HIGHTEST TECHNOLOGY LTD.

HARE SERIES

INSTRUCTION MANUAL

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DOCUMENTATION PRECEPTS

The following symbols and messages are used throughout this document and are according to ANSI Z535.6 (Product Safety Signs and Labels).

⚠ WARNING — Indicates a hazardous situation that, if not avoided, could result in death or serious injury

⚠ CAUTION — Indicates a hazardous situation which if not avoided could result in minor or moderate injuries

NOTICE — Indicates information considered important, but not hazard related (e.g. messages relating to property damage)

SYMBOLS USED ON THE FRONT PANEL OF THE DEVICE

The following symbols are used on the front panel of the device.

Indicates the warning about removal of battery from the device after using the device.

Indicates USB 2.0/1.1 Standard-A available on the device for communication purposes.

IMPORTANT SYMBOLS USED ON THE DISPLAY OF THE DEVICE

Following are some important symbols used on the main menu of the display.

Indicates the charge status of the removable battery.

Indicates when an external USB is connected to the device.

Indicates the 'Bluetooth' is active on the device.

Features

- Portable Contact Resistance Tester
- 0.4A to 100A Adjustable test current (HARE-100)
- 0.4A to 200A Adjustable test current (HARE-200)
- 0.4A to 300A Adjustable test current (HARE-300)
- Up to 5 Ω resistance measurement
- 0.1 μΩ resolution
- Automatic discharge
- High EM interferences protection
- Battery powered
- Ultra-fast measurement
- Light-weight
- 4.3" Resistive touch colour display (visible under

Technical Specifications

Measurement Parameters	Contact Resistance				
Measurement Modes	Static Resistance				
Adjustable Test Current	0.4A to 100A (HARE-100) 0.4A to 200A (HARE-200) 0.4A to 300A (HARE-300)				
Measurement Range	0.1 μΩ to 5 Ω				
Accuracy & Resolution	Nominal Resistance	Full Range Display	Resolution	Recommended Test Current	Typical Accuracy
	1 mΩ	999.9 μΩ	0.1 μΩ	50 – 300 A	±0.1% rdg ± 0.1% Fs
	10 mΩ	9.999 mΩ	1 μΩ	10 – 300 A	±0.1% rdg ± 0.1% Fs
	100 mΩ	99.99 mΩ	10 μΩ	5 – 30 A	±0.1% rdg ± 0.1% Fs
	1 Ω	999.9 mΩ	0.1 mΩ	1 – 3 A	±0.1% rdg ± 0.1% Fs
	5 Ω	4999 mΩ	1 Ω	0.4A	±1% rdg ± 1% Fs
Power Supply to charge the battery	100-240 V 47/63 Hz				
Memory	Up to 1000 records				
Test Plan	Up to 6 plans				
PC Software	DMP Software (Reporting only; no remote controlling)				
Display	4.3-inch TFT touch display				
Dimensions	12.5" x 10.1" x 6.0" (318 mm x 257 mm x 152 mm)				
Weight	3 kg				
Working Temperature	-10 °C to + 60 °C				
Storage Temperature	-30 °C to + 70 °C				
Humidity	95% RH non condensing				
Protection Class	IP67 (case closed)				
Set of Package	HARE device, Rechargeable Battery, Power Cord, 1.5m Measurement Cable Set, USB				

GENERAL INSTRUCTIONS

NOTICE

This guide applies to the HARE-100, HARE-200 and HARE-300 Digital Micro-Ohmmeters (aka HARE Series). The operating procedure is almost the same for the three models, and any differences between these models are clearly described in this manual.

⚠ WARNING

Before turning on the device, please read all instructions and follow the instructions as it works. With the purchase of the device, the user assumes all responsibility for the operation of the device. HIGHTEST Technology Ltd. It assumes no responsibility for the misuse of the device or the compliance of safety precautions.

⚠ CAUTION

All test personnel measuring with the HARE Series must be trained and competent to enter substations and fully understand the requirements for performing the turn ratio tests. All test personnel should stay away from high voltage equipment directly or indirectly during testing.

⚠ WARNING

DO NOT OPERATE THE EQUIPMENT WHILE CHARGING

HARE Series is solely a battery powered equipment. Which means, users MUST NOT perform/make tests while the device is connected to the main for charging the battery. The 100-240 VAC/47-63 Hz power input is only to charge the removable battery of the equipment.

DO NOT MODIFY THE TEST EQUIPMENT

To avoid the risk of unknown hazards in addition to possible hazards, do not make any modifications to the device and do not use non-original accessories. To ensure that all the safety features of the design are maintained, it is strongly recommended that repairs be made only by HIGHTEST factory service personnel or authorized service. Unauthorized modifications can cause safety hazards and will void the manufacturer's warranty.

WORK SAFETY

Never assume that equipment is safe to handle without using the necessary safety precautions. All procedures must comply with local safety regulations. All equipment must be inspected for damage before use. Damaged equipment must not be used. Avoid testing alone. In the event of an emergency another person's presence may be essential. Make sure that the transformer to be tested is de-energized.

⚠ CAUTION

ENVIRONMENT CRITERIA

HARE Series is designed for both indoor and outdoor operations.

Humidity: Confirm that relative humidity is less than 90% and non-condensing.

Temperature: Confirm that ambient temperature is within the acceptable range as specified in the technical specification.

Altitude: 2000m (6562 ft) to fully safety specifications.

INSTRUMENT CONNECTION AND ACTIVATION

The removable battery for HARE Series will always be supplied separately alongside the equipment. Users need to insert the battery first to use the equipment. The input power supply socket available on the device is ONLY to charge this battery. Users must not perform any tests while the battery is under charging/when the device is connected to the main supply.

When the removable battery is charged, the HIGHTEST device does not need to be connected to a power supply. Use only original power cords supplied with the devices to charge the battery.

- Input Power Supply to charge the battery: 100-240 V (Permissible deviation: ±15%), 47/63 Hz
- Battery:
- Power Consumption:

CONNECTING AC POWER SUPPLY

Verify that the AC power supply meets the HIGHTEST device input requirements.

NOTICE

CHARGING INTERNAL BATTERY

While the battery is inside the device, users can connect the power cord to the main supply. Once the AC power supply is connected, the battery will automatically begin charging.

⚠ CAUTION

INSERTING AND REMOVING THE BATTERY

Insertion and removal of the battery should only be performed by trained personnel. Unauthorised modifications can cause safety hazards and will void the manufacturer's warranty. HIGHTEST Technology Ltd. It assumes no responsibility for the misuse of the device or the compliance of safety precautions.

Follow the steps to insert and remove the battery of HARE Series equipment.

1. Unscrew the battery cover lid using a screw driver.

2. Insert the batteries with the + and – ends facing down as shown.

3. Close the battery cover and screw it.

4. If the battery requires charging, connect the device to main supply with the power cord supplied along with the equipment.

5. Once the battery is fully charged, remove the power cord and can be used for measurement.

STORAGE, MAINTENANCE & REPAIRS

The battery MUST BE REMOVED from the device after using it every time prior to storage. Make sure to remove all measurement cables and/or power cord from the device before opening the battery lid. Repairs must be done only by an authorized personnel (Hightest personnel or authorized agents of Hightest).

