narda Safety Test Solutions®
an L3 Communications Company

Selective Radiation Meter

SRM-3000

Selective measurement of high frequency electric and magnetic fields

from long wave up to mobile radio frequencies (100 kHz to 3 GHz)

- **Isotropic (non-directional) measurement with three axis antenna (27 MHz to 3 GHz)**
- **Excellent immunity for operation in high field strengths**
- **Automatic antenna and cable detection**
- **Results in V/m, A/m, power density or percentage of permissible limit**
- **Automatic correlation of results with telecommunications services (e.g. TETRA, GSM, UMTS) based on user-defined tables**
- **Automatic computation of contribution of individual services to overall field exposure (Safety Evaluation mode)**
- **Resolution bandwidths (RBWs) up to 6 MHz for UMTS and W-CDMA**
- **UMTS P-CPICH Demodulation mode for worst case extrapolation of UMTS Node-B base station emissions**

SRM-3000

FEATURES

The Selective Radiation Meter (SRM) is a hand-held frequency selective measuring device designed for safety analysis of high frequency electromagnetic fields. Broadcasting equipment operators and radio network providers, measurement services, and authorities can use the SRM to selectively detect individual telecommunications services and evaluate them according to applicable standards.

The SRM comprises a basic unit plus measuring antenna. The basic unit contains a spectrum analyzer covering the frequency range from 100 kHz up to 3 GHz. It can be combined with antennas from Narda or from other manufacturers. Isotropic (non-directional) measurements in the range from 27 MHz up to 3 GHz can be made using the Narda three axis antenna, covering everything from VHF radio up to W-CDMA and UMTS services.

The combination of basic unit plus antenna is portable, robust, battery operated, and provides all the functions needed for evaluating, storing and documenting the results without the need for an external PC. Results can be uploaded to a PC for archiving.

APPLICATIONS

The SRM was specifically designed as a hand-held measuring device for electromagnetic field safety requirements. It is equipped with tailor made operating modes for the preferred applications, but it can also be used for general field strength measurements, just like an ordinary RF spectrum analyzer. The preferred applications are:

Comparison measurements in known field environments

These are often needed at so-called “shared sites”, where several mobile phone operators share a common antenna site. The SRM indicates the overall field strength and the contributions made by the individual services, either as absolute values or as a percentage of the permitted limit value. Operators, authorities, and measurement service providers can then demonstrate on-site that immission safety limit values are being adhered to, or they can determine which operator needs to reduce transmission power, and by how much, in order to do so.

Survey measurements in unknown field environments

These are needed wherever a major field source cannot readily be identified, but immission limit values still have to be adhered to, such as at the workplace, in public or private areas, or for particularly sensitive protected areas like kindergartens, schools and hospitals. Authorities and measurement service providers can use the SRM not only to check

whether the applicable limits are being adhered to, but also to get a rapid overview of all the field sources in the frequency range of interest that may be relevant to human safety.

Individual telecommunications service measurements
Controlling field emissions is the responsibility of every service provider. With the SRM, it is possible to selectively detect every transmission frequency used and every occupied channel of the particular service, even in a complex field environment and in close proximity to other strong emitters. The results can be integrated over the frequency range used by the service, displaying the overall result as an absolute value or as a percentage of the applicable limit value. It is also possible to determine the field emission that would occur if all traffic channels were operated at full load by extrapolation from the field strength of a control or pilot channel operated continuously at full load.

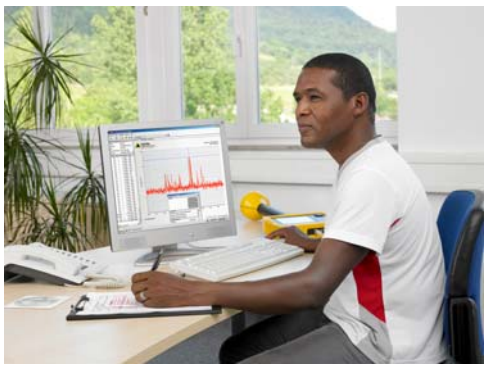
OPERATION

The SRM basic unit comprises a spectrum analyzer with RF input stage, measurement and operating computer, input panel and display. This means you can set all functions and values directly on the device, using the menus, number keys, softkeys or the rotary control. According to your choice, the SRM also calculates and displays the results directly

