

HAL Applications Q&A

This document aims to aid in some of the frequently asked questions for the HAL.

Q1. My HAL 103 / 104 is performing two HIPOT / IR tests despite only programming one test, why?

The HAL 103/104 has two outputs, front (White connectors at the front of the HAL) and rear (Output box connection) for HIPOT and IR testing, when creating these tests into a sequence sequences the HAL by default is set with both the front and rear ports enabled.

In order to perform the single test to the port required when creating a sequence and adding the first HIPOT or IR test, the HAL will display FR beneath the current trip levels. Simply scroll to the port you wish to disable and press the green button. For example a test sent to the rear port only should be displayed as -R as shown below

```

-----TEST SETTINGS EDITOR-----
Z171CHC0751 2.0S→2.50kV 1.00mA 5 1 123..
50Hz HIPOT 10S 0.00mA
↓ EXT. IO 2.0S→0.00kV FR

```

Both Test Outputs Active

```

-----TEST SETTINGS EDITOR-----
ZH71CHC07PV 2.0S→2.50kV 1.00mA 5 1 123..
50Hz HIPOT 10S 0.00mA
↓ EXT. IO 2.0S→0.00kV -R

```

Rear Test Output active

Q2. I am trying to perform an Insulation Resistance test and when programming a sequence I am only able to select 250/500 or 1000V yet my test voltage is different, can this be achieved?

Yes, The HAL has two modes for the test voltage, limited and unlimited. In limited mode the HAL is fixed to the most commonly used test voltages as suggested in the question. In unlimited mode the HAL can be programmed in 50V steps from 100V to 6000V.

In order to utilise the unlimited voltage function the HAL must be configured. From the MAIN MENU, scroll to SETUP and press the green button, then scroll to SYSTEM CONFIGURATION and press the green button. Within this sub menu, scroll to DC IR VOLTAGE and press the green button to scroll between limited and unlimited mode. Once selected, scroll to OK then press the green button to confirm changes.

```

-----SYSTEM CONFIGURATION-----
PRODUCT NUMBER: BLANK
ON TEST FAILURE: FAILURE MENU
TEST TYPE: ANY

TEST MODE: NORMAL
DC HIPOT RAMP DOWN: AT LEAST 1.0S
DC IR RAMP DOWN: AT LEAST 0.5S
DC IR VOLTAGES: UNLIMITED
COMMENTS: ALWAYS
STORE RESULTS: YES
AFTER TEST: DOWNLOAD, NEW TEST
CONFIGURE
DATE FORMAT: DD/MM/YYYY
ROLL PRINTER
PASSWORD PROTECTION OPTIONS
EDIT EXTERNAL SIGNAL NAMES
OK

```

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Q3. I wish to use our HAL101 to determine at what voltage my item breaks down by manually increasing the test voltage, can this be done?


Yes, all of the HAL models can be set to manually increase test voltages, this can be done either as part of a sequence or in manual mode. When setting up the test parameters in either mode, scroll to the Ramp Up time set this to VAR. This will disable the test hold time and the test will now be completely controlled by the operator. Maximum voltage, trip level, ramp down time and start control can still be configured.

When performing the test, enable to start condition as normal, then use the scroll wheel to increase the test voltage in 10V steps, by rotating clockwise. To terminate the test either breakdown will be achieved or press the green button to manually end the test.

```

-----TEST SETTINGS EDITOR-----
Z17IZHC07PV VAR 2.50kV 1.00mA
50Hz HIPOT 0.00mA
↓ EXT. IO 2.0S→0.00kV FR

```



Ramp time set to Variable in test sequence.

Q4. What are the connections on the output box on the HAL 103 /104/ LED?

The output box on the above mentioned tester has 3 main connections



HAL 103 / 104 / LED Output Box

- 1) Equipment under Test connection – Used to connect the product under test to the connection. Measurements are then performed between the Live, Neutral and Earth connection during various tests.
- 2) Earth Bond Probe Connection – Used to create connections between the Earth Conductor and accessible conductive parts during the Earth Bond Test. Also used for the detection of current flow during a Touch Current Test on the HAL 104/LED
- 3) Hipot / IR Return Probe – Generally used for detection of current flow (breakdown) when performing Hipot or Insulation Resistance tests on double or reinforced insulated products.