Users must follow the steps to remove the battery from the device;

1. Unscrew the battery cover lid using a screw driver.

2. Remove the battery from the device carefully.

3. Store the battery separately from the device.

4. Close the battery lid and screw it tight.

Do not store the HIGHTEST device outdoors in extreme weather conditions. The storage temperature must comply with the temperature range specified in Section "Technical Data". Repairs and maintenance should only be performed by a HIGHTEST technician or authorised personnel of HIGHTEST.

CLEANING

Make sure to clean the device front panel in routine basis to avoid the accumulation of dust or dirt on the surface of the device. Use only dry fabric to clean the surface. Do not use any wet tissue on the touch display.

Scope of Supply

If any of the following content is missing or damaged, please contact your authorized distributor or HighTest Technology Ltd.

Standard Content List

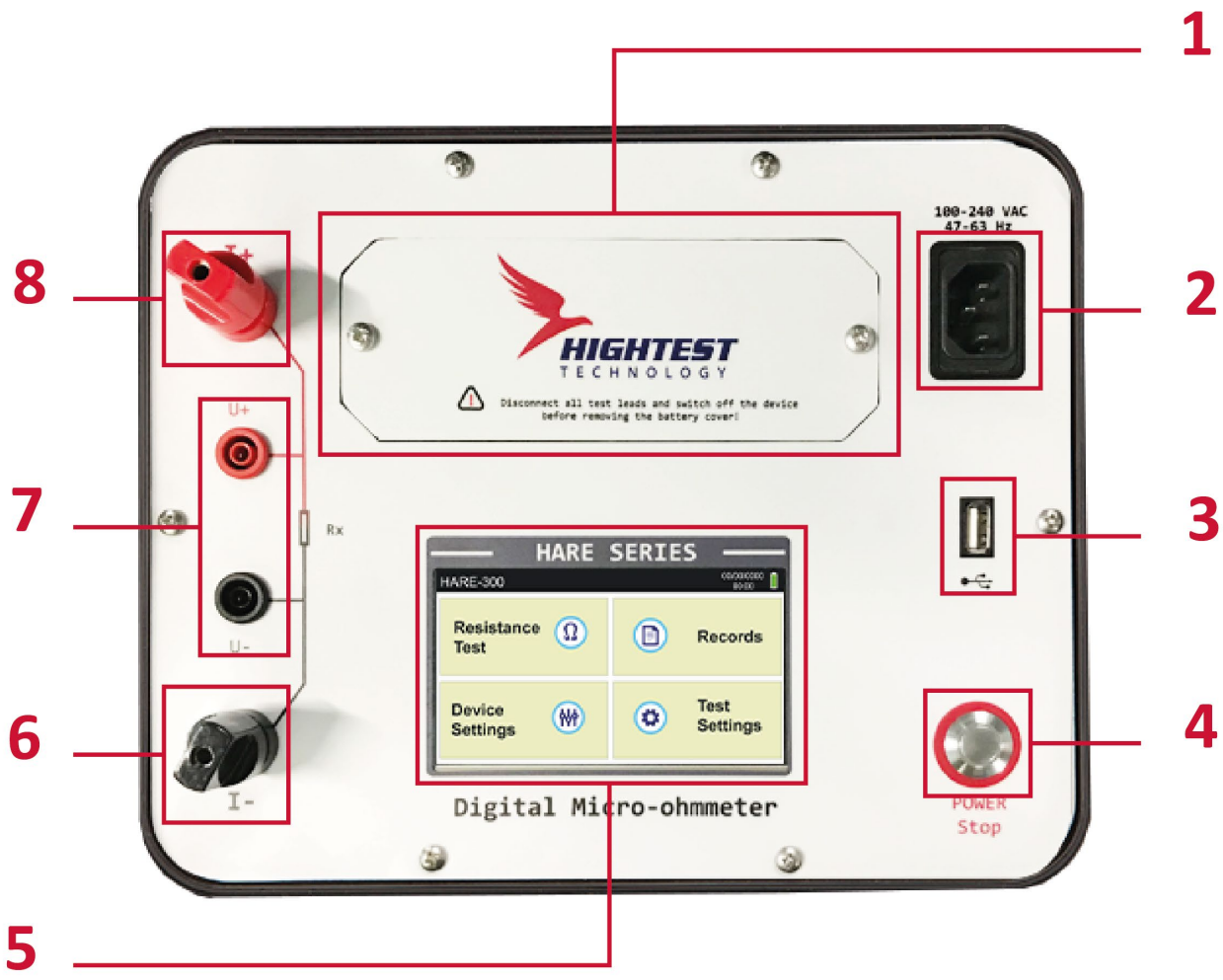
HARE Series Device	: Contact Resistance Tester
PWC-01	: 1.5 m Power Cord
TEST CABLE SET	: 1.5 m test cables each for I+ and I-
DMP Software	: Zipped folder on HIGHTEST USB
User Manual (Soft Copy)	: Soft copy saved on HIGHTEST USB
USB flash drive (Pen drive)	
Soft Carrying Bag	

Overview

HARE Series is a micro-ohmmeter manufactured by using advanced engineering technologies which can apply up to 100A/ 200A/ 300A test current. With its easy-to-use software, HARE Series can easily measure contact resistance of circuit breaker, shunt and disconnector by applying adjustable test current up to 100A/ 200A/ 300A depending on the model. HARE Series can measure from 0.1 μ Ω to 5 Ω and is capable of measuring static resistance of the circuit breaker's contact points. HARE Series can also measure idle circuit breakers. The 4.3-inch colour touch screen displays all measurement results on a single screen. With a user-friendly interface, the HARE Series guides operators to perform tests quickly. HARE Series' flash memory feature allows storing around 1000 records. Users can copy test records by using a USB drive. HARE Series is a very compact, rugged device with IP67 protection class (case closed) which weighs only 3 kg.

Section 1

Front Panel Components



1. Battery Lid

- To insert and remove the rechargeable battery of HARE.
- Please refer to the warning section before opening the battery lid.

2. Power Connector

- HARE Series' AC power input
- The input voltage should be between 100-240Vac 47-68 Hz.

3. USB Connection Port

- USB 2.0/1.1 Standard-A, to connect external USB flash drive to save the test results and to update software.

4. Power Button

Power Button has some specific tasks apart from the intended purpose.

- To turn ON the device.
- Pressing the power button for 2 seconds while the device is ON will switch off the device automatically. (Display status is negligible.)
- You can switch the device OFF by a single press on the power button while the device is on the main page.
- Can be used as a "**Back**" button on pages other than the home page.
- Can also be used as an "**Emergency Stop**" while performing the test.

5. Display

- 4.3-inch Resistive Touch TFT Display great convenience to users.
- It allows HARE Series device to show all measurement results on a single screen.
- Visibility in daylight and low light levels
- Able to adjust the brightness level.

6 & 8. Current lead Connectors

Make sure the current lead connectors are properly connected before starting the test.

- Snap the test cable into place and adjust the screws to tight it before testing
- To remove the test cable, loosen the screw and detach the cable connection.