- **as field strengths or as percentages of the permitted limit value,**
- **for a single source or an individual channel,**
- **as a list of sources or channels,**
- **as the proportion due to a telecommunications service, or**
- **as the proportions due to all services and their percentage contributions to the overall exposure level.**

The SRM automatically uses the following data for this:

- **Antenna factors to convert the antenna output voltage into field strength values**
- **Weighting curves specified in current immission safety regulations and standards**
- **Telecommunications service frequency range assignments**



The “SRM-Tools” PC software supplied with the device as well as the optional “SRM-TS” PC software provide fully editable tables for antennas and cables from other manufacturers, user-defined weighting curves, and lists of telecommunications services. These can be uploaded to the SRM using the serial or USB interface.

Measurements using the Narda three-axis antenna
These automatically yield isotropic (non-directional) results. There are basically three ways of making such measurements:

- **Antenna directly connected to the basic unit**
  Measurements of the entire mobile telephony frequency range can be made like this. Particularly useful in areas where access is difficult, such as antenna masts, where you need to hold and operate the device and antenna with one hand.
- **Antenna connected to the basic unit by cable**
  This is useful when you are searching for the location of the highest field strength by sampling a specific part of the volume inside a room.
- **Antenna fitted on tripod, connected to the basic unit by cable**
  This arrangement gives the most precise results, since the field being measured is not influenced by either the device or the person making the measurement.

Measurements with the Narda single-axis antenna
You can use a single-axis antenna to measure in three spatial axes with the SRM. You just need to align the antenna axis with the three mutually perpendicular axes one after the other using a special attachment on a tripod. The SRM saves the result for each of the three axes and then calculates the resulting field strength.

Measurements using other manufacturers' antennas
Also, no problem with the SRM. The antenna factors can be uploaded to the basic unit using the PC software provided.

Spatial averaging (option)
The "Spatial Averaging" function of the SRM lets you take the average of results recorded at different points in a room or space. The SRM determines the root mean square value (RMS), giving the average power level.

Averaging (time averaging)
The field strength measurement results can be averaged over a specified number of results or over a specific time, such as the 6 minute period stipulated in many standards.

Time controlled storing (option)
The SRM can store measurements under timer control by specifying the start date, start time, measurement duration, and other parameters.

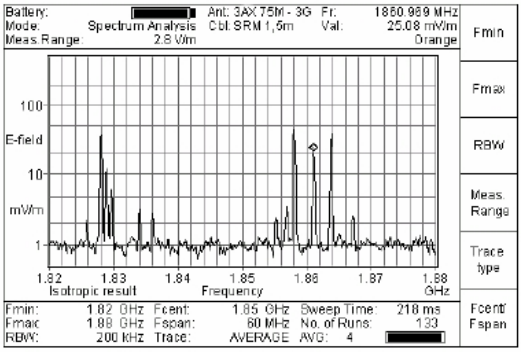
OPERATING MODES

The SRM is designed for everyday use and is equipped with general and special measurement modes tailored to its main applications.

SPECTRUM ANALYSIS

In a multi-frequency environment, “Spectrum Analysis” mode gives you an overview of all the frequency components and their field strengths. You only have to set the desired frequency range. The SRM will only allow you to set values that are within the frequency range of the antenna connected to it. The spectrum is displayed as a trace, which can be rapidly assessed to analyze the field situation by means of marker and zoom functions. Peak value tables show all the field strengths that exceed a specified value together with the corresponding frequencies.

The ability to integrate the results over a user-definable frequency range is a special feature, which you can use to display the power level of a transmission channel having a bandwidth greater than the selected resolution bandwidth (RBW). The broadband level can be determined by integrating over the entire frequency range.

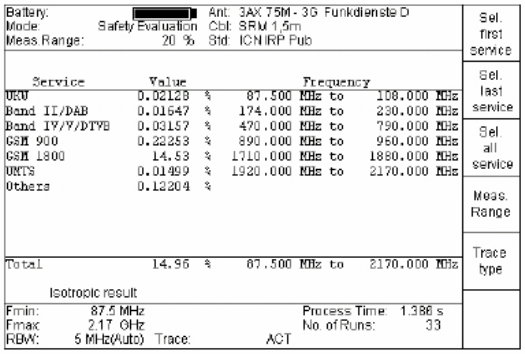


Spectrum analysis mode allows you to identify all the field sources that lie within the selected frequency range.

