Bridge modes available - **Automatic** and **Manual** Mode. In **Automatic** mode, the Digi-Bridge will fully automate the testing and locating process. For most situations this is the recommended mode of operation. For **Manual** mode please see the **Manual** (**Expert**) section of the user manual.
	**Once the test set up is complete, the user will be asked to enter the maximum allowable test voltage to be applied.**

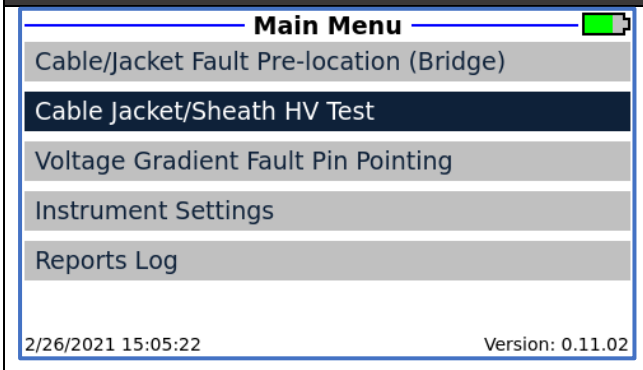
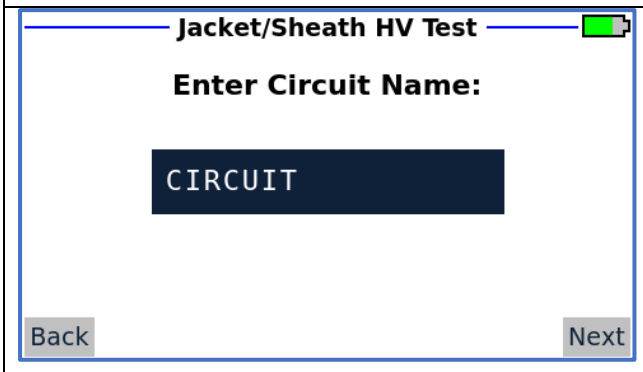
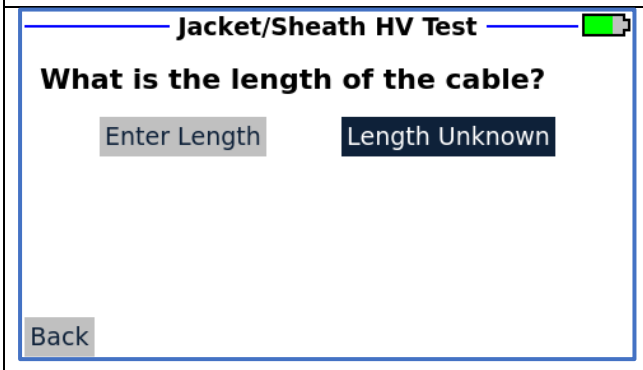
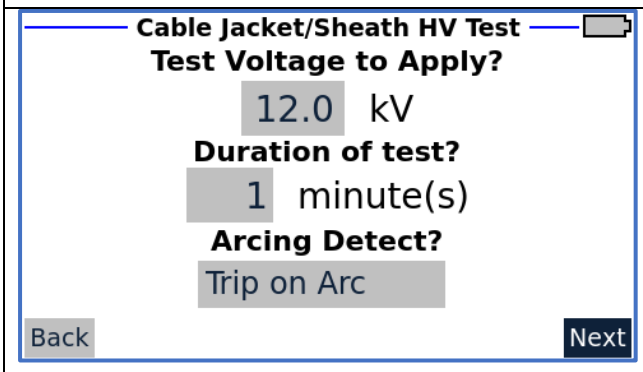
Screen Shot	Description
	Just before the high voltage is applied, the Digi-Bridge will alert the user to check if everything is safe to energize and if any **interlocks** are not met, such as if the Emergency off is still engaged or the correct test lead is not installed/detected. Finally Pressing the **I/O Button** will then start the application of the user specified voltage.
	While the Digi-Bridge is performing the fault location measurement, the user can see the percentages and/or distance to the fault. The instrument will home in on the location of the fault as shown by the red bar, that should get smaller and smaller and the defect site is located.
	Voila! The Digi-Bridge will show the location of the fault in feet/meters or %. It is recommended to do a few measurements to see the consistency of the location of the fault.

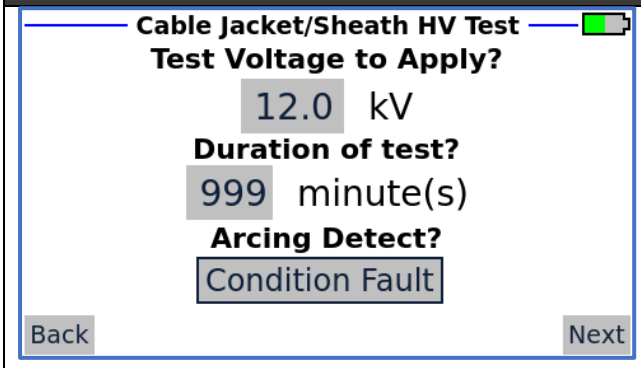
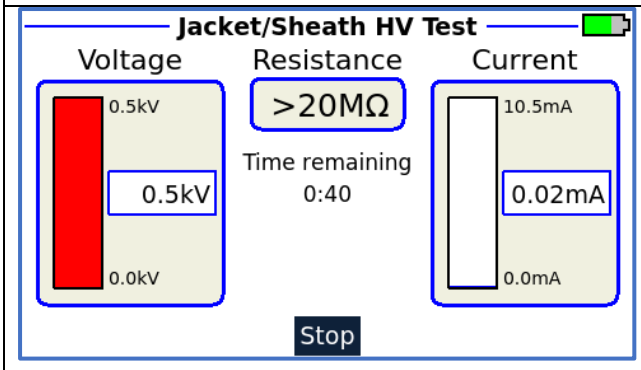
Manual (EXPERT) MODE 1

