MPB
WE ELECTRONIC!

Minimum health and safety requirements regarding the exposure of workers
2013/35/EU

SEP

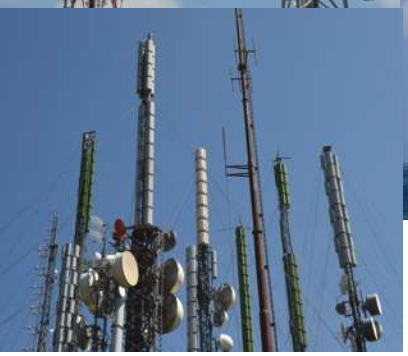
SELECTIVE ELECTRIC ISOTROPIC TRIAXIAL ANTENNA

FREQUENCY RANGE 100 KHz - 3.6 GHz

ALL-IN-ONE

"SPECTRUM ANALYZER + ISOTROPIC TRIAXIAL ANTENNA"

THE SMALLEST EMF SELECTIVE SYSTEM IN THE WORLD

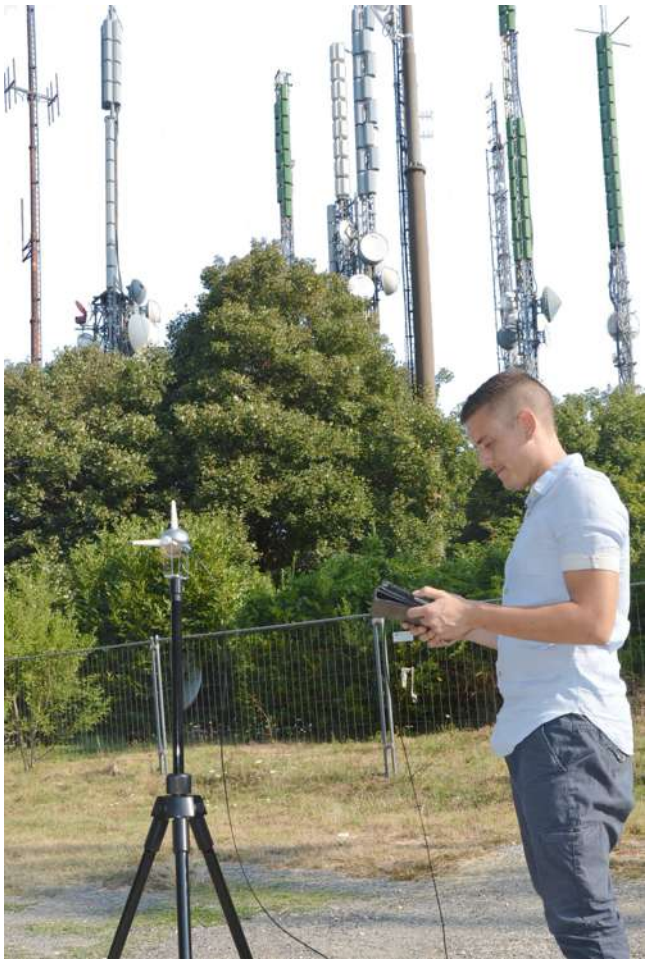


Broadcasting, telecommunication systems and industrial sites

The fast growing need for selective electric field measurements in work environments, led the R&D department at MPB to design and develop the SEP.
The SEP selectively monitors the electric field, allowing automatic accurate measurements, in real time and with minimum effort for the operator, thanks to its small size and weight. This antenna allows covering different applications, such as broadcasting, telecommunication and industrial sectors.