SAFETY EVALUATION

The SRM displays the field strength results as tables in this operating mode. These are arranged according to individual telecommunications services, with the overall exposure also shown. You can define the services yourself. The results can be displayed as a percentage of the limit value specified in the relevant immission safety regulations, or you can switch to show absolute values in V/m, A/m or W/m² and mW/cm². “Safety Evaluation” mode gives you an immediate overview of the contributions made by individual services to the overall field strength. This is useful in the event of any dispute that may arise when several providers share the same antenna location.

“Safety Evaluation” mode is based on spectrum analysis followed by integration over specified frequency ranges. The measurement is completely automatic. The SRM measures over the entire frequency range of all the selected services, automatically setting the resolution bandwidth (RBW) to suit the narrowest bandwidth service in the process. It stores the selectively measured absolute field strength values, evaluates them according to the selected regulation and also saves these results. Individual contributions are determined by integration over the individual service frequency ranges. The SRM collects the results for the frequencies between service bands together (Others) and includes this in the overall result (Total).



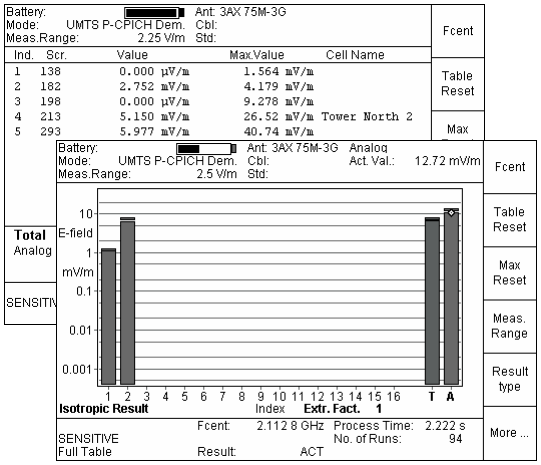
Safety Evaluation mode is ideal when you need to determine the contributions made by individual telecommunications services to the overall field exposure. The results are shown above as percentages of the permitted limit value.

UMTS P-CPICH DEMODULATION (option)

In “UMTS P-CPICH Demodulation” mode, the SRM can decode the pilot channels (P-CPICHs, Primary Common Pilot Channels) of every UMTS cell detected within a 5 MHz UMTS channel.

The device produces the corresponding results in the form of a table arranged according to the scrambling codes used to identify the different cells. The SRM shows the results as a percentage of a limit value or as absolute values in V/m, A/m or W/m² and mW/cm². Along with the sum of all field strength results from the demodulation (Total), the SRM determines the total analog channel power (Analog) for the UMTS channel being evaluated. At the same time, the SRM also shows the instantaneous values (Value) and the maximum values that have occurred for each cell since the last reset.

UMTS channel selection is by entering the center frequency or the relevant channel number. To make it quick and easy to identify the different scrambling codes, you can select user-defined cell name tables that assign a user-defined alphanumeric comment to each scrambling code.



The UMTS P-CPICH Demodulation option allows the SRM to decode all the pilot channels (P-CPICHs) within a 5 MHz bandwidth UMTS channel and assign the measured field strengths to each UMTS cell on this basis.

TIME ANALYSIS

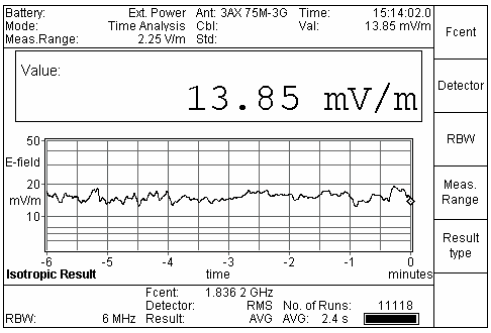
In “Time Analysis” mode, the SRM measures the field strength values at a settable center frequency using a resolution bandwidth which can be selected between 6.4 kHz and 6 MHz. The measurement algorithm ensures that the results are recorded continuously, processed, and stored in real time (corresponding with the internal sampling rate).

You can select between PEAK and RMS detectors in “Time Analysis” mode.