7. Voltage-sensing connector jacks

Plug voltage-sensing connector jacks in resistor R_x terminals on the front panel and make sure the test cable is properly connected before starting the test. The current-carrying cables and voltage sensing cables are terminated with heavy-duty alligator clamps to connect to the device being tested.

Section 2

Operating Instructions

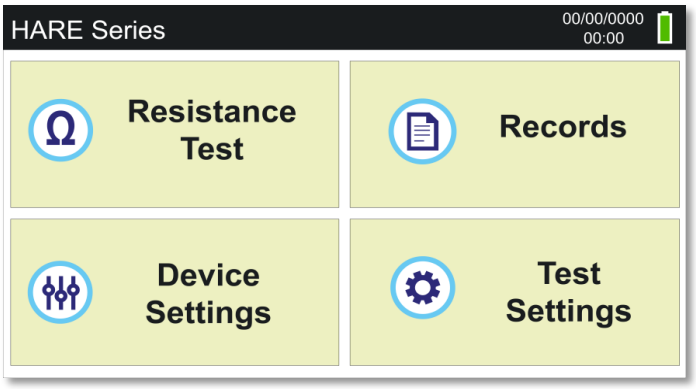
1. Instructions

- Insert the battery and charge it completely before using the device.
- Once the charging is over, remove the device from the main supply and can be used for testing.
- Connect the test cables to control-panel according to the instructions described above.
- Attach current test-cable clamps to opposite terminals of the resistive load being tested.
- Switch ON the device by pressing the power button of the device.
- Apply the procedures described below and introduce the test parameters to the instrument.
- Finally, you can test by pressing the "**Test**" tab, save the test results in the device memory or print them.

!DO NOT USE HARE CONNECTED TO THE MAIN SUPPLY!

Section 3

Display Introductions



Home Page

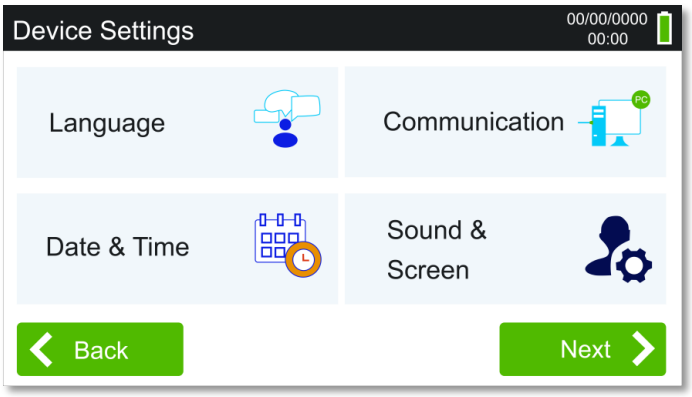
- To perform resistance testing.
- To access test records.
- To alter device settings.
- To add test settings and create test templates.
- Indicates the current date and time
- Indicates when the USB memory is inserted.
- Indicates the battery level and status
- Critical battery warning. If the battery is at/below 15%, the display shows the warning. If the battery is at critical level, no test can be performed.

1. Device Settings

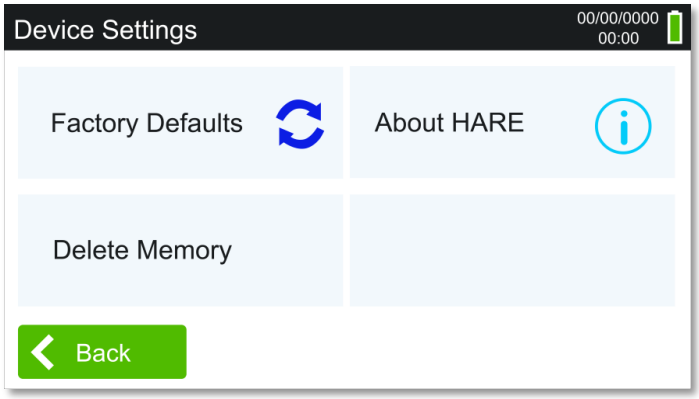
In this menu, the device setting can be altered. Device settings consist of 2 pages. You can use the '**Next**'/ '**Back**' tabs to navigate through the pages. You can make the following settings under this menu:

1. Language Settings
2. Date and Time Settings
3. Communication Settings
4. Sound and Screen Settings
5. Factory Defaults
6. About HARE
7. Delete Memory

Following is the page 1 of '**Device Settings**'



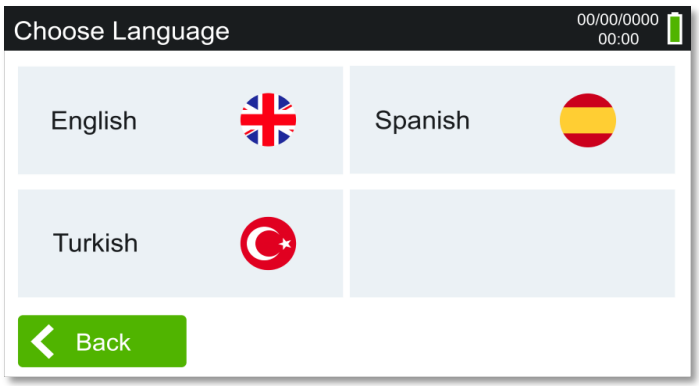
Press the '**Next**' tab to navigate to page 2 of '**Device Settings**'



1.1 Language Settings

HARE series supports multiple languages including EN, ES, TR .

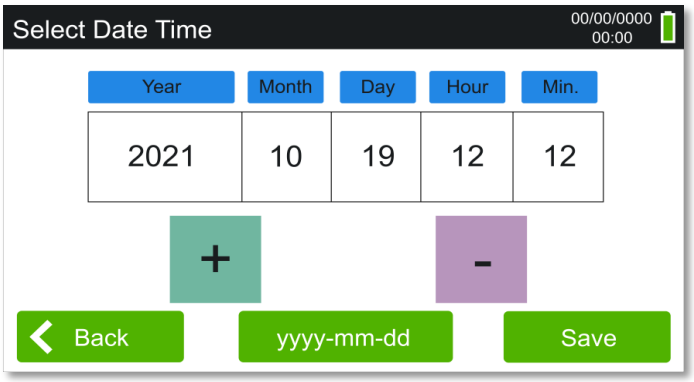
- Press the '**Language**' tab to choose the desired language for changing the default language of the device.
- The active language is marked in red.
- Exit the menu by using the '**Back**' tab.



1.2 Date and Time Settings

HARE has a high accuracy real-time clock.

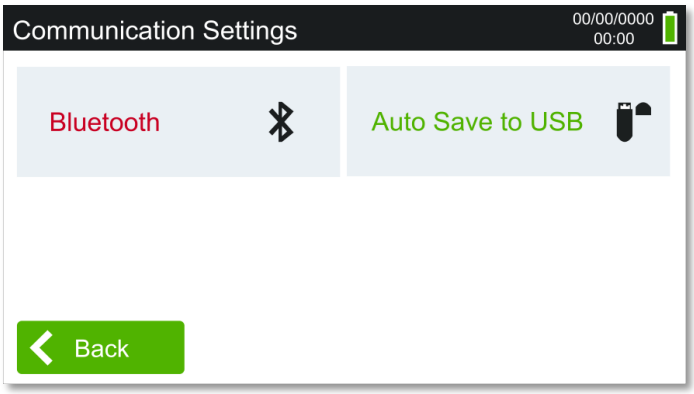
- Press '**Date & Time**' tab in the '**Device Settings**' menu to change date or time.
- Choose the parameter to be changed and then use '+/-' tabs to alter it.
- Press '**Save**' after making the necessary changes.