FEATURES

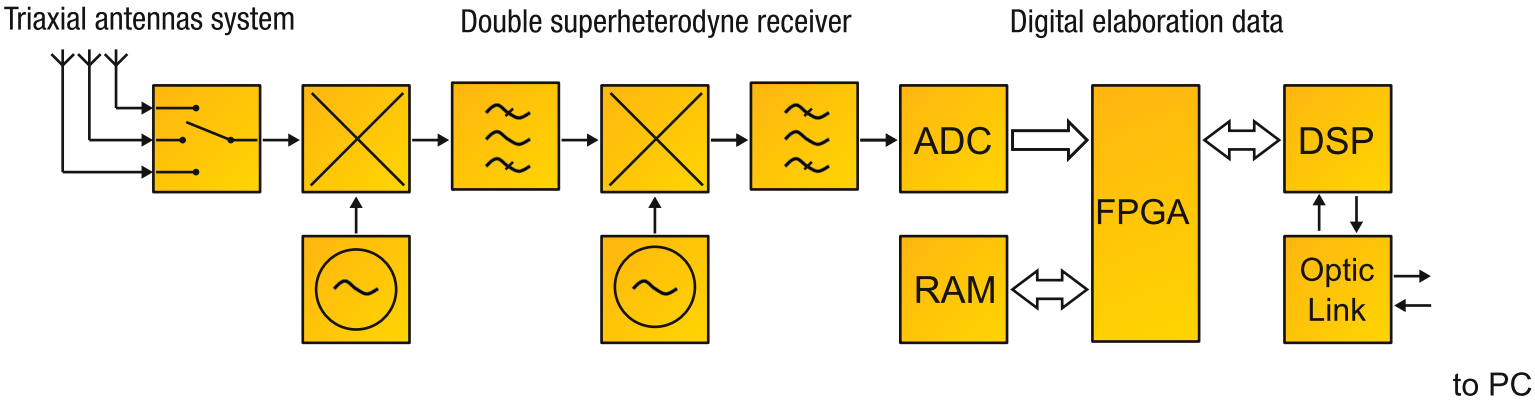
ISSUES	TRADITIONAL SYSTEMS	SEP
USE OF THE COAXIAL FERRITE CABLE	The electrical connection between the antenna and the spectrum analyzer interferes in the frequency response of the antenna. Errors are not properly measurable.The problem cannot be totally solved but can only be reduced through the use of ferrites	There is no coaxial ferrite, because both the antenna and the spectrum analyzer are inside the same sphere
ISOTROPY ERROR	Between the three dipoles and the “N” connector there is more than one cable (RF cable and switching cable/power cable). This worsens the antenna isotropy	The three dipoles are directly connected to the receiver. This choice was intended to minimize the isotropy error
POWER SUPPLY	Very short battery life of the spectrum analyzer. In several cases the batteries cannot be replaceable by the operator. Their substitution implies a system shutdown	Batteries rechargeable and replaceable by the operator without having to turn off the system
CALIBRATION	Three elements to be calibrated: antenna, ferrite cable and analyzer	Only the SEP to be calibrated
DATA RECORD	It is possible to save data or screenshots	It is possible to save data or screenshots. It is also possible to record the measurement sessions and to post process the stored signals



SYSTEM DESCRIPTION

The SEP is a spherical system that allows to selectively measure the electric field in a frequency range from 100 kHz to 3.6 GHz. Its all-in-one setting (spectrum analyzer + isotropic antenna) enables faster and easy to handle measurements.
The signal is analyzed and stored directly in the PC through a safe fiber optic or wireless connection.

The operating mode of the SEP is described in a simplified block diagram

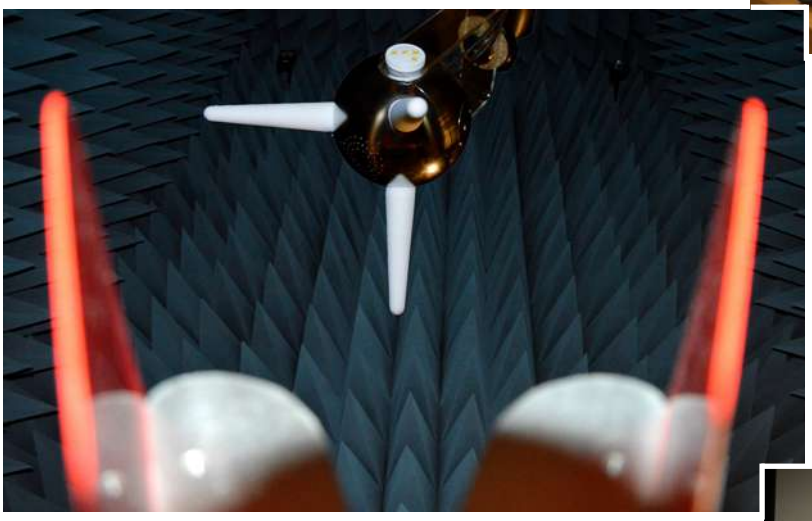


The signal, received from the three dipoles (X, Y and Z), is selected by a switch that directs it to the input of the receiver; the first stage of the superheterodyne receiver converts the signal to the frequency of the first IF, where it is filtered and amplified, before being re-converted to the frequency of the second IF. The latter makes it downloadable from the analog to the digital converter. The digital signal, as a result of complex processing, is made available to the optical interface, that transfers all the data to the PC.

As well as attention to electronics, same importance was given to the mechanics of the SEP.
This instrument provides the possibility to replace the batteries directly on the field, without having to turn off the system.

CHECK, CALIBRATION AND ASSISTANCE

In order to guarantee a quality and efficient product, several tests have been carried out for the SEP.
Our technical staff has developed, through the years, an important know-how in the field and works every day to improve products and skills.

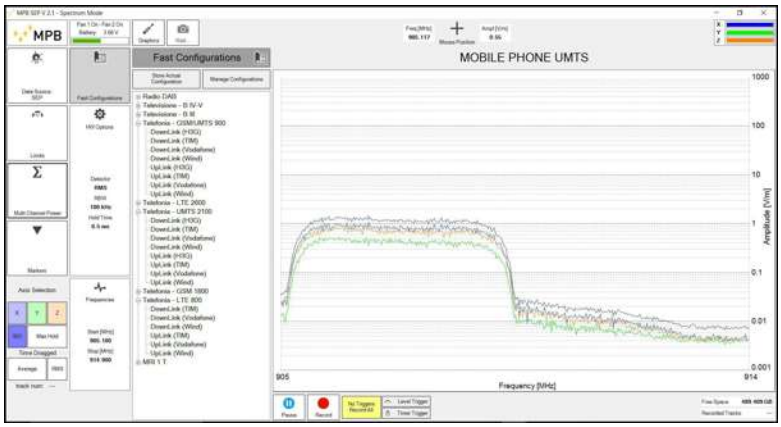


MPB laboratories are also equipped with an anechoic chamber, a TEM cell and two G-TEM cells, in order to test the products under optimal conditions and to provide them with the calibration certificate.

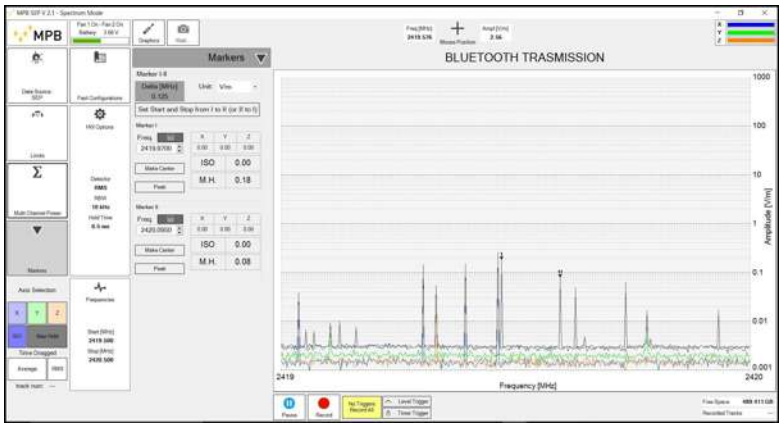
MPB engineers and technicians offer assistance and hold training courses to illustrate the functioning of the products.

SEP SOFTWARE

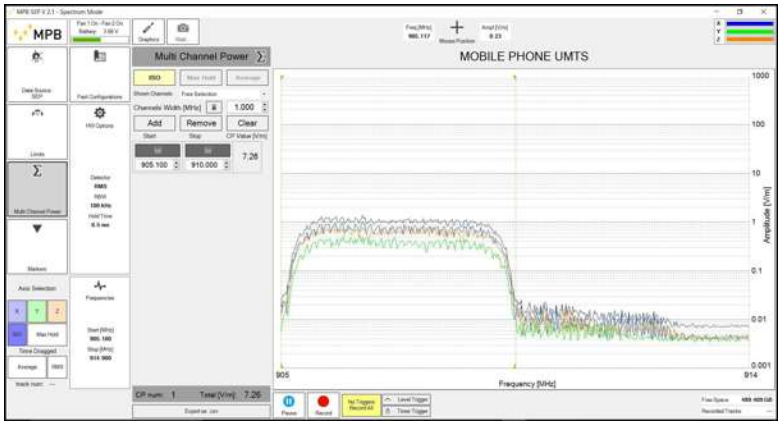
The SEP software allows measurements in real time, offers the possibility to apply filters like the channel power, to display the signal on each axis, to set markers, to adapt the multiple graphic settings for each measurement requirement, to save the chosen configuration. All the functionalities can be applied also on previously stored tracks, in order to perform a signal post processing.



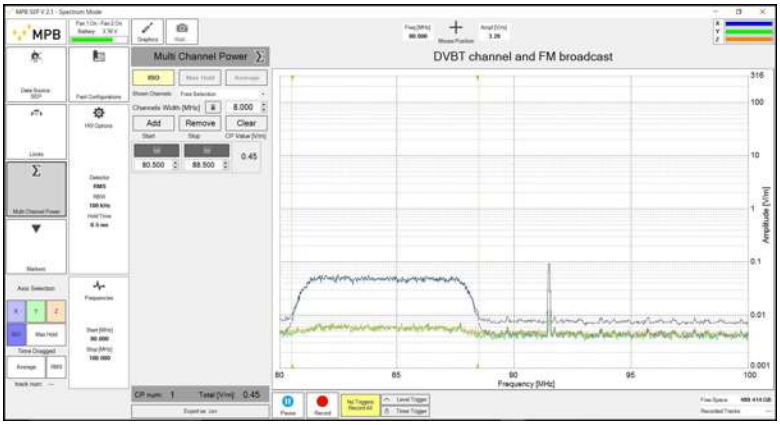
Standard UMTS measurement on X, Y, Z and isotropic



RMS measurement on X, Y, Z and isotropic on bluetooth transmission



UMTS Channel Power RMS measurement on X, Y, Z and isotropic



DVBT and FM broadcast RMS measurement on X, Y, Z and isotropic

STANDARD CONFIGURATION

Plexiglass support
Fiber optic (10 m)
USB with PC utility software
Operating manual
USB cable
USB optical converter
Bag
4 rechargeable batteries
Cap remover
Chargers
Calibration certificate

AVAILABLE OPTIONS

Rugged tablet PC
Non-magnetic and non-reflective tripod
Fiber optic connection
Bluetooth link connection
WiFi link connection

Mod ALGIZ 10X
Mod NMR-01
Mod FO-50
Mod SEP-WLD
Mod SEP-WHD

TECHNICAL SPECIFICATIONS

Frequency range	
Band1	100 KHz ... 9.999 MHz
Band2	10 MHz ... 3.6 GHz
Resolution	1 KHz
Reference Frequency	
Aging year	1 x 10^{-5}
Temperature drift (0°C ... +30°C)	5 x 10^{-6}
Frequency span	
Range	100 kHz to full span
Step number	MIN 50; MAX 12000 (Each Axis)
Resolution bandwidth	
Range (-3 dB bandwidth)	3 KHz to 1 MHz 1/3 sequence
Tolerance	5%
Spectral purity	
SSB phase noise	@ 1 GHz
@ 3 KHz (carriers)	<-85 dBc/Hz
@ 30 KHz (carriers)	<-90 dBc/Hz
@ 300 KHz (carriers)	<-102 dBc/Hz
Measurement range	
Max level	200 V/m @ 10 MHz ... 3.6 GHz
Min level @ 500 KHz	1 V/m @ 3 KHz RBW; Hw Detector Average
@ 10 ... 100 MHz	0.1 V/m @ 3 KHz RBW; Hw Detector Average
@ 0.1 ... 2 GHz	0.02 V/m @ 3 KHz RBW; Hw Detector Average
@ 2 ... 3 GHz	0.09 V/m @ 3 KHz RBW; Hw Detector Average
@ 3 ... 3.6 GHz	0.1 V/m @ 3 KHz RBW; Hw Detector Average
Damage level	350 V/m @ 10 MHz ... 3.6 GHz
	750 V/m < 2 MHz
Dynamic range @ 200 MHz @ 3 KHz RBW; Hw Detector Average	> 80 dB; 85 dB (Typ)
Linearity error @ 200 MHz	< +/-0.5 dB @ 0.1 ... 30 V/m (+/- 0.25 dB Typ)
	< +/-1 dB @ 0.03 ... 100 V/m
Flatness	
@ 0.5 MHz ...10 MHz	< +/- 1 dB @ 50V/m
@ 10 MHz ...2 GHz	< +/- 1 dB @ 6V/m
@ 2 GHz ...3 GHz	< +/- 1.2 dB @ 6V/m
@ 3 GHz ...3.6 GHz	< +/- 1.5 dB @ 6V/m
Isotropy @ 6 V/m; 3 KHz RBW; Hw Detector Average	
500 MHz	< +/-0.5 dB ; < +/-0.3 dB (Typ)
1000 MHz	< +/-0.6 dB (Typ)
2000 MHz	< +/-0.8 dB (Typ)
2500 MHz	< +/-1.3 dB (Typ)
Resolution level	
Max	0.001 V/m
Min	0.1 V/m
Spurious response	
Input related	< -60 dBc (Typ)
Residual @ HW Detector Average	0.1 V/m @ 30 MHz .. 1.5 GHz
	0.2 V/m @ 10 MHz .. 3 GHz
Selectable standards	Pre-defined
Correction factor	Stored in EEPROM
Detectors HW	Peak, AVG and RMS
Antenna	Three-axial X, Y and Z (Identified by a led) Positioned with an axis in vertical or all the axes inclined at 54.7 degrees
I/O Interface	
Optic link (“Connector-less” type)	Plastic fiber cable (length max 20 m)
USB	Micro USB connector
Bluetooth	Fiber/Bluetooth Adapter (distance max 20 m in open air)
WiFi	WiFi radio link Adapter (distance max 300 m in open air)
Operating Temperature	0 °C to 50 °C
Power supply	
Rechargeable and replaceable battery	Li-Ion 3.7 V
Operation time	4 h
Battery charger	4 slots battery 110…240V
Dimensions	140x140x140 mm
Weight	370 g
Recommended calibration interval	24 months

Subject to change without notice

SOFTWARE SPECIFICATIONS

Scale	Linear or semi-logarithmic
Data acquisition	X, Y, Z selectable
Selective standards	
Marker	Marker with value (V/m; W/m²; mW/cm²; mV/m)
Limit (horizontal marker)	Detects the peaks over the selectable limit. Sortable in frequency/amplitude
Isotropic	Root mean square value
Max hold	Selects the max value of the isotropic trace
RMS	With selectable time (from 1 minute to 1 hour)
Average	With selectable time (from 1 minute to 1 hour)
Channel power	Settable from 1 MHz to 20 MHz
Multi channel power	Multiple simultaneous channel powers with value acquisition
Report	Easy screenshots of measures with possibility to take notes
Setup	Programmable, customizable. Saved setup can be stored and post processed
Pc requirement	
OS	Windows 7, Windows 8, Windows 8.1, Windows 10
RAM	Minimun 2 GB
Resolution	Minimun 800 x 600

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DRONE APPLICATION

Thanks to its light weight and the possibility of using a wireless connection, the SEP can also be used for high altitude measurements with a drone.
This application is enabled through:
- Bluetooth connection with mod. SEP-WLD up to 20m
- WiFi connection with mod. SEP-WHD up to 300m

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