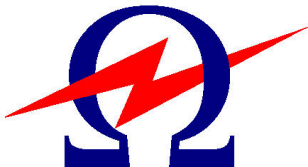

Operating Manual

HVA60



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NOTE:

The information presented in this instruction manual is believed to be accurate and correct for the intended use of this product. Should this instrument be used for other applications and purposes not covered herein, please contact HV Diagnostics Inc to validate its suitability. This manual, all of its contents and the instruments specifications are subject to change without notice.

Warranty Terms

HV Diagnostics Inc provides a one-year warranty from the original purchase date of instrument for all necessary parts and labor. This warranty and our liability is 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. This warranty does not include normal consumable items like lamps, paper rolls, printer ribbons, batteries or other expendable items. No other warranties are expressed or implied. This warranty will be voided in the event of abuse, incorrect operation and use, unauthorized modification or repairs or failure to perform the specified maintenance as indicated in this operation manual.

Safety Precautions and Prerequisites

- All equipment to be high potential tested must be de-energized and properly isolated from all power sources. All equipment grounds must remain in place.
- All high potential test equipment cable connections must be clean and secure. Separate equipment ground connections should be used. Ground integrity must be maintained at all times.
- Avoid testing alone – always have someone available who is able to render first aid and resuscitation if required.
- Do not install substitute parts or make unauthorized modifications to the test instrument or its accessories as this may introduce additional risks and unknown hazards. To ensure that all safety features in the instrument are maintained, it is strongly recommended that all repairs and modifications be performed by HV Diagnostics Inc or one of their authorized repair service centers.
- Before using this test instrument, please read through the operating manual in its entirety. Make sure you clarify any points that you feel unsure or uncertain about before using the instrument. Make sure you are knowledgeable about the proper application, safety, potential hazards involved, and procedures in using the test instrument. The awareness for safety, an integral part of the job, cannot be over emphasized. ***Safety is the responsibility of the user/operator.***
- All personnel operating the high potential test equipment must wear high voltage gloves. Verify the class rating/voltage of all protective devices (e.g. rubber blankets) to ensure proper protection.
- Use suitable barriers, barricades, or warnings to keep persons not directly involved with the work away from test activities. Personnel must be notified to prevent other workers, as well as the general public, from entering the high potential test area.
- Vacuum bottles must only be high potential tested with AC. Dangerous X-rays can be produced when vacuum bottles are high potential tested above their rating with DC.
- Since some electrical apparatus such as cables are essentially capacitors, they can hold a charge after being exposed to a high potential test. These electrical apparatus must therefore remain grounded for sufficient time to drain off any remaining charge. Never assume that a piece of equipment that has been high potential tested is safe to handle without using the necessary safety equipment and grounding procedures. Always treat exposed connectors and conductors as potential electric shock hazards.
- All auxiliary electrical apparatus such as switchgear, surge arresters etc must be isolated from the test source and device under test (DUT).
- The test leads must always be disconnected from the device under test (DUT) before attempting to disconnect from the test equipment. The ground connections must be the first made and the last removed. Any interruption of the grounding connection may create an electric shock hazard.

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1. *Introduction:*

The model HVA is an easy to use, single piece, microprocessor based, field portable, fully automatic DC and VLF (Very Low Frequency) high voltage test instrument developed for the high potential testing of the insulation dielectrics of various types of electrical apparatus.

2. *Application:*

The HVA test instrument is designed to perform high voltage insulation testing of various types of electrical apparatus. These applications include, but are not limited to, those testing requirements involving highly capacitive loads such as cables and generators. Other testing applications include switchgear, transformers, rotating machines, insulators, bushings etc.

In cable testing applications, the HVA is capable of testing both extruded (such as XLPE) and laminated cables (such as PILC). In addition, the HVA can be used for testing both the cables main insulation section as well as the cable's jacket/sheath.

Both DC (positive and negative with respect to ground) and AC VLF Sinewave and Squarewave outputs are included as standard. Test sequences according to the relevant test standards can be automatically or manually implemented. This flexibility allows the instrument to be used on a multitude of different applications requiring either high voltage AC or DC.

The instrument also has a sophisticated Arc management control system allowing users to select various tripping or fault condition modes. The instrument measures and records the capacitance, resistance, dielectric breakdown voltage, RMS current and applied voltage of the device under test.

3. *Special Features:*

- 3.1. **Optimized Frequency Selection:** The HVA has the ability to optimize the frequency when testing capacitive loads. It does this automatically and without having to restart the instrument.
- 3.2. **Fully Automatic Test Sequences:** The HVA can be easily programmed to follow a particular test sequence, applying user defined test voltages, durations, and waveforms.
- 3.3. Easy to use **Menu Guided**, single pushbutton operation.
- 3.4. **True Symmetrical Sinusoidal** and Squarewave outputs waveforms that are *load independent* within the specified load range of the equipment.
- 3.5. **Built in Memory** allows the storing of automatic test sequences and test reports to allow reviewing or downloading of test results to a Windows compatible PC.
- 3.6. **Short Circuit protected** with active arc management regulation to avoid the usual nuisance tripping of other conventional HV test equipment.
- 3.7. **Both Negative and Positive DC Outputs and Variable Frequency VLF** outputs in both Sinewave and Squarewave.
- 3.8. **Real Time Output Voltage Display.** The actual instantaneous output voltage is displayed on the test instrument LCD display.
- 3.9. **Automatic load measurement** without having to make several connections to the device to be tested before high voltage testing can commence.
- 3.10. **No mechanical moving parts or oil** is used in the generation or insulation of the high voltage inside the instrument. This minimizes maintenance and improved durability and reliability of the test instrument.