1.3 Communication Settings

HARE has Bluetooth and a USB port to allow external communication.

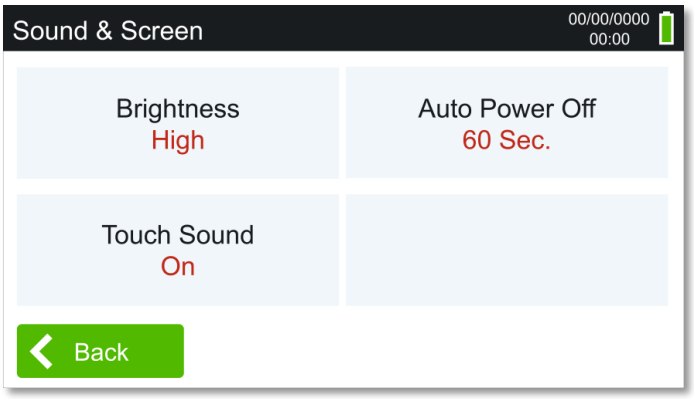
- The chosen option is highlighted in Green.



1.4 Sound and Screen Settings

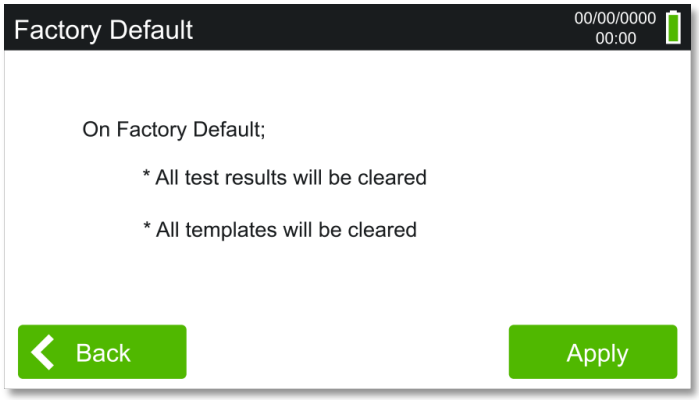
To change Sound and Display settings.

- **Brightness**: The brightness of the display can be set to high, medium and low. Keep the screen brightness to a minimum for longer battery life.
- **Touch Sound**: To turn ON/OFF the touchpad sound.
- **Auto Power off**: To set a time to automatically turn OFF the device after a certain seconds/minutes of inactivity.



1.5 Factory Default

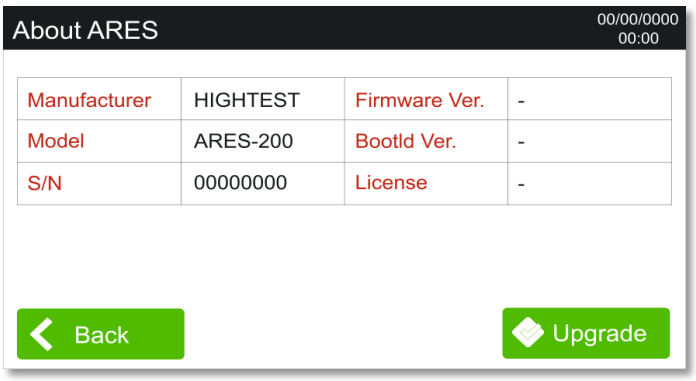
To reset the device to factory default settings. All the saved test results and templates will be permanently deleted.



1.6 About HARE

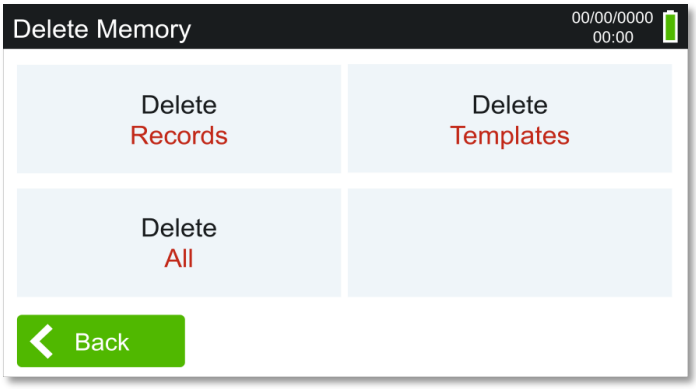
Information about HARE is available.

Download the latest version of HARE's firmware version from www.hightest.co.uk for update and by using a USB, you can update the device by pressing the '**Upgrade**' tab.



1.7 Delete Memory

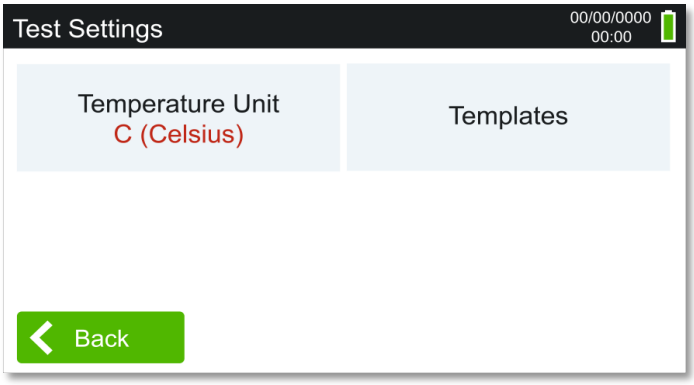
To delete either Records or Templates or both at once using this menu.



2. Test Settings

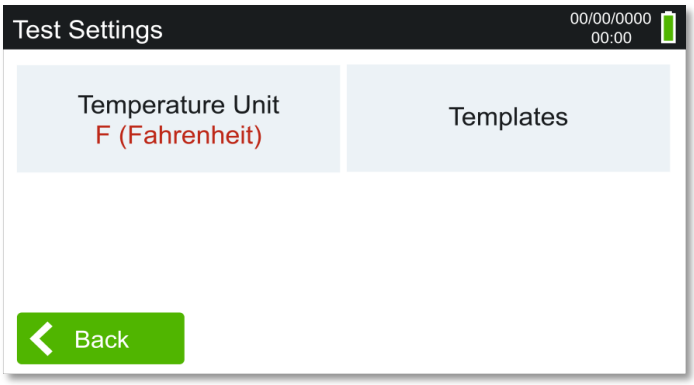
Available on the **"Home Page"** to make necessary settings related to the test to be performed. Test settings consist of one page. Pressing on 'Test Setting' tab directed you to the following screen where you can make the following settings under this menu:

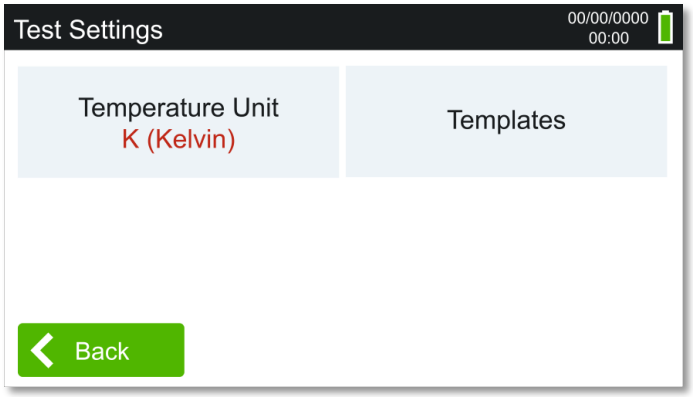
- Select appropriate unit of temperature from Celsius, Fahrenheit and Kelvin.
- Add Templates



2.1 Temperature Unit

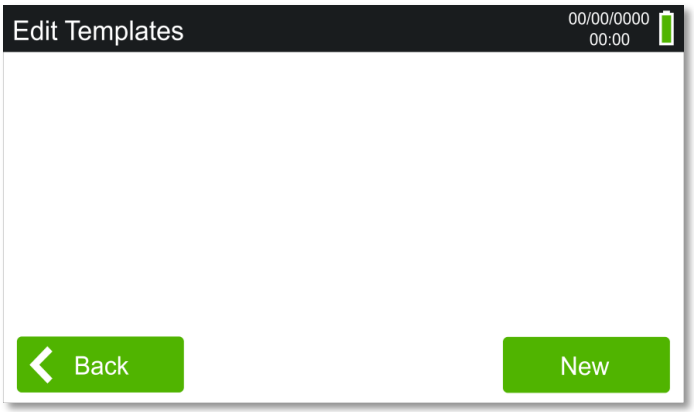
Users can choose temperature units among **'°Celsius'**, **'Kelvin'** and **'°Fahrenheit'** according to their convenience.





2.2 Templates

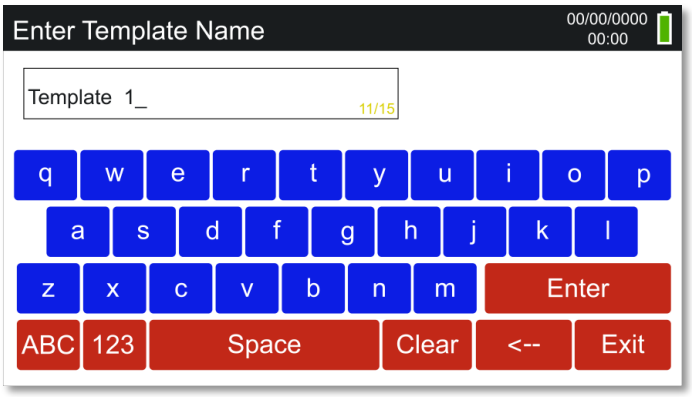
You can create templates for the frequently tested circuit breaker and make their tests easier and faster. From the templates menu, you can view/modify existing templates by pressing on the desired template. You can save up to 6 different templates in total.



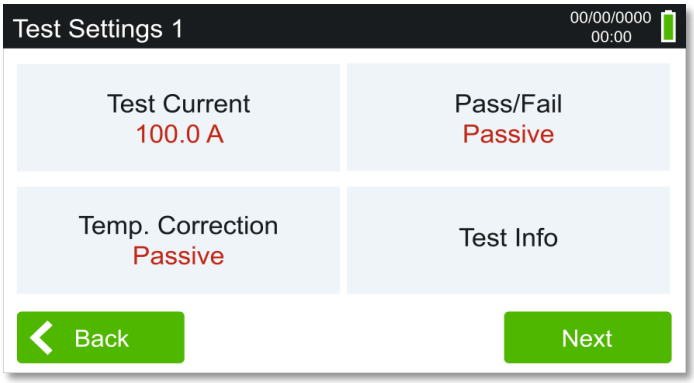
To create a new template:

- Press on '**New**' tab.
- Name the template

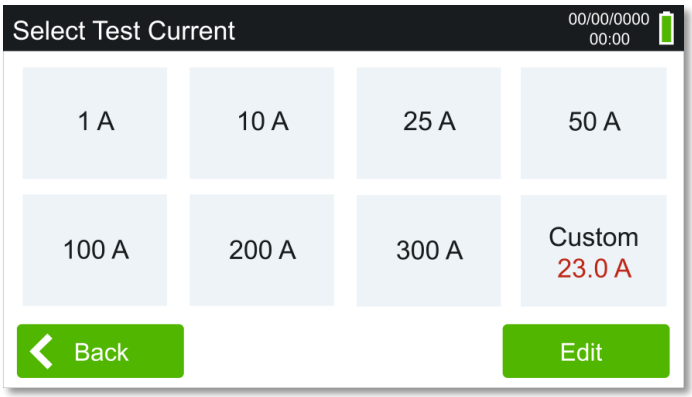
  The default name for all templates is 'Template' use the on-screen keyboard of HARE to enter a new name. Press 'Enter' to continue.



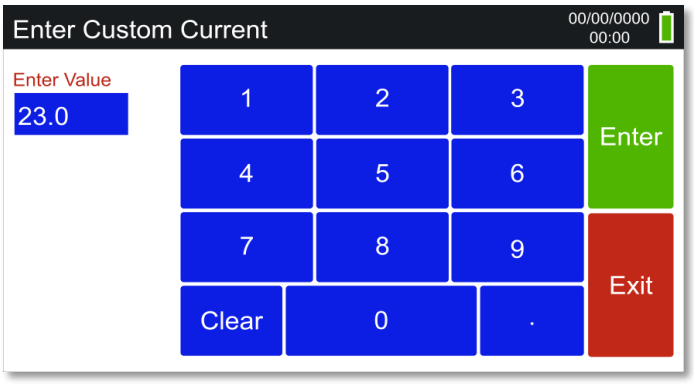
- The next window will be as follows;



2.2.1 Select the test current

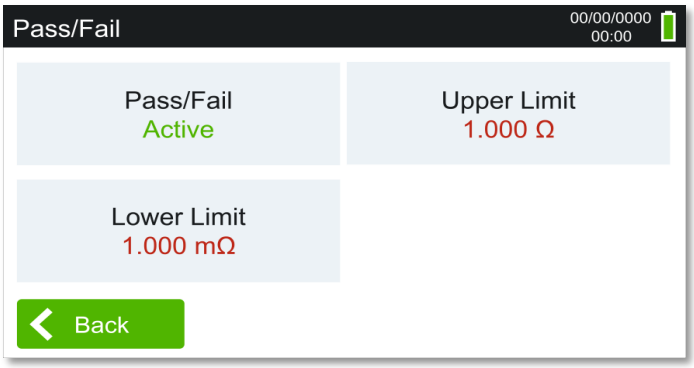


The device comes with certain range of test current from which a user can choose. 200A and 300A are only available to HARE-200 and HARE-300 devices. For other values, users can manually add according to their require. However the value must be under or equeal to the maximum test current value as per the technical specification of the device. The customized value can be entered by the numerical keyboard of the device by pressing 'Custom' tab.

