Software Programmers Manual

MK AT Runner

Version 1.900

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MODIFICATIONS

Issue	Date	Modified by	Modified Pages	Observations	Release Version
1.000	05/May/2016	APK	All	First revision	
1.200	14/Oct/2016	JP		Separate documents for runner and editor	
1.300	18/Nov/2016	JP		Added customisation section	
1.400	06/06/2017	APK		Updated screen shots for front screen and updated to reflect new options etc.	
1.500	07/03/2018	JP	20	Added information about report logos	
1.600	06/08/2018	CDVM/GD		Manual update	10.8.4
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1 Software System Requirements

Note: the following is the recommended specifications that should be suitable in most cases, but the ideal specification will depend on individual system characteristics and configuration.

Processor: i7

RAM: 16Gb min.

HHD: 160 GB min.

Operating system: Windows 10 (64 bit)

Note: MK recommend using the latest service packs and updates provided by Microsoft. Due to the pace at which new software technologies become available, support for such technologies is provided to the end user by means of a service pack. MK endeavour to utilise technologies available that will improve performance and stability in our software. When upgrading or installing the latest version of software, ensure your operating system has been recently updated to mitigate any compatibility issues that may arise as a result of an underlying change.

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2 General Information

2.1 Before You Begin

2.1.1 Familiarisation

Before using the MK AT test system, it is strongly advised that you read all of the manuals provided and ensure that you are familiar with the concepts in operating this form of automatic test equipment

2.2 About This Manual

This manual is designed in such a way that a first-time user of the MK AT system will, by following this manual be taken through the MK AT software in a logical manner. Those users more familiar with the MK AT may wish only to use this manual for reference.

2.3 MK AT Operating Concepts

The MK AT software operates on the following concepts -:

a) The user manufactures a piece of equipment (UUT), which is tested by conventional means and known to be to the required quality standard.

b) The MK AT 'learns' about the UUT characteristics by being programmed by the user. The MK AT can automatically learn the UUT connections, they can be programmed manually, or they can be imported from an external source

c) New build items of the same design can now be tested by the MK AT by being compared against the information acquired in B) above. The operator simply selects the item with the same part number (or some equivalent parameter) from the index.

The test referred to in c) above consists of one or more of the following stages.

1) Continuity comparison on the connections of the UUT on the index against the UUT being tested. *Referred to as the positive test or continuity test*

2) A check through the UUT to ensure that no connections exist, which were not present in the UUT on the index. *Referred to as the negative test or shorts test.*

3) Assuming the successful completion of 1) and 2) above, a high voltage insulation test can be performed. This test takes each point in turn to a specified high voltage whilst all other points are connected together. The resistance is then measured and compared against a threshold.

As an alternative to or as well as option 3) above, a high voltage hi-pot test can be performed if required which subjects the UUT to a specified high voltage and compares the leakage current against a threshold.

For twisted pair configurations, a capacitance test can be performed which will compare the capacitance against threshold format.

External equipment can also be connected as switched through the MK AT switching matrix.

If an insulation test and hi-pot test are selected, then the hi-pot test will only commence if the insulation test is successful without any point failures.

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In the event of the hi-pot test being performed before the insulation test then the insulation test will only commence if the hi-pot test is successful.

All of the test sections described are supported by, screen, print to file and printer reports if required.

2.4 MK AT Electrical Concepts

Even if the operator is familiar with automatic test equipment, the following basic concepts will help in the understanding of the MK AT operation.

The MK AT measures resistances or volt drops by applying a fixed current and using a voltmeter to measure the dropped voltage. If a resistance value is required, then a simple ohm's law calculation is performed. For higher resistances then the internal impedance of the MK AT is also taken into consideration.

For a four wire measurement, the resultant value will be a close accurate value of the UUT, for a two wire measurement, the resultant value is likely to contain an element due to the connecting interface.

2.4.1 What Test Current Should I Use?

It is always best to use the maximum test current available, this will give the greatest volt drop which can be measured with the highest accuracy; it will also stress the UUT more which may show a potential problem.

Never select a test current which will damage the UUT or a current which result in too much power dissipation in a resistive load.

2.4.2 What is Voltage Limit?

The test current is supplied from a power supply which produces approximately 42 volts on most MK AT systems. If the current is supplied into an open circuit i.e. no current flows, then 42 volts will appear across the UUT

The voltage limit is a programmable limit to this open circuit voltage and is typically set to 30 volts.

If the UUT has a maximum voltage requirement, then the voltage limit can be lowered accordingly.

2.4.3 Auto Learn and Shorts Test Methodology

MK AT will apply the current from point one to all other points. If the voltage measured is equal to voltage limit i.e. open circuit then MK AT will move on to point two etc. If the voltage measured is less than clamp i.e. a connection, then a binary split will be performed until the end points are established.

The current will be applied, and voltage read to establish the connection value.

Auto learn and shorts test will only learn and test values within the electrical constraints of the programmed current and voltage limit. Values outside these parameters will be missed by the auto learn or show up as open circuits by the shorts test. To cover the maximum range for auto learn and shorts test, select the minimum current and maximum voltage limit.

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2.4.4 Low Voltage Testing Methodology (Continuity Test)

MK AT will scan the list of expected connections, apply the current set up in the continuity test parameters and measure the resultant voltage. The voltage or resistance will then be compared to the limits a result produced. If the voltage limit is reached when the current is applied, then a > maximum resistance will be reported.

2.4.5 Low voltage short circuit

MK AT will take each net list (a set of points that are common) and test them using low voltage to all other net lists defined within the shorts sub test. If a short circuit is found (i.e. Low resistance so voltage limit is not reached), then the MK AT will use a binary chop to determine which other net list it is shorted to. It will then remove that net list from the list to be tested against and repeat. This will allow the system to find any number of shorted net lists.

2.4.6 High Voltage Testing Methodology (Insulation and Hi Pot)

MK AT will then take each net list, as defined in the insulation sub test and test against each other net list defined within that sub test. The sequence of how this is done is detailed below.

It will then calculate insulation resistance or leakage current, compare the values to those set up and produce a result.

It is possible that the high voltage test will report values not detected by the low voltage test because of the constraints of the low voltage test detailed above.

2.4.6.1 High Voltage DC and AC Ramp Test Algorithm

This is the normal algorithm applied during high voltage testing of AC and the majority of DC systems and consists of the following stages:

2.4.6.1.1 Relays Switched On

The appropriate test points (from and to) are switched onto the bus.

2.4.6.1.2 Ramp Up

This is a programmable ramp in which the high voltage is increased in a controlled manner until the high voltage potential is achieved. If not achieved, then the software acts accordingly and reports as such.

2.4.6.1.3 Pre Dwell

This is a programmable dwell where the high voltage remains present to allow for any capacitive effects.

2.4.6.1.4 Measure Dwell

This is a programmable period over which numerous readings of leakage current are made to establish the insulation resistance or HiPot value

2.4.6.1.5 Ramp Down

This is a programmable ramp in which the high voltage is decreases in a controlled manner until the high voltage potential is removed.

2.4.6.1.6 Safety Dump

This is a programmable time for which the safety dump is activated to discharge any residual potential. The high voltage is then checked to ensure that is has been discharged.

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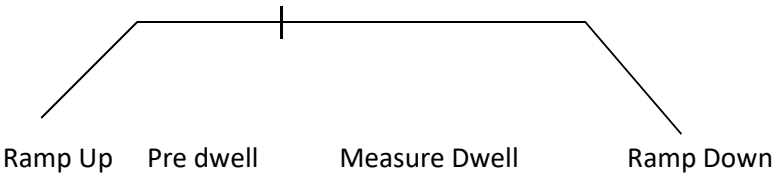
2.4.6.1.7 Relays Switched Off

The appropriate test point sources and monitors (signal and sense) are switched off the bus. The complete cycle then repeats.



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3 Software User Interface

MK AT software has been written with the primary intention of being simple to use, the aim being that familiarisation is quick and consistent in its use. As such the software is split in to two major parts the MK AT Editor and the MK AT Runner. The **Editor** is a desktop application that allows an operator to create test programs not only for MK AT but any MK test products. The **Runner** is designed more with the shop floor operation of connecting to and testing the UUT. Refer to the MK AT Editor Software Manual for information regarding test creation/editing.

3.1 Installation

This is outlined in the separate MK AT installation guide.

3.2 MK AT Runner

3.2.1 Default Logins

The system is setup with 3 default logins, the usernames are not case sensitive, but the passwords are.

Username: Administrator	Password: MKtest2016
Username: Advanced Programmer	Password: MKtest2013
Username: Operator	Password: Mktest21013

3.2.2 Switching the MK AT On and Off

Power up sequence

The controlling PC should be connected and powered up prior to the MK AT being switched on. When the MK AT mains power is switched on, only the standby (or SSR) green LED on the right-hand should be lit.

When the operator double clicks on the MK AT icon and logs in, the MK AT internal supplies should switch on and all green LED's (except the HV Dump LED) should be lit.

Power down sequence

Exit the runner but selecting the Logout on the top right of the screen. This will return the MK AT to the standby condition. Switch the MK AT mains switch off.

Caution – After switching off the system, always leave a minimum of 30 seconds after the final power supply indicator has extinguished before switching the system back on.

3.2.3 Running Other Software

Because the MK AT is operating in real time, it is **not** recommended to run other software, while the MK AT is being controlled by MK AT for Windows.

Of particular note is the use of screen savers, the computer controlling the MK AT should have the screen savers **disabled** as they can affect the real time timing and make any safety warnings invisible.

It is acceptable to run MK AT software on a remote system not connected to a MK AT with other windows based software.

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As the software normally operates in full screen, it is necessary to use the windows custom key (normally keyboard bottom left and right) to display the windows toolbar.

3.3 Home

3.3.1 Importing and running a program

Because the editor is a separate application, you need to import the test programs into the runner. The runner can have many test programs imported at any time, like the example shows below where we have the programs “MK-TEST-002” and “MK-TEST-001” loaded.

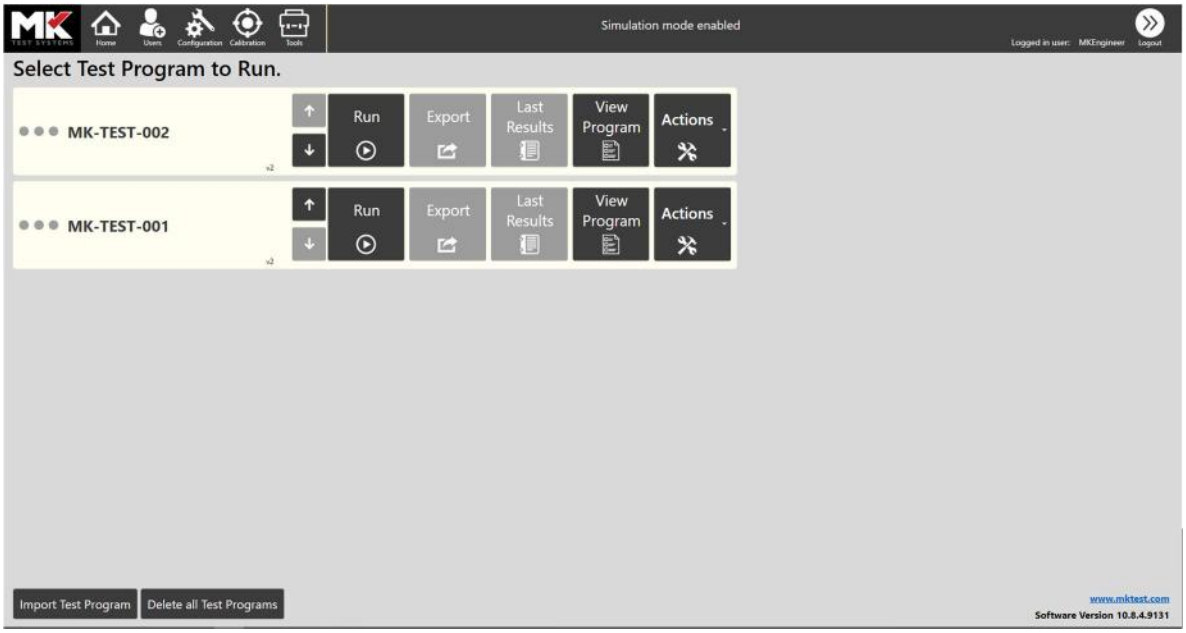

Figure 1: Main screen showing which test programs can be run

To remove a program from the list, use the delete button under the Actions menu button. Alternatively, you can use the ‘Delete all test programs’ button, next to the import button at the bottom left, to remove each test from the program list. Note this does not delete the test program file, it removes the test from the list and deletes data from the database associated with this program. There is also a clear option to allow you to clear all the results for a program. It is recommended that you do this from time to time to ensure that the database does not grow too large. When you import a new program, it will appear at the top of the list, you can also use the up and down arrows to re-order the loaded programs. As well as the test name you can also see the version number of the program, this is automatically incremented whenever a program is saved. If you run a program and there is a newer version that has not yet been loaded, you will be asked if you wish to load the newer version before running.

Selecting export will allow the user to save the last test run results (as an XML file).

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The Last Results will show the last test run report screen. If the last test run has failures and you wish to create a program with just these errors, that use the “Create test from failures” option within the Actions menu button. This will create a new program that will allow you to test the failed items without impacting on the original results.

The View Program option will show you a summary of the test program. This includes in file path location where the program is stored on the file system.

To run a program simply select the “Run” option, you will then be presented with the sub test selection screen.

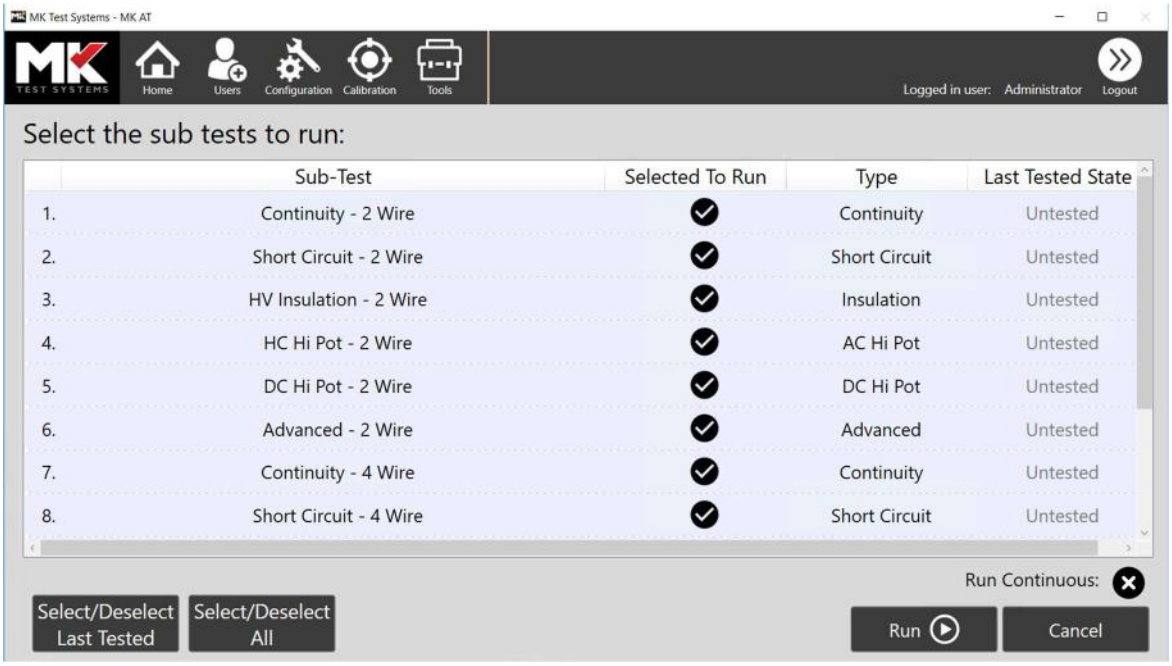

Figure 2: Sub-test selection screen

This allows you to choose which sub-test you wish to run, and optionally select to run continuously. To de-select a test simple click the “tick”. To re-select a test then click the “cross” against the specific sub-test that you wish to run and or remove. (Note you have to abort the test when running in continuous mode so the overall test status will never be a pass). To return to the main screen you have to cancel the operation that you have started.