Using the PEAK detector, the instantaneous (ACT) or the maximum (MAX) value can be displayed numerically. Using the RMS detector, you can additionally take the average of the measurement values (AVG) or of the maximum values (MAX AVG) and display these results numerically. You can set the averaging time between 0.96 seconds and 30 minutes. The “6 minute average” required by many standards is therefore no problem.

The SRM uses steep cutoff channel filters in “Time Analysis” mode to selectively monitor a specific service over a period of time without being affected by the other services.

Monitoring over a time period using “Time Controlled Storing” (option) is a useful additional feature.



The SRM measures the peak value or the RMS value over a period of time in „Time Analysis“ mode. This enables you to make a record of the variation of field strength versus time.

PRODUCT INFORMATION (BASIC UNIT)

Basic Unit SRM- 3000		
Frequency Range		100 kHz to 3 GHz
Modes		Spectrum Analysis Safety Evaluation UMTS P-CPICH Demodulation (Option) Time Analysis - Time Controlled Storing (Option)
RF FEATURES		
Frequency	Resolution bandwidths (RBW)	See specifications for each mode
	Phase noise (SSB)	30 kHz carrier spacing <-85 dBc (1 Hz) 100 kHz carrier spacing <-105 dBc (1 Hz) 1 MHz carrier spacing <-120 dBc (1 Hz)
	Reference frequency	Initial deviation < 1.5 ppm Aging < 0.5 ppm/ year Thermal drift < 2.0 ppm (within specified operating temperature range)
Amplitude	Measurement range, setting (MR)	-27 dBm to +23 dBm (in steps of 1dB)
	Display range	From noise floor up to +26 dBm
	Maximum RF power level	+30 dBm
	Maximum DC voltage	50 V
	Intrinsic noise	-120 dBm for 1 kHz RBW, f >20 MHz and MR = -27 dBm
	RF attenuation	0 to 50 dB in steps of 1 dB (coupled with measurement range)
	2nd order intermodulation products	≤ -57 dBc for two signals of level 9 dB below MR and a spectral line spacing of more than 100 kHz
	3rd order intermodulation products	≤ -68 dBc for two signals of level 9 dB below MR and a spectral line spacing of more than 500 kHz
	Level measurement uncertainty	(within the temperature range from 15 °C to 30 °C) < 1.1 dB for the frequency range 20 MHz to 3 GHz
	Spurious responses (input related)	< -65 dBc or MR -71 dB for signals with a level below MR -6 dB (whichever is worse), input frequency f > 40 MHz < -60 dBc for a carrier spacing of 72 MHz
	Spurious responses (residual)	< -94 dBm or MR -67 dB for frequencies above 20 MHz (worst of both)
	Units	dBm, dBV, dBmV, dBµV Units of field strength available if a measurement antenna is used (see “Measurement functions”)
RF input	Type	N connector, 50 Ω
	Return loss	> 12 dB for 200 kHz ≤ f ≤ 2.7 GHz

Unless otherwise stated, the quoted specifications apply within the temperature range 20°C to 26°C and relative humidity between 25 % and 75 %.
The device must be switched on for at least 30 minutes before the specifications are checked.