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Q5. I am testing a product with a different voltage rating than the mains voltage I am supplying the HAL104 / LED, when performing a mains powered test is it possible to supply a different voltage to item under test?

Yes, the HAL 104 / LED can supply an external voltage to the item under test using the External voltage input ports at the rear of the HAL. Voltages between 80 and 300V AC 50/60 Hz can be supplied using an external voltage supply.

The voltage will need to be supplied into the 2x 4mm sockets. Ensure the large rocker switch is placed into the AUX position to accept and feed the item under test.

This can be very useful for quality checks where the mains voltage is subject to fluctuations and a stable supply is required.



Input Voltage for Power Test

Q6. I am interested in how barcodes could improve the traceability and efficiency of the test process, please explain?

The HAL can accept barcodes for the following, Test ID, Test Sequence and comments. For example it can be time consuming and open to human error if the operative is manually entering serial numbers. In addition ensuring the correct test is performed on the product is also paramount.

By making small changes to the production process, adding a bar-coded reference number to the product for example will allow the operative to capture this unique number quickly and store it against the test results. Any future queries regarding the product safety can be easily identified and communicated.

In addition when creating a test sequence a name for this sequence is required, this test name can be created into barcode format for easy test identification. Again a Test Sequence barcode on the product would give the best method to do so, but in our experience a simple sheet of barcodes with descriptions for the product can also work very well.

The operative would then simply have to scan two barcodes into the HAL to ensure complete traceability and ensure the correct test sequence is performed.

In addition comments can be entered after testing is completed, again any common comments that may need to be entered can be done by use of barcodes, speeding up valuable time on the production line.

To ensure barcodes can be used for Test Sequence set up, scroll to SETUP from the MAIN MENU and press the green button, scroll to SYSTEM CONFIGURATION and scroll to the option TEST TYPE, use the Green button to scroll through the options and choose BARCODE ONLY, scroll down to OK and press the Green button to confirm and store that choice.

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```
-----SYSTEM CONFIGURATION-----
PRODUCT NUMBER: BLANK
ON TEST FAILURE: FAILURE MENU
TEST TYPE: BARCODE ONLY

TEST MODE: NORMAL
DC HIPOT RAMP DOWN: AT LEAST 1.0S
DC IR RAMP DOWN: AT LEAST 0.5S
DC IR VOLTAGES: LIMITED
COMMENTS: ALWAYS
STORE RESULTS: YES
AFTER TEST: DOWNLOAD, NEW TEST
CONFIGURE
DATE FORMAT: DD/MM/YYYY
ROLL PRINTER
PASSWORD PROTECTION OPTIONS
EDIT EXTERNAL SIGNAL NAMES
OK
```

Q7. I only ever perform one test sequence repeatedly, what steps can I take to make the process as efficient as possible?

In instances where the HAL is only being used to perform one particular test or set of tests, we can fix the HAL to only perform one test sequence. This option removes the need for the operator to choose a test sequence.

Firstly create the test sequence that will be performed, once complete the test can be chosen to be performed repeatedly/

This can be assigned within the SETUP menu in the SYSTEM CONFIGURATION options. Scroll to TEST TYPE and press the green button to select FIXED.

Once chosen a separate option will appear directly beneath the word FIXED, whilst highlighted press the Green Button and the list of all available test sequences will be displayed. Scroll to the required test to be fixed and press the green button to confirm. Scroll to OK and press the green button to confirm.