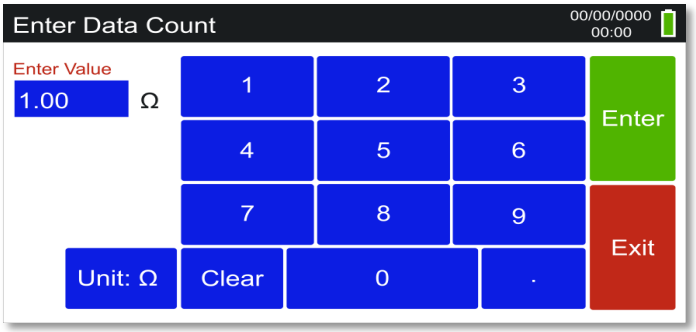


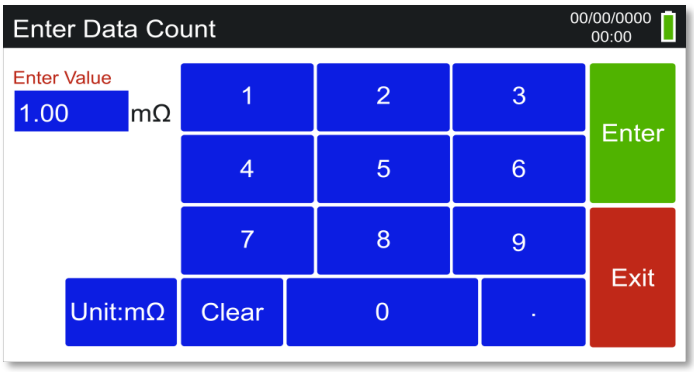
2.2.2 Pass/Fail

Users can set an upper and lower limit to compare the results they obtained during the tests. To achieve this, make the Pass/Fail tab 'Active'.



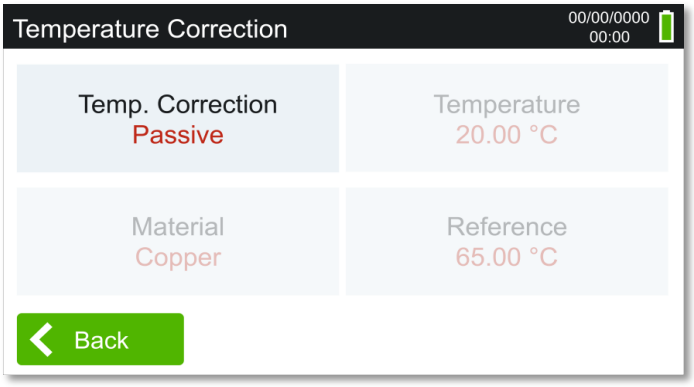
And then enter the upper and lower limits by using the on-screen numeric keyboard;



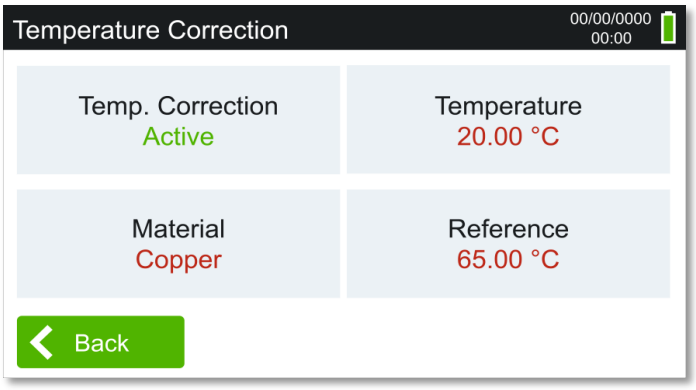


Then press 'Enter' to continue.

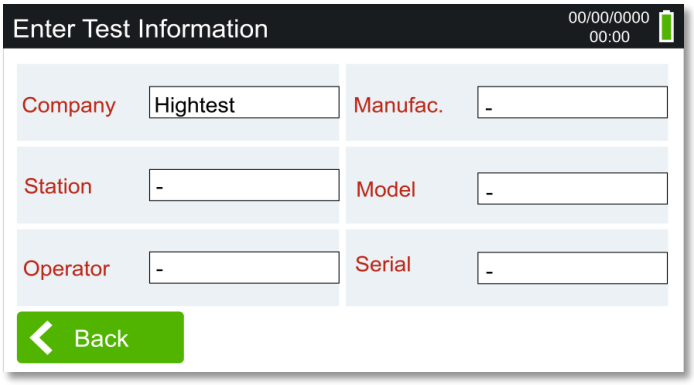
2.2.3 Temperature Correction



Users can set a reference temperature to get temperature corrected test results. To, achieve this, make sure to make the Temp. Correction tab 'Active' and select the appropriate material and set the reference temperature.



2.2.4 Test Information

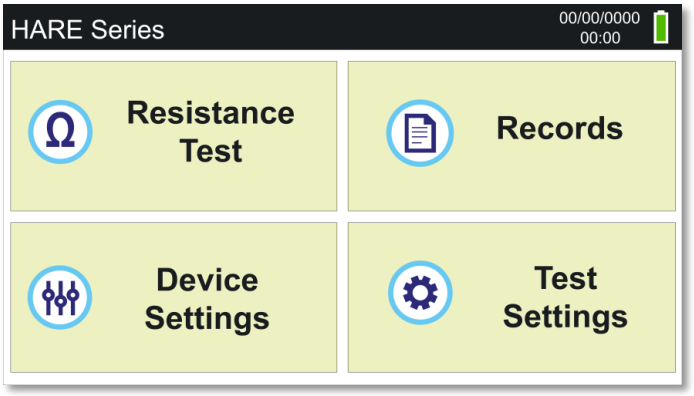


Users may add the information related to the tests in this menu.

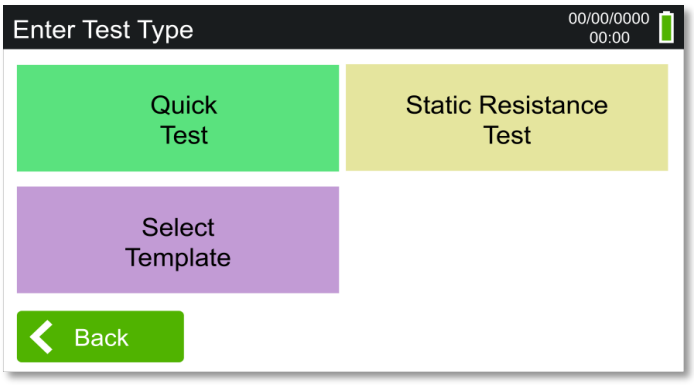
3. Resistance Test

!DO NOT USE HARE CONNECTED TO THE MAIN SUPPLY!

To perform resistance test, press on '**Resistance Test**' tab on the "**Home Page**" screen.