SPECTRUM ANALYSIS MODE		
Measurement principle		Spectrum analysis
Resolution bandwidths (-3 dB)		1 kHz to 5 MHz (in steps of 1, 2, 3, 5, 10) List of available RBWs depends on selected sweep SPAN
Measurement range setting (MR Range)		Set individually from a list or using the “MR Search” function for determining the optimum measurement range at a given time
Sweep time		50 ms to 1 s, (depending on span) measured in uniaxial direction (axis)
Filter	Type	Gaussian
	Shape factor (-3 dB / 60 dB)	<3.8 (for RBW ≤ 100 kHz)
Detection		Detection selected by Result Type: (AVG → RMS value; MAX → Peak value)
Result Type		ACT: Displays current spectrum MAX: Maximum hold function AVG: Average over a selectable number of spectra (4 to 64) or a selectable time period (1 to 30 minutes) Max AVRG: Maximum hold function after averaging over a defined number of spectra SAVG: Spatial averaging (Option)
Marker functions		Highest peak, peak right, peak left, higher peak, lower peak Marker field (frequency, level and service name from selected service table)
Evaluation functions		Peak table (list of 50 highest peaks) Integration over a user-specified frequency range
Axis		Isotropic measurement (isotropic result displayed directly) Measurement of X-, Y- or Z- axis (separate measurement of a single axis using the isotropic / three-axis antenna)
Display functions		Y-scale range 20, 40, 60, 80 or 100 dB Y-scale reference -47 dB to 43 dBm Full screen (enlarges the graph window to fill the entire screen area)
Zoom functions		Zoom Min: Sets the lower frequency limit of the zoom window Zoom Max: Sets the upper frequency limit of the zoom window Move Zoom Area: Moves the zoom window along the frequency axis Reduce/Enlarge Zoom Area: Changes the scale of the zoom window Zoom to Marker: Moves the zoom window to the current market position Execute Zoom: Sets the zoom window limits to the selected frequency values
SAFETY EVALUATION MODE		
Measurement principle		Spectrum analysis, followed by integration over user-defined frequency bands (“services”)
Resolution bandwidths (-3 dB)		Automatically, depending on the narrowest user-defined service, or user defined
Measurement range setting (MR Range)		Set individually from a list or using the “MR Search” function for determining the optimum measurement range at a given time
Filter		See Spectrum Analysis mode
Detection		RMS (integration time = $\frac{1}{2 \cdot RBW}$)
Result Type		See Spectrum Analysis mode
Axis		Isotropic measurement (for direct display of the isotropic result) Measurement in the direction of the X, Y, and Z axis (separate measurement in one direction using an isotropic / three-axis measuring antenna)
Display functions		Table view showing service names, field strengths and the corresponding frequency band (up to three columns) Full screen: Function enabling the entire screen to be used to display the table
Noise suppression		Identifies whether measured values are above the device noise floor by setting a threshold (selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor). Measurement values below the threshold are shown as the absolute threshold value marked with “<” (less than threshold)

UMTS P-CPICH DEMODULATION MODE (OPTIONAL)		
Measurement principle		Demodulation of the P-CPICH (Primary Common Pilot Channel) as the basis for automatic assignment of measured field strength values to the individual UMTS radio cells (defined as cell name tables)
UMTS channel selection		By entering the centre frequency (Fcent) By entering the channel number (Chann)
Resolution bandwidth(-3 dB)		3.84 MHz (fixed)
Measurement range setting (MR Range)		Set individually from a list or using the “MR Search” function for determining the optimum measurement range at a given time
Frequency setting resolution		100 kHz (for Fcent frequency entry)
		0.5 x channel number (for channel entry)
Detection		RMS (integration time = 10 ms)
Filter	Type	Root-raised cosine (RRC)
	Roll-off factor	α = 0.22
Demodulation algorithms		FAST
		SENSITIVE
Result types		ACT: Displays the instantaneous value combined with the maximum value MAX (maximum hold function) which occurred since the last reset AVG: Averages over a selectable number of results (4 to 64) or over a specified time period (1 to 30 minutes) combined with Max AVRG (maximum hold function of the average values)
Marker functions (in Hold mode only) (Bar graph, Mixed and Graph display)		Marker, highest peak, next peak right, next peak left, next highest peak, next lowest peak Display switchable between Value and Max Value
Evaluation functions		Extrapolation factor settable from 0 to 100 in steps of 0.001
Received / demodulated signal		P-CPICH
Axis		Isotropic measurement (for direct display of the isotropic result) Measurement in the direction of the X, Y, and Z axis (separate measurement in one direction using an isotropic / three-axis measuring antenna)
Display		Up to 16 scrambling codes simultaneously
		Value (instantaneous) and MAX Value (maximum) channel power
		User-defines cell names (using cell name tables)
		Number of sweeps since the last reset
		Selection of individual scrambling codes
		Extrapolation factor settable from 0 to 100 in steps of 0.001
	Normal Table	Table format: Index, Scrambling Code, Value, Max. Value, Cell Name
		Total of all ACT (Value) and MAX (Max Value) values (Total)
		Analog measurement result (Analog)
	Table Ratio	Table format: Index, Scrambling Code, Value, Max. Value, Ratio of Value to Analog
		Total of all ACT (Value) and MAX (Max Value) values (Total)
		Analog measurement result (Analog)
	Bar graph	Bar graph display of selected scrambling codes, with the Total value and the Analog measurement result with maximum values indicated in each case
	Mixed	Total of selected scrambling codes: Value and Max Value shown in enlarged numerical format with graphical display of the history for the last 1 to 60 minutes
	Value	Total of selected scrambling codes Value and Max Value shown in enlarged numerical format
	Graph	Total of selected scrambling codes Graphical display of the history for the last 1 to 60 minutes
Noise suppression		Identifies whether measured values are above the device noise floor by setting a threshold (selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor). Measurement values below the threshold are shown as the absolute threshold value marked with “<” (less than threshold)