```
-----SYSTEM CONFIGURATION-----
PRODUCT NUMBER: BLANK
ON TEST FAILURE: FAILURE MENU
TEST TYPE: FIXED
DFT DC IR

TEST MODE: NORMAL
DC HIPOT RAMP DOWN: AT LEAST 1.0S
DC IR RAMP DOWN: AT LEAST 0.5S
DC IR VOLTAGES: LIMITED
COMMENTS: ALWAYS
STORE RESULTS: YES
AFTER TEST: DOWNLOAD, NEW TEST
CONFIGURE
DATE FORMAT: DD/MM/YYYY
ROLL PRINTER
PASSWORD PROTECTION OPTIONS
EDIT EXTERNAL SIGNAL NAMES
OK
```

```
-----SELECT TEST SETTINGS-----
DFLT AC HIPOT
DFLT DC IR
DFLT ARC
TEST NAME
TEST
?
?
?
?
?
?
?
?
?
```

Q8. I have the Desk Test n Tag Printer and want to configure the HAL to print a test label automatically on completion of the test, how do I do this?

The HAL can be configured from the SYSTEM CONFIGURATION menu within the SET UP options.

When in system configuration scroll to AFTER TEST and select one of the following DOWNLOAD, OPTION or DOWNLOAD, MENU. Once selected an option CONFIGURE will appear, scroll to this and press the green button.

A new screen will appear allowing for configuration of the output properties. Using the scroll wheel and green button, ensure the options are set as follows;

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Scroll to OK press the green button to confirm.

Q9. I am point to point testing HIPOT / IR and will be using two hand held probes, is there a way I can start the tests without pressing the green button on the front of the HAL?

Yes, there are two potential methods for performing this task; this is commonly achieved using something along the lines of a footswitch to start the test.

Method One – Utilising the Guard Switch Circuit

The HAL Guard switch is a safety feature which inhibits the test should the switch be in an open state. It can also be used as a start condition for tests.

If used it will require the operative to close the switch and keep it closed for the duration of the tests

The switch used must be in a normally open condition and closed when pressed and held, a latching switch is not recommended for this application. The circuit only carries 5V and a few mA so a simple switch will suffice.

The two wires from the switch will need to be fitted to the two connectors shown on the guard Plug (see image below) so that when pressed the switch is closed and the test will begin.



The Guard Switch will need to be enabled as the Start condition for the tests in a sequence. In order to do this from the MAIN MENU enter the SETUP option and select EDIT TEST SETTINGS. Choose the test sequence to be configured and press the green button to enter the TEST SETTINGS EDITOR

Change the start condition to External Guard switch (see symbol below) for each test to be performed then scroll to OK and press the green button to confirm and commit the changes to memory.



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Method 2 – Using the External Start button connection

The HAL features connections on its rear control ports to allow for an external START and STOP button to be connected, repeating the functionality of the Green and Red buttons on the front panel

When utilised, the operative can then initiate the test by a single press of the switch.

The switch used must be in a normally open condition and closed when pressed and held, a latching switch is not recommended for this application.

The two wires from the switch will need to be fitted to the Mode Contacts connector on the rear of the HAL, please refer to manual for more details. When pressed the switch is closed and the test will begin.