4. *Safety Features:*

- 4.1. Short Circuit and Transient protected.
- 4.2. Status Display of all important safety interlocks and functions.
- 4.3. Safe easy-to-use operation with Local Emergency Off Switch with key lockout facility.
- 4.4. Remote Emergency Off Interlock: For connection to a foot switch or gate switch or another remote Emergency off pushbutton for example. This interlock also provides a switch facility to connect to a green (HV Off) or red (HV ON) remote external lights (not provided).
- 4.5. Fully integrated discharge and transient circuit to safely ground the DUT after testing and protect the unit from transient over voltages respectively.
- 4.6. Zero start interlock.
- 4.7. Initial load clearance test at reduced voltages to check if any shorts or grounds are present before high voltage testing commences.

5. Specification:

Input Voltage	100 – 240 V (50-60Hz)
Output Voltage	Sinusoidal: 0-62 kV peak, Symmetrical DC \pm 0-60 kV Accuracy \pm 1%
Output Current	0-50 mA (Resolution 1 μ A) Accuracy \pm 1%
Resistance Range	0.1 M Ω ...20 G Ω
Output Frequency	0.02....0.1 Hz in steps of 0.01 Hz (default 0.1 Hz)
Output Load	1.0 μ F @ 0.1 Hz @ 44kV RMS (Approx 10,000 ft of cable)* 2.0 μ F @ 0.05 Hz @ 44kV RMS (Approx 20,000 ft of cable)* 5.0 μ F @ 0.02 Hz @ 44kV RMS (Approx 50,000 ft of cable)*
Output Modes	AC Hipot (VLF) Symmetrical and load independent across full range DC Hipot (plus or negative polarity) Burn / Fault Condition or Fault Trip Mode Jacket / Sheath Testing
Memory	Minimum 50 Test Records Stored in non-volatile built in memory
Metering	Voltage and Current (True RMS and/or peak) Capacitance, Resistance, Time, Flashover Voltage
Duty	Continuous
HV Cable	15' (4.5 m) with Alligator clamps on end (other options available upon request)
Weight	132 lbs (60 kg)
Computer Interface	RS232 connection (Software included)
Dimensions (LxWxH)	18"x20"x14" (450x510x350 mm)

*Based on a typical 100pf/ft (330pf/m) cable.

6. Front Panel Description:

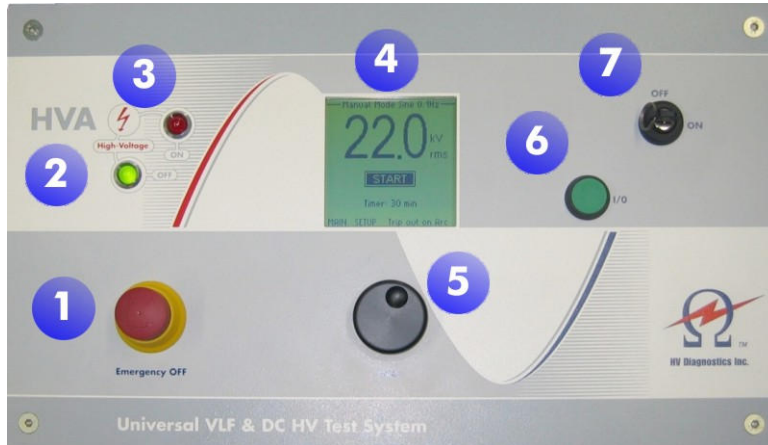


Figure 1:

1	Emergency OFF	Emergency Off with Latch. To release latch, rotate the switch. When depressed, emergency off is activated. When released, emergency off is deactivated and HV may be activated.
2	LED Green	High Voltage is OFF when this light is activated
3	LED Red	High Voltage ON (DANGER) when this light is activated.
4	Graphic Display	128 x128 Backlight Display
5	Navigation Wheel / Knob	ENTER /SELECT – Press Wheel SCROLL UP or DOWN – Rotate left or Right
6	High Voltage ON/OFF	Pressing this button within 10 seconds after High Voltage is Released by test instrument (see display) will activate HV Output.
7	Power ON/OFF Key	Key Switch: This switch turns the unit on and off. Removal of the key in the OFF position will lockout the unit and HV will not be able to be activated. This is a useful feature to prevent unauthorized powering up of the instrument.