TIME ANALYSIS MODE		
Measurement principle		Selective level measurement at a fixed frequency
Detection		Peak
		RMS (integration time = 480 ms)
Filter	Type	Steep cutoff channel filter
Resolution bandwidth RBW (-6 dB)		6.4 kHz to 6 MHz
Result Type		ACT: Displays the instantaneous value MAX: Maximum hold function AVG: Average over a defined time (0.96 seconds to 30 minutes) – with RMS detector only Max AVRG: Maximum hold function for the averaged values – with RMS detector only SAVG: Spatial averaging (Option) in Value display mode
Marker functions (in Hold mode only) (Mixed and Graph display)		Marker, highest peak, next peak right, next peak left, next highest peak, next lowest peak
Evaluation functions		Duty cycle (ratio of average power to maximum power)
Time Averaging		Selectable from 0.96 seconds up to 30 minutes (0.96 s; 1.2 s; 2.4 s; 3.6 s; 6 s;12 s; 18 s; 30 s; 1 min; 2 min; 3 min; 5 min; 6 min; 10 min;15 min; 20 min; 30 min)
Axis		Measurement in the direction of the X, Y, and Z axis (separate measurement in one direction using an isotropic / three-axis measuring antenna)
Display	Mixed	Result of measurement at the specified frequency: Value and Max Value shown as enlarged numerical format with graphical display of the history for the last 1 to 60 minutes
	Value	Result of measurement at the specified frequency: Value and Max Value shown as enlarged numerical format
	Graph	Result of measurement at the specified frequency: Value and Max Value shown as graphical display of the history for the last 1 to 60 minutes
Noise suppression		Identifies whether measured values are above the device noise floor by setting a threshold (selectable at 0, 3, 6, 10, 15, or 20 dB relative to device noise floor). Measurement values below the threshold are shown as the absolute threshold value marked with “<” (less than threshold). Only applies to the numerical result display (Value)
MEASUREMENT FUNCTIONS		
Detection of Narda measurement antennas (antennas)		Automatic consideration of antenna parameters after antenna is plugged in: antenna type, serial number, calibration date and antenna factors (see below) Automatic limitation of the frequency range according to the frequency range of the connected antenna
Antenna factors		Used for display in field strength units Saved in all Narda antennas during calibration 20 antenna factor lists for antennas from other manufacturers can be saved (these lists defined using the PC configuration software SRM Tools or SRM TS)
Detection of Narda Cables		Automatic consideration of cable parameters after cable is plugged in: Cable type, serial number, calibration date and loss factors (see below) Automatic limitation of the frequency range according to the frequency range of the connected cable
Cable loss factors		Used for compensation of the power level display Saved in all Narda cables during calibration 20 cable loss lists for cables from other manufacturers can be saved (these lists defined using the PC configuration software “SRM tools” included in delivery)
Units	With Antenna	% of the standard, V/m, A/m, W/m², mW/cm², dBV/m, dBmV/m, dBA/m, dBµV/m
	Without Antenna	dBV/m, dBmV/m, dBA/m, dBµV/m
Isotropic Measurements		Automatic switching of the antenna axes when using Narda’s three axis measurement antenna followed by computation of the isotropic result Sequential measurements using single-axis antennas with subsequent computation of the isotropic result are supported. Both results are directly displayed as a spectrum curve or as numerical values

