



Newton4th Ltd

IECSoft

USER MANUAL - Volume 3

IEC 61000 EMC Immunity Tests

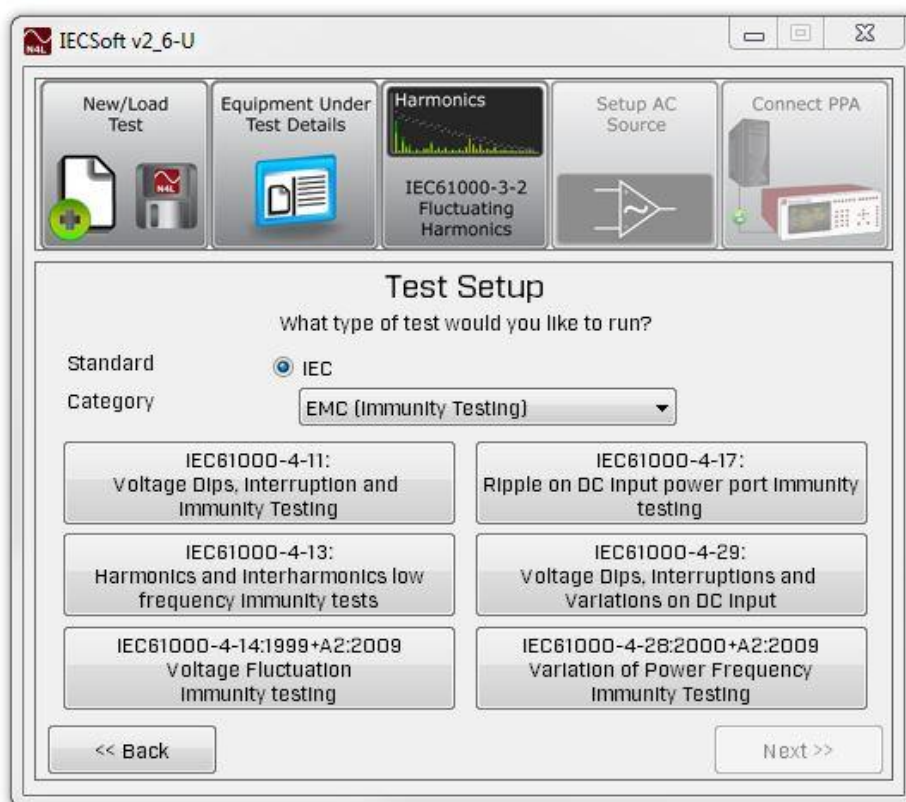
IEC61000-4-14

IEC61000-4-29

IEC61000-4-17

IEC61000-4-34

IEC61000-4-28



Version 1.02

30th August 2019

ABOUT THIS MANUAL

IECSOft is a self contained executable software program for use with the N4L PPA55xx series power analyzers.

Volume 1 of this User Manual details the use of the software for Flicker and Harmonic testing to the IEC61000-3-2/3-3 and IEC61000-3-11/3-12 Standards. This includes the equivalent JIS (Japanese Industrial standard) and BSEN (British Standard European Norm Standard) versions of these standards.

The second volume concentrates on two of the Immunity Testing options available using the software, IEC61000-4-11 and IEC61000-4-13 along with Flicker PST Simulation testing.

This third volume details the remaining Immunity Test modes not included in volume 2. These are: IEC61000-4-14, IEC61000-4-17, IEC61000-4-28, IEC61000-4-29 and IEC61000-4-34

Each of the Test options is described in turn, in its own chapter, with details of the principles on which it is based, how to use it and the test options available etc.

Revision: 02

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30th August 2019

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1 Introduction

1.1 Introduction to IECSoft

IECSoft is a self contained executable software program written in C++ using the Microsoft win32 graphics set.

IECSoft has the ability to connect to a PPA55x1 or PPA55x0 via RS232, USB and LAN. The software includes all measurement modes to reflect instrument operation.

The ability to export directly to Excel, CSV, PDF and “.n4liec” / “.n4lvdi” is supported by IECSoft.

IECSoft version **v2.6** and PPA55xx Firmware version **v2_179** were used to compile this volume of the User Manual.

1.2 PC Requirements

The minimum PC requirements to run the IECSoft software are as follows:

Windows XP (Service Pack 3) or later
At least 1GHz Processor
Minimum of 1GB RAM
At least 100MB of Hard Drive space.

For optimum performance the following PC requirements are recommended:

Windows XP (Service Pack 3) or later
At least 1GHz Processor
2GB RAM or more
At least 1GB of Hard Drive

2 Getting Started

2.1 Download

As with all N4L software, it is available free to download from our website. See www.newtons4th.com/support for more details, once registered and your account is activated you will have access to the software downloads section. The latest PPA firmware releases can also be found on our website.

2.2 Installation

At N4L we develop software that enables the engineer to be up and running and performing tests as soon as possible. With this in mind we have avoided the use of the .net environment and used the Microsoft win32 graphics set.

As such, installation is simple. All that is required is to download the .exe from the N4L website and extract the software to the desired location on your hard drive.

Alternatively the software can be run directly from USB memory stick.

2.3 Firmware Requirements

For full functionality using version **2.6** of IECSOFT Software the following firmware releases are recommended.

PPA55xx Firmware version **v2.179** or later

N4A AC Source Firmware version **v1.29** or later

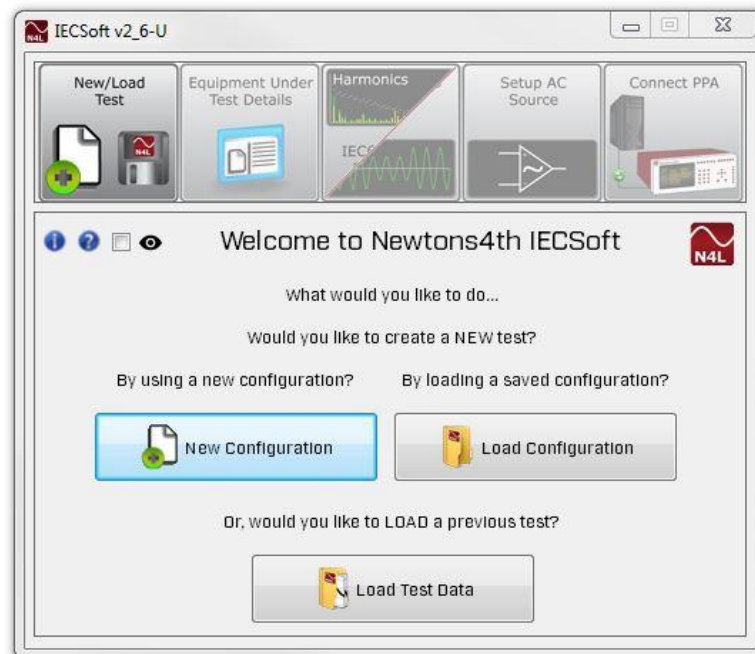
2.4 Impedance Network Switch Setting.

Before running any Immunity tests check that the three way switch (Harmonics / OFF / Flicker) on the front of the Impedance Network is set to the Harmonics position.

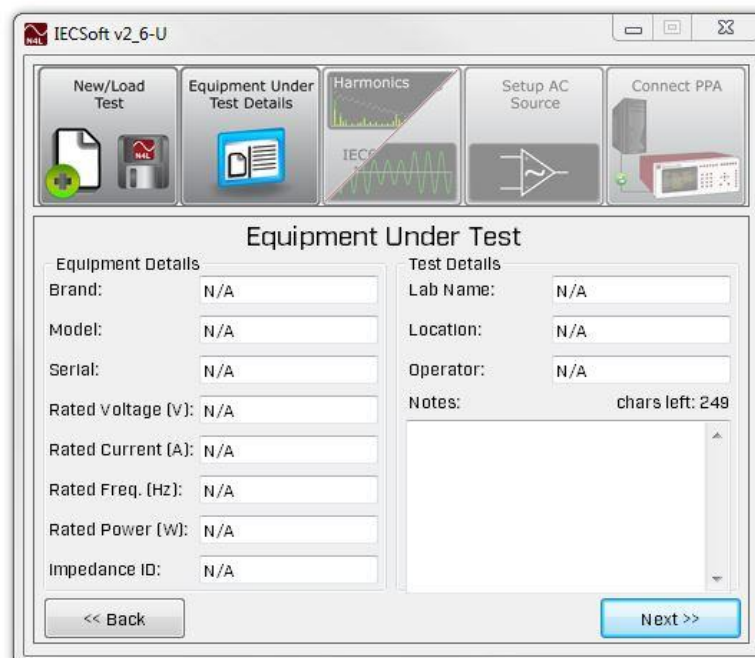
3 Initial Configuration.

This applies for all EMC test options.

Open the software and click on New Configuration.



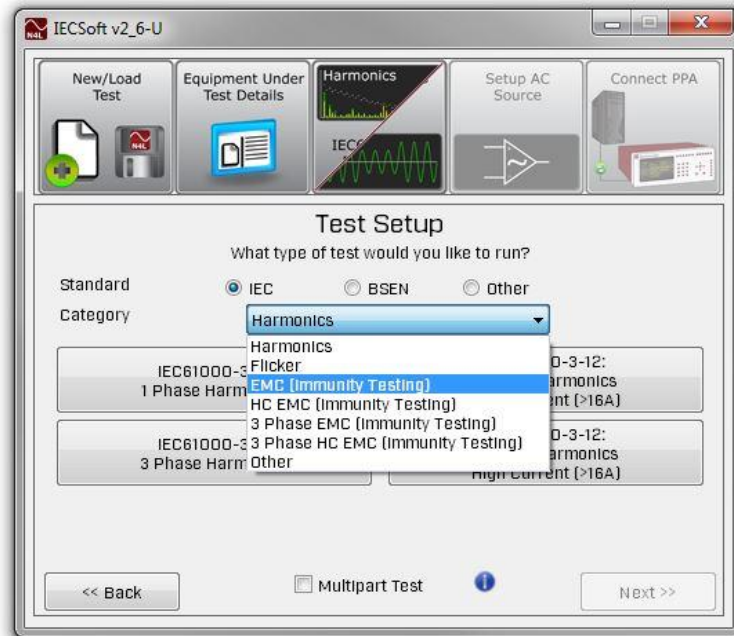
The Equipment under Test screen is displayed.



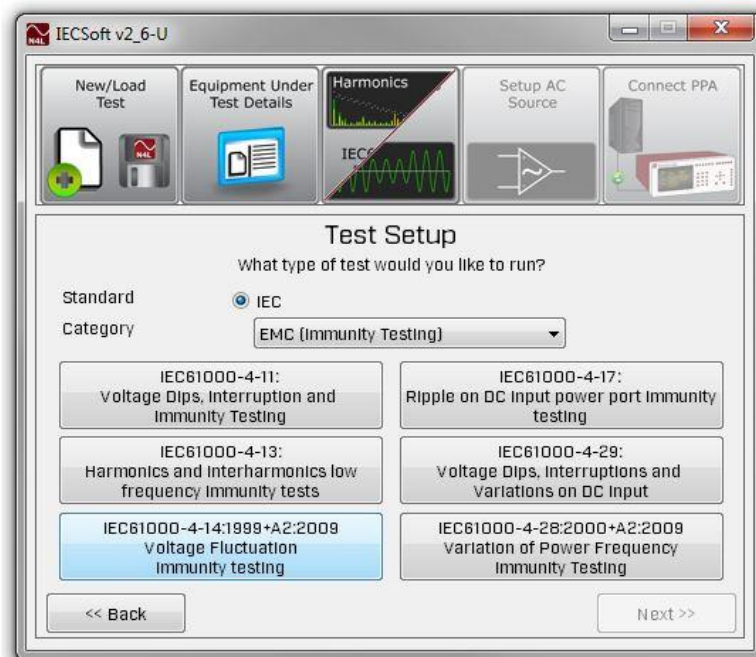
The User has the option to enter any of the equipment details.

Click on **Next** to continue.

Click on Category and select EMC (Immunity testing) on the drop down menu.



The Test setup screen will then display the various EMC tests that can be performed.



Now click on the required EMC test to continue.

4 IEC61000-4-14

Voltage Fluctuation Immunity testing

This section explains how to use the IECSoft software along with a N4A Source to perform Voltage Fluctuation Immunity testing to the requirements defined in IEC61000-4-14.

4.1 Scope

The object of these tests is to evaluate the immunity of electrical and electronic equipment when subjected to positive and negative low amplitude voltage fluctuations.

Whilst the tests are being performed the Equipment Under Test (EUT) should be under constant observation. There should be no malfunction of the EUT during any of the tests.

On completion of each test the software will ask for the result of the test to be entered. The result entered is determined by the observation of the behaviour of the EUT during the test.

Observation of the loss of function or degradation of performance of the EUT during the tests is used to determine the classification. The definitions of acceptable performance and a malfunction should be agreed between the laboratory performing the tests and the manufacturers / purchasers of the EUT. More details on Classifications can be found in section 9 of the IEC61000-4-14 Standard document.

4.2 Test Description

The EUT (equipment under test) is initially operated at a steady supply voltage (this can be 50Hz or 60Hz) and is then subjected to repetitive step voltage changes according to figure 1a and table 1.

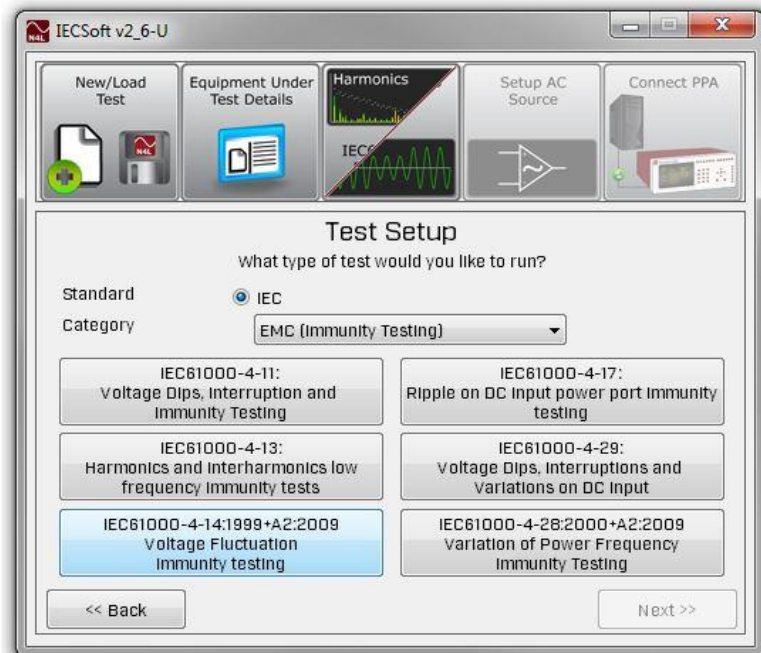
There are 3 test classes (test 1: no test required), details of the classes can be found in Annex A and the test levels can be found in Table 1 and figures 1a to 1d.

The operation of the EUT should be observed whilst it is subjected to the sequence of voltage fluctuations according to figure 2 in the IEC61000-4-14 Standard.

The initial voltage is set to U_n , $U_n - 10\%U_n$ and $U_n + 10\%U_n$ where U_n is the nominal voltage. Table 1 in the Standard gives the test levels for each of the different initial voltages. In the sequence each initial voltage is applied 3 times with a post-test interval at the end of the U_n and $U_n - 10\%U_n$ tests and a Pre-test interval before the start of the $U_n - 10\%U_n$ and $U_n + 10\%U_n$ tests. Please refer to table 2 in the Standard for more details about the Voltage sequence and the intervals between voltage changes.

4.3 Single Phase Test Procedure

Click on IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity Testing.



The Connect to AC Source Dialog is then displayed. Check the Interface settings and then click on “**Connect & Setup**”



The IEC61000-4-14 Test Setup screen is displayed.

IECSoft v2_6-U LAN,N4A03,91J-11932,1,21c

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Setup

EUT Details

EUT Type: N/A EUT input port tested: N/A

EUT operation mode: N/A Connections: N/A

Cables: N/A Peripherals: N/A

Test Setup Notes: General Notes:

Test Settings

Nominal Voltage: 230 V Frequency: 50Hz

Test Class: Class 2

Test Settings

☒ Un ☐ +/- 8% Un ☐ + 8% Un ☐ - 8% Un ☒ Un + 10% Un

Exit Next

Click on **Test Settings** and select the required test class from the drop down menu.

The Class 2 Test setup screen is displayed

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing" with a subtitle "Test Setup". The window is divided into two main sections: "EUT Details" and "Test Settings".

EUT Details:

- EUT Type: N/A
- EUT operation mode: N/A
- Cables: N/A
- EUT input port tested: N/A
- Connections: N/A
- Peripherals: N/A
- Test Setup Notes: (Empty text area)
- General Notes: (Empty text area)

Test Settings:

- Nominal Voltage: 230 V
- Frequency: 50Hz
- Test Class: Class 2

Test Settings (Limits):

- ☒ $\pm 8\% U_n$
- ☒ $U_n - 10\% U_n$ + $8\% U_n$
- ☒ $U_n + 10\% U_n$ - $8\% U_n$

At the bottom of the window are two buttons: "Exit" and "Next".

The Class 2 limits are displayed in the software window, these are highlighted yellow above. These limits are defined in the Standard document and can't be changed by the user.

The test frequency needs to be selected; this can be either 50Hz or 60Hz. The nominal voltage should also be entered before proceeding.

The EUT details can be entered and any test notes can be entered. If nothing is entered these will be shown as N/A on the Excel report.

Click on **NEXT** to display the Test sequence window:

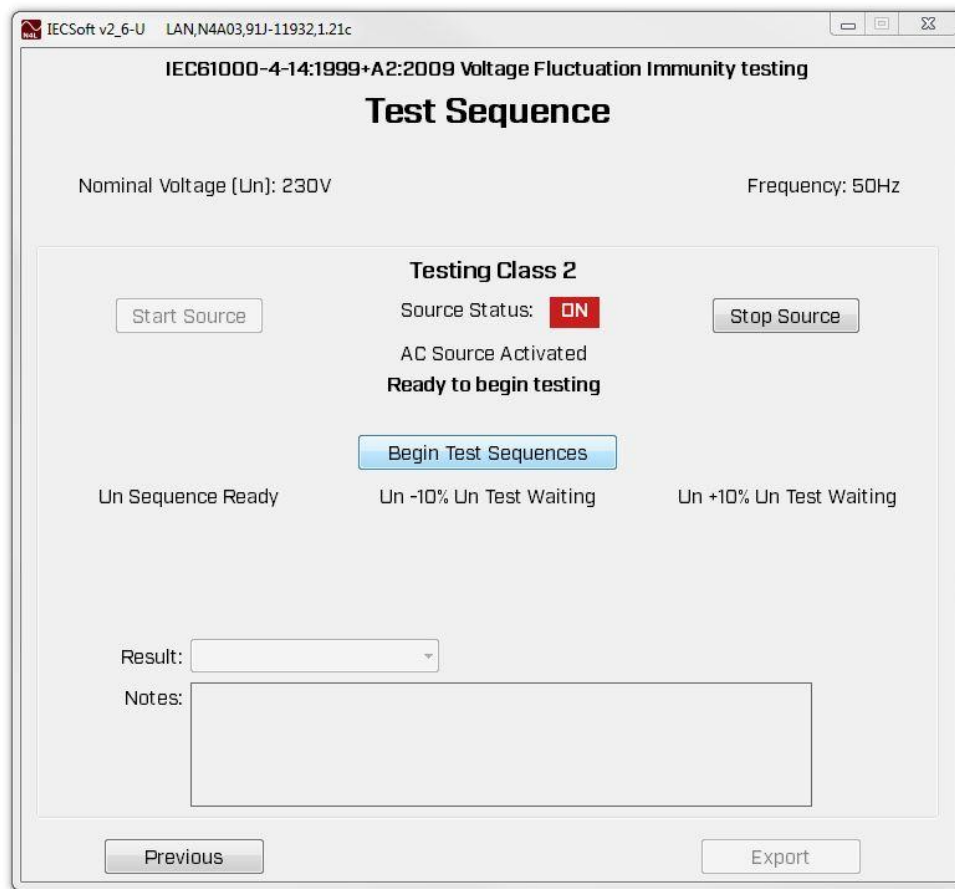
The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing" with a subtitle "Test Sequence". The window displays the following information and controls:

- Nominal Voltage (Un): 230V
- Frequency: 50Hz
- Testing Class 2
- Source Status: OFF (displayed in a green box)
- AC Source Ready
- Buttons: Start Source, Stop Source, Begin Test Sequences
- Status: Waiting for Source (displayed in three locations)
- Result: (dropdown menu)
- Notes: (text area)
- Buttons: Previous, Export

The Nominated Voltage and Test Frequency are displayed near the top of the test window.

The Source Status is displayed. This will be displaying **OFF** and shaded green so that the User will know that the Source output is not enabled and the EUT does not have power applied.

Click on **Start** Source:



The Start Source button is now greyed out and can't be selected. The Source Status now displays **ON** indicating that the Source Output is enabled. It is also highlighted with a red background to warn the User that the EUT is now powered up.

The STOP SOURCE button can be used AT ANY TIME during the test to immediately disable the Source Output and power down the EUT. To continue the user will have to click on Start Source and begin the test again from the start.

Click on “**Begin Test Sequences**”

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing". The window has a title bar with "IECSoft v2_6-U" and a LAN address. The main content area is titled "Test Sequence". It displays "Nominal Voltage (Un): 230V" and "Frequency: 50Hz". Below this, there is a section for "Testing Class 2" with a "Source Status" indicator showing "ON" in a red box. There are "Start Source" and "Stop Source" buttons. A "Running Un Sequence" section contains a "Begin Test Sequences" button. Below the button, it shows "Un Test Begun", "Un -10% Un Test Waiting", and "Un +10% Un Test Waiting". A timer displays "Sequence Running for 25 s". There is a "Result:" dropdown menu and a "Notes:" text area. At the bottom, there are "Previous" and "Export" buttons.

The “Un” test sequence now begins. The timer displays the remaining running time until the sequence is completed.

On completion of the “Un” tests a message is displayed - Un Test complete. There is a 60 second post test interval before completing the first sequence. The counter displays the time remaining until the “Un” test sequence is completed.

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing". The window has a standard Windows-style title bar with the text "IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c". The main content area is titled "Test Sequence". Below this title, it displays "Nominal Voltage (Un): 230V" and "Frequency: 50Hz". A section titled "Testing Class 2" contains a "Start Source" button, a "Source Status: ON" indicator (with "ON" in a red box), and a "Stop Source" button. Below this is a section titled "Running Un Sequence" which includes a "Begin Test Sequences" button. Further down, there are three status indicators: "Un Test Complete", "Un -10% Un Test Waiting", and "Un +10% Un Test Waiting". Below these is a "Post-test Interval" section showing "52 s". At the bottom of the main content area, there is a "Result:" dropdown menu and a "Notes:" text area. The window footer contains a "Previous" button on the left and an "Export" button on the right.

The software now indicates that “Un” testing is complete. There now follows a 60 second Pre-test Interval before testing the “Un-10%Un” mode can begin. The counter displays the time remaining until test sequence can begin.

The screenshot shows the 'Test Sequence' window of the IECSoft v2_6-U software. The window title bar includes the software version and a LAN address. The main heading is 'IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing'. Below this, the 'Test Sequence' section displays 'Nominal Voltage (Un): 230V' and 'Frequency: 50Hz'. The 'Testing Class 2' section contains 'Start Source' and 'Stop Source' buttons, with the 'Source Status' indicator set to 'ON'. The 'Running Un -10% Un Sequence' section features a 'Begin Test Sequences' button. A status table shows 'Un Test Complete', 'Sequence Ended', and 'Testing Finished' on the left; 'Waiting For Test' and 'Pre-test Interval' in the center; and 'Un +10% Un Test Waiting' on the right. The 'Pre-test Interval' is currently at '51 s'. At the bottom, there is a 'Result' dropdown menu, a 'Notes' text area, and 'Previous' and 'Export' buttons.

Testing Class 2		
Start Source	Source Status: ON	Stop Source
Running Un -10% Un Sequence		
Begin Test Sequences		
Un Test Complete	Waiting For Test	Un +10% Un Test Waiting
Sequence Ended	Pre-test Interval	
Testing Finished	51 s	

The “Un-10% Un” test sequence now begins. The timer displays the remaining running time until the sequence is completed.

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing". The window has a standard Windows title bar with the text "IECSoft v2_6-U LAN,N4A03,91J-11932,1,21c". The main content area is titled "Test Sequence". Below the title, it displays "Nominal Voltage (Un): 230V" and "Frequency: 50Hz". A section titled "Testing Class 2" contains a "Start Source" button, a "Source Status: ON" indicator (with "ON" in a red box), and a "Stop Source" button. Below this, it says "Running Un -10% Un Sequence". A "Begin Test Sequences" button is present. The test sequence progress is shown with three columns: "Un Test Complete" (with "Sequence Ended" and "Testing Finished" below it), "Un -10% Un Test Begun" (with "Sequence Running for" and "14 s" below it), and "Un +10% Un Test Waiting". At the bottom left, there is a "Result:" label next to a dropdown menu and a "Notes:" label next to a large text area. At the bottom right, there are "Previous" and "Export" buttons.

IECSoft v2_6-U LAN,N4A03,91J-11932,1,21c

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Sequence

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Running Un -10% Un Sequence

Begin Test Sequences

Un Test Complete	Un -10% Un Test Begun	Un +10% Un Test Waiting
Sequence Ended	Sequence Running for	
Testing Finished	14 s	

Result:

Notes:

Previous Export

On completion of the “Un-10% Un” test a message is displayed - “Un-10% Un” Test complete. There is a 60 second Post-test interval before completing the test. The counter displays the time remaining until the “Un-10% Un” test is completed.

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing". The main heading is "Test Sequence". Below this, it specifies "Nominal Voltage (Un): 230V" and "Frequency: 50Hz". The "Testing Class 2" section includes a "Start Source" button, a "Source Status: ON" indicator, and a "Stop Source" button. The "Running Un -10% Un Sequence" section features a "Begin Test Sequences" button. Below this, a table-like layout shows the test progress: "Un Test Complete", "Sequence Ended", and "Testing Finished" on the left; "Un -10% Un Test Complete" and "Post-test Interval 50 s" in the center; and "Un +10% Un Test Waiting" on the right. At the bottom, there is a "Result:" dropdown menu, a "Notes:" text area, and "Previous" and "Export" buttons.

Running Un -10% Un Sequence		
Un Test Complete	Un -10% Un Test Complete	Un +10% Un Test Waiting
Sequence Ended	Post-test Interval	
Testing Finished	50 s	

The software now indicates that “Un-10% Un” testing is complete. There now follows a 60 second Pre-test Interval before testing the “Un+10% Un” mode can begin. The counter displays the time remaining until test sequence can begin.

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing". The window has a title bar with "IECSoft v2_6-U" and "LAN,N4A03,91J-11932,1.21c". The main content area is titled "Test Sequence". It displays "Nominal Voltage (Un): 230V" and "Frequency: 50Hz". Below this, there is a section for "Testing Class 2" with a "Start Source" button, "Source Status: ON" (indicated by a red box), and a "Stop Source" button. A "Running Un +10% Un Sequence" section contains a "Begin Test Sequences" button. At the bottom of this section, there are three columns of text: "Un Test Complete", "Un -10% Un Test Complete", and "Waiting For Test". Below these are "Sequence Ended" and "Testing Finished" for the first two columns, and "Pre-test interval" for the third. A counter shows "47 s". There is a "Result:" dropdown menu and a "Notes:" text area. At the very bottom, there are "Previous" and "Export" buttons.

Testing Class 2		
Start Source	Source Status: ON	Stop Source
Running Un +10% Un Sequence		
Begin Test Sequences		
Un Test Complete	Un -10% Un Test Complete	Waiting For Test
Sequence Ended	Sequence Ended	Pre-test interval
Testing Finished	Testing Finished	47 s
Result: ▼		
Notes:		
Previous		Export

The “Un+10% Un” test sequence now begins. The timer displays the remaining running time until the sequence is completed.

IECSoft v2_6-U LAN\N4A03,91J-11932,1.21c

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Sequence

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Running Un +10% Un Sequence

Begin Test Sequences

Un Test Complete	Un -10% Un Test Complete	Un +10% Un Test Begun
Sequence Ended	Sequence Ended	Sequence Running for
Testing Finished	Testing Finished	14 s

Result:

Notes:

Previous Export

All tests have now been completed. A message is displayed "All Sequences Complete"

Click on Stop Source to turn off the Source output.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Sequence

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

AC Source waiting to be Deactivated
All Sequences Complete

Begin Test Sequences

Un Test Complete	Un -10% Un Test Complete	Un +10% Un Test Complete
Sequence Ended	Sequence Ended	Sequence Ended
Testing Finished	Testing Finished	Testing Finished

Result:

Notes:

Previous Export

The source is now switched off. The Source status changes to **OFF** and the background colour turns green to indicate that the Source output is now off and that the EUT is no longer powered up.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Sequence

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **OFF** Stop Source

AC Source Deactivated
All Sequences Complete

Begin Test Sequences

Un Test Complete	Un -10% Un Test Complete	Un +10% Un Test Complete
Sequence Ended	Sequence Ended	Sequence Ended
Testing Finished	Testing Finished	Testing Finished

Result: Undetermined

Notes:

Previous Export

Having observed the EUT's behaviour during the test click on the Result box and select the correct option from the drop down menu. Notes and comments can be added to the report if required.

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing". The window has a title bar with "IECSoft v2_6-U" and a file path "LAN,N4A03,91J-11932,1.21c". The main content area is titled "Test Sequence". It displays "Nominal Voltage (Un): 230V" and "Frequency: 50Hz". Under "Testing Class 2", it shows "Source Status: OFF" (in a green box), "AC Source Deactivated", and "All Sequences Complete". There are buttons for "Start Source", "Stop Source", and "Begin Test Sequences". Below these, there are three columns of status indicators: "Un Test Complete", "Un -10% Un Test Complete", and "Un +10% Un Test Complete", each with "Sequence Ended" and "Testing Finished" labels. At the bottom left, there is a "Result:" dropdown menu currently set to "Undetermined", with a list showing "Undetermined", "Pass", and "Fail". Below the dropdown is a "Notes:" label and a text input area. At the bottom of the window are "Previous" and "Export" buttons.

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Sequence

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **OFF** Stop Source

AC Source Deactivated

All Sequences Complete

Begin Test Sequences

Un Test Complete	Un -10% Un Test Complete	Un +10% Un Test Complete
Sequence Ended	Sequence Ended	Sequence Ended
Testing Finished	Testing Finished	Testing Finished

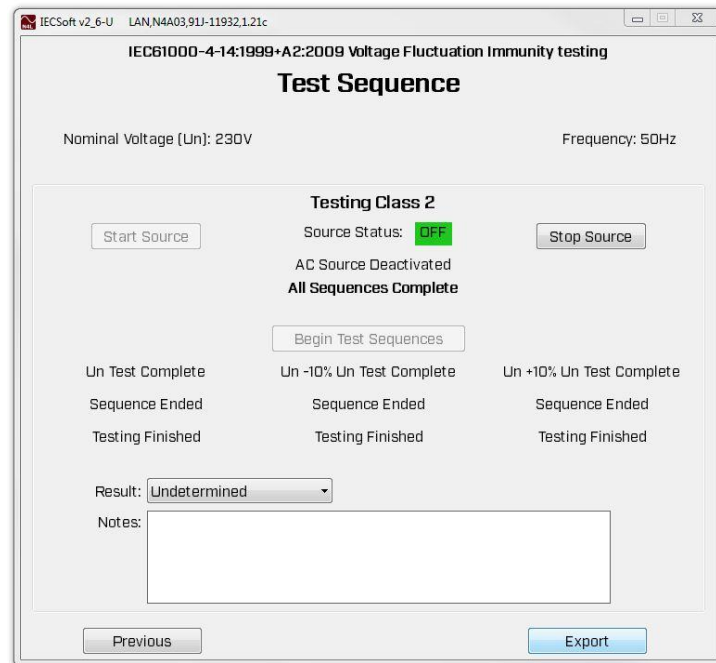
Result: **Undetermined**

Notes: **Undetermined**
Pass
Fail

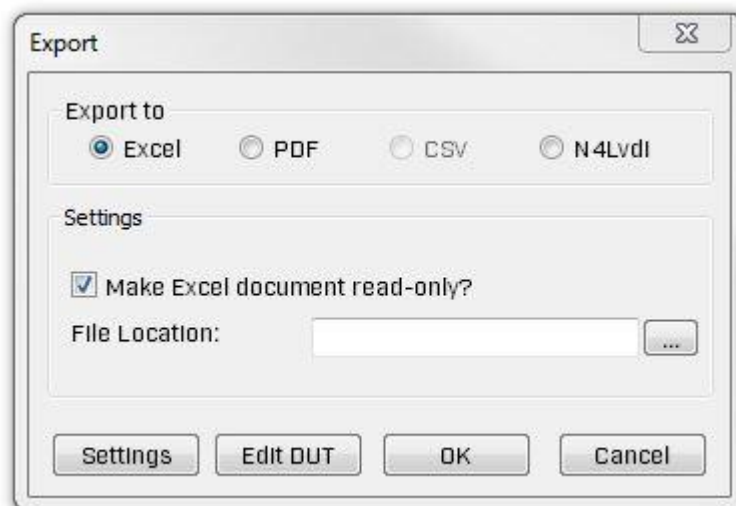
Previous Export

4.4 Saving / Exporting test data.

Click on the **Export** button to create a report



Clicking on the Export button opens the Export window.



For IEC61000-4-14 mode Excel and PDF reports can be created and the results can be exported to an ".n4lvdi" file. There is no option to create a ".csv" file in this mode.

Section 9 in this manual provides full details of the IECSoft software Export function.

Example IEC61000-4-14 Excel Report.

Click to add header

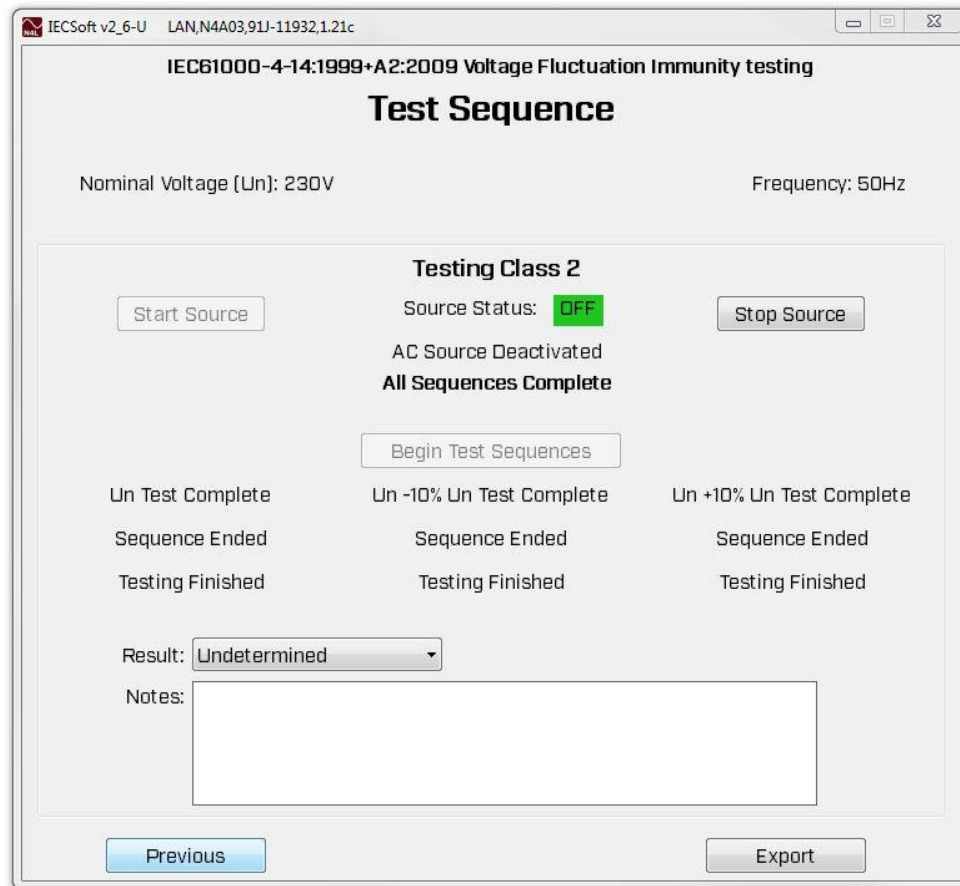
08th August 2019 - 16:18:48		Page 1/1		IECSoft v2_6	
		IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing			
Source Details					
Source Model	N4A03				
Source Serial	91J-11932				
Source Firmware	1.29				
Equipment Under Test					
Brand	N4L				
Model	Z100				
Serial	P1234				
Impedance Network ID	IMP001				
Rated Voltage	230.000V				
Rated Current	5.000A				
Rated Frequency	50.000Hz				
Rated Power	1.000kW				
EUT Type	N/A				
Input Port	N/A				
Operating Mode	N/A				
Connections	N/A				
Cables	N/A				
Peripherals	N/A				
Setup Notes					
General Notes					
Test Settings					
Nominal Voltage (Un)	230V				
Frequency	50Hz				
Test Class	Class 2				
Un Test Level	+/-8%				
Un +10% Un Test Level	-8%				
Un -10% Un Test Level	+8%				
Additional Test Details					
Operator	KAR				
Lab Name	N4L				
Location	LAB1				
Notes	IEC61000-4-14 class 2 tests				
Signature					
Test Results					
TestNotes					
Test Results	Undetermined				

Example IEC61000-4-14 PDF Report.

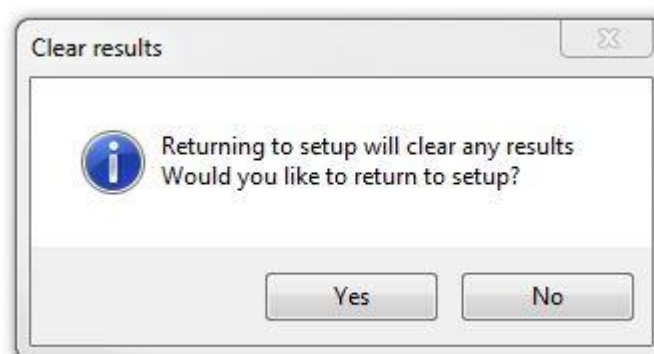
08th August 2019 - 16:18:48	Page 1/1	IECSoft v2_6
IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing		
AC Source Impedance Network ID EUT Details User Rated Voltage User Rated Current User Rated Frequency User Rated Power EUT Type Operation Mode Input Port Connections Cables Peripherals Setup Notes General Notes Operator Lab Name Location Notes Test Class Nominal Voltage Frequency Un Test Level Un+10% Un Test Level Un-10% Un Test Level Test Notes	Instrumentation Details Newtons4th N4A03 SN: 91J-11932 Firmware: v1.29 IMP001 Brand: N4L Model: Z100 Serial: P1234 230.000V 5.000A 50.000Hz 1.000kW N/A N/A N/A N/A N/A N/A Operating Conditions KAR N4L LAB1 IEC61000-4-14 class 2 tests Test Configuration Class 2 230.000V 50.000Hz +/-8% -8% +8%	
Signature		
Results	Undetermined	

4.5 Using the Previous Button

This can be used at any time to return to previous screens.



A warning message appears to warn the user that all test data will be lost. The user can then decide to continue and return to the previous screen(s) losing any data or stay the the present screen and keep the data.



4.6 Details for the other Test Classes

4.6.1 Class 3 Setup screen and limits

IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing

Test Setup

EUT Details

EUT Type:	N/A	EUT input port tested:	N/A
EUT operation mode:	N/A	Connections:	N/A
Cables:	N/A	Peripherals:	N/A
Test Setup Notes:	General Notes:		

Test Settings

Nominal Voltage: 230 V Frequency: 50Hz

Test Class: Class 3

Test Settings

☒ Un	☒ Un - 10% Un	☒ Un + 10% Un
+/- 12% Un	+ 12% Un	- 12% Un

Exit Next

4.6.2 Class X Setup Screen

The screenshot shows a software window titled "IEC61000-4-14:1999+A2:2009 Voltage Fluctuation Immunity testing" with a subtitle "Test Setup". The window is divided into two main sections: "EUT Details" and "Test Settings".

EUT Details:

- EUT Type: N/A
- EUT operation mode: N/A
- Cables: N/A
- EUT input port tested: N/A
- Connections: N/A
- Peripherals: N/A
- Test Setup Notes: (Empty text area)
- General Notes: (Empty text area)

Test Settings:

- Nominal Voltage: 230 V
- Frequency: 50Hz
- Test Class: Class X

Test Settings (Limits):

- ☒ Un +/- 45% Un
- ☐ Un - 10% Un + 5% Un
- ☒ Un + 10% Un - 20% Un

At the bottom of the window are two buttons: "Exit" and "Next".

The user can enter any limit for each of the 3 tests.

The option is there to deselect any of the test options so that these options are not performed during the test process.

4.7 Three Phase Test Procedure

For three phase apparatus, all 3 phases shall be tested at the same time.

The voltage steps are made phase by phase at the same phase angle, $\emptyset$, and NOT simultaneously on the 3 phases.

5 IEC61000-4-17

Ripple on DC input power port immunity testing.

This section explains how to use the IECSoft software along with a N4A Source to perform Ripple on DC input power port immunity testing defined in IEC61000-4-17.

5.1 Scope

The object of these tests is to evaluate the immunity of electrical and electronic equipment when subjected to Voltage Ripple on the DC input power ports.

Whilst the tests are being performed the Equipment under Test (EUT) should be under constant observation. There should be no malfunction of the EUT during any of the tests.

On completion of each test the software will ask for the result of the test to be entered. The result entered is determined by the observation of the behaviour of the EUT during the test.

Observation of the loss of function or degradation of performance of the EUT during the tests is used to determine the classification. The definitions of acceptable performance and a malfunction should be agreed between the laboratory performing the tests and the manufacturers / purchasers of the EUT. More details on Classifications can be found in section 9 of the IEC61000-4-17 Standard document.

5.2 Test Description

The Standard does not specify the tests to be applied to any particular apparatus or systems.

It does however state preferred test levels. Details of these preferred Test Levels and their associated Ripple levels are specified in Table 1 in the IEC61000-4-17 Standard.

Table 1 - Test Levels

Level	Percentage of the nominal DC voltage
1	2%
2	5%
3	10%
4	15%
x	x

Note: "x" is open an open level,
this level can be given in the product specification.

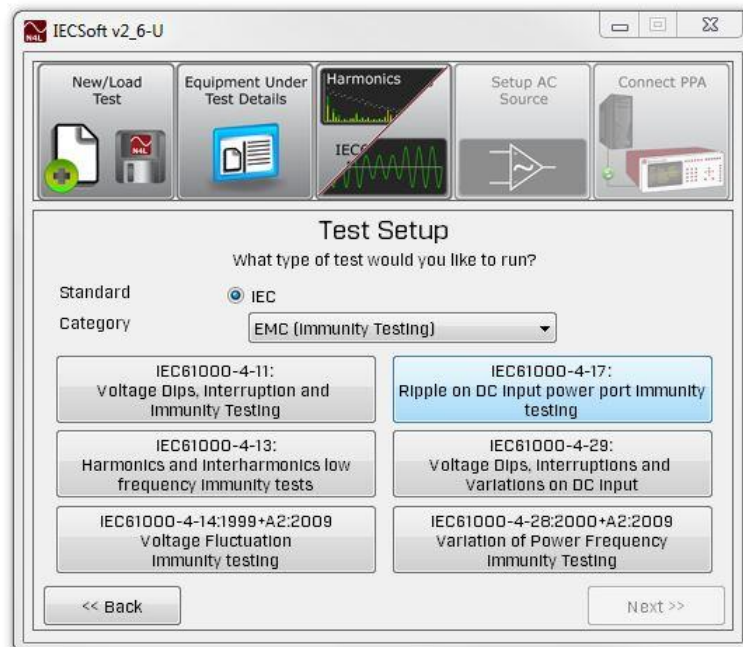
The Users / Product committees are responsible for the selection of the appropriate test levels to be applied to their equipment.

When the User selects a level in the software the corresponding Ripple (see table 1 above) will be applied to the DC Voltage used to power up the equipment.

The Standard (section 8) states that the test voltage shall be applied for at least 10 minutes or for the period of time necessary to allow complete verification of the EUT's operating performance. To comply with this requirement the software will indicate when the test running time reaches 10 minutes but will not stop the test. The user must manually stop the test once they are satisfied that they have validated the EUT's operating performance.

5.3 Single Phase Test Description

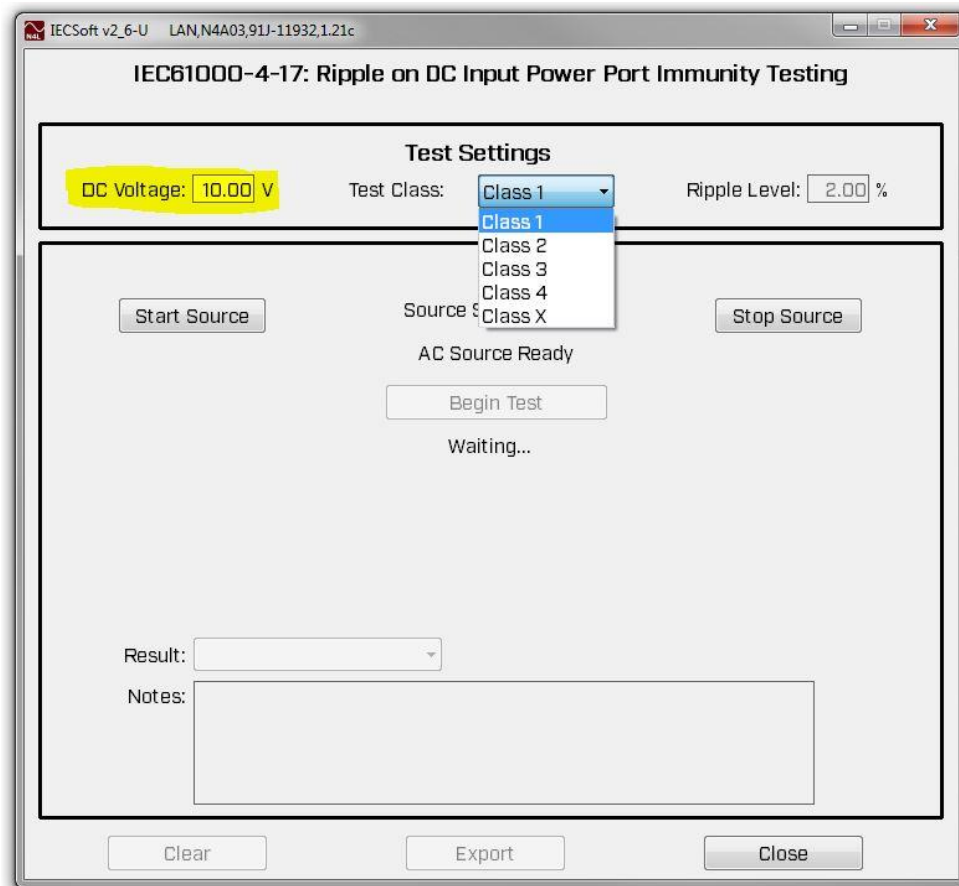
Click on IEC61000-4-17 Ripple on DC input power port immunity testing.



The Connect to AC Source Dialog is then displayed. Check the Interface settings and then click on “**Connect & Setup**”



The IEC61000-4-17 Test Settings screen is displayed:



The DC Voltage (highlighted yellow) is the output level of the AC Source, this is the voltage used to power up the EUT. This defaults to 10V so the User should adjust this to the required voltage.

Click on **Test Level** and select the required level from the drop down menu.

When a Test Level is selected the appropriate Ripple level for that test level will automatically be displayed in the Test Settings window. The exception to this is when Test Level x is selected, for this level the user can enter any value for the Ripple Level.

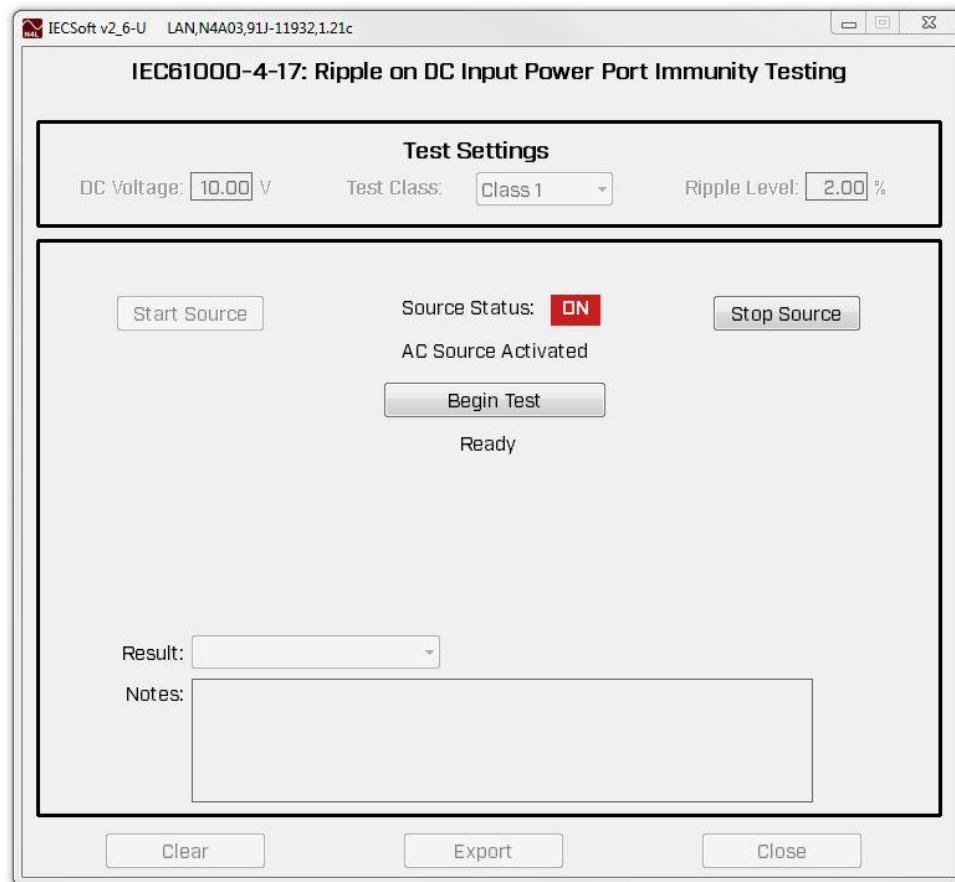
The Source Status is displayed. This will be displaying **OFF** and shaded green so that the User will know that the Source output is not enabled and the EUT does not have power applied.

When all settings have been entered click on **START SOURCE**.

The screenshot shows a software window titled "IEC61000-4-17: Ripple on DC Input Power Port Immunity Testing". The window has a title bar with "IECSoft v2_6-U" and a file path "LAN\N4A03,91J-11932,1,21c". The main interface is divided into several sections:

- Test Settings:** A section at the top with three input fields: "DC Voltage: 10.00 V", "Test Class: Class 1" (a dropdown menu), and "Ripple Level: 2.00 %".
- Source Control:** A section below the settings containing a "Start Source" button (highlighted in blue), a "Source Status: OFF" indicator (where "OFF" is in a green box), and a "Stop Source" button.
- Test Execution:** A section below the source control containing the text "AC Source Ready", a "Begin Test" button, and the text "Waiting...".
- Results and Notes:** A section at the bottom left containing a "Result:" dropdown menu and a "Notes:" text area.
- Footer:** A row of three buttons at the bottom: "Clear", "Export", and "Close".

The Test Settings Window is updated:



The Start Source button is now greyed out and can't be selected. The Source Status now indicates that the Source Output is enabled. It is also highlighted with a **red** background to warn the User that the EUT is now powered up.

The STOP SOURCE button can be used AT ANY TIME during the test to immediately disable the Source Output and power down the EUT. To continue the user will have to click on Start Source and begin the test again from the start.

Click on **"Begin Test"**

The screenshot shows a software window titled "IEC61000-4-17: Ripple on DC Input Power Port Immunity Testing". The window has a title bar with "IECSoft v2_6-U" and a LAN address. The main content area is divided into sections. The top section, "Test Settings", contains three input fields: "DC Voltage: 10.00 V", "Test Class: Class 1", and "Ripple Level: 2.00 %". Below this, a larger section displays the test parameters: "Testing a DC Ripple of 2.00% on a DC Voltage of 10.00V". This section includes a "Source Status" indicator showing "ON" in a red box, a "Stop Source" button, and the text "AC Source Activated". There is also a "Stop Test" button. Below these are three status indicators: "Elapsed Time: 5 s", "Event Triggered", and "Time until test is valid: 9 m, 54 s". At the bottom of this section, there is a "Result" dropdown menu set to "Undetermined" and a "Notes" text area. The window footer contains three buttons: "Clear", "Export", and "Close".

The test window is updated to display the DC Voltage applied to the EUT and Ripple Voltage applied to the DC Voltage.

The Elapsed Time Counter is constantly updating to display the running time of the test.

A second counter displaying how much longer the test must run before the result can be considered to be valid. A minimum running time of 10 minutes is defined in the Standard document.

When the minimum 10 minute test running time is achieved the test window is updated:

The screenshot shows a software window titled "IEC61000-4-17: Ripple on DC Input Power Port Immunity Testing". The window has a title bar with "IECSoft v2_6-U" and a LAN address. The main content area is divided into sections. The "Test Settings" section at the top shows "DC Voltage: 10.00 V", "Test Class: Class 1", and "Ripple Level: 2.00 %". Below this, a status section indicates "Testing a DC Ripple of 2.00% on a DC Voltage of 10.00V", "Source Status: ON" (with a red button "Stop Source"), and "AC Source Activated". A blue "Stop Test" button is also present. The "Elapsed Time" is shown as "11 m, 19 s". The "Event Triggered" and "Event Running..." status is shown. The "Time until test is valid:" is displayed as "Valid" in green text. At the bottom, there is a "Result: Undetermined" dropdown and a "Notes:" text area. The window has "Clear", "Export", and "Close" buttons at the bottom.

The "Time until test is valid" counter stops displaying a time and instead displays a "Valid" message.

Note: The Elapsed Time counter continues incrementing and the test will keep running.

The Standard requires the ability for the test to continue running for at least 10 minutes or for the period of time necessary to allow a complete verification of the EUT's operating performance.

For this reason the test will remain running until the user stops the test by clicking on **Stop Test**.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-17: Ripple on DC Input Power Port Immunity Testing

Test Settings
 DC Voltage: V Test Class: Ripple Level: %

Testing a DC Ripple of 2.00% on a DC Voltage of 10.00V
 Source Status: ON
 AC Source waiting to be Deactivated

Elapsed Time: 12 m, 8 s Event Triggered Time until test is valid: Valid
 Event Complete

Result:
 Notes:

NOTE: The test stops but the Source output remains ON and the EUT is still energised.

Click on Stop Source to turn off the Source output.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-17: Ripple on DC Input Power Port Immunity Testing

Test Settings
 DC Voltage: V Test Class: Ripple Level: %

Testing a DC Ripple of 2.00% on a DC Voltage of 10.00V
 Source Status: OFF
 AC Source Deactivated

Elapsed Time: 12 m, 8 s Event Triggered Time until test is valid: Valid
 Event Complete
 Test Complete

Result:
 Notes:

The Source Status will now display **OFF** shaded green to confirm that the EUT is no longer energised.

A message is also displayed to confirm that the Test is now complete.

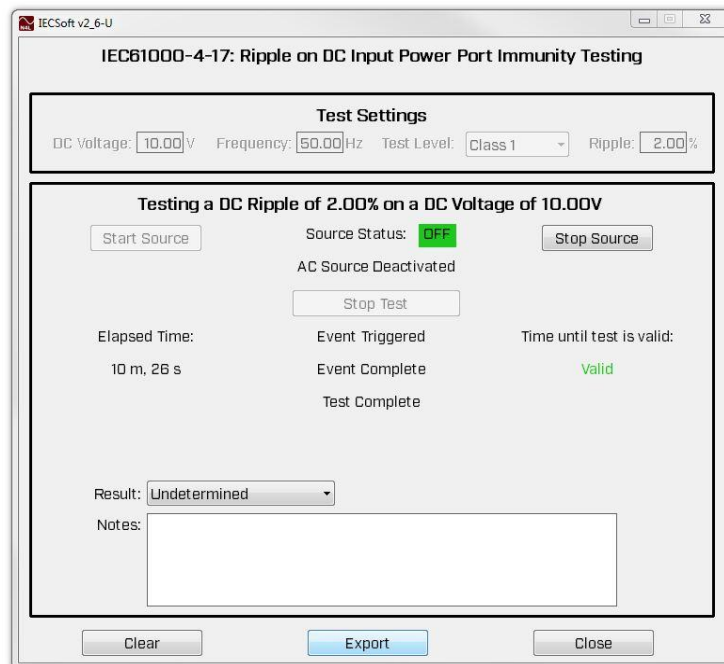
The screenshot shows a software window titled "IEC61000-4-17: Ripple on DC Input Power Port Immunity Testing". The window has a title bar with "IECSoft v2_6-U" and "LAN,N4A03,91J-11932,1,21c". Inside the window, there are several sections:

- Top Section:** Contains three input fields: "DC Voltage: 10.00 V", "Test Class: Class 1", and "Ripple Level: 2.00 %".
- Test Configuration Section:** Displays "Testing a DC Ripple of 2.00% on a DC Voltage of 10.00V". It shows "Source Status: OFF" (in a green box) and "AC Source Deactivated". There are buttons for "Stop Source" and "Stop Test".
- Test Progress Section:** Shows "Elapsed Time: 11 m, 8 s". It also displays "Event Triggered", "Event Complete", and "Test Complete". The "Time until test is valid:" is shown as "Valid" in green.
- Result Section:** A dropdown menu for "Result:" is open, showing options: "Pass", "Undetermined", "Pass", and "Fail". The "Pass" option is selected.
- Bottom Section:** Contains three buttons: "Clear", "Export", and "Close".

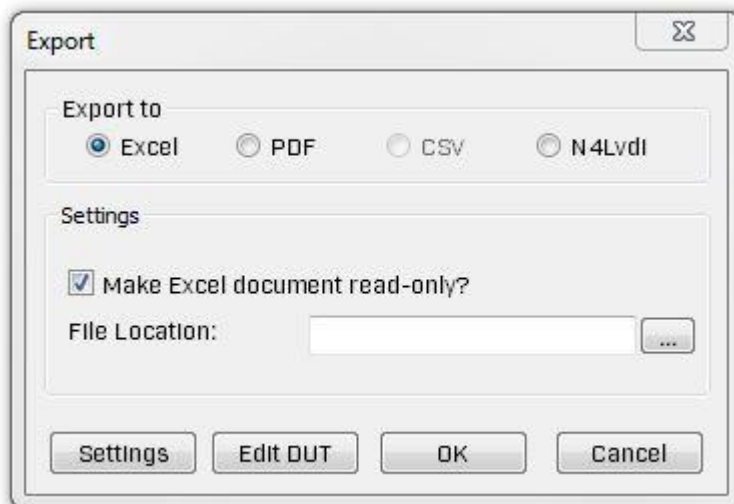
Having observed the EUT's behaviour during the test click on the Result box and select the correct option from the drop down menu. Notes and comments can be added to the report if required.

5.4 Saving / Exporting test data.

Click on the Export button to create a report.



Clicking on the Export button opens the Export window.



For IEC61000-4-17 mode Excel and PDF reports can be created and the results can be exported to an ".n4lvdi" file. There is no option to create a ".csv" file in this mode.

Section 9 in this manual provides full details of the IECSoft software Export function.

Example IEC61000-4-17 Excel report.

Click to add header

12th August 2019 - 11:19:44		Page 1/1		IECSOft v2_6			
		IEC61000-4-17:2009 Ripple on DC Input Power Port Immunity Testing					
Source Details							
Source Model	N4A03						
Source Serial	91J-11932						
Source Firmware	1.29						
Equipment Under Test							
Brand	N4L						
Model	Z100						
Serial	P1234						
Impedance Network ID	IMP001						
Rated Voltage	230.000V						
Rated Current	5.000A						
Rated Frequency	50.000Hz						
Rated Power	1.000kW						
Test Settings							
Test Level	Class 1						
Ripple Level	2%						
DC Voltage	10.000V						
Frequency	50.000Hz						
Test Duration	13 m, 29 s						
Additional Test Details							
Operator	KAR						
Lab Name	N4L						
Location	LAB1						
Notes	IEC61000-4-17 class 1 test						
Test Results							
Test Notes							
Signature							
Results	Undetermined						

Example IEC61000-4-17 PDF report.

12th August 2019 - 11:19:44		Page 1/1		IECSoft v2_6	
IEC61000-4-17:2009 Ripple on DC Input Power Port Immunity Testing					
AC Source Impedance Network ID EUT Details User Rated Voltage User Rated Current User Rated Frequency User Rated Power DC Voltage Frequency Test Level Ripple Level Test Duration Test Notes Notes		Instrumentation Details Newton's4th N4A03 SN: 91J-11932 Firmware: v1.29 IMP001 Brand: N4L Model: Z100 Serial: P1234 230.000V 5.000A 50.000Hz 1.000kW Test Configuration 10.000V 50.000Hz Class 1 2% 13 m, 29 s IEC61000-4-17 class 1 test			
Signature					
Results		Undetermined			

6 IEC61000-4-28

Variation of Power and Frequency Immunity tests

This section explains how to use the IECSoft software along with a N4A Source to perform Variation of Power and Frequency Immunity testing defined in IEC61000-4-28.

6.1 Scope

The object of these tests is to evaluate the immunity of electrical and electronic equipment when subjected to variations of the power frequency.

Whilst the tests are being performed the Equipment under Test (EUT) should be under constant observation. There should be no malfunction of the EUT during any of the tests.

On completion of each test the software will ask for the result of the test to be entered. The result entered is determined by the observation of the behaviour of the EUT during the test.

Observation of the loss of function or degradation of performance of the EUT during the tests is used to determine the classification. The definitions of acceptable performance and a malfunction should be agreed between the laboratory performing the tests and the manufacturers / purchasers of the EUT. More details on Classifications can be found in section 9 of the IEC61000-4-28 Standard document.

6.2 Test Description

The test is performed at nominal mains voltage.

There are 5 test classes that can be selected; these classes and the test levels for each class are detailed in Table 1 in the Standard.

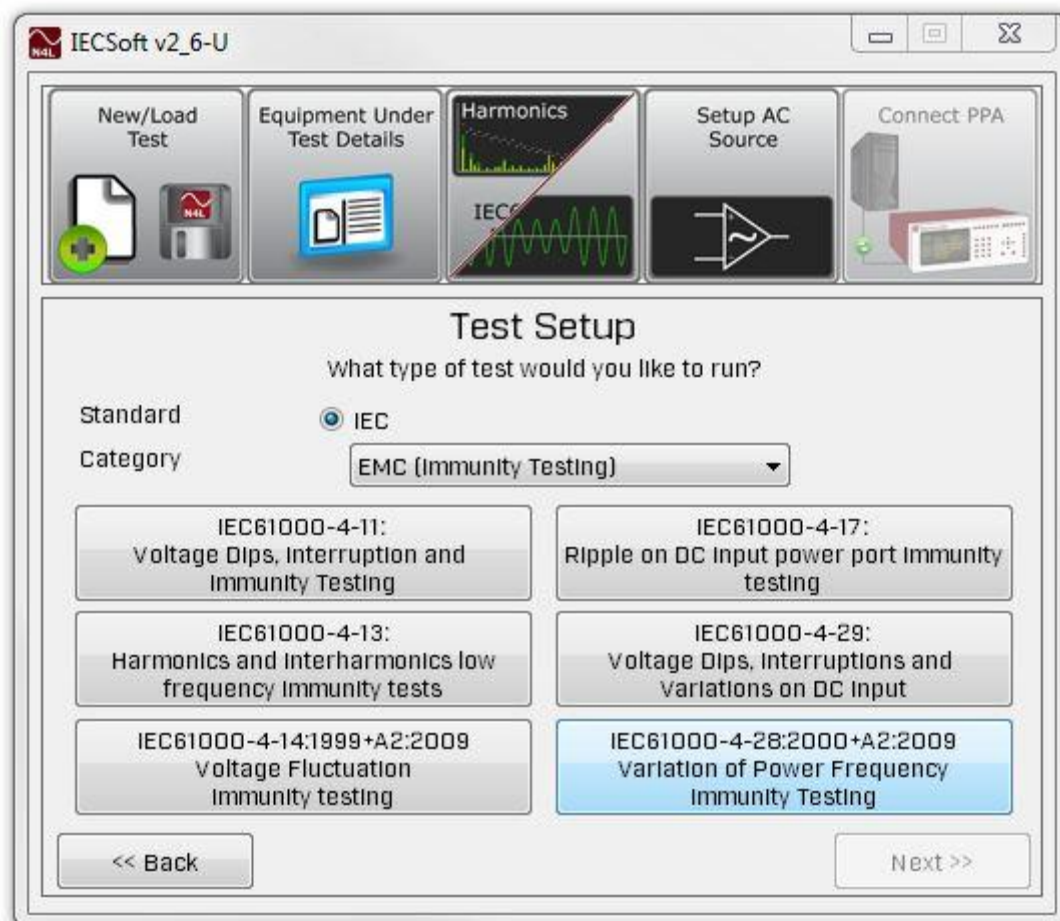
The EUT (Equipment under test) is initially operating at mains frequency (f_1); this can be 50Hz or 60Hz.

The operation of the EUT should be observed whilst it is subjected to a frequency variation sequence according to figure 1 in the IEC61000-4-28 Standard.

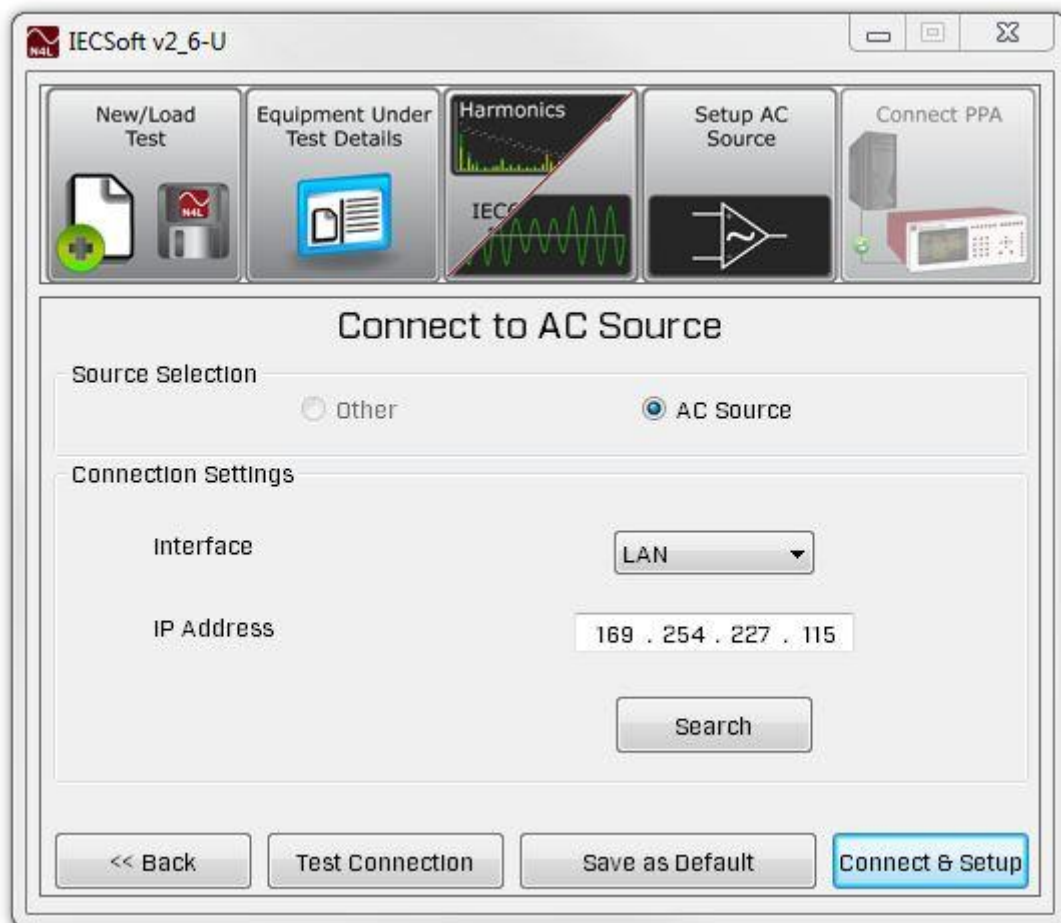
The sequence contains 3 tests using the upper test level followed by 3 tests using the lower test level (see table 1 in the Standard). The length of each test is two minutes and between each test the EUT is operated at the mains frequency for a period of 1 minute. There is a transition period between the EUT operating at mains frequency and at the test frequency. The same transition period applies when EUT operation changes from test frequency back to the mains frequency. More details about the frequency variation sequence can be found by referring to figure 1 and figure 2 in the Standard document.

6.3 Single Phase Test Description

Click on IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing.



The Connect to AC Source Dialog is then displayed. Check the Interface settings and then click on “**Connect & Setup**”



The IEC61000-4-28 Test Setup screen is displayed.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

EUT Details

EUT Type: N/A EUT input port tested: N/A

EUT operation mode: N/A Connections: N/A

Cables: N/A Peripherals: N/A

Test Setup Notes: General Notes:

Test Settings

Nominal Voltage: 230 V Frequency: 50Hz

Test Class: Class 2

Test Settings

Transition duration: 10 s

Upper limit: +3%

Fluctuation lower limit: -3% Un

Exit Next

Click on Test Settings and select the required test class from the drop down menu.

The Class 2 Test setup screen is displayed

The screenshot shows a software window titled "IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing Test Setup". The window is divided into two main sections: "EUT Details" and "Test Settings".

EUT Details:

- EUT Type: N/A
- EUT input port tested: N/A
- EUT operation mode: N/A
- Connections: N/A
- Cables: N/A
- Peripherals: N/A
- Test Setup Notes: (Empty text area)
- General Notes: (Empty text area)

Test Settings:

- Nominal Voltage: 230 V
- Frequency: 50Hz
- Test Class: Class 2

Test Settings (Class 2 Limits):

Transition duration	Fluctuation upper limit	Fluctuation lower limit
10 s	+ 3 %	- 3 % Un

At the bottom of the window, there are two buttons: "Exit" and "Next".

The Class 2 limits are displayed in the software window, these are highlighted yellow above. These limits are defined in the Standard document and can't be changed by the user.

The test frequency needs to be selected; this can be either 50Hz or 60Hz. The nominal voltage should also be entered before proceeding.

The EUT details can be entered and any test notes can be entered. If nothing is entered these will be shown as N/A on the Excel report.

Click on **NEXT** to display the Test Setup window:

The screenshot shows a software window titled "IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing Test Setup". The window has a title bar with "IECSoft v2_6-U" and "LAN,N4A03,91J-11932,1.20". Inside the window, the title "IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing" is at the top, followed by "Test Setup" in a larger font. Below this, "Nominal Voltage (Un): 230V" is on the left and "Frequency: 50Hz" is on the right. In the center, there is a section titled "Testing Class 2". Below this title, there are three buttons: "Start Source" (blue), "Source Status: OFF" (green text on a green background), and "Stop Source" (grey). Below these buttons, it says "AC Source Ready". Further down, there is a button labeled "Begin Test Sequences" and the text "Waiting for Source". At the bottom left, there is a "Result:" label next to a dropdown menu showing "Undetermined". Below that is a "Notes:" label next to a large empty text box. At the very bottom of the window, there are two buttons: "Previous" and "Export".

The Nominated Voltage and Test Frequency are displayed near the top of the test window.

The Source Status is displayed. This will be displaying **OFF** and shaded green so that the User will know that the Source output is not enabled and the EUT does not have power applied.

Click on **Start Source**:

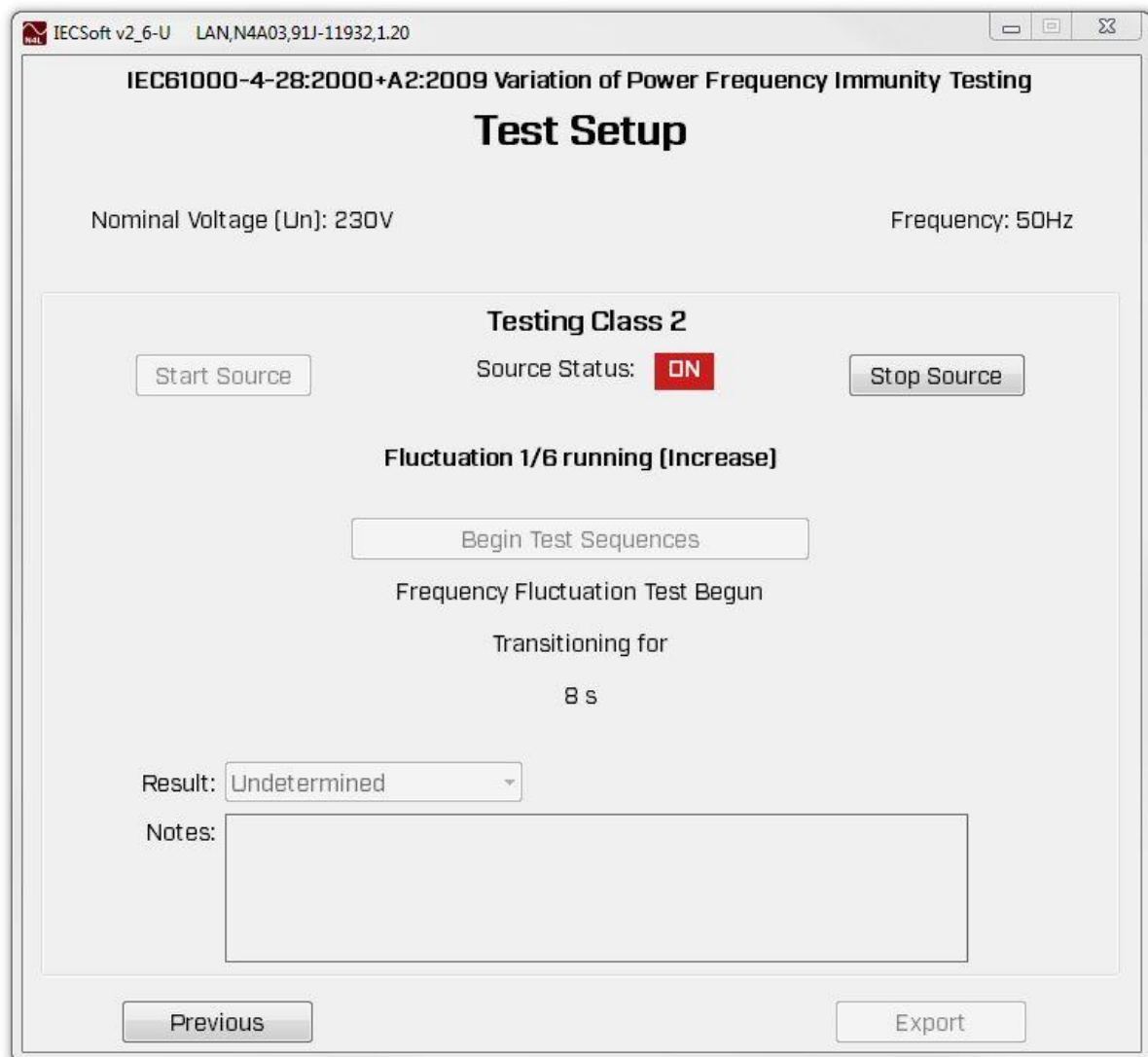
The screenshot shows a software window titled "IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing Test Setup". The window has a title bar with "IECSoft v2_6-U" and "LAN,N4A03,91J-11932,1.20". Inside the window, the nominal voltage is set to 230V and the frequency to 50Hz. The testing class is "Testing Class 2". The "Start Source" button is greyed out, and the "Source Status" is displayed as "ON" in a red box. Below this, it says "AC Source Activated" and "Ready to begin testing". A "Begin Test Sequences" button is highlighted in blue. Below that, it says "Frequency Fluctuation Sequence Ready". At the bottom, there is a "Result" dropdown menu set to "Undetermined" and a "Notes" text area. The "Previous" and "Export" buttons are at the bottom of the window.

The Start Source button is now greyed out and can't be selected. The Source Status now displays **ON** indicating that the Source Output is enabled. It is also highlighted with a red background to warn the User that the EUT is now powered up.

The STOP SOURCE button can be used AT ANY TIME during the test to immediately disable the Source Output and power down the EUT. To continue the user will have to click on Start Source and begin the test again from the start.

Click on “**Begin Test Sequences**”

The test starts running



The Fluctuation Test that is running is displayed. The test starts at the selected mains frequency (f_1), the remaining transition time (t_p) until the test starts at the Upper test frequency level is also displayed and updating. See table 2, figure 1 and figure 2 in IEC61000-4-28 for more details.

Once the transition period ends the test starts running at the Upper test frequency level for a period of 2 minutes. See Figure 1 in IEC61000-4-28.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 1/6 running (Increase)

Begin Test Sequences

Frequency Fluctuation Test Begun

Testing frequency for
21 s

Result: Undetermined

Notes:

Previous Export

There is now a transition period to allow the frequency to return to the mains frequency (f1) selected earlier in the Test Setup windows. See figure 1 and figure 2 in IEC61000-4-28.

The screenshot shows a software window titled "IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing" with a subtitle "Test Setup". The window is from IECSoft v2_6-U, LAN, N4A03, 91J-11932, 1.20. It displays test parameters: Nominal Voltage [Un]: 230V and Frequency: 50Hz. The "Testing Class 2" section includes "Start Source" and "Stop Source" buttons, with the "Source Status" indicator set to "ON". The test sequence is "Fluctuation 1/6 running (Increase)", with a "Begin Test Sequences" button. The status shows "Frequency Fluctuation Test Begun" and "Transitioning for 7 s". The "Result" is set to "Undetermined" in a dropdown menu, and there is a "Notes" text area. At the bottom are "Previous" and "Export" buttons.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage [Un]: 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 1/6 running (Increase)

Begin Test Sequences

Frequency Fluctuation Test Begun

Transitioning for
7 s

Result: Undetermined

Notes:

Previous Export

Once the transition period ends there is a waiting interval of 1 minute before the second of the six fluctuation tests begins. The counter continuously updates showing the remaining waiting period.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage [Un]: 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Waiting for an interval

Begin Test Sequences

Frequency Fluctuation Test Begun

Waiting for
27 s

Result: Undetermined

Notes:

Previous Export

The process described in the previous pages is then repeated for Fluctuation Test number 2 (and all remaining tests).

The test number is updated in the software window and test No.2 begins with the transition period. See table 2, figure 1 and figure 2 in IEC61000-4-28 for more details.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 2/6 running (Increase)

Begin Test Sequences

Frequency Fluctuation Test Begun

Transitioning for
9 s

Result: Undetermined

Notes:

Previous Export

Fluctuation test No.3 details:

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 3/6 running (Increase)

Begin Test Sequences

Frequency Fluctuation Test Begun

Transitioning for
3 s

Result: Undetermined

Notes:

Previous Export

When Fluctuation test No.4 starts the software window will display “decreasing” in the test title as seen in the screenshot below. This also applies to tests 5 and 6; this is because the frequency variation sequence for these tests uses a negative pulse. Refer to figure 1 in IEC61000-4-28 for more information.



Fluctuation test No.4 details:

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 4/6 running (Decrease)

Begin Test Sequences

Frequency Fluctuation Test Begun

Testing frequency for
12 s

Result: Undetermined

Notes:

Previous Export

Fluctuation test No.5 details:

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 5/6 running (Decrease)

Begin Test Sequences

Frequency Fluctuation Test Begun

Testing frequency for
20 s

Result: Undetermined

Notes:

Previous Export

Fluctuation test No.6 details:

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

Nominal Voltage (Un): 230V Frequency: 50Hz

Testing Class 2

Start Source Source Status: **ON** Stop Source

Fluctuation 6/6 running (Decrease)

Begin Test Sequences

Frequency Fluctuation Test Begun

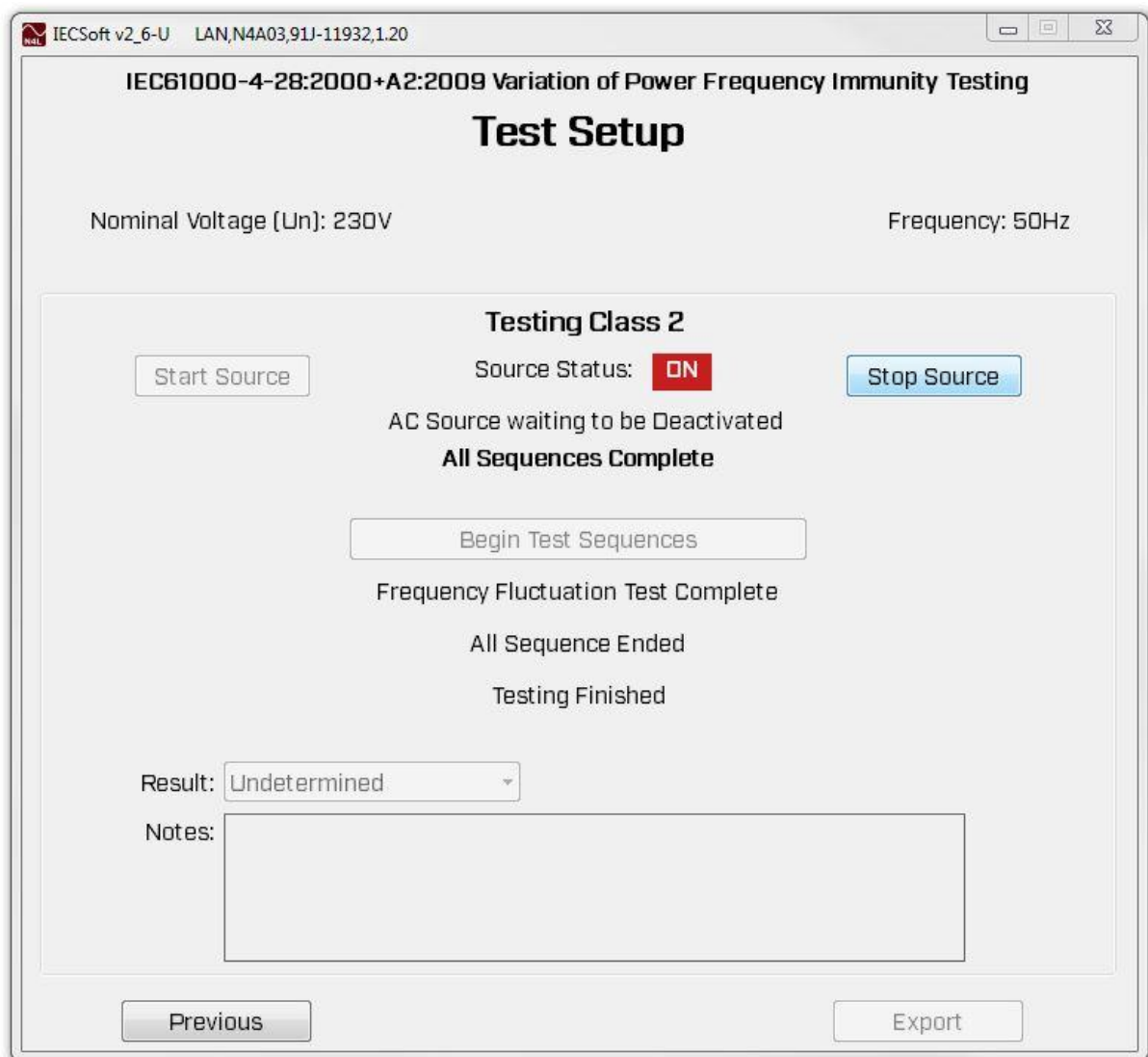
Testing frequency for
28 s

Result: Undetermined

Notes:

Previous Export

Once test No.6 is completed a message is displayed "All sequences Complete" After test No.6 the software displays that the overall test is complete. The AC source Output remains **ON** so a second message is displayed reminding the User that the AC Source needs to be deactivated.



Click on **Stop Source** to turn **OFF** the AC source Output and power down the EUT.

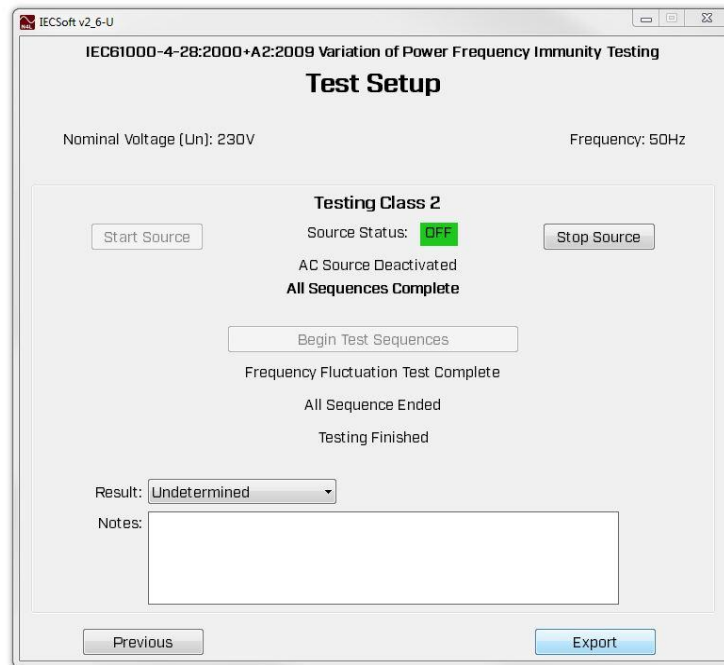
The source is now switched off. The Source status changes to **OFF** and the background colour turns green to indicate that the Source output is now off and that the EUT is no longer powered up.

The screenshot shows the 'Test Setup' window of the IECSoft v2_6-U software. The window title is 'IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing'. The main heading is 'Test Setup'. Below this, the 'Nominal Voltage (Un): 230V' and 'Frequency: 50Hz' are displayed. The 'Testing Class 2' section shows 'Source Status: OFF' (indicated by a green box) and 'AC Source Deactivated'. There are 'Start Source' and 'Stop Source' buttons. Below these, a 'Begin Test Sequences' button is present. The status messages 'Frequency Fluctuation Test Complete', 'All Sequence Ended', and 'Testing Finished' are displayed. At the bottom left, there is a 'Result:' dropdown menu currently showing 'Undetermined', and a 'Notes:' text area. The dropdown menu is open, showing options: 'Undetermined', 'Pass', and 'Fail'. At the bottom of the window, there are 'Previous' and 'Export' buttons.

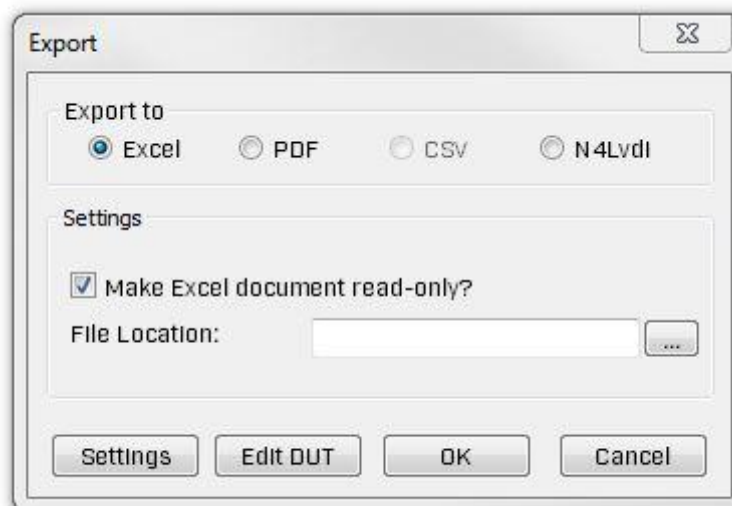
Having observed the EUT's behaviour during the test click on the Result box and select the correct option from the drop down menu. Notes and comments can be added to the report if required.

6.4 Saving / Exporting test data.

Click on the Export button to create a report etc.



Clicking on the Export button opens the Export window.



For IEC61000-4-28 mode Excel and PDF reports can be created and the results can be exported to an ".n4lvdi" file. There is no option to create a ".csv" file in this mode.

Section 9 in this manual provides full details of the IECSoft software Export function.

Example IEC61000-4-28 Excel report.

Click to add header

12th August 2019 - 14:49:21		Page 1/1		IECSoft v2_6			
		IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Tests					
Source Details							
Source Model	N4A03						
Source Serial	91J-11932						
Source Firmware	1.29						
Equipment Under Test							
Brand	N4L						
Model	Z100						
Serial	P1234						
Impedance Network ID	IMP001						
Rated Voltage	230.000V						
Rated Current	5.000A						
Rated Frequency	50.000Hz						
Rated Power	1.000kW						
EUT Type	N/A						
Input Port	N/A						
Operating Mode	N/A						
Connections	N/A						
Cables	N/A						
Peripherals	N/A						
Setup Notes							
General Notes							
Test Settings							
Nominal Voltage	230V						
Frequency	50Hz						
Test Class	Class 2						
Transition time	10s						
Fluctuation Upper Limit	3%						
Fluctuation Lower Limit	-3%						
Additional Test Details							
Operator	KAR						
Lab Name	N4L						
Location	LAB1						
Notes	IEC61000-4-28 class 2 test						
Signature							
Test Results							
TestNotes							
Test Results	Undetermined						

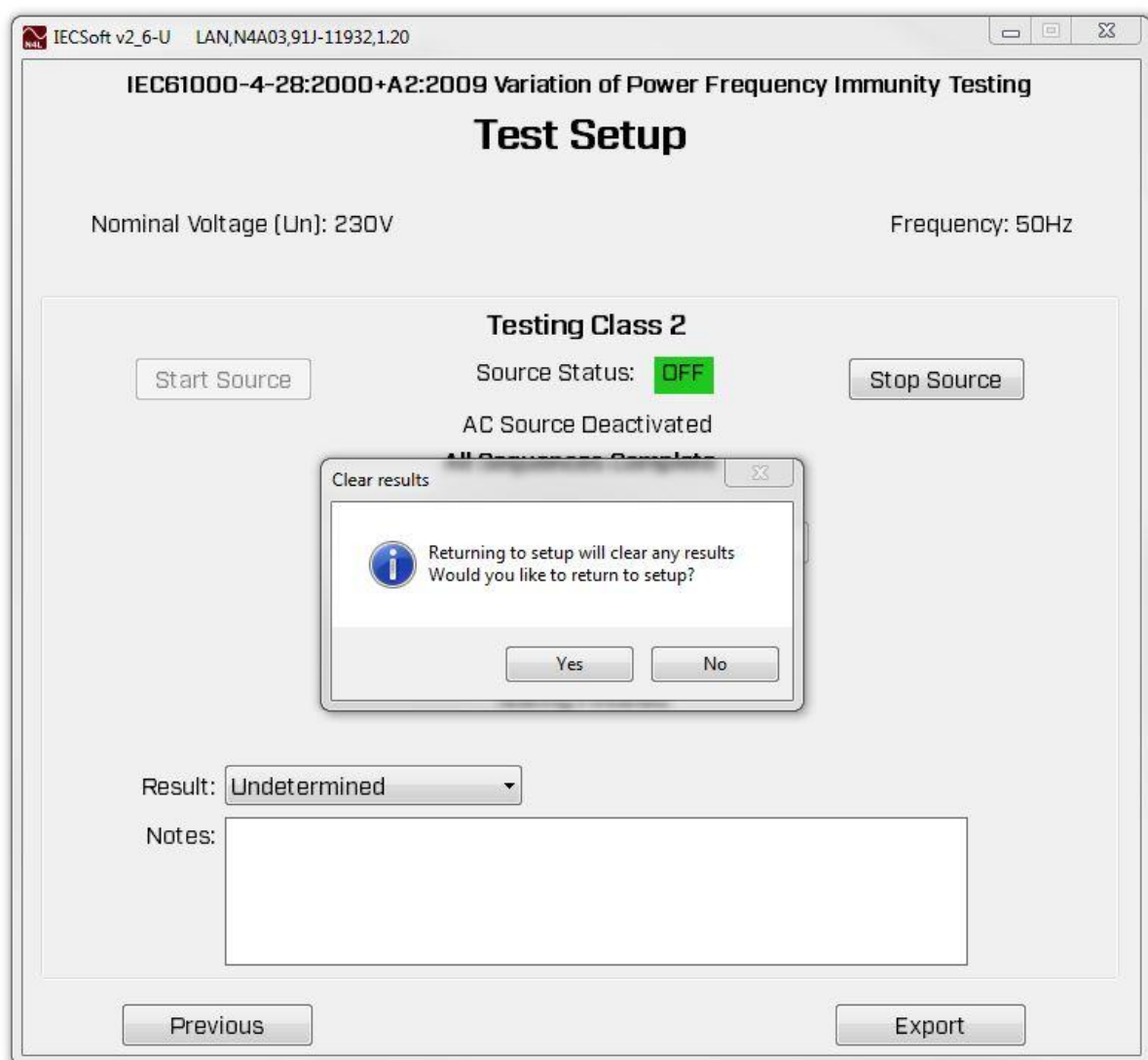
Example IEC61000-4-28 PDF report.

12th August 2019 - 14:49:21		Page 1/1		IECSoft v2_6	
IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Tests					
AC Source Impedance Network ID EUT Details User Rated Voltage User Rated Current User Rated Frequency User Rated Power EUT Type Operation Mode Input Port Connections Cables Peripherals Setup Notes General Notes Operator Lab Name Location Notes Test Class Nominal Voltage Frequency Transition Time Fluctuation Upper Limit Fluctuation Lower Limit Test Notes		Instrumentation Details Newtons4th N4A03 SN: 91J-11932 Firmware: v1.29 IMP001 Brand: N4L Model: Z100 Serial: P1234 230.000V 5.000A 50.000Hz 1.000kW N/A N/A N/A N/A N/A N/A Operating Conditions KAR N4L LAB1 IEC61000-4-28 class 2 test Test Configuration Class 2 230.000V 50.000Hz 10s 3% -3%			
Signature					
Results		Undetermined			

6.5 Using the Previous Button

This can be used at any time to return to previous screens.

A warning message appears to warn the user that all test data will be lost. The user can then decide to continue and return to the previous screen(s) losing any data or stay the the present screen and keep the data.



6.6 Details of other test classes

6.6.1 Class 3 setup screen and limits

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

EUT Details

EUT Type:	N/A	EUT input port tested:	N/A
EUT operation mode:	N/A	Connections:	N/A
Cables:	N/A	Peripherals:	N/A
Test Setup Notes:	General Notes:		

Test Settings

Nominal Voltage:	230 V	Frequency:	50Hz
Test Class:	Class 3		

Test Settings

Transition duration	Fluctuation upper limit	Fluctuation lower limit
10 s	+ 4 %	- 6 % Un

Exit Next

6.6.2 Class 4 setup screen and limits

IECSoft v2_6-U LAN,N4A03,91J-11932,1.20

IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing

Test Setup

EUT Details

EUT Type:	N/A	EUT input port tested:	N/A
EUT operation mode:	N/A	Connections:	N/A
Cables:	N/A	Peripherals:	N/A
Test Setup Notes:	General Notes:		

Test Settings

Nominal Voltage: 230 V Frequency: 50Hz

Test Class: Class 4

Test Settings

Transition duration	Fluctuation upper limit	Fluctuation lower limit
1 s	+ 15 %	- 15 % Un

Exit Next

6.6.3 Class X setup screen and limits

The user can select to adjust the Transition Duration and the Upper & Lower Frequency Fluctuation limits.

The screenshot shows a software window titled "IEC61000-4-28:2000+A2:2009 Variation of Power Frequency Immunity Testing Test Setup". The window is divided into two main sections: "EUT Details" and "Test Settings".

EUT Details:

- EUT Type: N/A
- EUT input port tested: N/A
- EUT operation mode: N/A
- Connections: N/A
- Cables: N/A
- Peripherals: N/A
- Test Setup Notes: (Empty text area)
- General Notes: (Empty text area)

Test Settings:

- Nominal Voltage: 230 V
- Frequency: 50Hz
- Test Class: Class X

Test Settings (Limits):

Transition duration	Fluctuation upper limit	Fluctuation lower limit
5 s	+ 20 %	- 10 % Un

At the bottom of the window, there are two buttons: "Exit" and "Next".

6.7 3-phase test procedure

For three-phase systems, all three phases shall be tested simultaneously. The frequency variation is to be applied simultaneously on the three phases.

7 IEC61000-4-29

Voltage Dips, short interruptions and voltage variations on DC input power port immunity tests.

This section explains how to use the IECSoft software along with a N4A Source to perform voltage dips, short interruptions and voltage variations on DC input power port immunity testing defined in IEC61000-4-29.

7.1 Scope

The object of these tests is to evaluate the immunity of electrical and electronic equipment when subjected to voltage dips, short interruptions or voltage variations on dc input power ports.

Whilst the tests are being performed the Equipment under Test (EUT) should be under constant observation. There should be no malfunction of the EUT during any of the tests.

On completion of each test the software will ask for the result of the test to be entered. The result entered is determined by the observation of the behaviour of the EUT during the test.

Observation of the loss of function or degradation of performance of the EUT during the tests is used to determine the classification. The definitions of acceptable performance and a malfunction should be agreed between the laboratory performing the tests and the manufacturers / purchasers of the EUT. More details on Classifications can be found in section 9 of the IEC61000-4-29 Standard document.

7.2 Test Description

There are no test Classes or specified test levels for Voltage Dips, Short Interruptions or Voltage Variations stated in the IEC61000-4-29 Standard document.

In their place, section 5 along with Tables 1a, 1b and 1c in the standard document detail the preferred Voltage test levels and test durations. The table below is a summary of these preferred levels.

A combination of these tests should be performed to determine that the EUT operates as intended. Refer to the Standard document for full details of these levels and the test requirements.

Test Type	Test Level $\%U_T$	Duration Seconds
Voltage DIPS	40 70 X	0.01
		0.03
		0.1
		0.3
		1
		X
Short Interruptions	0	0.001
		0.003
		0.01
		0.03
		0.1
		0.3
		1
		X
Voltage Variations	80 to 120 85 to 120 X	0.1
		0.3
		1
		3
		10
		X

x : Is an open value

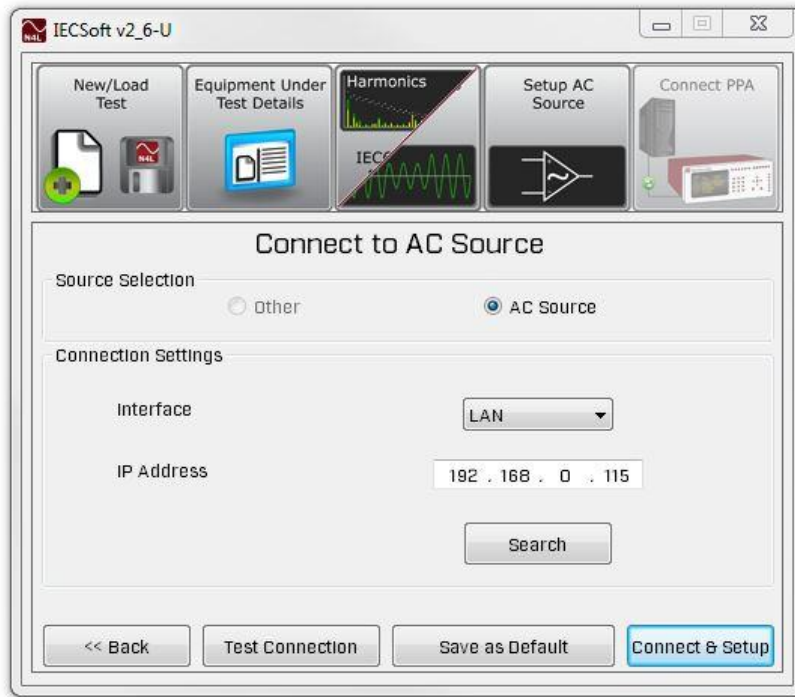
U_T : The rated Voltage for the equipment

7.3 Single Phase Test Description

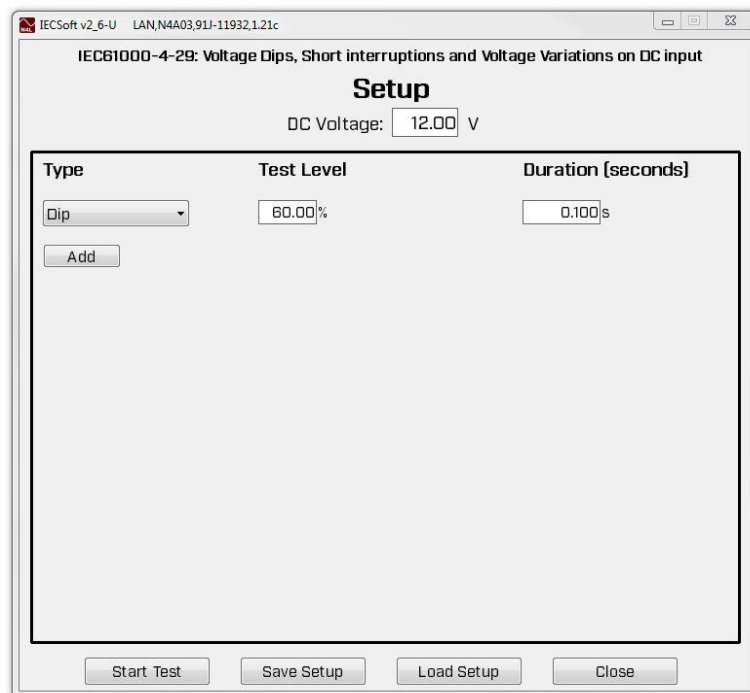
Click on IEC61000-4-29: Voltage Dips, Interruptions and Variations on DC input



The Connect to AC Source Dialog is then displayed. Check the Interface settings and then click on "**Connect & Setup**"

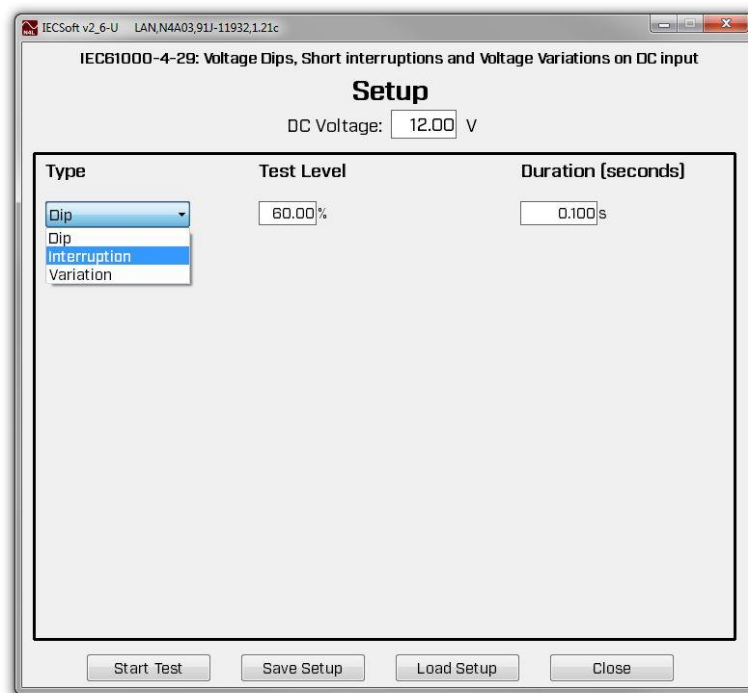


The IEC61000-4-29 Test Setup screen is displayed.



At the top of the Setup window is the DC Voltage. The default voltage is 12.00V. The user will need to enter the DC operating voltage of the EUT to be tested.

The first test is already displayed. Click on **Type** and select Dip, Interrupt or Variation from the drop down menu.



When Dips are selected the user will need to enter the required test Level. This is the percentage change that the voltage will "Dip" whilst the test is running. For example, with a nominal voltage of 100V and a Test level of 70% is entered, the voltage would drop to 70V or 70% of the nominal voltage.

Enter the duration in seconds. The voltage "Dip" will be applied for this number of seconds.

For Interruptions only the duration needs to be entered. The test level will be set to 0V for the specified duration.

For Variations two test levels and the duration need to be entered. During the test the voltage will be varied between the two test levels for the specified duration.

Refer to tables 1a, 1b and 1c in the IEC61000-4-29 Standard document for further details.

Click on "**Add**" to add another test to the sequence.

IECSoft v2_6-U LAN_N4A03,91J-11932,1.21c

IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input

Setup

DC Voltage: 12.00 V

Type	Test Level	Duration (seconds)	
Dip	40.00%	0.100s	
Dip	60.00%	0.100s	Remove

Add

Start Test Save Setup Load Setup Close

The tests can be deleted by clicking on **"Remove"**.

The maximum number of tests in each sequence is 10. Once this figure is reached the option to "Add" a test is no longer displayed.

IECSoft v2_6-U LAN_N4A03,91J-11932,1.21c

IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input

Setup

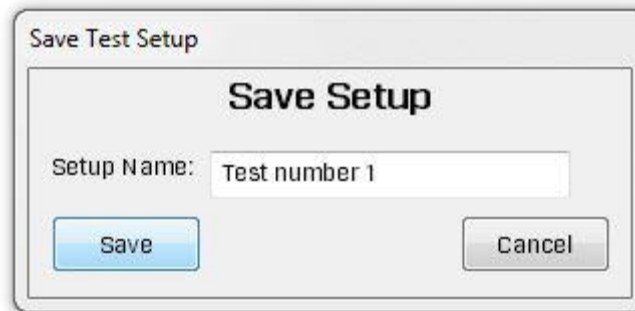
DC Voltage: 12.00 V

Type	Test Level	Duration (seconds)	
Dip	40.00%	0.100s	
Dip	70.00%	0.030s	
Dip	70.00%	1.000s	
Interruption	0.00%	0.001s	
Interruption	0.00%	0.030s	
Interruption	0.00%	1.000s	
Variation	85.00% to 120.00%	0.100s	
Variation	85.00% to 120.00%	3.000s	
Variation	85.00% to 120.00%	10.000s	
Dip	40.00%	0.01s	Remove

Start Test Save Setup Load Setup Close

When the required number of tests have been entered click on **"Save Setup"**.

The Save Setup window is displayed:



Enter a Test Setup file name for the file to be created and then click on **Save**.

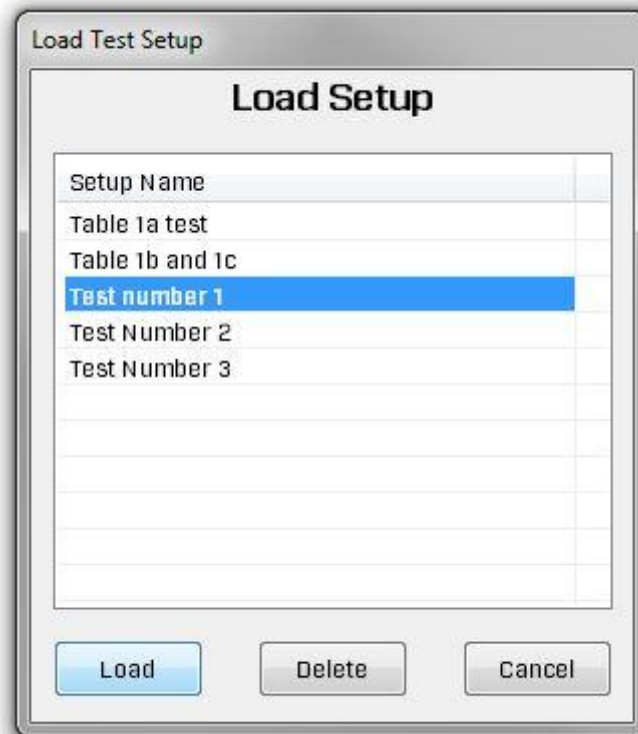
The Setup file is automatically created. This can be viewed using the Load Setup feature which is explained in the next section.

Loading a Saved Setup.

Click on **Load Setup** at the base of the Setup screen.



The Load test Setup window is displayed:



A list of saved test setup files is displayed in the Load Setup window.

Note:

To delete a saved Setup file, highlight it by clicking on the file name in the list and then click on the **Delete** button. The list of names will be updated with the highlighted file deleted from the list.

Highlight the test to be recalled and then click on **Load**. The Setup screen is displayed and will have been updated to display the tests in the stored setup file.

IECSoft v2.6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input

Setup

DC Voltage: V

Type	Test Level	Duration (seconds)
Dip	40.00%	0.100s
Dip	70.00%	0.300s
Dip	70.00%	1.000s
Dip	40.00%	0.300s
Interruption	0.00%	0.300s
Interruption	0.00%	1.000s
Interruption	0.00%	0.100s
Variation	85.00% to 120.00%	0.100s
Variation	85.00% to 120.00%	3.000s
Variation	85.00% to 120.00%	10.000s

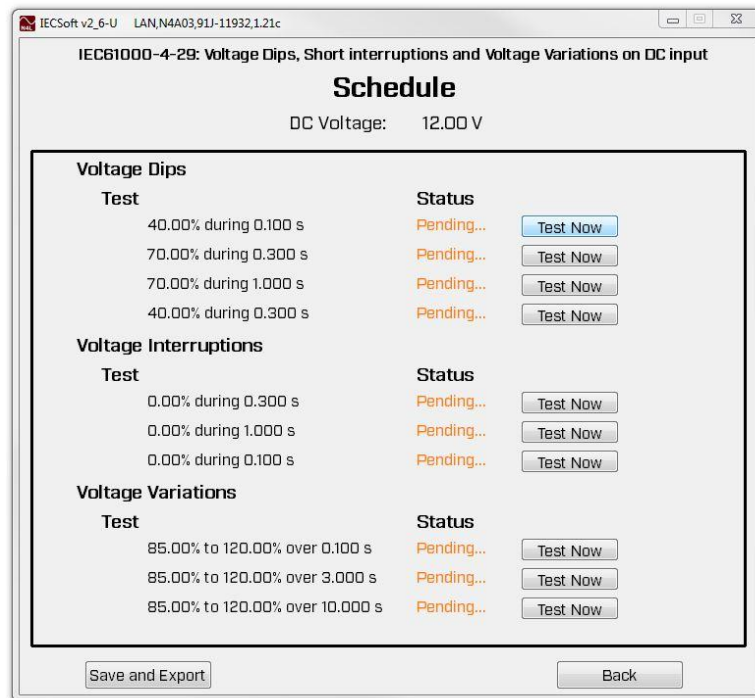
Remove

Start Test Save Setup Load Setup Close

NOTE: The DC Voltage displayed in the Setup window **IS NOT** saved or recalled in the Setup files. When a saved program is loaded into the software the DC Voltage for the test to be performed **MUST** be re-entered otherwise the previously entered voltage will still be used.

Running the Test

Click on the **Start Test** button. The Schedule window appears:



The Schedule window lists the tests that were displayed in the Setup window along with the current Status of each test. The initial status for each test is "Pending" with a **Test Now** button located to the side of the Status for each test.

There are two options to perform the tests:

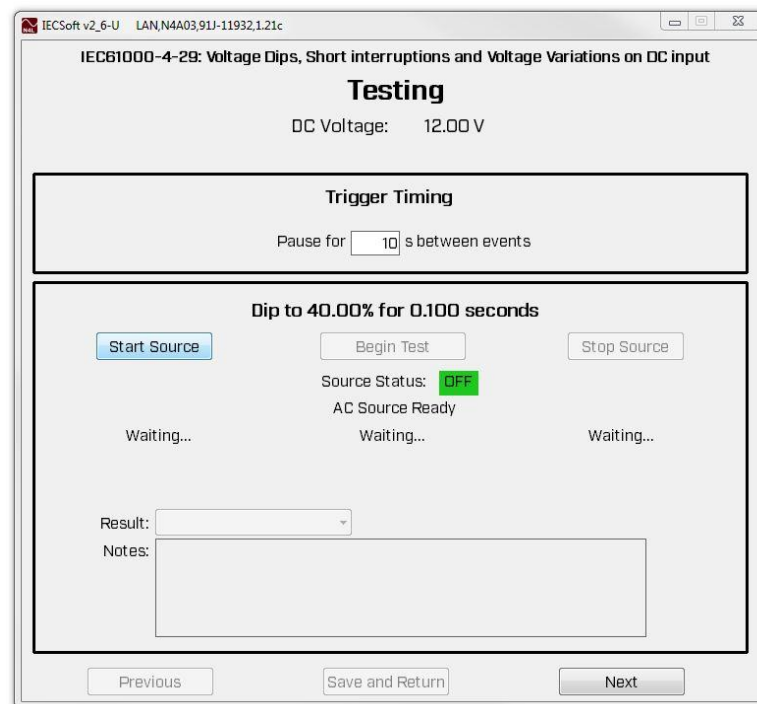
Each test is performed by clicking on the **Test Now** button against that test on the Schedule screen. The tests can be performed in any order using this method but it is necessary to return to the Schedule screen after each test to select the next test to be performed.

The second option is to select the "**Next**" button in the Testing window (described in more detail later) at the end of each test to select the next test in the list and perform that test without returning to the Schedule screen.

There is no "auto test" function to automatically perform all of the tests in one sequence.

Click on **Test Now**:

The Testing window appears.



Details of the test settings and the selected DC Voltage are displayed in the test window.

The Source status is also displayed. The messages confirm that the software is connected to the Source and that the Source is ready but that the Output is switched **OFF**. The status is shaded green to make it clear that the Source Output is switched off and that the EUT is not powered up.

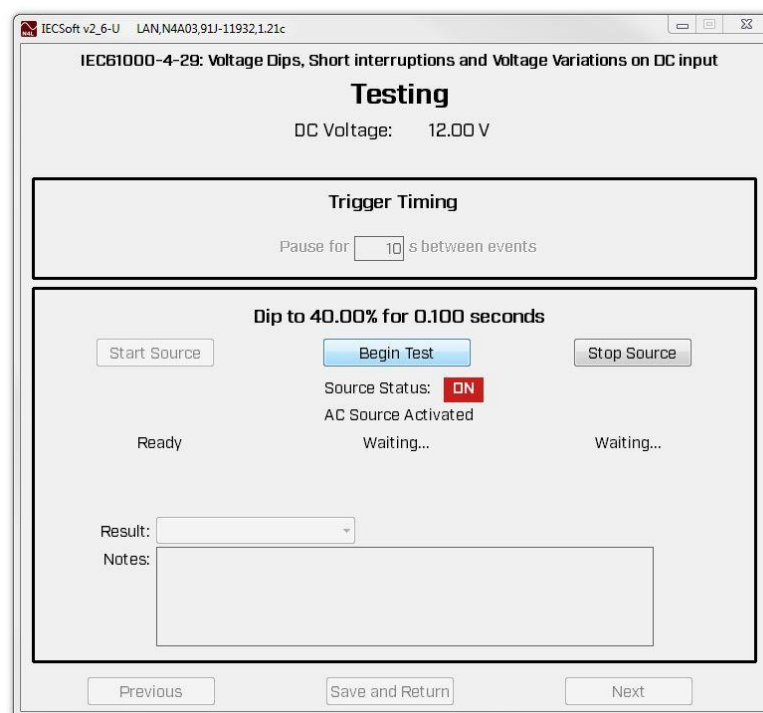
Trigger Timing

There is a pause between the tests (events). The software applies a default period of 10 Seconds. This is the minimum period allowed but this can be increased by the user before running the tests.

Click **Start Test** to continue:

The Start Source button is no longer available but the Begin Test and Stop Source buttons are now available.

The source Status is now updated to confirm that the source Output is now switched **ON**. It is shaded red to warn the user that the Source output is now **ON** and that power is applied to the EUT.



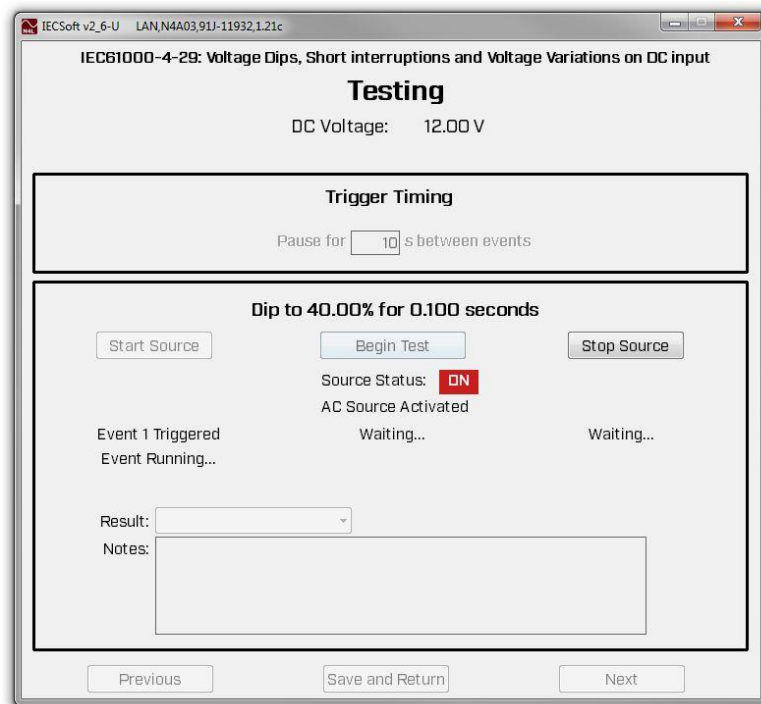
There are 3 parts to the test. Part one is now displaying "Ready" whilst parts 2 and 3 are still displaying "Waiting" messages.

Note:

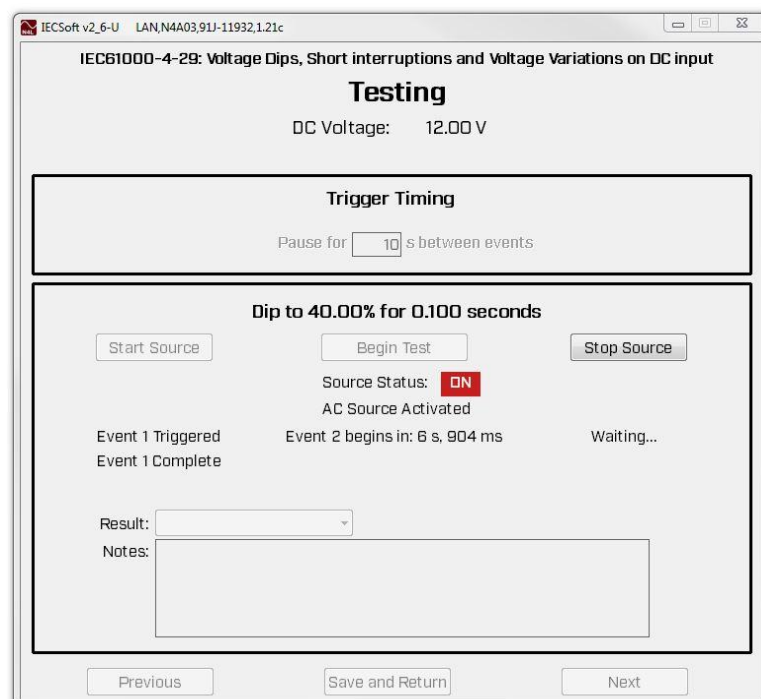
The AC Source output can be switched off at any time by clicking on **Stop Source**. This will immediately switch off the Source output removing power to the EUT. The Source Status message will change to OFF shaded green.

Click on **Begin Test** when ready to start the test running.

Test (event) 1 will immediately be triggered and then start running after a few seconds.



Once test 1 is complete the Trigger Time delay is implemented before Test 2 begins. There is a timer in the software window which displays the remaining time before testing continues.



The same process is implemented after Test 2 finishes and before Test 3 begins. The Counter moves from Test (event) 2 to Test (event) 3.

IECSoft v2.6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input

Testing

DC Voltage: 12.00 V

Trigger Timing

Pause for s between events

Dip to 40.00% for 0.100 seconds

Start Source Begin Test Stop Source

Source Status: **ON**

AC Source Activated

Event 1 Triggered Event 2 Triggered Event 3 begins in: 8 s, 804 ms

Event 1 Complete Event 2 Complete

Result:

Notes:

Previous Save and Return Next

On completion of test 3 the Testing window displays tests (events) 1 to 3 are all complete.

IECSoft v2.6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input

Testing

DC Voltage: 12.00 V

Trigger Timing

Pause for s between events

Dip to 40.00% for 0.100 seconds

Start Source Begin Test Stop Source

Source Status: **OFF**

AC Source waiting to be Deactivated

Event 1 Triggered Event 2 Triggered Event 3 Triggered

Event 1 Complete Event 2 Complete Event 3 Complete

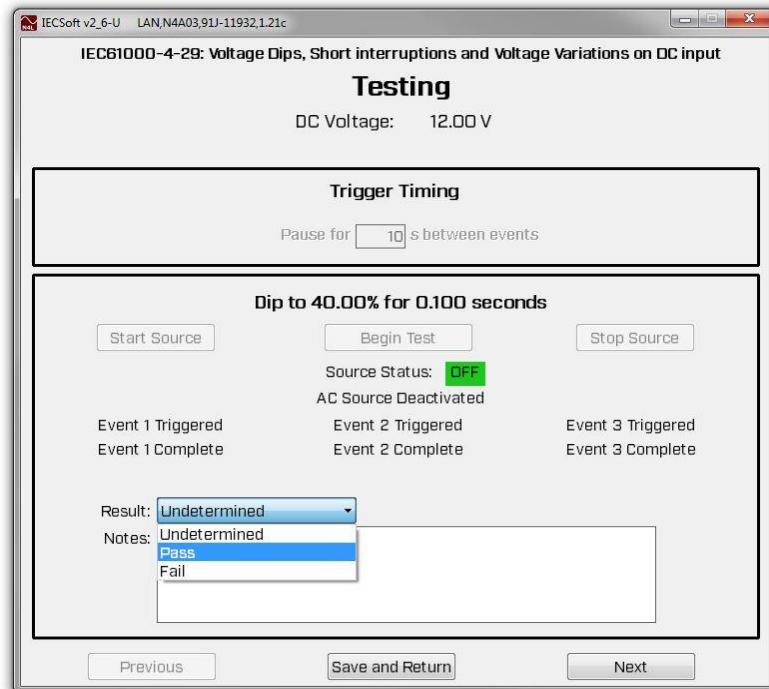
Result:

Notes:

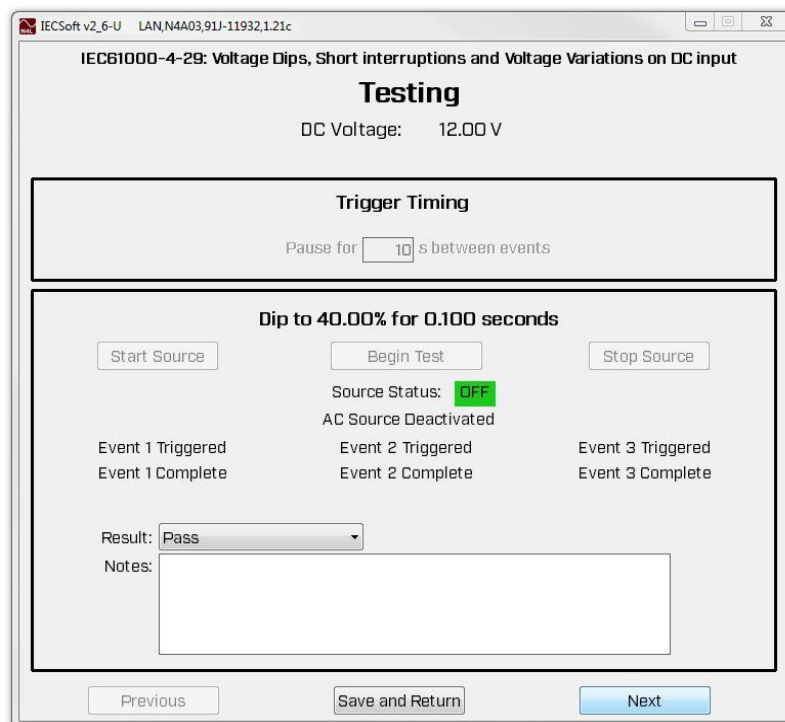
Previous Save and Return Next

Click on **Stop Source** to switch **OFF** the source output.

The Source Status will now be displaying **OFF**. Having observed the EUT whilst the test was running, the user should click on the drop down menu and select one of the 3 options.



The selected option is displayed in the testing window.



Click on "**Next**" to display the next test that was listed on the Test Schedule window or Click on "**Save & return**" to return to the Schedule window.

Example Schedule Window:

IECSoft v2_6-U LAN,N4A03,91J-11932,1.21c

IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input

Schedule

DC Voltage: 12.00 V

Test	Status	Buttons
Voltage Dips		
40.00% during 0.100 s	Complete	Review, Reset
70.00% during 0.300 s	Complete	Review, Reset
70.00% during 1.000 s	Pending...	Test Now
40.00% during 0.300 s	Pending...	Test Now
Voltage Interruptions		
0.00% during 0.300 s	Complete	Review, Reset
0.00% during 1.000 s	Pending...	Test Now
0.00% during 0.100 s	Pending...	Test Now
Voltage Variations		
85.00% to 120.00% over 0.100 s	Complete	Review, Reset
85.00% to 120.00% over 3.000 s	Pending...	Test Now
85.00% to 120.00% over 10.000 s	Pending...	Test Now

Save and Export Back

In this example some tests have not yet been performed. These tests are given a "Pending" Status.

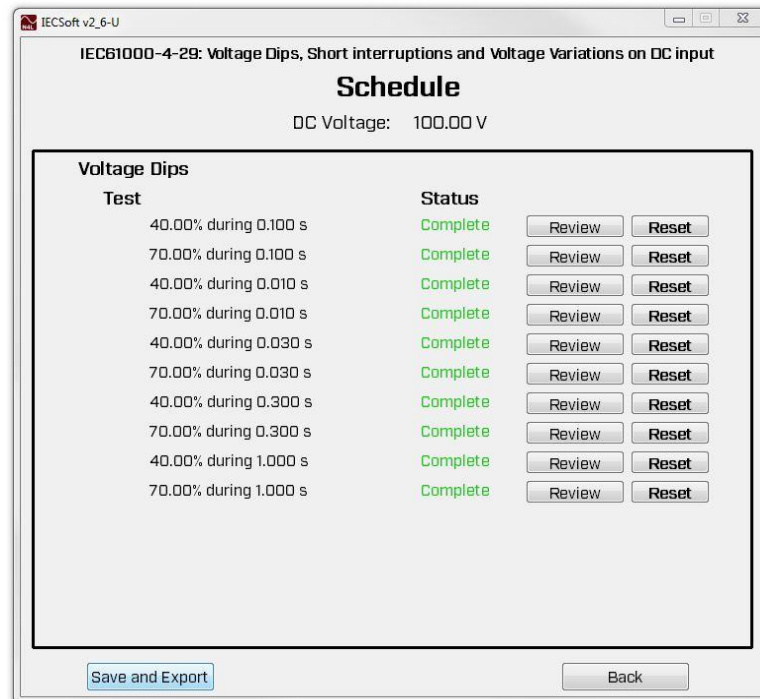
The Status of completed tests changes to "Complete". The Test Now button is changed to a Review button and a Reset button is added to all completed tests.

Clicking on the **Review** button displays the Testing window for that test. The results can be reviewed and the Result changed using the drop down menu if considered appropriate.

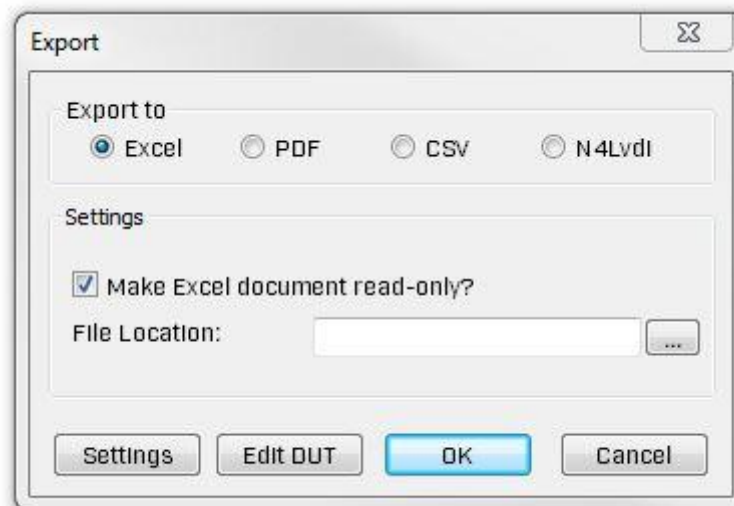
Clicking on the **Reset** button changes the Status back to Pending and the Review button is renamed "Test Now" allowing the test to be repeated if required?

7.4 Saving / Exporting test data.

Click on **Save and Export** to display the export file options.



Clicking on the Export button opens the Export window.



For IEC61000-4-29 mode Excel & PDF reports can be created. The results can be exported to ".csv" and ".n4lvdi" files.

Section 9 in this manual provides full details of the IECSoft software Export function.

Example Excel Report front page.

Click to add header

12th August 2019 - 13:06:56		Page 1/11	IECSoft v2_6
 IEC61000-4-29:2001 Voltage Dips, Short interruptions and Voltage variations on DC input power 			
Source Details			
Source Model	N4A03		
Source Serial	91J-11932		
Source Firmware	1.29		
Equipment Under Test			
Brand	N4L		
Model	Z100		
Serial	P1234		
Impedance Network ID	IMP001		
Rated Voltage	230.000V		
Rated Current	5.000A		
Rated Frequency	50.000Hz		
Rated Power	1.000kW		
Additional Test Details			
Operator	KAR		
Lab Name	N4L		
Location	LAB1		
Notes	IEC61000-4-29 DIP test		
Signature			

Example Excel Report Individual test page.

Click to add header

12th August 2019 - 13:06:56		Page 2/11	IECSoft v2_6
IEC61000-4-29: Voltage Dips, Short interruptions and Voltage Variations on DC input			
Instrument Details			
Source Model	N4A03		
Source Serial	91J-11932		
Source Firmware	1.29		
Equipment Under Test			
Brand	N4L		
Model	Z100		
Serial	P1234		
Test Results 1/10			
DC Voltage	10.000V		
Test Type	Dip		
Test Level	40.00%		
Duration	0.100 s		
Test Notes			
Test Results	Undetermined		

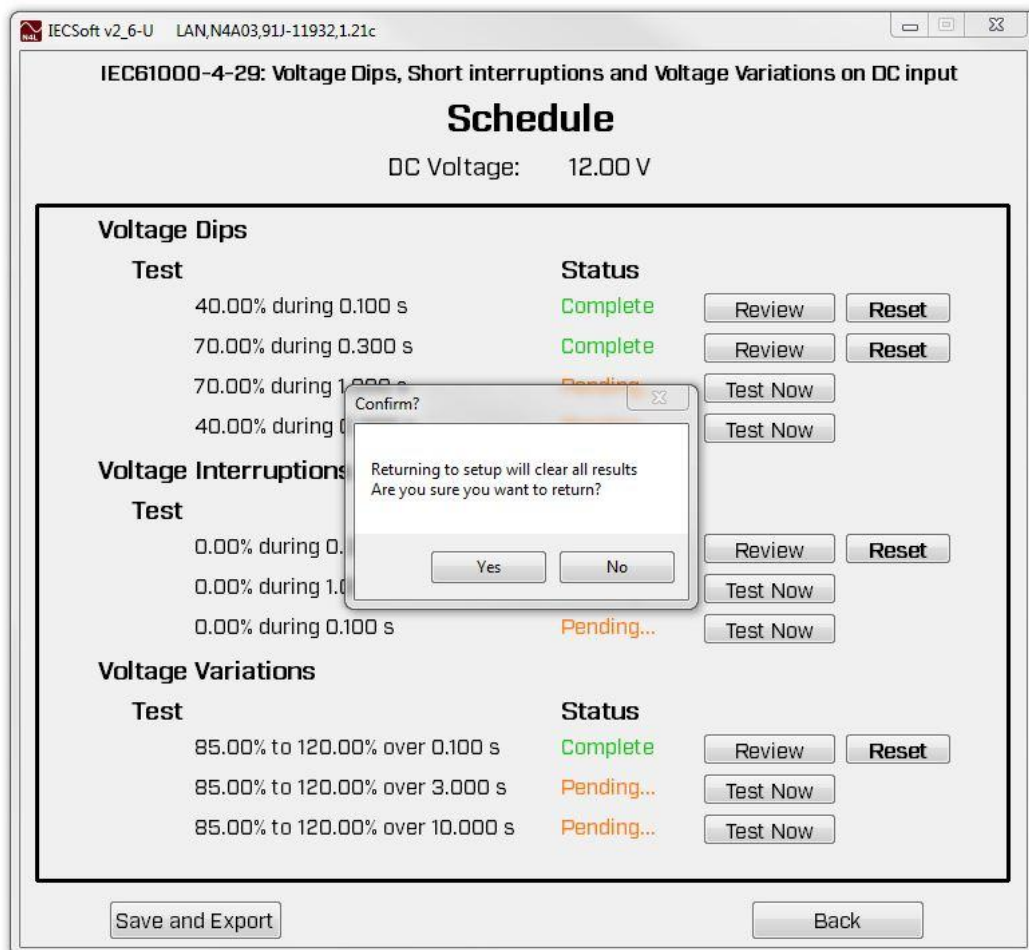
Example PDF Report.

12th August 2019 - 13:06:56 Page 1/10 IECSoft v2_6	
IEC61000-4-29:2001 Voltage Dips, Short interruptions and Voltage variations on DC input power port	
AC Source Impedance Network ID EUT Details User Rated Voltage User Rated Current User Rated Frequency User Rated Power Operator Lab Name Location Notes DC Voltage Test Type Test Level Duration Test Notes	Instrumentation Details Newtons4th N4A03 SN: 91J-11932 Firmware: v1.29 IMP001 Brand: N4L Model: Z100 Serial: P1234 230.000V 5.000A 50.000Hz 1.000kW Operating Conditions KAR N4L LAB1 IEC61000-4-29 DIP test Test Configuration 10.000V Dip 40% 100 ms
Signature	
Results	Undetermined

7.5 Using the Back Button

The back button should only be used when returning to the Setup menu to re-enter setting because any stored test data will be lost.

A message will appear reminding you that continuing will delete all save tests. Clicking **"Yes"** to continue will return you to the Setup dialog box.



8 IEC61000-4-34

Voltage Dips, Interruption and Immunity Testing >16A

This section explains how to use the IECSoft test software along with a N4A Source to perform Voltage Dips, Interruption and Immunity tests to the requirements defined in IEC61000-4-34.

8.1 Scope

The object of these tests is to evaluate the immunity of electrical and electronic equipment when subjected to voltage dips, short interruptions and voltage variations.

Whilst the tests are being performed the Equipment Under Test (EUT) should be under constant observation. There should be no malfunction of the EUT during any of the tests.

On completion of each test the software will ask for the result of the test to be entered. The result entered is determined by the observation of the behaviour of the EUT during the test.

Observation of the loss of function or degradation of performance of the EUT during the tests is used to determine the classification. The definitions of acceptable performance and a malfunction should be agreed between the laboratory performing the tests and the manufacturers / purchasers of the EUT. More details on Classifications can be found in section 9 of the IEC61000-4-34 Standard document.

8.2 Test Description

The EUT (Equipment under test) is initially operated at a steady supply voltage (this can be 50Hz or 60Hz) and is then subjected to voltage dips, short interruptions and voltage variations.

There are 3 test classes detailed in Annex B of the Standard.

Class 1 allows the user to create a sequence of up to 9 individual Dip, Interruption and Variation tests. The test level and duration needs to be entered.

Class 2 and Class 3 each contain a predetermined set of Dip and interruption tests.

Table 1 in the Standard details the test levels and durations for Voltage Dips that apply to all classes.

Note: for Class 3 there is an additional option in the test window called Class 3(50%). See "note d" in Table 1 of the Standard for details of this option

Table 2 in the Standard details the test levels and durations for Short Interruptions that apply to all classes.

Table 3 in the Standard details the Voltage Variations that are optional.

To comply with the requirements of the Standard, each Test (event) must be repeated three times with a minimum interval between each event of 10 seconds.

Having observed the behaviour of the EUT during the test the User should select the appropriate result from the drop down menu.

Class X. For certain EUT's the product committee can also define the levels for a Class X. Should a Class X text need to be performed the User should use Class 1 in the software. This is because for class 1 ANY combination of test level and duration can be selected.

8.3 Single Phase Test Description

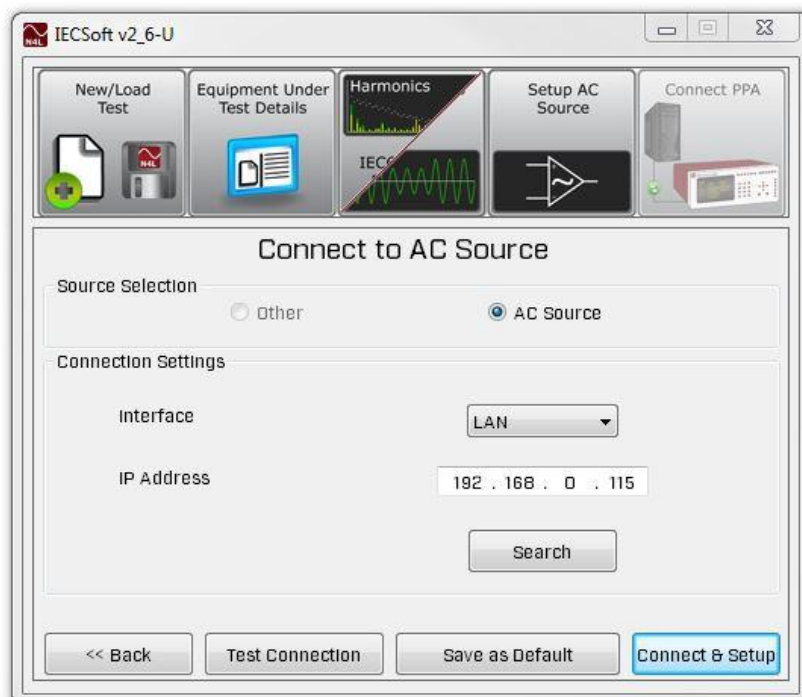
Open the software and step through the dialog screens. In the Test Setup dialog click on category and select HC EMC (Immunity Testing) from the drop down menu.



The Test setup screen will then display the various EMC tests that can be performed.



Click on the IEC61000-4-34 Voltage Dips, Interruption and Immunity testing option.



The Connect to AC Source Dialog is then displayed. Check the Interface settings and then click on “**Connect & Setup**”

The Test Overview dialog is displayed with default information:

The screenshot shows a software window titled "IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A". The window has a standard Windows-style title bar with the text "IECSoft v2_6-U LAN,N4A03,91J-11932,1.20" and window control buttons. The main content area is titled "Test Overview" and is divided into two columns. The left column, "Test Sequence Settings", contains "Sequence Details" (Number of Configurations: 1, Sequence Class: 2, Class test sequences: 3, Total test sequences: 3) and "Test Details:" (Voltage Dips: 0.00% during 1.0 cycles, 70.00% during 25.0 cycles; Voltage Interruptions: 0.00% during 250.0 cycles). The right column, "Configurations", shows "Configuration: 1 / 1" with navigation arrows, "Nominal Voltage (UT): 230.00 V", "Frequency: 50.00 Hz", "EUT Details:" (EUT Type, Input port tested, Operation mode, Connection, Cables, Peripherals, Test Setup Notes, all N/A), and "General Notes:". At the bottom are four buttons: "Start testing", "Configure", "Clear", and "Close".

Test Sequence Settings		Configurations	
Sequence Details		Configuration: 1 / 1	
Number of Configurations:	1	Nominal Voltage (UT):	230.00 V
Sequence Class:	2	Frequency:	50.00 Hz
Class test sequences:	3	EUT Details:	
Total test sequences:	3	EUT Type:	N/A
Test Details:		Input port tested:	N/A
Voltage Dips		Operation mode:	N/A
0.00% during 1.0 cycles		Connection:	N/A
70.00% during 25.0 cycles		Cables:	N/A
Voltage Interruptions		Peripherals:	N/A
0.00% during 250.0 cycles		Test Setup Notes:	
		General Notes:	

Click on "**Configure**" to display the Add / Edit Configuration dialog box.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Add/Edit Configuration

Prev Configuration: 1 / 1 Add

Configure details

Nominal Voltage (UT): 230.00 V Frequency: 50 Hz

EUT Details

Sequence Class: ☐ Class 1 ☒ Class 2 ☐ Class 3 (40%) ☐ Class 3 (50%)

seq3 Add Edit Remove

EUT Type: N/A EUT input port tested: N/A

EUT operation mode: N/A Connections: N/A

Cables: N/A Peripherals: N/A

Test Setup Notes: General Notes:

Save and Return Remove

Test configurations can be added, edited or deleted.

The software displays the 4 types of Test configuration defined in IEC61000-4-34. These are Class 1, Class 2, Class 3(40%) and Class 3(50%).

Class 1 allows the user to create a sequence of up to 9 individual Dip, Interrupt and Variation tests. The test level and duration needs to be entered. This is described in more detail later in this document.

Class 2 and Class 3 each contain a predetermined set of Dip and interrupt tests. The tests included for each Class are defined in IEC61000-4-34. They are displayed in the Test Overview dialog which is described in more detail later in this document.

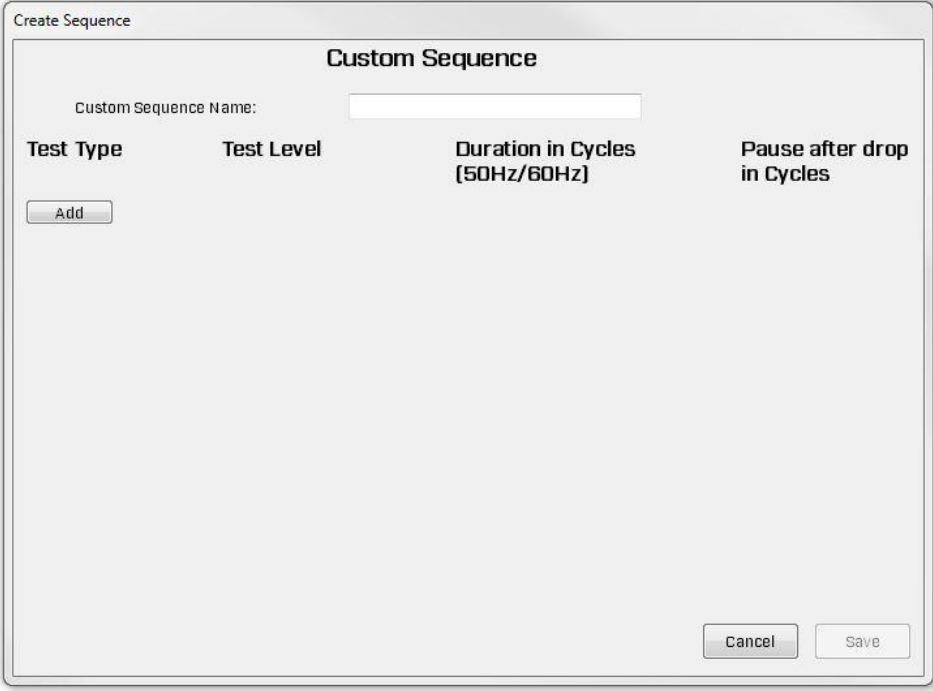
Voltage variations are detailed in table 3 in the Standard. These tests are optional and are therefore only selectable when performing a Class 1 test.

Any number of configurations can be added including more than 1 example of each Class. Each configuration can have a separate Nominal Voltage and Frequency. Test setup details and Notes can be added but these will be common to all configurations.

To create a Class 2 or Class 3 configuration select the Class type under EUT Details. Enter the Nominal Voltage and Frequency and enter or update any of the test details if required. Click on "**Add**" in the top right hand corner of the dialog box to save the current configuration, and add and display the next configuration.

The configuration details near the top of the dialog box will be updated.

To create a **Sequence** configuration select Class 1 under EUT details. Then click on "**Add**" under EUT details. A Create Custom Sequence window opens:



The image shows a 'Create Sequence' dialog box. At the top, it says 'Create Sequence' and 'Custom Sequence'. Below this is a text field for 'Custom Sequence Name:'. Underneath, there are four columns: 'Test Type', 'Test Level', 'Duration in Cycles (50Hz/60Hz)', and 'Pause after drop in Cycles'. An 'Add' button is located under the 'Test Type' column. At the bottom right, there are 'Cancel' and 'Save' buttons.

Enter a name for sequence.

Click on "**Add**"

The screenshot shows a 'Create Sequence' dialog box with a 'Custom Sequence' section. The 'Custom Sequence Name' is 'Sequence 1'. The 'Test Type' is 'Dip', 'Test Level' is '50.00 %', and 'Duration in Cycles (50Hz/60Hz)' is '10.0 / 12.0'. The 'Auto Ratio' checkbox is checked, and 'Pause after drop in Cycles' is '0.0'. There are 'Add' and 'Remove' buttons for the test type, and 'Cancel' and 'Save' buttons at the bottom right.

Test Type	Test Level	Duration in Cycles (50Hz/60Hz)	Pause after drop in Cycles
Dip	50.00 %	10.0 / 12.0	0.0

The first test will be displayed.

Under Test Type select the type of Dip, Interrupt or Variation from the drop down menu.

Voltage Dips

Enter the required test Level. This is the percentage change that the voltage will "Dip" to whilst the test is running. For example, with a nominal voltage of 100V and a Test level of 75% is entered, the voltage would drop to 75V or 75% of the nominal voltage.

Enter the duration in cycles. The voltage "Dip" will be applied for this number of cycles. A value can be entered individually for 50Hz and 60Hz tests. Alternatively if the Auto Ratio box is selected when a value is entered for 50Hz the duration of the same ratio is automatically calculated and entered for 60Hz. If a value is entered for 60Hz first then the value for 50Hz will be calculated and entered into the window.

Voltage Interruptions

The voltage test level for interruptions should be 0%. The software defaults to this level when interruptions are selected.

Enter the duration in cycles. Refer to Voltage Dips above for full details on selecting the duration.

Voltage Variations

Enter the test levels. The preferred settings detailed in table 3 of the Standard are 70% to 100%.

Enter the duration in cycles. The preferred duration in table 3 is 25 cycles at 50Hz and 30 cycles at 60Hz. For voltage variations this is the time for the voltage to increase from the lower test level to the higher test level.

Enter the “pause after drop in cycles”. This is the time interval that the voltage remains at the low (reduced) test level before starting to return to the higher test level. The preferred value stated in table 3 of the Standard is 1 cycle. The software automatically defaults to 1 cycle when a variation test type is selected.

Note: Table 3 states that the product committee can define their own test levels, duration and pause after the abrupt drop in voltage. Therefore, the user is able to adjust any of these settings in the software if required.

Click on “**Add**” to add a new test to the sequence. The tests can be deleted by clicking on “**Remove**”.

The maximum number of tests in each sequence is 9. Once this figure is reached the option to “**Add**” a test is no longer displayed.

Create Sequence

Custom Sequence

Custom Sequence Name:

Test Type	Test Level	Duration in Cycles (50Hz/60Hz)	Pause after drop in Cycles
Dip	0.00 %	10.0 / 12.0 ☒ Auto Ratio	0.0
Dip	50.00 %	40.0 / 48.0 ☒ Auto Ratio	0.0
Interrupt	0.00 %	10.0 / 12.0 ☐ Auto Ratio	0.0
Variation	50.00 % to 100.00 %	10.0 / 12.0 ☒ Auto Ratio	1.0
Variation	75.00 % to 100.00 %	20.0 / 24.0 ☒ Auto Ratio	1.0
Dip	50.00 %	10.0 / 12.0 ☒ Auto Ratio	0.0
Interrupt	0.00 %	30.0 / 36.0 ☒ Auto Ratio	0.0
Dip	50.00 %	100.0 / 120.0 ☒ Auto Ratio	0.0
Variation	60.00 % to 100.00 %	50.0 / 60.0 ☒ Auto Ratio	1.0

When the required number of tests have been entered click on **"Save"**.

This returns the user to the Add / Edit Configuration dialog which will have been updated to include the new configurations selected above.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Add/Edit Configuration

Configuration: 4 / 4

Configure details

Nominal Voltage (UT): V Frequency:

EUT Details

Sequence Class: ☒ Class 1 ☐ Class 2 ☐ Class 3 (40%) ☐ Class 3 (50%)

EUT Type: EUT input port tested:

EUT operation mode: Connections:

Cables: Peripherals:

Test Setup Notes:

General Notes:

To enter another sequence click on "**Add**" under EUT details and follow the above procedure to create another sequence.

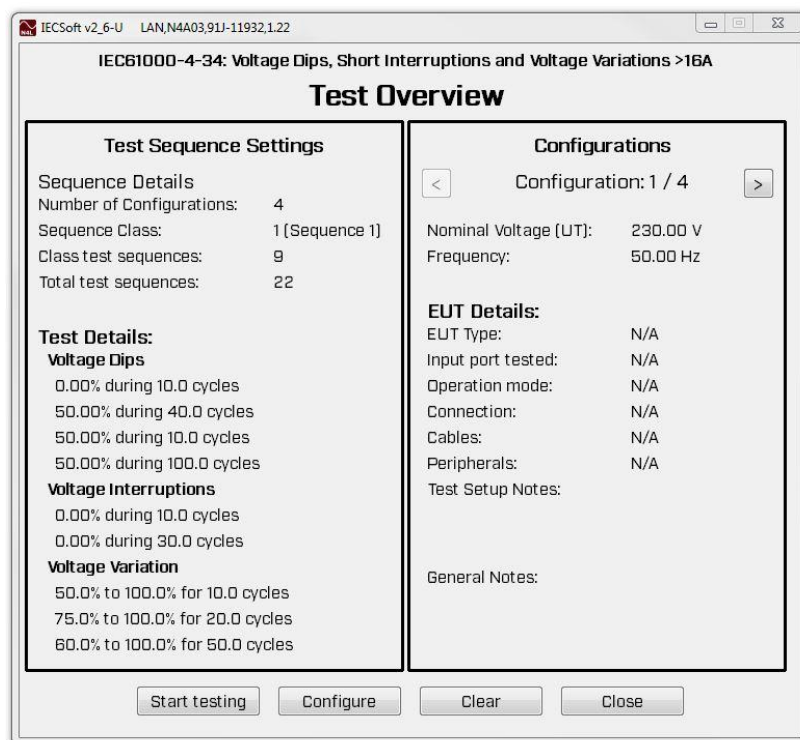
To include a custom sequence in a Configuration, click on Class 1 under EUT details. Click on the drop down menu under Class 1 and select the required sequence.

Once you have added configurations it is possible to step through the sequence of configurations. If you click on the "**Prev**" button in the top left hand corner the "**Add**" button in the top right hand corner will change to "**Next**". You can step through the Configurations using these two buttons.

Note: The "Add / Next" button changes to "**Add**" when the highest Configuration is being displayed but changes back to "**Next**" when any other configuration is displayed.

If the "**Remove**" button is pressed the displayed Configuration is deleted and the total number of Configurations displayed near the top of the dialog box is reduced by one.

Once the desired number of Test configurations has been entered click the "**Save and Return**" button. The test Overview dialog box appears:



The Test Overview dialog box lists the individual tests to be performed for the displayed Configuration. The configuration displayed is adjusted using the < > arrow keys in the top right hand corner of the dialog box.

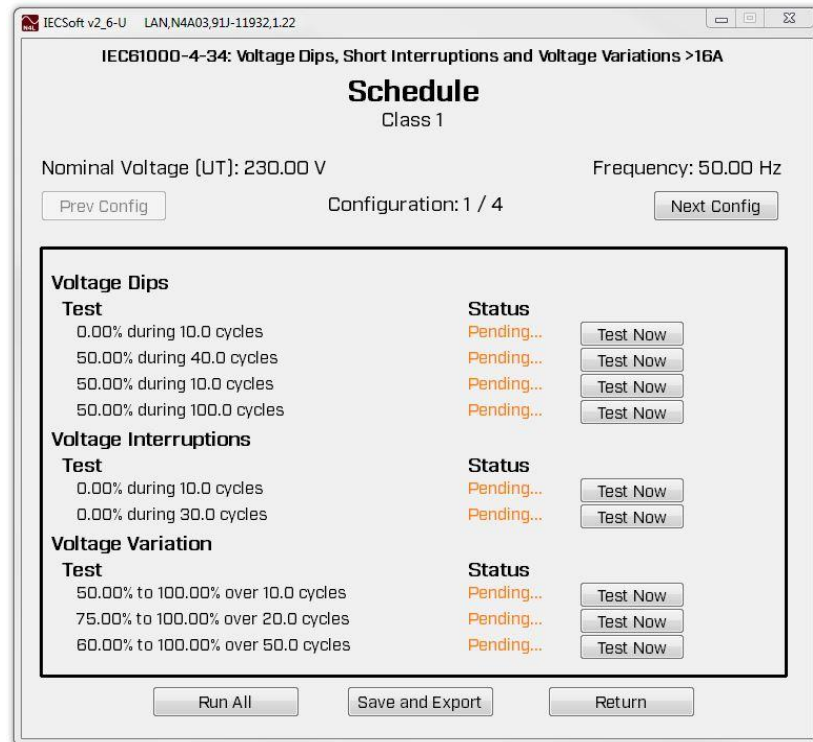
The test sequence details are displayed along with the EUT details and any notes entered previously. When a different Configuration is selected the test details will be updated to represent the new configuration.

Click on “**Configure**” to return to the previous screen to update the Test Configurations.

Click on “**Clear**” to display the default setting which will clear any saved Configurations.

Click on “**Close**” to close the window and return to the “Connect to AC Source” dialog box.

Click on "**Start Testing**" to proceed with the tests:



The Schedule dialog box is displayed. This lists the individual DIP, Interruption and Variation tests to be performed for the selected test configuration along with detail of each test.

The "**Next Config**" & "**Prev Config**" buttons can be used to select which configuration is displayed in the dialog box.

The Status is shown for each of the individual tests. PENDING against a test indicates that that test has not yet been performed. The status will change to COMPLETE once that test has been performed.

The tests are executed one at a time by clicking on "**Test Now**" against each test. Once one test is complete another test is started by clicking on "**Test Now**" against that test. The test can be executed in any order.

Alternatively all tests can be performed one after the other by clicking on the "**Run All**" button which is described in more detail later in this document.

8.3.1 Individual testing:

Clicking on “**Test Now**” opens the Test Sequence dialog box.

The screenshot shows a software window titled "IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A". The main heading is "Test Sequence". Below this, it displays "Configuration: 1 / 4", "Nominal Voltage (UT): 230.00 V", and "Frequency: 50.00 Hz".

The "Event Timing" section contains two input fields: "Pause for 10 s between events" and "Pause for 10 s between phases".

The "Class 1 - Sequence 1 / 9: Dip 0.00% for 10.0 cycles" section includes three buttons: "Start Source", "Run Sequence", and "Stop Source". Below these buttons, the "AC Source" status is shown as "OFF" in a green box.

At the bottom of this section, there is a "Result:" dropdown menu set to "Undetermined" and a "Notes:" text area.

The bottom of the dialog box features three navigation buttons: "Previous", "Save and Return", and "Next".

The Source Status is displayed. This will be displaying **OFF** and shaded green so that the User will know that the Source output is not enabled and the EUT does not have power applied.

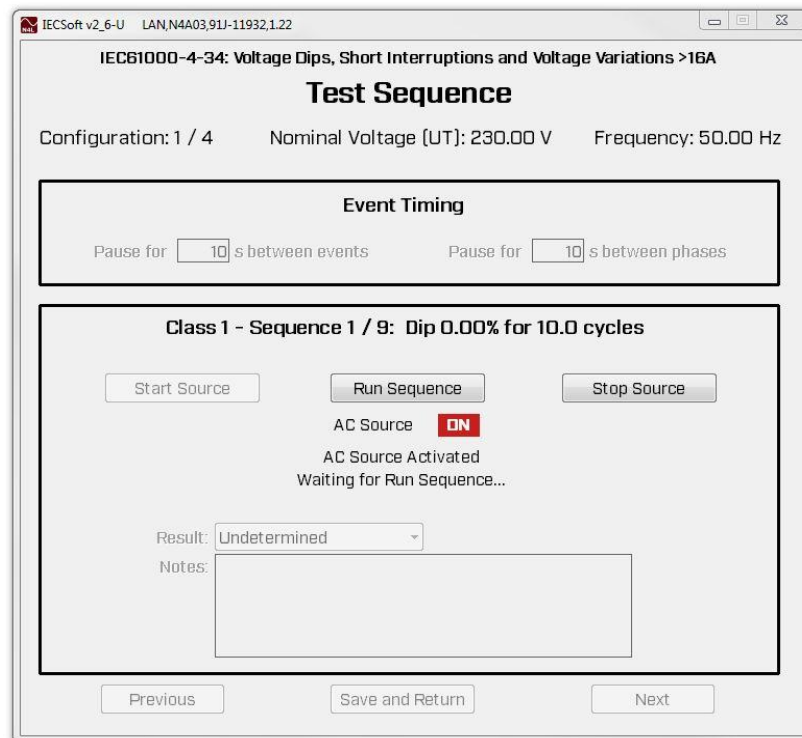
The selected nominal voltage and frequency are displayed along with the Configuration number of the test being performed.

Details of the individual test are also displayed. This information includes the Class type, the DIP / Interrupt percentage figure and the number of Cycles.

The user can enter a value for “Pause between Events”. The value entered will determine how long the AC source output remains on for before the test starts and after the test is completed. A default value of 10 seconds applies which is the minimum period stated in the Standard document.

The "Pause between Phases" option does not apply for single phase testing so is greyed out and can't be selected in the test window.

Clicking on "**Start Source**" enables the "Run Sequence" and "Stop Source" buttons and disables the "Start Source" button.



The Start Source button is now greyed out and can't be selected. The Source Status now displays **ON** indicating that the Source Output is enabled. It is also highlighted with a red background to warn the User that the EUT is now powered up.

The output of the AC Source will remain **ON until the Stop Source button is pressed. It will NOT be switched off on completion of the test.**

The AC Source can be switched OFF at any time by clicking on the STOP SOURCE button.

The Test status message also indicates that the source Output is activated and that the software is waiting to be told to start the event (test).

Click on **“Run Sequence”** to start the test running:

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 1 / 9: Dip 0.00% for 10.0 cycles

AC Source **ON**

AC Source Activated
Waiting for next Event
Time until Event 1 starts: 4 s, 889 ms

Result:

Notes:

To comply with the requirements of the Standard, each Test (event) must be repeated three times. This can be seen in the Test status message which is constantly updated with the event being performed or the time until the next event begins.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.22

IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 1 / 9: Dip 0.00% for 10.0 cycles

AC Source **ON**

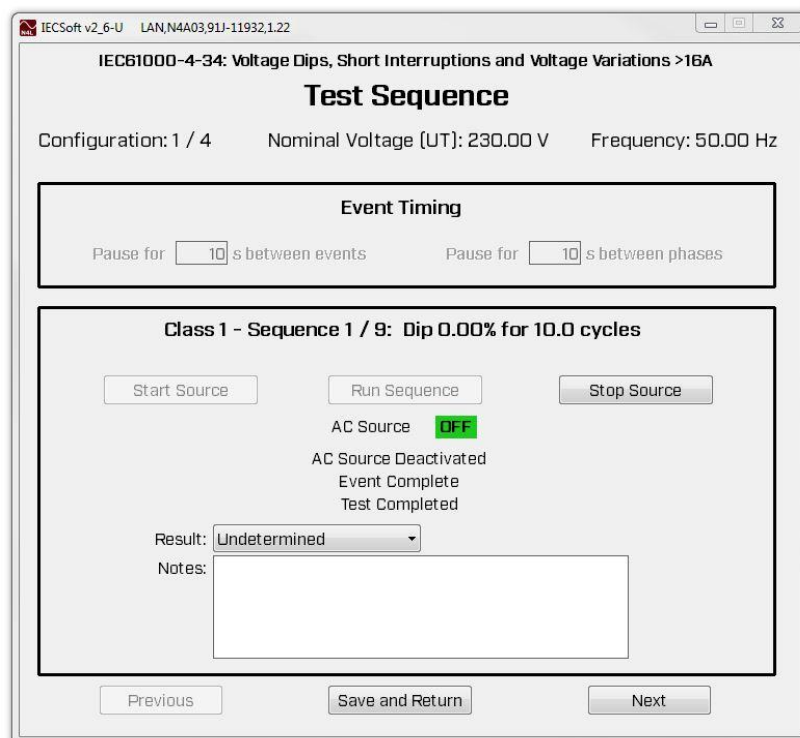
AC Source Activated
Event Complete

Result:

Notes:

At the end of the test the status message will confirm that the event (3 tests) is complete. The status message and warning Icon will both indicate that the source output is still **ON**.

Click on "**Stop Source**" to switch **OFF** the AC Source output.



The AC Source warning Icon now changes to **OFF** with a green background to indicate that the Source Output is now off and the EUT should be safe to handle.

The Status message also indicates that the AC Source is now deactivated along with details of the test.

The result of the test can be entered along with tests notes.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 1 / 9: Dip 0.00% for 10.0 cycles

AC Source **OFF**

AC Source Deactivated

Event Complete

Test Completed

Result: **Undetermined**

Notes: **Undetermined**

Pass

Fail

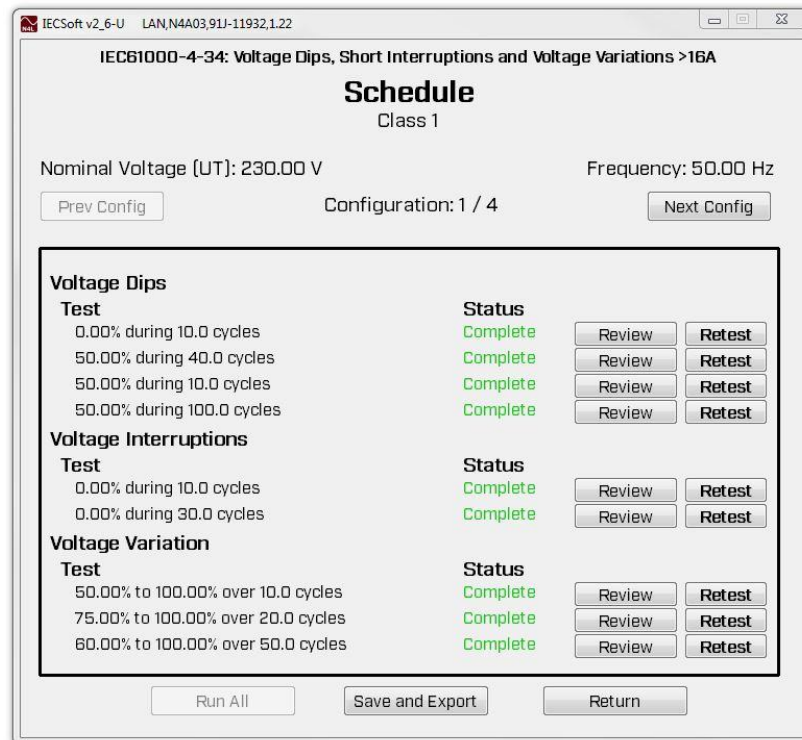
The result of the test can be selected from the list of options in the drop down menu: Pass, Fail or Undetermined. There is also a space to enter any notes about this particular test.

The “**Next**” and “**Previous**” buttons can be used to step through the Test Sequences to allow another test to be selected. The above procedure is then repeated to perform another test.

The buttons also allow the status of each Test Sequence to be confirmed.

The user can return to the Schedule window at any time by clicking on “**Save and Return**”.

When each test is completed the Status in the Schedule dialog box changes to Complete. The “Test Now” button is changed to “Review” and an extra “Retest” button appears.



Clicking on “**Review**” displays the Test Sequence dialog box for that test. Clicking on “**Retest**” will change the Status for that test back to “Pending”. The “Review” button will be replaced by a “Test Now” button which can be used to repeat the test.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Schedule

Class 1

Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Prev Config Configuration: 1 / 4 Next Config

Test	Status	
0.00% during 10.0 cycles	Pending...	Test Now
50.00% during 40.0 cycles	Complete	Review Retest
50.00% during 10.0 cycles	Complete	Review Retest
50.00% during 100.0 cycles	Complete	Review Retest

Voltage Interruptions

Test	Status	
0.00% during 10.0 cycles	Complete	Review Retest
0.00% during 30.0 cycles	Complete	Review Retest

Voltage Variation

Test	Status	
50.00% to 100.00% over 10.0 cycles	Complete	Review Retest
75.00% to 100.00% over 20.0 cycles	Complete	Review Retest
60.00% to 100.00% over 50.0 cycles	Complete	Review Retest

Run All Save and Export Return

The test can be repeated by clicking on the **"Return"** button at the bottom of the Schedule dialog box. A message will appear reminding you that continuing will delete all save tests. Clicking **"Yes"** to continue will return you to the Test Overview dialog box.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.22

IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Schedule

Class 1

Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Prev Config Configuration: 1 / 4 Next Config

Test	Status	
0.00% during 10.0 cycles	Pending...	Test Now
50.00% during 40.0 cycles	Complete	Review Retest
50.00% during 10.0 cycles	Complete	Review Retest
50.00% during 100.0 cycles	Complete	Review Retest

Voltage Interruptions

Test	Status	
0.00% during 10.0 cycles	Complete	Review Retest
0.00% during 30.0 cycles	Complete	Review Retest

Voltage Variation

Test	Status	
50.00% to 100.00% over 10.0 cycles	Complete	Review Retest
75.00% to 100.00% over 20.0 cycles	Complete	Review Retest
60.00% to 100.00% over 50.0 cycles	Complete	Review Retest

Run All Save and Export Return

Clear results

Returning to the Overview screen will clear any results. Would you like to return to Overview?

Yes No

8.3.2 Continuous “Run All” test mode:

IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Schedule
Class 1

Nominal Voltage [UT]: 230.00 V Frequency: 50.00 Hz

Prev Config Configuration: 1 / 4 Next Config

Test	Status	Action
0.00% during 10.0 cycles	Pending...	Test Now
50.00% during 40.0 cycles	Pending...	Test Now
50.00% during 10.0 cycles	Pending...	Test Now
50.00% during 100.0 cycles	Pending...	Test Now
Voltage Interruptions		
0.00% during 10.0 cycles	Pending...	Test Now
0.00% during 30.0 cycles	Pending...	Test Now
Voltage Variation		
50.00% to 100.00% over 10.0 cycles	Pending...	Test Now
75.00% to 100.00% over 20.0 cycles	Pending...	Test Now
60.00% to 100.00% over 50.0 cycles	Pending...	Test Now

Run All Save and Export Return

On the Schedule screen click on “**Run All**”. This will display the Run all Scheduled Tests settings window:

Run All Settings

Run All Scheduled Tests

Autorun Settings

Pause Between Events: 10 s

Pause Between Phases: 10 s

Pause Between Tests: 5 s

Sounds

☒ Event Start ☒ Event End ☒ Test End

☒ Sequence Change ☒ Configuration Change

Keyboard Controls:

P = PASS F = FAIL U = UNDETERMINED

Press TAB to edit the notes

Press the ENTER to go to the next Config, and ESC to end autorun

WARNING: Source will be active throughout all tests

Begin Cancel

AUTO RUN SETTINGS

The user can enter a value for "Pause between Events". The value entered will determine the time period between the AC source output being switched on and the test starting. It also determines when the AC Source output switches off after the test is completed. A default value of 10 seconds applies.

The "Pause between Phases" option does not apply for single phase testing so is greyed out and can't be selected in the single phase test window.

The "Pause between Tests" option means that it possible to adjust the delay period between a test finishing and the next test starting.

SOUNDS

It is possible to set sounds that will be triggered when Events and Tests start or finish. Each option selected will have a different sound to the others selected.

KEYPAD CONTROLS and MESSAGES

Details of the keypad control features are displayed along with messages.

NOTE:

The message warns the user that the AC Source Output will remain ON for the full duration of the Auto Run tests and will remain ON after the tests are completed until switched off by the user.

Click on "**Begin**" to Run All tests.

The software will now run through all of the tests for each sequence for the selected configuration.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 1 / 9: Dip 0.00% for 10.0 cycles

Start Source Stop Source

AC Source **ON**

AC Source Activated
Waiting for next Event
Time until Event 2 starts: 4 s, 802 ms

Result:

Notes:

Previous Save and Return Next

The Test Sequence screen is displayed. The software will then step through all of the tests included in each of the Sequences. All tests will be repeated 3 times as per the requirements.

The warning Icon will indicate that the Source Output is ON and the EUT powered up.

IECSoft v2_6-U LAN,N4A03,91J-11932,1.22

IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 1 / 9: Dip 0.00% for 10.0 cycles

Start Source Stop Source

AC Source **ON**

AC Source Activated
Event Complete
Time until sequence changes: 3 s, 901 ms

Result:

Notes:

Previous Save and Return Next

The test status message will be continuously updated with details of the Configuration or Sequence being performed.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 9 / 9: Variation 60.00% to 100.00% for 50.0 cycles

Start Source Stop Source

AC Source **ON**

AC Source Activated

Event Complete

The next configuration is 230.0V at 50.0Hz

Result:

Notes:

Previous Save and Return Next

Once the test is completed Click on “**Stop Source**” to switch the Source Output **OFF**. When one configuration ends the “Enter” button can be used to move to the next configuration.

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IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations >16A

Test Sequence

Configuration: 1 / 4 Nominal Voltage (UT): 230.00 V Frequency: 50.00 Hz

Event Timing

Pause for s between events Pause for s between phases

Class 1 - Sequence 9 / 9: Variation 60.00% to 100.00% for 50.0 cycles

Start Source Run Sequence Stop Source

AC Source **OFF**

AC Source Deactivated

Event Complete

Test Completed

Result:

Notes:

Previous Save and Return Next

Click on "**Save and Return**" to return to the SCHEDULE display.

The results from each test can be reviewed and Re-tested if required.

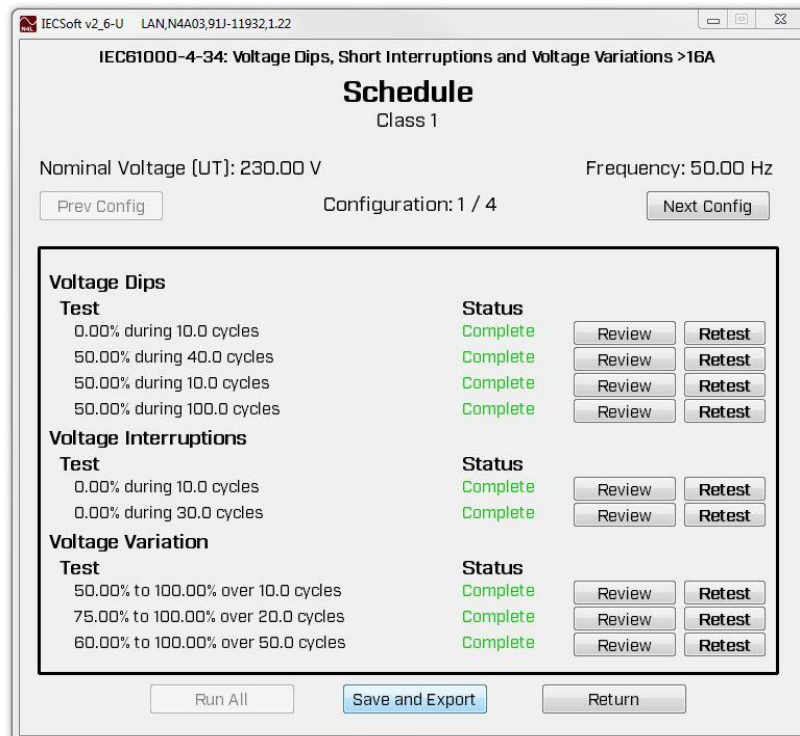
To continue testing click on "**Next Config**" in the top right hand corner of the test window. The details of the Next configuration are then displayed. To run all tests in the Configuration click on "**Run All**" or click on "**Test Now**" against any test to run that individual test.

NOTE:

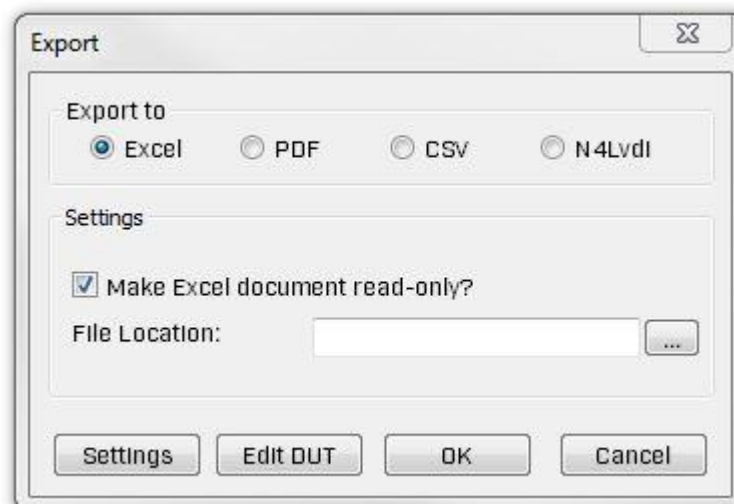
Always ensure that the AC SOURCE is switched OFF when testing is complete.

8.4 Saving / Exporting test data.

Click on “**Save and Export**” to display the Export window.



Clicking on the Export button opens the Export window.



For IEC61000-4-34 mode Excel & PDF reports can be created. The results can be exported to “.csv” and “.n4lvdi” files.

Section 9 in this manual provides full details of the IECSoft software Export function.

Example Excel Report front page.

Click to add header

13th August 2019 - 10:02:59		Page 1/10		IECSoft v2_6			
		IEC61000-4-34:2007 Voltage Dips, Short Interruptions, Voltage Variations >16A					
Source Details							
Source Model	N4A03						
Source Serial	91J-11932						
Source Firmware	1.29						
Equipment Under Test							
Brand	N4L						
Model	Z100						
Serial	P1234						
Impedance Network ID	IMP001						
Rated Voltage	230.000V						
Rated Current	5.000A						
Rated Frequency	50.000Hz						
Rated Power	1.000kW						
Additional Test Details							
Operator	KAR						
Lab Name	N4L						
Location	LAB1						
Notes	IEC61000-4-34 Class 1 test						
Signature							

Example Excel Report Configuration Page.

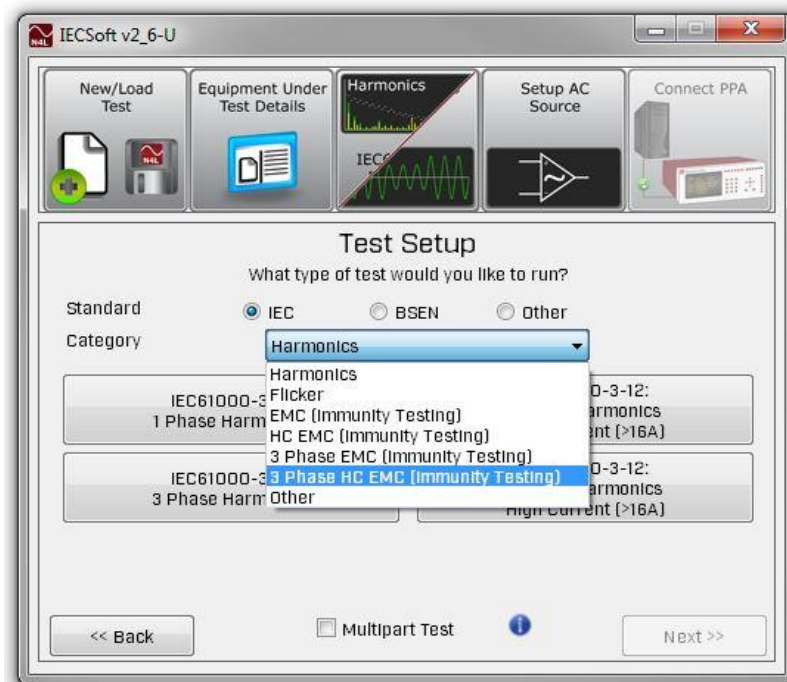
Click to add header

13th August 2019 - 10:02:59		Page 2/10	IECSoft v2_6
IEC61000-4-34: Voltage Dips, Short Interruptions and Voltage Variations (>16A)			
Instrument Details			
Source Model	N4A03		
Source Serial	91J-11932		
Source Firmware	1.29		
Equipment Under Test			
Brand	N4L		
Model	Z100		
Serial	P1234		
Equipment Under Test			
EUT Type	N/A		
Input Port	N/A		
Operating Mode	N/A		
Connections	N/A		
Cables	N/A		
Peripherals	N/A		
Setup Notes			
General Notes			
Configuration Settings			
Nominal Voltage (UT)	230.000V		
Frequency	50.000Hz		
Sequence Class	1		
Sequence Name	Sequence 1		
Test Results 1/9			
Test Type	Dip		
Test Level	0%		
Duration in cycles	10		
Test Notes			
Test Results	Undetermined		

Example PDF Report.

13th August 2019 - 10:02:59		Page 1/9	IECSoft v2_6
IEC61000-4-34:2007 Voltage Dips, Short Interruptions, Voltage Variations >16A			
Config 1 Sequence 1			
AC Source Impedance Network ID EUT Details User Rated Voltage User Rated Current User Rated Frequency User Rated Power EUT Type Operation Mode Input Port Connections Cables Peripherals Setup Notes General Notes Operator Lab Name Location Notes Class Nominal Voltage (UT) Frequency Test Type Test Level Test Duration Test Notes	Instrumentation Details Newtons4th N4A03 SN: 91J-11932 Firmware: v1.29 IMP001 Brand: N4L Model: Z100 Serial: P1234 230.000V 5.000A 50.000Hz 1.000kW N/A N/A N/A N/A N/A N/A Operating Conditions KAR N4L LAB1 IEC61000-4-34 Class 1 test Test Configuration 1 (Sequence 1) 230.000V 50.000Hz Dip 0% 10 cycles		
Signature			
Results	Undetermined		

8.5 3-phase test procedure



Open the software and step through the dialog screens. On the Test Setup dialog click on Category and select 3 Phase EMC (Immunity Testing) from the drop down menu.

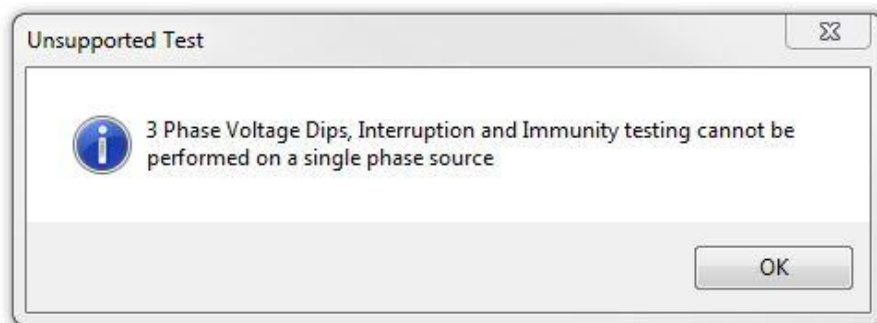


Click on the IEC61000-4-34 3 Phase Voltage Dips, Interruption and Immunity testing option.

Follow the on screen instructions as per Single Phase testing to connect to the AC Source.

Note:

A 3-phase AC Source is required to perform these tests. When attempting to connect to a Single Phase Source in this mode the following message is displayed.



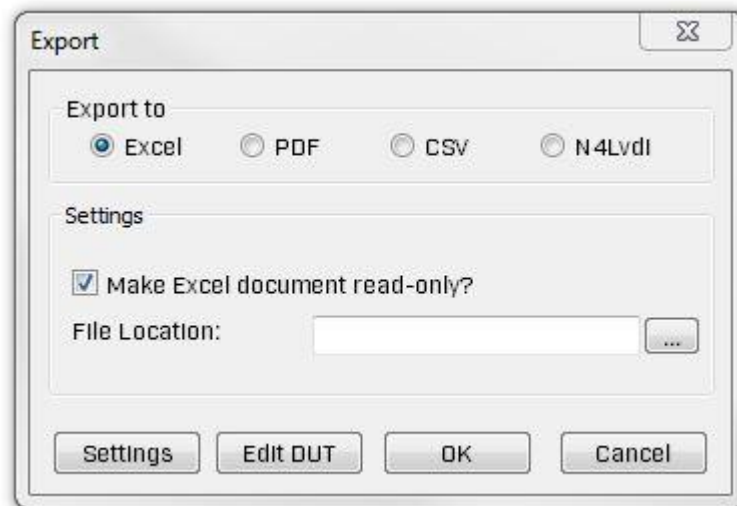
Clicking on “**OK**” will return the user back to the Connect to AC Source dialog box.

The procedure is the same as for Single Phase tests with the exception of the following:

- The Dips have to be performed on all phase to phase options along with phase to neutral. This results in 18 different tests per DIP test (That is: 3x ph1-ph2, 3x ph2-3, 3x ph3-1, 3x ph1-n, 3x ph2-n and 3x ph3-n). Further details can be found in Section 8.2.1, figure 3b and figure 3c in the BSEN 61000-4-34 Standard document.
- Interrupts (and variations) are performed simultaneously on all 3 phases.

9 The Export function

Clicking on the “save and export” button will display the Export Settings window. The setting options in this window are described below:



In addition to producing an Excel or PDF report it is recommended that the test data is saved to an “.N4Lvdi” file. This allows the test data to be reviewed again in IECSOft at a later date allowing you to re-create the Excel report along with allowing further tests to be performed using the same settings etc. The file can also be used to aid Technical Support should this be required.

9.1 “Export to” options:

The results can be exported and saved into 4 file types:

Excel report document - A document containing all of the results and graphs for either Flicker or Harmonics.

PDF report document - A document containing all of the results and graphs for either Flicker or Harmonics.

“.CSV” file – A file containing the result data that can be viewed using “notepad”.

“.N4Lvdi” file – A file containing all of the data that can be recalled into IECSoft using the “Load IEC Test” (or using drag and drop) function on the welcome screen.

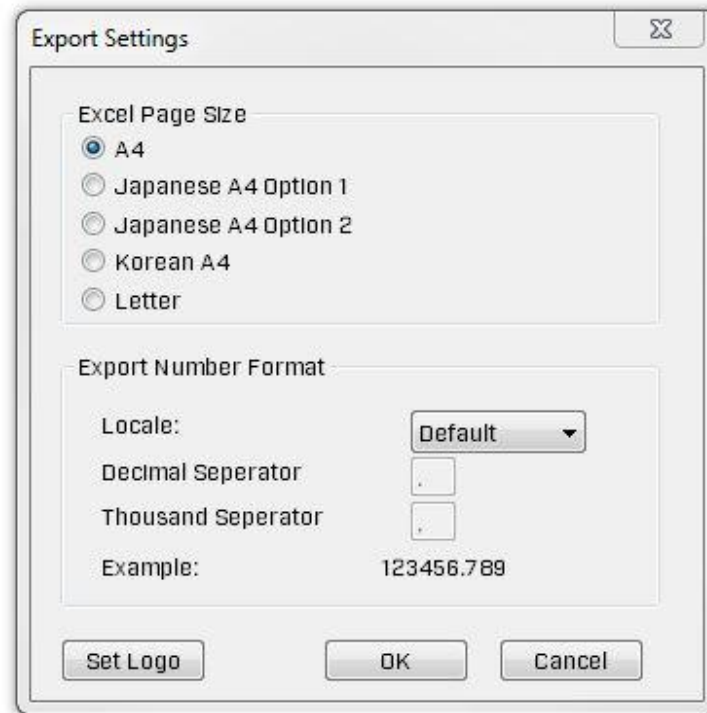
Note: Exporting data to a “.CSV” is only available in certain IEC61000 test modes. Further details can be found in sections 4 to 8.

9.2 Make Excel document read-only:

The default setting is to create a Read Only Excel document. By deselecting this option the Excel report can be edited at a later date.

9.2.1 Export Settings Button.

Click on the “**Settings**” button in the Export window to display the Export settings window:



Excel page size:

There are a number of Excel Report page size options that can be selected by the user:

A4 – Standard A4 size for the UK and Europe.

Japanese A4 Option 1 – Required for use with Japanese Excel version 2013 and later.

Japanese A4 Option 2 – Required for use with Japanese Excel version 2010 and earlier.

Korean A4 – Required for use with Korean versions of Excel.

Letter – Letter style format. (Mainly used in the USA).

Note: The User should select the appropriate option for the version of Excel installed on their PC or Laptop. This will ensure that the report is displayed and printed out correctly.

Export Number format:

The number format can be adjusted by the User. This allows the format to be adjusted to agree with the version of Excel to ensure that numbers are correctly displayed in the reports.

9.2.2 Edit DUT Button:

Before saving the results it is possible to add or amend the information entered into the "Equipment under Test" window.

Click on "**Edit DUT**" in the Export window on the following page will open:

The screenshot shows a dialog box titled "Additional Details". It contains two columns of input fields. The left column, labeled "Device Details", includes fields for Brand, Model, Serial, Rated Voltage (V), Rated Current (A), Rated Frequency (Hz), Rated Power (W), and Impedance ID, each with a text input box containing "N/A". The right column, labeled "Test Details", includes fields for Lab Name, Location, and Operator, each with a text input box containing "N/A", and a large text area for Notes with a "chars left: 249" indicator. At the bottom of the dialog are "Cancel" and "OK" buttons.

Any of the details can be amended if required and comments can be entered into the Notes section. Click "**OK**" to save the changes and close the window. The information entered here will then be included in the report or results file.

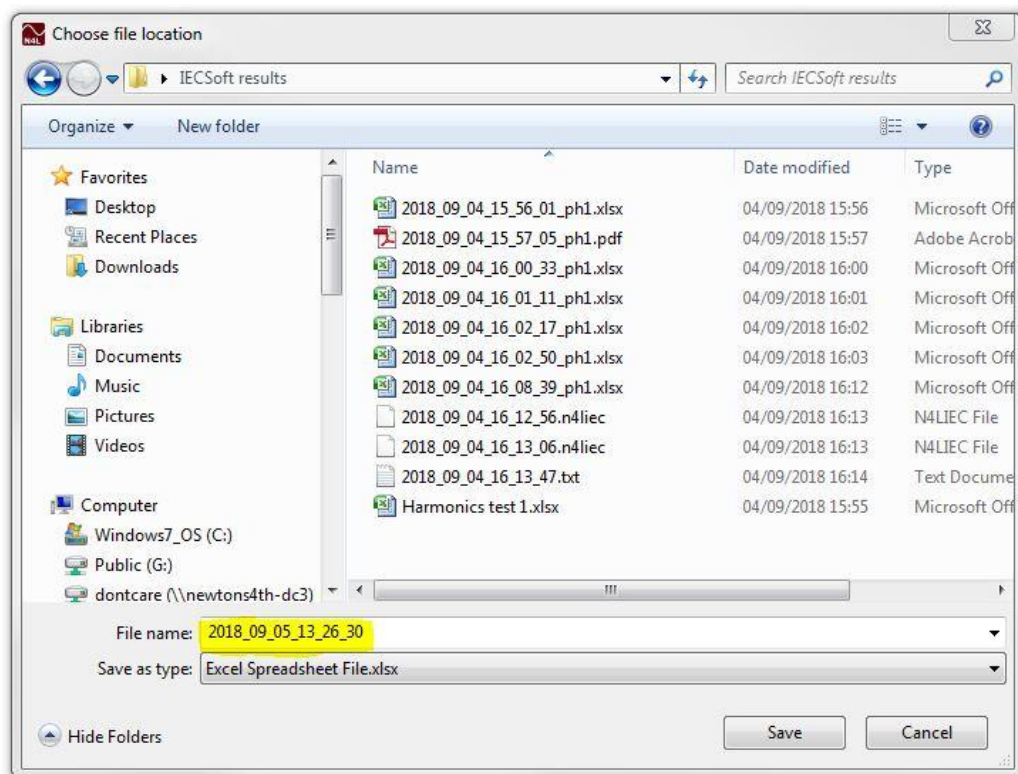
9.3 Creating an Excel report.

The default Excel report will contain locked spreadsheets with “Finalize document” applied to prevent the data from being changed at a later date. It is possible to produce an editable document but this **MUST** be selected at the time the Excel report is produced. The locked report can’t be unlocked by the user. However, if an “.N4Lvdi” file was created at the time the test was performed this file can be loaded back into IECSoft to create a new unlocked Excel document.

9.3.1 Non-Editable Documents.

Ensure “Export to Excel” and “Make Excel document read-only?” are still selected in the Export window along with any other optional selections.

Click on the file location box, the “Choose File Location” window will be displayed.



Select the location to where you want the file to be stored.

You will see that IECSoft automatically gives the file a name based on the date and time. This file name can be kept or deleted and a new file name entered. Click "**Save**" which will close the window and then click on "**OK**" in the Export window.

The following message will be displayed for a short period.

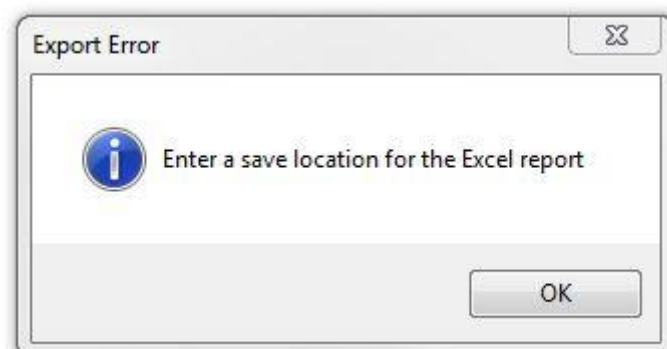


The file will then be stored to the requested location and will also open up on the PC. The following message is then displayed to confirm that the excel document was successfully saved to the required location.



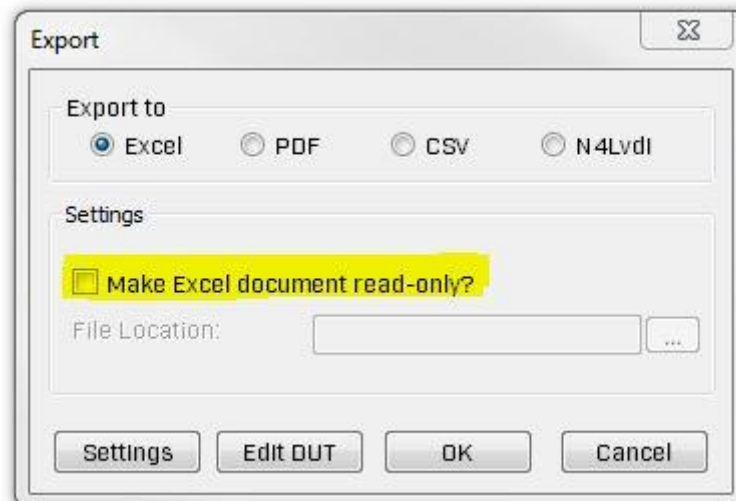
Click on **Close** to clear the message.

Note: If you click on "**OK**" without entering a file location the following error message is displayed. Click on "**Ok**" and enter a file location as described above.



9.3.2 Excel documents that can be edited.

Ensure in the Export window that “Make Excel document read-only?” is not selected.



Note: It is not possible to enter a file name and save the file directly to the PC. The file must be saved once it is open.

Click on “**OK**” in the Export window,

The following message will be displayed for a short period.



The file will then be open up on the PC.

The following message is then displayed to confirm that the excel document was successfully opened on the PC.

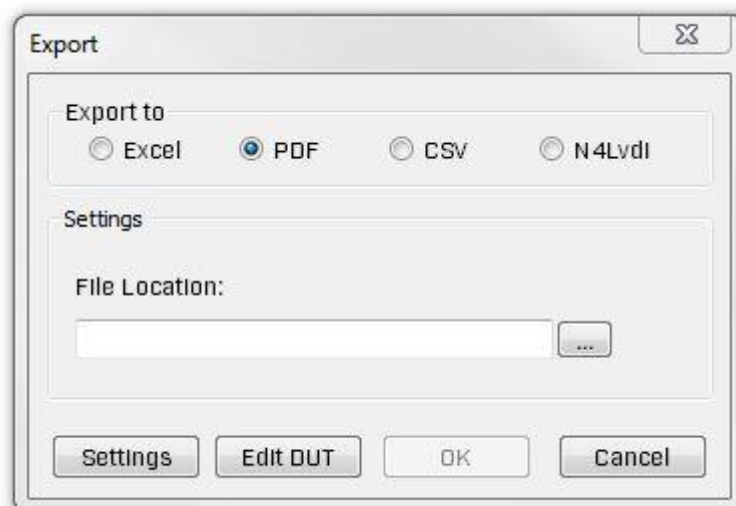


Click on **Close** to clear the message.

The Excel file can now be edited but remember the document **MUST** be saved before it is closed otherwise it will be lost and can't be recovered if the test window is already closed.

9.4 Creating a PDF report

Click on "Export to PDF". The following window will open:



The DUT details can be added or updated if required and the Settings can also be adjusted if necessary.

Click on the file location box, the "Choose File Location" window will be displayed. Select the location to where you want the file to be stored.

IECSOft automatically gives the file a name based on the date and time. This file name can be kept or deleted and a new file name entered. Click "**Save**" which will close the window and then click on "**OK**" in the Export window.

The following message will be displayed for a short period.



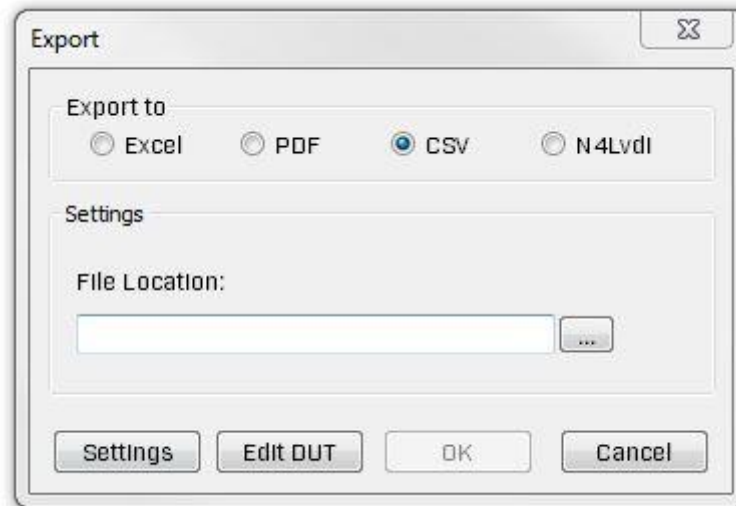
The file will then be stored to the requested location. The following message is displayed to confirm that the PDF document was successfully saved to the required location.



Click on **Close** to clear the message.

9.5 Creating “.CSV” files.

Click on “**Export to .CSV**”. The window will be updated:



Note: Exporting data to a “.CSV” is only available in certain IEC61000 test modes. Further details can be found in sections 4 to 8.

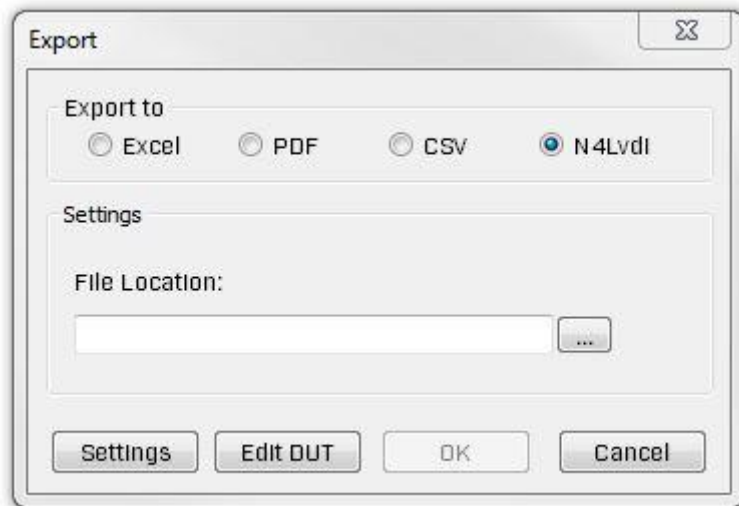
The DUT details can be added or updated if required and the Settings can also be adjusted if necessary.

Click on the file location box, the “Choose File Location” window will be displayed. Select the location to where you want the file to be stored.

IECSoft automatically gives the file a name based on the date and time. This file name can be kept or deleted and a new file name entered. Click “**Save**” which will close the window and then click on “**OK**” in the Export window to save the file in “.CSV” format to the requested location.

9.6 Creating “.N4Lvdi” files.

Click on “Export to .N4Lvdi”. The window will be updated:



The DUT details can be added or updated if required and the Settings can also be adjusted if necessary.

Click on the file location box, the “Choose File Location” window will be displayed. Select the location to where you want the file to be stored.

IECSoft automatically gives the file a name based on the date and time. This file name can be kept or deleted and a new file name entered. Click “**Save**” which will close the window and then click on “**OK**” in the Export window to save the file in “.N4Lvdi” format to the requested location.

9.7 Recalling stored Configuration & Result files.

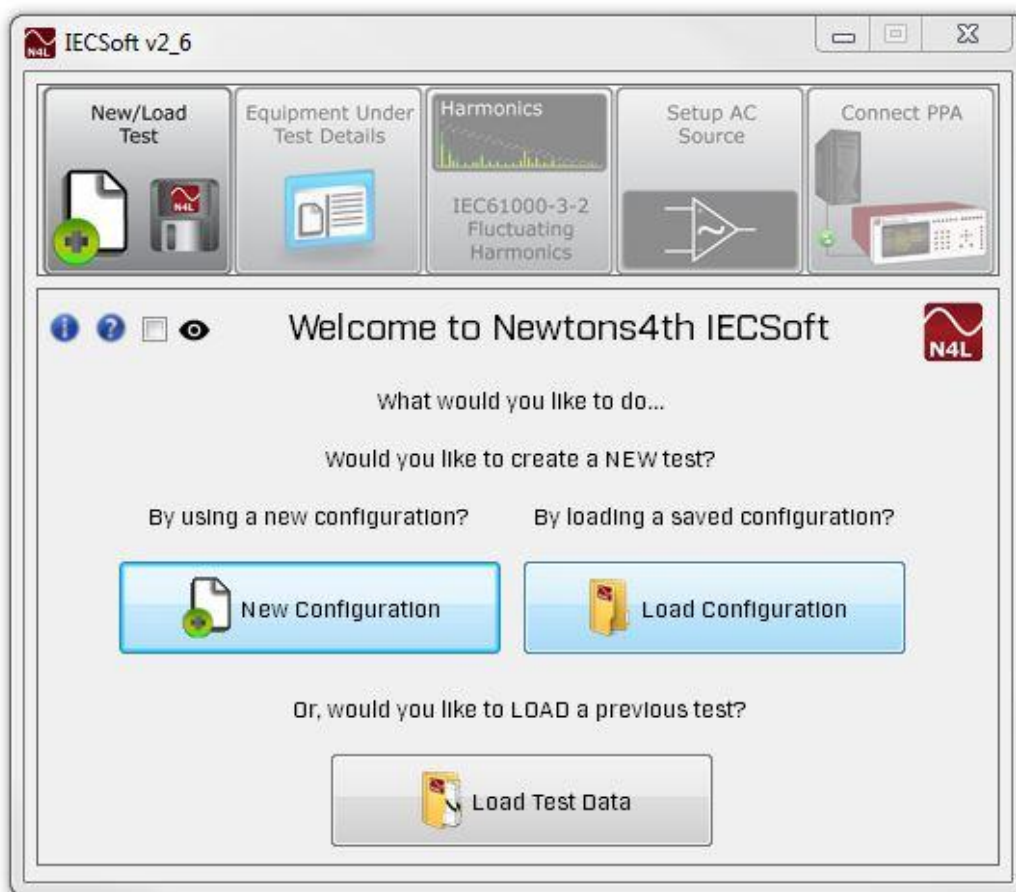
Configuration settings can be recalled into IECSoft using stored configuration files (.iecfg files).

Result files can be recalled into IECSoft and then viewed using stored result files (.N4Lvdi).

There are two methods of recalling the “.iecfg” configuration and the “.N4Lvdi” Result files. These are:

- 1) Using the IECSoft Welcome screen.
- 2) Using Drag “n” drop.

9.7.1 Using the Welcome Screen.



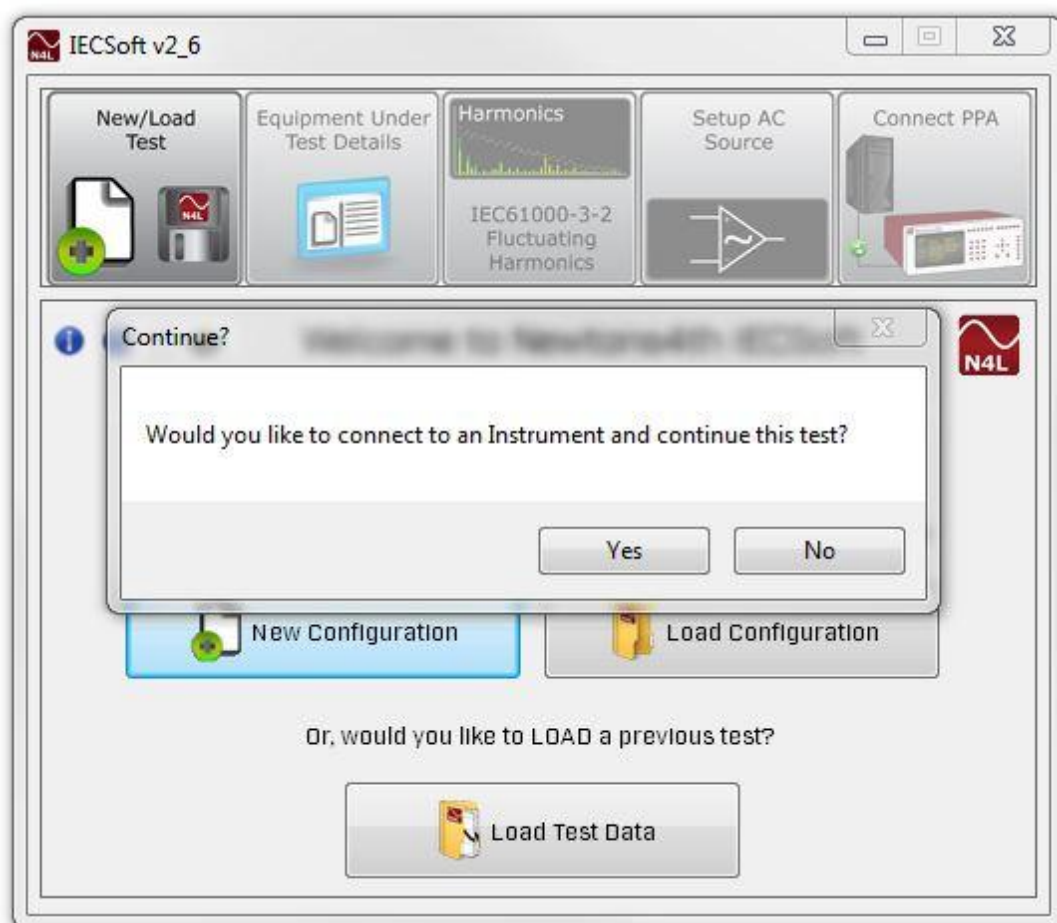
To Load Configuration Files.

To load a stored “.iecfg” Configuration file click on “**Load Configuration**”. Double click on the file once it is located on the computer. The configuration settings will then be recalled into IECSoft and the “Test Setup – page 2” dialog will be displayed.

Click “**Next**” to continue with the instrument Setup and to perform the tests.

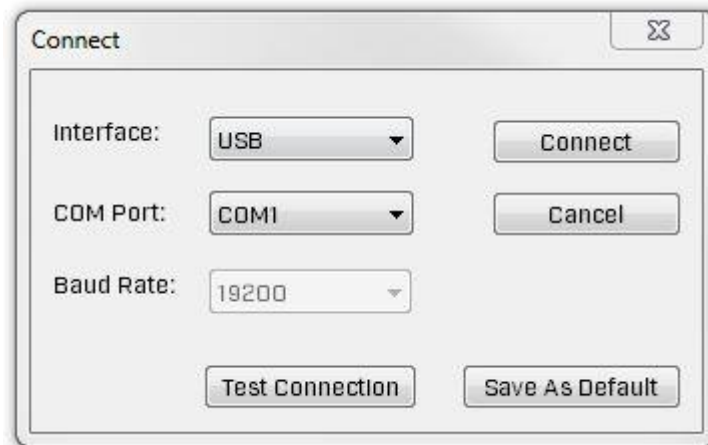
To Load Result files.

To load a stored “.N4Lvdi” Result file click on “**Load Test Data**”. Double click on the file once it is located on the computer. The following message window appears:



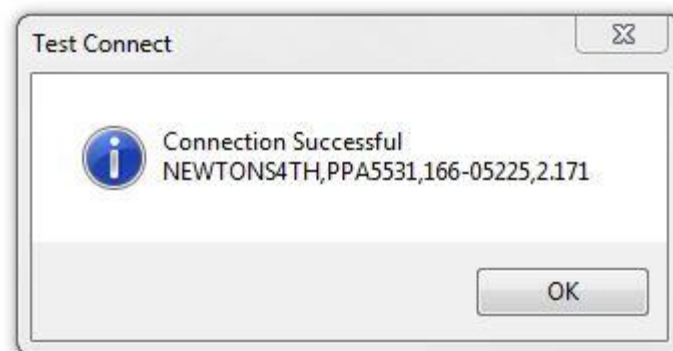
Click on "**NO**" and the results page is displayed allowing the results to be reviewed. The software will not be connected to the instrument but the user can view the saved results in the various formats and export the results again if required.

Click on "**YES**" and the connection window is displayed:

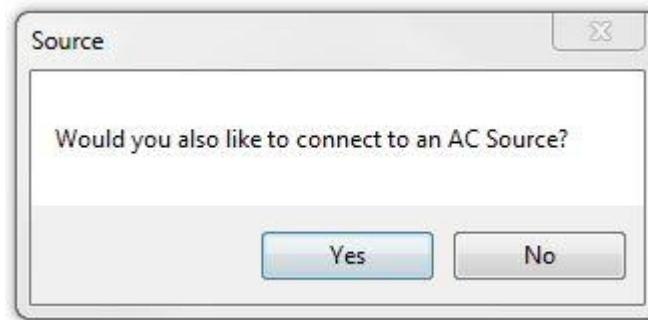


Select the required Interface option and ensure the instrument is set to the same option. For a LAN interface click on search and select the IP address of the instrument. For Serial and USB select the appropriate COM Port. For serial interface connections only ensure the Baud Rate in the connection window *and* on the instrument are set to 19200.

Click on "**Connect**": The test Connection window appears.

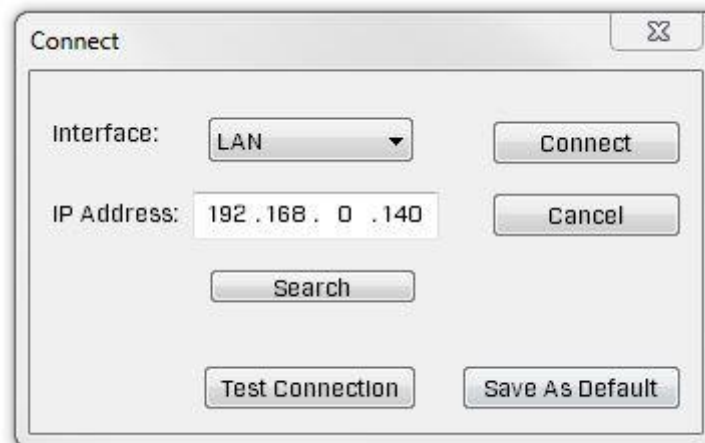


Click on "**OK**": The Source connection window appears:

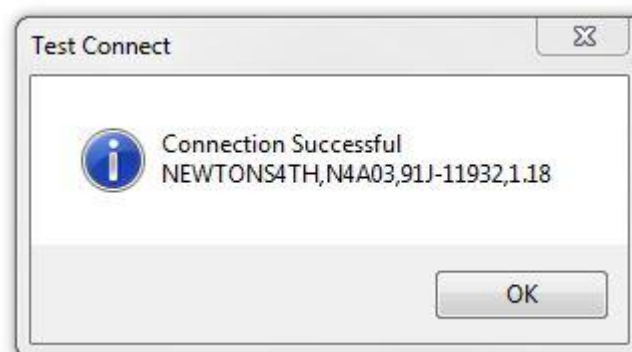


Click "**NO**": The results page is displayed.

Click "**YES**": The Source connection window appears.



Select the correct Interface settings then click on "**Connect**":



Click on "**OK**": The Setup windows will then appear.

The results page is displayed allowing the results to be reviewed and the tests to be repeated as required.

9.7.2 Drag “n” drop.

Drag an “.iecfg” Configuration file on to the IECSoft “.exe” file or shortcut. IECSoft will then automatically start up and load the configuration settings from the stored file. The “Test Setup Page 2” dialog will be displayed. Click “**Next**” to continue with the setup and connect to the instrument to perform the tests.

Drag an “.N4Lvdi” Result file on to the IECSoft “.exe” file or shortcut. IECSoft will then automatically start up and display the “Would you like to connect to an Instrument and continue this test?” message. Click on “**NO**” to view the results data or “**YES**” to connect to an instrument, view the results data and perform further tests.

Appendices

Appendix A – Help and Assistance.

If you require any further assistance with the operation of IECSoft please do not hesitate to contact your local distributor or N4L on support@newtons4th.com