7. Side Panel Description:

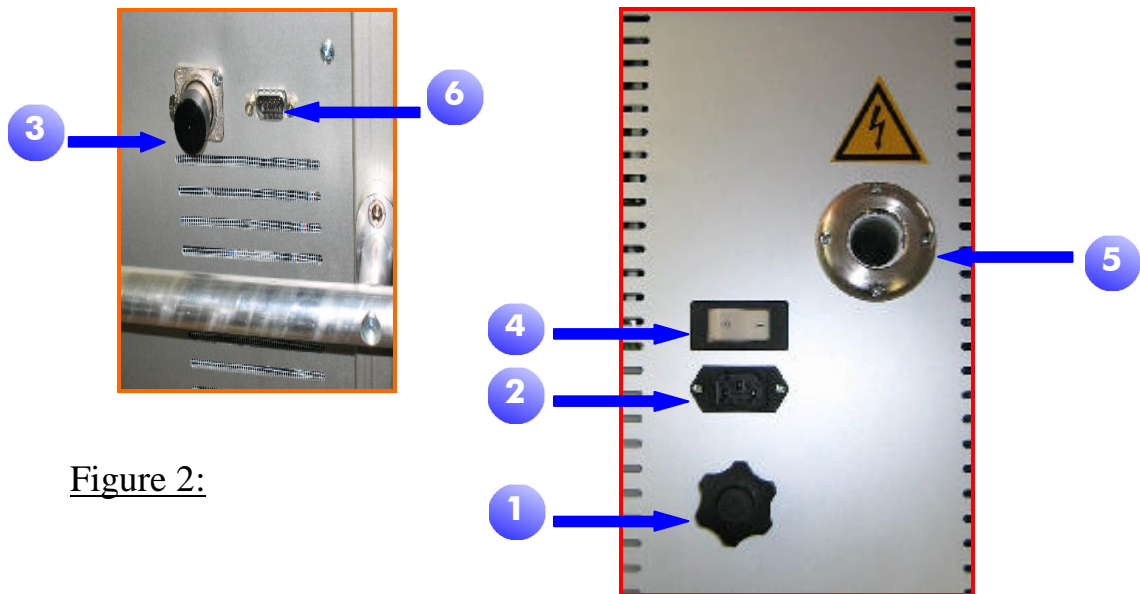


Figure 2:

1	Earth Connection	This is the first connection that should be made and the last to be removed. Connect to the ground of the DUT. Make sure earth cable is securely connected to this connector so that it cannot come loose inadvertently.
2	Main Plug	110V – 230V 50/60 Hz
3	External Remote Control Interlock Plug	PIN1 and PIN2 have to be short circuited to allow HV operation. This port can also be connected to a remote emergency off or other switch such as a gate, foot pedal or dead man switch. For all pin connections – please see Figure 3 below.
4	Main Switch ON/OFF	Integrated magnetic auto-resetable “fuse” 6A. The fuse will reset on turning switch “OFF” and then “ON” again.
5	High Voltage Output Connector	This connects to the HV Test Lead. To Connect HV test lead, screw the plug of the HV test lead into this socket until hand tight and firm. Attention: Never disconnect High Voltage Connector without first ensuring that the device under test has been discharged and grounded and the key switch is off.
6	Communication Port	

PINOUT Connections for External Remote Control Interlock Plug

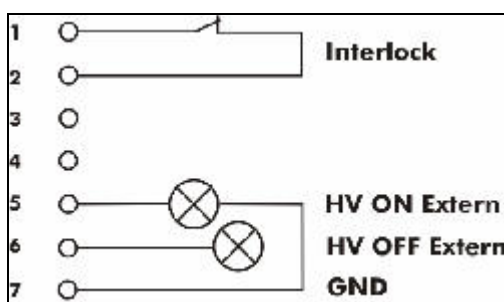
This plug provides an interlock for the remote switch such as a door interlock or dead man switch(s). Connection should be made using 600V rated, greater than 18 gauge or 1mm² twisted pair type cable (not supplied as standard with the instrument). A mating plug is provided with a shorting wire in the event that an external interlock is not used.

The PIN 1 and PIN2 should be closed (shorted) before the instrument's High Voltage can be turned on.

External 12V lamps can be used and connected onto PIN5 (RED lamp recommended for HV is ON) and PIN 6 (GREEN recommended for when HV is OFF). Both lamps will source the 12V from the HVA instrument and both lamps need to be grounded via PIN 7. The maximum output from the 12V supply is 100mA per light, so each lamp must not exceed 1.2 Watts.

PIN1	Interlock
PIN2	Interlock
PIN3	Not in Use
PIN4	Not in Use
PIN5	Lamp High Voltage On
PIN6	Lamp High Voltage OFF
PIN7	GND

Figure 3:



Terms Used:

A description of some Key Terms used in the Instrument User Interface and the Operation Manual:

Term Used	Description
Manual Mode	<p>A Quick Test Mode that minimizes the amount of user supplied information and settings input before starting a test. This mode is useful if you want to quickly perform a test without supplying information of the test for reporting purposes.</p> <p>A report will still be generated if the user selects to Save a report, but most site and customer specific information will be left blank.</p> <p>The manual test can apply DC (both Positive OR negative polarity), VLF Squarewave or VLF Sinewave.</p> <p>The Test Duration can be set.</p> <p>The Burn Mode can be set to ON or OFF with a user defined Dwell time if ON selected.</p>
Automatic Test Sequence	<p>An automatic test sequence is a particular test sequence that has been configured at some point by an operator that allows an automatically controlled sequence of events to occur. The Voltage levels, Voltage Steps, Times, Waveforms, Trip modes can all be predefined in an automatic test sequence.</p> <p>A good application of this is when a particular testing standard needs to be applied to a DUT- such as IEEE, IEC etc.</p> <p>The Instrument will then perform a high voltage test according to the parameters specified in that testing standard. Maintenance, Acceptance and Other Tests can all be preconfigured for use in the field.</p> <p>Once set up, the automatic sequences remain in the memory on the instrument even after a power shutdown.</p> <p>New operators not familiar with a particular testing standard, then just have to select the correct sequence, without having to know or remember the exact requirements of the testing standard. A Setup Automatic test sequence is easy to identify once created by the advanced naming methodology: For Example a typical Automatic Test Sequence may be:</p> <p>“15kV XLPE Cable Maintenance Test Sequence”</p>
Burn Mode: TRIP or ON (ACTIVE)	<p>Two options are available for the BURN MODE setting. TRIP and ON.</p> <p>If an arc is detected during a high potential test, then depending on the setting of the Burn Mode, the Instrument will either TRIP out or Condition the fault under a controlled “Burn” mode.</p> <p>TRIP Setting: The Unit, on detecting a arc, turns off the output voltage, reduces the DUT voltage to zero volts through a discharge circuit and then records the Time to Tripping.</p> <p>BURN MODE ON: This will cause the instrument on the detection</p>