Screen Shot	Description
	To enable **Manual** (Expert) Bridge Fault Pre-Location Mode. Select Manual from the screen shown while in the **Bridge Mode**.
	**NOTE**: The **Manual** Mode is not recommended for the average user – It is recommended to use the **Automatic** Mode in most situations for most users. There are certain safety / protection measures that are **disabled** during Manual operation mode, that are active in Automatic mode, that can result in damage to the equipment and /or jeopardize the safety of the user. Care should be taken when using this mode. **Contact** HV Diagnostics Inc is in any doubt.
	There are 3 horizontal bars in manual mode that show various scaling / ranges. Top bar is the highest range (least sensitive), the lowest bar is the lowest range (highest sensitivity). The goal is to make all 3 red markers line up in the center – "Zero'd" (see pointer in center). Fluctuation can occur due to noise. There are **2 steps** in the Manual Mode: **ZERO/CAL** followed by the **BALANCE**.
	1st Step: With "**Zero/Cal**" menu highlighted, using the main control knob, rotate until all three tick markers on all 3 bars line up as shown. – Zero'd out. Red Tick markers become green as they approach zero. This is an important step to achieve maximum accuracy.

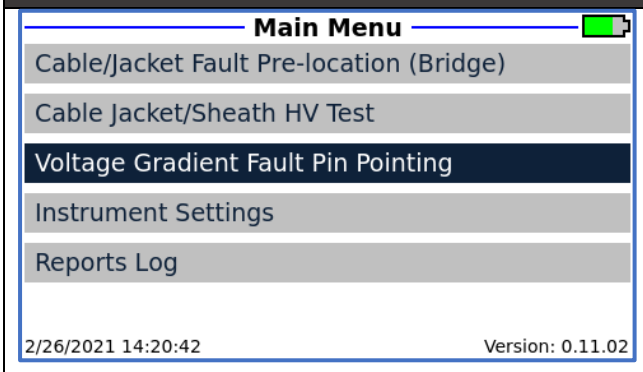
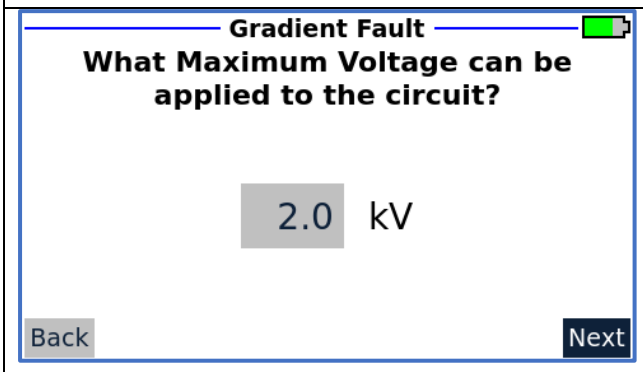
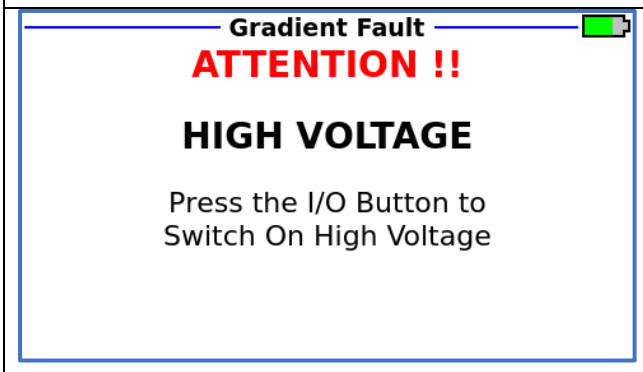
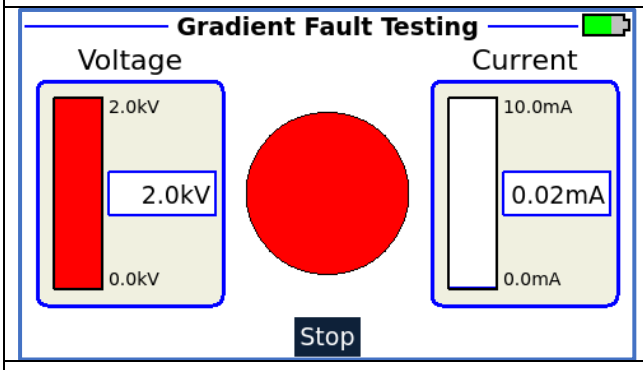
Screen Shot	Description
	2nd Step: Select and Change Mode from Zero/Cal to **Balance.** Rotate and Now Select and Set the desired voltage under "Set:" The voltage is immediately active at output.
	The motor "pot" position can now be changed manually. The motor speed can be changed from -6 to +6. Negative values move to the left and positive values move to the right. 6 is max speed, 0 is stopped, with incremental speeds in between. The goal again being to have all 3 tick markers as close to the center (zero' d out) as possible.
	In the image shown the red tick marks have now gone past the center, so the motor speed has been adjusted to a negative value to move back to the left. This time a slower speed is used to slowly approach the center to try avoiding overshooting the Zero point.
	Now that all the tick marks align at the zero point, the Position value can be read in the bottom center on the screen. In this example the fault is 90.612% away from the near end. **CAUTION:** Full voltage will remain applied until the user exits manual mode. To exit manual mode, press any one of the following: I/O button, back button, or Emergency off button. Wait for the **Green** LED to appear.

