

# Detectus HRE series

EMC-Scanners

pendulum

DATA SHEET

- Detect EMC problems before the test lab does. Save time and money by avoiding re-visits
- Repetitive and consistent measurements enables easy comparative measurements between design alternatives
- Improve quality of design, by eliminating internal EMI hot spots
- Powerful visualization of EMI sources, for any frequency, in the powerful and easy-to-use SW
- Scan in step sizes down to 25  $\mu\text{m}$  in 3D, for frequencies up to 10 GHz with Pendulum probe kits
- IC measurements with dedicated IC-probes and high-resolution 10 $\mu\text{m}$ /pixel inspection camera (option)

  
Detectus



The Pendulum/Detectus HRE series of EMC-Scanners are powerful pre-compliance tools for measurement and analysis of ElectroMagnetic Interference (EMI). The models in the HRE series feature repetitive high-resolution 4D (3D movement plus 0-360° rotation of the probe head) scanning of radiation, down to 25  $\mu\text{m}$  steps, and up to 10 GHz frequency range, **even inside an IC**, with an outstanding easy-to-use scanning SW for visualization and documentation.

Detect your EMC noise sources early during development, while the cost for remedy still is low!

## World leading Detectus EMC-Scanners are now Pendulum

The Swedish company Detectus is a world-leading supplier of EMC-Scanner products, since the 1990's. As from July 2020, the Detectus company is an integral part of Pendulum Instruments.

### Advantages of an EMC scanner

#### In R&D

Using the EMC-Scanner during the early stages of design enables you to detect potential emission problems before they become integrated into the product and expensive to correct.

If a product has failed a test at a test house, normally you only learn which frequency failed, not the location of the noise source.

The EMC-Scanner can help you find the source, and repeated measurements while redesigning your product helps you lower the emission levels.

You can compare different design solutions and make comparative measurements of electromagnetic emissions.

#### In Q&A

The EMC-Scanner can help you maintain a high quality in the production line. You can make measurements on samples from the production line and easily compare them with a reference. That way you can make sure that, for example, a change of supplier of a component doesn't affect the emission spectra in a negative way.

## How do you perform EMC-scanning?

A complete scanner system consists of the EMC-Scanner Hard-ware package, the Detectus Scanning SW (DSS), a Spectrum Analyzer and a PC to run the scanner SW. Pendulum Instruments can supply everything if required, but normally the user already possesses a PC and a Spectrum Analyzer.

The test object is put on the coordinate board and a small near-field probe is moved in a controlled and repetitive path above the test object, registering the field strength. The probe output signal in every position is measured by the Spectrum Analyzer, and transferred to the scanner SW. The smart SW combines the spatial information (X,Y,Z) with the spectrum in that position, and presents detailed results.

## Drivers for almost all Spectrum Analyzers

Pendulum/Detectus has a SW driver library with hundreds of Spectrum Analyzers models for all major manufacturers, from the 1980's HP analyzers to the most modern Analyzers. When a new Spectrum Analyzer model is introduced, we quickly create a driver, provided they have a VISA compatible communication port (GPIB, USB or LAN) for remote control.

Your investment in a Detectus EMC-Scanner is safe-guarded, even if you upgrade your Spectrum Analyzer to a newer model.

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## Leading Performance from the Detectus designers

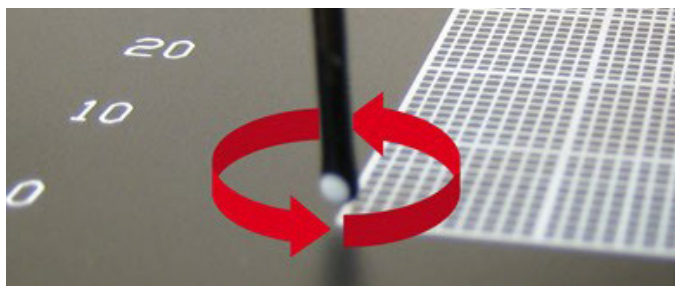
- With 25 mm step size of the scanner, you can pinpoint emission sources in densely packed designs. You can even follow emission hot spots inside an IC, using the IC option.
- You can scan emissions up to 10 GHz, with the standard Pendulum Probe kits. If the user has near-field probes going up to higher frequencies, e.g. 70 GHz, then these can normally be attached and used for EMC-scanning. The SW has no limits, but you must of course use a Spectrum Analyzer that support the frequency range.
- Within the Detectus HRE series you can choose from two different sizes, with or without probe rotation, to fit most test objects. The scan area (xyz) is:
  - 280x180x85mm (3D or 4D\*)
  - 390x280x130 mm (3D or 4D\*)