The Start Button key will need to be enabled as the Start condition for the tests in a sequence. In order to do this from the MAIN MENU enter the SETUP option and select EDIT TEST SETTINGS. Choose the test sequence to be configured and press the green button to enter the TEST SETTINGS EDITOR

Change the start condition to Start Button (see symbol below) for each test to be performed then scroll to OK and press the green button to confirm and commit the changes to memory.



Please note, this switch will permanently act as the Start button functions, so any press on this switch will act as if the Green button was pressed on the HAL

Q10. I have multiple HAL units and I want to ensure they are configured in the same way, is there a quick way to do this rather than configuring each one separately?

Yes, this is possible using our Tester Configuration program.

The Tester Config program allows the user to clone a Clare Test Instrument either for back up of configuration data or to replicate settings across multiple instruments.

Equipment Required

PC with RS232 Port

Test Instrument

Download Cable supplied with Instrument

Clare Tester Config Tool – Available from the Download Section of Seaward.co.uk

Method – Creating Clone File

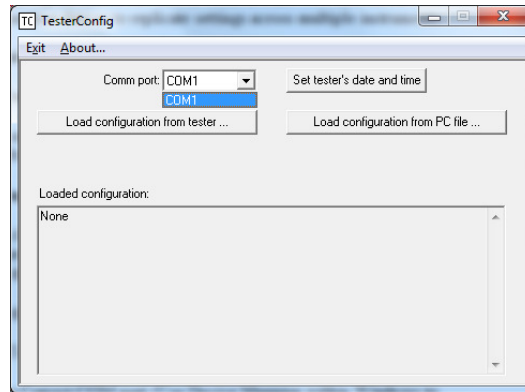
Before creating a clone file ensure the Test Instrument to be used is configured to working requirements, i.e. ensure it is set up and test sequences required are programmed into the device

Step 1 – Connect the Test Instrument to a PC using the Download Cable.

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Step 2 – Run the Tester Config software

Step 3 – Select the Correct COM port (Use Device Manager within Windows to determine correct port, but if connected directly to an RS-232 port on the PC this is usually designated as COM1)

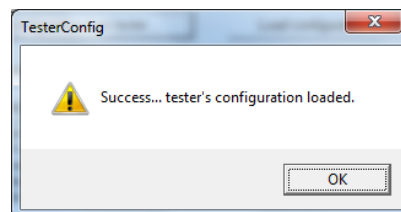


Step 4 – Press the Button labelled “Load Configuration from Tester...” a box will pop up with further instructions;

Step 5 – From the Main Menu of the HAL, scroll to REMOTE MODE and press the Green Button

Step 6 – Return to the Tester Config software and press the OK button

Step 7 – The software will capture the information from the Tester and a confirmation pop up will be shown



Press the OK button and then click the “Save Loaded Configuration to PC File...”, a prompt will appear to save the created back up file, choose a destination and filename the press the Open Key to create and store the back up.

Method – Loading Clone File to HAL

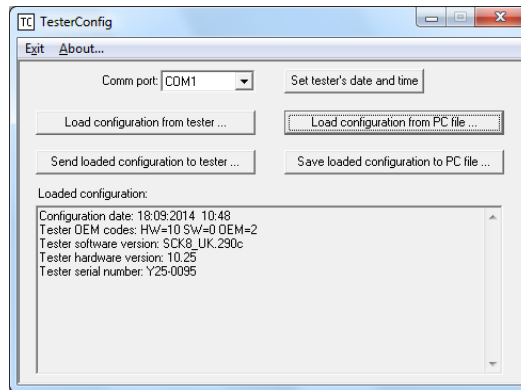
Step 1 – Connect the Test Instrument to a PC using the Download Cable.

Step 2 – Run the Tester Config software

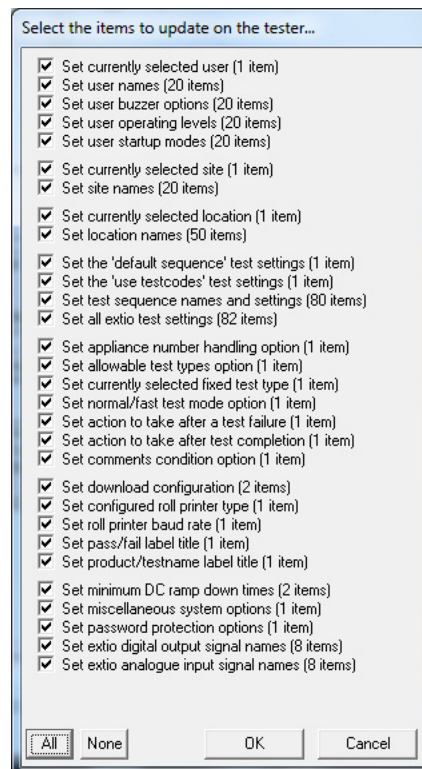
Step 3 – Select the Correct COM port (Use Device Manager within Windows to determine correct port, but if connected directly to an RS-232 port on the PC this is usually designated as COM1)

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Step 4 – Press the Button labelled “Load Configuration from PC File” a box will pop up with a prompt to find the saved configuration file. Select the file and press the open button. The Config software will display information relating to the file to be loaded



Step 5 – Press the Button labelled “Send loaded configuration to Tester...” a box will pop up allowing a choice of what configuration information shall be transferred. Either individually choose or select all to send all the data, then Press OK, instructions for the next steps will be displayed.