Term Used	Description
	of an arc, to continue to try and energize the DUT. If the arc continues, the instrument will continue to apply power to the arc, thereby conditioning the area surrounding the arc location. If ON is selected, then the operator must specify the DWELL time of the fault conditioning mode. For example, if a 1-minute dwell time is selected, on the detection of arc (if one occurs), the unit will apply power to DUT for one full minute after the arc occurred. The unit will then automatically turns off the high voltage and reduce the applied test voltage to the DUT to zero.
DC	This is a single polarity, selectable for either positive or negative to ground. Normally Negative with respect to ground is used. It is not recommended to use this waveform for testing of extruded cables like XLPE. The leakage current detected during a DC test is due to the resistive components of the dielectric being tested and may include the resistive leakage currents across the terminations.
VLF	<p>VLF stands for Very Low Frequency and is typically between 0.01 and 0.1Hz. The usual frequency selected is 0.1 Hz. That means one cycle every 10 seconds. It may be required depending on the high loading conditions to reduce the frequency to below 0.1Hz. The frequency should however be kept as close to 0.1Hz as possible and this is done by the instrument in the 0.1Hz/Auto mode.</p> <p>SINEWAVE: This is the default VLF waveform that should be applied during testing. A Sinewave is the same waveform found as the power frequency waveform which is also a Sinewave at 50 or 60Hz depending on the country. The Value selected during testing and the measured value is the RMS or Root Mean Square. This is how most AC waveforms are measured. The Peak of a Sinewave is 1.414 multiplied by the RMS value.</p> <p>SQUAREWAVE: The square wave is also sometimes called rectangular, trapezoidal or cosines. The value selected during testing and the measured value is the peak of the Squarewave.</p>
Frequency	AUTO ADJUST: This mode will maximize the output frequency to the highest possible value, load permitting. The instrument can accommodate 1 μ F at 44kV RMS or 62kV Peak (sinusoidal). If the load is higher than 1 μ F then the instrument will automatically reduce the frequency to the next lowest value possible. The frequency selected in this mode will depend on the load and voltage applied during the test, as this will determine the power required. A maximum capacitive load of 10 μ F is possible.

8. *Connecting Up the Test Instrument:*

Safe operation requires strict adherence to the recommended grounding procedures. The HVA test hook-up to a cable or other electrical apparatus requires three connections. It is important that these connections are made correctly, securely and in the correct sequence.

The **110/220V Power Supply Cable** should be connected to the Point 2 of Figure 2. Do not turn the unit ON as yet. If the unit powers up automatically (if the main ON/OFF switch was accidentally left in the ON position) then simply turn off the unit at Main ON/OFF switch (Position 4 of Figure 2). It is always preferable to use a grounded power supply.

The **Ground Cable** should be connected to the HVA instrument at Point 1 as shown on Figure 2. The other end of the ground cable needs to be connected to the DUT's ground point. In the case of a cable, this will be a grounded concentric neutral / ground point of the cable or the station ground bar. See Figure 4.

The **HV Test Lead** is a coaxial conductor made up of the center conductor and an outside Shield Return that should remain at ground potential. The return shield is internally connected to ground in the HV plug that is located at Position 5 of Figure 2.

Connect the HV Test lead to the HVA test instrument by screwing in the single HV Plug, which is located on one end of the HV test cable. Make sure the plug is securely screwed into the HV socket.

Then connect the other end of the HV Test Cable to the device under test (DUT). To do this you will need to connect the HV test lead Shield Return to the ground point of the test object (DUT). The HV Conductor connector will need to be connected to the center conductor of the DUT. In the case of a cable this will be the main center conductor of the cable. See Figure 4. The HV Test Lead connection is made before each test and is the last connection to be made before starting the test.