\* 4D = 3D xyz movement, plus probe rotation 0 to 360o

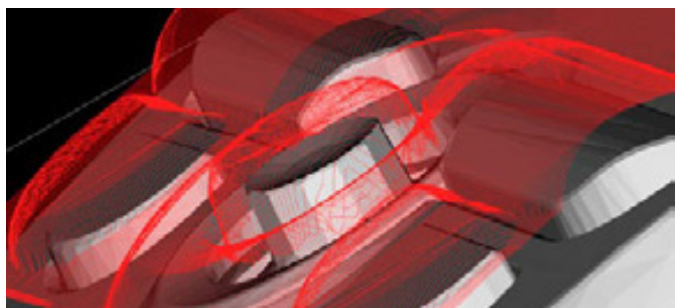
## 4D Scanning = 3D movement + rotation

The HRE-4x models of Scanners are exactly like the HRE-0x models, with the addition of automatic rotation around the probe axis. During measurement the Scanner will rotate the probe and find the “worst case” angle and then store the amplitude. This procedure is performed in every measuring position.

The probe rotation resolution is one degree. The ability to rotate the probe means that you no longer have to worry about missing sources of radiation due to the fact that your probe has different sensitivity in different angles. It will also enable you to more easily follow cables, traces on PCBs and even bonding wires inside a chip.



## Import 3D surface models

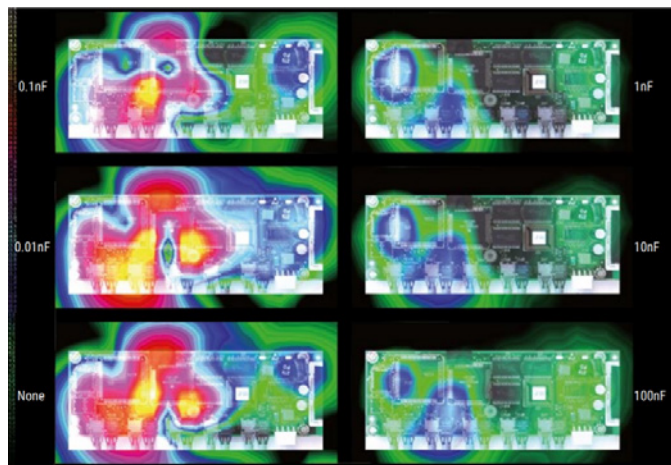


You can import 3D surface models in STL file format into the powerful and easy-to-use SW, and create 3D EMI radiation measuring points that follow the surface at a fixed distance. 3D surface models can easily be aligned to the measurement using the 3-point alignment feature in the SW.

## World class SW lets you SEE electromagnetic fields

The easy-to-use and feature-rich SW let you measure and visualize the intensity and the location of a radiation source at a component level - **or even inside a component**. The results of such a measurement can be shown as two or three dimensional colored maps. The measurements can easily be repeated creating objective, comparative measurement results.

Measurements can be saved and later compared with any changes of the circuit board, thanks to the exact repeatable scanning. The SW even allows to subtract two scanning results to emphasize the true difference of any change of board layout, or components.