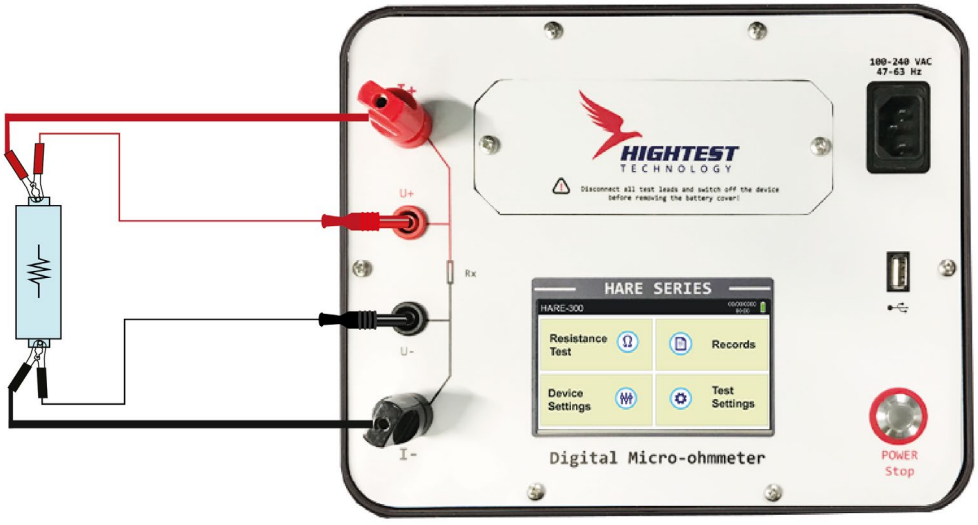
You can carry out a resistance test using the following menu; Quick Test, Static Resistance Test, Select Template



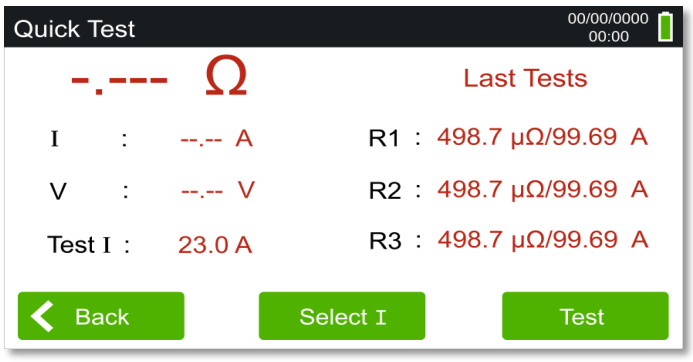
3.1 Quick Test

To test a Shunt or Circuit Breaker contact static resistance. Before turning on the device, make sure the cables are connected properly. Then follow the steps given below for testing:

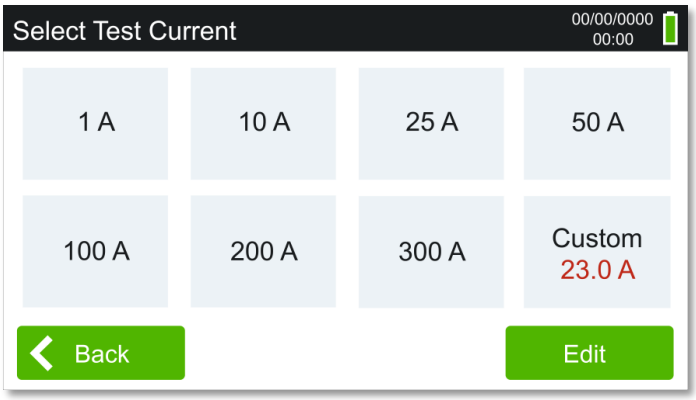
Connect the test cables to the sample to be tested as shown in the figure below and press '**Quick Test**' tab.



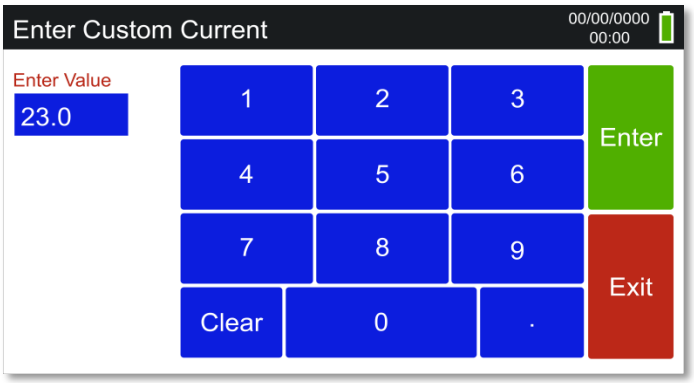
Following is the page 1 of '**Quick Test**'



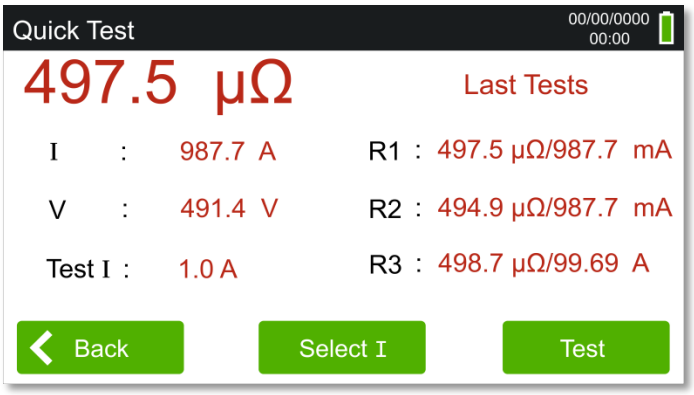
Press the '**Select I**' tab to select the test current.



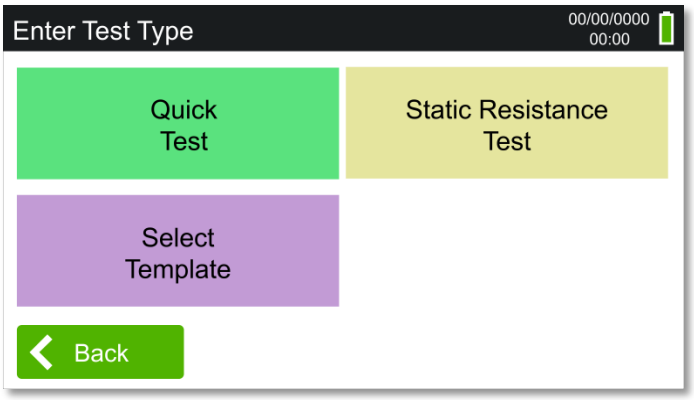
Users can choose test current options available on the device or manually enter a value on the custom tab.



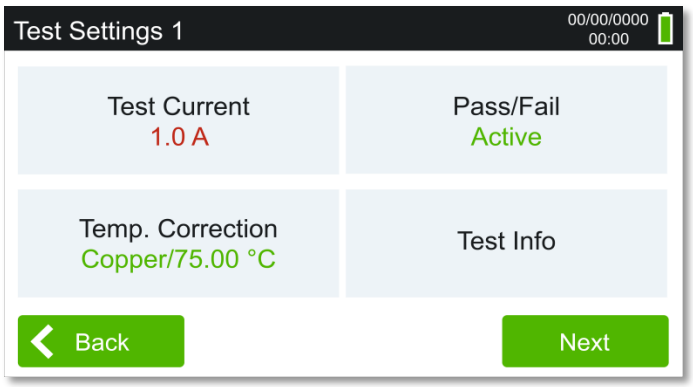
And the test result will be obtained immediately as shown below;



3.2 Static Resistance Test



Choose the 'Static Resistance Test' option for testing with advanced feauters of HARE series.