Step 6 – From the Main Menu of the HAL, scroll REMOTE MODE and press the Green Button

Step 7 – Return to the Tester Config software and press the OK button

Step 8 – The software will send the information from the Tester and a confirmation pop up will be shown once complete.

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Q11. I need to update the firmware in my HAL to work with the latest version of Safety E-Base, how do I perform this?

Yes, this is possible using our Tester Update program.

The Tester Update program allows the user to update the firmware of the HAL

Equipment Required

PC with RS232 Port

Test Instrument

Download Cable supplied with Instrument

Tester Update Software – Need to supply a link

Clare Firmware Update Tool – Available from the Download Section of Seaward.co.uk

Method – Updating the Firmware

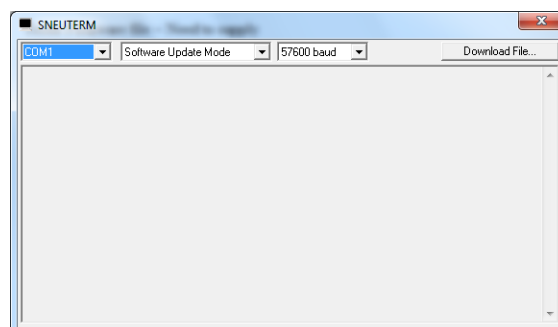
Step 1 – Connect the Test Instrument to a PC using the supplied Download Cable.

Step 2 – Run the Tester Update software

Step 3 – Select the Correct COM port (Use Device Manager within Windows to determine correct port, but if connected directly to an RS-232 port on the PC this is usually designated as COM1)

Step 4 – Select Software Update Mode from the dropdown list

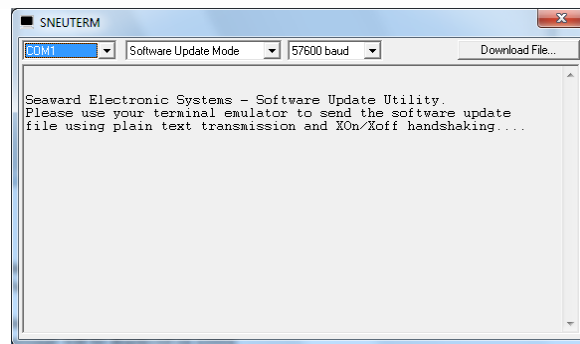
Step 5 – Select Baud Rate 57600



Step 6 – With the HAL switched off, press and hold the Green Button and the far right Function key as shown then press the Power button on the HAL

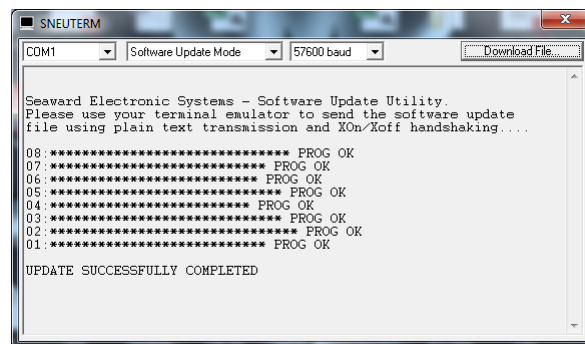
Step 7 – With successful communication between tester and computer, the following message will be displayed on screen

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Step 8 – Press the Download button, a secondary box will open to find and select the Tester Update File (Text File as example below). Choose the required file and press Open, the firmware update procedure will begin.

The Tester Update program will display an ongoing countdown as the file is loaded, upon completion the software will display a successful notice and the new firmware is applied to the HAL. (Shown below)



Q12. Please explain the function of the digital output control ports on the HAL104 / LED what is their function and what could I use them for?

The HAL features 8 digital outputs. The digital outputs function as relay drivers to control 12V relays, their function can be to send commands to begin a certain process from a relay. The HAL SwitchSmart is an 8 output switching matrix, the outputs are controlled from the HAL and can be used to direct test voltages for example to one of 8 channels.

Application example – A customer had the requirement to press a power switch during a powered leakage test on the HAL104. The item under test was not accessible as it was housed inside an enclosure during testing. The HAL control port was utilised at the start of the powered Touch Leakage test to energise a relay which in turn switched in a solenoid which actuated a metal “Finger” that engaged the power switch on the item under test

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Q13. Please explain the function of the analogue input control ports on the HAL104 / LED what is their function and what could I use them for?

The analogue input ports are a method of determining a Pass / Fail condition for external measuring sources that have an analogue voltage output. The voltage is sent from the external test instrument and read by the HAL. The user can then set an upper and lower voltage level, used to determine a pass or fail condition.