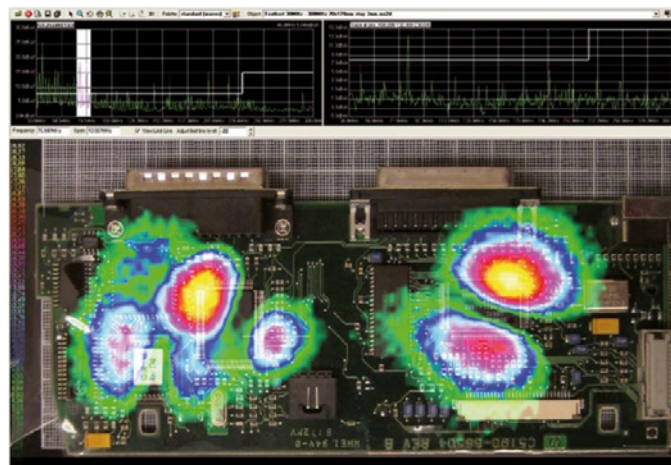


Comparative measurements of EMI for six different IC de-coupling capacitor alternatives

## MultiScan

The MultiScan measurement enables field plots from any frequency within the measured wide band span. This powerful feature gives the user a huge amount of information.

In the screen dump below, the main part of the screen shows the field plot of the frequency selected in the top left graph. The upper right graph shows the full spectrum from a user selectable position.



MultiScan measurement. The top left graph shows the accumulated trace (a max hold spectrum of all measuring points). The top right graph shows the wide band spectrum from a user selectable spot on the field plot.

## Accurate probe frequency response calibration to Strip line

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.

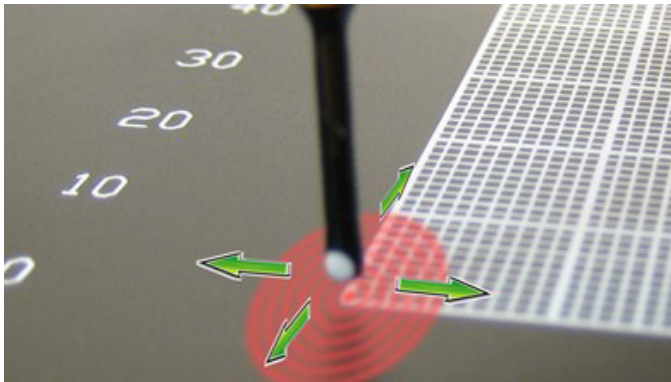


The probe calibration uses a well defined strip line board and a spectrum analyzer with built in tracking generator to automatically generate probe correction factors in the Scanner Software, to compensate for imperfections in probes, cables, connectors and pre-amplifier.

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.

## Accurate probe position calibration to beacon

The scanner tables of the HRE-series scanners are equipped with beacons for automatic and accurate probe calibration.



Calibrating to the electric center point of the probe helps you reproduce high quality measurement results every time.

## Probe & Pre-amplifier kit to 10 GHz

The EMC-Scanners comes upon delivery with a probe set to either 3 or 6 GHz. There is an optional extension to 10 GHz, that could easily be retrofitted.



The standard probe sets contain:

- E-field 30MHz-3/6GHz
- Vert. H-field, 30MHz-3/6GHz
- Horiz. H-field, 30MHz-3/6GHz
- Vert. H-field, 9kHz-50MHz
- Pre-amplifier to 3/6 GHz

## IC measurements

To make high resolution IC emission measurements, you need the IC option (A1104) and one or more near-field IC-probes. The high resolution (10µm/pixel) of the inspection camera shows a microscopic view of the probe tip and the test object. The inspection camera will allow you to define your measuring path very accurately and to examine measurement result with accuracy and confidence.