When a test programming is running you will see various screens that show you the progress of both the overall test and the specific sub-test. Depending on the type of sub-test that is running you may be able to abort the running of a sub-test. This will safely stop the testing action and the show the result screen.

The result screen, shown below is the screen that is shown when a test program has completed. There is a collapsible section called “options” at the top of the screen that allows the operator to access the print and export buttons to allow then to record the result data.

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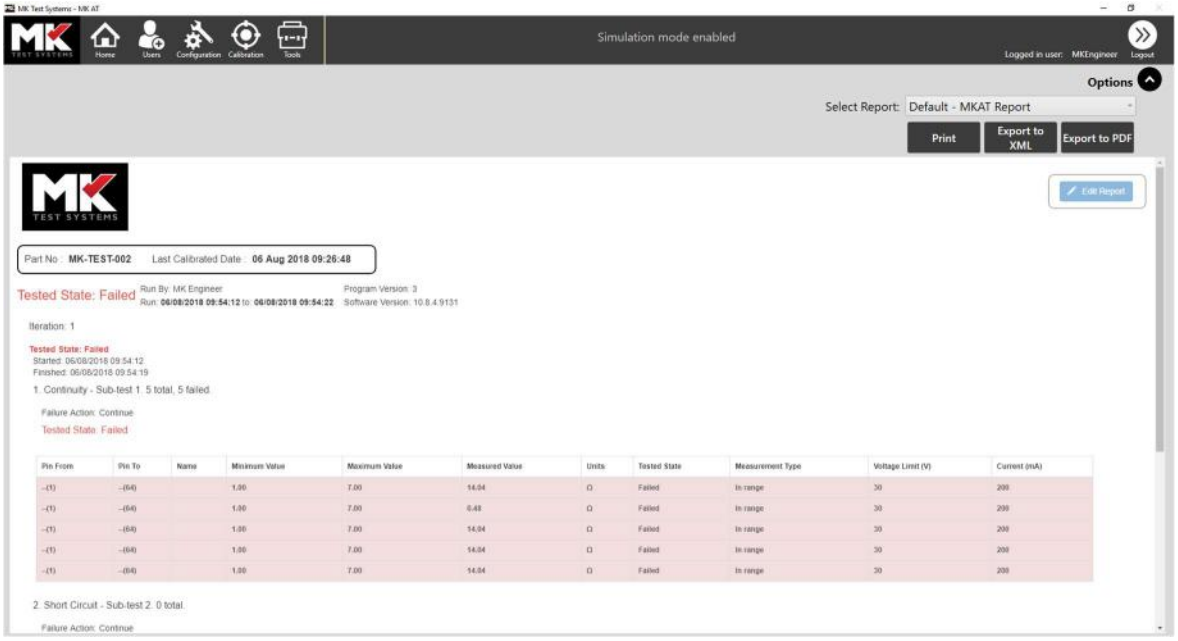
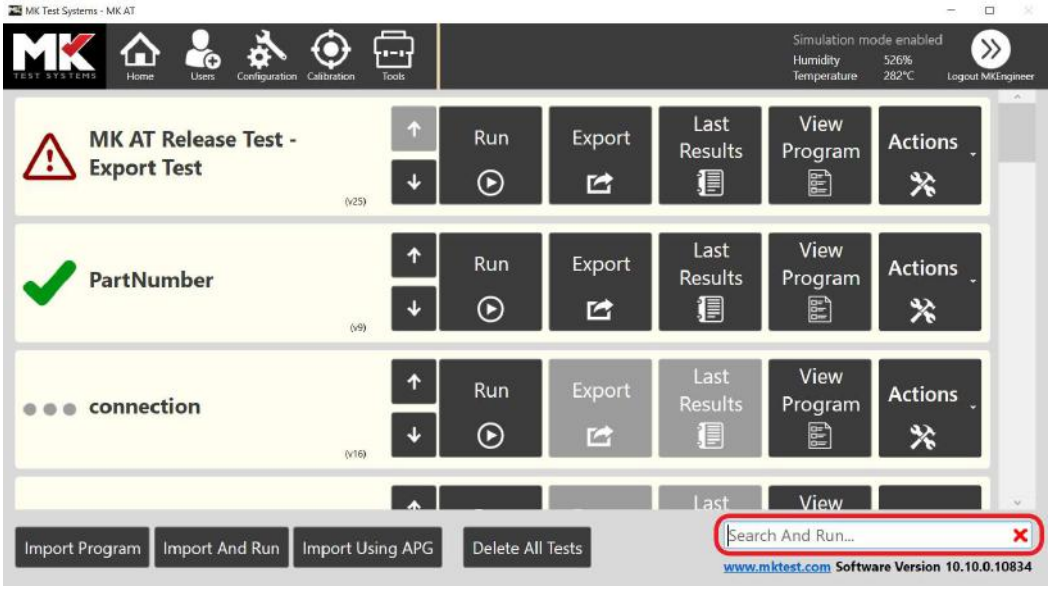


Figure 3 Report screen, showing a simple report of a test, the options to export and print can be accessed by expanding the options section

3.3.2 Search and Run:

- This feature allows the operator to search the loaded test programs by name.



- The search is case insensitive and begins when the first character is entered into the search field.

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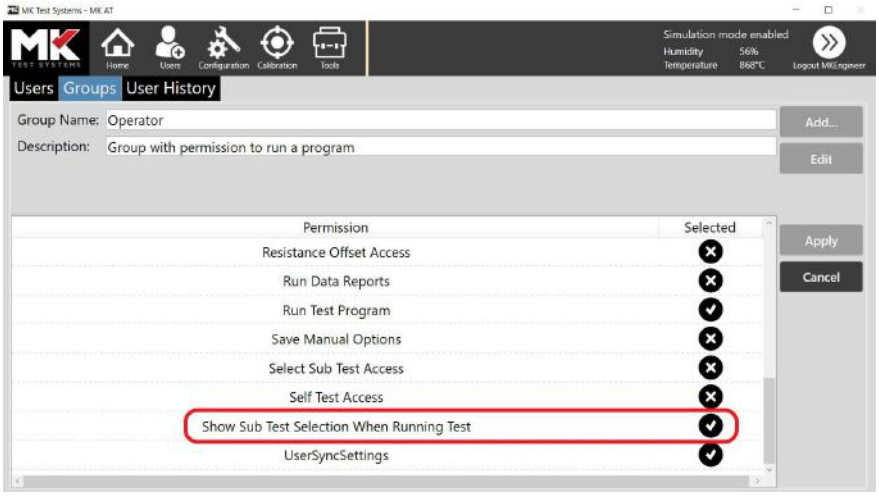
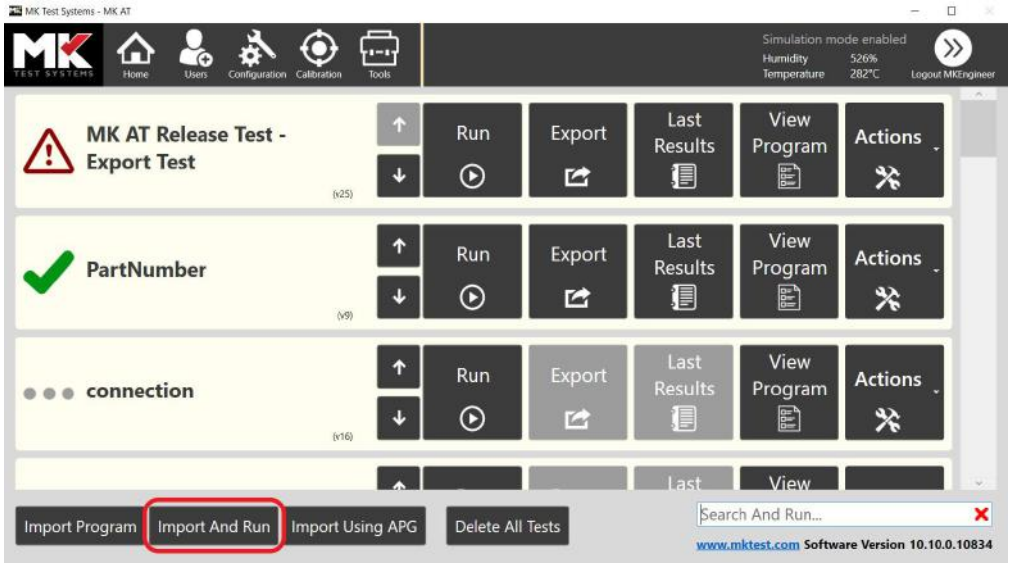
- If a matching program is found, pressing *Enter* will run it automatically.
- For multiple matches, the last imported match will be selected.
- The subtest selection screen is configurable by the user. With this option disabled, the matched program will run without showing the sub-tests screen.



3.3.3 Import and Run:

- The *Import and Run* feature enable test programs to be run automatically after import.
- Showing the sub-test screen is configurable by user permissions.



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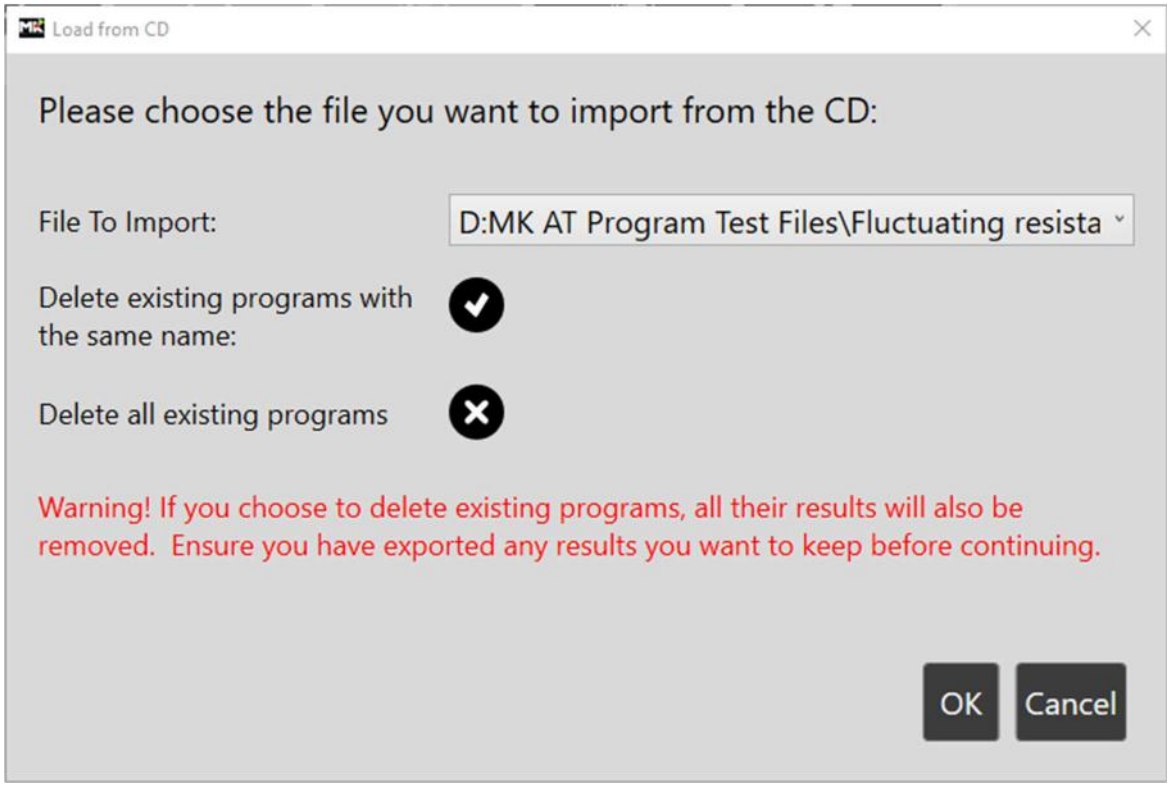
3.3.4 Importing from a CD

Test programs can also be imported from a CD. When a CD is inserted into the disk drive a popup window on the runner will appear (See below). You can select a program or configuration you wish to use from the file to import drop down menu. There are several options then given below which can be toggled on and off. Where delete existing programs with the same name is selected, if the new file has the same name as an existing test program the new program will be imported and the old one will then be deleted. Delete all existing programs will remove all imported test programs and import the new one from the CD.

The import can also be done by using the import test program and the bottom of the home page the same as importing normally. Use the file explorer to find the disk drive and select the program you wish to import.



3.3.5 Create test from failures

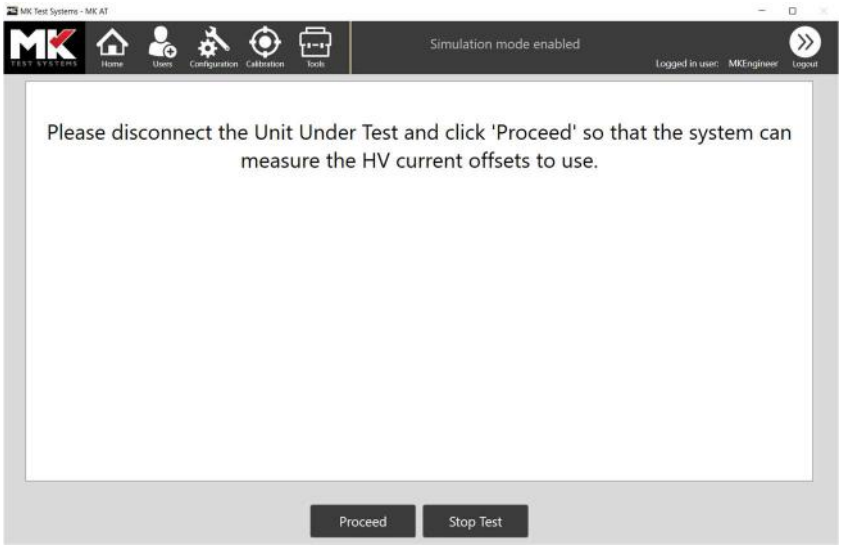
If you have run a test and there have been failures reported you can create a new test directly from the results, this new program will contain just the failed items from the original test allowing you to find and fix errors without having to re-run an entire test program.

If a test program has failed items, it will be highlighted by symbol. You can create a test programs from the *Actions* menu . It will scan the previous results and generate a new test program. You can now run this test independently of the main test program. This test program is treated as a new test program and as such can be exported/imported the same as normal test programs.

3.3.6 HV Offsets

A table of current offset values can be generated with the UUT disconnected and these values can be stored and subtracted from subsequent measurements taken with the UUT connected to get more accurate results. This option is available for both AC and DC HV tests. It can be enabled within the Editor from the Sub-Test Options screen, (see Editor Manual for details).

With this option enabled, the first time this program is run, the operator is prompted to disconnect the UUT and the current offsets are measured.



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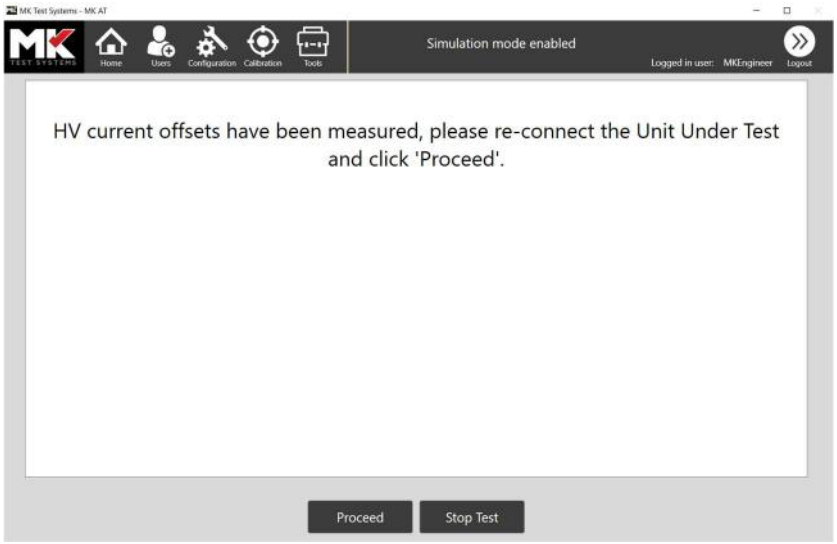
Once complete, the operator is prompted to reconnect the UUT and the testing continues in the normal way.



After the first measurement, the offsets are stored and used in any further tests where relevant. If the program is run again, the operator then has the option to remeasure the current offsets, if required. This is done by selecting the option *Measure HV Current Offsets* in the run screen, as shown in the example below:

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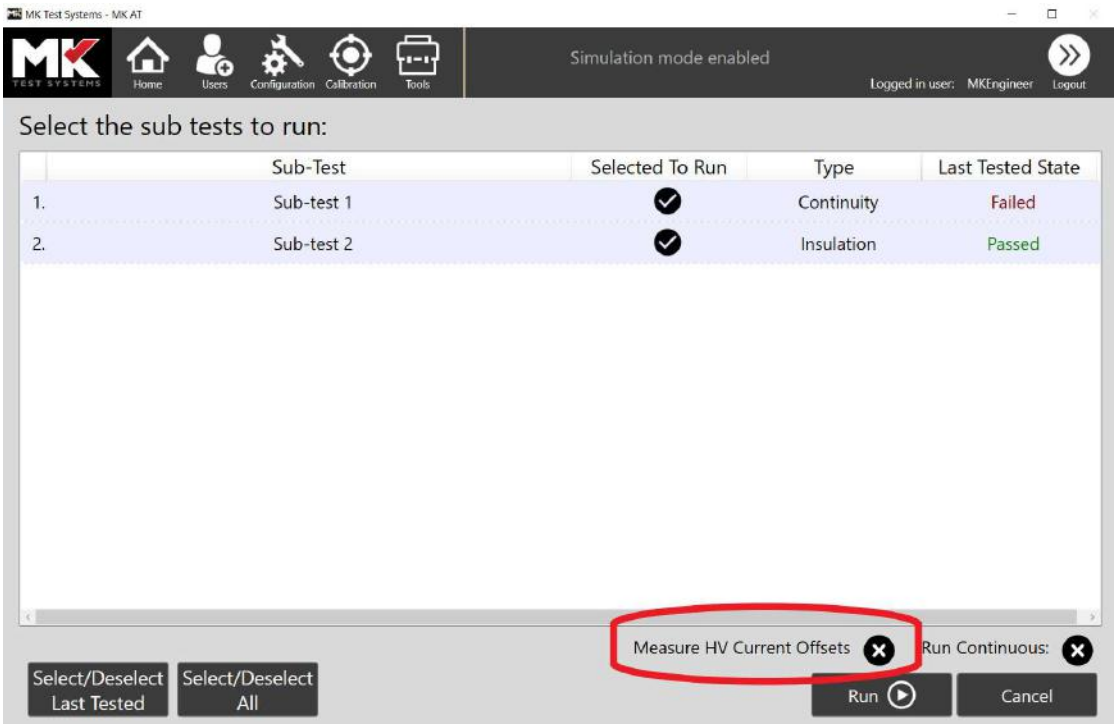

3.3.6.1 Import & Export of HV Offsets from a file

For Programs that require HV offsets to be measured, there is the option to import and export the offsets from a file.

If a program has not been run before, there will not be any offsets available to export and the *Export HV Offsets* option will be disabled, as shown below. These options are accessible from the *Actions* menu on the Home screen of the Runner.

Once the program has run for the first time, offsets can be exported to a file using the *Export HV Offsets* option. For a new or reloaded test, offsets exported previously can be imported if the Pin To & Pin From values and the Voltage are the same. If the offsets are imported and any of these parameters have changed, the import will fail with the following error:

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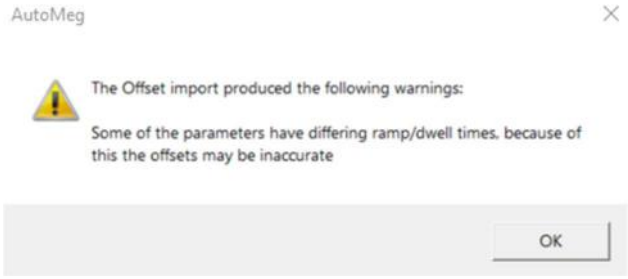
If the offsets are imported and either the *Ramp Time* or *Dwell Time* have changed, the import will complete but a warning message will be displayed:



The offsets can be used across multiple test programs. The sub-test names don't have to match as long as the settings outlined above match, the offsets can be imported.

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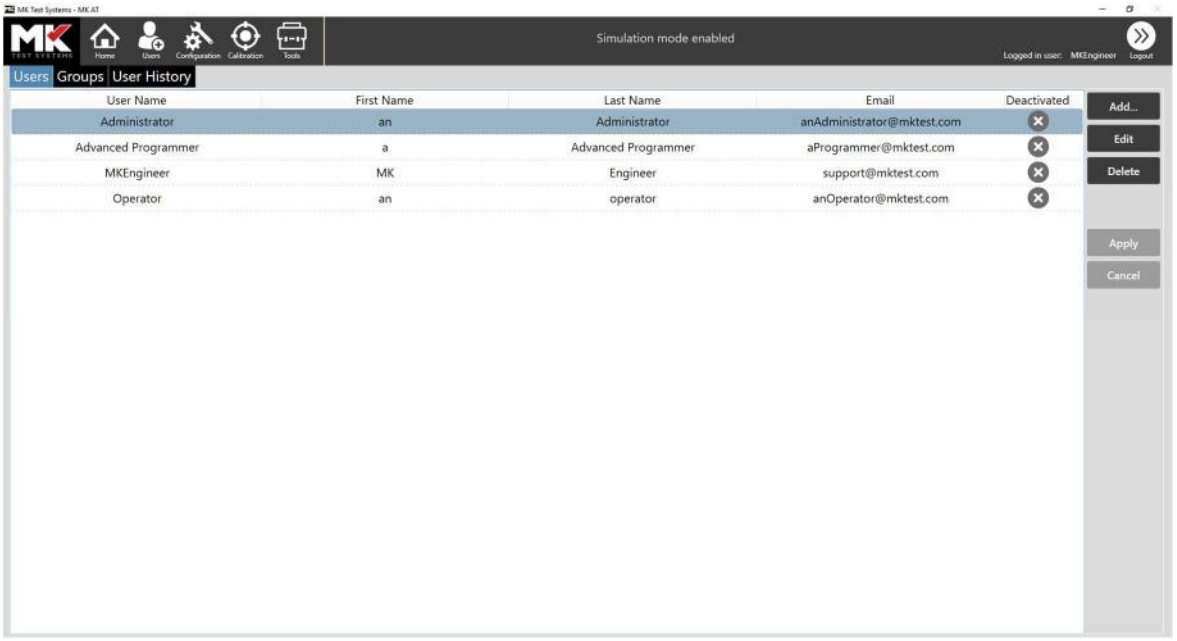
3.4 Users

This allows you to create, edit and manage the users who are allowed to login to the MK AT runner, you can also control the options and functions that an operator is allowed to use. You can do this by assigning groups to users, and control what permission are in which groups.

3.4.1 Users

The Users tab lists all the current users stored on the database and provides options for administrating them. The right-hand column of buttons provides the function to add/edit/delete any user provided the user currently logged in has permission. When creating/editing a user you can select which groups that user belongs to this dictates the level of access a user has and is discussed in detail in the section below.



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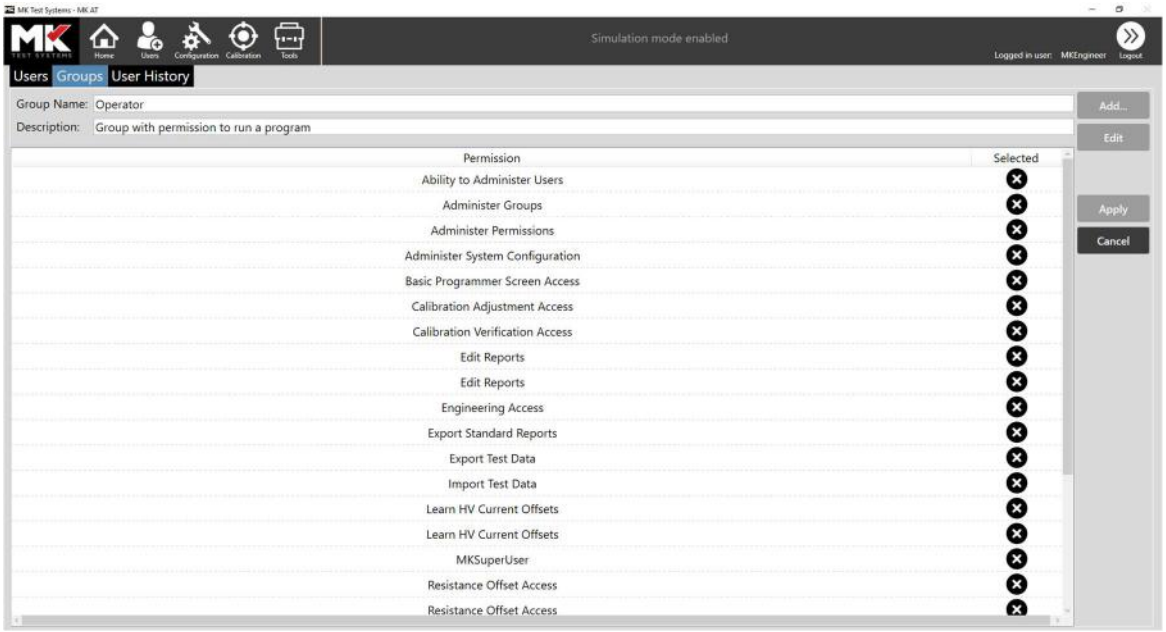
3.4.2 Groups

Groups allow for sets of permissions to be granted/denied and then applied to each user of that group. To create a group, go to the user's tab and navigate to the group sub tab. The groups already created are displayed in a list format and like the user's tab gives you the option to add or edit groups.

To assign permissions to a group select from the list of permissions when in the add/edit window. A user may have multiple groups assigned to them. Permissions should only be granted to users who require them to do their duties and should be removed if they are no longer needed.



3.4.3 User History

User history can be used to keep a log of the system being used, it provides the username and login/logout datetimes. You can filter by user and you can filter by date using the selectors at the top.

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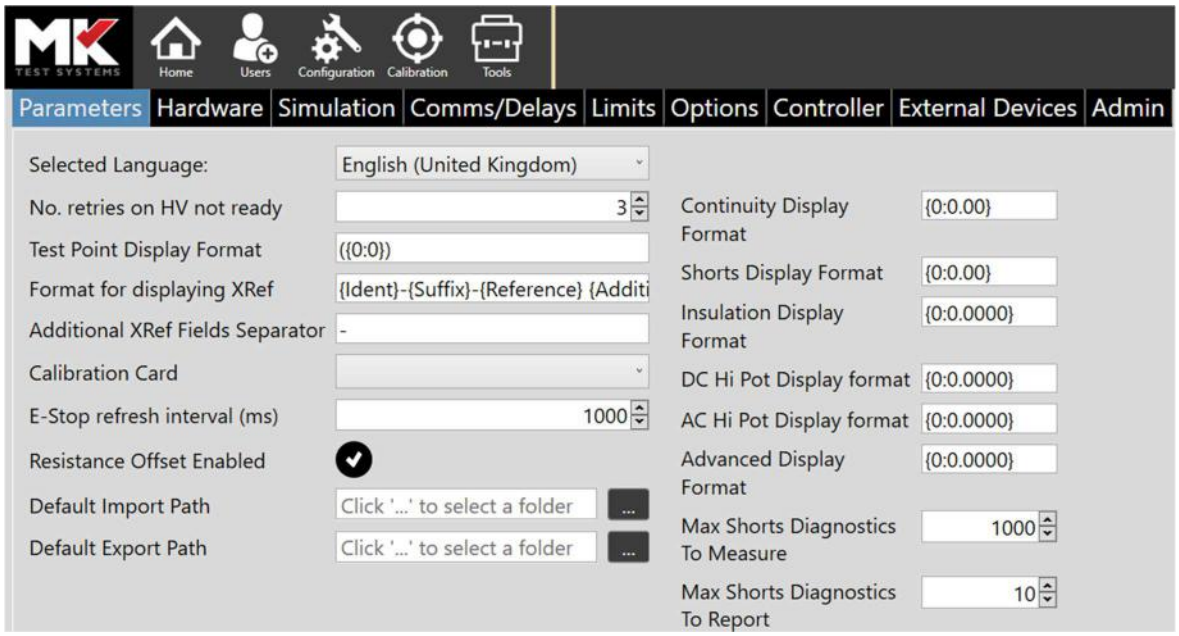
3.5 Configuration

3.5.1 Parameters

This section allows configuration of parameters that control the MK AT system:



Selected Language: Allows the selection of alternative languages for the Runner.

No. retries on HV not ready: Specifies the number of times an HV test will be attempted following a *HV not ready* event.

Format for displaying Connections: specified the display format for connections, typically as a simple integer as shown in the example above.

Format for displaying XRef: The XRef is compiled from three components, the Identifier(Ident), the Reference and the Suffix. This parameter allows the ordering of the components to be configured. In the example above the XRef would be *Identifier-Suffix-Reference.*

Additional XRef Fields Separator: Defines the separator character to be used between any additional XRef fields that have been added.

Calibration Card: Specifies the location of the calibration card, where required.

E-Stop refresh interval: This is the refresh interval that the system uses to monitor the Emergency stop button.

Resistance Offset Enabled: If this option is checked, the resistance offsets, saved for individual test points, will be used for continuity measurements. See the section *System Offsets* for more details.

Default Import: Selecting *Import Program*, *Import and Run*, *Import Using APG* will all use the default import path. (Note: The *Import Using APG* function behaves slightly differently. It will use the default path until the path is changed by the user to an alternative location. Once changed, the new path will persist.)

Default Export Path: Selecting Export will use the default export path

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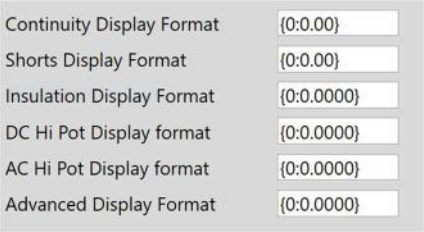
Max Shorts Diagnostics To Measure: Sets the maximum number of diagnostic tests to perform following a failed shorts test.

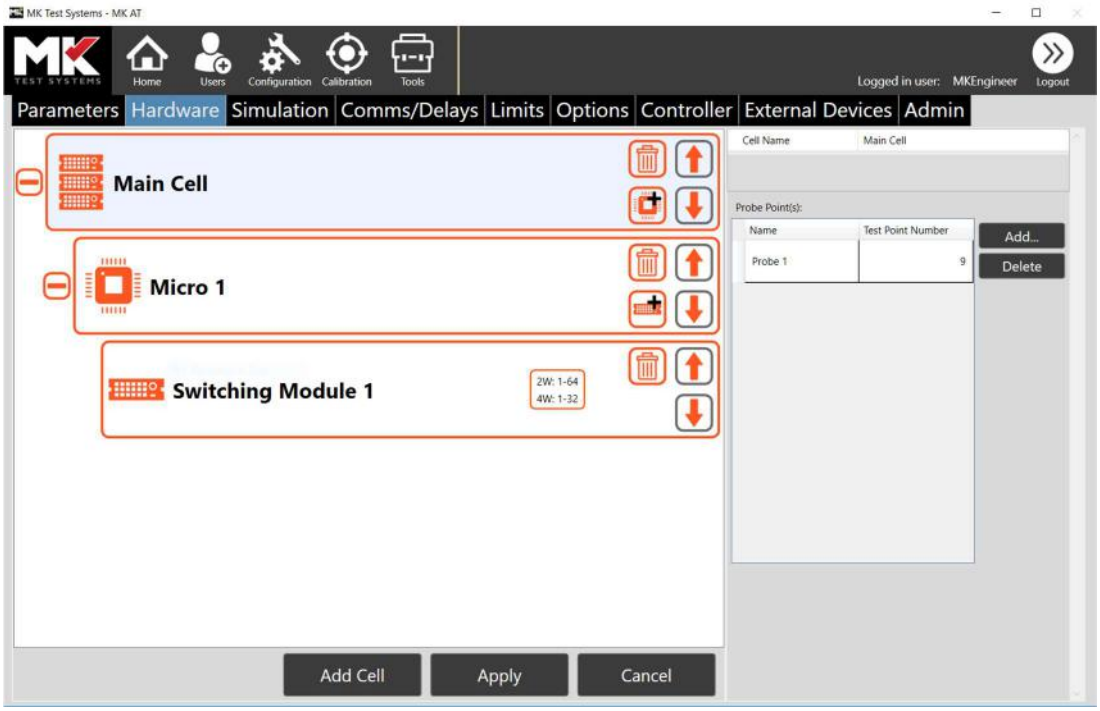
Max Shorts Diagnostics To Report: Sets the maximum number of diagnostic tests to report following a failed shorts test.

Display Formatting: The display format for each test type can be configured. In the example shown below, Continuity is setup to display to 2 decimal places and Insulation is setup to display to 4 decimal places



3.5.2 Hardware

The hardware configuration can be set up in this section. Selecting the main cell allows the name to be edited and probe points to be added in the right-hand panel. Further cells can be added using the Add Cell button.



Selecting the *Add Micro* button allows one or more microprocessors to be added and they can be removed using the Delete Micro button. Selecting the micro opens a window on the right-hand side that allows its properties to be edited.

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Microprocessor Address	Micro 1
Enabled	☑
Measurement Micro	☑
Switching Micro	☐

One or more switching modules can be added to the micro using the *Add Switching Module* button and they can be removed using the *Delete Switching* Module button . Selecting the switching module opens a window on the right-hand side that allows its properties to be edited.

Identifier / Name	Switching Module 1
Enabled	☑
Use for satellite test	☐
No Slots	16
Addresses Per Slot	128
Slot 1	AM4-0251
Slot 2	
Slot 3	
Slot 4	
Slot 5	
Slot 6	
Slot 7	
Slot 8	
Slot 9	
Slot 10	
Slot 11	
Slot 12	
Slot 13	
Slot 14	
Slot 15	
Slot 16	

The *Enabled* option can be used to enable and disable switching modules, allowing the same program to be run across different setups. This may be used where there are multiple switching modules set up as satellites.

If *Use for satellite test* option is selected, the system performs a self-test on the first point of the switching module at the start of each test iteration. This ensures that a remote satellite is switched on before starting a test.

The *No Slots* is the total number of card slots available in the switching module. The total number of addresses per slot can be selected form the *Addresses Per Slot* drop down menu.

The specific card type for each slot can be selected by clicking on the dropdown menu next to each slot.

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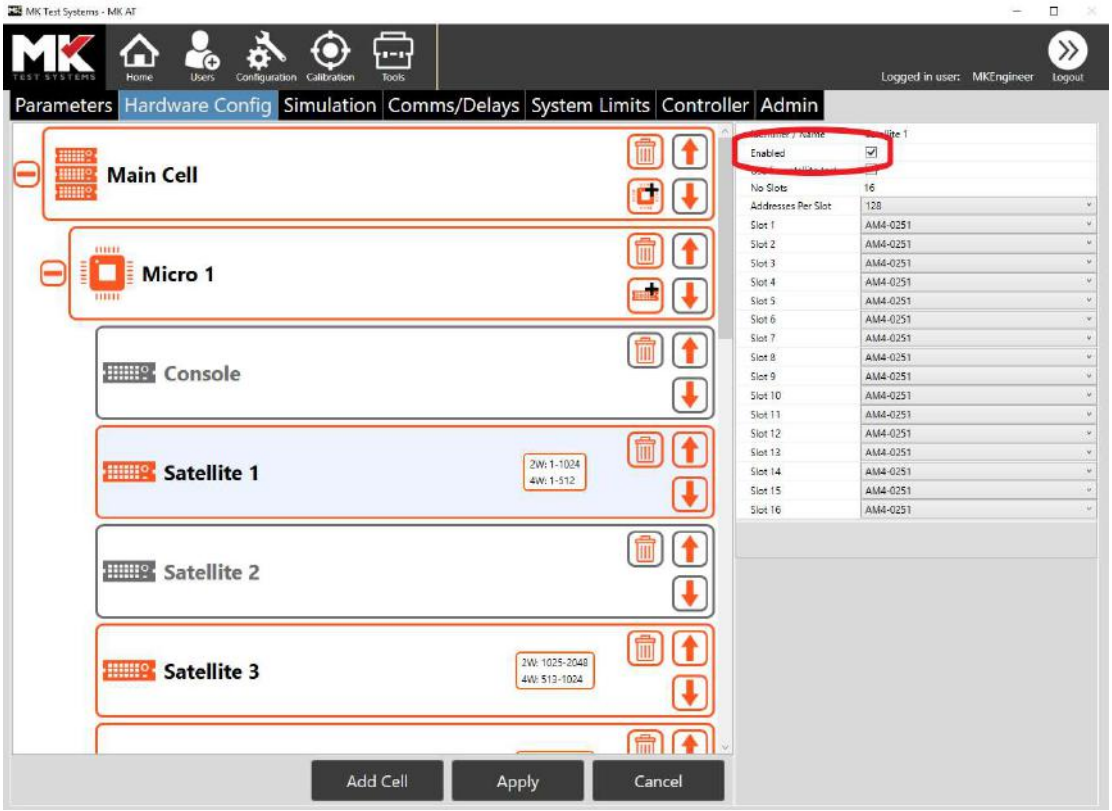

In the example above, several switching modules have been set up as satellites. In this case, only satellites 1 and 3 are actually going to be used so these are enabled (using the check box on the right) while the Console and Satellite 2 are disabled. Once any changes to the setup are confirmed (by selecting the ***Apply*** button) the test point values shown for each satellite are automatically updated for 2 and 4 wire, shown in the orange box.

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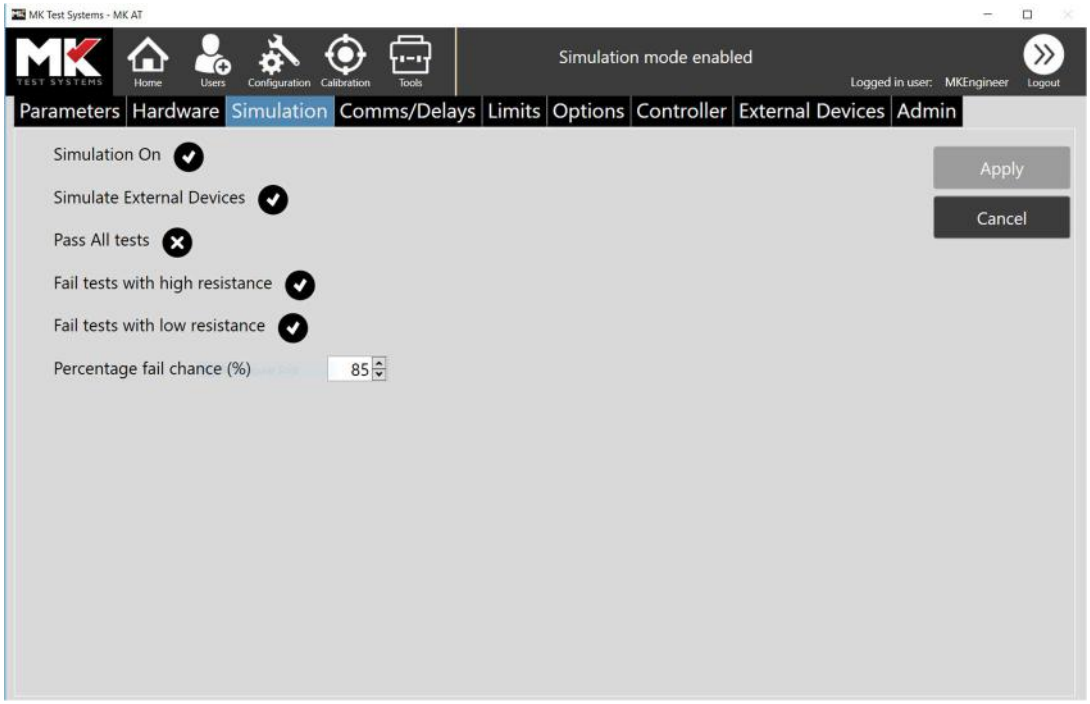
3.5.3 Simulation

The runner has a simulation mode which allows it to run without connection to physical hardware for training and testing purposes. This functionality is switched on using the *Simulation On* check box. Connection to external devices such as a thermometer can be simulated by selecting the *Simulate External Devices* checkbox. The remaining options control the generation of the results in simulation mode. *Pass All tests* force all test results to pass and the *Percentage fail chance* option controls the proportion of pass and fail results in simulation mode.

Any changes mode to the simulation options must be confirmed using the *Apply* button. Once simulation mode has been activated the warning message *Simulation mode enabled* flashed in the top panel of the Runner, shown in the example below.



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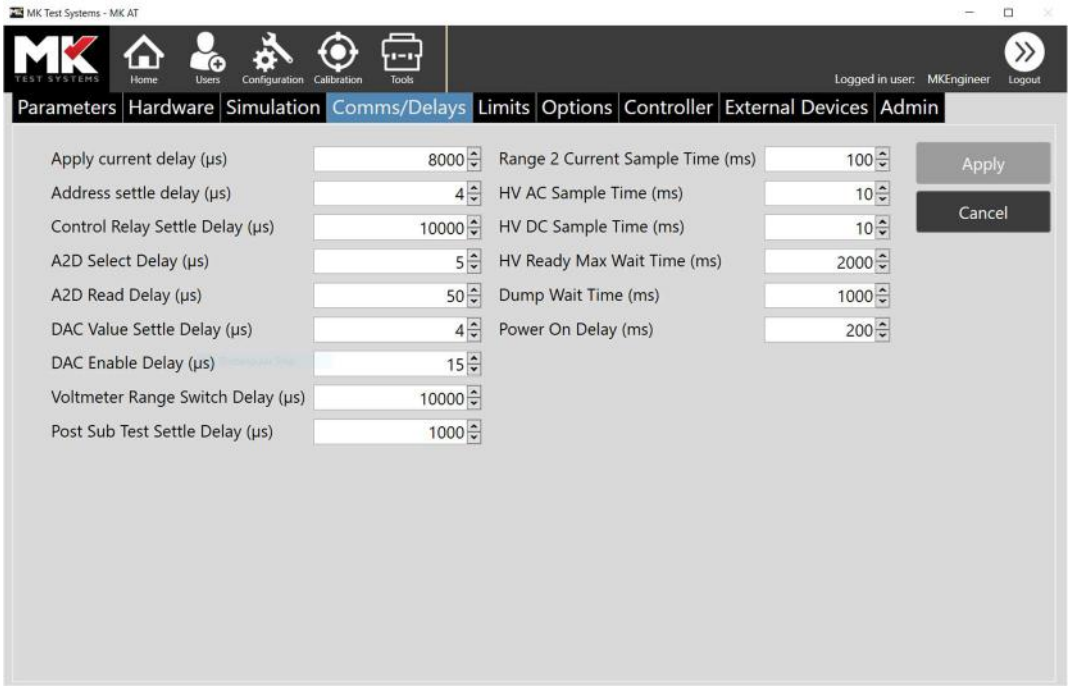
3.5.4 Comms/Delays

The parameters listed in the *Comms/Delays* section directly affect system measurements and should only be changed under direction from a MK Test Engineer.



3.5.5 Limits

The parameters listed in the *Limits* section directly affect system measurements and should only be changed under direction from a MK Test Engineer.

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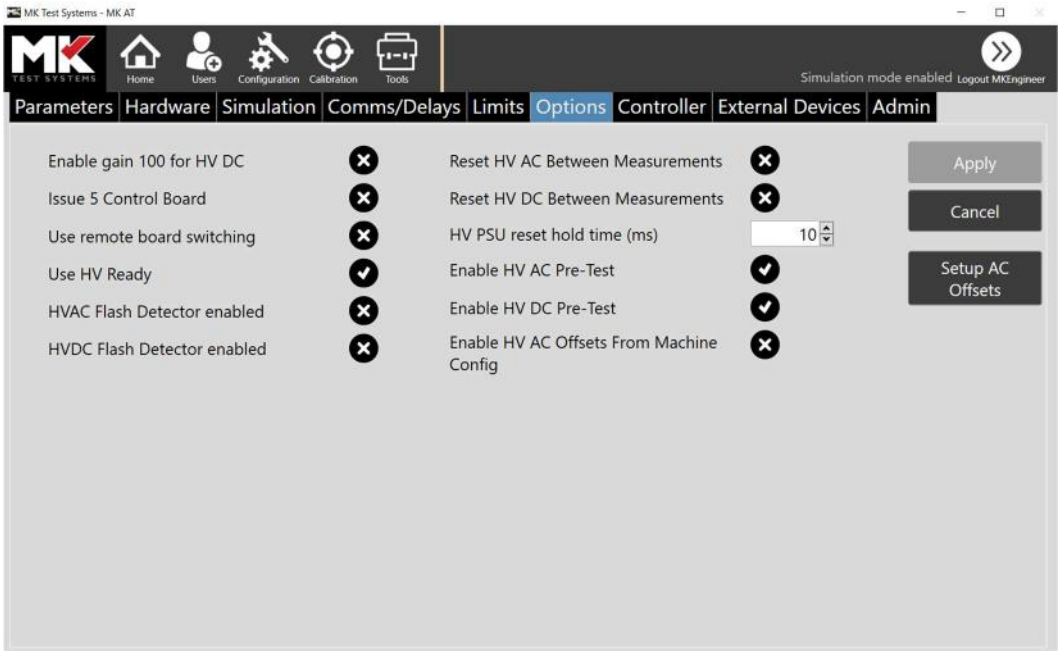
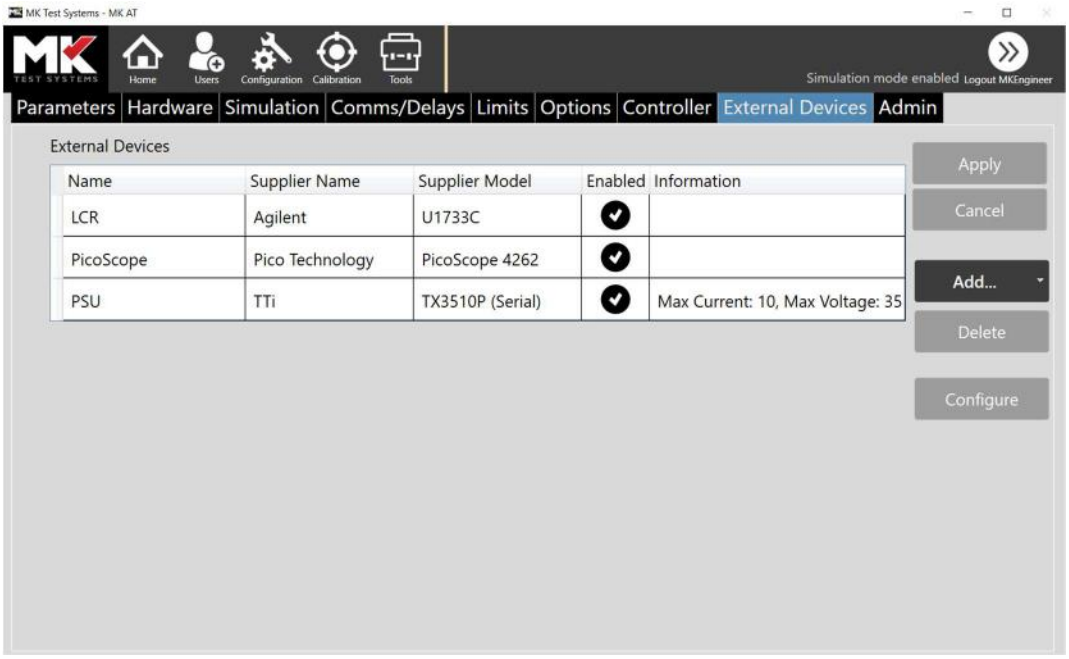
3.5.6 Options

The parameters listed in the *Options* section directly affect system measurements and should only be changed under direction from a MK Test Engineer.



3.5.7 External Devices

External devices such as LCRs, external meters, or oscilloscopes, can be added and configured in this section.



To add a new external device, select the ***Add*** button. This open the menu shown below:

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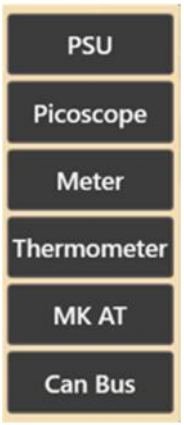
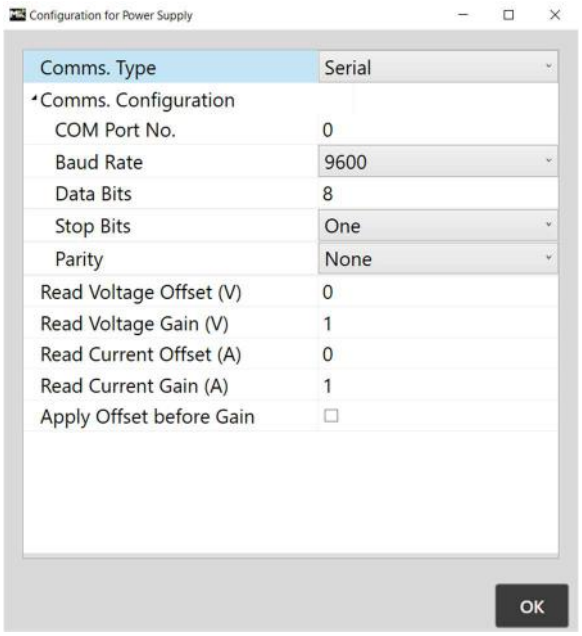


Select one of the listed options and enter the required details, Name, Supplier Name and Supplier Model from the dropdown lists. If the device requires further configuration, select the ***Configure*** button and enter the details. The example below is the configuration for a serial Power Supply:



All changes must be confirmed using the ***Apply*** button. External device entries can be removed from the list using the ***Delete*** button.

Other Options

3.5.8 Remapping of External Devices

If a program is opened where the required external device(s) are not available from the current configuration there is now an option to remap the external device to a compatible external device from the loaded configuration.

- When importing a sub test, any required external devices must be present in the configuration.

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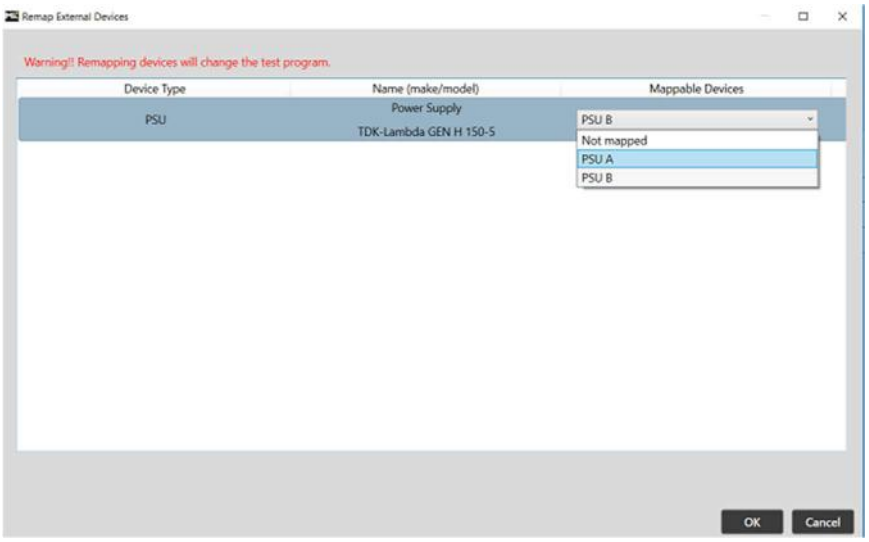
- If the configuration file (on the target system) contains one or more versions of the required external device, the user will have the option to remap this device for the imported program. This updates the imported program so that all references to the external device are changed to match the selected device. (This allows sub-tests to be imported onto a system that already has a compatible external device set up, without having to make further changes)



- In the example above, the imported program requires a *TDK-Lambda GEN H* power supply.
- The target system has two power supplies (PSU A and PSU B) that match, shown in the Mappable Devices column.
- If the operator selects PSU A, for example, all references in the imported program will be automatically updated to reference this power supply.

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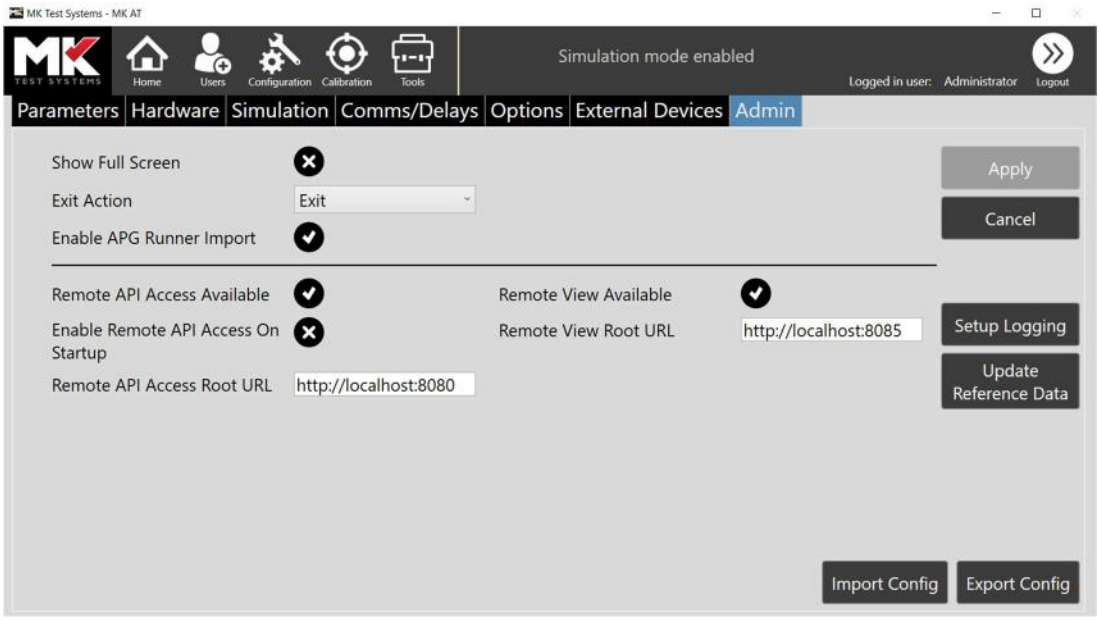
3.5.9 Admin

System controls:



Show Full Screen: Toggles full screen mode for the Runner.

Exit Action: Action to follow exiting the Runner. Choose from *Exit, Shutdown, Hibernate* and *Log Off*.

Enable APG Runner Import: This option allows programs to be created automatically using the APG, directly from the Runner. Once enabled, a button called *Create Test Program From APG* appears on the Home screen after the next log in.

Remote API Access Available: This option enables remote API access, allowing the system to be controlled by third party software. If checked, the option *Enable Remote API Access* appears on the login screen and if this is enabled, a message is displayed showing the root URL that connections can be made on.

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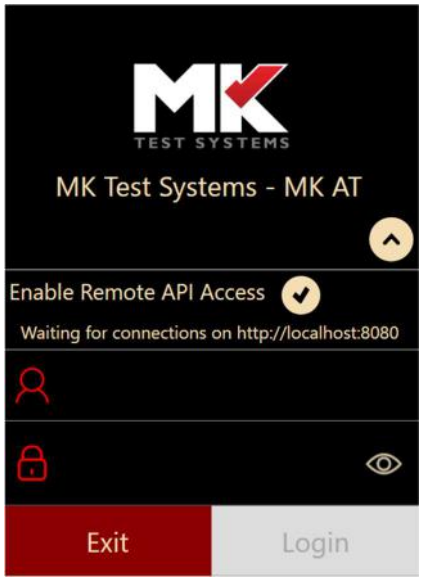


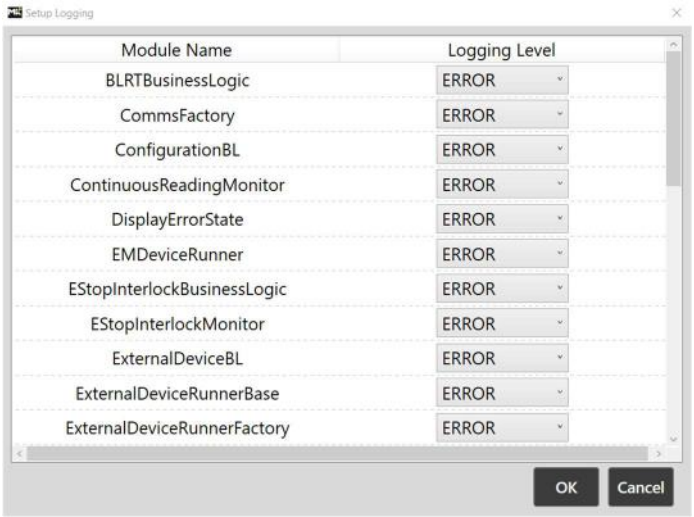
Enable Remote API Access On Start-up: Allows API access to be enabled automatically when the Runner is launched. The option *Enable Remote API Access* on the login screen will be enabled automatically.

Remote API Access Root URL: If remote API Access is required, the root URL is specified here.

Remote View Available: Enables remote view, see remote view section below for details.

Remote View Root URL: If remote view is required, the root URL is specified here.

Setup Logging: This button opens the *Setup Logging* window:



For each module listed, a logging level can be selected from the dropdown menu. This feature should only be used under guidance from a MK Test engineer.

Update Reference Data: This function allows missing or amended commands for external devices to be imported into the system without the need for a software update.

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Import Config: Import an existing configuration file. The existing configuration will be overwritten so it should be exported first, if required.

Export Config: Export the current configuration and save for later use.

3.6 Calibration

Calibration should only be completed by trained and authorised persons. Please contact MK Test Systems for more details.

3.6.1 Verification

Verification of the calibration should be carried out regularly, typically once a year, prior to the expiry date displayed on the system. The verification process is used to confirm that the system is still within tolerances but does not actually adjust the calibration.

The calibration expiry date is displayed at the top of the window, shown below. This message turns from blue to red several days prior to the expiry date as a warning. The number of days can be configured by entering a value into the *No days to warn of expiry* box.

The calibration expiry period can be adjusted by entering the desired number of months into the *No months before calibration expires* box.

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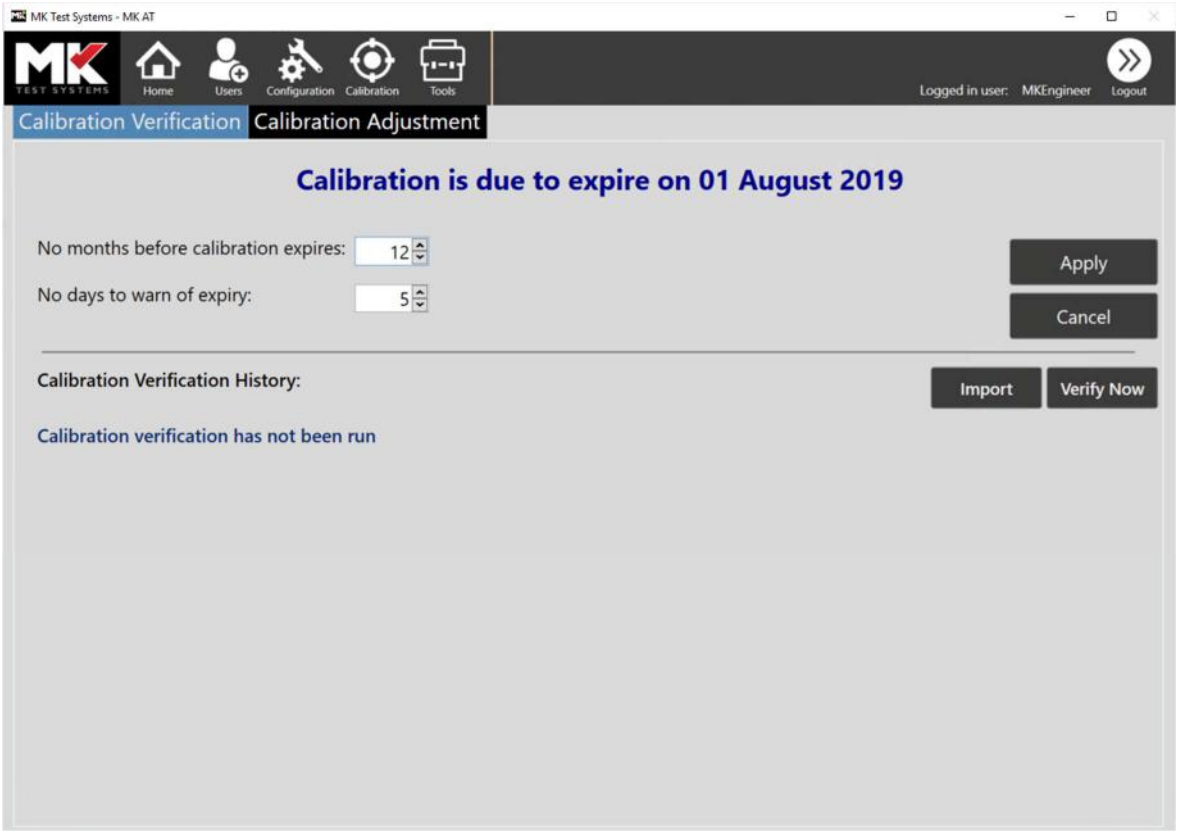

Calibration verification is performed by running a verification program on the Runner and comparing the results with the expected values. The verification program will be supplied with the system and will be run in the factory before the system is released. To import a verification program, select the *Import* button and navigate to the correct program. Then select the *Verify Now* button to begin the process and run the program by selecting the *Run* button. The program will lead the engineer through the process of connecting the calibration adaptor and multimeter to the system and entering the measured values. Once the measurement is entered, the Apply button is selected to confirm the reading and move onto the next one, as shown below.

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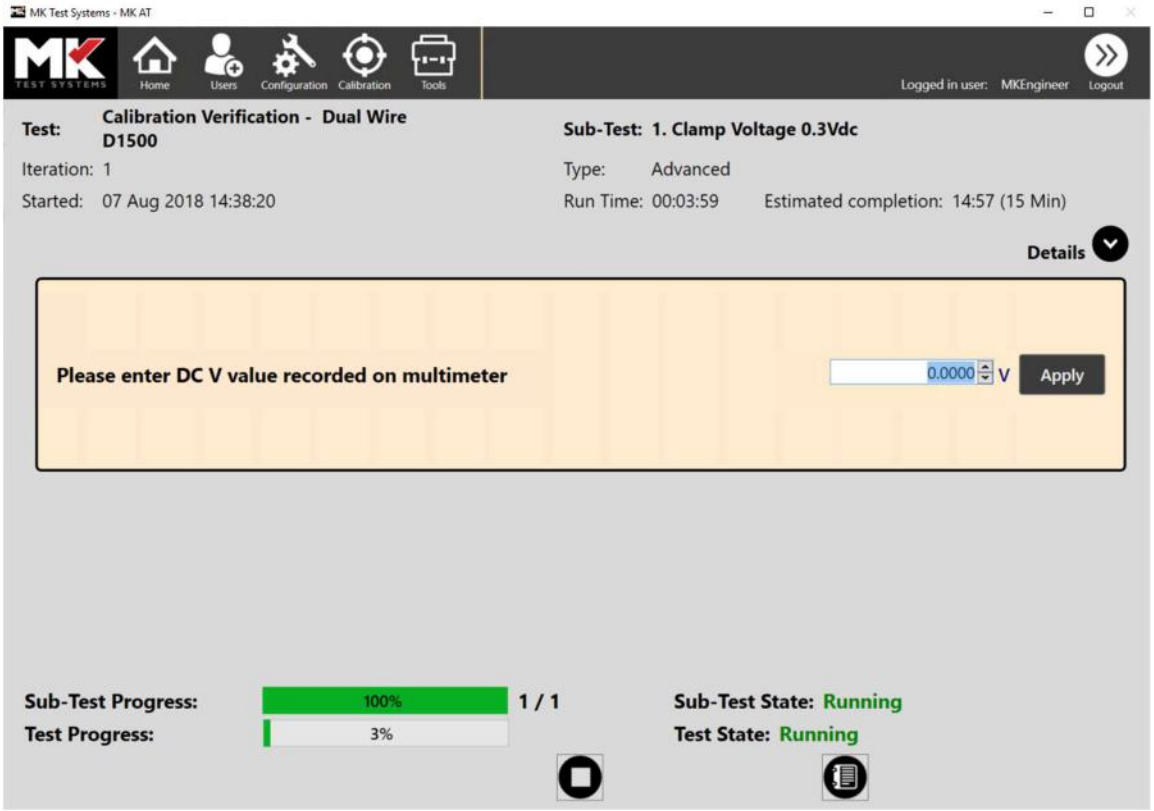

Once the verification program is complete, a new entry appears in the Calibration Verification History section, as shown below. All subsequent verifications will be added to this list forming a history of system conformity.

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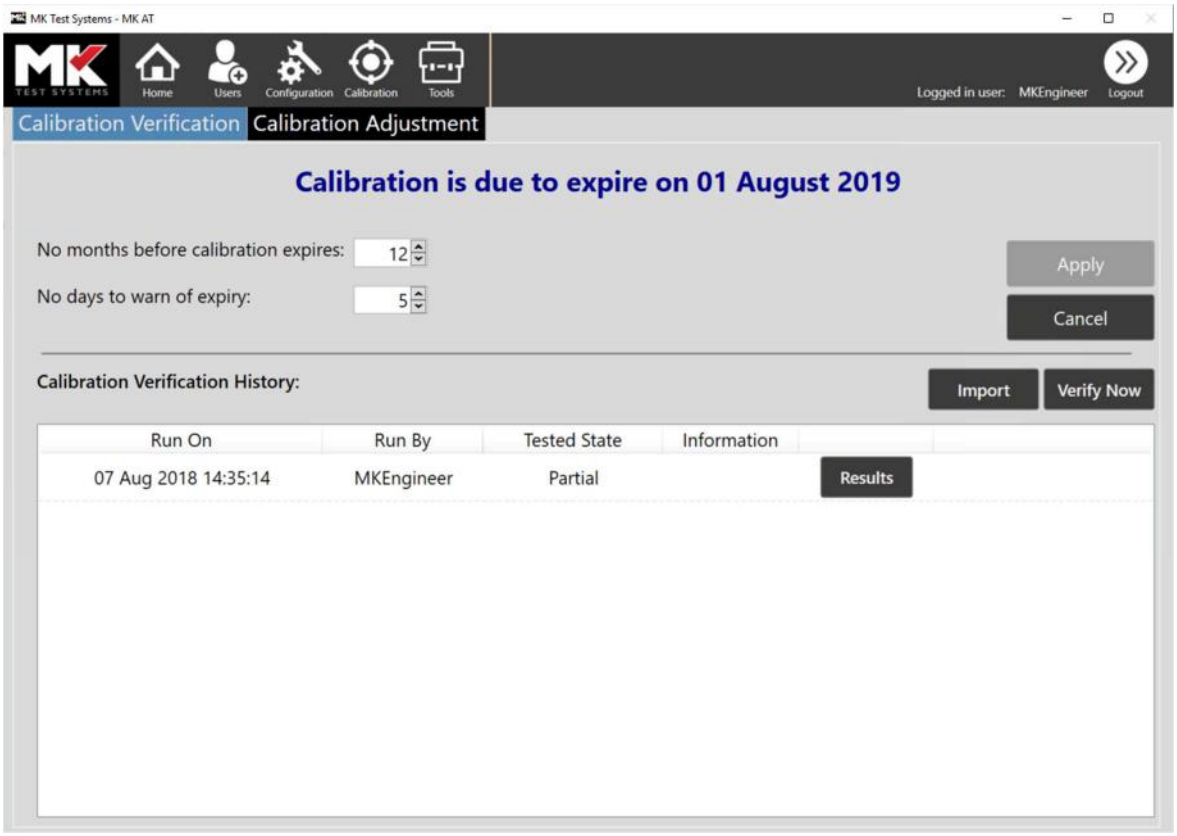

The results are now manually compared with the expected values and if they fall within the specified tolerances a calibration certificate can be issued. (A template for the calibration certificate is available from MK Test on request). The next calibration verification date can now be set, typically one year from the date of the last verification. This can only be achieved from the Calibration Adjustment screen by making a change to a *gain* or *offset* value and selecting the *Apply* button. (If no adjustment is required, a value can be amended and then the change reverted before selecting the Apply button).

3.6.2 Adjustment

Adjustment is used to set the gain and offset of a MK AT. This correction is usually configured at MK Test systems factory however there may be times when a new calibration adjustment is needed. A calibration board should be used, and relevant cables connected to a calibrated multimeter.

Turn the MK AT off. The calibration board can then be connected to the card being used for calibration (this card must be set in the parameters tab in configuration). Position the multimeter so you can read the values without having to touch the multimeter. Switch on the MK AT system and open the runner software.

Under calibration you can set the adjustments manually, follow the instructions of each screen clicking next to progress. Each calibration test will ask you to set the reading type on the multimeter and then begin the reading where you will be asked to manually input the reading given on the multimeter.

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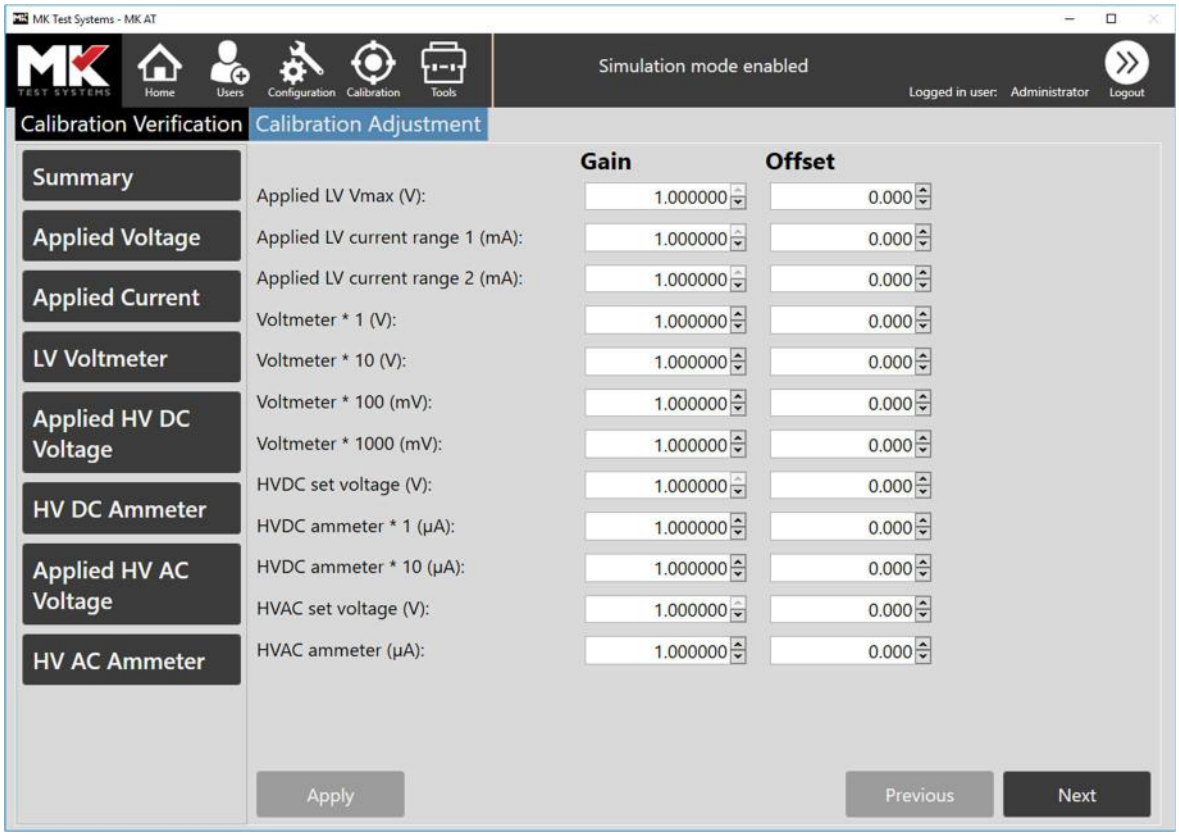

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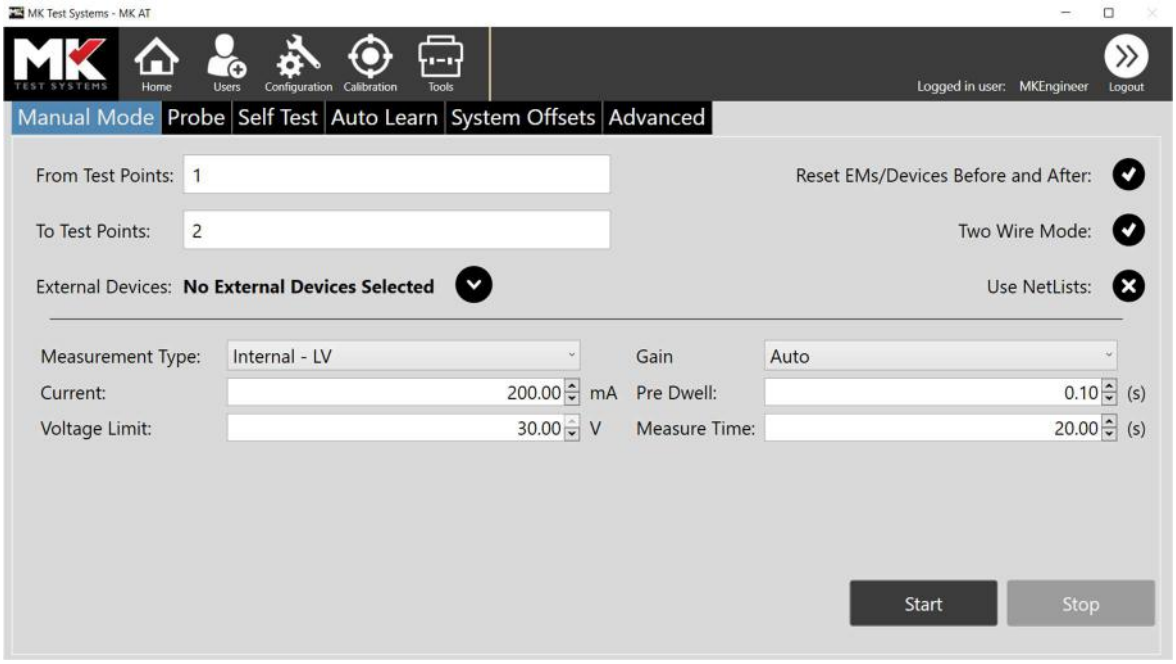
3.7 Tools

3.7.1 Manual Mode

The manual screen allows you to make any type of measurement and setup “ad hoc” device sequences. This allows an operator to be able to diagnose faults using any measurement type. Also, if your system has external devices, you can ensure that any external energization and or switching that occurs, during the automated testing, is set the same while doing a manual test.



The *From* and *To Test Points* can either be entered manually or a net can be selected from any test program currently loaded by selecting the *Use NetLists* option and then clicking on the edit button next to the *NetList From* or *NetList To*.

Relays and external devices can be reset before and after each test by enabling the *Reset Ems/Devices Before and After* option and the *Two Wire Mode* option toggles the system between two and four wire mode.

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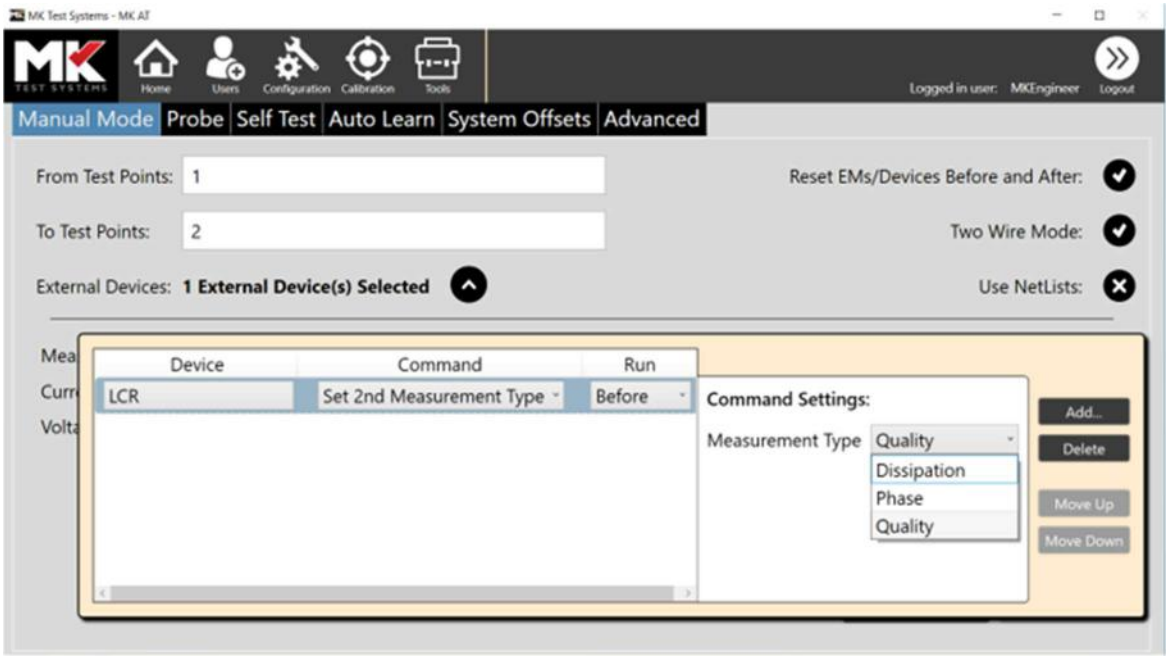
External Devices:

If you wish to add an external device sequence then selecting the E*xternal Devices* drop down will show the following screen, where you can add the device commands you wish to execute:



To add a device, select the *Add* button. Select a device from the list of available devices. A list of relevant commands will then be listed under *Command* for the chosen device and the command can be specified to run before or after the test.

If further command settings are available for the device these will be shown in the *Command Settings* section. In the example above, the LCR has three possible 2nd measurement types which can be selected form the drop-down list as required.

Further external devices can be added using the *Add* button and entries can be removed using the *Delete* button. The *Move Up* and *Move Down* buttons can be used to reorder the entries.

To set up the manual test, select a measurement type from the list and enter the *Current*, *Voltage Limit*, *Pre Dwell* and *Measure Time*. Click *Start* to begin the test. It will stop automatically after the measurement time period but can be ended early using the *Stop* button.

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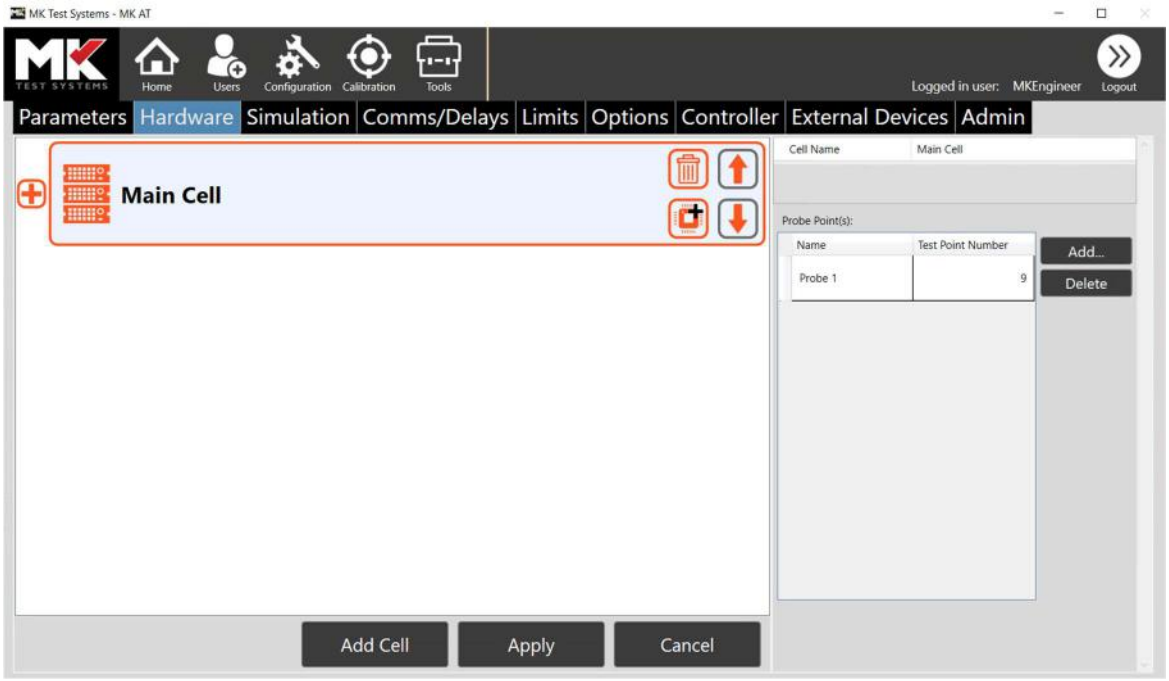
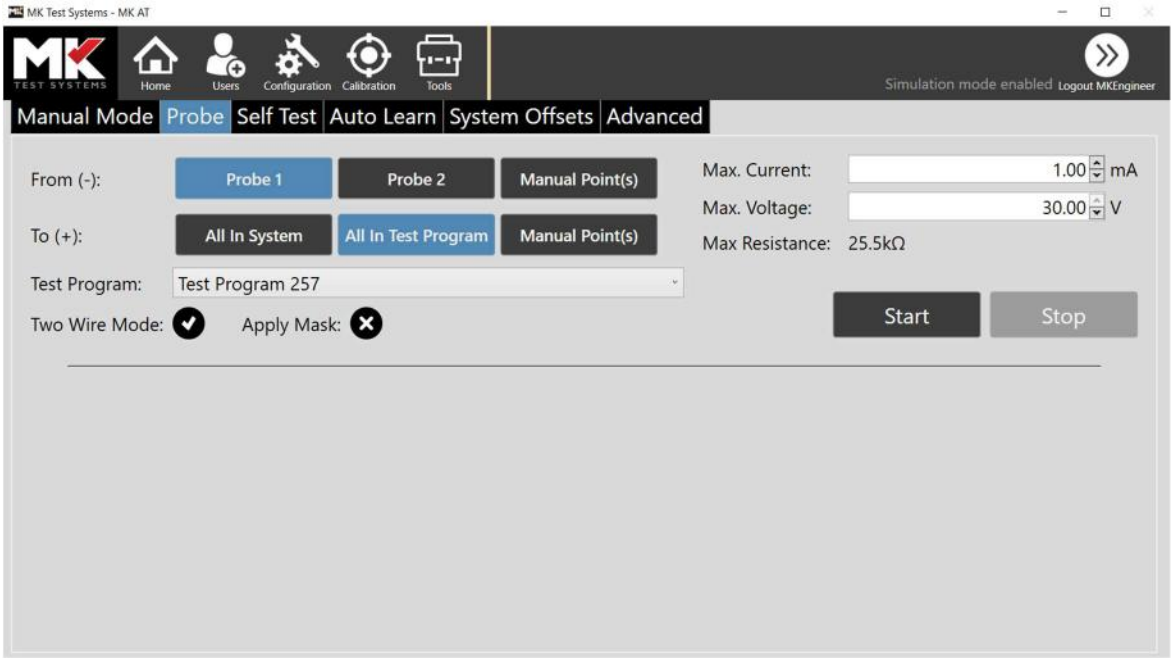
3.7.2 Probe

This section allows probe tests to be set up for diagnostic and fault finding purposes. Probes are set up in the Hardware section of *Configuration* where they can be added to the *Probe Point* table, shown below on the right.



The Probe screen is accessed from the Tools menu:



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- Any probe points that have been set up in the hardware configuration can be assigned to ***From (-)***.
- Alternatively, test points can be assigned manually. Clicking the ***Manual Point(s)*** button opens the following field allowing test points to be entered:

- ***To (+)*** can be set to:
    - ***All In System****:* The test will include all test points available in the system (excluding any system masked points). This is the default setting.
    - ***All In Test Program****:* The test will include all test points defined within the specified test program. Where this option is selected, the *Start* button will be disabled until as test program is specified.
    - ***Manual Point(s)****:* The test will include only the test points entered.
- The ***Test Program*** dropdown list will include all currently loaded test programs. If a test program is selected, the associated XRef data will be used when reporting the results. Where the ***All In Test Program*** option is selected, a test program must be selected to define the test point range to use. Note that if the specified program has any additional XRef data this will also be included in the results.
- ***Two Wire Mode****:* toggles the system between 2 and 4 wire mode.
- ***Apply Mask****:* This option forces the probe test to exclude any test points that are masked in the specified program.
- The ***Max. Current*** and ***Max. Voltage*** can be entered on the right. The default values are 1mA at 30V giving an associated ***Max. Resistance*** of 25.5kOhm (30V / 0.001A * 0.85) is displayed below. Any connections with a resistance over this limit will be excluded from the results.

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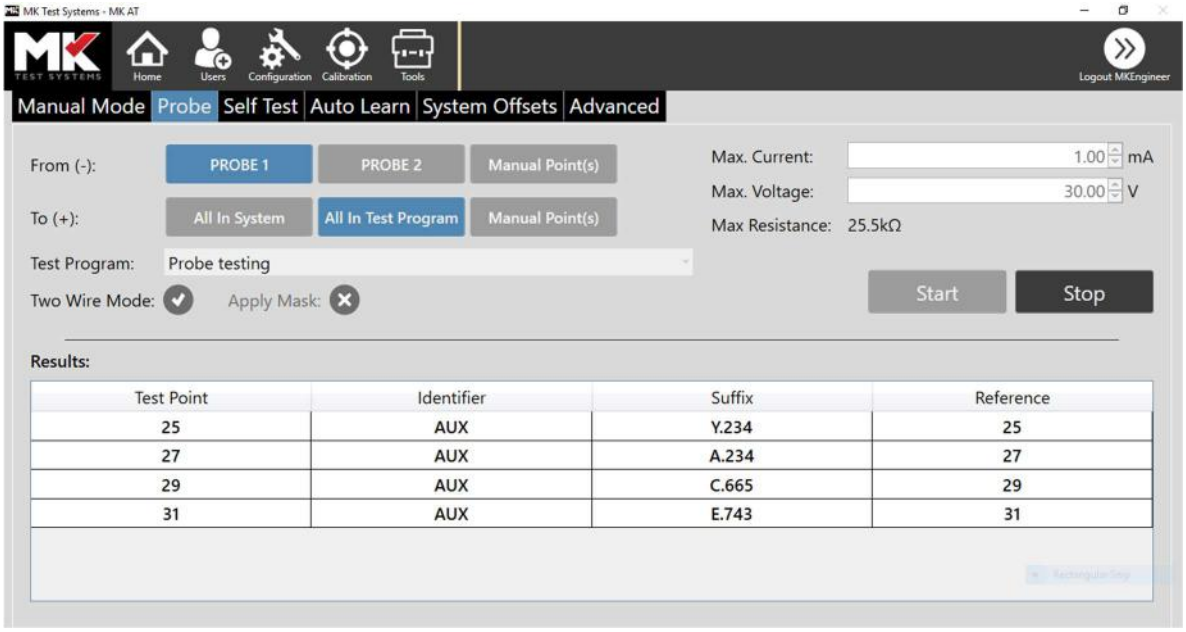
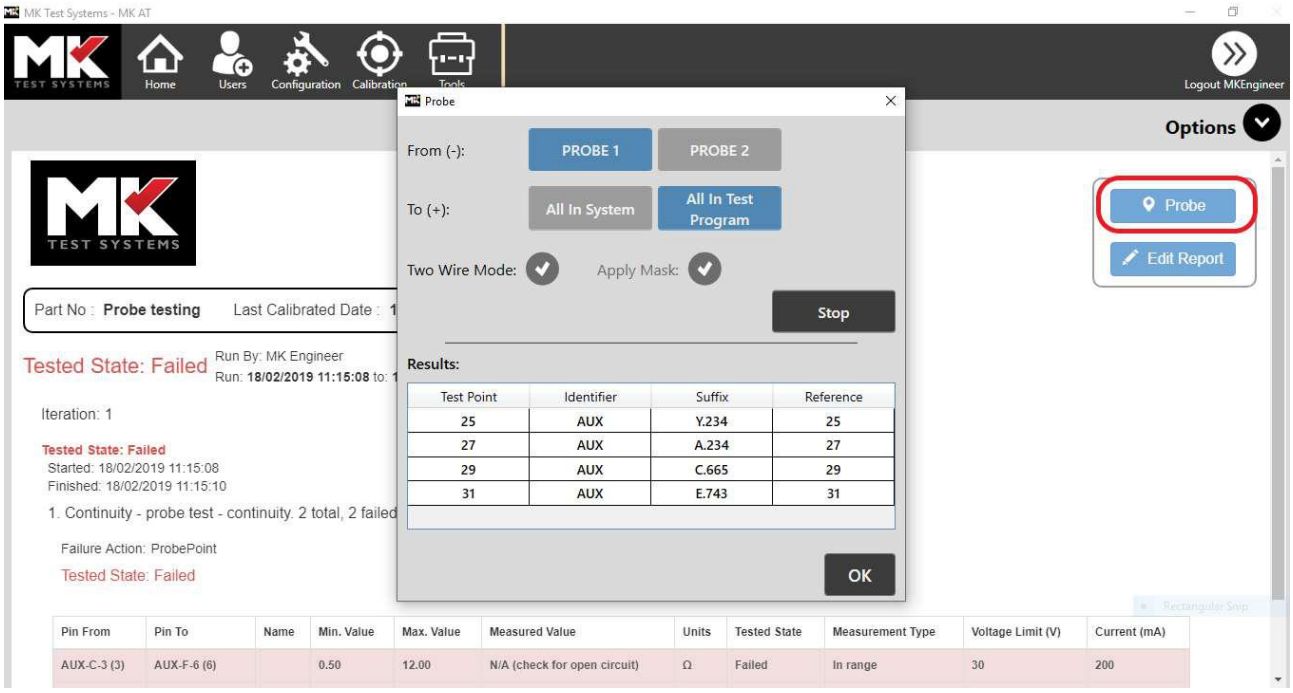


- The results table shows the test points found along with the XRef data from the specified test program.

Probe from results report:

- The probe function is also available from the results screen following the execution of a test program. Once a test program is competed and the results report is displayed, a probe window can be opened by selecting the Probe button.



- If ***All In Test Program*** is selected, the probe test will automatically use the current test program for XRef data to display.

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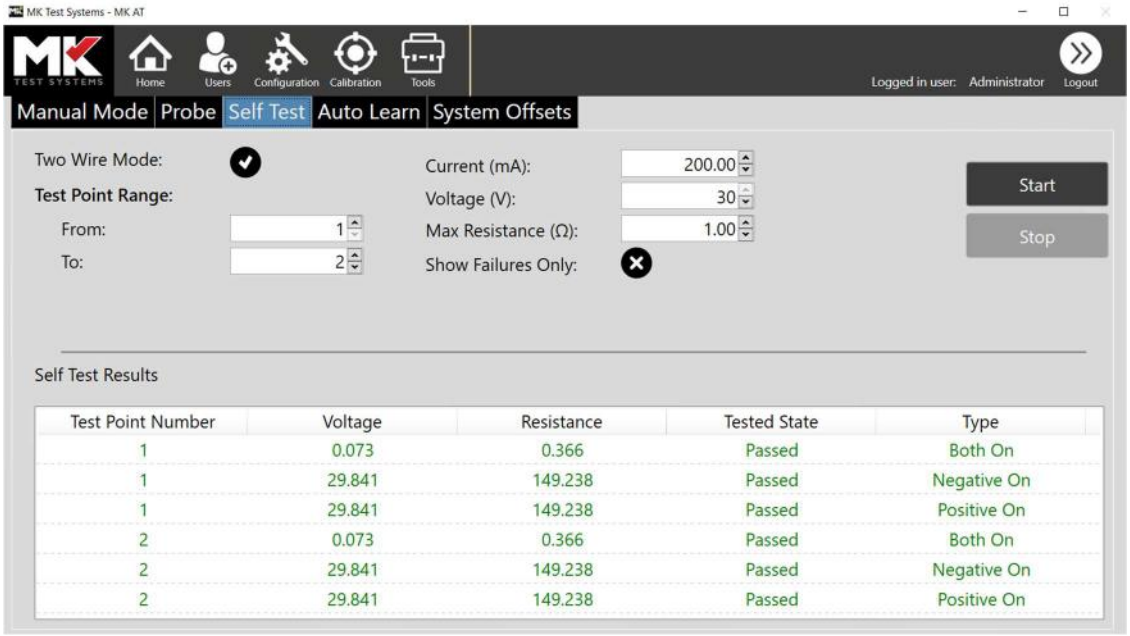
- If ***Apply Mask*** is selected, any test points that have been masked in the current test program will be excluded from the test.
- The ***Max. Current*** and ***Max. Voltage*** are taken from the values defined on the main Probe screen.

3.7.3 Self Test

A *Self Test* can be performed to check each of the test points in the specified range to ensure that they are working as expected. Three tests are performed for every test point. Firstly, both the negative and positive sides of the relay are switched on and the measured resistance must be less than the M*ax. Resistance* for the test to pass. Next, the negative side of the relay is switched on and the positive side switched off and, in this case, the measured resistance should indicate an open circuit for the test to pass. Finally, the positive side of the relay is switched on and the negative side switched off and again, the resistance should indicate an open circuit for the test to pass.



The test can be customised as required. *Two Wire Mode* toggles the system between two and four wire mode. *Test Point Range* specifies the test points to be included in the test. The *Current* and *Voltage* can be configured to suit the system and the *Max. Resistance* determines the pass criteria for resistance where the test type is *Both On*. The *Show Failures Only* option can be used to filter out any results that have passed and display only failed results in the *Self Test Results* pane. The test is begun by selecting the *Start* button and will stop automatically when all test points in the *Test Point Range* have been checked but the test can be ended at any point using the *Stop* button if necessary.

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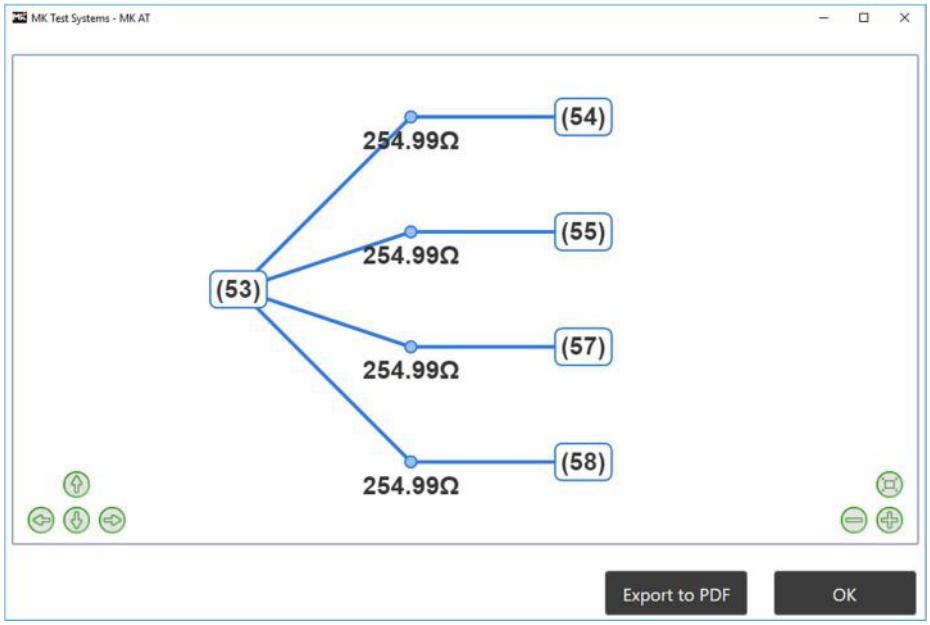
3.7.4 Auto Learn

The auto learn functionality can be used to generate a set of connections directly from a UUT. This can be used when you have a known good standard UUT. Once the connections have been learnt then you can export the connections ready to be imported into the continuity connection editor screen.

Auto learn can be found under the tools tab. You can configure your auto learn to meet desired requirements and test points. Clicking start will run the program and any connections found will begin to be listed. The result of this can then be exported to an XML file ready to be read by the editor.

You can also view a visual representation of the connections with the Button. This will draw each test point with a connection and join them to the test points associated with the nominal resistance labelled. This can also be exported to pdf whilst in the viewer window.



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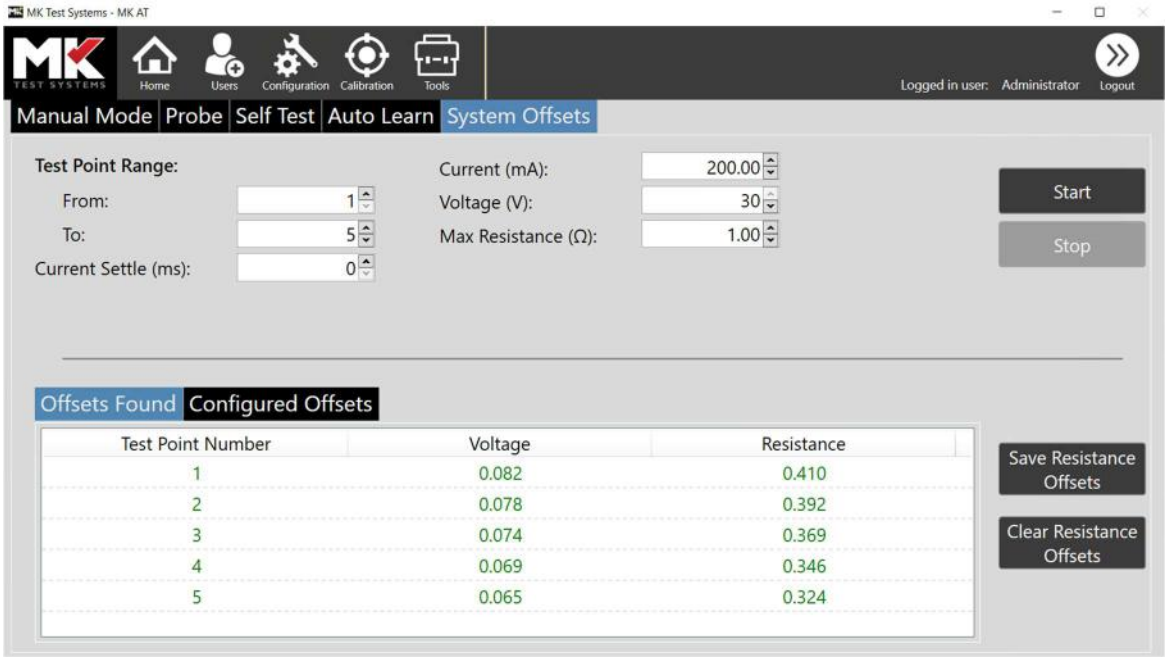
3.7.5 System Offsets.

UUT must be disconnected before system offsets can be calculated

On some larger systems there will be an “internal” system resistance before the interface connector. To ensure the best possible accuracy when measuring in 2 wire mode then the system needs to measure the offset of each test point. The system offset allows you to view and automatically gather / measure the system offsets for each point.



Test Point Range specifies the test points to be tested. The *Current* and *Voltage* can be configured to suit the system. Any resistance measurements that are greater than the specified *Max. Resistance* value are excluded from the *Offsets Found* results. The test is begun using the *Start* button and will end automatically once all the test points in the range have been checked but the test can be stopped at any time using the *Stop* button if necessary. The offset values can then be saved using the *Save Resistance Offsets* button.

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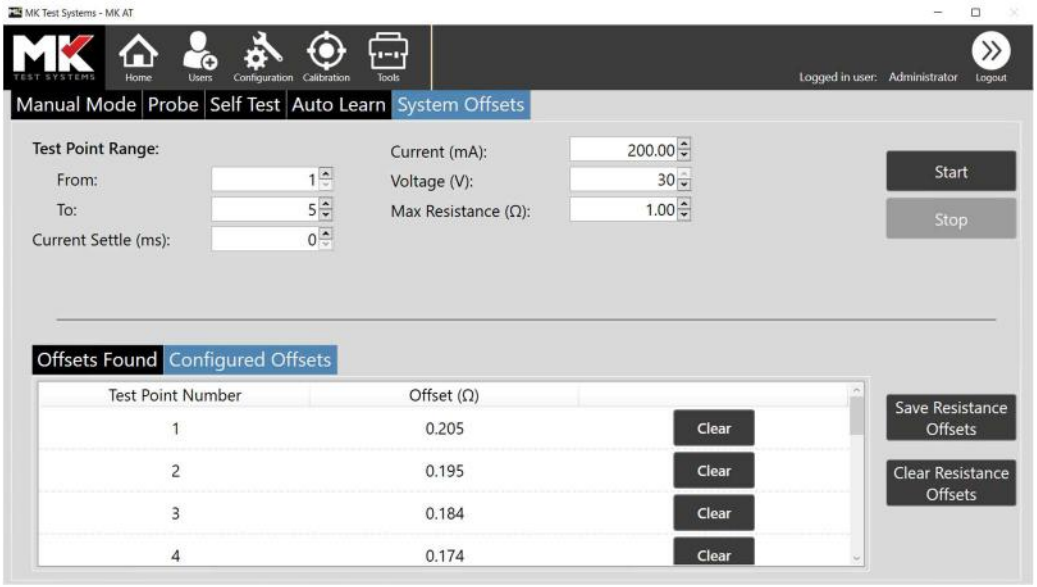
The saved resistance values can be viewed in the *Configured Offsets* tab, as shown below.



The saved offset values can be removed individually if necessary using the *Clear* button or they can all be removed using the *Clear Resistance Offsets* button.

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4 Remote View

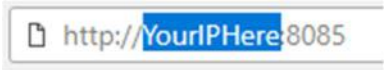
Remote view is a browser-based interface designed to be accessed from a different or 'Remote' computer. The MK AT runner software acts as the 'Server' and can be accessed by any device with a browser (depending on configuration).

4.1 Setup

The settings for the remote view can be found on the admin tab of configuration in the runner software. Remote view available option toggles the remote view on and off. The root URL is the location used to access the remote view. The * is used to indicate the IP address of the machine running the software. You can also set it to localhost if you only wish to access the remote viewer on that machine.

It is advised that you speak to your IT administrator as ports may need to be configured to allow connections. You may also need to run MK AT as administrator for the remote view to work correctly depending on your IT policy.

4.2 Running remote view

The remote view is accessed via your browser. You must enter the root URL created during setup for example if you entered the above setup you should enter this URL in the browser 

and replace "YourIPHere" with the IP of the machine your MK AT Runner software is active on.

The browser will now display the home view. This is a cut down version of the original desktop Runner Software. You can select to run a test program and view the results. When a test program is selected to run a options page appears, here subtests can be selected/deselected to run. Clicking run will then commence the test. A window like the runner software will appear. Whilst a test program is running the page will auto update information to the screen so there is no need to refresh the page. You will also notice the runner software will display the usual information when the program is run from the software.

Once the test program has finished the results page is displayed in the same way as the usual report generator including any templates or report template changes (Referenced in a later section).

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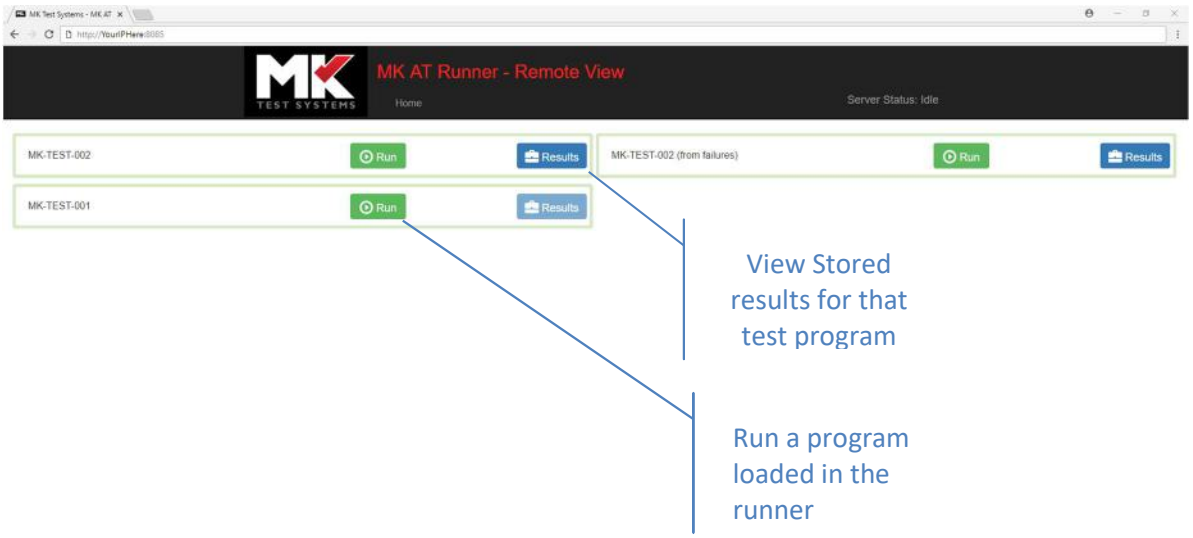

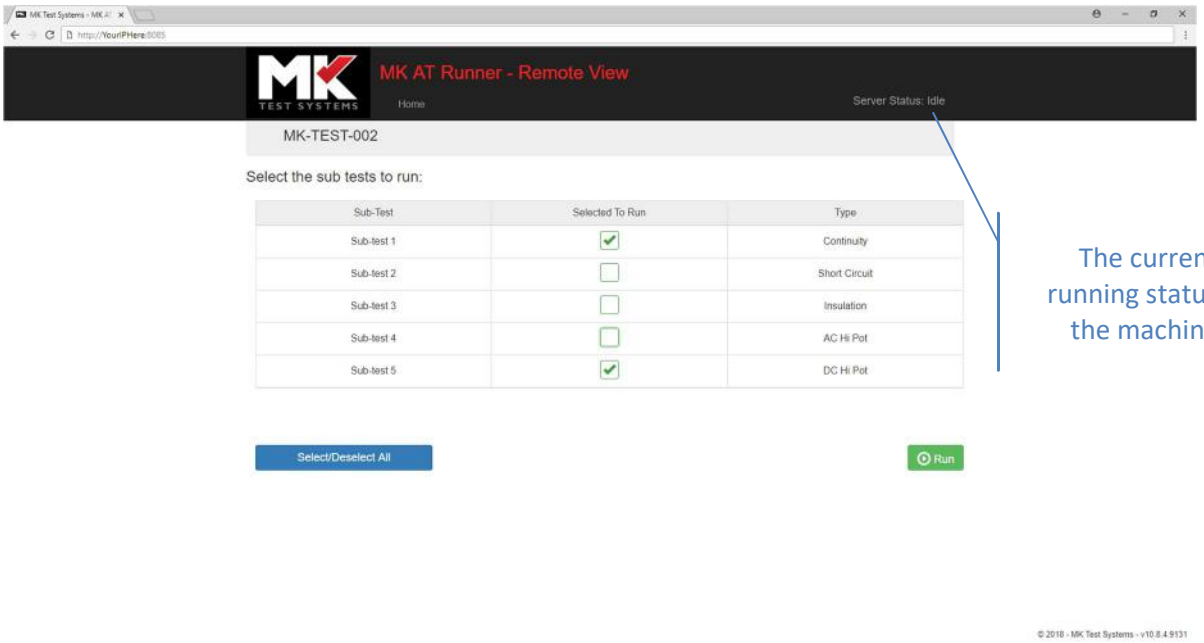

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5 Customisation

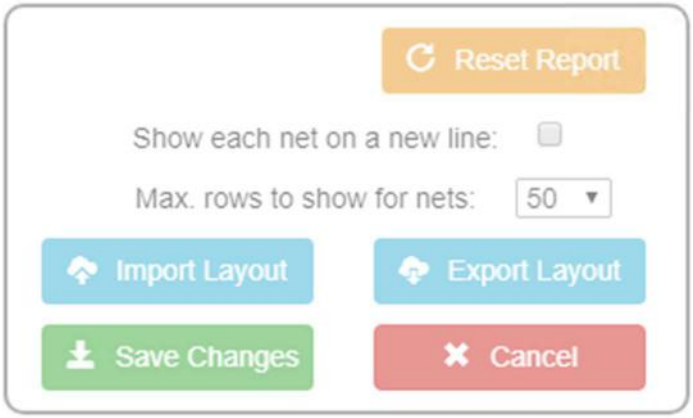
5.1 Edit Report

The edit report function can be found when viewing a report. It provides functionality to customise headers, footers and choose which data is displayed.

5.1.1 Customising reports

When viewing a report, an *Edit Report* button

is visible in the top right of the viewing pane, select this to begin editing. The panel below will appear, and the user will now be able be able to see regions which are editable.



Buttons appear in each data column as shown below:

The green arrows allow for the column positions to be reordered and the orange buttons allow the columns to be hidden.

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For sub-tests that have large nets, the *Show each net on a new line* option can be used for clarity along with the *Max. rows to show for nets option* which limits the number of rows displayed to the specified number.

There is also provision for the addition of a custom header, sub-header and a footer. These show as free text areas with basic formatting. Once the changes are saved the formatting buttons disappear so that just the newly formatted text is shown.

5.1.2 Saving and exporting changes

The layout changes can be saved to the report template using the

button. The changes will then be applied automatically whenever this template is used.

The formatting changes can also be exported using the

button. This allows the format to be saved and then applied to another report template using the

button. The formatting can also be reset to the original template layout using the

button.

5.1.3 Important note

When changes are saved, they are saved to the report template not to a test program or set of results. This means every report using the specific report template will have the changes appear where appropriate.

5.2 Customising the login screen

You can replace the background image on the login screen by placing a new *png* image in *C:\ProgramData\MK Test Systems Limited* this image must be called “LoginBackground.png” and should ideally be a high-resolution image sized per the screen it’s being viewed on.

5.3 Adding logos to the report

You can add a logo to the report by putting the image in *C:\ProgramData\MK Test Systems Limited\Reports\Logos*. This image will need to be called “CustomerLogo.jpg” and should be around 180px wide and 110px tall.

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