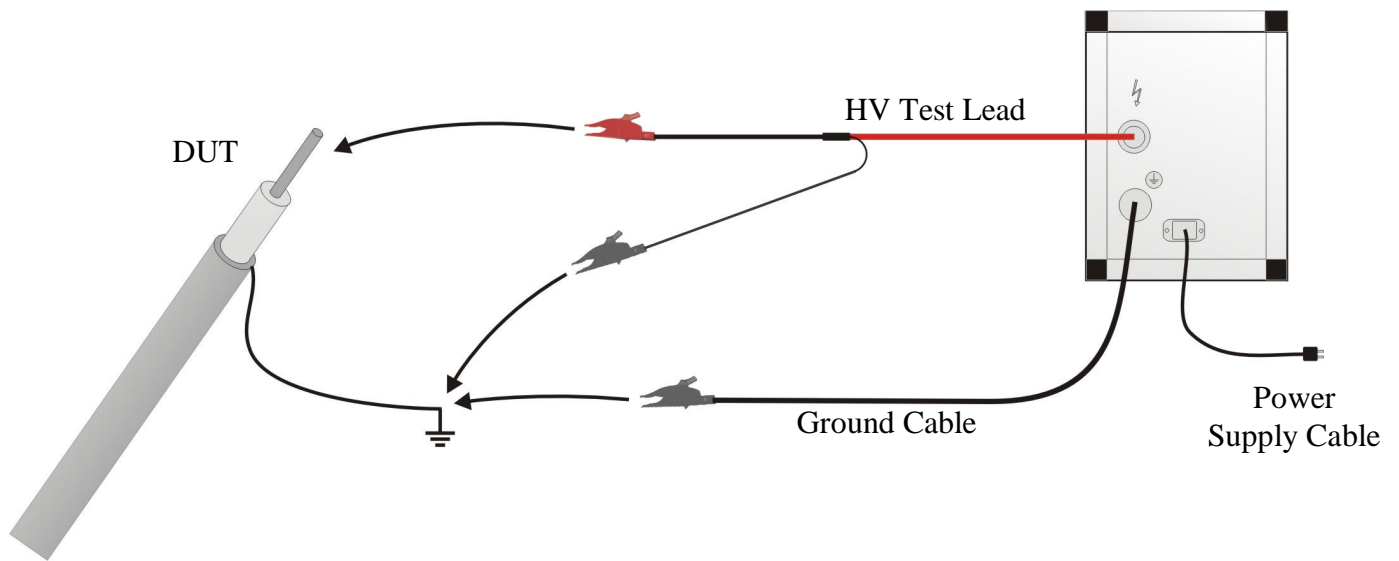
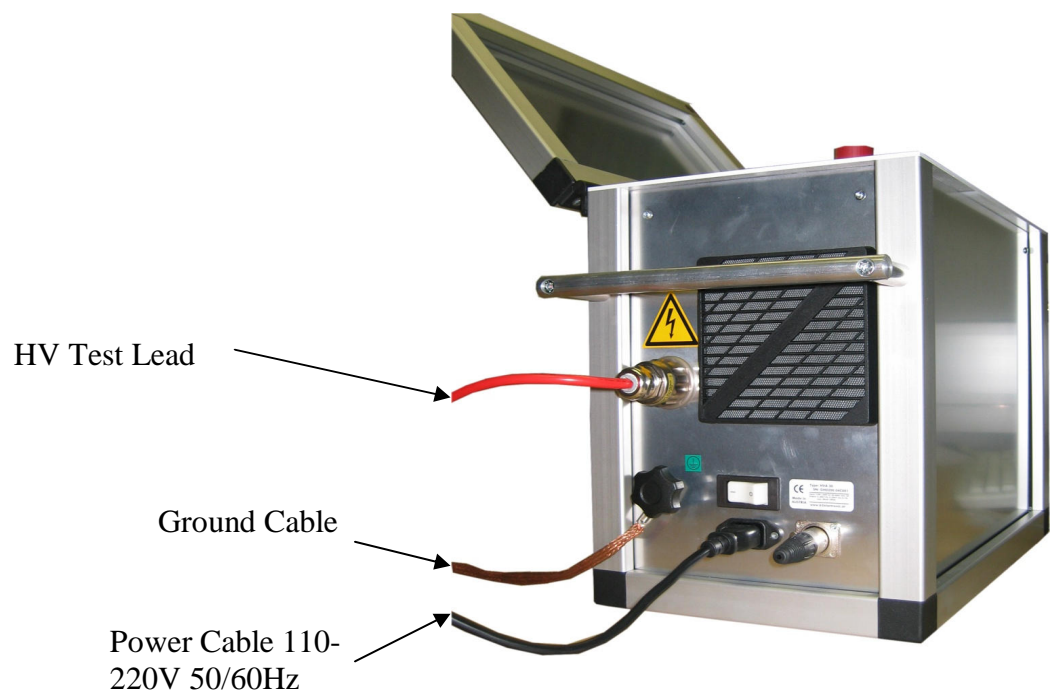


Figure 4: Connection Diagram for Cable

Note: The Ground Cable can be either a green and yellow striped cable or a bare copper braided cable.

The HV Test Lead can be a Red jacketed HV cable with Alligator Clamps on both the HV and Screened Ground terminations or a optional Larger White Neoprene Jacketed cable with a Quick coupling connector for the HV termination and a large alligator for the screened ground connection.



9. *Controlling The User Interface:*

Once all the electrical connections have been made and have been rechecked, turn ON the HVA test instrument. Both the Side panel On/off switch and the key switch on the top front plate need to be in the ON position. After the quick boot up, the HVA60 will display the main Menu screen on the LCD.

To **Select** any item press down / click the main control knob (similar to clicking a computer mouse).

To **Scroll** to different menu items, rotate the main control knob.


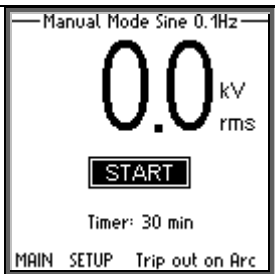
Some Key Text Entry Notations


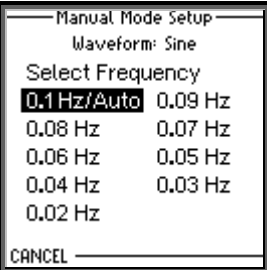

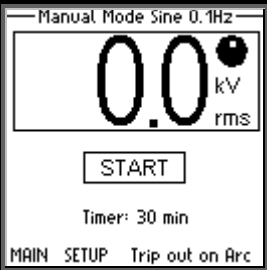
<	Means Backspace and delete
—	Means Space
x	Means Accept Field and Exit



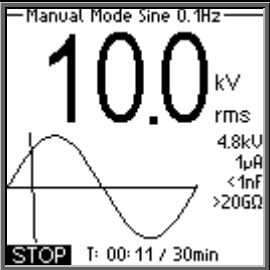
Both Numeric (0,1,2....) and Alpha (ABC...) characters can be selected. Certain fields have restrictions on the number or type of characters that can be used. Rotations of the control knob will allow all those permissible characters to be displayed and selected if required by the operator.