### The IC-option includes:

- A real time inspection camera with 10 µm resolution and digital zoom
- Mounting for high resolution near field probes
- LED lighting
- Software features for zoom, pan and screen shot

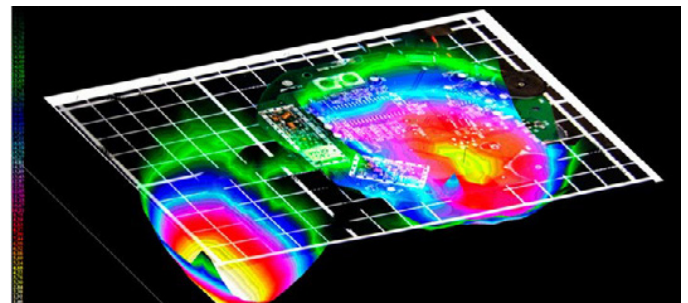
### The IC-option allows you to:

- Define your measuring path and examine results very accurately
- Use the special high resolution near field probes to take full advantage of the HRE scanners 25 µm resolution
- Zoom in and see details beyond the capability of the naked eye

## Immunity software option

The patented Immunity software option uses a Detectus EMC-Scanner system, a signal generator with a small antenna and any kind (e.g. multimeter or timer/counter) of Error Detection Device (EDD) with a communication interface to transmit the results from the device under test (DUT), caused by radiated electromagnetic interference. The DUT may be components, cables, PCB's or products. The measurements are easily interpreted and can be repeated for objective comparison.

During measurement the EMC-scanner moves the antenna to predetermined measuring positions above the test object. In each position the signal generator sweeps in frequency and amplitude while the EDD measures for test object failure. You can also test immunity for modulated signals like FM, AM and Pulse.



The Scanner SW can produce two or three dimensional color maps showing sensitive hot spots at any frequency plus printable reports.

## Near-field probe kits

The probe kits for 3 GHz and 6 GHz are standardly included in the HRE-xx/3G respectively HRE-xx/6G product packages. The probe upgrade kits for 10 GHz are purchased as an upgrade option.

The probes for IC measurements requires the IC option (Option SICM)

### 3 GHz probe kit (standard in 3G models)

**LF-B 3:** Vertical H-field 9 kHz - 50 MHz  
**RF-B 0.3-3:** Vertical H-field 30 MHz - 3 GHz  
**RF-R 0.3-3:** Horizontal H-field 30 MHz - 3 GHz  
**RF-E 03:** Vertical E-field 30 MHz - 3 GHz  
**PA 303 Preamplifier:** 30 dB to 3 GHz

### 6 GHz probe kit (standard in 6G models)

**LF-B 3:** Vertical H-field 9 kHz - 50 MHz  
**XF-B 3-1:** Vertical H-field 30 MHz - 6 GHz  
**XF-R 3-1:** Horizontal H-field 30 MHz - 6 GHz  
**XF-E 04s:** Vertical E-field 30 MHz - 6 GHz  
**PA 306 Preamplifier:** 30 dB to 10 GHz

### 10 GHz upgrade kit from 3 GHz (option S310)

**SX-B 3-1:** Vertical H-field 1 GHz - 10 GHz  
**SX-R 3-1:** Horizontal H-field 1 GHz - 10 GHz  
**SX-E 05:** Vertical E-field 1 GHz - 10 GHz  
**PA 306 Preamplifier:** 30 dB to 10 GHz

### 10 GHz upgrade kit from 6 GHz (option S610)

**SX-B 3-1:** Vertical H-field 1 GHz - 10 GHz  
**SX-R 3-1:** Horizontal H-field 1 GHz - 10 GHz  
**SX-E 05:** Vertical E-field 1 GHz - 10 GHz

### IC measurement probes (requires IC measurement option SICM)

**SPHV:** Vertical H-field 1.5 - 6 GHz  
**SPHH:** Horizontal H-field 1.5 - 6 GHz  
**SPEF:** E-field 7 MHz - 3 GHz

## Coordinate table

**Step size (X, Y, Z):** down to 0,025 mm  
**Position accuracy:** ±0.02 mm  
**Scan area (X, Y, Z):**  
**HRE-02 or HRE-42:** 280x180x85mm  
**HRE-03 or HRE-43:** 390x280x130 mm  
**Speed:** The HRE scanner scans an area of 200 x 200 mm with a step size of 10 mm, in 4 min

## Rear Panel Inputs and Outputs

**RS232 port:** D-Sub 9 pole female  
**Ethernet port:** RJ45, 10/100 Mbps

## Scanner Software

**System requirements:** Runs on Windows operating systems. Requires Windows 10

**Spectrum Analyzers supported:** Most models with a Visa compatible communication interface (RS232, USB, GPIB\*, LAN). A list of 100+ models is available at the Pendulum Instruments web site  
*\* requires National Instruments GPIB adapter in PC*

## Calibration

### Probe frequency response

**Mode:** Semi-automatic procedure using the strip line calibration option, and the control SW in option SPCK

### Probe position accuracy

**Mode:** Semi-automatic procedure using the built-in beacons in the HRE-scanners

## General Specifications

### Environmental Data

**Operating Temp:** +10°C to +35°C  
**Storage Temp:** -40°C to +71°C  
**Humidity:** 20% to 80% (+10°C to +35°C)  
**Safety:** Complies with relevant EN standards, CE  
**EMC:** Complies with relevant FCC and EN standards, CE

### Power Requirements

**Line Voltage:** 115V/230V,-15%,+10%  
**Frequency:** 50/60 Hz  
**Power consumption:** <1150 W

### Dimensions and Weight

**Width x Height x Depth:**  
**HRE-02:** 535x690x600 mm (21x27x24 in)  
**HRE-42:** 535x690x600 mm (21x27x24 in)  
**HRE-03:** 780x850x810 mm (31x33.5x32 in)  
**HRE-43:** 780x850x810 mm (31x33.5x32 in)  
**HRE-03 or HRE-43:** 535x690x600 mm

### Net Weight:

**HRE-02 or HRE-42:** 95 kg (209 lbs)  
**HRE-03 or HRE-43:** 150 kg (330 lbs)

### Shipping Weight (incl. pallet):

**HRE-02 or HRE-42:** approx. 155 kg (340 lbs)  
**HRE-03 or HRE-43:** approx. 170 kg (375 lbs)

## Ordering Information

### Basic Models

**HRE-02/3G, HRE-02/6G:** EMC scanner system including probe kit for either 3 GHz or 6 GHz. Test object size and scan area: 280x180x85 mm

**HRE-03/3G, HRE-03/6G:** MC scanner system including probe kit for either 3 GHz or 6 GHz. Test object size and scan area: 390x280x130 mm

**HRE-42/3G, HRE-42/6G:** EMC scanner system as HRE-02 plus rotational probe axis for 4D measurements.

**HRE-43/3G, HRE-43/6G:** EMC scanner system as HRE-03 plus rotational probe axis for 4D measurements.

**Included with Instrument:** 2 years product warranty\*, line cord, Scanner SW and user documentation on USB stick, and Certificate of Conformity

*\* The warranty period may be extended to 3 years by registering the product on Pendulum Instrument's web page.*

### Built-in Options and SW

**Option S310:** 10 GHz upgrade probe kit for 3 GHz systems

**Option S610:** 10 GHz upgrade probe kit for 6 GHz systems

**Option SICM:** IC measurement option incl. camera, lighting and fixture for ICR probes

**Option SPHV:** IC probe, H field, 1,5 - 6 GHz, horizontal

**Option SPHH:** IC probe, H field, 1,5 - 6 GHz, vertical

**Option SPEF:** IC probe, E field, 7 MHz - 3 GHz

**Option SSWU:** SW for immunity measurements

**Option SUSS:** Subscription of Support and Scanner SW updates for one year

### Optional Accessories

**Option A1226:** Probe calibration kit incl. strip line, 50 ohm termination and SW

**Option A1139:** N-male to SMA-female adapter

**Option RSA-R306B:** Spectrum Analyzer RSA R306B from Tektronix, USB instrument, 9 kHz to 6,2 GHz

### Order numbers:

The EMC-Scanners are ordered using the following system:

**HRE-xx/yG**

xx = model name; 02, 03, 42 or 43

y = frequency bandwidth in GHz; 3 or 6

### Examples

HRE-02/3G

HRE-43/6G