Cable Jacket/Sheath HV Test MODE 2

Screen Shot	Description
	In the main menu, select Cable Jacket/Sheath HV Test Mode.
	Enter the circuit name here.
	The user can enter the known length or if the user is not sure of the length, “Length Unknown” can be selected.
	User to enter the maximum test voltage and the duration of the test. (Max voltage is 12kV DC) Under “Arcing Detect”, by default the Digi-Bridge will be set to “**Trip on Arc”**. If an arcing fault is present on the cable under test, the unit will trip out.

Screen Shot	Description
	Alternatively, the user can toggle this “Arcing Detect” option to “**Condition Fault**” where the unit will continue to inject current, but only if a fault exists, otherwise there are no differences between the two modes. .
	This screen appears allowing user to turn on high voltage after pressing the I/O Button. Final Safety interlocks will also be checked at this stage – if any are not in a healthy state, a message will be shown in red.
	After high voltage is turned on, this screen will give the user the details of the Jacket/Sheath test. Left is the voltage applied to the DUT. On the right, the current drawn by the DUT. Excessively high current, rapidly fluctuating or will indicate a Jacket/Sheath fault. A Cable Jacket/Sheath test that passes will show a stable low current and hold full voltage.

Voltage Gradient Fault Pinpointing MODE 3

Screen Shot	Description
	Select the Voltage Gradient Fault Pinpointing option from the Main Menu.
	User to enter the maximum test voltage and the duration of the test. (Max voltage is 12kV DC).
	This screen appears allowing user to turn on high voltage after pressing the I/O Button. Final Safety interlocks will also be checked at this stage – if any are not in a healthy state, a message will be shown in red.
	During pinpointing, the red dot will pulse as voltage is injected into the cable. There will be an audible beep synchronized with the pulsing of the red dot.

Maintenance and Repairs

Repairs and maintenance should only be performed by authorized HV Diagnostics personnel.

Please contact HV Diagnostics Inc or our Authorized Representative.

HV Diagnostics, Inc.
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Fax: +1 (678) 445-2557
www.hvdiagnostics.com

Declaration of Conformity

Declaration of Conformity

EU Directive 2014/30/EU (EMC Directive)
EU Directive 2014/35/EU (LV Directive)
Electromagnetic Compatibility Regulations 2016
Electrical Equipment (Safety) Regulations 2016

Manufacturer/Authorized Representative: **HV Diagnostics, Inc.**

Address: **271 Rope Mill Pkwy, Woodstock, GA, 30188, USA**

We declare on our sole responsibility, that the following product:

Product Name: Digi-Bridge®
Model Numbers: 910 001 / 910 001B

Is in compliance with the essential requirements of CE EMC Directive (2014/30/EU) as outlined in Annex III, CE Low Voltage Directive (2014/35/EU), UK Electromagnetic Compatibility Regulations 2016 and UK Electrical Equipment (Safety) Regulations 2016.

The product identified above complies with the EU Directive 2014/30/EU and the UK Electromagnetic Compatibility Regulations 2016 by meeting the protection requirements concerning EMC:

Applied Standards:
EN61326-1: 2013
IEC 61000-4-2: 2008
IEC 61000-4-3: 2006+A1:2007+A2:2010
IEC 61000-4-4: 2004+Corr(2007)+A1:2010
IEC 61000-4-5: 2005+Corr(2009)
IEC 61000-4-6:2008; IEC 61000-4-8:2010; IEC 61000-4-11:2004

The product identified above complies with the EU Directive 2014/35/EU and the UK Electrical Equipment (Safety) Regulations 2016 by meeting the protection requirements concerning Product Safety:

Applied Standards:
IEC 61010-1:2010 (3rd Ed); UL 61010-1:2012
CAN/CSA-C22.2 No. 61010-1:2012

Countries Covered:
EU: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

EFTA: Switzerland, Iceland, Liechtenstein, and Norway

Atlanta, GA, USA
16th August 2021
Place and Date:

Signature of Manufacturer/Authorized Representative:
Craig Goodwin
Printed Name: