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pendulum

EMC Scanner
SCN-500

USER MANUAL



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Limited Warranty

Hardware

Certification

Pendulum Instruments certifies that this product meets its published specifications at the time of shipment from the factory. Pendulum Instruments further certifies that its calibration measurements are traceable to Pendulum Instruments Standards.

Warranty

This Pendulum Instruments system is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Pendulum Instruments will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Pendulum Instruments AB. The Buyer shall pay shipping charges for transport to Pendulum Instruments and Pendulum Instruments shall pay shipping charges to return the product to Buyer. However, The Buyer shall pay all shipping charges, duties, and taxes for products returned to Pendulum Instruments from countries outside of Sweden.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. PENDULUM INSTRUMENTS SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Exclusive Remedies

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. PENDULUM INSTRUMENTS SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Pendulum Instruments products. For any assistance, contact your nearest Pendulum Instruments sales and Service Office.

Software

Limited Warranty on Media and Manuals

If you discover physical defects in the media on which this software is distributed or in the manuals distributed with the software, Pendulum Instruments will replace the media or the manuals at no cost, provided that you return the defective materials along with a copy of your receipt to Pendulum Instruments or to an authorized dealer during the 1-year period following your receipt of the software.

Limited Warranty on the Product

Pendulum Instruments warrants that the software will perform substantially as described in this document. If within one (1) year of receiving the software you give written notification to Pendulum Instruments of a significant, reproducible error in the software which prevents its operation, and provide a written description of the problem, Pendulum Instruments will either provide you with corrective or work- around instructions, a corrected copy of the software, or refund your purchase price upon return of all copies of the software and documentation together with a copy of your receipt.

EXCEPT FOR THE LIMITED WARRANTY DESCRIBED ABOVE, THERE ARE NO WARRANTIES TO YOU OR ANY OTHER PERSON OR ENTITY FOR THE PRODUCT EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ALL SUCH WARRANTIES ARE EXPRESSLY AND SPECIFICALLY DISCLAIMED. Some states do not allow the exclusion of implied warranties or limitation on how long they last, so the above limitation and exclusion may not apply to you. This limited warranty gives you specific legal rights and you may also have other rights, which vary from country to country. IN NO EVENT SHALL PENDULUM INSTRUMENTS BE RESPONSIBLE FOR ANY DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR SIMILAR DAMAGES OR LOST DATA OR PROFITS TO YOU OR ANY OTHER PERSON OR ENTITY REGARDLESS OF THE LEGAL THEORY, EVEN IF WE HAVE BEEN ADVISED OF THE
POSSIBILITY OF SUCH DAMAGE. Some countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. The warranty and remedies set forth are exclusive and in lieu of all others, oral or written, express or implied.

Technical data

EMC Scanner (RS series - Discontinued)

	RS321	RS642	RS644
Movement in XYZ-axis:	300x200x100 mm	600x400x200 mm	600x400x200 mm
Size:	620x400x550 mm	920x600x750 mm	920x600x950 mm
Weight:	20 kg	27 kg	35 kg

Accuracy:	+/- 0.3 mm
Min step size:	1 mm
Line voltage:	230V/110V, -15%, +10%
Line frequency:	50Hz/60Hz, +/- 2Hz
Power consumption:	<25W
Power con. standby:	<20W
Environment temp.:	+10 C to +35 C
Humidity:	20% to 80%
Communication:	RS-232 or Ethernet
Software:	Requires Windows 10. Configurable for most spectrum analyzers. Configurable for National GPIB-adapters.

Heat Scanner Option (RS series- Discontinued)

Scanner:	See product leaflet of EMC Scanner
Temperature range:	0-150 °C
Resolution:	+/- 0.3 °C
Point of measuring:	6 mm diameter at a distance of 200 mm.
Response time:	500 ms

EMC Scanner (HR series)

	HR-1 (Discontinued)	HR-3
Movement in XYZ-axis:	190x140x80 mm	390x280x130 mm
Size:	Width:535 Depth:600 Height:690 mm	Width:780 Depth:850 Height:810 mm
Weight:	95 kg	125 kg

Accuracy:	+/- 0.05 mm
Min step size:	0.025 mm
Line voltage:	230V/110V, -15%, +10%
Line frequency:	50Hz/60Hz, +/- 2Hz
Power consumption:	1150W
Environment temp.:	+10 C to +35 C
Humidity:	20% to 80%
Communication:	RS-232 or Ethernet (UTP)
Software:	Requires Windows 10. Configurable for most spectrum analyzers. Configurable for National GPIB-adapters.

EMC Scanner (SCN-500 series)

	SCN-522	SCN-524	SCN-534	SCN-564
Movement in XYZ-axis (mm):	200x100	200x100x100	300x200x100	600x400x300
Rotation around Z axis (Y/N):	N	Y	Y	Y
Size:	450x370x430 mm (17.7x14.6x16.9”)	450x370x630 mm (17.7x14.6x24.8”)	550x470x630 mm (21.7x18.5x24.8”)	850x670x830 mm (33.5x26.4x32.7”)
Weight:	11 kg (24 lbs)	13 kg (29 lbs)	15 kg (33 lbs)	23 kg (51 lbs)

Min step size:	0.1 mm
Line voltage:	100 - 240 Vac
Line frequency:	50Hz/60Hz
Power consumption:	45W
Operating temp.:	+10°C to +35°C
Storage temp.:	-40°C to +71°C
Humidity:	20% to 80% (+10°C to +35°C)
Maximum height over sea level:	2000 m.
Over voltage category:	OVC II
Laser Safety:	CLASS 2 LASER PRODUCT IEC 60825-1: 2014 P 1mW; λ=670nm COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR CONFORMANCE WITH IEC 60825-1 ED. 3., AS DESCRIBED IN LASER NOTICE NO. 56, DATED MAY 8, 2019.
Safety:	EN 61010-1:2010/A1:2019/AC:2019-04: Safety requirements for electrical equipment for measurement, control, and laboratory use.
EMC:	EN/(IEC) 61000-6-3:2007: Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environment. EN/(IEC) 61000-6-1:2007: Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environment
Communication:	USB 2.0
Software:	Requires Windows 10. Configurable for most spectrum analyzers. Configurable for National GPIB-adapters.

Safety Instructions

Introduction

Read this page carefully before you install and use the instrument. This instrument has been designed and tested according to safety Class 1 requirements of EN61010-1:2010 and has been supplied in a safe condition.

The user of this instrument must have the required knowledge of it. This knowledge can be gained by thoroughly studying this manual.

This instrument is designed to be used by trained personnel only. Removal of the cover for repair or rack-mounting of the instrument must be done by qualified personnel who are aware of the hazards involved.

Safety Precautions

To ensure the correct and safe operation of this instrument, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

Caution and Warning Statements

CAUTION: Shows where incorrect procedures can cause damage to, or destruction of equipment or other property.

WARNING: Shows a potential danger that requires correct procedures or practices to prevent personal injury.

Safety Precautions

The machine may only be used in accordance with the provisions of this manual. For the damage caused by use of the machine for other applications then the machine has been developed, closes the manufacturer Pendulum Instruments Sp. z o.o from any liability.

CAUTION:

- Before commissioning the machine, make sure that the mains voltage (that is specified on the name plate of the individual components) is in accordance with the existing mains voltage in your plant or working place. A wrong voltage can destroy the machine and its components. The machine may be connected to any AC supply with a voltage rating of 100 to 240 Vrms, 50 to 60 Hz. The machine automatically adjusts itself to the input line voltage.
- Under no circumstances should you operate a machine at the locations where there could be a risk of water and other liquids penetrating.
- The dimensions of the machine must be taken into the consideration to prevent moving axis from crushing into objects around it.
- Make sure that support table that machine is placed on, is capable of withstanding the weight and dynamic forces of the scanner and the test object. Inadequate support table can break and cause the machine to fall off.
- Clean plastic and painted surfaces of the machine with a suitable cleaning agent only (household, non-abrasive cleaning agents). Using inappropriate agents may destroy surfaces of the machine. The metal rails and screw are supposed to be greased and must not be wiped dry.
- Temperature of the test objects should be less than 100 degrees Celsius. Higher temperatures may cause surfaces of the machine to melt and potentially cause a fire hazard.
- The machine must not be placed in potentially explosive atmospheres.

WARNING:

- To avoid electrical shock do not insert objects into the machine imports; except for the intended replacement of parts in accordance to this User Manual.
- For the implementation of maintenance work always disconnect the machine from the AC power grid.
- Opening the machine for repair or any other purpose may lead to exposure to live wires and as a result cause electric shock. Only authorized service technicians are allowed to perform the aforementioned actions.
- When laying out the mains cable be careful that you avoid tripping hazards and prevent damage to the electric main.
- Ensure cables of the scanner/test object are free from damage and do not have any non-standard joints or show any signs of overheating. Cracked wire insulation caused by heat, age, corrosion or bending may lead to electric shock.
- Be sure not to put your fingers, hair, or clothing close to the moving sections in order prevent pinching or accident that can result in personal injury. Operators are required to always wear the proper clothing; hair should be covered to avoid entanglement. Jewelry such as rings and necklaces must also be removed.

Grounding

Whenever an instrument is connected to the line voltage, a grounding fault will make it potentially dangerous. Before connecting any unit to the power line, you must make sure that the protective ground functions correctly. Only then can a unit be connected to the power line and only by using a three-wire line cord. No other method of grounding is permitted. Extension cords must always have a protective ground conductor.

WARNING:

- If a unit is moved from a cold to a warm environment, condensation may cause a shock hazard. Ensure, therefore, that the grounding requirements are strictly met.
- Never interrupt the grounding cord. Any interruption of the protective ground connection inside or outside the instrument or disconnection of the protective ground terminal is likely to make the instrument dangerous.

Option SLDM (laser distancing meter) safety information

The Option SLDM sensors operate with a semiconductor laser with a wavelength of 670 nm (visible/red).

The sensors fall within Laser Class 2 (II). The laser is operated on a pulsed mode, the maximum optical power is ≤ 1 mW.

The pulse frequency depends on the adjusted measuring rate (0.25 ... 4 kHz).

The pulse duration of the peaks is regulated depending on the measuring rate and reflectivity of the target and can be 0.3 ... 3999.6 µs.

Observe the laser protection regulations. Although the laser output is low, directly looking into the laser beam must be avoided. Close your eyes or immediately turn away if the laser beam hits the eye.

The housing of the optical sensors may only be opened by the manufacturer.

For repair and service purposes, the sensors must always be sent to the manufacturer.

Lasers of Class 2 (II) are not subject to notification and a laser protection officer is not required.

During operation of the sensor, the pertinent regulations according to IEC 60825-1 on „Safety of laser products“ must be fully observed at all times. The sensor complies with all applicable laws for the manufacturer of laser devices.

CAUTION:

- Avoid unnecessary laser radiation to be exposed to the human body.

WARNING:

- Switch off the sensor for cleaning and maintenance.
- Use of controls or adjustments or performance of procedures other than those specified may cause harm.
- Connect the power supply and the display-/output device according to the safety regulations for electrical equipment. (Damage to or destruction of the sensor)
- Avoid shocks and impacts to the sensor. (Damage to or destruction of the sensor)
- The laser option can be used only with original power supply (Damage to or destruction of the sensor)
- Protect the sensor cable against damage. (Failure of the measuring device)
- Avoid constant exposure of sensor to splashes of water. (Damage to or destruction of the sensor)
- Avoid exposure of sensor to aggressive media like detergents, cooling emulsions. (Damage to or destruction of the sensor)

Symbols



Indicates that the operator should consult the manual.



Shows where the protective ground terminal is connected inside the instrument. Never remove or loosen this screw.

If in Doubt about Safety

Whenever you suspect that it is unsafe to use the instrument, you must make it inoperative by doing as follow

– Disconnect the line cord

– Clearly mark the instrument to prevent its further operation

– Inform your local Pendulum Service Center.

For example, the instrument is likely to be unsafe if it is visibly damaged.

Introduction

The EMC Scanner measures the emission from components, cables, PCB's and products. The system consists of an X-Y-Z robot, a spectrum analyzer with near field probes, possibly a GPIB adapter for communicating with the spectrum analyzer and a personal computer with custom software.

During measurement the robot moves the near field probe to predetermined measuring points above the test object. At each measuring point the location of the probe and the value of the emission intensity are stored in the computer. When the measurement is finished, the results can be documented in different types of reports.

Hardware (HR series)

Front panel



1. Power on button

Click here to power up the Scanner.

2. Safety key

Auto: The Scanner can only be operated when the cover is closed.

Test: The Scanner can be operated even if the cover is open.

WARNING!!

Operating the Scanner with the cover open may be dangerous.

The moving parts inside the Scanner may hurt you.

DO NOT OPERATE THE SCANNER WHEN THE COVER IS OPEN!

3. Power off button

Click this button to shut down the Scanner.

4. Cover lock release

To open the cover, you must pull the cover handle down and then press the cover release button.

5. Not in use

Hardware (SCN-500 series)

Front panel



1. ZY/ZR selection

When unpressed, the joystick (2) operates the X and Y axes. When pressed, the joystick (2) operates the Z and R axes. The LED in the button indicates that ZR axes are activated for moving with the joystick. When not lit, XY axes are activated.

2. Joystick for moving the probe

3. Power on indicator

Green light indicates power on. No light indicate no power.

4. Machine stop button

Press to quickly turn off the power to all motors.

Turn clockwise to release the button and turn power on.

Back panel



1. USB connector

For communication with PC.

2. Main power ON/OFF

3. Main power fuses

2 x 800mA T

4. Main power inlet

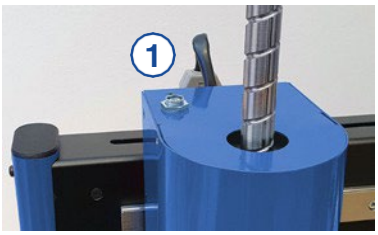
100-240 Vac, 50/60 Hz

5. Grounding screw

A functional ground for connecting DUT to ground when needed.

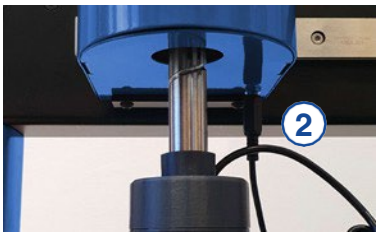
Top of ZR module

1. Connector for Laser Distance Meter (opt. SLDM)



Bottom of ZR module

2. Connector for crash switch



Installation

A complete EMC Scanner setup consists of:

1. EMC Scanner (included)
2. Spectrum analyzer
3. Near field probe
4. Pre-amplifier
5. Means for communication with the spectrum analyzer.
   If GPIB is required then National Instruments GPIB adapter
6. PC with windows 10 or later
7. Detectus Scanning Software

Installing the Hardware

Scanner serial number: _____

1. Unplug the PC and Scanner from the power.
2. Connect the RS-232 or USB cable between the PC and the Scanner.
3. Connect the power, and then switch on the PC and the Scanner.

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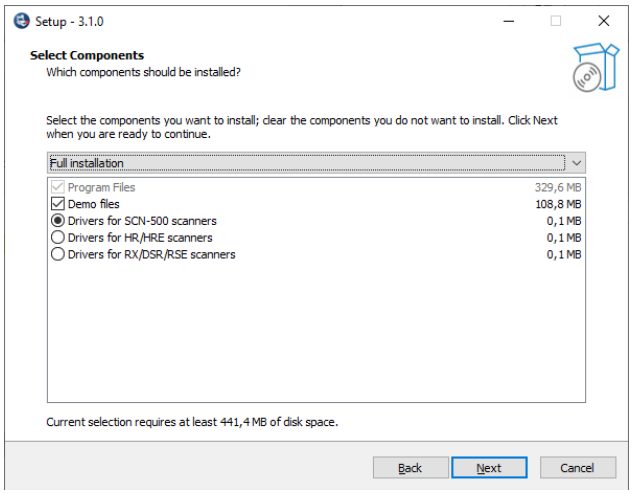
Before installing the software

Make sure that the PC complies with system requirements. (See technical data on page 5.)

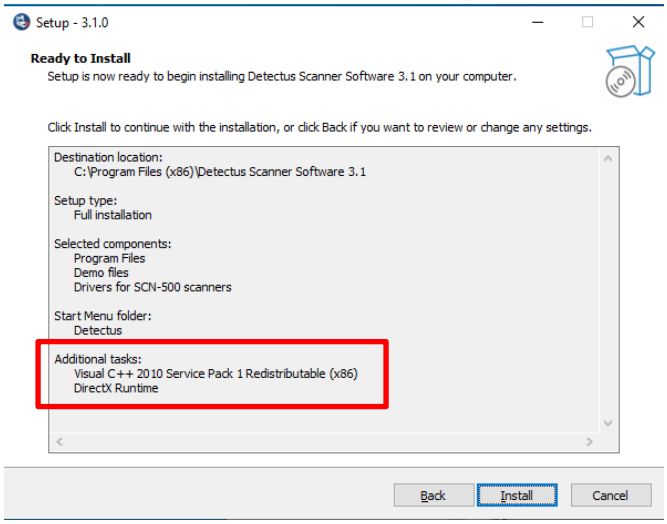
If applicable, make sure that the GPIB-adapter is properly installed and that the diagnostic program provided by National Instruments confirms its functionality.

Installing the Software

1. Insert the USB stick provided with the EMC Scanner into the computer.
2. Run setupDSS.exe on the USB stick.
3. Follow the instructions on the screen and select the drivers that suit your Scanner model. Demo files are optional.



4. Depending on what has previously been installed in Windows, the installation software may try to download and install some additional Microsoft packages. If no internet connection is available during installation, the additional packages can be downloaded and installed manually later.

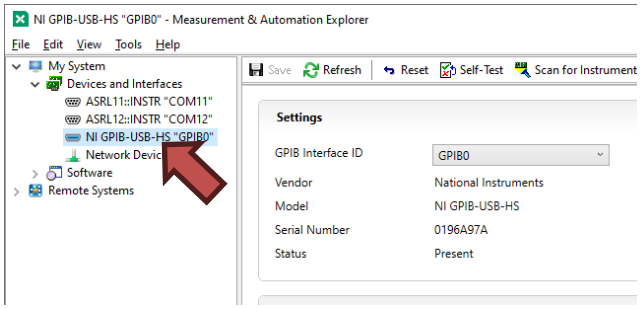


Setting up NI Visa and instruments with GPIB

Some spectrum analyzer drivers in DSS and all drivers for signal generators and EDDs are using National Instruments Visa. Therefore, it is required to install the NI Visa driver first. NI Visa, and instructions how to install it, can be downloaded at www. ni.com. Click Support and then NI Visa…

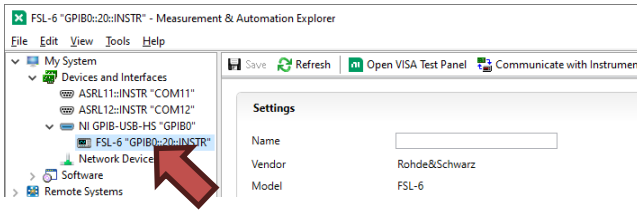
Below are step-by-step instructions how to connect Detectus DSS running on a Windows 7 PC to a Visa compatible instrument using GPIB.

1. Open National Instruments Measurement & Automation
2. Click on your GPIB adapter in the tree view.



If you don't see your GPIB adapter in the tree view, then you need to install and configure it. Follow NI installation guidelines.

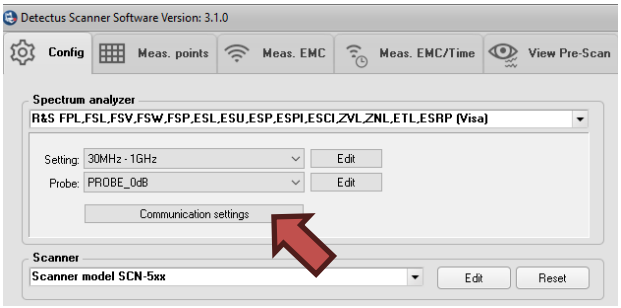
3. Click on "Scan for Instruments"
4. Now you should see your instrument at the bottom of the screen.



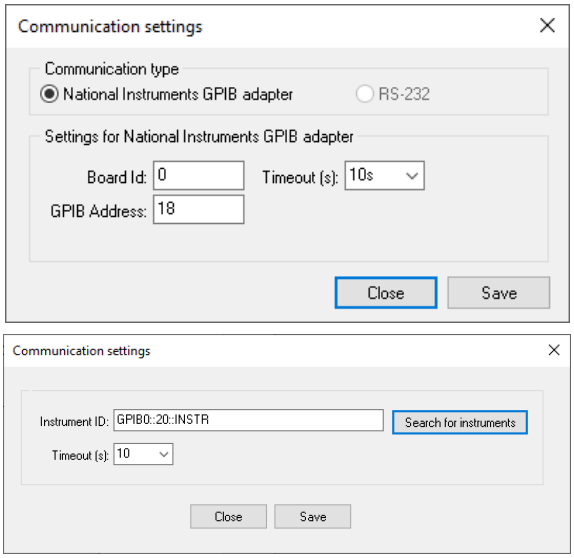
It is very important that you can see you're your instrument in this list because otherwise DSS will not be able to connect to it.

GPIB address of the spectrum analyzer

1. Click on the **Config** tab.
   In the **Spectrum analyzer** box, click on the **Communication settings** button to show the next dialog box.



The communication settings dialog will look different for different spectrum analyzer drivers.



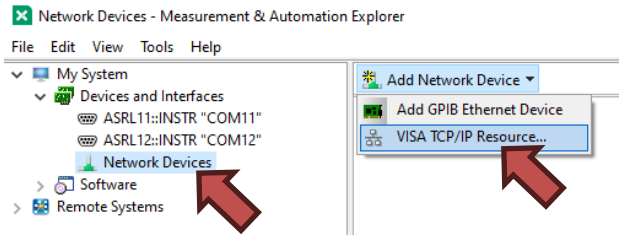
2. Enter the GPIB address of your spectrum analyzer into the **GPIB Address** box.
3. Click on the **Save** button.
4. Click on the **Close** button.

Setting up NI Visa and instruments with LAN

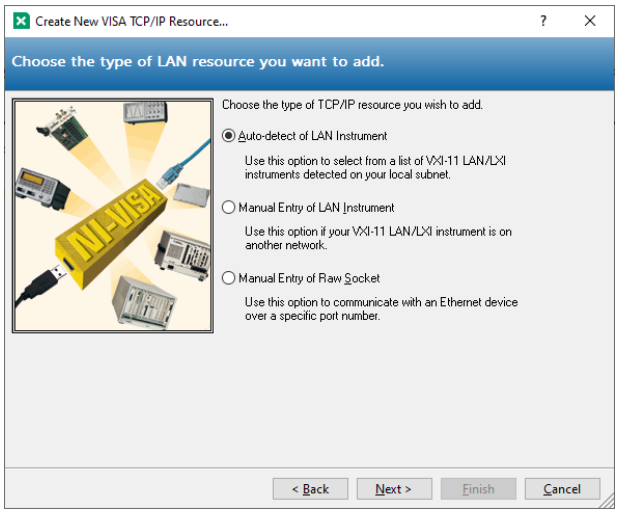
Some spectrum analyzer drivers in DSS and all drivers for signal generators and EDDs are using National Instruments Visa. Therefore, it is required to install the NI Visa driver first. NI Visa, and instructions how to install it, can be downloaded at www.ni.com. Click Support and then NI Visa…

Below are step-by-step instructions how to connect Detectus DSS running on a Windows 10 PC to a Visa compatible instrument using LAN in a network where IP addresses are handled by a DHCP server. That is, a regular office network. A slightly more complicated procedure for connecting via a LAN cable directly is found in appendix 2.

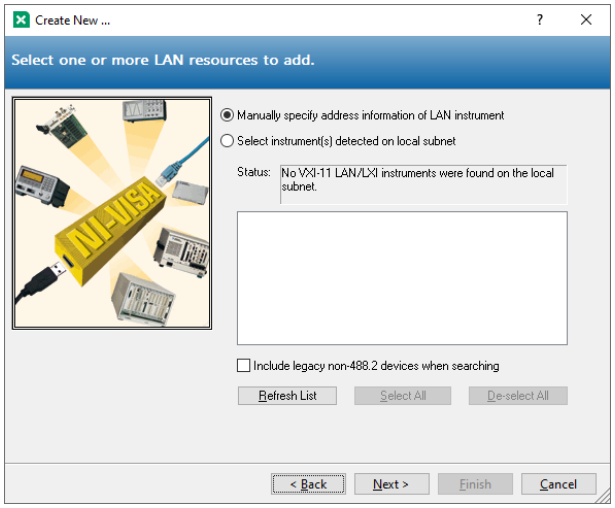
1. Open National Instruments MAX
2. Click on your “Network Devices” in the tree view and then click “Add Network Device” and then click “VISA TCP/IP Device”.



3. Select “Auto-detect of LAN Instrument” and then Click Next

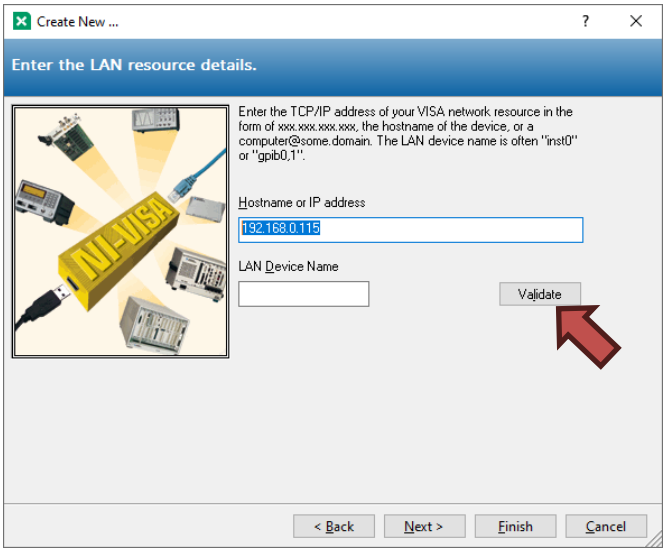


4. Hopefully you now see your instrument in the list.

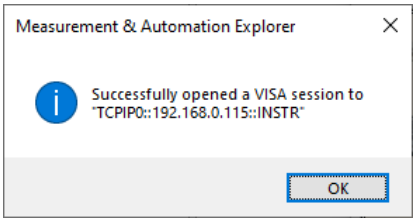


If your instrument is not found then go back and select “Manual Entry of LAN Instrument”” and then click Next.

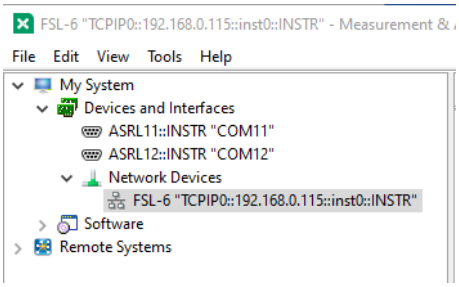
5. Type in the IP address of your instrument and click “Validate”



6. If you typed the correct IP address and your instrument is found, then you should see this message. Click OK.



7. Click “Finish”
8. Now you should see your instrument in the tree view.



It is very important that you can actually see your instrument in the tree view because otherwise DSS will not be able to connect to it.

For details on how to connect from within DSS please see page 35.

Calibration

Positional calibration of the near field probe (RS series)

1. Place the near field probe in the probe holder. If the probe does not fit you can cut one of the spare probe holders to fit your probe.



2. Carefully move the Z-axis carriage by hand downwards until the limiting position switch is activated.



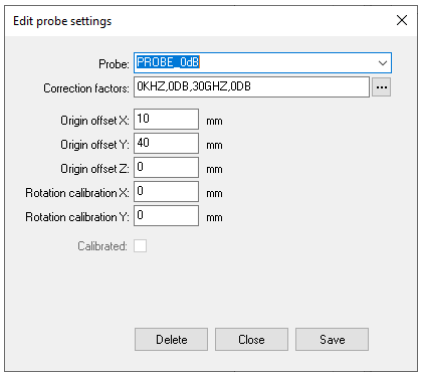
3. Place the probe holder and the probe in the Z-axis carriage (see picture). The probe should point straight down towards the Scanner.



4. Carefully move the probe downwards until the tip of the probe touches the Scanner table.



5. Move the Z-axis carriage upwards until the lower limiting position switch is released.
6. Click on the **Config** tab. In the **Scanner** box, click the **Reset** button.
7. Measure the distance between the center of the probe tip and the origin of the coordinates of Scanner table.
8. Click on the **Config** tab. In the **Spectrum analyzer** box, near the **Probe** setting, click the **Edit** button.



9. Adjust the values of **Origin Offset X and Y** with the distances measured in step 7. For DS, RX and RQ scanners, do not change the value of **Origin Offset Z.** It should always be 10.
10. Click on the **Save** button.
11. Click on the **Close** button.
12. Click on the **Config** tab. In the **Scanner** box, click the **Reset** button.

Repeat step 6 to 12 until the tip of the probe is positioned above the origin of coordinates after a reset.

Positional calibration of the near field probe (HR series)

In the Scanner table of the HR Scanner there is a built-in transmitter that emits at 120MHz from two beacons located in the upper left corner of the grid on the Scanner table.

By using the SMA connector on the left side of the Scanner table, you can connect an external signal source that emits at a different frequency.

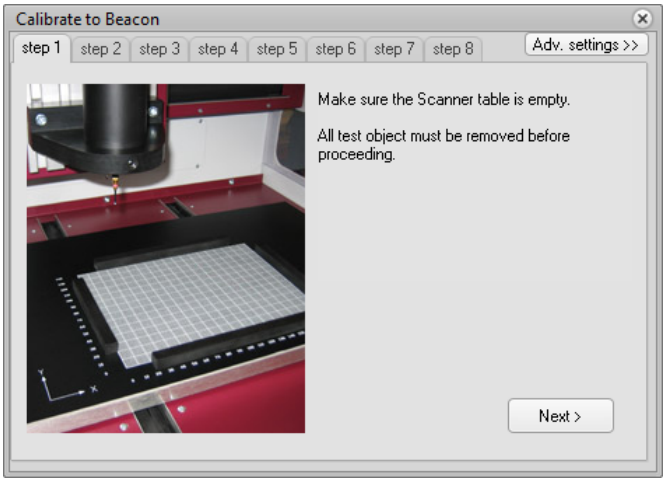
The purpose of the beacons is to calibrate the position of the near field probes in X and Y-axis. The two beacons are designed for different types of probes.

Click on the “Calibrate to Beacon button”

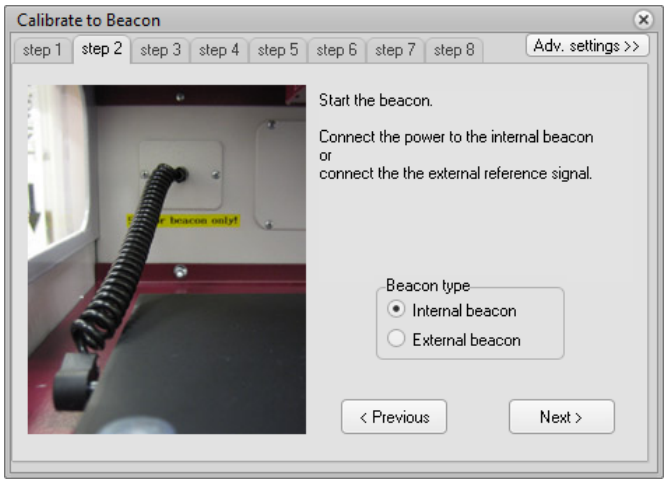


A dialog with 8 steps will guide you through the calibration process.

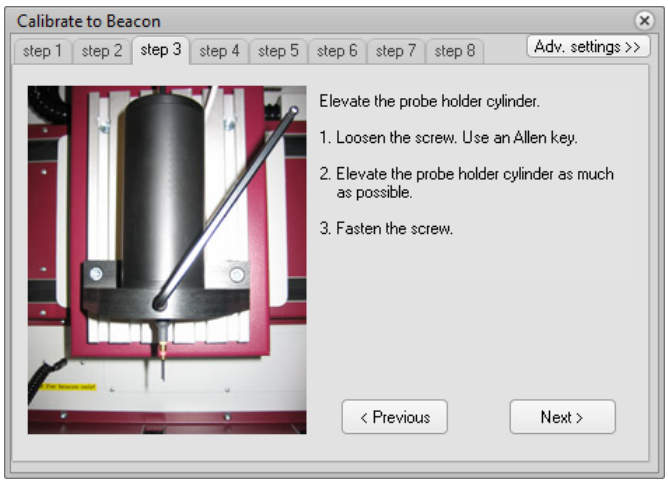
1. Step 1 : Make sure the Scanner table is empty.



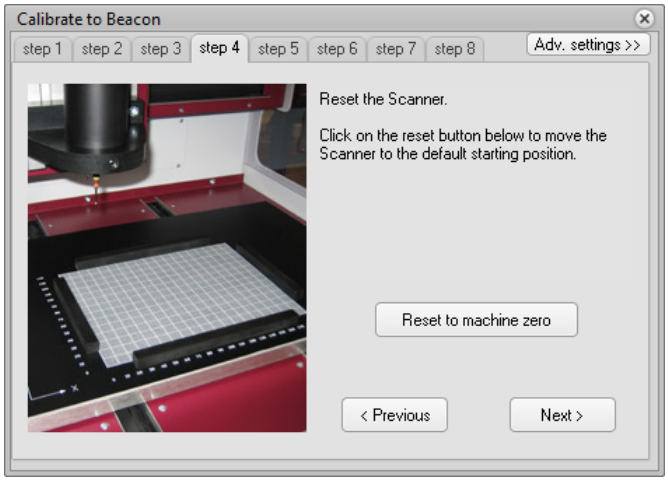
2. Step 2 : Choose and connect the internal or external calibration signal source.



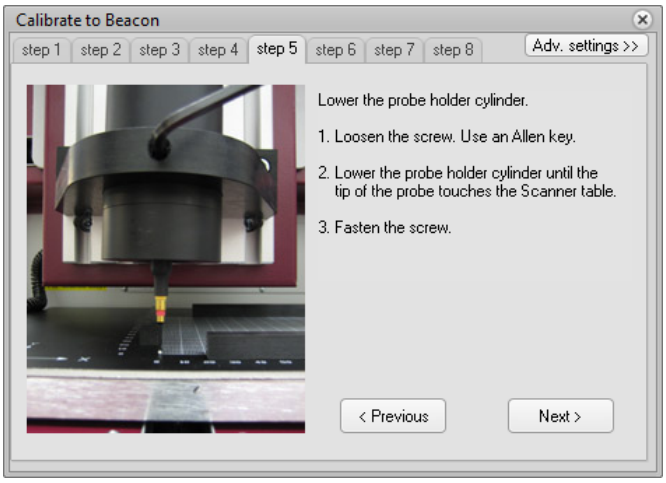
3. Step 3 : This is for safety to prevent the probe from running into the Scanner table.



4. Step 4 : Click the button “Reset to machine zero”. The Scanner resets and moves down to Z=0. The Scanner table must be empty.



5. Step 5 : Lower the probe holder cylinder. An easy way to calibrate the Z-axis is to use a thickness gauge between the tip of the probe and the table.

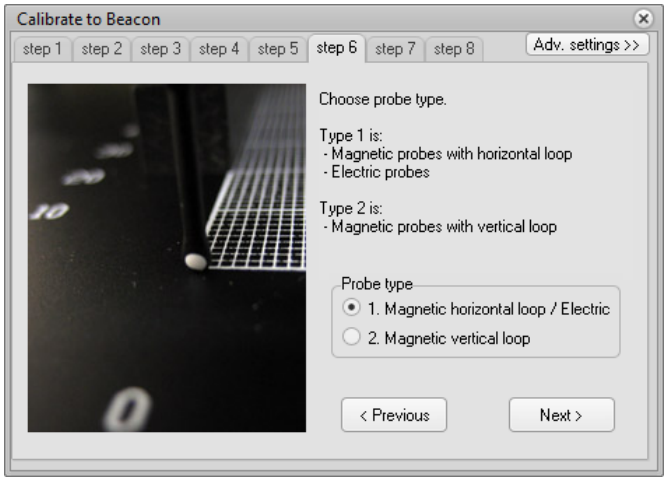


6. Step 6
Depending on the type of near field probe being used onr of the two beacons needs to be selected.

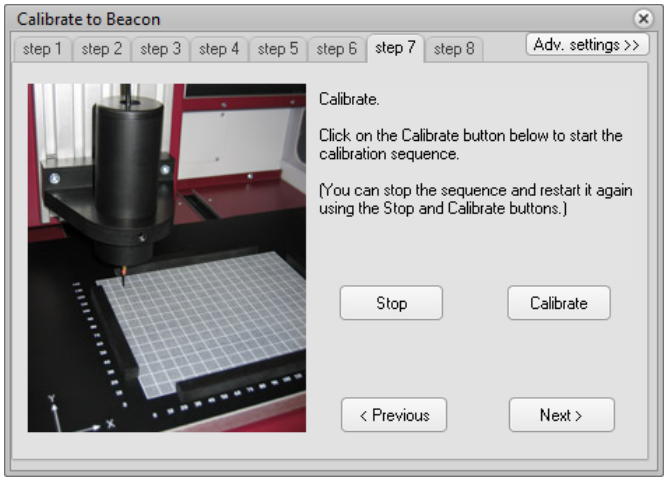
Beacon 1 is a vertical coil that works for H-field probes that are sensitive to a vertical field typically horizontal loop probes. This beacon also works for E-field probes.

Beacon 2 is two crossed horizontal wires that work for H-field probes that are sensitive to a horizontal field typically vertical loop probes.

PLEASE NOTE!
For best performance, a vertical loop probe must be rotated so that the plane of the loop is aligned with the X or Y-axis.



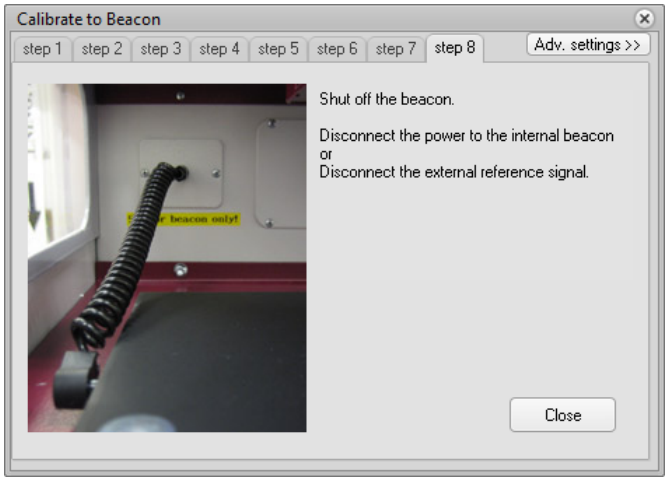
7. Step 7 : Click on the Calibrate button to start the calibration sequence. The calibration will take between one and ten minutes depending on the speed of the spectrum analyzer.



When the calibration is done you will be given a choice to move the probe to X0Y0Z0. It is recommended to do so. This is a chance to verify that the probe is correctly calibrated. If the calibration was successful, the tip of the probe should be position directly above X0Y0.
If the calibration is off, you may need to adjust the starting position of the calibration. This can be done in the advanced settings. See below.

8. Step 8

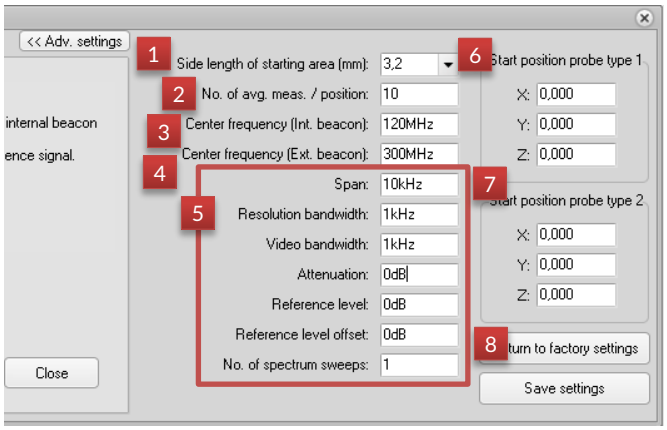
Don't forget to disconnect the calibration signal source.



Advanced settings:

Clicking on "Advanced Settings" opens the dialog shown below.

With these settings you can fine tune the calibration settings



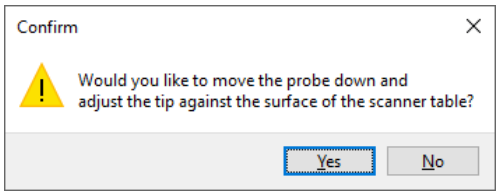
1. Side length of starting area
   The Scanner will search for the beacon in smaller and smaller squares. This is the size of the first big square.
   Default value is 3.2mm
2. No. of avg. meas. / position
   These are the number of measurements made at each measuring position, from which the average value is calculated. More measurements will give a more accurate result but will take longer. Default value is 10 measurements.
3. Center frequency (Int. beacon)
   This is the frequency that will be measured when selecting Internal beacon in step 2 above. Default value is 120 MHz
4. Center frequency (Ext. beacon)
   This is the frequency that will be measured when selecting External beacon in step 2 above. Default value is 300 MHz
5. Spectrum analyzer settings
   These are the setting that will be used when searching for the beacon.
6. Start position probe type 1
   These are the coordinates of the point around which we will start to search for the beacon when type 1 is selected in step 6 above.
7. Start position probe type 2
   These are the coordinates of the point around which we will start to search for the beacon when type 2 is selected in step 6 above.
8. Return to factory settings
   Click here to return to factory default settings.

Positional calibration of the near field probe (SCN-500 series)

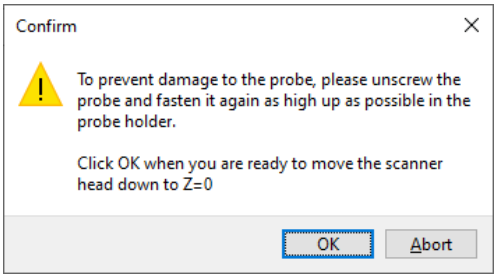
1. Make sure the scanner table is empty.
2. Reset the scanner.



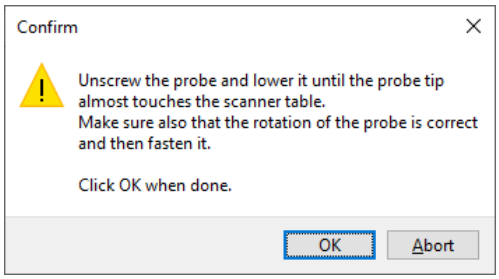
3. After reset you will get the choice to adjust the height of the probe. Click Yes.



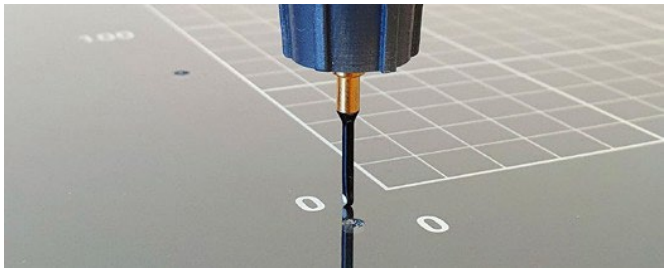
4. Make sure that the probe is mounted heigh enough, or just remove the probe to be extra safe, before clicking OK to move down.



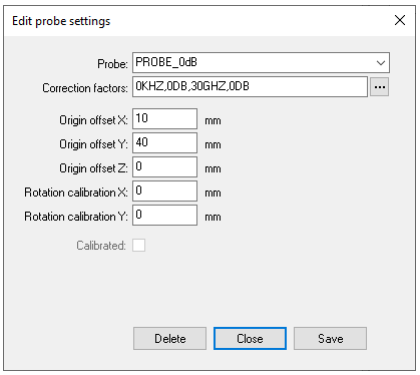
5. Lower the probe untill it almost touches the scanner table and fasten it.



6. Now the height (Z axis) of the probe is set.
7. If the tip of the probe is not located at the origin of coordinates, then the origin offset values need to be adjusted.
8. Measure the distance between the center of the probe tip and the origin of the coordinates of Scanner table.

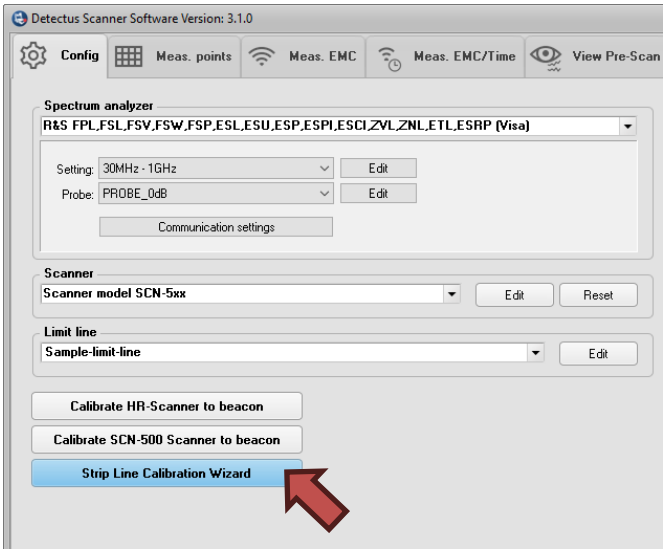


9. Click on the **Config** tab.
   In the **Spectrum analyze**r box, near the **Probe** setting, click the **Edit** button.



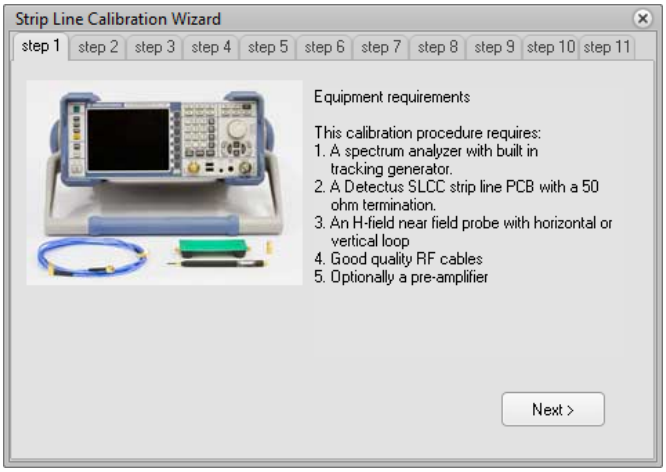
10. Adjust the values of **Origin Offset X and Y** with the
11. distances measured in step 8.
    Please note! The value for Origin Offset Z is not in use for SCN-5xx series and must be set to zero.
12. Click on the **Save** and then the **Close** button.
13. Reset the scanner by repeating steps 2 – 4
14. Repeat step 8 to 12 until the tip of the probe is positioned above the origin of coordinates after a reset.

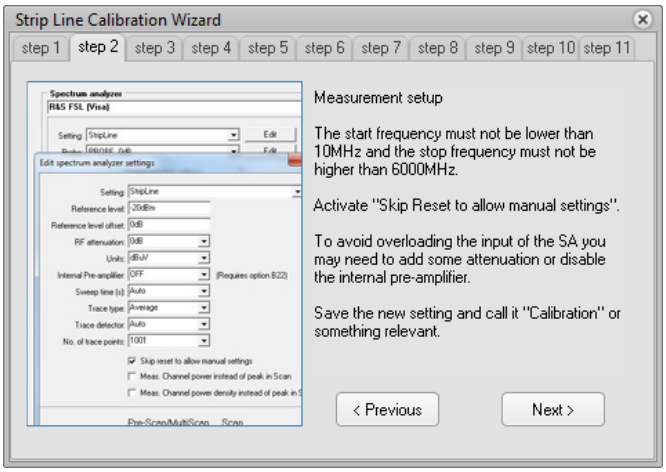
Amplitude/frequency calibration using Strip line calibration option (All scanner models)

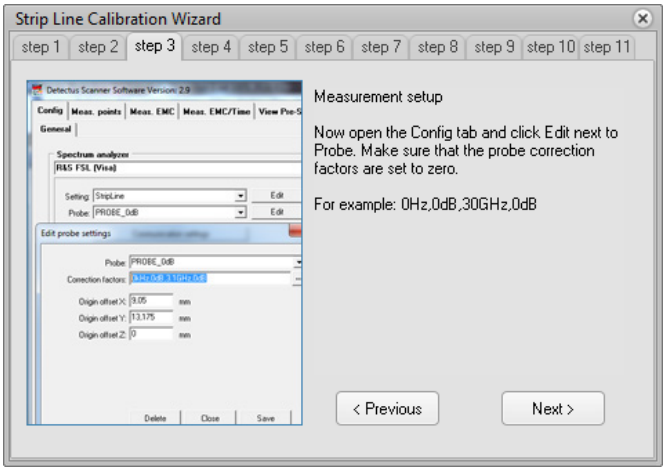


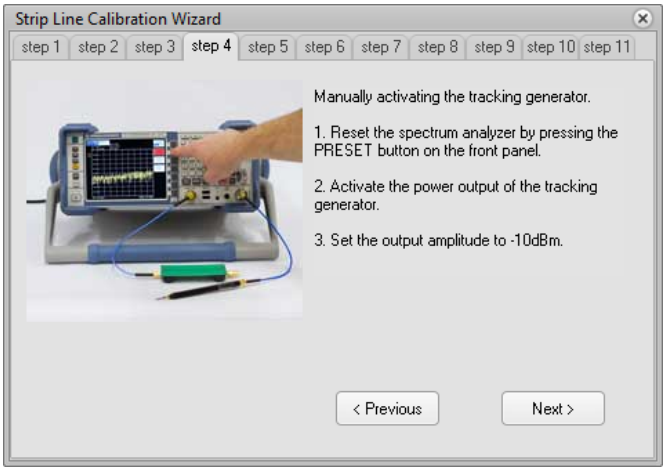
The strip line calibration option enables you to accurately measure the field strength of the magnetic near field and to compare measurements made with different probes and setups. The probe calibration uses a well-defined strip line board and a spectrum analyzer with built in tracking generator to automatically generate probe correction factors in the Scanner Software, to compensate for imperfections in probes, cables, connectors and pre-amplifier. The calibration procedure only takes a few minutes and is very easy to perform. A step-by-step wizard includes detailed instructions on how to connect everything and setup the calibration measurement. Calibration can be made on any magnetic near field probe and covers a frequency range from 10 MHz to 6 GHz.

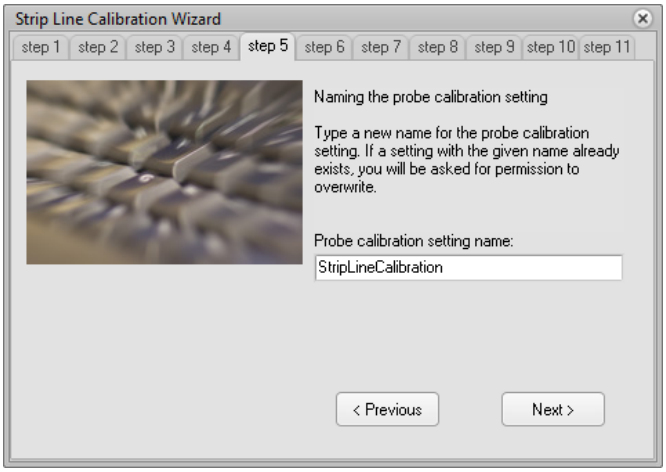




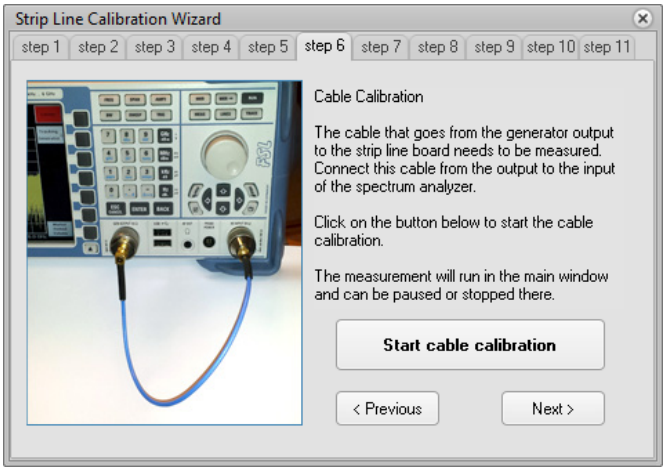


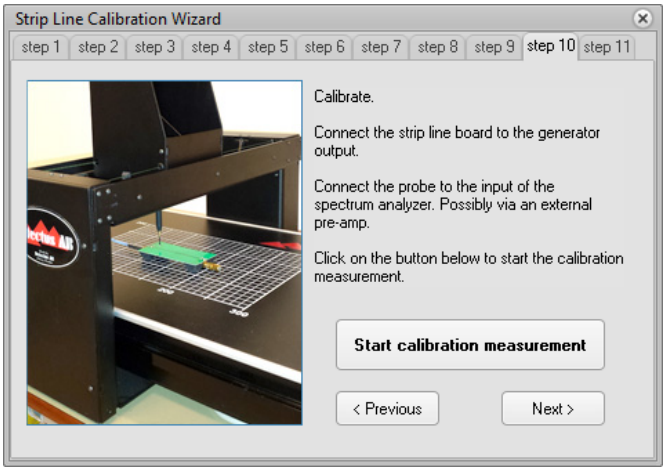


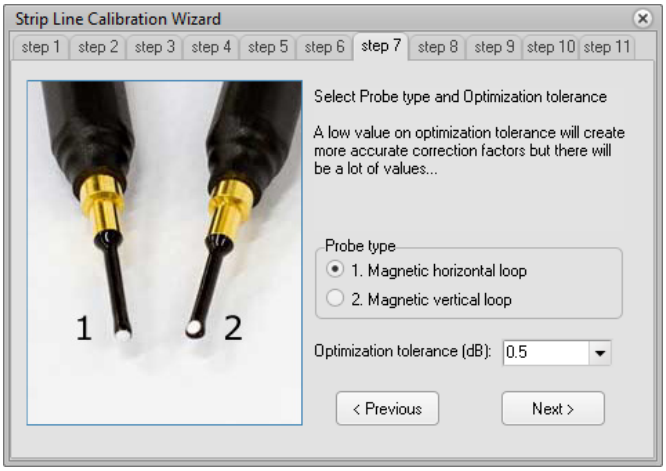


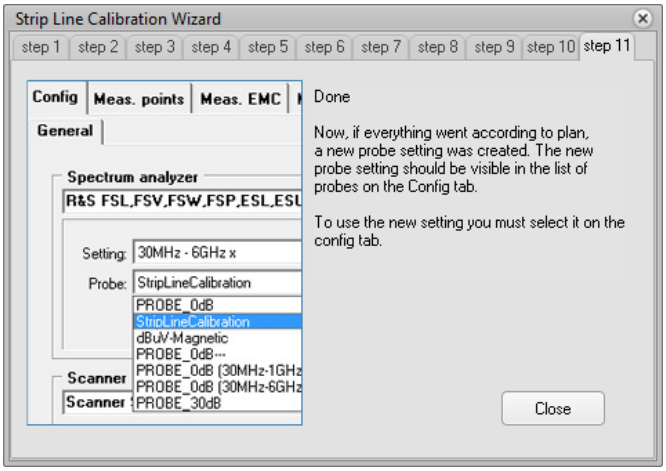


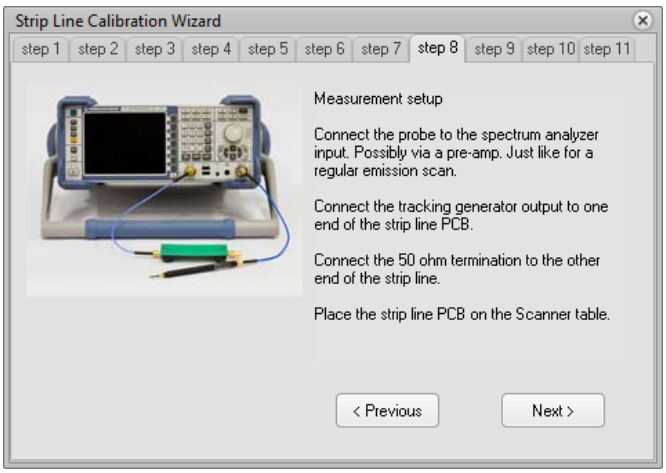
pendulum

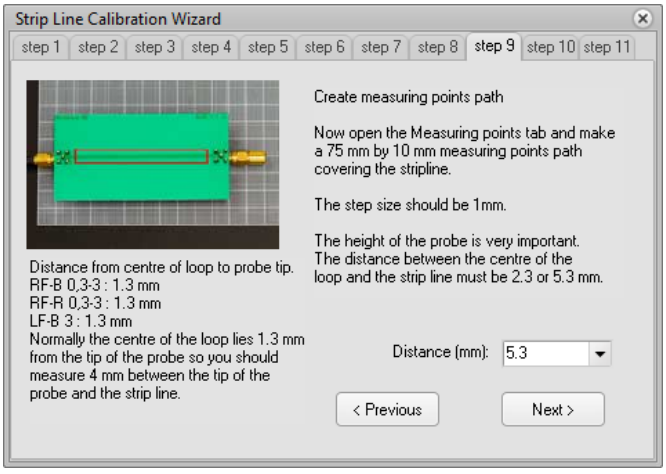

Strip Line Calibration Wizard
step 1 step 2 step 3 step 4 step 5 step 6 step 7 step 8 step 9 step 10 step 11
Cable Calibration
The cable that goes from the generator output to the strip line board needs to be measured. Connect this cable from the output to the input of the spectrum analyzer.
Click on the button below to start the cable calibration.
The measurement will run in the main window and can be paused or stopped there.
Start cable calibration
< Previous
Next >


Strip Line Calibration Wizard
step 1 step 2 step 3 step 4 step 5 step 6 step 7 step 8 step 9 step 10 step 11
Calibrate.
Connect the strip line board to the generator output.
Connect the probe to the input of the spectrum analyzer. Possibly via an external pre-amp.
Click on the button below to start the calibration measurement.
Start calibration measurement
< Previous
Next >


Strip Line Calibration Wizard
step 1 step 2 step 3 step 4 step 5 step 6 step 7 step 8 step 9 step 10 step 11
1
2
Select Probe type and Optimization tolerance
A low value on optimization tolerance will create more accurate correction factors but there will be a lot of values...
Probe type
1. Magnetic horizontal loop
2. Magnetic vertical loop
Optimization tolerance (dB): 0.5
< Previous
Next >


Strip Line Calibration Wizard
step 1 step 2 step 3 step 4 step 5 step 6 step 7 step 8 step 9 step 10 step 11
Config
Meas. points
Meas. EMC
General
Spectrum analyzer
R&S FSL,FSV,FSW,FSP,ESL,ESU
Setting: 30MHz - 6GHz x
Probe: StripLineCalibration
PROBE_0dB
StripLineCalibration
dBuV-Magnetic
PROBE_0dB---
PROBE_0dB (30MHz-1GHz
PROBE_0dB (30MHz-6GHz
PROBE_30dB
Scanner
Scanner
Done
Now, if everything went according to plan, a new probe setting was created. The new probe setting should be visible in the list of probes on the Config tab.
To use the new setting you must select it on the config tab.
Close


Strip Line Calibration Wizard
step 1 step 2 step 3 step 4 step 5 step 6 step 7 step 8 step 9 step 10 step 11
Measurement setup
Connect the probe to the spectrum analyzer input. Possibly via a pre-amp. Just like for a regular emission scan.
Connect the tracking generator output to one end of the strip line PCB.
Connect the 50 ohm termination to the other end of the strip line.
Place the strip line PCB on the Scanner table.
< Previous
Next >

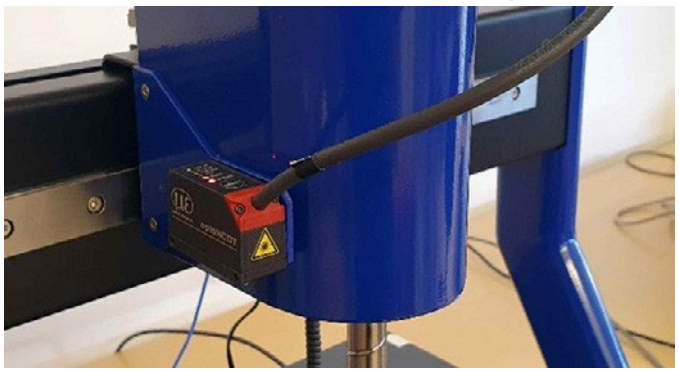

Strip Line Calibration Wizard
step 1 step 2 step 3 step 4 step 5 step 6 step 7 step 8 step 9 step 10 step 11
Distance from centre of loop to probe tip.
RF-B 0,3-3 : 1.3 mm
RF-R 0,3-3 : 1.3 mm
LF-B 3 : 1.3 mm
Normally the centre of the loop lies 1.3 mm from the tip of the probe so you should measure 4 mm between the tip of the probe and the strip line.
Create measuring points path
Now open the Measuring points tab and make a 75 mm by 10 mm measuring points path covering the stripline.
The step size should be 1mm.
The height of the probe is very important. The distance between the centre of the loop and the strip line must be 2.3 or 5.3 mm.
Distance (mm): 5.3
< Previous
Next >

Laser Distance Meter (LDM) of SCN-500 series of EMC Scanners

The LDM is measuring the topography of a DUT using laser triangulation to create a 3D model (STL) that can be used to measure emission or immunity with the SCN-500 series of EMC Scanners.

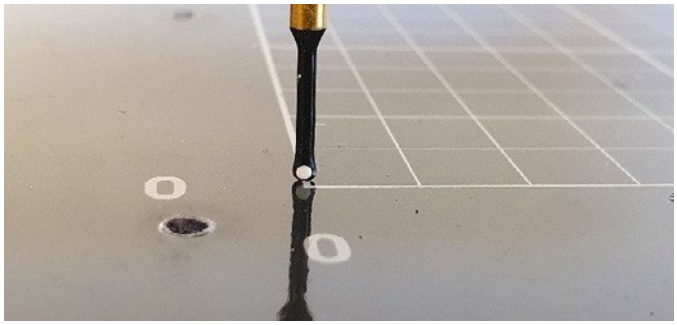
The LDM is sending a laser beam straight down projecting a red dot on the surface of the DUT. A slightly angled camera built into the LDM registers the position the laser dot and the height is calculated by triangulation.

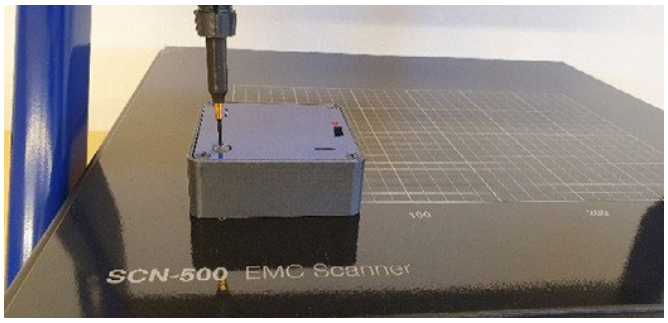
The LDM is attached on the left side of the ZR module of the SCN-500 EMC Scanner and connected at the top.



Preparations:

Before we begin calibration the position of the LDM we must make sure that the probe is properly calibrated to the coordinate grid. This can be done either manually or with the help of the Beacon calibration option.



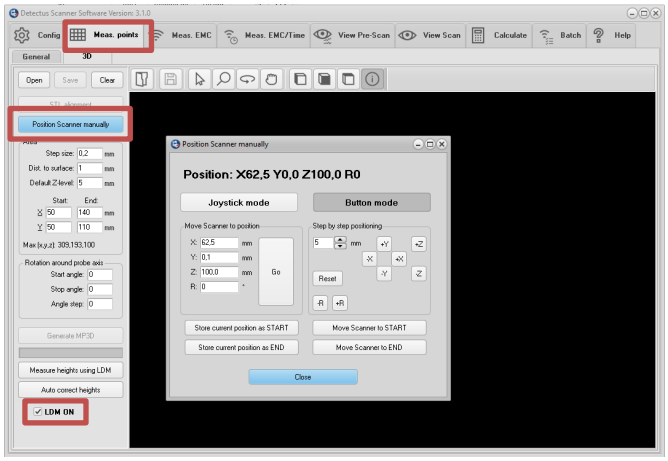


Measuring the position of the LDM:

For the LDM to work properly it need to be calibrated in position. That is, the offset in X and Y of the laser beam compared to the probe must be typed into the software.

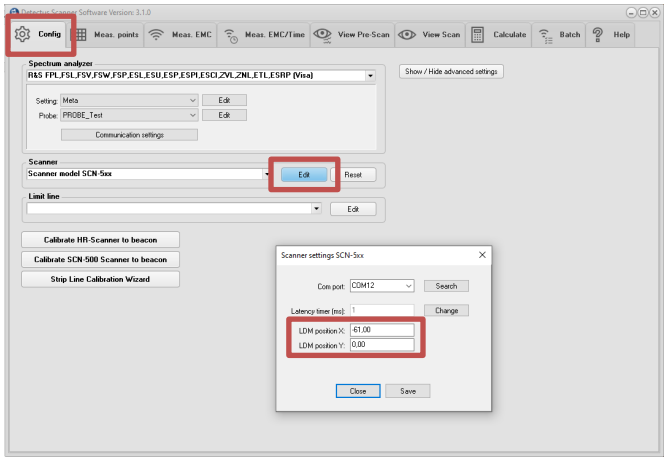
Measure the offset like this:

1. Go to Measuring Points tab - 3D.
2. Turn the laser on by checking LDM ON.
3. Click “Position Scanner manually” to open the positioning dialog.
4. Move the scanner head using the step-by-step movement buttons until the red laser dot is at the origin of coordinates.
5. Remember the X and Y position.
6. Turn the laser off.



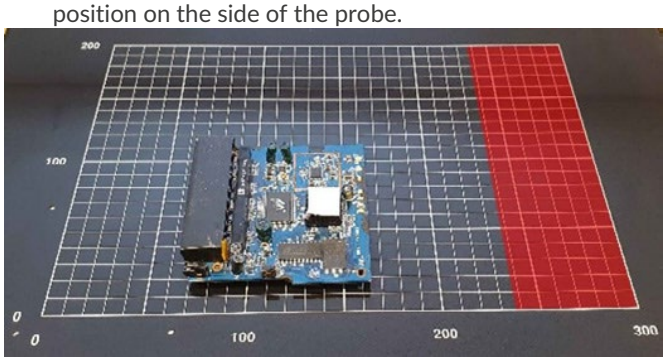
Enter the LDM offset coordinates:

1. Go to Config tab and click the Scanner Edit button.
2. Type in the reversed coordinates from the positioning dialog.
3. Click Save and then Close.

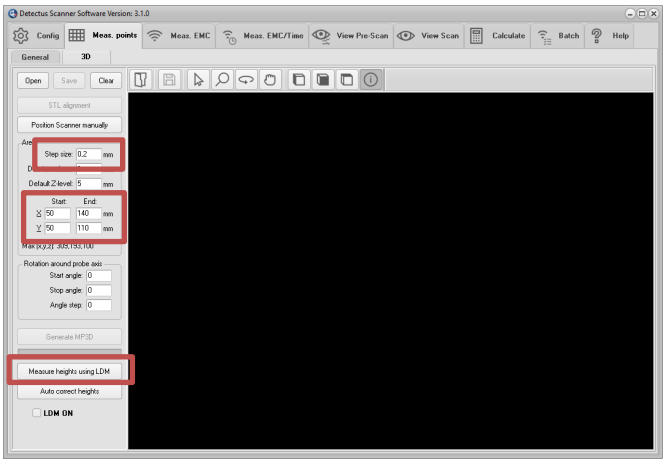


Measuring the topography of a DUT:

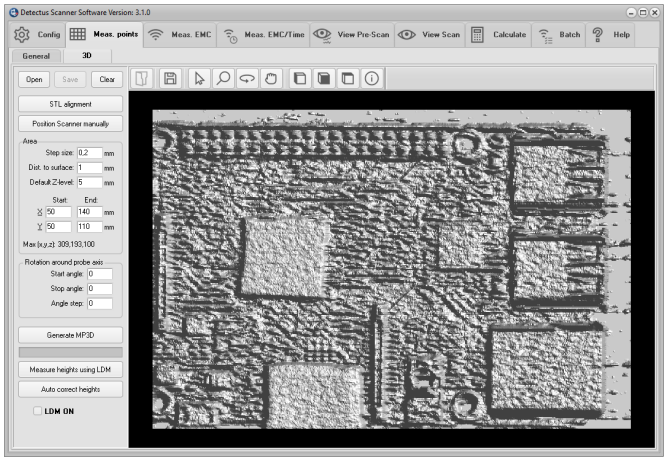
1. Place the DUT on the scanner table. Keep in mind that there is an area to the right where the laser cannot reach due to its position on the side of the probe.



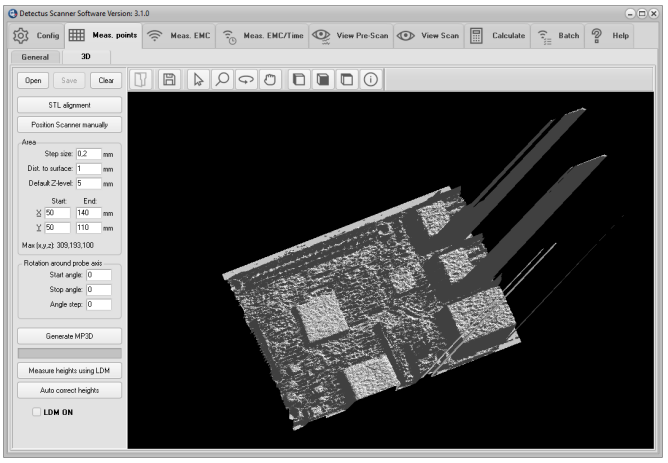
2. Go to Meas. Points tab – 3D.



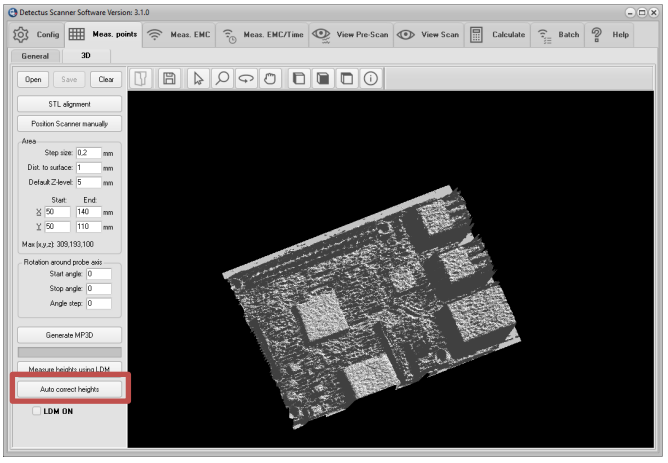
3. Enter the coordinates for an area that covers the DUT.
4. Enter the step size.
5. Click the button “Measure heights using LDM”.
6. Enter a filename for the 3D model in the “Save As” dialog that opens.
7. The scanning will begin.
8. When the scanning is done you can load the 3D model and it probably looks fairly good from the top view.



9. However, depending on the shape of the DUT and if the laser dot was blocked from the view of the camera, there may be some points where we have no good reading. If so, those points will show as unreasonably heigh spikes.



10. The feature “Auto correct heights” will find the points with bad readings and try to correct them by approximation from the surrounding points.
11. Clicking “Auto correct heights” will open a “Save As” dialog and it is recommended to choose a different name and not overwrite the original 3D model just in case…



Tip:

Sometimes it is impossible to completely avoid bad readings because of the shape of the DUT but it is possible to reduce the number points in a few easy ways.

- Rotate the DUT so that steep edges are facing in the Y+ direction.
- Cover deep holes with non-transparent tape.
- Cover shiny parts with non-transparent tape.

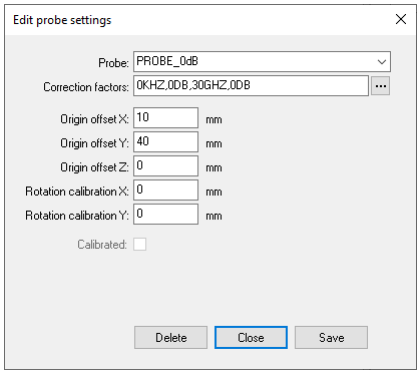
Entering the amplitude correction factors of the near field probe

You can calibrate your probe, Pre-amp and cables automatically and accurately using Detectus Strip line calibration board and the self-explaining wizard found on the Config tab. The Strip line calibration board is sold separately and requires a spectrum analyzer with built-in tracking generator. Make sure the scanner table is empty.

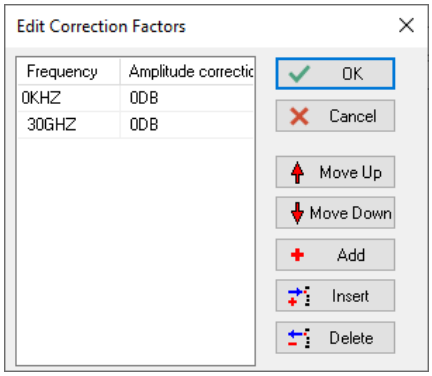
1. Click on the **Config** tab.
   In the **Spectrum analyzer** box, near the **Probe** setting, click the **Edit** button.



2. Enter a new name for the probe setting in the **Probe** text box. **Please note** that the name must begin with **PROBE_**.



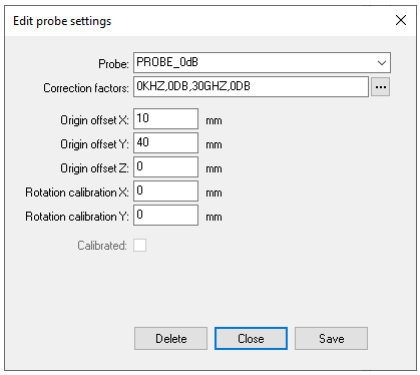
3. Click the … button to edit the **Correction factors**.
   Enter the frequency in Hz, kHz, MHz or GHz. Enter the amplitude correction in dB.



4. Click on the **OK** button.
5. Click on the **Close** button.

Positional calibration of the IR-probe (DS, and Rx series)

1. Place the IR-probe in the Z-axis carriage. The probe should point straight down towards the Scanner.
2. Click on the **Config** tab.
   In the **Scanner** box, click the **Reset** button.
3. Press the **LASER ON** button on top of the IR-probe.
   A diode will light a red spot on the Scanner for app. 15 seconds.
4. Measure the distance between the light spot and the origin of coordinates of the Scanner table.
5. Click on the **Config** tab.
   In the **Spectrum analyzer** box, near the **Probe** setting, click the **Edit** button.



6. Adjust the values of **Origin Offset X and Y** with the distances measured in step 4.
   For DS, RX and RQ scanners, do not change the value of **Origin Offset Z**. It should always be 10.
7. Click on the **Save** button.
8. Click on the **Close** button.
9. Click on the **Config** tab.
   In the **Scanner** box, click the **Reset** button.
10. Repeat step 2 to 9 until the light spot is positioned at the origin of coordinates after a reset.

Calibrating the temperature reading of the IR-probe (DS and Rx series)

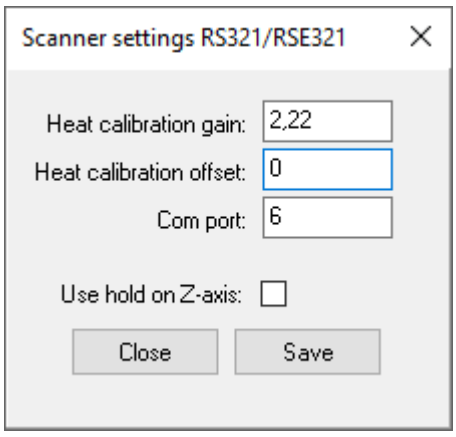
To be able to perform the calibration, you need two surfaces of different temperatures. A big difference in temperature between the two surfaces will generate a better result than a small difference in temperature. The temperatures of the surfaces need to be fairly stable during the calibration process.

Calibrating the temperature (°C) reading of the IR-probe is done in three steps:

1. Setting calibration factors to default values.
2. Calculating the calibration gain.
3. Calculating the calibration offset.

Setting calibration factors to default values

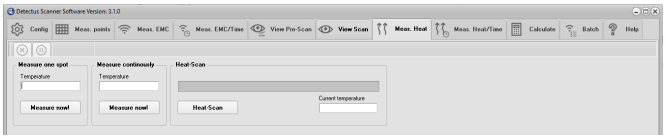
1. Click on the **Config** tab.
   In the **Scanner** box, click on the **Edit** button to show the next dialog box.



2. Make sure that the **Heat calibration gain** is set to 2.22 and that the **Heat calibration offset** is set to 0 (zero).
3. Click on the **Save** button.
4. Click on the **Close** button.

Calculating calibration gain

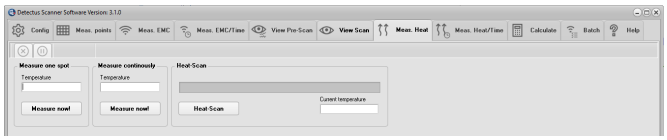
1. Point the IR-probe towards a surface with a low constant temperature, e.g. the black surface on top of the Scanner table.
2. Click on the **Meas. Heat** tab.
3. In the **Measure Continuously** box, click on the button **Measure Now** button.



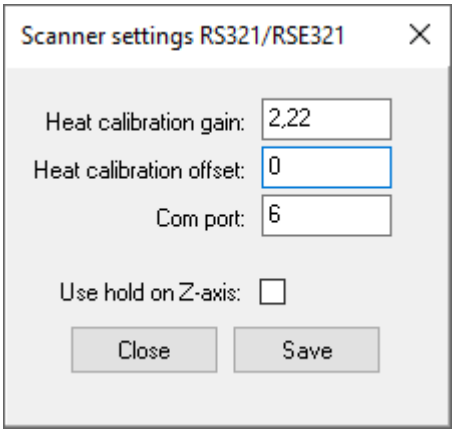
4. Make notes on the temperature reading on the screen and the temperature reading on the LCD display of the IR-probe.
5. Now point the IR-probe towards a surface with a high constant temperature.
6. Make notes on the temperature reading on the screen and the temperature reading on the LCD display of the IR-probe.
7. Calculate the new calibration gain using this formula:
   SCR1 = Low temperature shown on the screen.
   LCD1 = Low temperature shown on the LCD display of the IR-probe.
   SCR2 = High temperature shown on the screen.
   LCD2 = High temperature shown on the LCD display of the IR-probe.
   New calibration gain = (LCD2 - LCD1)/ (SCR2 - SCR1)*Old calibration gain
8. Cick on the **Config** tab.
   In the **Scanner box**, click on the **Edit** button to show the next dialog box.
9. Enter the new Heat Calibration gain
10. Click on the **Save** button.
11. Click on the **Close** button.
12. Repeat the procedure until (LCD2 - LCD1)/ (SCR2 - SCR1) is near one.

Calculating calibration offset

1. Point the IR-probe towards a surface with a constant temperature, e.g. the black surface on top of the Scanner table.
2. Click on the **Meas. Heat** tab.
3. In the **Measure Continuously** box, click on the button **Measure Now** button.



4. Make notes on the temperature reading on the screen and the temperature reading on the LCD display of the IR-probe.
5. Calculate the new offset factor using this formula:
   SCR = temperature shown on the screen.
   LCD = temperature shown on the LCD display of the IR-probe
   New calibration offset = LCD - SCR + old calibration offset.
6. Click on the **Config** tab.
   In the **Scanner** box, click on the **Edit** button to show the next dialog box.



7. Enter the new Heat Calibration gain.
8. Click on the **Save** button.
9. Click on the **Close** button.
10. Repeat the procedure until the temperature reading on the screen and the temperature reading on the LCD display of the IR-probe are equal.

Changing the heat emission factor of the IR probe

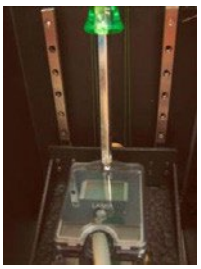
The emission factor is the rate of energy emitted from the surface of the object in front of the probe. All objects possess a particular emission factor which changes according to the object's conditions or temperature. Since the probe allows the emission factor to be set, even more precise measurements can be conducted by matching the emission factor of the object to be measured.

Objects with a low emission factor (e.g the surface of shiny metallic objects) reflect the surrounding temperature since they are reflective. In this case, it is necessary to block out these effects from the surrounding objects since incorrect measurements will result by reflecting these temperatures.

The emission factor normally has a maximum value of 1.00. However, taking into consideration the influence of the surrounding noise, the emission factor of the probe can be set up to 1.20.

This is how to change the emission factor of the probe:

1. Unscrew and remove the cover.



2. Press the enter button to enter setup mode. The button will light red.



3. Press arrow buttons until the cursor on the display is above the “ε”



4. Press the enter button to select the emissivity setting mode.
5. Press the arrow buttons to adjust the emission factor.
6. Press the enter button to exit the emissivity setting mode.
7. Press the enter button to exit the setup mode.
8. Mount to cover.

How to ...

How to mount the probe - SCN-500 series

1. Connect the RF cable to the probe and tighten the nut firmly. It is very important that the nut is firmly tighten because of the rotation forces that will occur during four axis measurements.



2. Insert the probe from the top of the Z axis.



3. Fasten the probe by tightening the nut firmly.

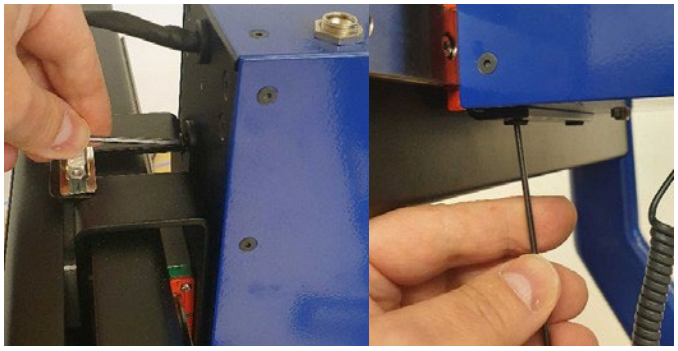


How to mount the ZR module - SCN-500 series

1. In the package with the SCN-500 EMC Scanner there is a small plastic bag with three screws and an Allen key. Those are for mounting the ZR module.



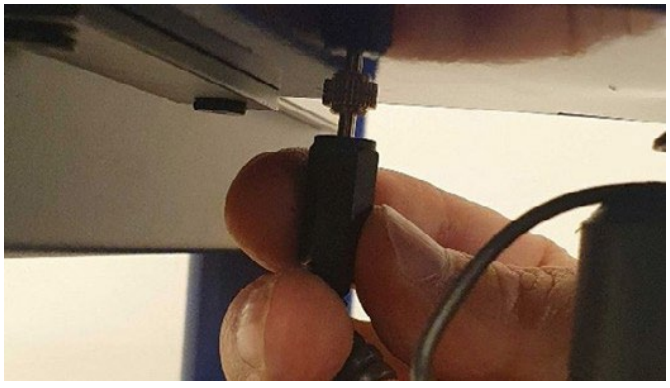
2. Mount the ZR module and fasten it with the upper screw first. Then fasten the two screws a the bottom.



3. Connect the 15-pin D-SUB and secure it with the two screws. Use a regular flat head screwdriver.



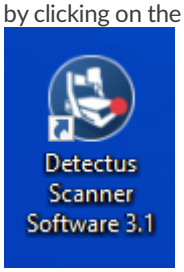
4. Connect the probe holder to the ZR module.



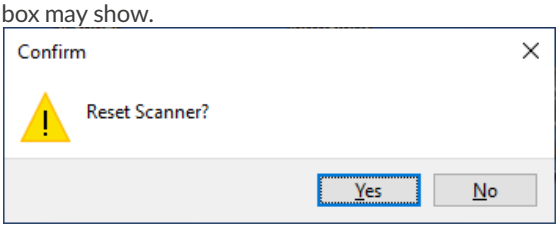
How to perform Pre-Scan and EMC-Scan measurements

This chapter will guide you through, step by step, how to perform a simple EMC-Scan measurement step by step.

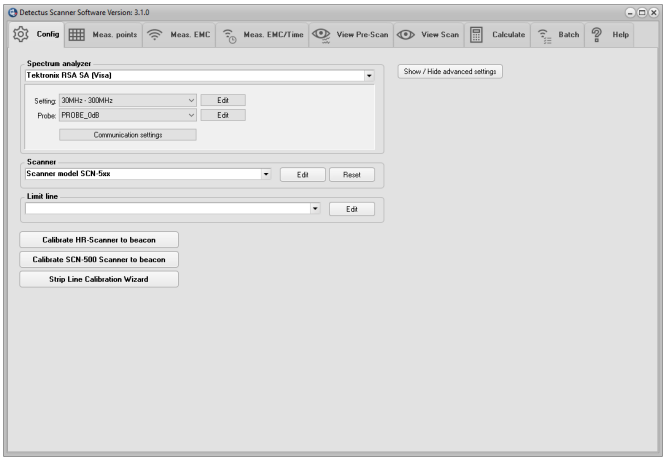
1. Start the software by clicking on the icon on your desktop.



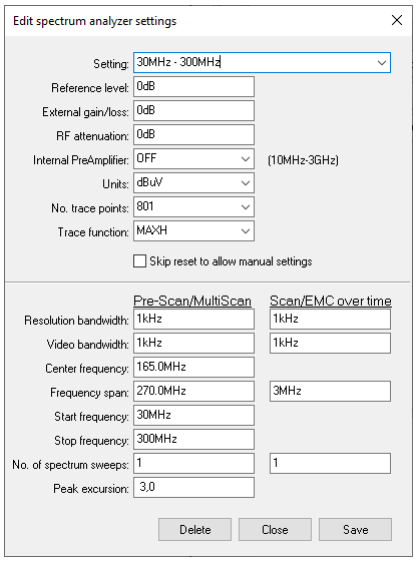
2. After a few seconds, depending on scanner model, this dialog box may show.



3. Click on **Yes** to reset the Scanner to its starting.
4. Position and calibrate the near field probe according to the procedure in “Positional calibrating the near field probe”.
5. Make sure that the near field probe is connected to the spectrum analyzer (possibly via a pre-amplifier) and that all instruments are powered on.
6. Click on the **Config** tab.

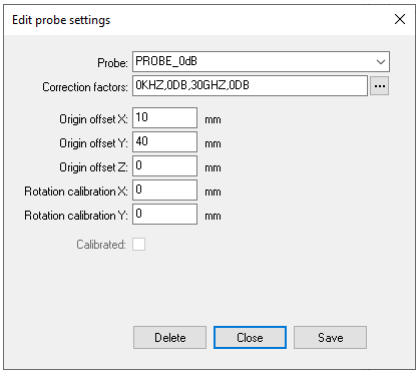


7. In the **Spectrum analyzer** box, near **Setting**, click on the **Edit** button.

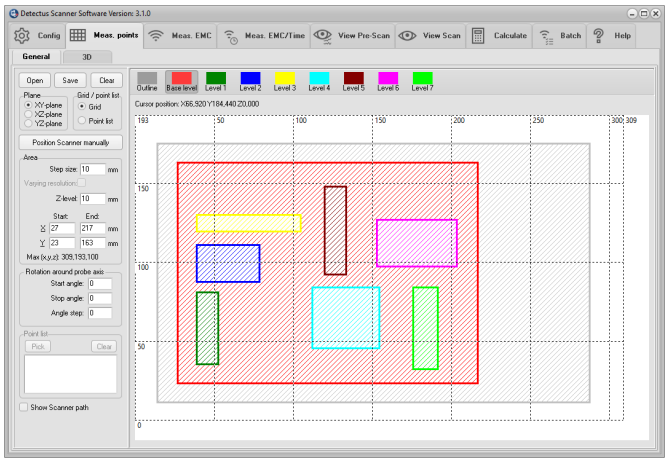


This is the Settings dialog box.

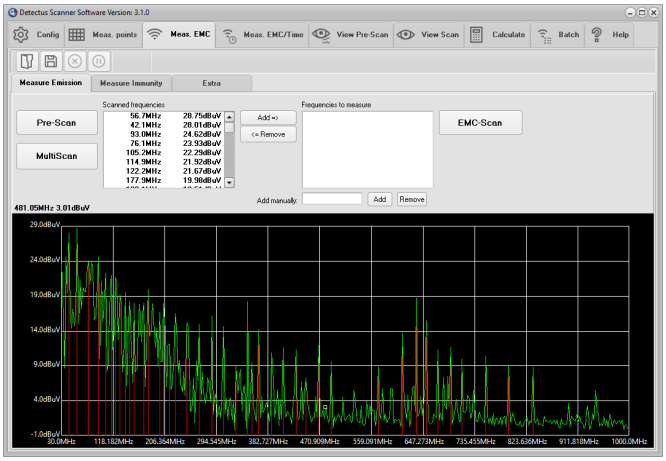
8. Click on the ”down arrow” on the right side of the **Setting** box and select a suitable setting from the list showing all stored settings. If no suitable setting is found, you may enter a new setting name and alter the settings to suit.
9. Click on the **Save** button.
10. Click on the **Close** button.
11. Click on the **Config** tab.
    In the **Spectrum analyzer** box, near the **Probe** setting, click on the **Edit** button.
12. Click on the ”down arrow” on the right side of the **Probe** box and select a suitable setting from the list showing all stored settings. If no suitable setting is found, you may enter a new setting name and alter the settings to suit. (Refer to “Entering the amplitude correction factors of the near field probe”).



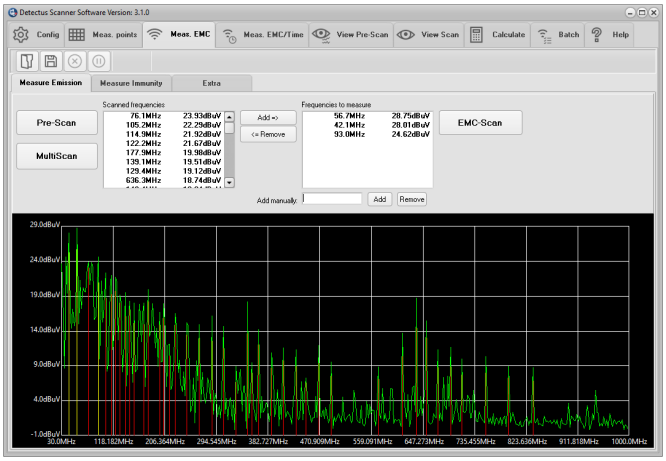
13. Click on the **Save** button.
14. Click on the **Close** button.
15. Place the test object on the Scanner table.
16. Click on the **Meas. points** tab.
17. Click on the **General** button to select 2.5-dimensional measuring points. It is also possible to generate full 3D measuring points. See “How to generate 3D measuring points” for a detailed description.
18. In the **Grid / Point** list box, select **Grid.**



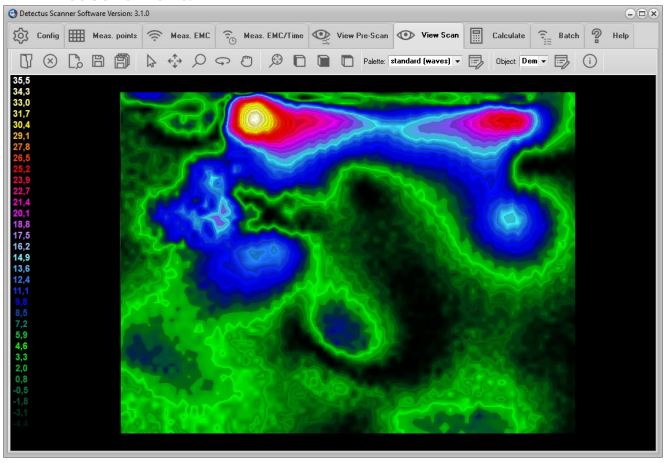
19. Enter a suitable step size in the **Step size** box. A small step size will generate a high-resolution measurement and a large step size will generate a low-resolution measurement.
    Measuring in large steps is quicker than measuring in small steps.
20. Select measuring plane by clicking on **XY plane, XZ plane or YZ plane.**
21. Click on the **Outline** button.
    Define the outline of the test object by entering values in the **Area** box. You may also click and draw the outline.
    Drawing the outline is optional but may be valuable when you want to repeat a measurement.
22. Click on the **Base level** button. Define the measuring area by entering values in the **Area** box. You may also click and draw the area.
23. Enter the value of **Z-level** in the **Area** box.
    Z-level is the height of the probe above the Scanner table during measurement.
24. You may define "islands" with different Z-levels than the Base level by clicking on **Level 1 ... Level 7** buttons. This is useful e.g. to make the probe skip over high components on a PCB.
25. The measuring point can be saved (as an **.MP** file) for later use by clicking on the **Save** button.
26. Click on the **Meas. EMC** tab



27. Click on the **Pre-Scan** button to start the wide-band measurement. (The setting for this measurement was defined in step 6.)
    When the measurement is finished, you will see the spectra and a list of peaks.
28. Click on the **Save** button to save the measurement.
    (Saving is optional, but you will find it useful when you want to repeat a measurement and compare the results.)
29. Select the desired frequencies from the list of **Scanned frequencies** and click on the **Add =>** button to move the frequencies into the list of **Frequencies to measure**.
    Other ways of entering a frequency into the list of **Frequencies to measure**, are by double-clicking on the spectra graph or simply by typing the frequency into the **Add manually** box and clicking on the **Add** button next to it.



30. Click on the **EMC-Scan** button to start the narrow-band measurement of the selected frequencies. (The setting for this measurement was defined in step 6.)
31. Before the measurement is started, you will have to enter where to save the result as one or more files. Enter the desired file name.
    You do not have to enter the file extension because the files will automatically be named "**.E01"** for the first frequency, "**.E02"** for the second frequency and so on. The measuring results stored in these files can be visualized on the **View Scan** tab.
32. Click on the **View Scan** tab.
    Click on the  button to load a previously saved EMC-Scan measurement.

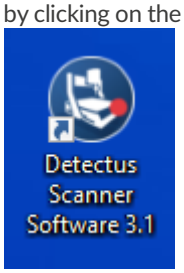


33. There are many ways to visualize the result of an **EMC-Scan** measurement, utilizing the features on the **View Scan** tab. For detailed information, please refer to page 131.
34. The result of an **EMC-Scan** measurement can be documented as a report in HTML format and printed out.
    Click on the  button to create the report and open it in your default HTML browser. In your browser you can save or print the report. If you want to edit the report you can use any word processor that is capable of reading HTML-formatted files.

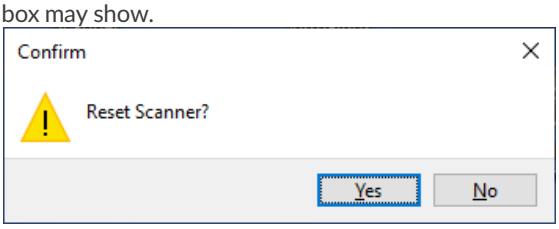
How to perform a MultiScan measurement

This chapter will guide you through, step by step, how to perform a simple EMC-Scan measurement step by step.

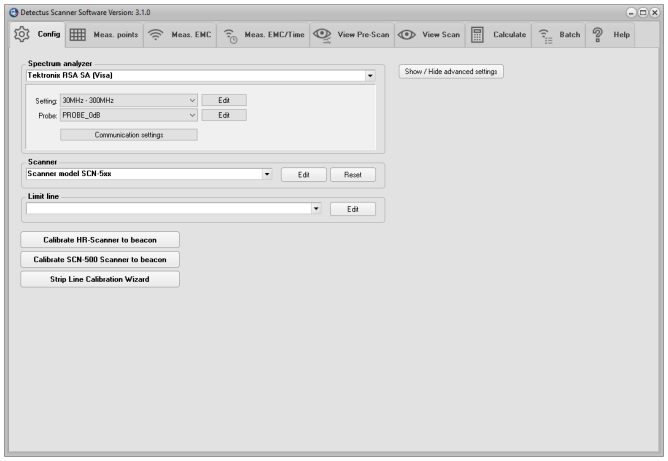
1. Start the software by clicking on the icon on your desktop.



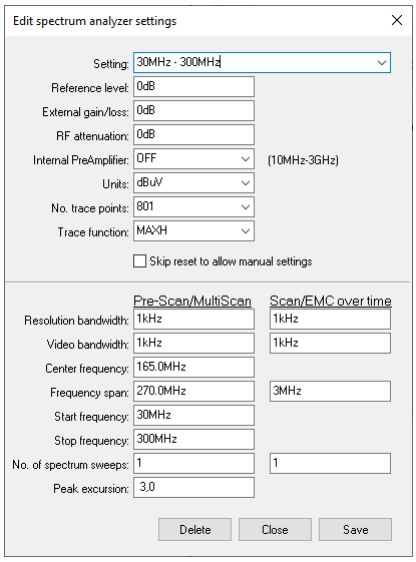
2. After a few seconds, depending on scanner model, this dialog box may show.



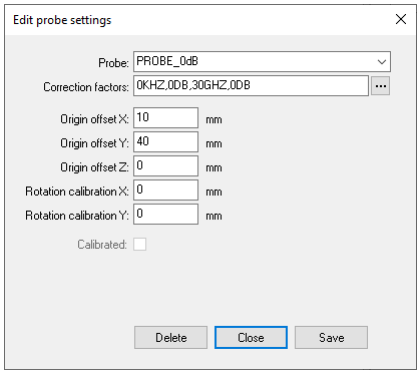
3. Click on **Yes** to reset the Scanner to its starting position.
4. Position and calibrate the near field probe according to the procedure in “Positional calibration of the near field probe”.
5. Make sure that the near field probe is connected to the spectrum analyzer (possibly via a pre-amplifier) and that all instruments are powered on.
6. Click on the **Config** tab.



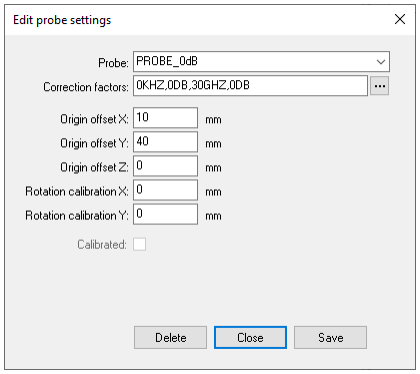
7. In the **Spectrum analyzer** box, near **Setting**, click on the **Edit** button.
   This is the Settings dialog box.



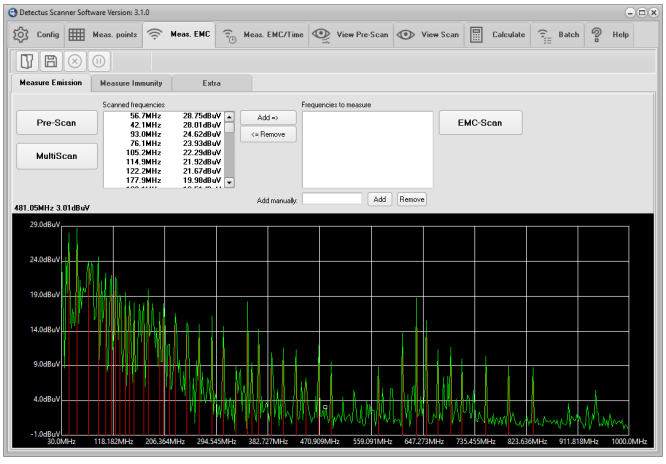
8. Click on the ”down arrow” on the right side of the **Setting** box and select a suitable setting from the list showing all stored settings. If no suitable setting is found, you may enter a new setting name and alter the settings.
9. Click on the **Save** button.
10. Click on the **Close** button.
11. Click on the **Config** tab.
    In the **Spectrum analyzer** box, near the **Probe** setting, click on the **Edit** button.



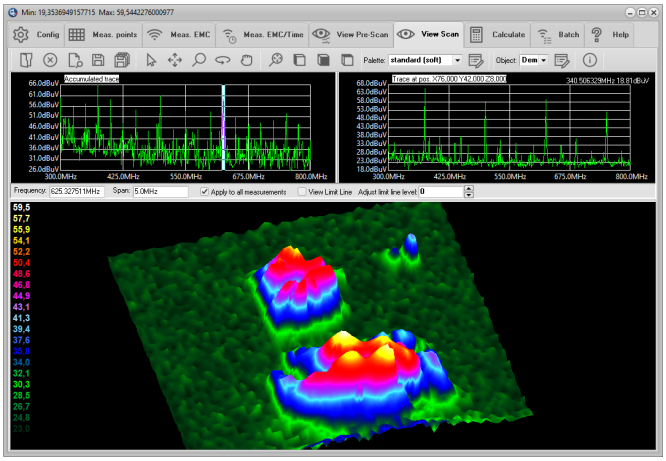
12. Click on the ”down arrow” on the right side of the **Probe** box and select a suitable setting from the list showing all stored settings. If no suitable setting is found, you may enter a new setting name and alter the settings. (Refer to “Entering the amplitude correction factors of the near field probe”).
13. Click on the **Save** button.
14. Click on the **Close** button.
15. Place the test object on the Scanner table.
16. Click on the **Meas. points** tab.
17. Click on the **General** button to select 2.5-dimensional measuring points. It is also possible to generate full 3D measuring points. See “How to generate 3D measuring points” for a detailed description.
18. In the **Grid / Point** list box, select **Grid.**



19. Enter a suitable step size in the **Step size** box. A small step size will generate a high-resolution measurement and a large step size will generate a low-resolution measurement.
    Measuring in large steps is quicker than measuring in small steps.
20. Select measuring plane by clicking on **XY plane, XZ plane or YZ plane.**
21. Click on the **Outline** button.
    Define the outline of the test object by entering values in the **Area** box. You may also click and draw the outline.
    Drawing the outline is optional but may be valuable when you want to repeat a measurement.
22. Click on the **Base level** button. Define the measuring area by entering values in the **Area** box. You may also click and draw the area.
23. Enter the value of **Z-level** in the **Area** box.
    Z-level is the height of the probe above the Scanner table during measurement.
24. You may define "islands" with different Z-levels than the Base level by clicking on **Level 1 ... Level 4** buttons. This is useful e.g. to make the probe skip over high components on a PCB.
25. The measuring point can be saved (as an **.MP** file) for later use by clicking on the **Save** button.
26. Click on the **Meas. EMC** tab



27. Click on the **MultiScan** button to start the wide-band measurement of the selected frequency span. (The setting for this measurement was defined in step 7.)
    Before the measurement is started, you will have to enter the location to save the result as one or more files.
28. Enter the desired file name.
    You do not have to enter the file extension because the files will automatically be named **.MS2D.** The measuring results stored in this file can be visualized on the **View Scan** tab.
29. Click on the **View Scan** tab.
30. Click on the button to load a previously saved MultiScan measurement.
31. There are many ways to visualize the result of a **MultiScan** measurement by utilizing the features on the **View Scan** tab. For detailed information, please refer to page 131.

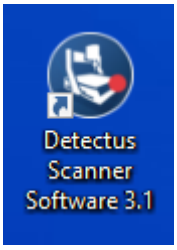


32. The result of a **MultiScan** measurement can be documented as a report in HTML format and printed out.
    Click on the button to create the report and open it in your default HTML browser. In your browser, you can save or print the report. If you want to edit the report, you can use any word processor that is capable of reading HTML-formatted files.

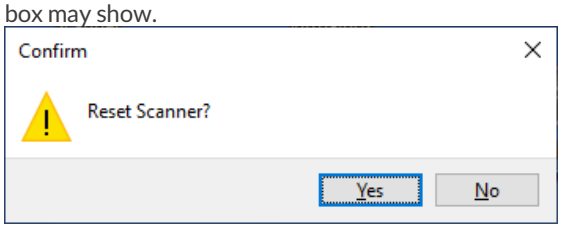
How to perform a Heat-Scan measurement (Only on RS series)

This chapter will guide you, step by step, through a simple Heat-Scan measurement step by step.

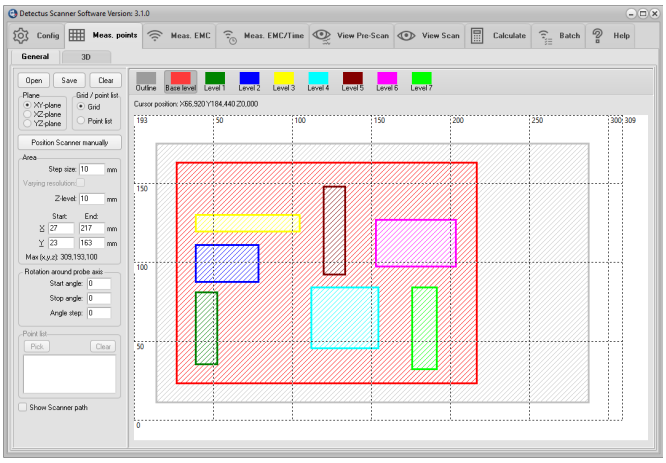
1. Start the software by clicking on the icon on your desktop.



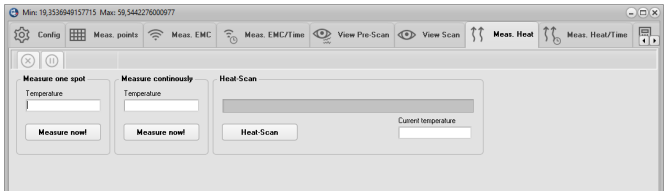
2. After a few seconds, depending on scanner model, this dialog box may show.



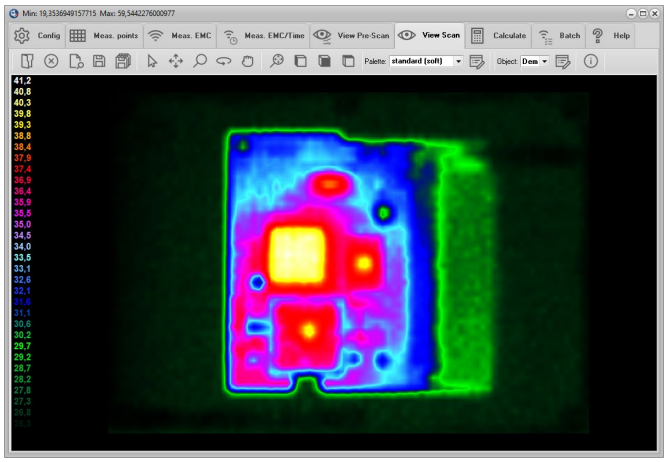
3. Click on **Yes** to reset the Scanner to its starting position at coordinates X0 Y0 Z10.
4. Position and calibrate the IR-probe according to the procedure in “Positional calibration of the IR-probe against Scanner”.
5. Click on the **Meas. points** tab.
6. Click on the **General** button to select 2.5-dimensional measuring points. It is also possible to generate full 3D measuring points. See “How to generate 3D measuring points” for a detailed description.
7. In the **Grid / Point list** box, select **Grid**.



8. Enter a suitable step size into the **Step size** box. A small step size will generate a high-resolution measurement and a large step size will generate a low-resolution measurement.
   Measuring in large steps is quicker than measuring in small steps.
9. Select the desired measuring plane by clicking on **XY plane, XZ plane or YZ plane.**
10. Click on the **Outline** button.
    Define the outline of the test object by entering values into the **Area** box. You may also click and draw the outline.
    Drawing the outline is optional, but you will find it useful when you want to repeat a measurement.
11. Click on the **Base level** button.
    Define the measuring area by entering values into the **Area** box. You may also click and draw the area.
12. Enter the value of **Z-level** into the **Area** box.
    Z-level is the height of the probe above the **Scanner** table during measurement.
13. You may define “islands” with different **Z-levels** than the Base level, by clicking on the **Level 1 ... Level 4** buttons. This is useful e.g. to make the probe skip over high components on a PCB.
14. The measuring points can be saved (as .MP files) for later use by clicking on the Save button.
15. Click on the **Meas. Heat** tab.



16. Click on the **Heat-Scan** button to start the measurement.
17. Before the measurement is started, you will have to enter the location to save the result file. Enter the desired file name. You do not have to enter the file extension because the file will automatically be named “**.T01”.** The measuring results stored in these files can be visualized on the **View Scan** tab.
18. Click on the **View Scan** tab.
    Click on the button to load a previously saved **Heat-Scan** measurement.

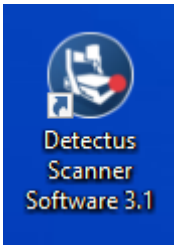


19. There are many ways to visualize the result of a Heat-Scan measurement by utilizing the features on the View Scan tab. For detailed information, please refer to page 131.
20. The result of a Heat-Scan measurement can be documented as a report in HTML format and printed out.
    Click on the button to create the report and open it in your default HTML browser. In your browser you can save or print the report. If you want to edit the report you can use any word processor that is capable of reading HTML-formatted files.

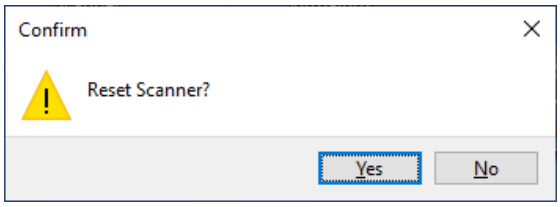
How to perform a Pre-Scan measurement on specified positions

This chapter will guide you step by step through a Pre-Scan measurement on specified positions.

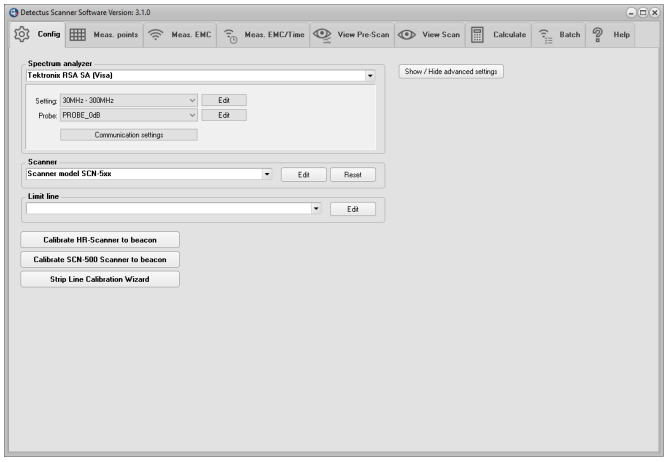
1. Start the software by clicking on the icon on your desktop.



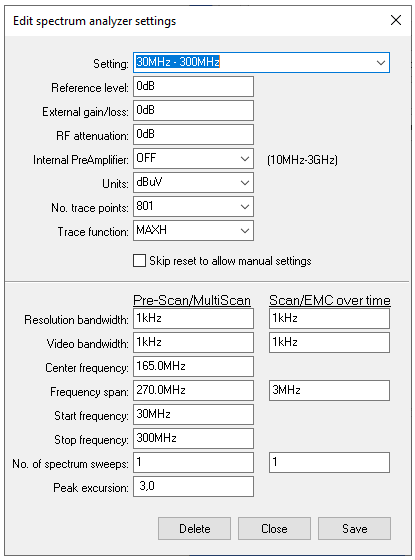
2. After a few seconds, depending on scanner model, this dialog box may show.



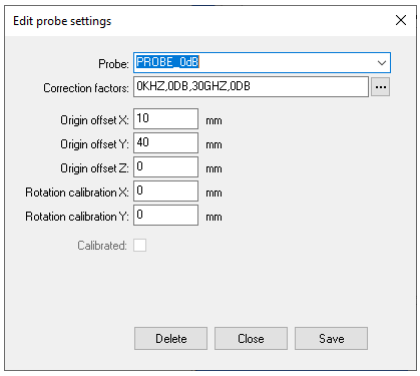
3. Click on **Yes** to reset the Scanner to its starting position at coordinates X0 Y0 Z10.
4. Position and calibrate the near field probe according to the procedure in “Positional calibration of the near field probe”.
5. Make sure that the near field probe is connected to the spectrum analyzer (possibly via a pre-amplifier) and that all instruments are powered on.
6. Click on the **Config** tab.



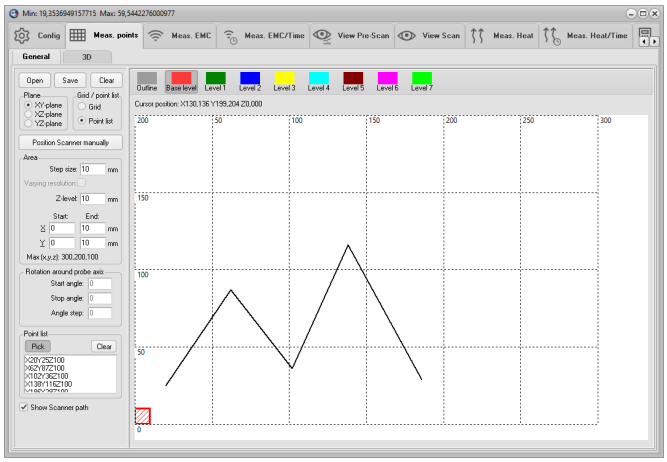
In the Spectrum analyzer box, near **Setting**, click on the **Edit** button.



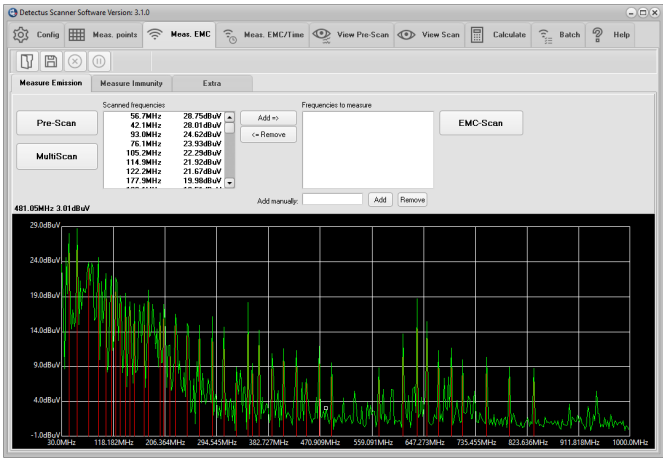
7. Click on the ”down arrow” on the right side of the **Setting** box and select a suitable setting from the list showing all stored settings. If no suitable setting is found, you may enter a new setting name and alter the settings.
8. Click on the **Save** button.
9. Click on the **Close** button.
10. Click on the **Config** tab.
    In the **Spectrum analyzer** box, near the **Probe** setting, click on the **Edit** button.



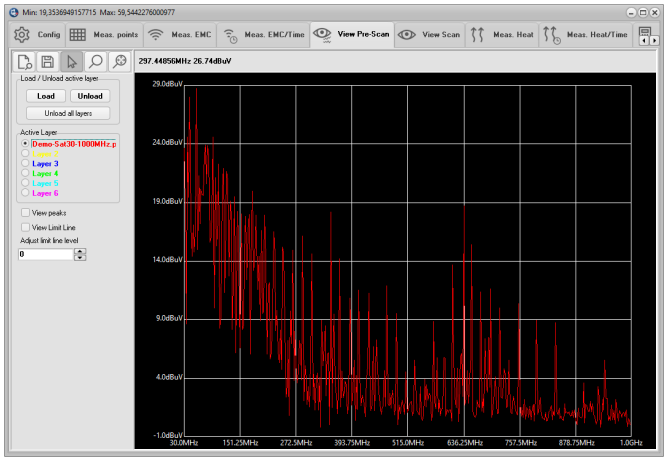
11. Click on the ”down arrow” on the right side of the **Probe** box and select a suitable setting from the list showing all stored settings. If no suitable setting is found, you may enter a new setting name and alter the settings to suit you. (Refer to “Entering the amplitude correction factors of the near field probe”).
12. Click on the **Save** button.
13. Click on the **Close** button.
14. Place the test object on the **Scanner** table.
15. Click on the **Meas. points** tab.
16. Click on the **General** button to select 2.5-dimensional measuring points. It is also possible to generate full 3D measuring points. See “How to generate 3D measuring points” for a detailed description.



17. In the **Grid / Point list** box, select **Point** list.
18. In the **Point list** box, click on the **Pick** button.
19. Pick a desired number of points by clicking on the grid.
    A dialog box will ask you to enter the **Z-level** of each point.
20. The measuring points can be saved (as **.MP** files) for later use by clicking on the **Save** button.
21. Click on the **Meas. EMC** tab.



22. Click on the **Pre-Scan** button to start the wide-band measurement.
    (The setting for this measurement was defined in step 6.
    When the measurement is finished the spectra graph and a list of peaks are displayed.
23. Click on the **Save** button to save the measurement as a **.PRE** file.
24. Click on the **View Pre-Scan** tab.



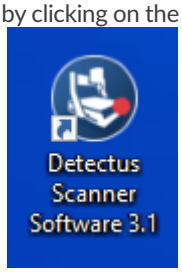
25. Click on the **Load** button and select the previously saved file.
26. For detailed information on how to operate the **View Pre-Scan** tab, please refer to table of contents.
27. The result of a **Pre-Scan** measurement can be documented as a report in HTML format and printed out.

    Click on the  button to create the report and open it in your default HTML browser. In your browser you can save or print the report. If you want to edit the report you can use any word processor that is capable of reading HTML-formatted files.

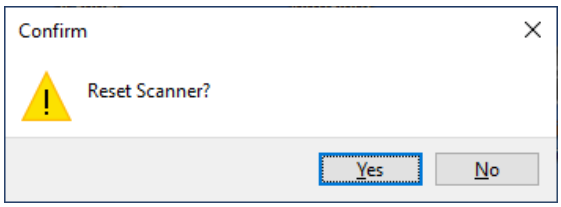
How to perform a spot Heat measurement over a period of time (DS and Rx series)

This chapter will guide you step by step through the heat measurement of a spot during a period of time.

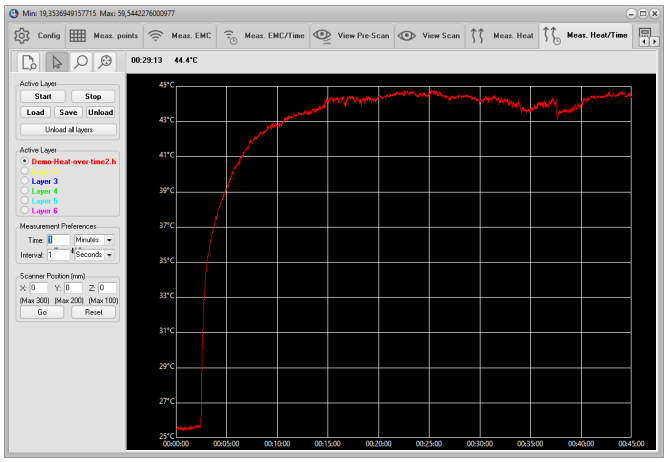
1. Start the software by clicking on the icon on your desktop.



2. After a few seconds, depending on scanner model, this dialog box may show



3. Click on **Yes** to reset the Scanner to its starting position at coordinates X0 Y0 Z10.
4. Position and calibrate the IR-probe according to the procedure in “Positional calibration of the IR-probe”.
5. Click on the **Meas. Heat/Time** tab.



6. Enter the desired coordinates into Scanner Position (mm) box, and click on the Go button to move the Scanner and aim the IR-probe towards the spot to be measured.
7. Verify the position of the IR-probe by pressing the **LASER ON** button on top of the IR-probe. (The laser will light for approximately 15 seconds.)

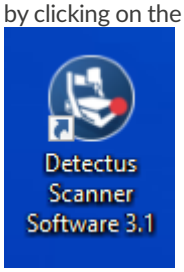
pendulum

8. In **Measurement Preferences** enter the total measuring time in the Time box.
9. In **Measurement Preferences** enter the interval desired between the individual measurements in the Interval box.
10. In the **Active Layer** box, select a colored layer.
11. Start the measurement by clicking on the **Start** button.
12. When the measurement is finished you can click on the Save button to save the measurement as a **.HOT** file. (Saving is optional but you will find it useful when you want to repeat a measurement and compare the results.

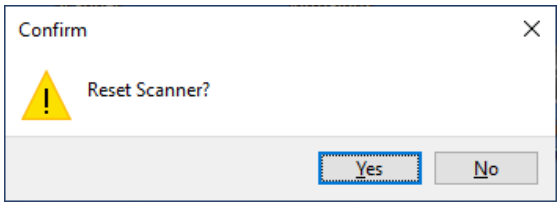
How to perform a spot EMC measurement over a period of time

This chapter will guide you, step by step, through making a spot EMC measurement over a period of time.

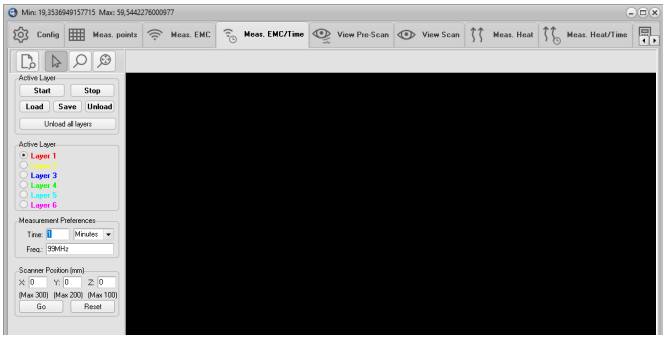
1. Start the software by clicking on the icon on your desktop.



After a few seconds, depending on scanner model, this dialog box may show



2. Click on **Yes** to reset the Scanner to its starting position at coordinates X0 Y0 Z10.
3. Position and calibrate the IR-probe according to the procedure in “Positional calibration of the IR-probe”.
4. Click on the **Meas. EMC/Time** tab.



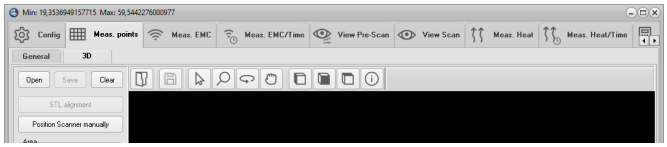
5. Enter the desired coordinates into **Scanner Position (mm)** box, and click on the **Go** button to move the Scanner and place the near field probe above the spot you want to measure.
6. In **Measurement Preferences** enter the total measuring time in the **Time** box.
7. In **Measurement Preferences** enter the desired frequency in the **Frequency** box. Allowed units are Hz, kHz, MHz and GHz.
8. In the **Active Layer** box, select a colored layer.
9. Start the measurement by clicking on the **Start** button.
10. When the measurement is finished you can click on the **Save** button to save the measurement as a **.EOT** file.
(Saving is optional but you will find it useful when you want to repeat a measurement and compare the results.)

How to generate 3D measuring points

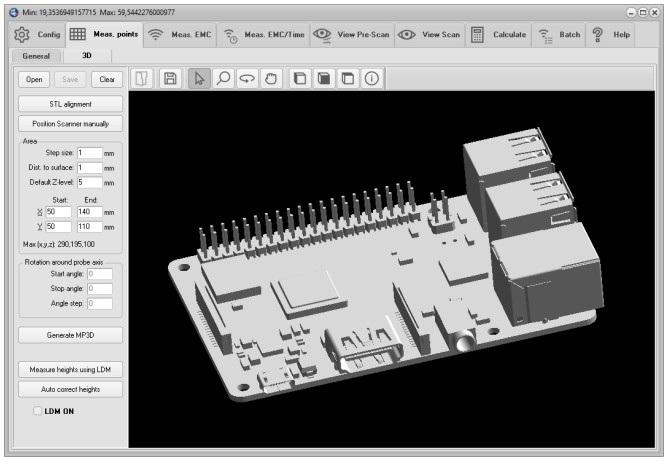
3D measuring points are based on a 3D surface model in STL file format.

The measuring points are generated to form an offset surface to the STL file.

1. Click on the **Meas. points** tab.



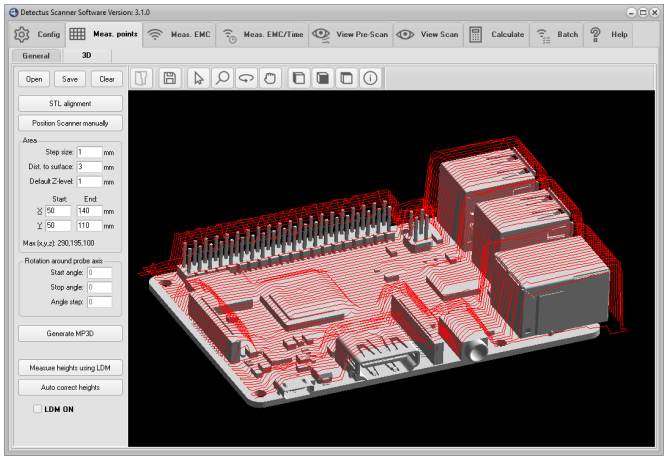
2. Click on the  button to open an STL-file.
Both ASCII and Binary STL-files are supported
3. The STL-file view can be rotated, zoomed and panned



4. Click on the **STL alignment** button.
Make sure the 3D model (STL-file) is aligned with the physical object on the scanner table by using the STL-alignment feature described in detail on page 103.
5. Set up the scanning area



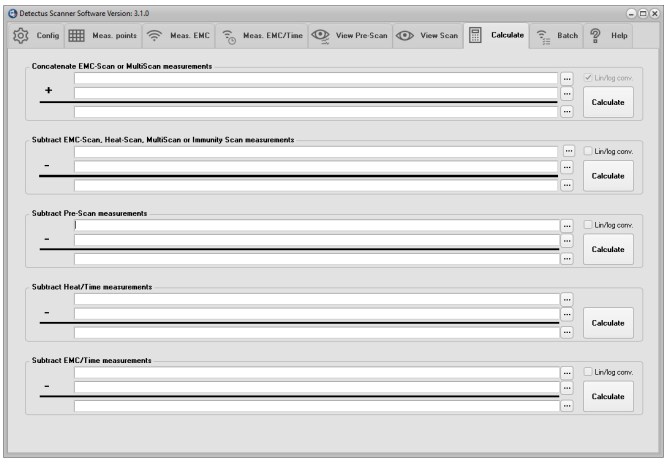
6. Click on the **Generate MP3D** button to generate the measuring points.
Generation may take some time if the 3D model is complex.
A blue bar will show the progress.
Generation can be stopped by clicking again on the same button.



How to make calculations

On the Calculate tab, you can perform four different calculations based on measurements. The calculations are as follows:

1. **Concatenate EMC-Scan measurements** is a vector addition, measuring point by measuring point, of two previously saved EMC-Scan measurements. This calculation is intended to eliminate the irregular appearance of the appearance of a measured field, caused by the difference in sensitivity in different angles of a dipole antenna.
   Perform a measurement, turn the antenna (probe) 90° and perform another measurement, then concatenate the two measurements.



2. **Subtract EMC-Scan or Heat-Scan measurements** is a subtraction, measuring point by measuring point, of two previously saved EMC-Scan or Heat-Scan measurements. This calculation is intended to visualize the difference between two EMC-Scan or two Heat-Scan measurements. For example, one measurement performed before and one after an alteration to the test object.
3. **Subtract Pre-Scan measurements** is a subtraction of two previously saved Pre-Scan measurements.
   This calculation is intended to visualize the difference between two Pre-Scan measurements. For example, one measurement performed before and one after an alteration to the test object.
4. **Subtract Heat/Time measurements** is a subtraction of two previously saved Heat/Time measurements.
   This calculation is intended to visualize the difference between two Heat/Time measurements. For example, one measurement performed before and one after, an alteration to the test object.
5. **Subtract EMC/Time measurements** is a subtraction of two previously saved EMC/Time measurements.
   This calculation is intended to visualize the difference between two EMC/Time measurements. For example, one measurement performed before and one after an alteration to the test object.

Lin/Log

Activating Lin/Log means that the calculation is performed in linear mode instead of logarithmic mode.

That is, all values are first converted from logarithmic mode to linear mode then the calculation is performed and then the result of the calculation is converted back to logarithmic mode.

Please note!

A negative linear result cannot be converted to log mode.

To resolve that the minus sign is removed before converting to log mode and then added to the result after conversion.

To make a calculation, do as follows:

1. Click on the two upper ... buttons to select the two files that will be used in the calculation.
2. Click on the lower ... button to select a folder and enter a name for the file that will contain the result of the calculation.
3. Click on the **Calculate** button to perform the calculation.
4. The resulting file can now be visualized on the corresponding View tab.

Reference manual

How the Pre-Scan measurement is performed in detail

1. The Scanner moves to the first measuring position.
2. The spectrum analyzer is reset.
3. Basic settings are transferred to the spectrum analyzer.
4. The spectrum analyzer is set to max hold mode.
   (Max hold means that the highest amplitude at each frequency is kept.)
5. The spectrum analyzer takes a number of sweeps.
6. The Scanner moves to the next measuring position.
7. Steps 5 to 6 are repeated until all measuring positions are measured.
8. The frequency and amplitude of all peaks are acquired.
   (The spectrum analyzer decides what is a peak and what is not.)
9. The trace is acquired.
10. The Scanner moves to its starting position.

How the Scan measurement is performed in detail

1. The spectrum analyzer is reset.
2. The Scanner moves to the first measuring position.
3. Basic settings are transferred to the spectrum analyzer.
4. The spectrum analyzer zooms in on the first selected frequency.
5. The spectrum analyzer is set to max hold mode.
   (Max hold means that the highest amplitude at each frequency is kept.)
6. The spectrum analyzer takes a number of sweeps.
7. The frequency and amplitude of the highest peak is acquired.
8. Max hold mode is cleared.
9. The spectrum analyzer zooms in on the next selected frequency.
10. Steps 5 to 9 are repeated until all frequencies are measured.
11. The Scanner moves to the next measuring position.
12. Steps 5 to 11 are repeated until all measuring positions and frequencies are measured.
13. The Scanner moves to its starting position.

How the MultiScan measurement is performed in detail

Basically, a MultiScan measurement is a series of Pre-Scan measurements, one in every measuring position.

From these Pre-Scan measurements field plots similar to Scan measurements, are generated. So when viewing the result from a MultiScan measurement any frequency can be chosen to look at in detail.

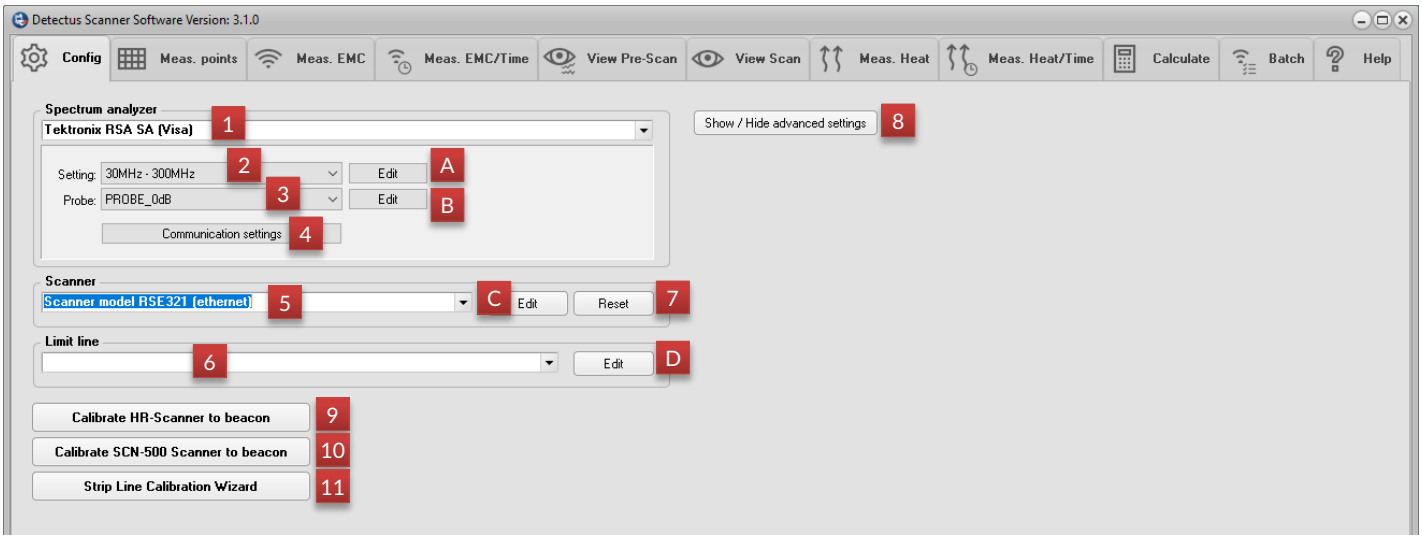
1. The spectrum analyzer is reset.
2. The Scanner moves to the first measuring position.
3. Basic settings are transferred to the spectrum analyzer.
4. The spectrum analyzer is set to max hold mode.
   (Max hold means that the highest amplitude at each frequency is kept.)
5. The spectrum analyzer takes a number of sweeps.
6. The trace data is transferred to the software.
7. Max hold mode is cleared.
8. The Scanner moves to the next measuring position.
9. Steps 4 to 8 are repeated until all measuring positions are measured.
10. The Scanner moves to its starting position.

How the Immunity-Scan measurement is performed in detail

An Immunity-Scan is, very much like a MultiScan measurement, only we measure immunity and not emission.

1. The signal generator (SG) and the Error Detection Device (EDD) is reset.
2. Basic settings are transferred to the SG and the EDD.
3. The Scanner moves to the first measuring position.
4. The lowest frequency and amplitude are sent to the SG.
5. Wait for a while (dwell time) to let the DUT react.
6. Measure DUT failure using the EDD and the Detection sequence.
7. If the DUT does not fail we increase the amplitude and measure again for DUT failure until the DUT fails or we reach the highest amplitude setting.
8. Store frequency and amplitude data.
9. Set the next frequency and redo from (5) until we have measured all frequencies.
10. The Scanner moves to the next measuring position.
11. Steps 4 to 10 are repeated until all measuring positions are measured.
12. The Scanner moves to its starting position.

The Config tab



On this tab, you may create your own settings for Scanner, spectrum analyzer, near field probe, IR-probe, limit lines, graphics and reports. You may also use the pre-defined settings.

1. Spectrum analyzer:

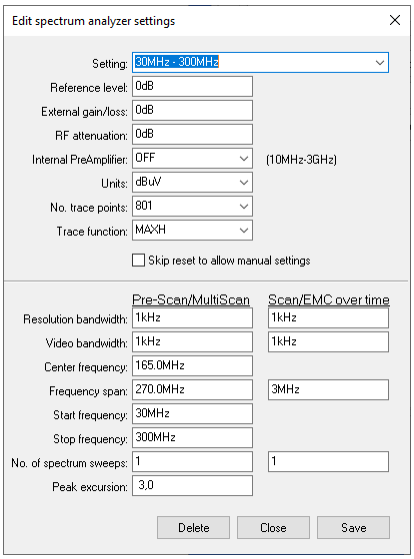
From the list of spectrum analyzer drivers, choose the one that best corresponds to your hardware. If no suitable driver is found, please contact your local supplier.

Drivers marked with (Visa) requires National Instruments Visa. NI Visa and instructions how to install it can be downloaded at www.ni.com. Click Support and then NI Visa...

2. Setting

Choose from the list of available spectrum analyzer settings.

Click on the **edit** button (A) to edit the selected spectrum analyzer setting.



The upper part of the **Edit spectrum analyser** settings dialog box contains settings that are valid for both **Pre-Scan** and **Scan** measurements. In the lower part of the dialog box, the settings for **Pre-Scan** and **Scan** measurements are separated into two columns.

The only setting that is not explained in the manual of the spectrum analyzer is **No. of spectrum sweeps.**

The **No. of spectrum sweeps** is the number of sweeps made by the spectrum analyzer in max hold mode at each measuring position. Please refer to page 46 for a detailed explanation of how to perform a measurement.

2.1 To view or edit a setting, click on the **Edit** button (A). The dialog box shown above will open. When you have finished editing, click on the **Save** button to save the changes and then on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.

2.2 To copy a setting, click on the **Edit** button (A). The dialog box shown above will open. Change the name in the upper text box labelled Setting and click on the **Save** button to save the setting under its new name, then click on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.

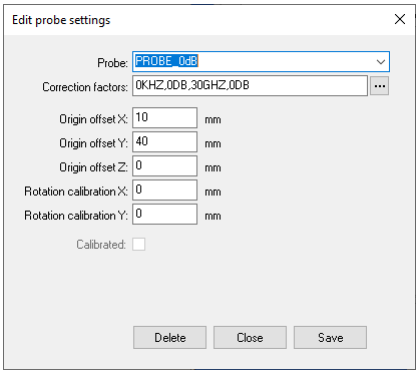
2.3 To create a new setting, make a copy of a setting as described in 2.2, and edit the new setting as described in 2.1.

2.4 To delete a setting, click on the **Edit** button (A), to open the dialog box shown above. Click on the **Delete** button. (You will also have to confirm the deletion.) When the current setting is deleted, no setting is active so before you can perform a new measurement you need to select another setting.

3. Probe

Choose from a list of available probe settings.

Click on the **Edit** button (B) to edit the settings of the selected probe.



3.1 To view or edit a setting, click on the **Edit** button (B). The dialog box shown above will open. When you have finished editing, click on the **Save** button to save the changes and then on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.

3.2 To copy a setting, click on the **Edit** button (B). The dialog box shown above will open. Change the name in the upper text box labelled Probe and click on the **Save** button to save the setting under its new name, then click on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.

3.3 To create a new setting, make a copy of a setting as described in 3.2, and edit the new setting as described in 3.1.

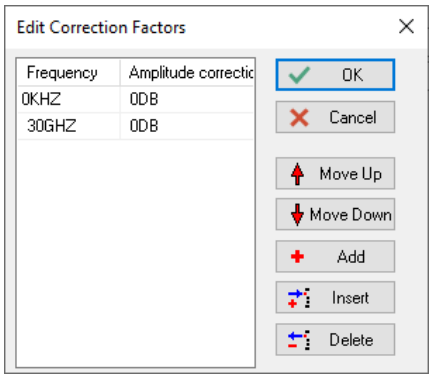
3.4 To delete a setting, click on the **Edit** button (B), to open the dialog box shown above. Click on the **Delete** button. (You will also have to confirm the deletion.) When the current setting is deleted, no setting is active so before you can perform a new measurement, you need to select another setting.

Correction factors

The **correction factor** is made up of pairs of values. A pair contains a frequency and an amplitude separated by a comma. A comma also separates the pairs.

The amplitude in the correction factor will be added to the measured amplitude at the specified frequency. The amplitude between two specified frequencies will be calculated linearly.

For easier editing of the correction factors, click on the ... button to open the dialog box shown below.



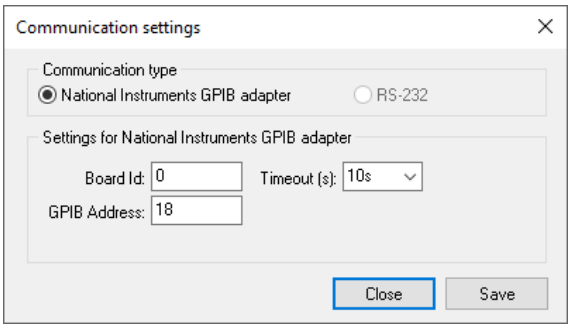
In this dialog box you can add, move, insert or delete frequency values and amplitude values.

The **Origin offset** is the distance from the position where the limiting position switch is activated to the position where the tip of the probe is at position X0,Y0. Please refer to ”Positional calibration of the near field probe”.

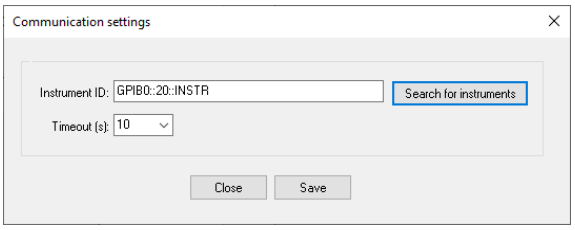
4. Communication settings

The communication settings dialog will look different for different spectrum analyzer drivers.

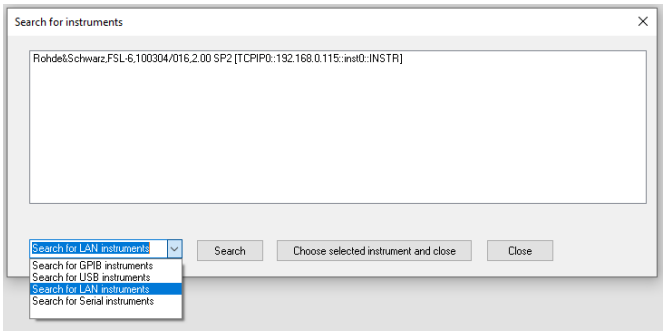
This is the settings dialog for the drivers that only support GPIB.



This is the settings dialog for the drivers that support Visa.



The Search for instruments button will open another dialog that allows for searching for instruments connected id different ways.



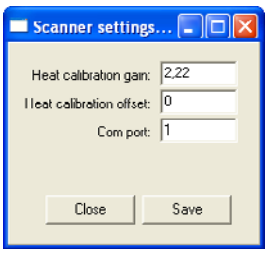
For searching to succeed the instrument must previously have been added into NI MAX. See page 11 for details.

5. Scanner

Select your Scanner model from the list.

Click on the **Edit** button (C) to edit the setting of the selected Scanner model.

When you have finished editing, click on the **Save** button to save the changes and then on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.



pendulum

5.1 Heat calibration gain:
This is the gain calibration factor of the IR-probe. Please refer to Calibrating the temperature reading of the IR-probe.

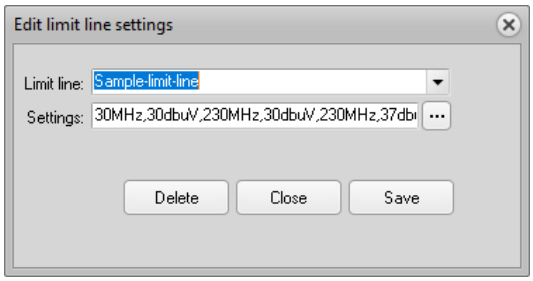
5.2 Heat calibration offset:
This is the offset calibration factor of the IR-probe. Please refer to Calibrating the temperature reading of the IR-probe.

5.3 Com port:
The number of the RS-232 port connected to the Scanner

6. Limit line

Choose from the list of previously defined limit lines. The limit lines can be used on the **View Pre-Scan** tab.

Click on the **Edit** button (E) to create or edit a limit line



6.1 To view or edit a setting, click on the **Edit** button (D). The dialog box shown above will open. When you have finished editing, click on the **Save** button to save the changes and then on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.

6.2 To copy a setting, click on the **Edit** button (D). The dialog box shown above will open. Change the name in the upper text box labelled Setting and click on the **Save** button to save the setting under its new name, then click on **Close** to close the dialog box. To discard any changes, just click on the **Close** button.

6.3 To create a new setting, make a copy of a setting as described in 6.2, and edit the new setting as described in 6.1.

6.4 To delete a setting, click on the **Edit** button (D), to open the dialog box shown above. Click on the **Delete** button. (You will also have to confirm the deletion.) When the current setting is deleted, no setting is active so before you can make a new measurement you need to select another setting.

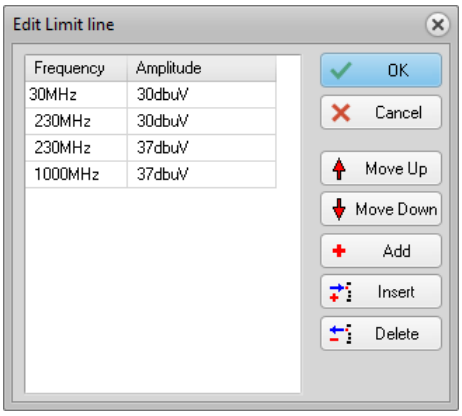
Limit line:

Type the name of a new limit line or select one that has previously been saved.

Settings:

The limit line is made up of pairs of values. A pair contains a frequency and an amplitude separated by a comma. A comma also separates the pairs.

For easier editing of the limit line, click on the … button to open the dialog box shown below.



In this dialog box you can add, move, insert or delete frequency values and amplitude values.

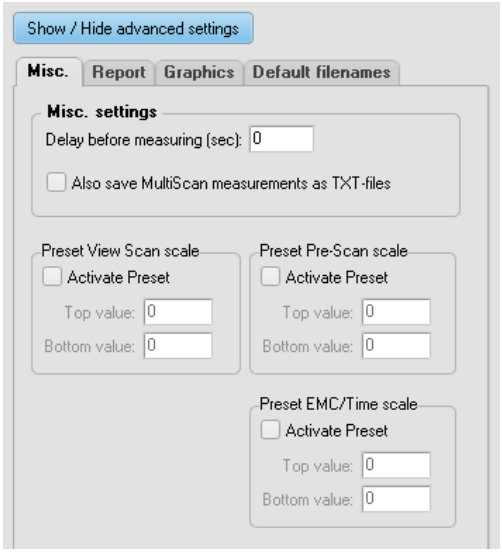
7. Reset:

Click the **Reset** button to reset the Scanner to its starting position.

8. Show/Hide Advanced settings

Click on this button to show or hide the advanced setting.

8.1 Misc. tab



8.1.1 Delay before measuring

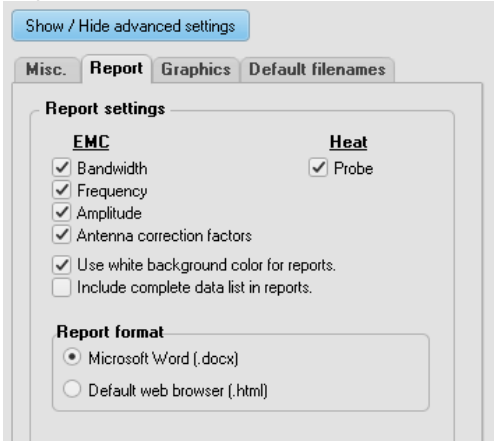
A delay, in seconds, before measuring at each measuring point.

8.1.2 Also save MultiScan measurements as TXT-files
Check this option to automatically also save a TXT-file.

8.1.2 Preset values in View Scan:
Check the **Activate Preset** box and adjust the default top and bottom value of the color palette used in View Scan tab. By default, the color palette is set up to cover the total amplitude span of the loaded measurements. By adjusting the top and bottom value of the color palette, you can focus the entire color palette to the amplitude span that you wish to examine.

8.1.3 **Preset values in Pre-Scan, Heat/Time and EMC/Time:** Check the **Activate Preset** box and adjust the default top and bottom value of the amplitude scale used on each tab.

8.2 Report tab

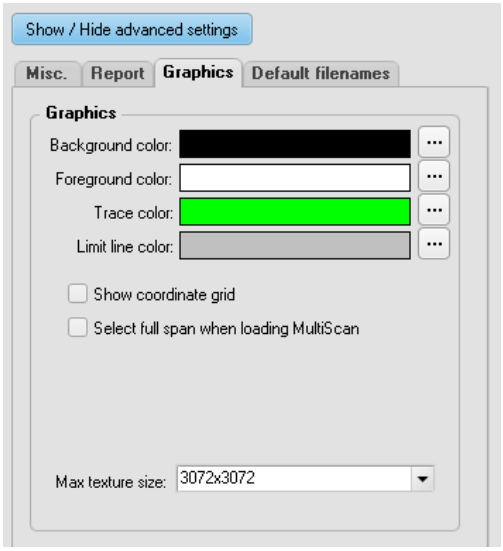


8.2.2 Report settings, EMC:
Check the options you wish to include in the EMC reports printed from the **View Scan and View Pre-Scan** tabs.

8.2.3 Report settings, Heat:
Check the options you wish to include in the Heat reports printed from the **Measure Heat/Time and View Scan** tabs.

8.2.4 Report format
From version 3.1 the default report format is Word docx. There are editable templates for the docx reports. The templates can be found in the Templates folder "C:\Users\Public\Documents\Detectus\Templates". Please note that if editing the templates in Word, spell checking should be turned off. Otherwise the keywords inside angle brackets could be messed up. If that happens a copy of the original templates can be found in "C:\Program Files (x86)\Detectus Scanner Software 3.1\Templates".

8.3 Graphics tab

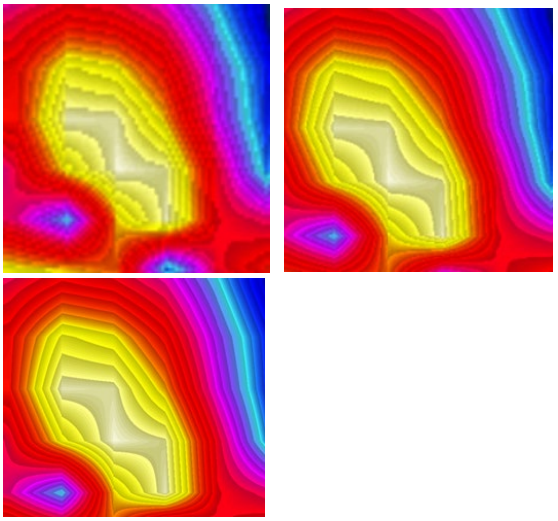


8.3.2 Background color, Foreground color, Trace color and **Limit line color:** Click on the ... button to select the foreground color of the graphics on the **Measure EMC** tab, the **Measure Heat/Time** tab, the **View Scan** tab and the **View Pre-Scan** tab.

8.3.3 Show coordinate grid on View Scan tab

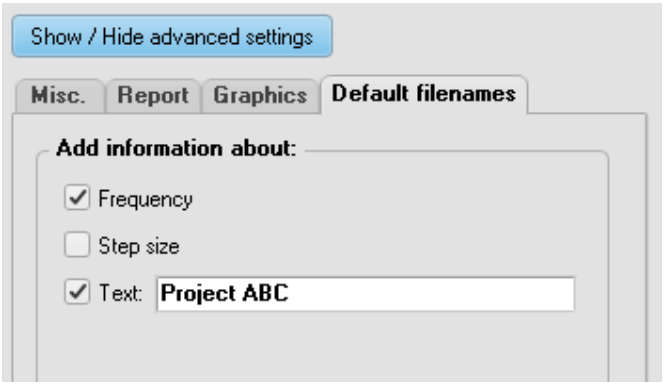
8.3.4 Select full span when loading MultiScan measurements on the View Scan tab.

8.3.5 Max texture size
Setting the texture size higher will give better images but also slower update when browsing frequencies on a MultiScan on View Scan tab. The optimal setting is different for different PCs.



8.4 Default filenames

The default measurement filenames can be setup to automatically include information about frequency, Step size and a line of text.



9 Calibrate HR Scanner to beacon

This button is only visible when HR Scanner is selected. For details refer to page 26.

10 Strip Line Calibration Wizard

For details see page 16 under Amplitude/frequency calibration using Strip line calibration option (All scanner models)

The Meas. points – General tab

On this tab, you define the measuring points. The measuring points can either make up a grid of points or just be individual points on specified positions.

1. Open

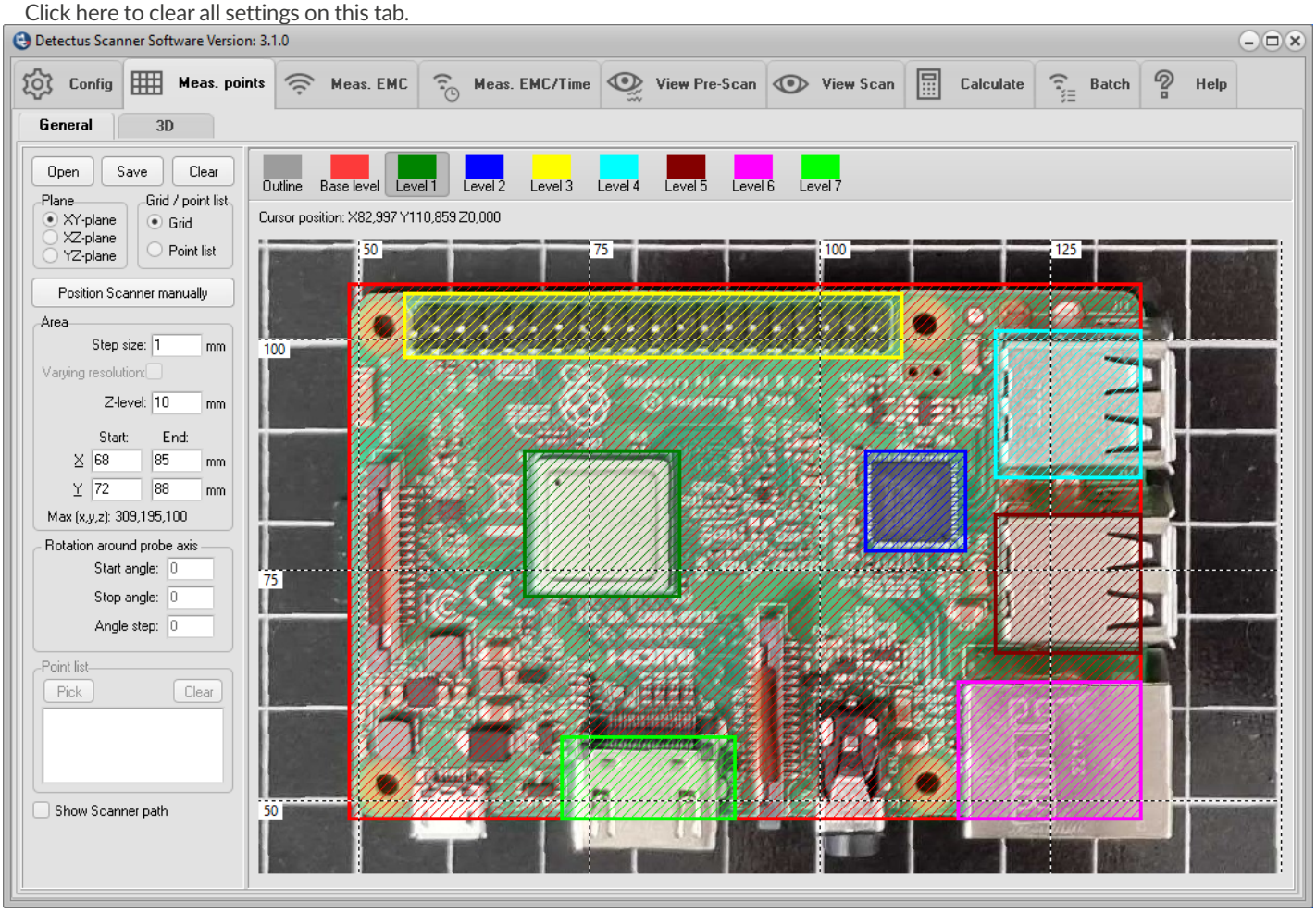
Click here to load a previously saved set of measuring points. The files containing measuring points are named *.MP.

2. Save

Click here to save a set of measuring points to an *.MP file.

3. Clear

Click here to clear all settings on this tab.



4. Grid/Point list

The option Grid will enable you to define a grid of measuring points. The option Point list will enable you to Pick individual points for measuring.

5. Plane

Select the orientation of the measuring plane.

6. Area

In this box, you define the area, step size and height of the currently selected level. (The level is selected by clicking on one of the buttons Outline, Base level, Level 1, Level 2, Level 3 and so on)

The settings in this box are valid only when Grid is selected in the Grid/Point list box.

Start X, End X, Start Y and End Y:

These values define an area aligned with the currently selected Plane. The values can be entered either manually into the text boxes or by clicking and drawing on the graphics.

Step size:

Step size is the distance between measuring points.

A small step size will generate a high-resolution measurement and a large step size will generate a low-resolution measurement.

Measuring in large steps is quicker than measuring in small steps.

Z-level:

Z-level is the height of the probe above the Scanner table during measurement.

Varying resolution:

This is not a setting. It is just an indication that different step sizes are being used on different planes.

Point list, Pick

Click this button to activate Pick mode. (Pick mode is activated when this button appears to be pressed down and the hair-cross pointer is visible.)

When Pick mode is activated you can point and click on the graphics to pick the X and Y coordinates of a measuring point. Unless you point and click on a previously defined area, a dialog box will appear, and ask you to enter the height of the point you have just picked.

Point list, Clear

Click this button to clear the point list.

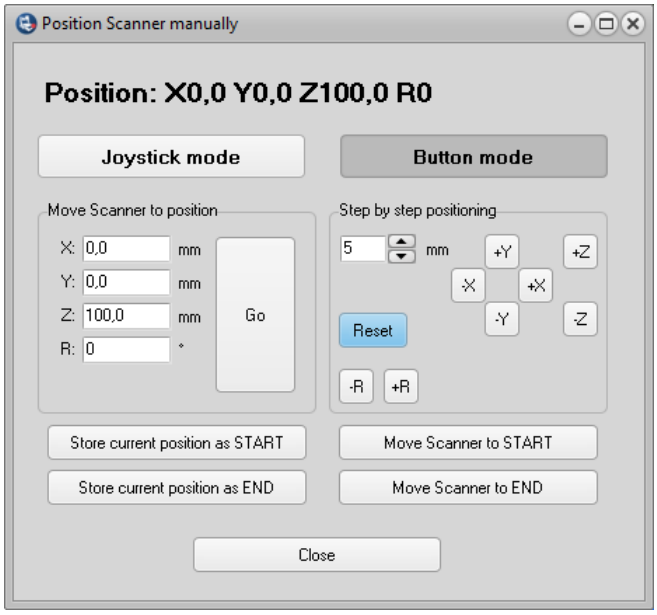
Point list

The point list can be edited manually just like an ordinary text box.

7. Position Scanner manually

Click on this button to open the form shown below:

For details please refer to page 105.



8. Show Scanner path

Check this option to show the path along which the Scanner will move during measurement.

9. Outline

Click on this button to select the Outline for editing. Edit the properties of Outline either by changing the values in the Area box, or by clicking and drawing on the graphics.

The sole purpose of Outline is to help you document the position of the test object on the Scanner table.

10. Base level

Click on this button to select the Base level for editing. Edit the properties of Base level either by changing the values in the Area box, or by clicking and drawing on the graphics.

Base level defines the area to be measured.

11. Level 1, Level 2, Level 3, and Level 4.

Click on one of the buttons to select the desired level for editing. Edit the properties of level either by changing the values in the Area box, or by clicking and drawing on the graphics.

The purpose of these levels is to make it possible to define islands of different height, so that the probe will not run into a high component.

A level with higher number has higher priority than a level with lower number. This means that if two, or more, levels coincide at a measuring position, then the height of the level with the highest number will be used.

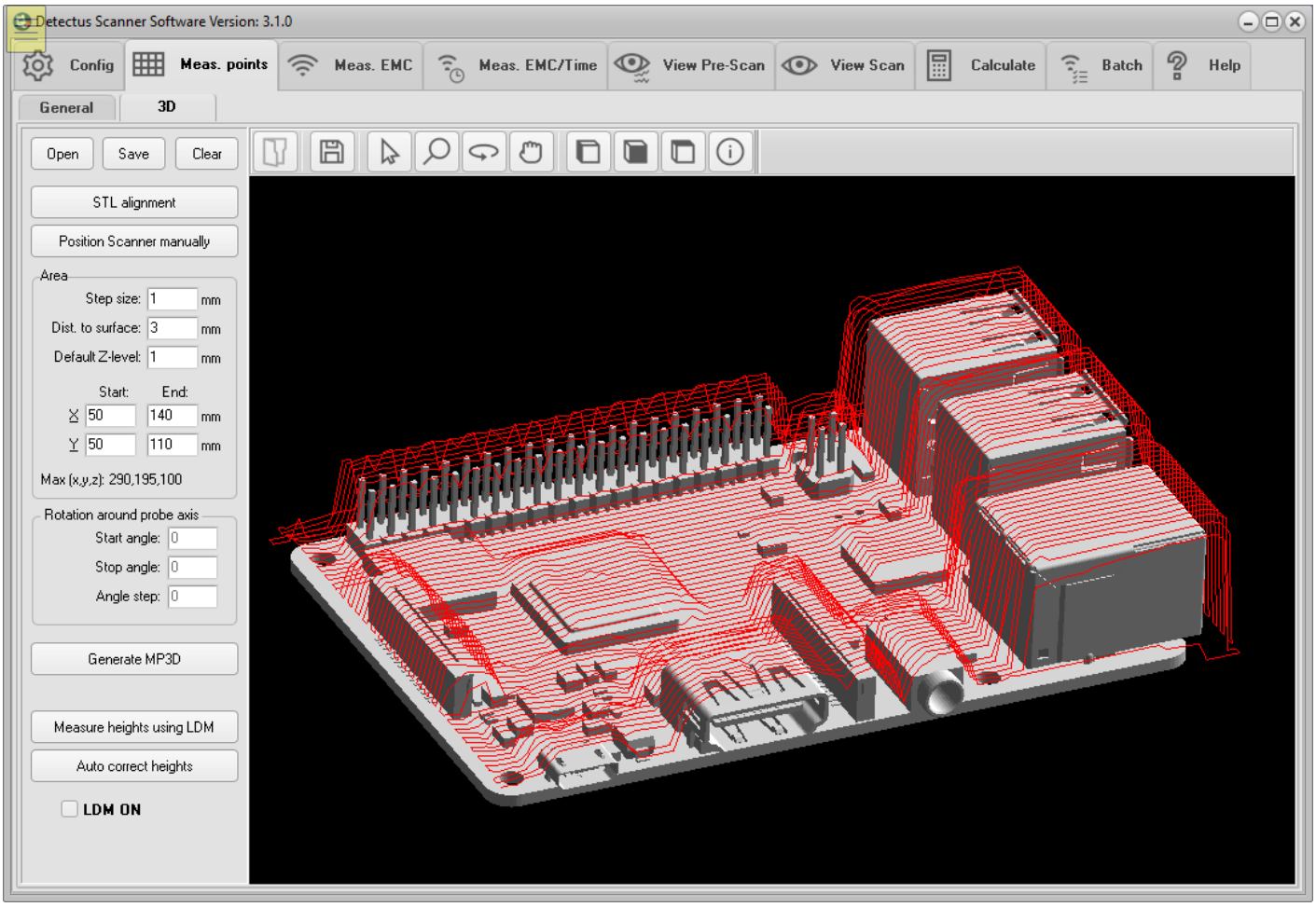
12. Rotation around probe axis

These values define the rotation around the probe axis.

This feature is only available for Scanner models HR41 and HR43.

The Meas. points – 3D tab

On this tab, you define the measuring points as an offset to a 3d surface model.



1. Open

Click here to load a previously saved set of measuring points. The files containing 3D measuring points are named *.MP3D.

2. Save

Click here to save a set of measuring points to an *.MP3D file.

3. Clear

Click here to unload MP3D and STL files.

4. Load STL file

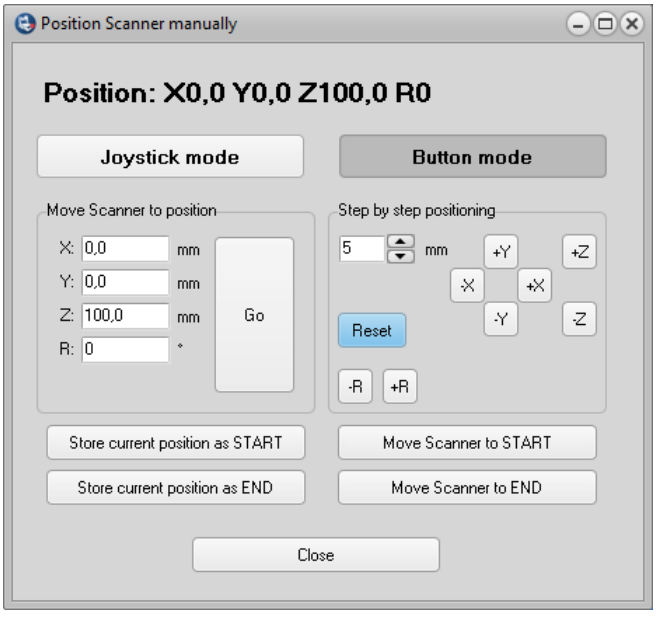
Click here to load a 3d surface model in binary STL file format.

5. STL alignment

Click here to open the STL alignment dialog. See page 103.

6. Position Scanner manually

Click on this button to open the form shown below:



For details please refer to page 105.

7. Step size

Step size is the distance between measuring points.

A small step size will generate a high-resolution measurement and a large step size will generate a low-resolution measurement.

Measuring in large steps is quicker than measuring in small steps.

8. Dist. To surface

The distance between the surface of the STL file to the measuring points.

9. Default Z-level

The height of the measuring points that are beside the STL surface model. This is the lowest possible height of a measuring point.

10. Start and stop for X and Y

These values define the measuring area in the XY-plane.

11. Generate MP3D

Click here to start generating measuring points.

12. Save STL file

Click here to save the surface model in its current position to a binary STL file.

13. Information mode

Click on this button to activate Information mode.

When Information mode is activated, the following features are available:

a. Place the pointer on a measurement and you will see its file name along with the coordinates of the point at which you are pointing. If the measurement in question is an EMC-Scan measurement, you will also see the frequency of the highest peak.

b. Rotate the view in 3D by keeping the left mouse button pressed down as you move the pointer.

c. Pan the view in 3D by keeping the right mouse button pressed down as you move the pointer.

d. Zoom in or out by turning the mouse wheel.

14. Zoom mode

Click on this button to activate Zoom mode.

When Zoom mode is activated, the following features are available:

a. Zoom in or out by turning the mouse wheel.

b. Zoom in or out by keeping the left mouse button pressed down as you move the pointer.

15. Rotate mode

Click on this button to activate Rotate mode.

When Rotate mode is activated, the following features are available:

a. Rotate the view in 3D by keeping the left mouse button pressed down as you move the pointer.

b. Zoom in or out by turning the mouse wheel.

16. Pan mode

Click on this button to activate Pan mode.

When Pan mode is activated, the following features are available:

a. Pan the view in 3D by keeping the left mouse button pressed down as you move the pointer.

b. Zoom in or out by turning the mouse wheel.

17. Side view

Click on this button to rotate and view the measurements from the side.

18. Front view

Click on this button to rotate and view the measurements from the front.

19. Top view

Click on this button to rotate and view the measurements from the above.

20. 3D

Click on this button to enable 3D mode.

21. Information

Click this button to show and hide the information window.

22. Rotation around probe axis

These values define the rotation around the probe axis.

This feature is only available for Scanner models HR41 and HR43.

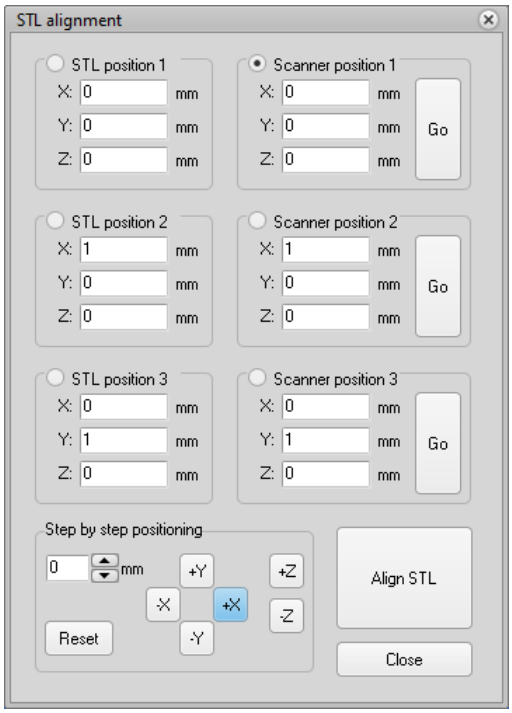
The Meas. points – 3D tab – STL alignment

Using this dialog box you can move and rotate a surface model of a test object so that it aligns with the position and rotation of the test object placed on the Scanner table.

The alignment procedure requires three positions on the surface of the STL file and three corresponding positions on the surface of the real life test object.

IMPORTANT! The three positions must be chosen so that they form an angle.

After alignment the surface model should be saved in its new position to a binary STL file. See page 99 (step 12).



STL position 1

Click here to activate the coordinates of STL position 1.

Doing so will also activate the hair cross marker on the graphics part of the Meas. Points – 3D tab.

Clicking on the surface model will update the coordinates of STL position 1.

Scanner position 1

Click here to activate the coordinates of Scanner position 1.

Doing so will also activate the Step by step positioning box.

Move the Scanner using the Step by step positioning buttons until the tip of the near field probe is near the surface of the test object in the same position as pointed at when setting STL position 1.

Alternately you can type in coordinates and then click on the Go button to move the Scanner.

STL position 2

See STL position 1

Scanner position 2

See Scanner position 1

STL position 3

See STL position 1

Scanner position 3

See Scanner position 1

Step by step positioning

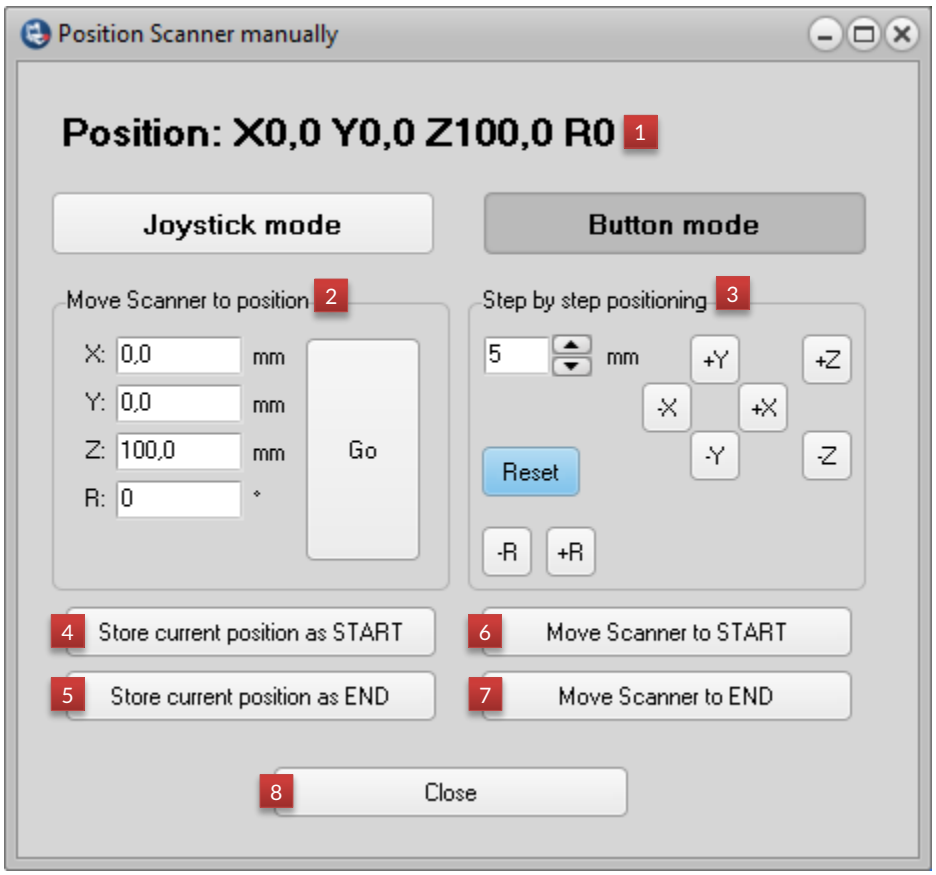
Set the step size and click on the axis buttons to move the Scanner step by step.

Align STL

Click here to move and rotate the STL surface model so that it aligns with the test object.

The Position Scanner manually form

The purpose of this form is to help in finding the correct coordinates for the measuring points. The form is accessible from both measuring points tabs.



1. Coordinates

These labels show the current Scanner position

2. Move Scanner to position

Type in the desired coordinates and click on the Go button to move directly to the specified position.

3. Step by step positioning

Set the distance and click on the axis buttons to position the Scanner step by step.

4. Store current position as START

Click on this button to store the current position as Start-X and Start-Y on the measuring points tab that currently shows behind this form. Optionally you can also store the Z-level.

5. Store current position as END

Click on this button to store the current position as End-X and End-Y on the measuring points tab that currently shows behind this form. Optionally you can also store the Z-level.

6. Move Scanner to START

Click on this button to move the Scanner to the “Start” coordinates shown on the measuring points tab that currently shows behind this form.

7. Move Scanner to END

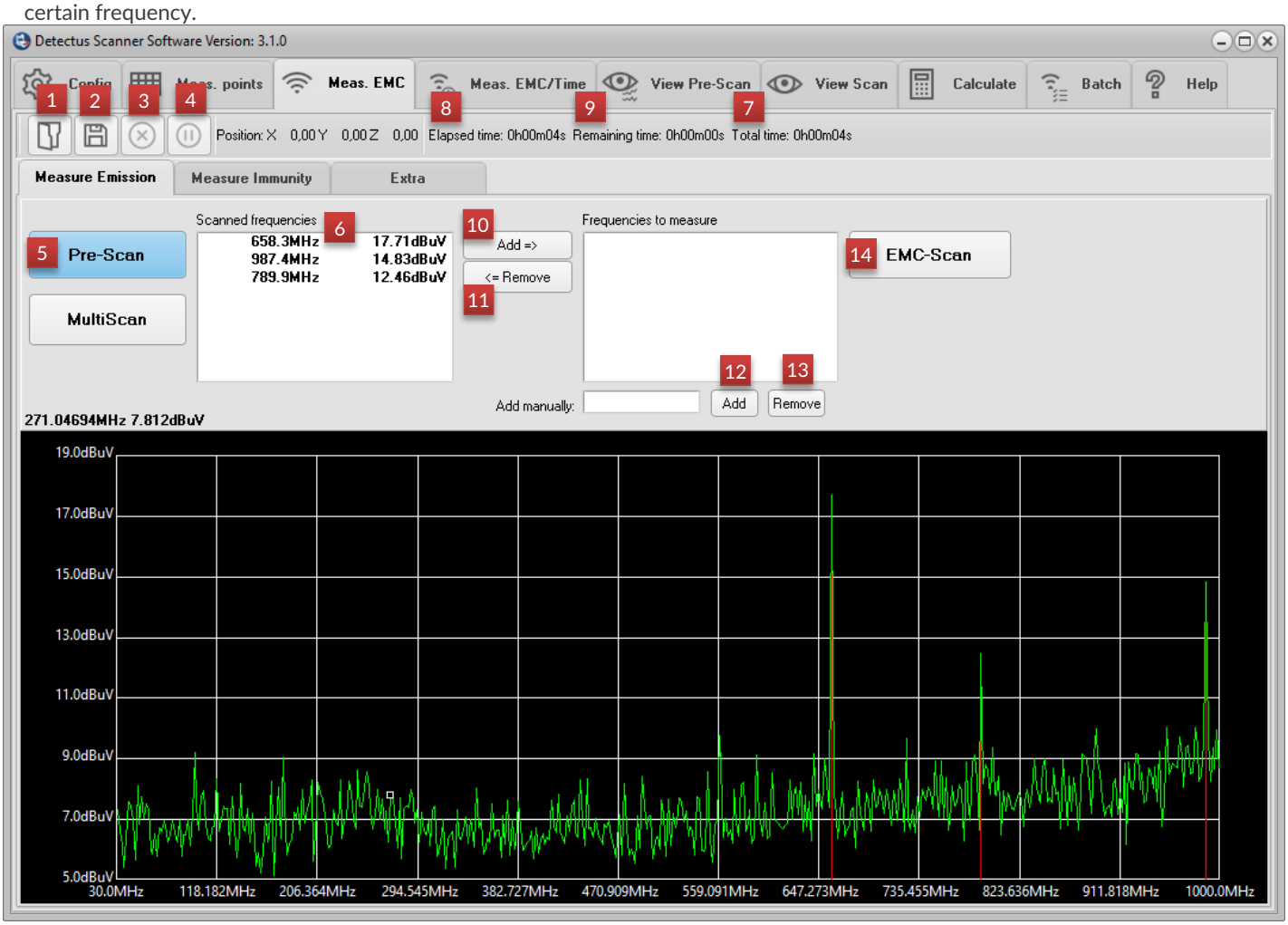
Click on this button to move the Scanner to the “End” coordinates shown on the measuring points tab that currently shows behind this form.

8. Close

Click on this button to close this form.

The Meas. EMC – Measure Emission tab

On this tab, you can perform two kinds of EMC measurements, the wide-band Pre-Scan measurement that will give an overview of the emitting frequencies, and the narrow–band EMC-Scan measurement that will reveal the form and position of the emission fields at a certain frequency.



1. Open

Click here to open a previously saved Pre-Scan measurement. The Pre-Scan measurements are named *.PRE.

2. Save

Click here to save a Pre-Scan Measurement to a *.PRE file.

3. Stop

Click here to stop a Pre-Scan or Scan measurement.

4. Pause

Click here to pause a Pre-Scan or Scan measurement. Click again to restart the measurement.

5. Pre-Scan

Click here to perform a Pre-Scan measurement.

A Pre-Scan measurement is a wide-band measurement that results in a spectra graph and a list of peaks (6). For details, please refer to How to perform measurements on page 46, or How the Pre-Scan measurement is performed in detail on page 79.

6. Scanned frequencies

This is a list of peaks from a Pre-Scan measurement. The peaks are also shown in the spectra graph as vertical red lines.

7. Total time

This label shows the estimated total time of the Pre-Scan or Scan measurement in progress.

8. Elapsed time

This label shows the elapsed measuring time of a Pre-Scan or Scan measurement in progress.

9. Remaining time

This label shows the estimated remaining time of a Pre-Scan or Scan measurement.

10. Add =>

Click here to move one or more frequencies from the list of Scanned frequencies to the list of Frequencies to measure.

11. <= Remove

Click here to remove one or more frequencies from the list of Frequencies to measure back to the list of Scanned frequencies.

12. Add manually

To add manually a frequency to the list of Frequencies to measure, enter a frequency, including unit (Hz, kHz, MHz, GHz), into the text box, and click on the Add button. The added frequency will show as a yellow vertical line in the spectra graph. Another way of adding a frequency is to double-click on the spectra graph at the desired frequency.

13. Remove

Click here to remove a frequency that has previously been added manually to the Frequencies to measure box.

14. EMC-Scan

Click this button perform an EMC-Scan measurement.

15. MultiScan

Click this button perform an MultiScan measurement.

For details, please refer to How to perform a MultiScan measurement on page 53.

The Meas. EMC – Measure Immunity tab

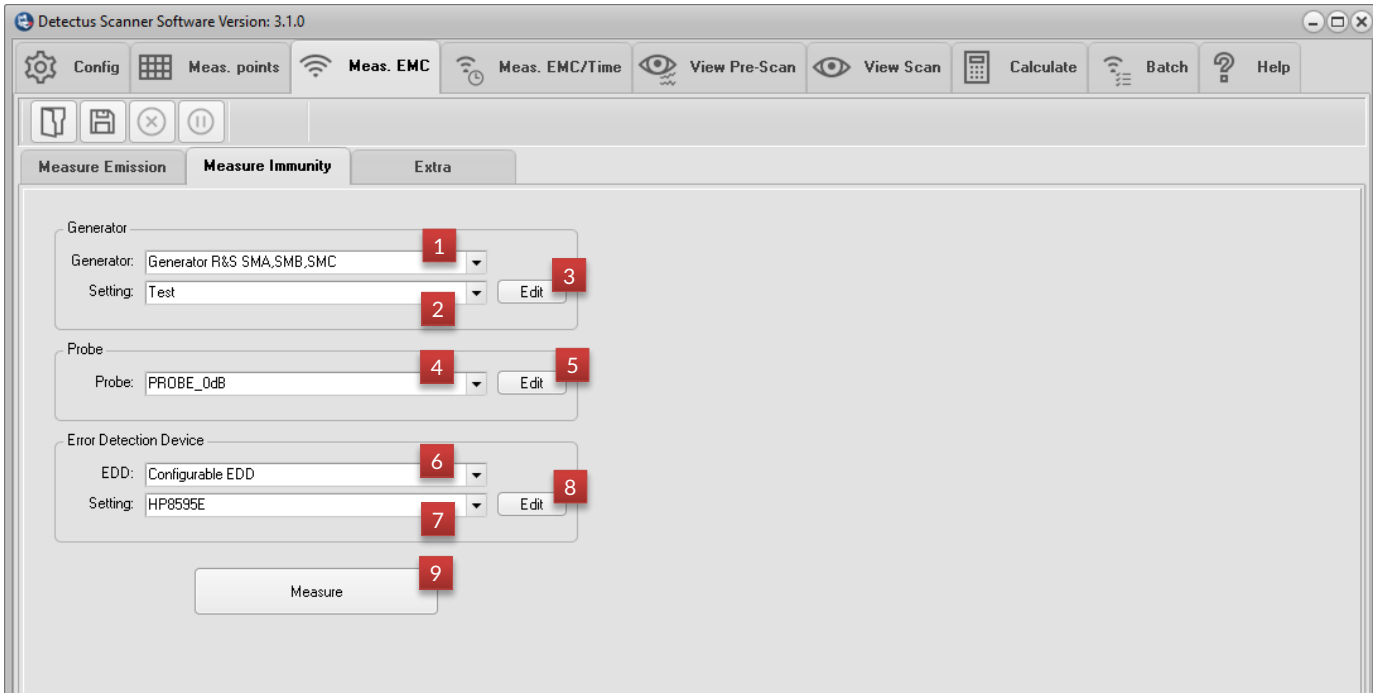
Please note! This feature is only available with the Immunity-Scan software option.

All communication with signal generators and EDDs are done using National Instruments Visa. Therefore it is required to install the NI Visa driver. It can be downloaded at www.ni.com. Further information about using Visa can be found on page 14 and in appendix 2

Using the features on this tab you can make an Immunity-Scan measure-ment. During measurement the EMC Scanner moves the probe/antenna to pre¬determined measuring positions above the test object. In each measuring position the signal generator sweeps in frequency and amplitude while the Error Detection Device, or EDD for short, measures for test object failure.

If your signal generator allows it, you can also use different modulations such as FM, AM and Pulse.

The Error Detection Device can be any type of GPIB or VISA controllable instrument that measures a value from the test object to determine when the test object fails. The EDD can for example be a voltmeter, an oscillo-scope measuring a signal against a mask or a protocol tester.



pendulum

1. Generator

Click here to select a signal generator driver. If your preferred signal generator is not in the list, please contact your local Pendulum Instruments representative.

2. Setting

Click here to select a signal generator setting. See details below.

3. Edit

Click here to change or create a new signal generator setting.

4. Probe

Click here to select a probe setting.

5. Edit

Click here to change or create a new probe setting.

6. EDD (Error Detection Device)

Click here to select an EDD driver.

The driver called “Configurable EDD” is an open driver that works like a script. See below for more details.

7. Setting

Click here to select an EDD setting/script. See below for more details.

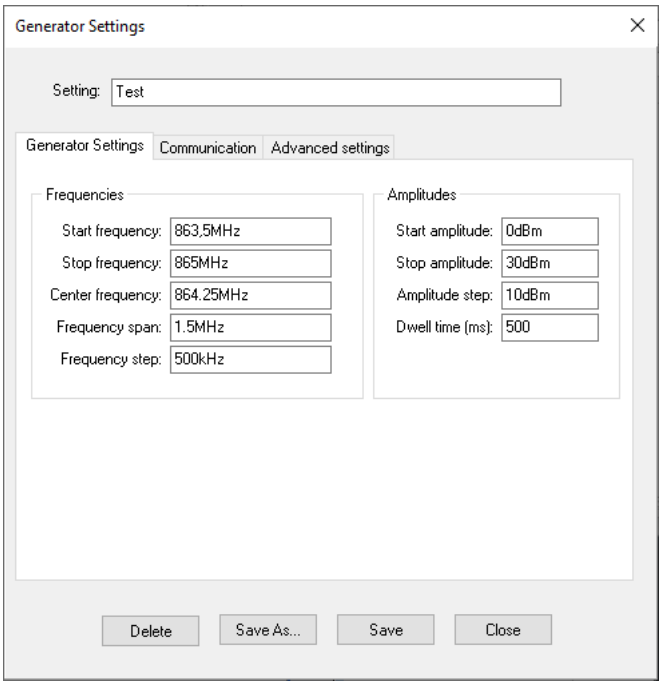
8. Edit

Click here to change or create a new EDD setting.

9. Measure

Click here to start an Immunity-Scan.

Measure Immunity tab – Generator



Frequencies

Set up frequencies here, either by entering start and stop or by entering center and span.

Please note that choosing a wide span or small frequency steps will greatly affect the measuring time.

Amplitudes

Set up frequencies here by entering start, stop and step. Dwell time is the time that the output from the signal generator is turned on before we measure for failure using the EDD.

Delete

Click here to delete the current setting.

Save As…

Click here to save current setting under a new name.

Save

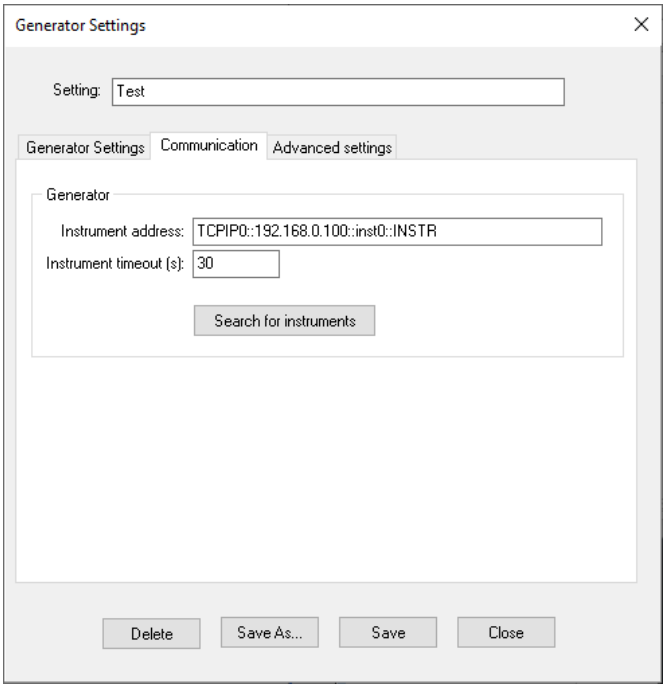
Click here to save current setting.

Close

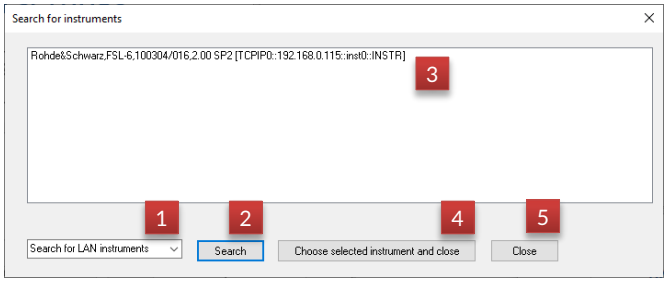
Click here to close this dialog.

Measure Immunity tab – Generator communication settings

All communication with signal generators and EDDs is done using National Instruments Visa. Therefore, it is required to install the NI Visa driver. It can be downloaded at www.ni.com. Further information about using Visa can be found in appendix 2



Click the "Search for instruments" button to open the dialog below.



1. Click here to select type of communication.

2. Click here to start searching for instruments. Please note that the instrument must be present in NI MAX first. For further information see appendix 2.

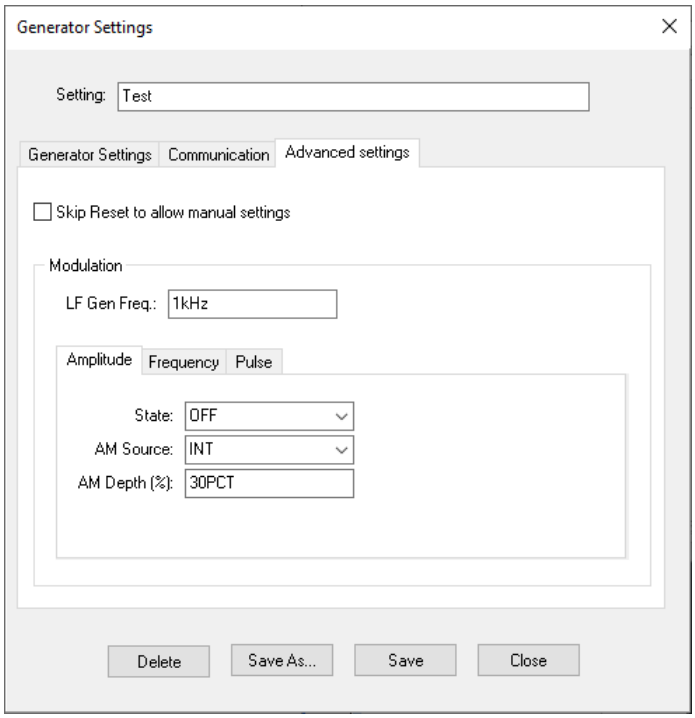
3. Select your preferred instrument in the list.

4. Click here to save and close this dialog.

5. Click here to close this dialog without saving.

Measure Immunity tab – Generator advanced settings

This tab will look different for different instruments depending on their capability. Generally, this tab will contain settings for modulation and other advanced settings.

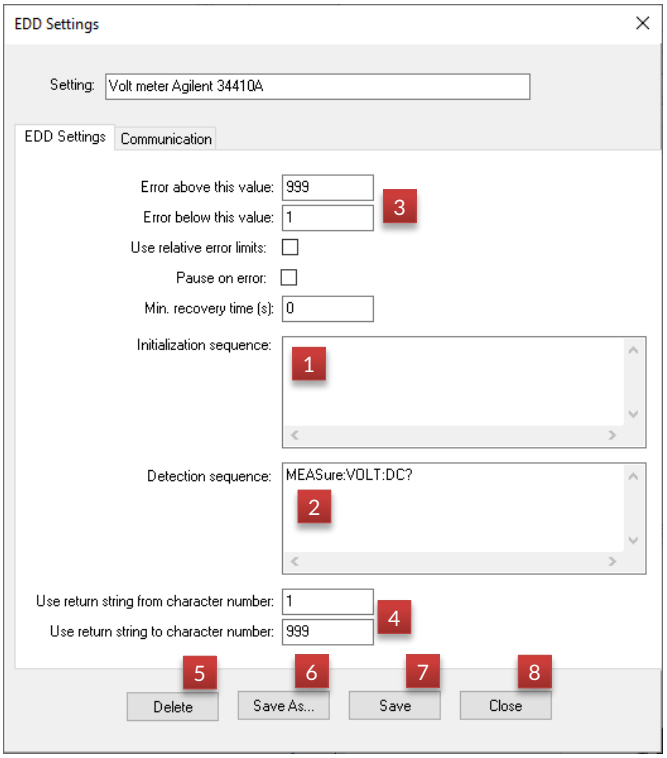


Measure Immunity tab – EDD settings

Because the driver for the instrument (EDD) that we use to detect test object (DUT) failure needs to be very flexible to suit different test objects, we've made it as an open driver that you can change yourself.

The principal is very simple; we use two lists of commands that are sent to the instrument in plain text. The first list, Initialization sequence, contains commands for basic setup of the instrument. The second list, Detection sequence, contains commands that measure for DUT failure.

The example below shows how to use a multimeter as EDD. The multimeter is connected to the DUT and measures a voltage. If the voltage stays above 1 Volt the DUT is working but when the voltage drops below 1 Volt we have failure.



1. Initialization sequence

This list of GPIB commands is sent to the EDD once to set it up for measuring. In this example the list is empty because the multimeter does not need to be prepared for measuring voltage.

2. Detection sequence

This list of GPIB commands is sent to the EDD every time we need to check for DUT failure.

Please note! It is important that the last command in the list is a "question" to the EDD. The question/command must be chosen so that the answer is a number. In this example the number represents a voltage.

3. Error levels

The answer from the EDD is compared to these levels.

In this example we know that the measured voltage is 1.5V when everything works and 0.5V when the DUT fails. So we put "1" as the "Error below this value". The setting "Error below this value" will not be used so we just set it to some high value.

4. Use only a part of the return string

If the answer/return string from the EDD contains other characters than numbers, we need to filter out the non-number characters.

For example, a valid return string would be "1.52" whilst "Voltage:1.52" would have to be filtered.

Probably you will not have to use this feature because most instruments answers with plain numbers and in that case you can use all characters in the return string. Set 1 to 999 or any number that is high enough so you will not have to worry about loosing the back end of the return string.

Example:

Return string: "Voltage:1.52"

Use return string from character number: 9

Use return string to character number: 999

This would give us the filtered answer "1.52" which is ok to compare with the error levels.

5. Delete

Click here to delete the current setting.

6. Save As…

Click here to save current setting under a new name.

7. Save

Click here to save current setting.

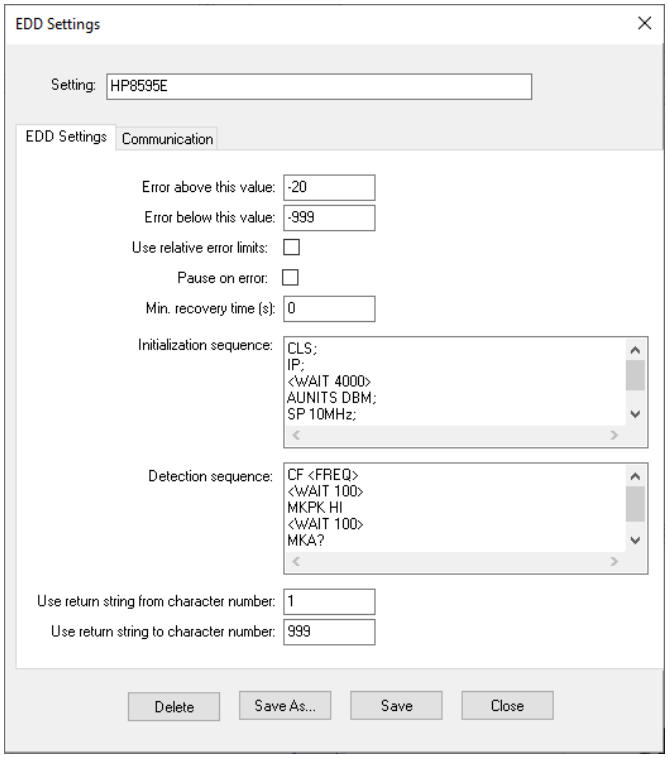
8. Close

Click here to close this dialog.

Measure Immunity tab – EDD settings (Script commands)

The initialization sequence and the detection sequence may contain script commands that are processed in the software before being sent to the EDD.

The example below shows how to use a HP 8595E spectrum analyzer as EDD. The example uses the WAIT command for timing and the FREQ command to make the EDD “follow” the frequency of the signal generator.



The WAIT command:

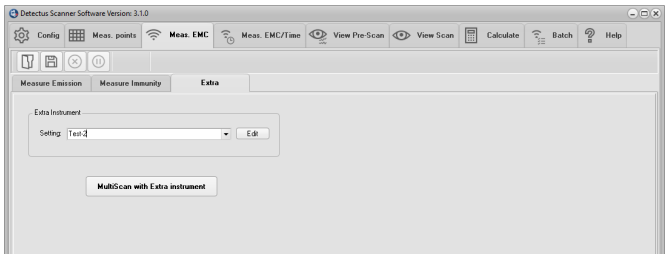
Syntax: <WAIT xxx>
Replace xxx with the requested delay time in milliseconds.
Example: <WAIT 500>
This will cause a delay of half a second. Nothing will be sent to the EDD.

The <FREQ> command:

Syntax: <FREQ>
Before a line containing <FREQ> is sent to the EDD <FREQ> will be replaced by the frequency of the signal generator.
Example: CF <FREQ> (Assuming that SF freq. is 125.5MHz)
The command sent to the EDD will be “CF 125.5MHz”

The Meas. EMC – Extra tab

New feature in version 2.9.2



Using the features on this tab you can make MultiScan measurements with an extra instrument performing some task on the side in each measuring position. What this feature can be used for and what type of instrument is up to your imagination. The only requirement is that the instrument must be remotely controllable and Visa compatible.

Note that this is not a replacement for the spectrum analyzer. A regular MultiScan measurement is also done.

Note. All communication with Extra instruments are done using National Instruments Visa. Therefore, it is required to install the NI Visa driver. It can be downloaded at www.ni.com. Further information about using Visa can be found on page 14 and in appendix 2.

Because the driver for the Extra instrument needs to be very flexible, we've made it as an open driver that you can change everything yourself.

The principal is very simple; we use four lists of commands that are sent to the instrument in plain text.

Initialization sequence – These commands are send to the Extra instrument directly after the spectrum analyzer has been initialized.

Start Measuring position – These commands are send to the Extra instrument in every measuring position before we measure with the spectrum analyzer.

End Measuring position – These commands are send to the Extra instrument in every measuring position after we have measured with the spectrum analyzer.

Finish up – These commands are send to the Extra instrument at the end of the measurement.

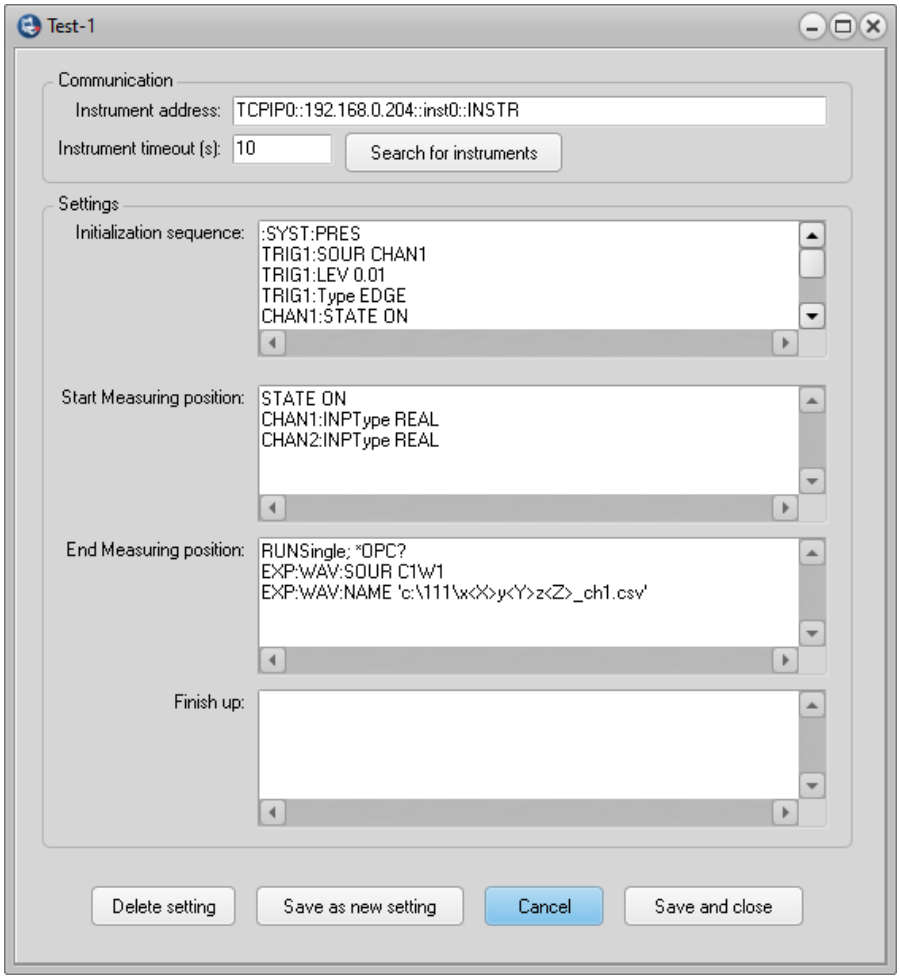
The coordinate commands:

Syntax: <X> or <Y> or <Z>

Before sending this line to the Extra instrument <X>,<Y> and <Z> will be replace by the coordinates of the current position.

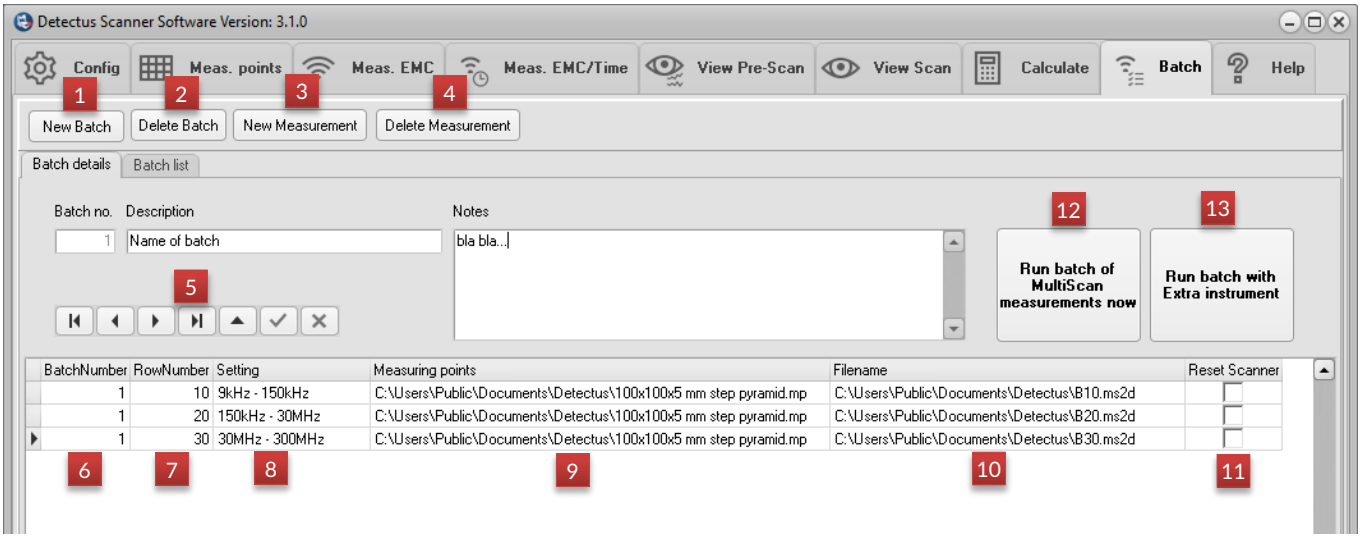
Example: EXP:DATA:TO:FILE:NAMED 'c:\111\x<X>y<Y>z<Z>_ch1.csv'

This will save some data in the to a file on the hard drive of the Extra instrument.



The Batch tab

On this tab you can make batch measurements. That is, you can make a list of measurements with different settings that can be executed in sequence. The purpose is to be able to make unattended measurements for example overnight.



1. New Batch

Click here to create a new batch.

2. Delete Batch

Click here to delete the current batch.

3. New Row

Click here to create a new measurement row in current batch.

4. Delete Row

Click here to delete the current row.

5. Batch navigator

Use this navigator to browse between batches.

6. Batch number

7. Row column

Shows row number.

8. Setting column

Click on the arrow button in the field to select a spectrum analyzer setting.

9. Measuring points

Click on the arrow button in the field to select a previously save measuring points file.

10. Filename

This is the filename of the resulting measurement.
Click on the arrow button in the field to show a file-save-dialog.

11. Reset Scanner

Check the box if you want the Scanner to perform a positional reset before starting the measurement.

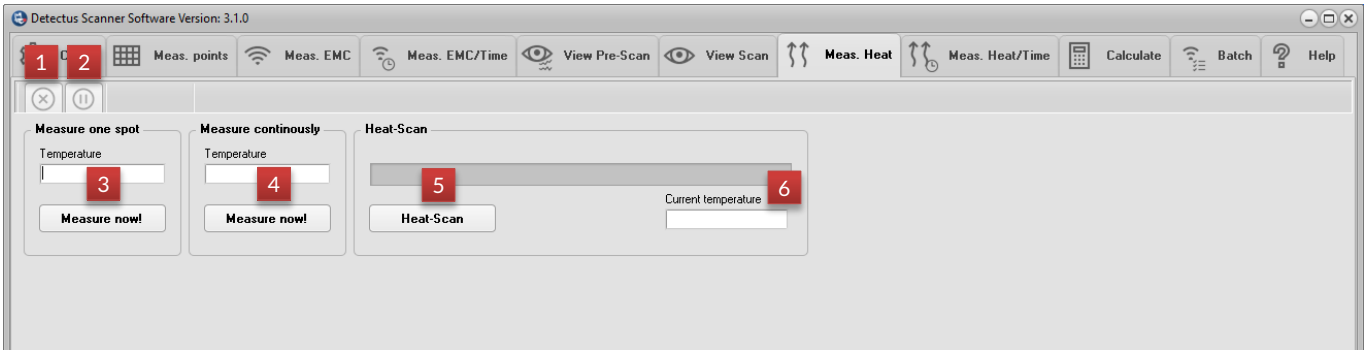
12. Run Batch of MultiScan measurements now

Click here to execute the current batch.

13. Run Batch of MultiScan measurements with Extra Instrument now

Click here to execute the current batch. Besides performing the regular MultiScan measurements the procedures defined on Meas.EMC-Extra tab will also be performed.

The Meas. Heat tab (only DS and Rx series)



1. Stop

Click here to stop a Heat-Scan measurement.

2. Pause

Click here to pause a Heat-Scan measurement. Click again to restart the measurement.

3. Measure one spot

Click here to measure the temperature, and show the result in the text box above the button

4. Measure continuously

Click here to measure the temperature continuously. The measurements will be performed with an interval of approximately two seconds. The temperature reading will show in the text box above the button. Click on the button again to stop measuring.

The measuring will stop if you change to another tab.

5. Heat-Scan

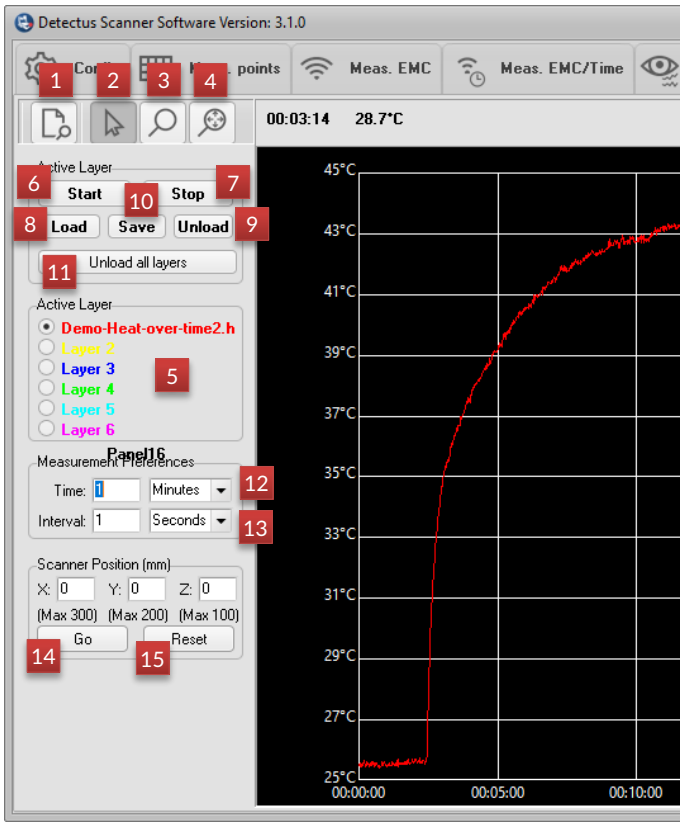
Click here to perform a Heat-Scan measurement. Before the measurement is started, you will have to save the result to a *.T01 file using a normal Save As dialog box.

6. Current temperature

This text box will show the current temperature during a Heat-Scan measurement.

The Meas Heat/Time tab (DS and Rx series)

On this tab you can perform a heat-over-time measurement on a specified position. The measurements are stored on six different layers. You can e.g. load two previously saved measurements into Layer 1 and Layer 2, and then start a measurement onto Layer 3.



1. Report

Click on this button to create the report and open it. The report will open in your default HTML browser or in Word or WordPad depending your settings on the Config tab. For mor details see page 37.

2. Information mode

Click on this button to activate Information mode.

When Information mode is activated, the label above the graphics will show the time and temperature corresponding to the position of the pointer.

3. Zoom mode

Click here to activate Zoom mode.

When Zoom mode is activated, you can zoom in by clicking and drawing a rectangle around a specific area.

4. Unzoom

Click on this button to unzoom and show the entire graph.

5. Active Layer

Select one of the available layers. The layer you choose will be the destination when you load a previously saved measurement or start a measurement. This is illustrated by the color of the buttons Start, Stop, Load, Save and Unload.

6. Start

Click on this button to start a Heat/Time measurement onto the current layer.

7. Stop

Click on this button to stop a Heat/Time measurement in progress. The result will not be discarded.

8. Load

Click on this button to load a previously saved Heat/Time measurement. The measurements are named *.HOT.

9. Unload

Click on this button to unload the measurement from the active layer.

10. Save

Click on this button to save the measurement on the active layer to a *.HOT file.

11. Unload all layers

Click on this button to unload all measurements.

12. Time

Enter the desired total time of the measurement.

13. Interval

Enter the desired interval between the individual measurements.

14. Scanner Position (mm) – Go

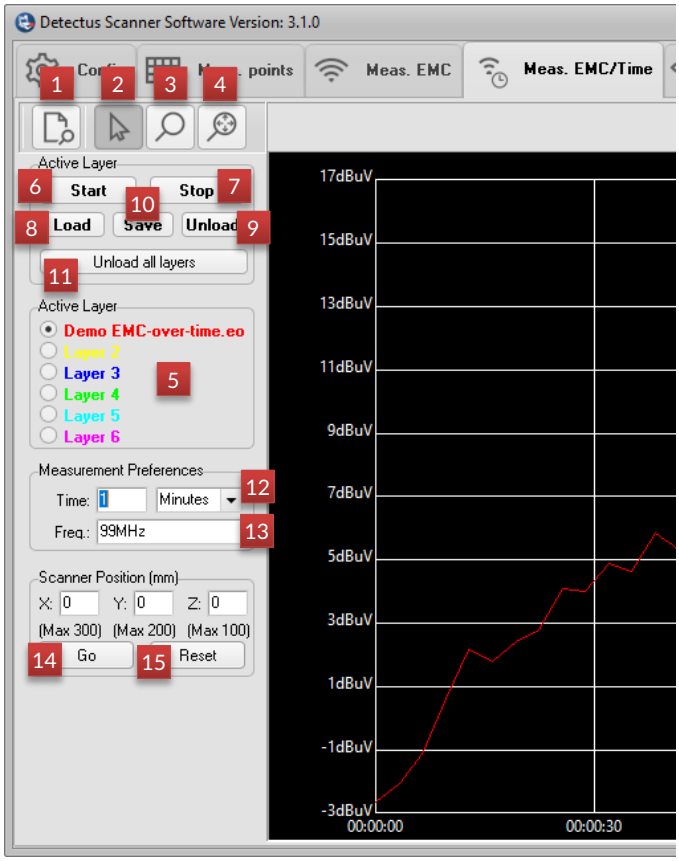
Click on this button to move the Scanner to the coordinates entered into the X, Y and Z text boxes.

15. Reset

Click on this button to reset the Scanner to its starting position at coordinates X0 Y0 Z10.

The Meas EMC/Time tab

On this tab you can perform an EMC-over-time measurement on a specified position. The measurements are stored on six different layers. You can e.g. load two previously saved measurements into Layer 1 and Layer 2, and then start a measurement onto Layer 3.



1. Report

Click on this button to create the report and open it. The report will open in your default HTML browser or in Word or WordPad depending your settings on the Config tab. For mor details see page 37.

2. Information mode

Click on this button to activate Information mode.

When Information mode is activated, the label above the graphics will show the time and temperature corresponding to the position of the pointer.

3. Zoom mode

Click here to activate Zoom mode.

When Zoom mode is activated, you can zoom in by clicking and drawing a rectangle around a specific area.

4. Unzoom

Click on this button to unzoom and show the entire graph.

5. Active Layer

Select one of the available layers. The layer you choose will be the destination when you load a previously saved measurement or start a measurement. This is illustrated by the color of the buttons Start, Stop, Load, Save and Unload.

6. Start

Click on this button to start a EMC/Time measurement onto the current layer.

7. Stop

Click on this button to stop a EMC/Time measurement in progress. The result will not be discarded.

8. Load

Click on this button to load a previously saved EMC/Time measurement. The measurements are named *.EOT.

9. Unload

Click on this button to unload the measurement from the active layer.

7. Save

Click on this button to save the measurement on the active layer to a *.EOT file.

8. Unload all layers

Click on this button to unload all measurements.

9. Time

Enter the desired total time of the measurement.

10. Frequency

Enter the desired frequency. Allowed units are Hz, kHz, MHz and GHz.

11. Scanner Position (mm) – Go

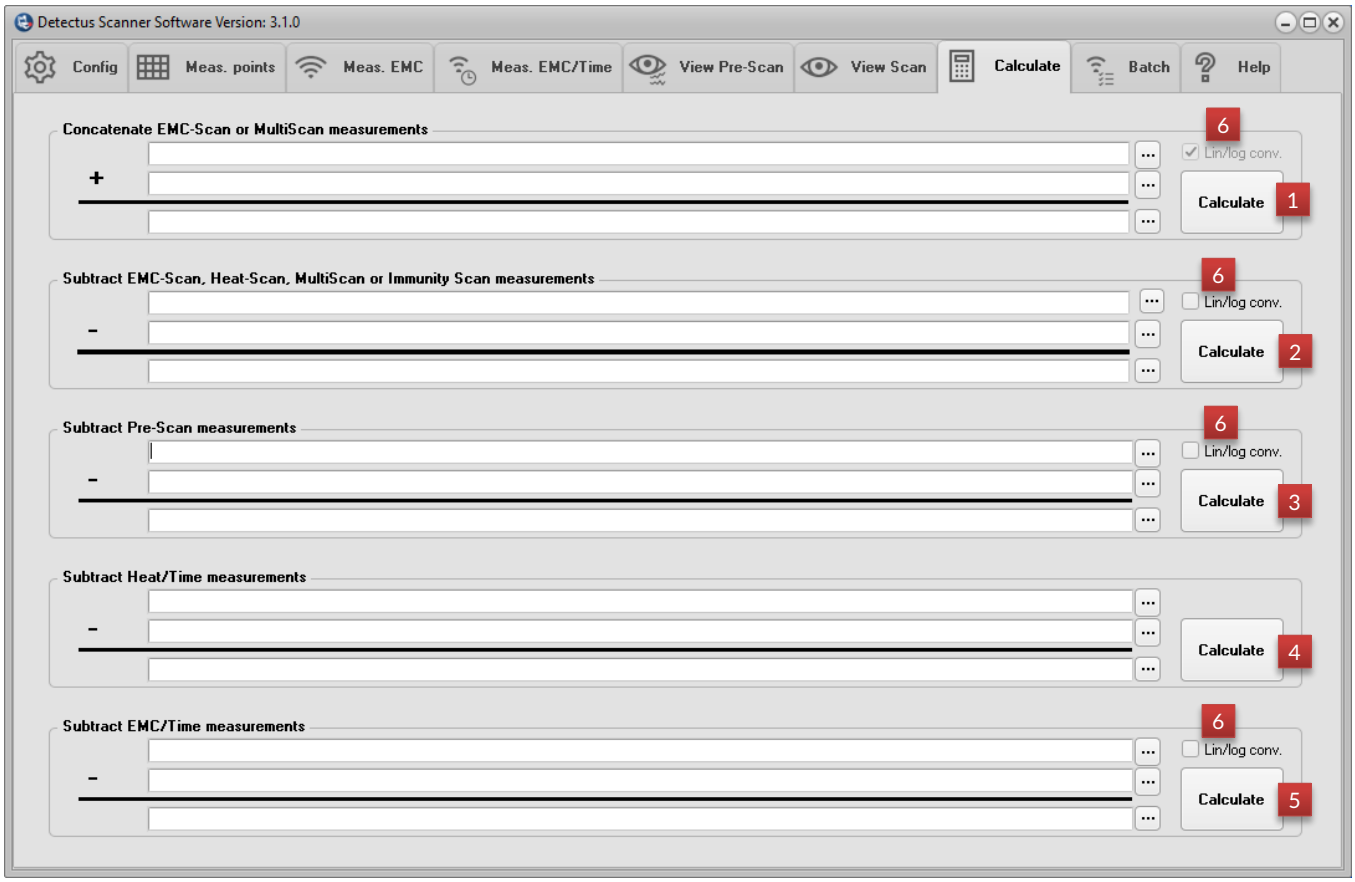
Click on this button to move the Scanner to the coordinates entered into the X, Y and Z text boxes.

12. Reset

Click on this button to reset the Scanner to its starting position at coordinates X0 Y0 Z10.

The Calculate tab

On the Calculate tab, you can perform four different calculations based on measurements. The calculations are as follows:



1. Concatenate EMC-Scan measurements

is a vector addition, measuring point by measuring point, of two previously saved EMC-Scan measurements.

This calculation is intended to eliminate the irregular appearance of a measured field, caused by the difference in sensitivity in different angles of a dipole antenna.

Perform a measurement, turn the antenna (probe) 90° and perform another measurement, then concatenate the two measurements.

2. Subtract EMC-Scan or Heat-Scan measurements

is a subtraction, measuring point by measuring point, of two previously saved EMC-Scan or Heat-Scan measurements.

This calculation is intended to show the difference between two EMC-Scan or two Heat-Scan measurements. For example, one measurement performed before and one after an alteration to the test object.

3. Subtract Pre-Scan measurements

is a subtraction of two previously saved Pre-Scan measurements.

This calculation is intended to show the difference between two Pre-Scan measurements. For example, one measurement performed before and one after an alteration to the test object.

4. Subtract Heat/Time measurements is a subtraction of two previously saved Heat/Time measurements.

This calculation is intended to show the difference between two Heat/Time measurements. For example, one measurement performed before and one after an alteration to the test object.

5. Subtract EMC/Time measurements is a subtraction of two previously saved EMC/Time measurements.

This calculation is intended to show the difference between two EMC/Time measurements. For example, one measurement performed before and one after an alteration to the test object.

6. Lin/Log

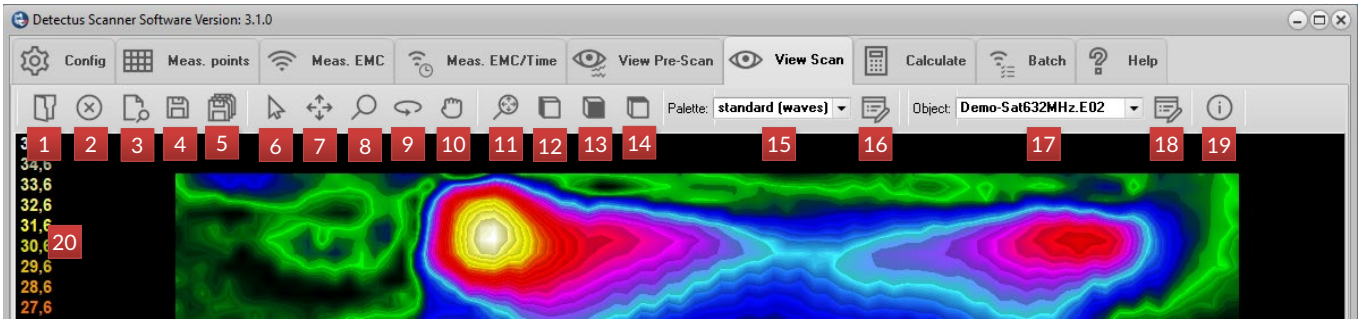
Activating Lin/Log means that the calculation is performed in linear mode instead of logarithmic mode.

That is, all values are first converted from logarithmic mode to linear mode then the calculation is performed and then the result of the calculation is converted back to logarithmic mode.

Please note!

A negative linear result cannot be converted to log mode.
To resolve that the minus sign is removed before converting to log mode and then added to the result after conversion.

The View Scan tab



1. Open 

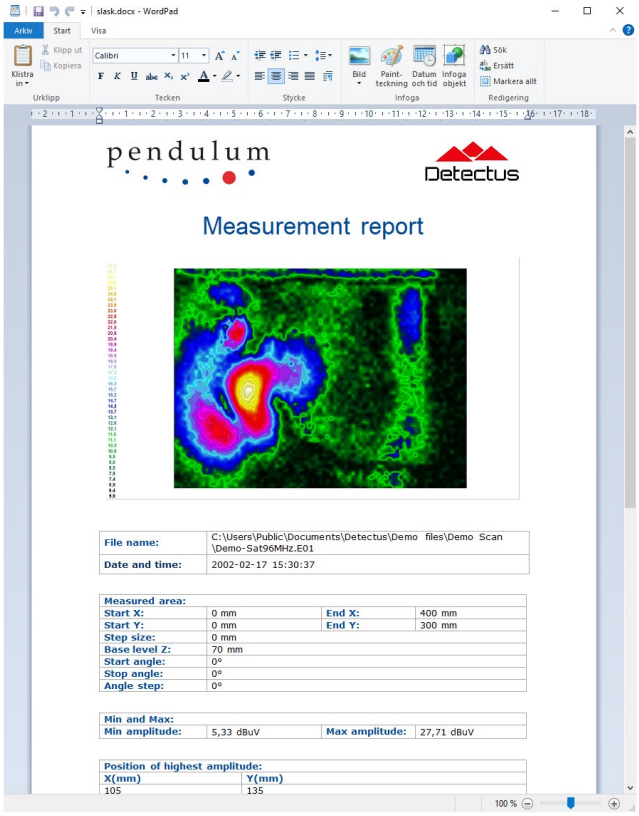
Click on this button to open an EMC-Scan measurement, a Heat-Scan measurement, a project or an image. Please refer to page 136 for an explanation of how to load an image.

2. Unload 

Click on this button to unload all loaded measurements and images or to unload only the measurement or image selected in the pull-down list box (16).

3. Report 

The result of an EMC-Scan, MultiScan or Heat-Scan measurement can be documented as a report in Word (docx) or HTML format. Report file format can be selected on Config tab under Advanced settings. If word is not available a docx report will be opened in WordPad. For mor details see page 37.



4. Save 

Click on this button to save the current image to a *.BMP or *.JPG file.

5. Save project 

Click on this button to save a project containing all the currently loaded measurements and images. Project files are named *.PRJ.

When you open a previously saved project file, the measurements and images will be sized, positioned and rotated as they were when the project was saved.

The project file does not contain any measurement or image data, only the names of the files and information about their size, position, and rotation.

6. Multipurpose mode 

Click on this button to activate Information mode.

When Information mode is activated, the following features are available:

a. Place the pointer on a measurement and you will see its file name along with the coordinates of the point at which you are pointing. If the measurement in question is an EMC- Scan measurement, you will also see the frequency of the highest peak.

b. Rotate the view in 3D by keeping the left mouse button pressed down as you move the pointer.

c. Pan the view in 3D by keeping the right mouse button pressed down as you move the pointer.

d. Zoom in or out by turning the mouse wheel.

e. Hold ctrl key to press left mouse button to move the measurement in X and Y axes.

f. Hold ctrl key to press right mouse button to move the measurement in Z axis.

7. Move mode

Move in X and Y axes with left mouse button and in Z axis with right mouse button.

8. Zoom mode 

Click on this button to activate Zoom mode.

When Zoom mode is activated, the following features are available:

a. Zoom in or out by turning the mouse wheel.

b. Zoom in or out by keeping the left mouse button pressed down as you move the pointer.

9. Rotate mode

Click on this button to activate Rotate mode.

When Rotate mode is activated, the following features are available:

a. Rotate the view in 3D by keeping the left mouse button pressed down as you move the pointer.

b. Zoom in or out by turning the mouse wheel.

10. Pan mode

Click on this button to activate Pan mode.

When Pan mode is activated, the following features are available:

a. Pan the view in 3D by keeping the left mouse button

b. pressed down as you move the pointer.

c. Zoom in or out by turning the mouse wheel..

11. Zoom to fit window

12. Side view

Click on this button to rotate and view the measurements from the side.

13. Front view

Click on this button to rotate and view the measurements from the front.

14. Top view

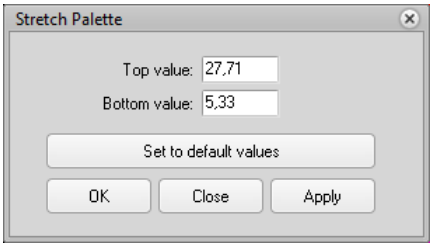
Click on this button to rotate and view the measurements from the above.

15. Palette

Pull down and select the desired color palette.

16. Stretch color palette

Click on this button to open the dialog box shown below.



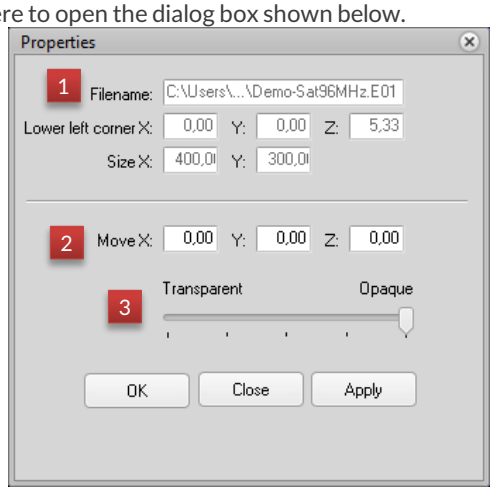
By default, the color palette is set up to cover the total amplitude span of the loaded measurements. By adjusting the top and bottom value of the color palette, you can focus the entire color palette to the amplitude span that you wish to examine.

17. Object

Pull down and select the measurement or image you wish to scale, move or rotate.

18. Edit object properties

Click here to open the dialog box shown below.



1. The upper part of the dialog box contains original values that cannot be changed.

2. Move to origin of coordinates

3. Visibility

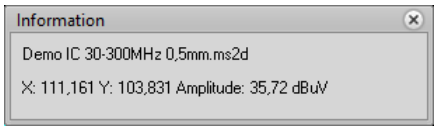
Slide the bar from Opaque to Transparent to make the image more transparent.

The purpose of this feature is to be able to place a photo or a circuit design drawing of the test object (in 3D) above the measurement of this same object, and then make the photo or drawing semi-transparent. This will allow you to pinpoint the emission source more easily.

.

19. Information

Click this button to show and hide the information window showing File name and coordinates.



20. Amplitude scale

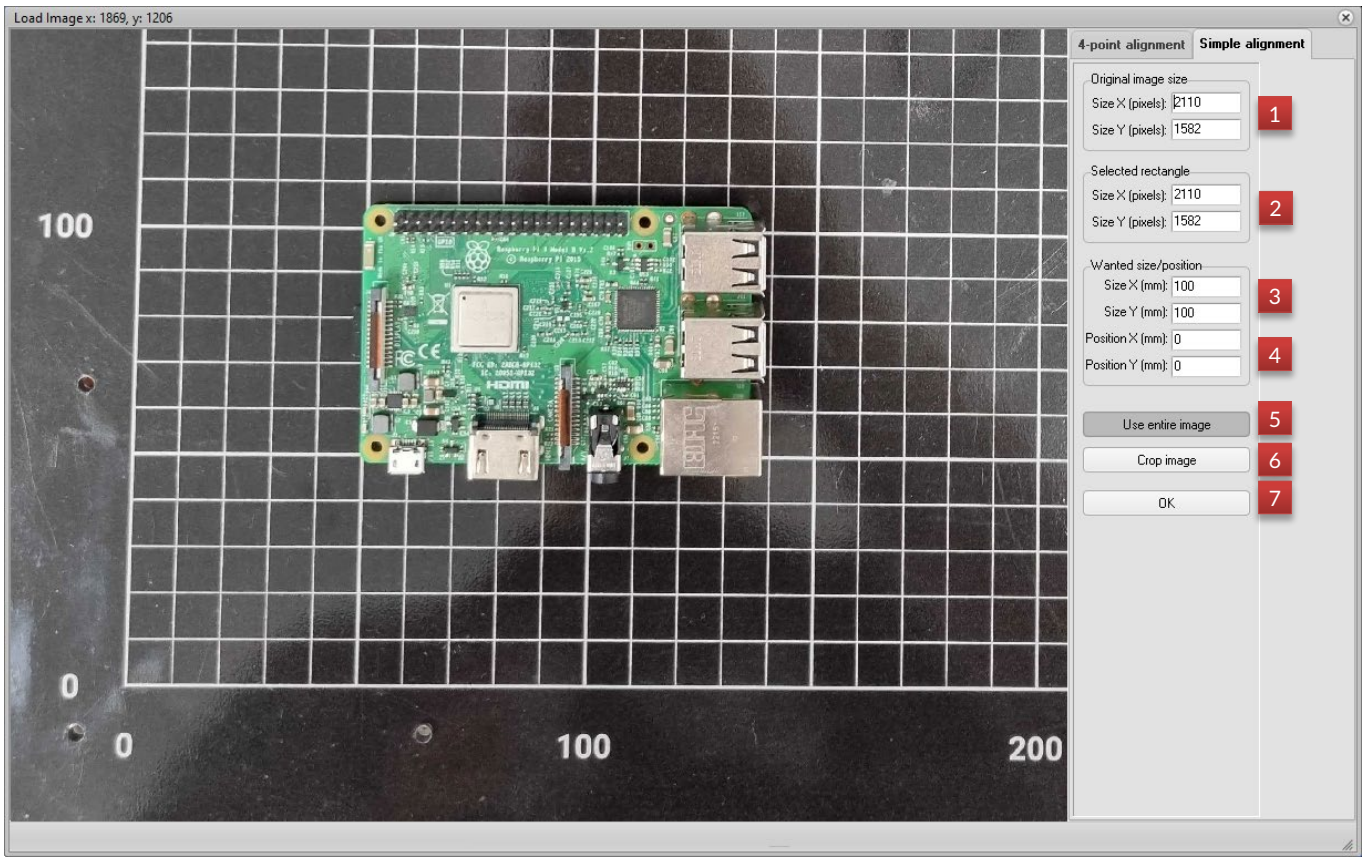
The amplitude scale can easily be adjusted by clicking and dragging the upper or lower ends up and down. Right click to reset back to original values.
This is basically another way to do the same thing as in 16. Stretch color palette.

The View Scan tab – Loading images with simple alignment

Before loading an image, a few things need to be determined. Is the entire image, or just a part of it, to be used? What size does the image need to take when loaded (in millimeters)? How should the image be positioned?

The aligned image will automatically be saved with the extension .AJPG (aligned-JPG). The AJPG file can later be loaded directly without alignment.

To do this, the dialog box shown below is used.



1. Original image size

Here you can see the size, in pixels, of the original image. These values are for your information only and cannot be changed.

2. Selected rectangle

These values show the size of the selected rectangle. This is applicable when the Crop image button is pressed down. The desired part of the image is selected by clicking and drawing a rectangle on the image.

3. Wanted size

These values define the size of the image in millimeters. Enter the size, natural or other, that you want the image to assume when loaded. If you change one of the values, the other value will change automatically to maintain the aspect ratio of the original image/selected rectangle.

4. Wanted position

These values define the position (mm) of the lower left corner of the image.

5. Use entire image

Click on this button to select the entire image for loading, without cropping it.

6. Crop image

Click on this button to enable cropping of the image.

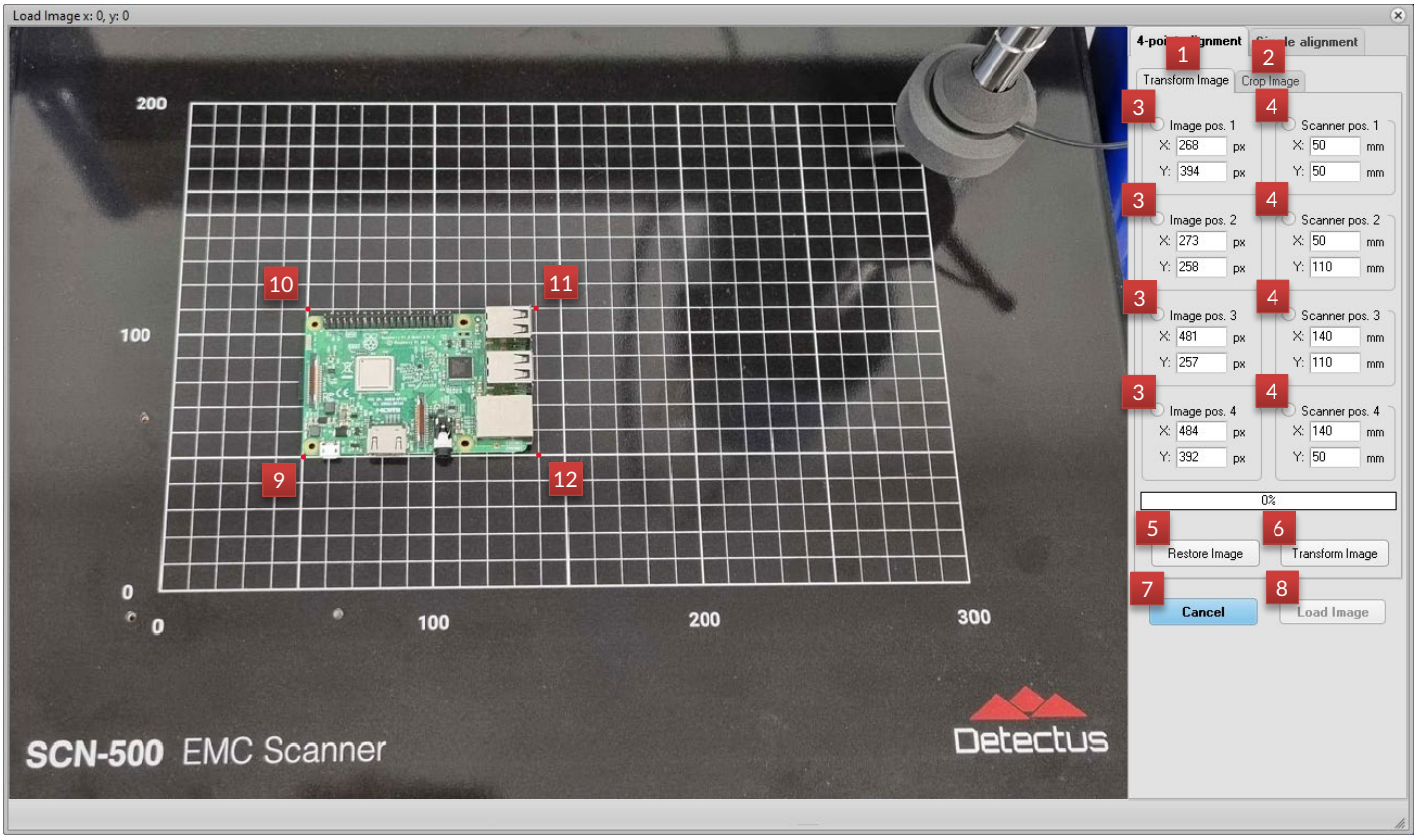
7. OK

Click on this button to load the image and close this dialog box.

The View Scan tab – Loading images with 4-point alignment

The 4-point alignment will allow you to pick four points with the mouse cursor on the image and four points with the probe on the physical object. These eight points are then used to stretch and distort the image so that it aligns with the physical object. This will, for example, help correcting a photo that was taken at an angle. The aligned image will automatically be saved with the extension .AJPG (aligned-JPG). The AJPG file can later be loaded directly without alignment.

9 – 12 are sample points that correspond with the values in (3) and (4) for the Raspberry.jpg file.



1. Transform Image tab

This is where you transform the image from a distorted shape into a “flat”, aligned shape.

2. Crop image

Click on this tab and then click and draw a square around the part of the image that you want to use.

3. Image positions

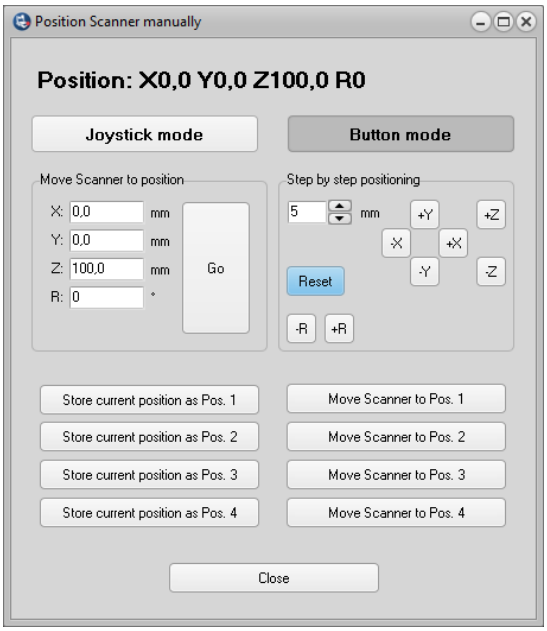
Select one of the position boxes by marking the circle above it. Then click on the preferred position on the image.

The position coordinated will be filled into the position boxes.

4. Scanner positions

Select one of the position boxes by marking the circle above it.

Doing so will show this dialog



This dialog box will help you move the probe to the preferred position. Use the “Step by step positioning” or “Move Scanner to position” features to move the probe.

When the probe is at the preferred position, use the Store buttons to store the coordinate in one of the Scanner position boxes on the 4-point alignment form.

5. Restore Image

Click here to reload the image from file

6. Transform image

Click here to transform the image

7. Cancel

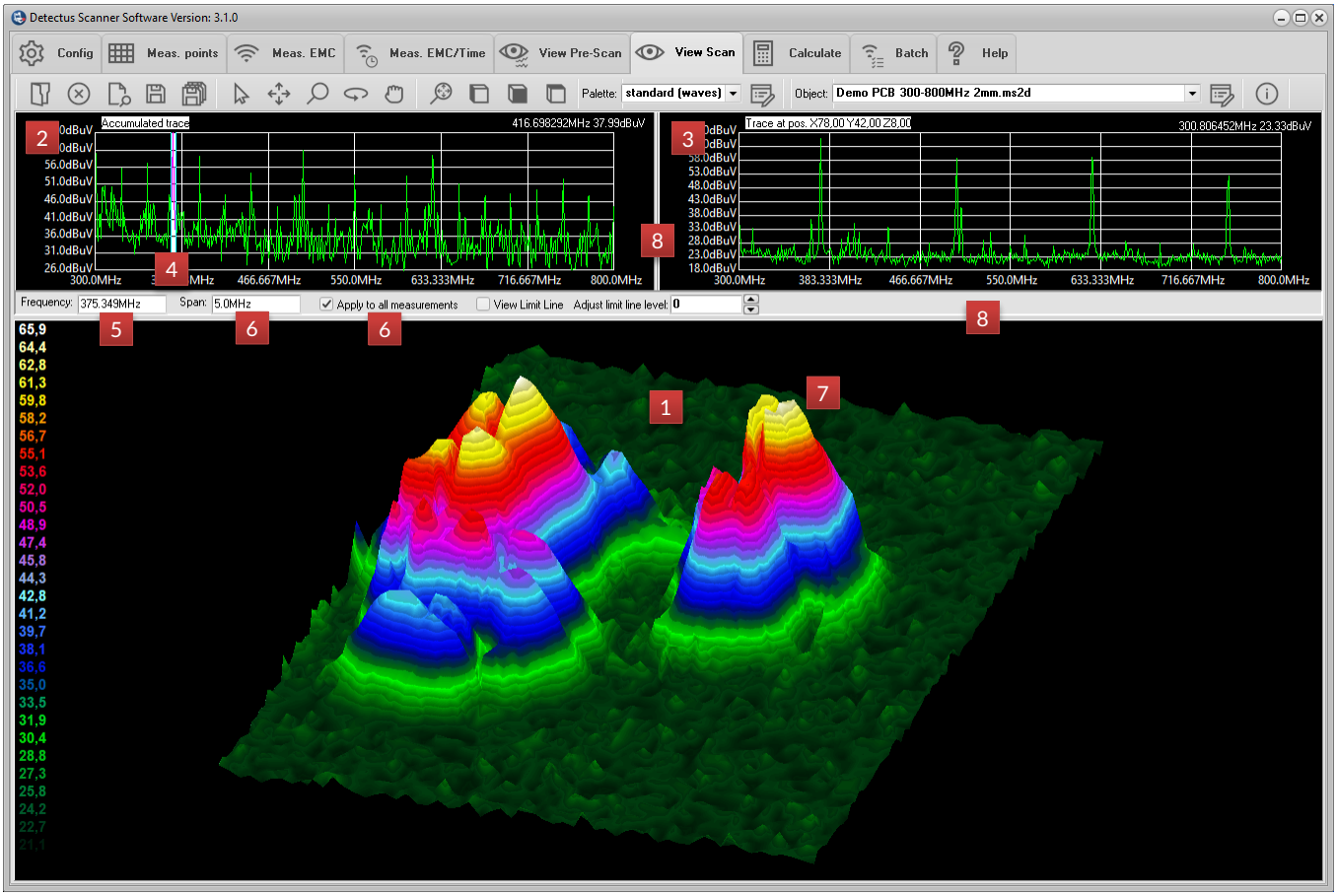
Click here to cancel and close the Image loading form

8. Load Image

Click here to load the image

This button is activated after transforming

The View Scan tab – Viewing MultiScan measurements



1. Field plot

The field plot is generated from the highest peak within the selected span in each measuring position.

Right-click and select “View wide band spectra from …” to change the “Trace at position”-graph (6).

2. Accumulated trace

This is a Max-Hold calculation of all the wide band spectras (Pre-Scans) of all measuring positions. So, this graph shows the same information as a Pre-Scan measurement would.

3. “Trace at position”-graph

This is the wide band spectra (Pre-Scan) measured at the indicated position. The position is also shown graphically with a marker (7)

Right-click on the field plot and select “View wide band spectra from …” to change the “Trace at position”-graph

4. Selected Span

This is a numerical representation of (4) and (5).

Right-click and drag the cursor to change the selected frequency and span.

5. Frequency

This is the selected center frequency from which the field plot is generated. Type in a new center frequency and hit <enter> to change the field plot.

6. Span

This is the selected span from which the field plot is generated. Type in a new frequency span and hit <enter> to change the field plot.

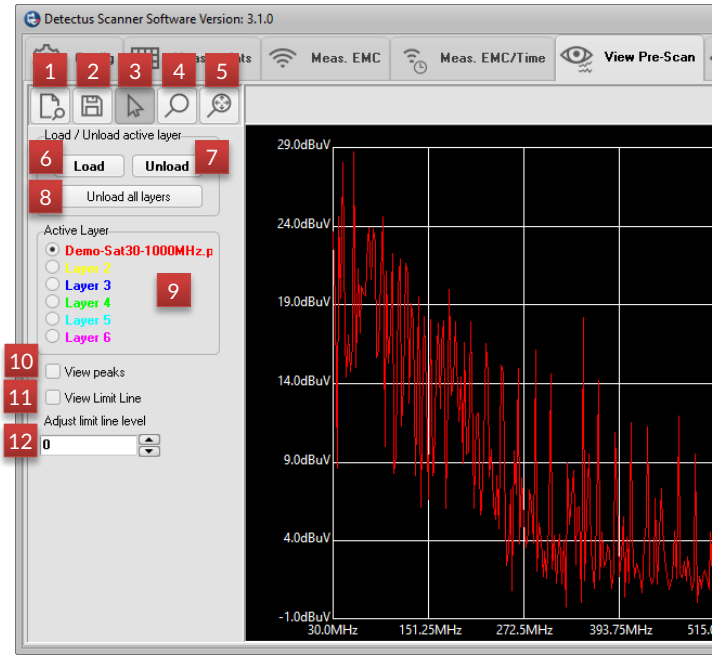
7. Marker

This marker show the position at which the position trace (6) is measured.

8. Slide bars

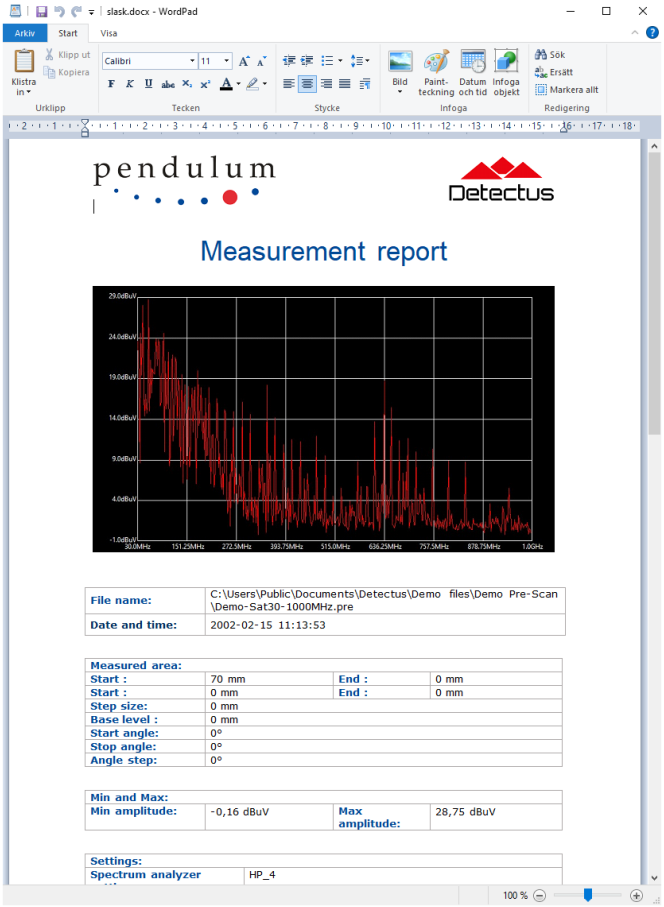
These bars can be moved with the cursor to change the size and shape of the three graph windows.

The View Pre-Scan tab



1. Report

Click on this button to create the report and open it. The report will open in your default HTML browser or in Word or WordPad depending your settings on the Config tab. For mor details see page 37.



2. Save

Click on this button to save the current image to a *.BMP or *.JPG file.

3. Information mode

Click on this button to activate Information mode.

When Information mode is activated, the label above the graphics will show the frequency and amplitude corresponding to the position of the pointer.

4. Zoom mode

Click here to activate Zoom mode.

When Zoom mode is activated, you can zoom in by clicking and drawing a rectangle around the area that you wish to study more closely.

5. Unzoom

Click on this button to unzoom and show the entire graph.

6. Load

Click on this button to load a previously saved Pre-Scan measurement. The measurements are named *.PRE.

7. Unload

Click on this button to unload the measurement from the active layer.

8. Unload all layers

Click on this button to unload all measurements.

9. Active Layer

Select one of the available layers. The layer you choose will be the destination when you load a previously saved measurement. The color of the buttons Load and Unload will correspond to the color of the selected layer.

10. View peaks

Check this box to view the peaks in the spectra graph as vertical red lines.

11. View limit lines

Check this box to view the limit line that is selected on the Configuration tab.

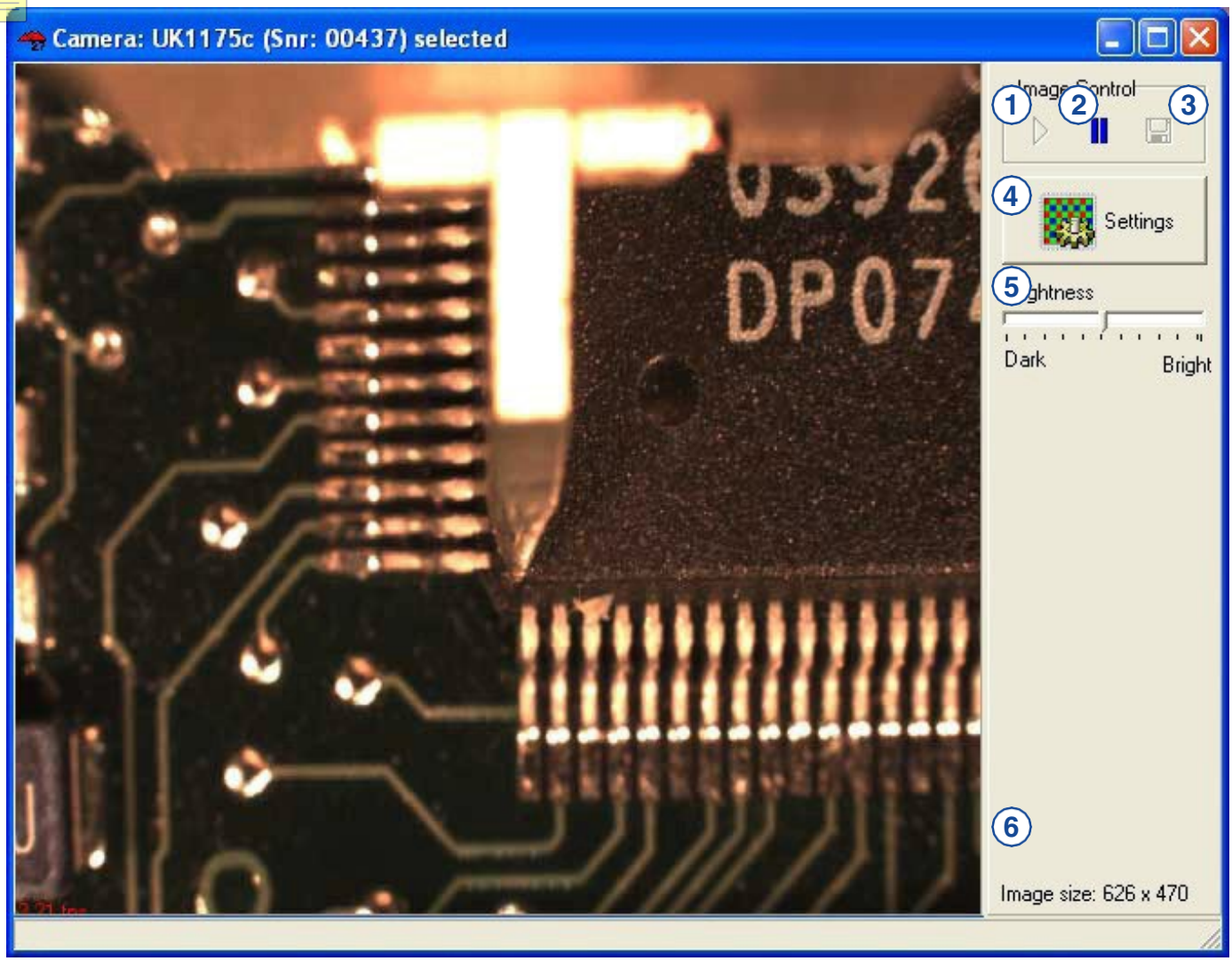
12. Adjust limit line level

The value entered here will work as an offset to the amplitude values of the limit line.

The Camera window (HR series with IC option)

The Camera window provides a high resolution (2048x1536) view of the test object and the tip of the probe.

The purpose is to allow the user to, very accurately, calibrate to position of the probe and to view and document the position of the probe.



1. Activate video

Click here to activate the video after it has been paused.

2. Freeze video

Click here to freeze the video. Doing so will activate the “Save to file” button.

3. Save to file

Click here to save the frozen video image to file. The size of the saved image will be according to the Image size label (6).

4. Settings

Click here to open the Camera settings dialog.

5. Brightness

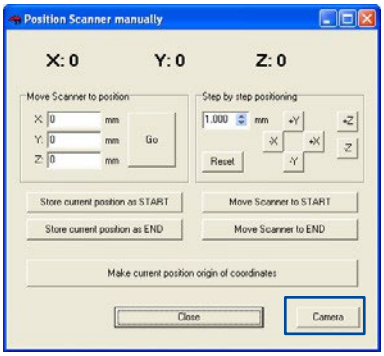
Adjust the lever to desired brightness.

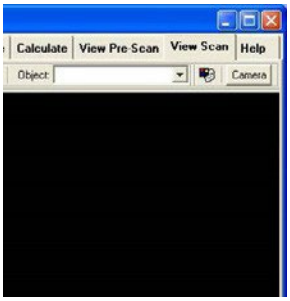
6. Image size

This label shows image size. Resizing the Camera window will change the image size.

This is also the size of the image when saved.

The Camera window can be opened from the “Position Scanner manually” dialog and from the View Scan tab.





pendulum

Maintenance (DS and Rx series)

1. Clean regularly all outside surfaces of the scanner using a damp cloth with a gentle cleaning agent.
2. Do a review of all the screws on the scanner and if there are some loose screws, just tighten them.
3. Use some oil on the rails if necessary. Use oil with good adhesion.

Maintenance (HR series)

1. Clean regularly all outside surfaces of the scanner using a damp cloth with a gentle cleaning agent.

2. Do a review of all the screws on the scanner and if there are some loose screws, just tighten them.

3. The shaft guides and drive shafts should be lubricated every 1500 to 3000 operating hours. Use ordinary ball bearing grease and ordinary oil.



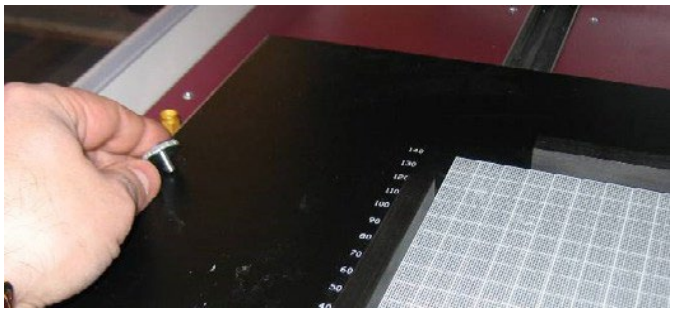


3.1. With the power on, open the hood.

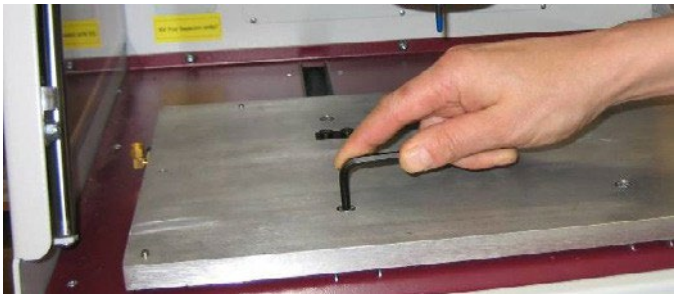
3.2. Turn the mains switch on the back off.

3.3. Push/pull the plate with the coordinate grid towards the front of the Scanner.

3.4. Unscrew the two screws to the top plate and remove the plate.

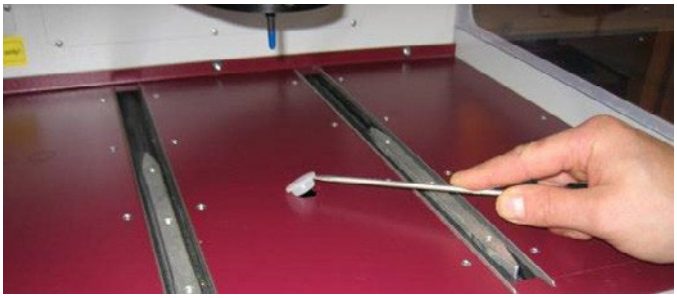


3.5. Unscrew the base plate and remove it. Use an Allen key.



3.6. Remove any foreign object and dust from the sealing lips using a damp cloth.

3.7. Remove the plastic plug.



3.8. Lubricate the nipple found under the plastic plug. Use a grease gun.



3.9. Lubricate the shaft guides through the sealing lips. Use oil.



3.10. In order to lubricate the X-axis, push the sledge to the left and remove the plastic plug on the left side of the Scanner.



3.11. Lubricate through the now visible nipple using a grease gun.

3.12. Lubricate the X-axis shaft guides through the sealing lips using oil.

3.13. In order to lubricate the Z-axis. Remove the holder for the pre-amplifier using an Allen key.



3.14. Remove the now visible plastic plug.

3.15. Push the Z-axis sledge down.

3.16. Lubricate the now visible nipple using a grease gun.

3.17. Remove the plastic plugs on both sides of the Z-axis sledge.



3.18. Lubricate the Z-axis guide shafts using oil.

3.19. Lubrication is done. Now put all plastic plugs, parts and screws back.

4. Don't forget to turn on the mains switch on the back of the Scanner.

Appendix 1
Installing R&S FS300 USB driver

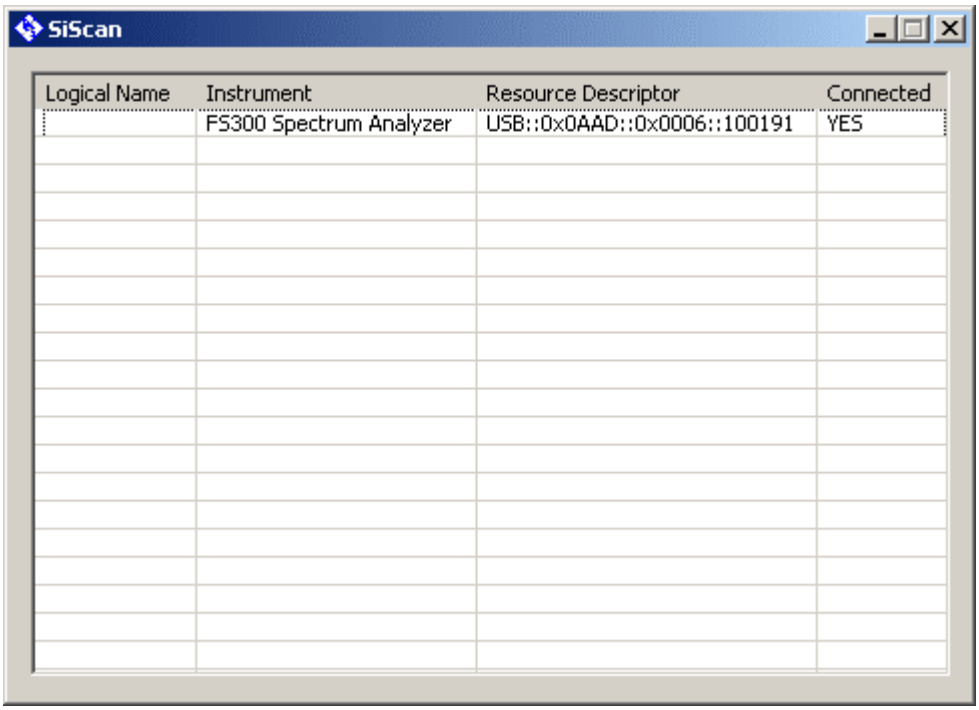
Follow the steps below to install the USB driver for R&S FS300..

1. Download the “FS300: VXIplug&play driver for Spectrum Analyzer FS300” from http://www.rohde-schwarz.com.

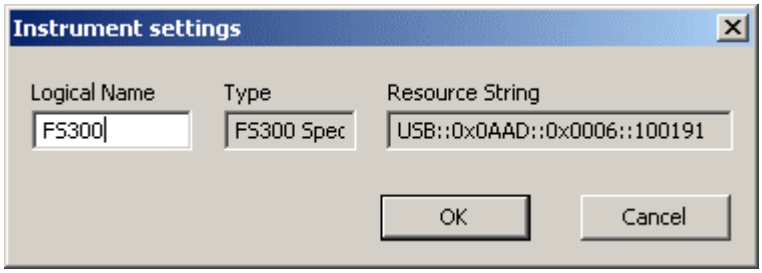
2. Run the downloaded installation program.

3. Connect and power on the FS300 spectrum analyzer.

4. Start the program SiScan by clicking: Start – Program – Rohde & Schwarz – SiTools – SiScan.



5. Double click on the line “FS300 Spectrum analyzer”



6. Type in “FS300” as Logical Name and click ok.

7. Close SiScan by clicking on the “X” button.

8. Finished.

Appendix 2
How to connect to an instrument via LAN

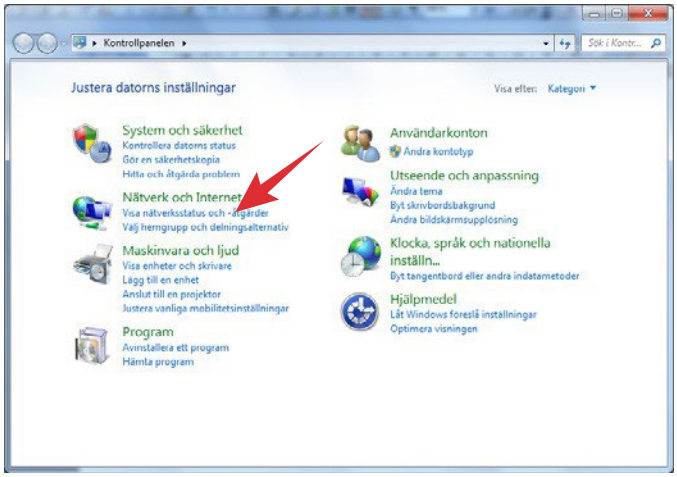
Some spectrum analyzer drivers in DSS and all drivers for signal generators and EDDs are done using National Instruments Visa. Therefore it is required to install the NI Visa driver first. The driver and instructions how to install it can be downloaded at www.ni.com. Click Support and then NI Visa...

Below is step-by-step instructions how to connect Detectus DSS running on a Windows 7 PC to an instrument via LAN in a simple network using fixed IP-addresses.

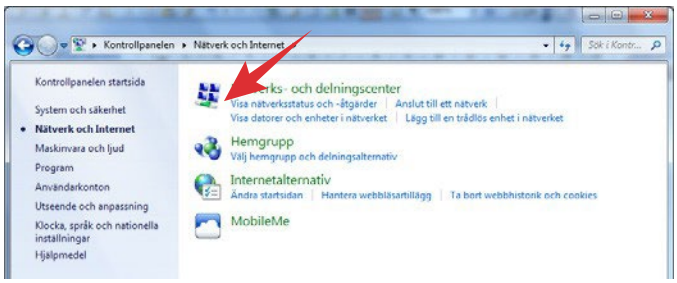
For example, a PC connected to an instrument via just a LAN cable or a PC connected to several instruments using cables and a hub or switch.

This method is not recommended in networks where there is a server with DHCP functionality.

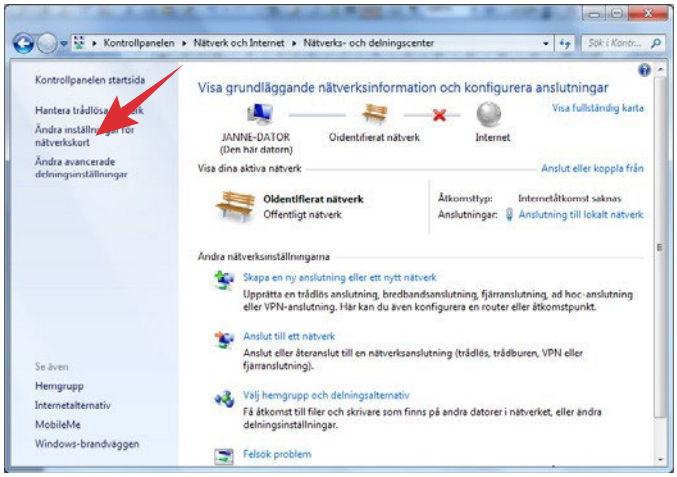
1. Open control panel and click “Network”



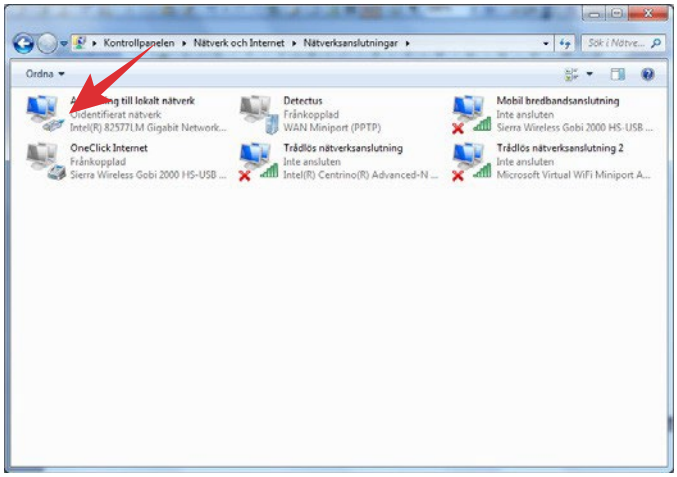
2. Click “Network and sharing center”



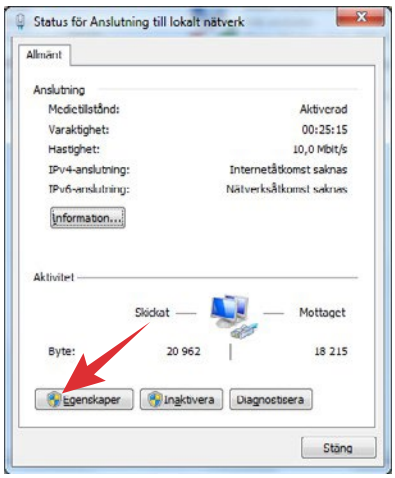
3. Click “Change settings for network adapter”



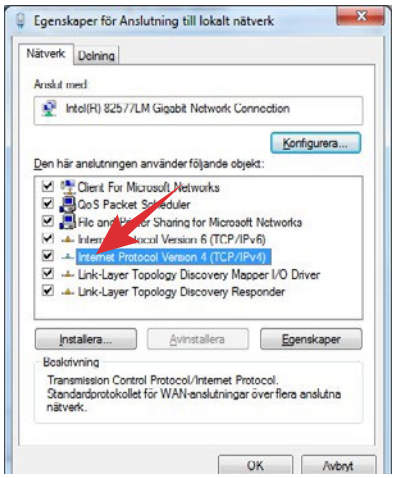
4. Double click on “Connection to local network”



5. Click on “Properties”

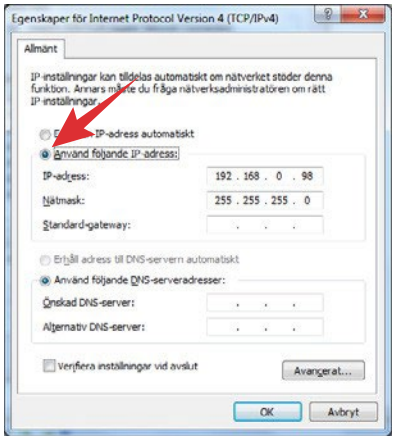


6. Double click on “TCP/IPv4”



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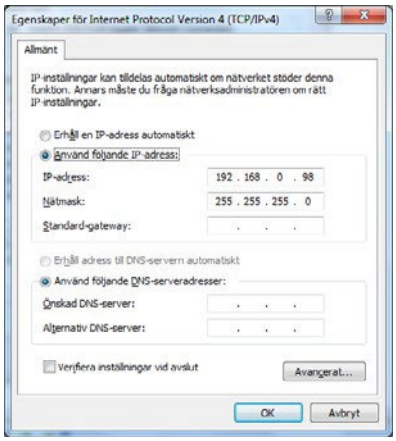
7. Activate “Use this IP-address”. This is where you need to change back when returning to your office and want to connect to your normal DHCP network.



8. Type in IP-address and netmask. The netmask and the three first digit groups of the IP-address should be the same as for the instrument. The last digit group of the IP-address must not be the same as for the instrument.

   Example:

   Instrument netmask: 255.255.255.0
   Instrument IP-address: 192.168.0.99
   PC netmask: 255.255.255.0
   PC IP-address: 192.168.0.98



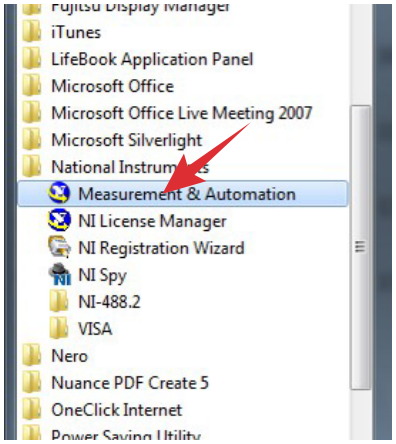
9. Click OK and close all previously opened dialog boxes.

10. Set up the network settings for the instrument according to (8).

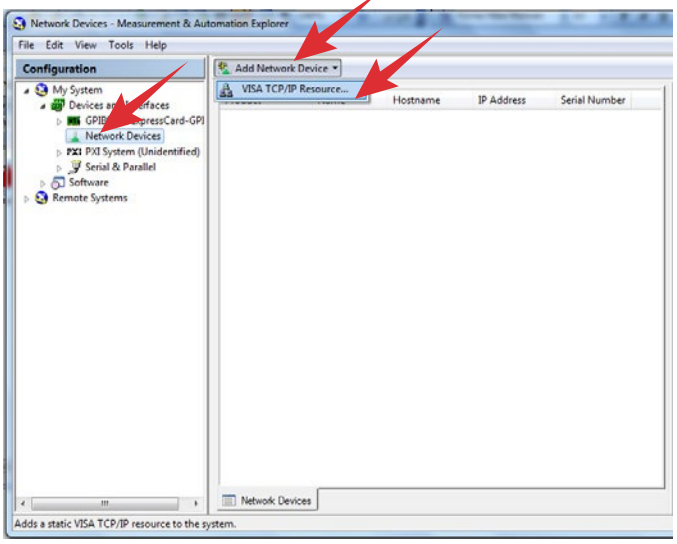
11. Make sure that the instrument doesn’t have DHCP activated.

12. Next we need to make sure that NI-VISA knows about our LAN instrument.

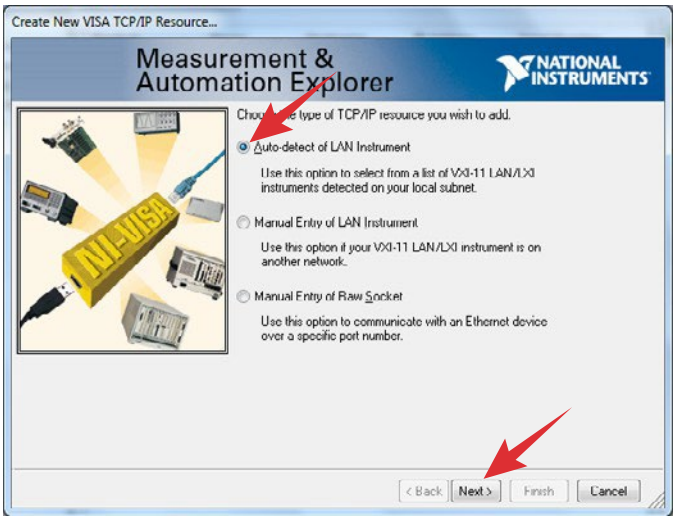
13. Open National Instruments Measurement & Automation



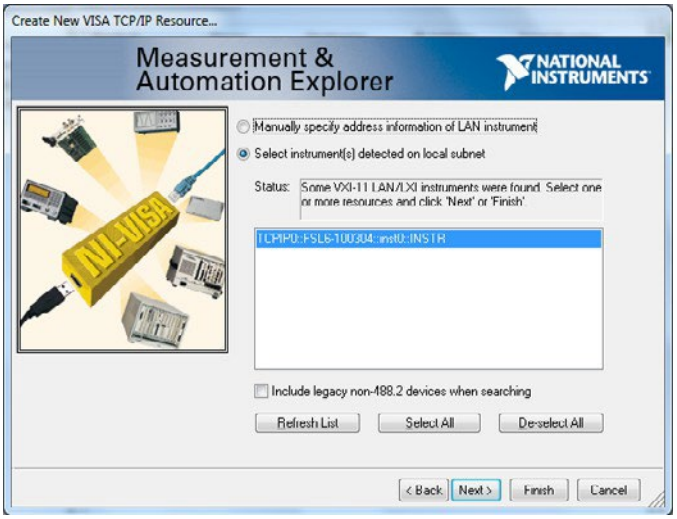
14. Click on “Network Devices”, then “Add network device” and then “VISA TCP/IP Recource…”



15. Select “Auto-detect of LAN Instruments” and then click “Next”

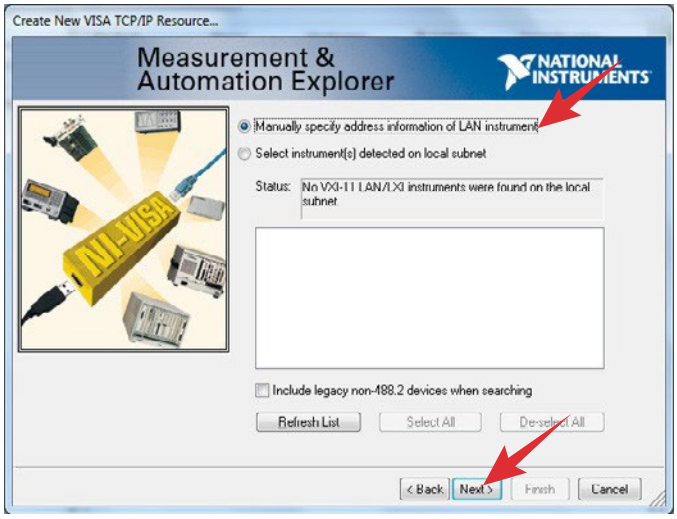


16. If everything is ok you should, after a little while, see your instrument pop up in the list. If it does you can just click “Finish” and move on to step 20.

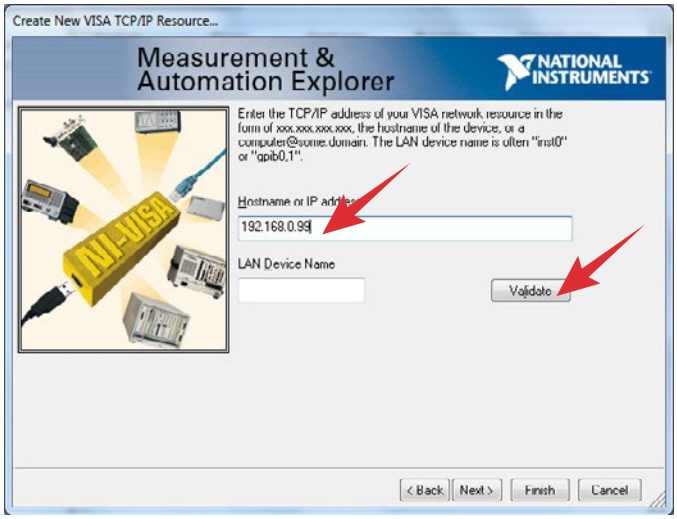


pendulum

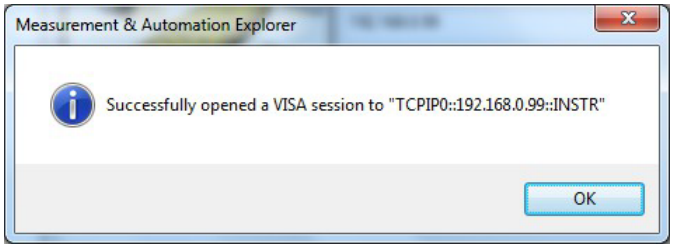
17. If your instrument doesn't popup we have to find it manually. Select "Manually specify…" and then click next.



18. Enter the IP-address of your instrument and then click "Validate"

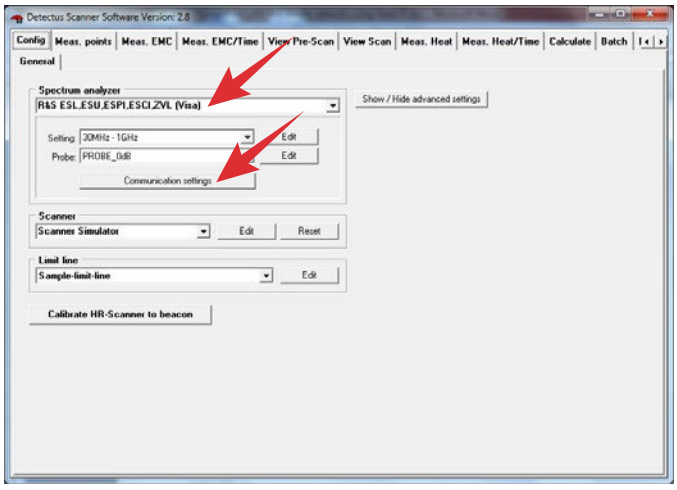


19. Hopefully you will see a dialog like this one. If you don't you have to start checking connections and IP-addresses and then try again.

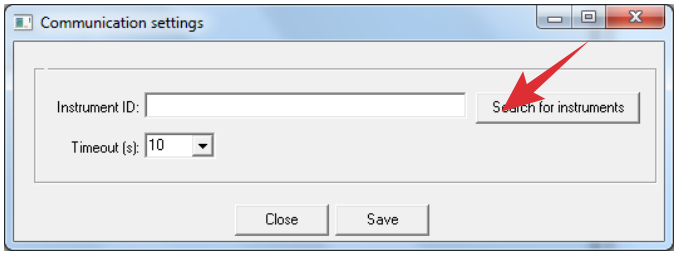


20. Assuming that the above procedure worked out, you are now ready to start the DSS software.

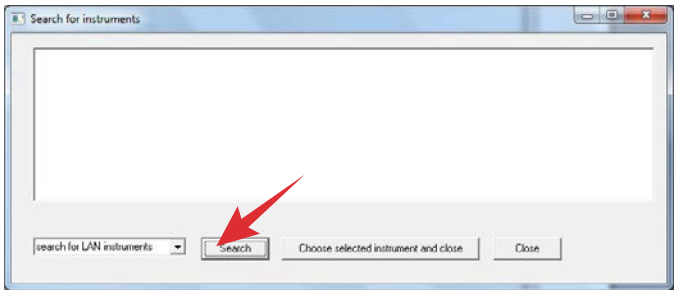
21. Make sure you have selected a spectrum analyzer driver that has (Visa) in the name and then click "Communication settings"



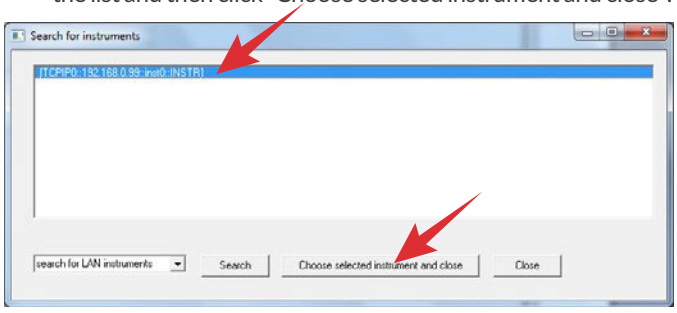
22. Click "Search for instruments". (If your dialog doesn't look like this, you have not selected a Visa driver. Go back to 21)



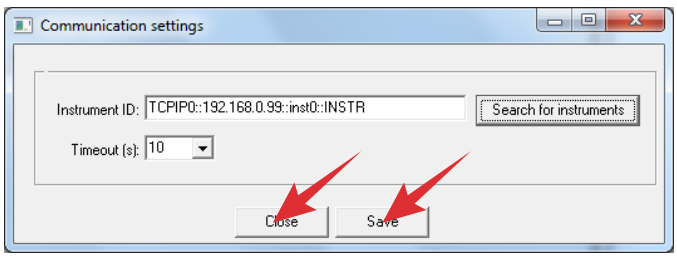
23. Click "Search"



24. Hopefully you instrument pops up. Select your instrument in the list and then click "Choose selected instrument and close".



25. Now you should see the address of the instrument filled in. Click "Save" and then "Close".



pendulum

Appendix 3

How to configure Tektronix SignalVU and TekVisa so that Detectus Scanner Software can use any Tektronix spectrum analyzer

The procedure is different depending on if it is a clean installation with no other Visa's than TekVisa installed on the PC or if National Instruments Visa is also installed.

1. In case of a clean installation with no other Visa's on the PC.

a. Install Tektronix SignalVU and TekVisa. TekVisa is included in SignalVU. There should be a checkbox for TekVisa during the installation.

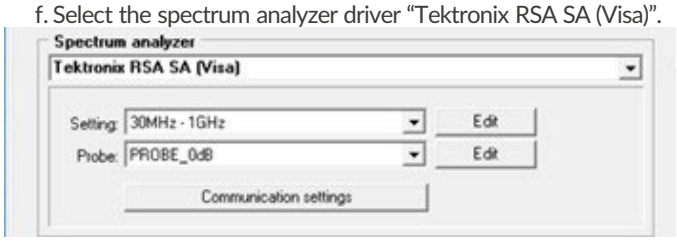
b. Restart the PC if the installation requires it.

c. Connect the spectrum analyzer.

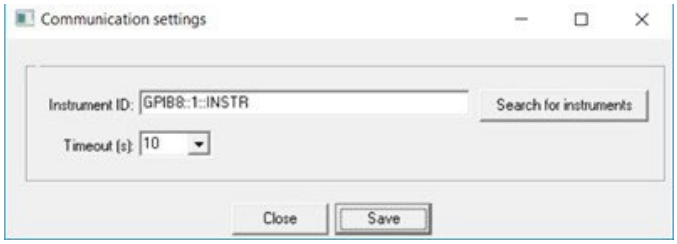
d. Start SignalVU and verify that SignalVU can connect to the spectrum analyzer. For example by clicking Preset.

e. Start Detectus Scanner Software.

f. Select the spectrum analyzer driver "Tektronix RSA SA (Visa)".



g. Click "Communication settings".



h. Make sure the Instrument ID is set to "GPIB8::1::INSTR". The Search button will not work in this case.

i. Click Save and then Close.

j. Now Detectus Scanner Software should be able to communicate with the spectrum analyzer.

k. Remember! SignalVU must be running in the background.

2. In case of a mixed installation with both NI Visa and TekVisa installed.

a. Install Tektronix SignalVU and TekVisa. TekVisa is included in SignalVU. There should be a checkbox for TekVisa during the installation.

b. Restart the PC if the installation requires it.

c. Install National Instruments GPIB. NI Visa is included in the installation.

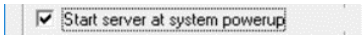
d. Restart the PC if the installation requires it.

e. Go to the notification area of the taskbar (lower right corner) and find the item "Tek VISA LAN Server Control".

Right-click it and select "Start VXI-11 Server".

f. Right-click again on "Tek VISA LAN Server Control" and select "Server Properties…".

g. Check the box to start the VXI-11 server with windows.



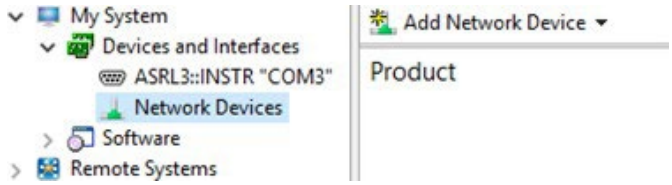
h. Click OK to close the dialog.

i. Connect the spectrum analyzer.

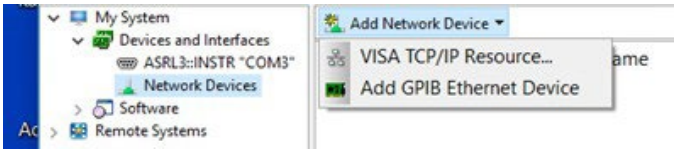
j. Start SignalVU and verify that SignalVU can connect to the spectrum analyzer.

k. Start NI MAX (Measurement and Automation Explorer)

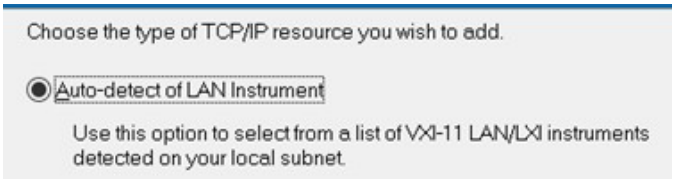
l. Select "Devices and Interfaces" and then "Network Devices".



m. Click "Add Network Device" and then "VISA TCP/IP Recource…".



n. Select "Auto-detect of LAN Instrument" and then click Next.



o. Select the instrument at address 127.0.0.1 and then click Finish.



p. Close NI MAX.

q. Start Detectus Scanner Software.

r. Select the spectrum analyzer driver "Tektronix RSA SA (Visa)" and then click "Communication settings"..



s. Click "Search for instruments".

t. Select "Search for LAN instruments" and click Search.

u. Select SignalVU at address 127.0.0.1



v. Click "Choose selected instrument and close".

w. Make sure the Instrument ID is set to "TCPIP::127.0.0.1::INSTR". Searching will not work in this case.

x. Click Save and then Close.

y. Now Detectus Scanner Software should be able to communicate with the spectrum analyzer.

z. Remember! SignalVU must be running in the background.

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