10. Performing A Quick Manual Test:





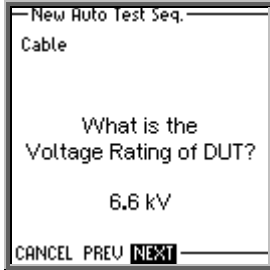
Once all the electrical connections have been made and have been rechecked, turn ON the HVA test instrument. Both the Side panel On/off switch and the key switch on the top front plate need to be in the ON position. After the quick boot up, the test instrument will display the main Menu screen as shown below.

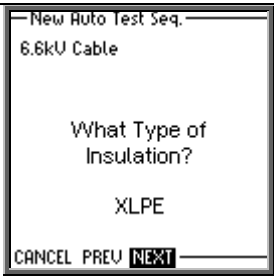
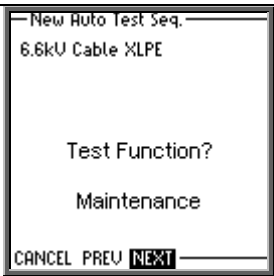
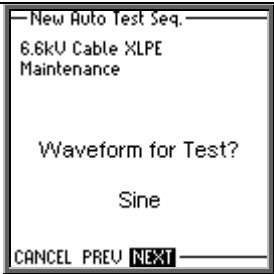
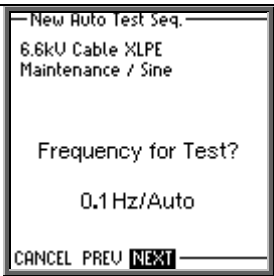

Step	Description	Display	Action
1	Main Menu (First Screen after boot up)		Select <i>Manual Mode</i> on the Main Menu.
2	Manual Mode Startup Screen		<div>1.If you want to start a test immediately with previously used settings then select “<i>START</i>” and Goto Step 6.</div> <div>2.To Setup the applied settings for a Manual test, like waveform type, Scroll and Select “<i>SETUP</i>”</div> <div>3.TRIP OUT ON ARC: If an Arc occurs, the instrument will turn off HV automatically.</div> <div>4.BURN ON ARC: If an Arc occurs, the instrument will continue to apply power to the DUT, conditioning the faulted area.</div> <div>5.<i>Timer</i>: This is the user defined time duration of the test. A value of 30 minutes for example will mean that the test, once started will continue for 30minutes at which point the instrument will automatically terminate the test and disconnect the applied voltage.</div>




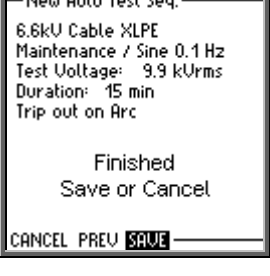
Step	Description	Display	Action
3	Manual Mode Setup: Waveform Type		6. Select the Waveform type you want to apply to the DUT. 7. Select “CANCEL” to go back. (Sinewave has been selected in this example.)
4	Manual Mode Setup: Select Frequency If Sinewave is chosen, you need to select frequency.		Select Frequency for Sinewave. 0.1Hz/Auto is normally chosen. Select Cancel to return.
5	Manual Mode Setup: Test Duration		Select the Duration the Test Time.
6	Manual Mode Start		Press the Start Button to start the test. Note: It is possible to set the applied test voltage before initiating the Start of the test.

Step	Description	Display	Action
7	Manual Mode HV Activate Screen	 <p>ATTENTION! High Voltage! Press I/O Button to switch ON High Voltage.</p>	<p>Press the Green I/O Push button to activate High Voltage.</p> <p>Note that there is a 10 second window to do this before screen goes back to step 6 above.</p> <p>To escape, rotate main control knob to go back to Step 6 above.</p>
8	Manual Mode Active MANUAL MODE	 <p>Manual Mode Sine 0.1Hz</p> <p>0.0 kV rms 0.0kV 0.0μA</p> <p>Startup</p> <p>STOP T: 00:04 / 2min</p>	<p>The applied output voltage waveform that was selected will graphically appear on the screen. The load parameters will also be measured and displayed. The measured RMS voltage and current will be shown after one cycle has elapsed.</p>
9	Manual Mode Active MANUAL MODE (Cont.)	 <p>Manual Mode Sine 0.1Hz</p> <p>10.0 kV rms 4.8kV 1μA <1nF >20GΩ</p> <p>STOP T: 00:11 / 30min</p>	<p>The measured voltage (of 10kV rms) is shown. The Timer counts down. The measured load parameters are displayed.</p> <p>Pressing the Control knob activates the <i>STOP</i> button and terminates the test.</p>




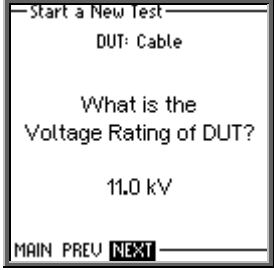
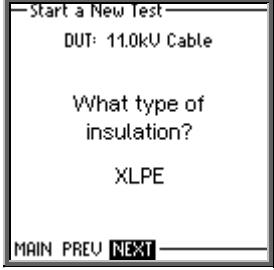
11. Setting up an Automatic Test Sequence:






Step	Description	Display	Action
1	Main Menu (First Screen after boot up)		Select <i>Reports and Setup</i> on Main Menu.
2	Reports Setup Menu		Select the <i>Edit Auto Test Seq.</i> to add a new test sequence.
3	Auto Test Seq. Edit/Create/New Automatic Test Sequence		Select <i>NEW</i> to create a new Automatic Test Sequence
4	Auto Test Seq. Specify DUT		Specify the DUT (Device under Test). Rotate the knob to toggle to different electrical apparatus such as Cable, Motor, Generator, etc.
5	Auto Test Seq. Specify Voltage Rating of DUT: <Note: This is not the applied test voltage.>		The operator needs to specify the DUT rated voltage. This is not the test voltage that will be applied but is used for reporting purposes, e.g. rated line voltage in this example is 6.6kV.