STEPS TO FOLLOW;

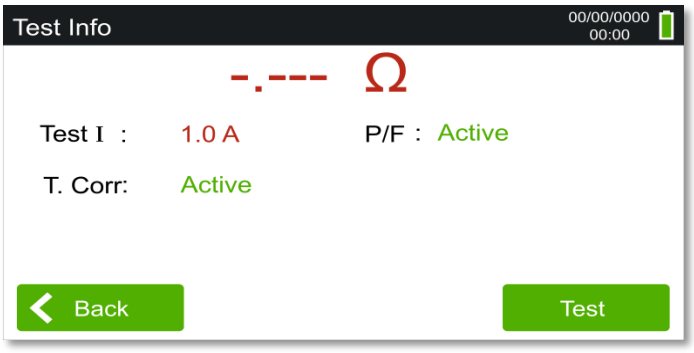
1. Select Test Current

2. Set Comparator 'Active' (*Users' preference*); Set the upper and lower limits.

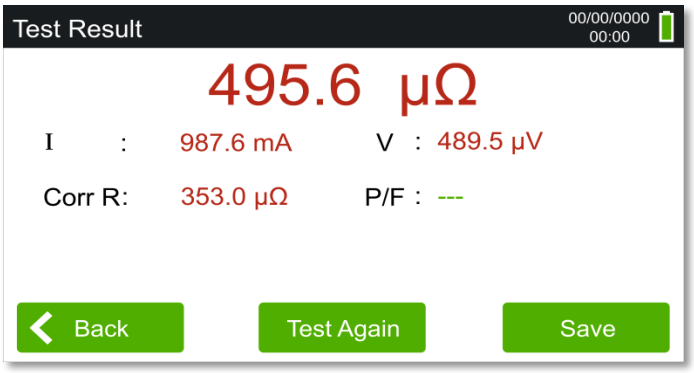
3. Choose appropriate temperature correction

4. Add Test Info

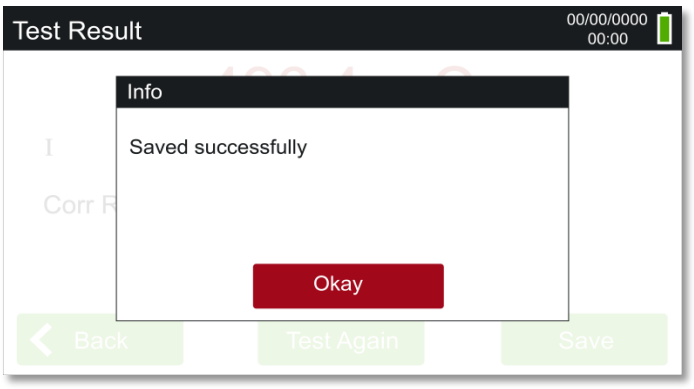
Press Next to Continue. In the next step, you may see the following details on the screen;



Press 'Test' to continue. And you may see the result as follows.



Users have the option to repeat the test by pressing, 'Test Again' or to 'Save' the obtained result. To save it, click on the 'Save' tab.



The saved test results are available on the 'Records' tab on the main menu.

3.3 Test Template

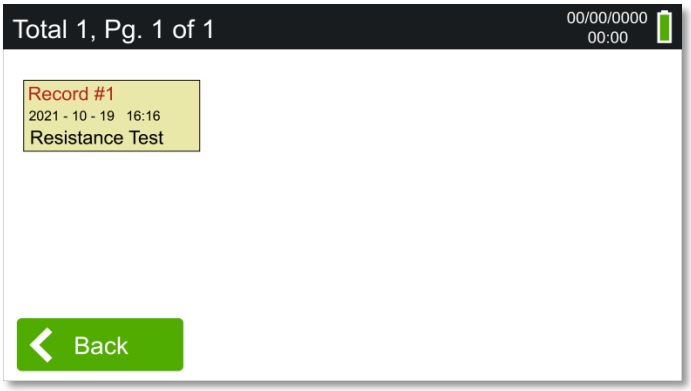
Users can opt to choose an already saved template on the device to perform a tests from this option.

4. Test Records

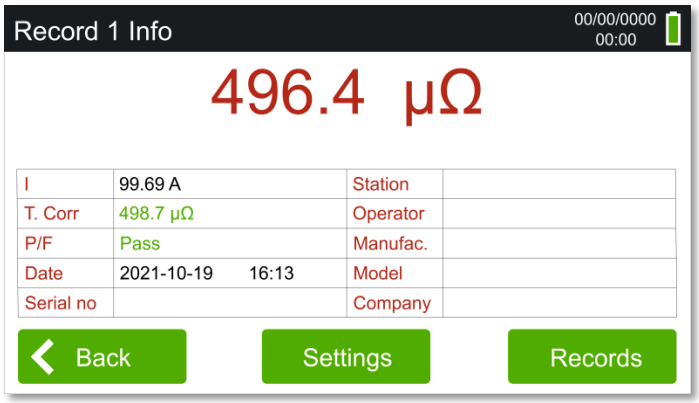
You can access the test results that you have already saved from the '**Test Records**' on the main menu. HARE can store 1000 test results in its internal memory, each test can hold up to 100 measurements. In addition to the internal memory, HARE has unlimited extended memory by using an external USB. When a USB is connected, the test records will be saved to USB.

When we examine this page:

- 1st Line Record Number,
- 2nd Line test date and time,
- 3rd Line indicates the test type



Users can open the required test record from the list of results. The selected test record may open as shown below. All the details you have entered while testing may shown on the screen.



From the 'Settings' users can copy the result to a USB or delete the record.

Turning of the device

When you finish the tests, please make sure to remove all cables from the control-panel according to the instructions described above and switch off the device.

When the screen is on "**Home Page**" you can switch off the device by pressing the power button once, then click the '**Ok**' tab. This is recommended because it saves all changes made on test information.

Users can switch off the device automatically by pressing the power button for 2 seconds (Display status is negligible). This is not recommended because it may lose the last recorded test information.

⚠ WARNING

Once the device is off and if you are not indending to use HARE further for next days or so, please make sure to remove the battery from the device to avoid unnecessary discharging. Please follow the steps in the instructions steps to remove and insert the battery.

HIGHTEST Technology Ltd. is a leading manufacturing company based in the UK that produces high precision test equipment. Our focus is on the development, manufacture, and marketing of Transformer test and measurement equipment.

We have been designing and manufacturing high-end test equipment for many years and we supply our instruments worldwide to Transformer manufacturers, Electrical utilities, general contractors and service companies. Our test equipment is designed and produced according to the most widely adopted international standards and our experienced team provides excellent after-sales support and technical assistance as we endeavour to uphold customer satisfaction at all times.

Please contact HighTest Technology Ltd. or our authorised distributor in your region for any queries regarding this device.

HighTest Technology Ltd.
Unit 14, First Quarter, Blenheim Road,
Epsom, Surrey, KT19 9QN, United Kingdom.
Tel: +44 203 900 2710, +44 203 287 2302
Email: info@hightest.co.uk, sales@hightest.co.uk
Web: www.hightest.co.uk