Application example: A customer utilised a thermometer that had the ability to output an analogue voltage where 0.1V represented 5 degrees Celsius. After 10s of a run test it would be expected that a heater reached 100°C.

A pass condition was achieved if the thermometer would output a signal of 2V, (Representing 100°C) and the company allowed a 10% variation. The user set upper and lower levels of 1.8V and 2.2V.

Q14. How do I enable the Digital Output and Analogue Input ports?

The control ports are enabled for each individual test performed, and are accessed with the EDIT TEST SEQUENCES menu within SETUP.

Select the Test that requires a control port to be enabled, scrolling to the EXT IO option and Pressing the Green button

The Digital Outputs by default are set to OFF, simply highlight the port(s) to be initialised and press the Green button to change the state to ON.

The Analogue Inputs are always enabled by default and set at 0.000V to 5.000V, to set the voltage range required, highlight the voltage to be changed, then press the F3 function key to enable the Rotate Field option, then use the rotary encoder to change the voltage. A reading within the High and Low limits for the incoming voltage which will determine a pass or fail condition.

EXTERNAL IO SETTINGS			
50Hz EBOND			
STATE		LO V	HI V
DOUT1:	ON	ANLC1: 1.150	2.750
DOUT2:	-	ANLC2: 0.000	5.000
DOUT3:	-	ANLC3: 0.000	5.000
DOUT4:	-	ANLC4: 0.000	5.000
DOUT5:	-	ANLC5: 0.000	5.000
DOUT6:	-	ANLC6: 0.000	5.000
DOUT7:	ON	ANLC7: 0.000	5.000
DOUT8:	-	ANLC8: 0.000	5.000

OK	PREVIOUS FIELD	ROTATE FIELD	NEXT FIELD
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Q15. What is the Arc Detection feature and how do I enable it?

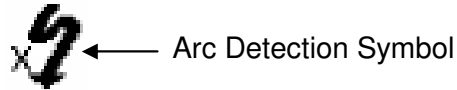
The most common leakage current detection mode used when testing dielectric strength is to compare the measured leakage current with a maximum leakage current threshold to determine whether or not a breakdown has occurred.

An alternative leakage current detection mode is to use Arc Detection. Momentary arcing during dielectric testing causes rapid changes in the leakage current level. These short duration current spikes may not be detected by the maximum leakage current measurement circuitry. The arc detection circuitry is configured to detect rapid, momentary changes in leakage current and terminate the test.

In the case of maximum leakage current detection, this allows a predictable and repeatable response that is easily verified i.e. the measured current can be directly compared with a definable threshold and the performance can be verified by applying a

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known leakage current and observing the response. In the case of arc detection, the behaviour is more difficult to characterise as it is extremely difficult to produce a "known" arc.



The arc detection system within the HAL series uses allows a user programmable threshold. This threshold is an arbitrary value from 1 (most sensitive) to 9 (least sensitive) or X (arc detection off). Careful consideration should be given to the arbitrary nature of the sensitivity threshold on any arc detection function and the unpredictable nature of an electrical arc. It is recommended that a user 'profile' their equipment such that testing a range of samples can lead to an 'ideal' sensitivity setting.