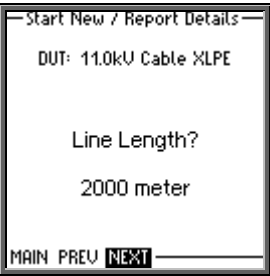
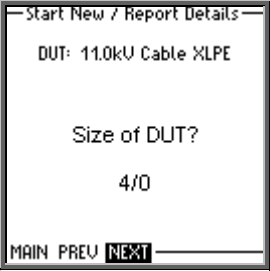



Step	Description	Display	Action
6	Auto Test Seq. Specify Type of Insulation of DUT		Scroll through some options of typical DUT's insulation types like XLPE, PILC, EPR, PVC, etc. HYBRID insulation is for a combination of several types of insulation.
7	Auto Test Seq. Specify Type of Testing to be Performed		Scroll to select either <i>Acceptance</i> or <i>Maintenance</i> to choose the type of test to be performed.
8	Auto Test Seq. Specify Type of Waveform		Select the Waveform type to be applied to the DUT. Scroll to select either: <i>Sine (for Sinewave)</i> <i>Squarewave</i> <i>DC Plus</i> <i>DC Minus</i>
9	Auto Test Seq. Specify the Frequency		Select the Applied Frequency if Sinewave or Squarewave was chosen above. 0.1Hz/Auto is normally chosen.
10	Auto Test Seq. Specify Number of Steps		Enter the number of voltage steps to be applied to the DUT. For example: If the test requires two voltage levels to be applied to the DUT; then select 2 <i>Steps</i> . <i>Example: 4kV and 8kV</i>

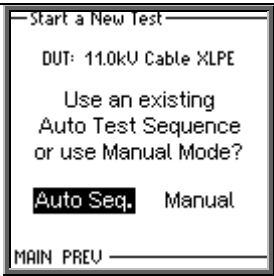
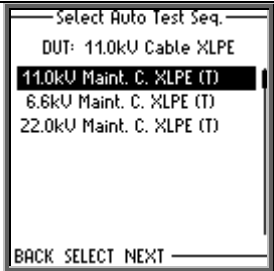



Step	Description	Display	Action
11	Auto Test Seq. Specify Voltages for Each Step	 <p>New Auto Test Seq. 6.6kV Cable XLPE Maintenance / Sine 0.1 Hz Test Voltage: 1.0 kUrms Duration: 15 min Step 1 Test Voltage 9.9 kVrms CANCEL PREV NEXT</p>	<p>Enter the voltage level for each individual step.</p> <p>The instrument will automatically select the next step to be set until number of specified steps have been defined.</p>
12	Auto Test Seq. Specify Test Duration of Each Step	 <p>New Auto Test Seq. 6.6kV Cable XLPE Maintenance / Sine 0.1 Hz Test Voltage: 9.9 kUrms Duration: 15 min Step 1 Duration? 15 min CANCEL PREV NEXT</p>	<p>Enter the test duration in minutes for each step.</p> <p>The instrument will automatically select the next step to be set until number of specified steps have been defined.</p>
13	Auto Test Seq. Specify the Current Limit	 <p>New Auto Test Seq. 6.6kV Cable XLPE Maintenance / Sine 0.1 Hz Test Voltage: 9.9 kUrms Duration: 15 min Current Limit? Trip out on Arc CANCEL PREV NEXT</p>	<p>8. TRIP OUT ON ARC: If an Arc occurs, the instrument will turn off HV automatically.</p> <p>9. BURN ON ARC: If an Arc occurs, the instrument will continue to apply power to the DUT, conditioning the faulted area.</p>
14	Auto Test Seq. Save the Test Sequence	 <p>New Auto Test Seq. 6.6kV Cable XLPE Maintenance / Sine 0.1 Hz Test Voltage: 9.9 kUrms Duration: 15 min Trip out on Arc Finished Save or Cancel CANCEL PREV SAVE</p>	<p>The test sequence can now be saved. The new test sequence will now be permanently stored in the instrument's memory for future use even if unit is powered off and then on again.</p>


12. Full Test Sequence – Extended Reporting:

Step	Description	Display	Action
1	Main Menu (First Screen after boot up)		Select <i>Start A New Test</i> on the Main Menu. OR select <i>Use Last Test Sequence</i> if that is what you want to initiate.
2	Report Active (Yes or No)		If <i>Yes</i> is selected then a report will be generated. If <i>No</i> is selected then a test can still be performed but no a report will be stored.
3	Specify DUT		Specify the DUT (Device under Test). Rotate the knob to toggle to different electrical apparatus such as Cable, Motor, Generator etc.
4	Specify Voltage Rating of DUT: <Note: This is not the applied test voltage.>		The operator needs to specify the DUT rated voltage. This is not the test Voltage that will be applied but is used for reporting purposes e.g. the rated ling voltage. In this example the voltage is 11kV.
5	Specify Type of Insulation of DUT		Scroll through some options of typical DUT's insulation types like XLPE, PILC, EPR, PVC etc. A <i>HYBRID</i> insulation is for a combination of several types of insulation.






Step	Description	Display	Action
6	Report Title		<p>This is the Title of the test report. It is also used to store the file of the report in memory.</p> <p>This is typically the Cable number / ID for a cable test. The name allows for both alpha and numeric values and is totally up to the operator.</p>
7	Specify a Phase		<p>This field allows the operator to specify the phase of the circuit being tested. Such as A or RED phase. The operator can select more than one phase if required.</p>
8	Specify Company Name		Self-Explanatory.
9	Specify Region Name		Self-Explanatory.
10	Specify a Station Name		Self-Explanatory.

Step	Description	Display	Action
11	Specify the Line Length		This field has nothing to do with any calculation of measurement. It is purely used for reporting purposes. The units of measurement are feet or meters depending on the <i>Units</i> selected in the <i>Settings</i> menu.
12	Specify the Size of the DUT		For a cable this will be the size of the conductor typically. For a Motor this may be the Horse Power or Kilowatts.
13	Specify the Manufacturer Name		Self-Explanatory.
14	Specify a Work Order		Self-Explanatory.
15	Specify the Operator Name		Self-Explanatory.



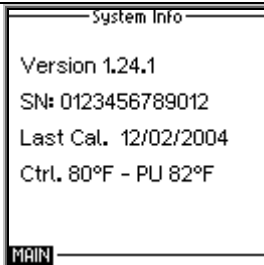
Step	Description	Display	Action
16	Select an Automatic Test Sequence or Manually Perform the Test	 <p>Start a New Test DUT: 11.0kV Cable XLPE Use an existing Auto Test Sequence or use Manual Mode? Auto Seq. Manual MAIN PREV</p>	<p>Selecting the AUTO SEQ. will allow the operator to select a test sequence from a list of existing predefined test sequences. GOTO Step 17</p> <p>Selecting MANUAL will allow the operator to perform a test manually. To continue please GOTO Section 11 Step 2 above.</p>
17	Select the AUTO TEST SEQUENCE	 <p>Select Auto Test Seq. DUT: 11.0kV Cable XLPE 11.0kV Maint. C. XLPE (T) 6.6kV Maint. C. XLPE (T) 22.0kV Maint. C. XLPE (T) BACK SELECT NEXT</p>	<p>Scroll down to select the test sequence from the list of Test Sequences. If the Test Sequence required is not listed then an Automatic Test Sequence will need to be set up. Please see page 22.</p>
18	TEST SEQUENCE DETAILS	 <p>Start Auto Test Seq. 11.0kV Cable XLPE Maintenance Test Sequence Test Voltage: 13.0 kUrms Duration: 15 min Waveform: Sine 0.1 Hz Trip out on arc Reporting active MAIN BACK START</p>	<p>The parameters of the Test Sequence are displayed to allow the operator to view them before allowing the instrument to automatically apply them.</p>
19	HV Activate Screen	 <p>ATTENTION! High Voltage! Press I/O Button to switch ON High Voltage. [Warning Icon] [Lightning Bolt Icon]</p>	<p>Press the Green I/O Push button to activate High Voltage.</p> <p>Note there is 10 seconds to do this before screen goes back to step 18 above.</p> <p>To escape, rotate main control knob to go back to Step 6 above.</p>
20	Active Automatic Mode	 <p>Auto Test Sine 0.1Hz 0.0 kV rms 8.2kV 5.3uA 1.19nF 348MΩ S1/1 STOP T: 00:00 / 15min</p>	<p>The applied test sequence that was selected will be applied to the DUT. The output waveform will graphically appear on the screen. The load parameters will also be displayed. The measured RMS voltage and current will be shown after one cycle has elapsed.</p>

Step	Description	Display	Action
21	Test Complete		After an Automatic Test is completed, the results can be viewed on the screen if selected.

13. Reports:

Step	Description	Display	Action
1	Main Menu (First Screen after boot up)		Select <i>Reports and Setup</i>
2	Reports and Setup Screen		
3	View Reports		The Reports are listed in Date order. The total number of Reports is shown in the heading - in this case a total of 6 reports are in memory. Currently report Number 6 of 6 is displayed. The Page number is on the top right of the page for that particular report. In this case page 1 of 3 of report number 6.
4	View Report Pages		Page 2 of 3 of report number 6.
5	View Report Pages		Page 3 of 3 of report number 6.

14. Settings Menu:

Step	Description	Display	Action
1	Main Menu (First Screen after boot up)		Select <i>Reports and Setup</i> on Main Menu.
2	Instrument Settings		<p>Select <i>Set Date and Time</i> to set the Date and Time.</p> <p>Reporting: Extended: for full reporting functionality. Basic: for minimum reporting functionality. Allow for quick startup and testing with the bare minimum of information required to make up the test report.</p> <p>Startup: Select the default startup screen either Main Menu or Manual Mode.</p> <p>Language: Select which Language to use for the user interface.</p> <p>System Info: For information such as temperature and the latest installed firmware version and the last calibration date.</p>
3	System Info		System Info: For information such as temperature and the latest installed firmware version and the last calibration date.

15. *Optional Accessories:*

- a. **HV Test Lead with Quick Coupling Connector <Part # 800 004> and Vise Grip Connector <Part # 700 006>.**
- b. **ATA Approved Transport Case <Part # 800 005>:** This is a protective case used for the transport and shipping of the HVA60.
- c. **Vacuum Bottle Circuit Breaker Tester Upgrade <Part # 800 010>**
- d. **External Discharge and Grounding Rod <Part # 800 008>**
- e. **Flashing Remote HV Indication and Emergency Stop Interlock <Part # 700 009>**