Weighted Display			In % of the standard for the following human safety standards: ICNIRP, IEEE, FCC, BGV B11, BImSchV, Safety Code 6 Updating for new human safety standards can be made using the PC configuration software SRM Tools included in delivery or SRM TS)
Correlation of results with telecom service			Definition and editing of service tables with the PC configuration software SRM Tools or SRM TS, i.e. lists of frequency bands (upper and lower limit frequency, name for defined frequency band) Storage of up to 50 service tables in the basic unit Use of the service tables for automatic correlation of measurement results with defined services based on frequency (marker functions, peak table evaluation function, Safety Evaluation mode)
Setups			Up to 20 complete device configurations can be saved in the basic unit; up- and downloadable using SRM Tools or SRM TS software.
Memory	Memory modes		Instantaneous result stored as: Spectrum in Spectrum Analysis mode (SPEC), Table in Safety Evaluation mode (TAB) (Option), Values in UMTS P-CPICH Demodulation mode (UTAB) Values in Time Analysis mode (VAL) with the Time Controlled Storing Option (LIST)
	Conditional Storing		Conditional storing of results exceeding a specified threshold value (in all operating modes) with individual storage rates and reset function
	Time Controlled Storing (option)		Timer controlled storage of results for long term monitoring (in all operating modes) with individual storage rates and reset function
			Start date and start time settable with a resolution of one second
			Measurement duration settable from 1 second to 99 hours in 1 second steps
			Storage rate settable to every 1.2 s, 2.4 s, 3.6 s, 6 s, 12 s, 18 s, 30 s, 1 min, 2 min, 3 min, 5 min, 6 min, 10 min, 15 min, 20 min, 30 min
			Reset function for automatically resetting the stored maximum values, either after every result save (Always), or when the measurement starts (On start), or never (Never)
	Memory capacity		16 MB; 48 MB from series F (up to 9999 data sets)
GENERAL SPECIFICATIONS			
Operating temperature range			-10 °C to +50 °C during normal operation
			0 °C to +40 °C when charging
RF-Immunity			200 V/m between 100 kHz and 3 GHz
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
		Transport	2K4 (IEC 60721-3)
		Operating	7K2 (IEC 60721-3)
	Mechanical	Storage	1M3 (IEC 60721-3)
		Transport	2M3 (IEC 60721-3)
		Operating	7M3 (IEC 60721-3)
	ESD and EMC		EN 61326:2004
	Safety		EN 61010-1:2002
CE (European Community)			Yes
Air humidity (operating range) RF			< 29 g/m³ (< 93 % at +30 °C)
Weight			1.9 kg (including rechargeable cell)
Dimensions			255 x 195 x 60 mm
Display	Type		Monochrome, LCD (transreflective) with backlighting for indoor or outdoor use
	Size, resolution		115 x 80 mm, 480 x 320 pixels
Interface			RS 232, electrical or optical (with additional accessory), 115.2 kbaud
			USB
Power supply	Rechargeable cell		Lithium-Ion rechargeable battery - typical 4 hour operating time Charged using external power supply
	External power supply (12 V DC / 2,5 A)		AC/DC-Adapter Input: 100 to 240 V / 47 to 63 Hz / 700 mA
Recommended calibration interval			24 months
Country of origin			Germany

PRODUCT INFORMATION ISOTROPIC ANTENNAS

Three axis antenna (E-Field) - included in SRM-3000 Set

Frequency range	27 MHz to 3 GHz The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.			
Antenna type	E-field			
Sensor type	Three axis design with scanned axes			
Dynamic range [a]	0.2 mV/m to 200 V/m			
CW damage level	435 V/m or 50 mW/cm²			
Intrinsic noise display in conjunction with the SRM basic unit (separate measurement of a single axis) [b]	25 µV/m at 900 MHz with RBW = 1 kHz 40 µV/m at 2.1 GHz with RBW = 1 kHz			
Intrinsic noise display in conjunction with the SRM basic unit (for isotropic result) [b]	40 µV/m at 900 MHz with RBW = 1 kHz 70 µV/m at 2.1 GHz with RBW = 1 kHz			
Measurement range limit (for single CW signal)	300 V/m 1000 V/m for f ≤ 110 MHz			
Max. measurement range (in conjunction with the SRM basic unit) [b]	200 V/m (without restrictions for total span of 27 MHz to 3 GHz)			
RF connector	N connector, 50 Ω			
MEASUREMENT UNCERTAINTY				
Extended measurement uncertainty [c] (in conjunction with SRM basic unit and 1.5 m RF cable)	Frequency range		Single axis measurement with isotropic antenna	Isotropic measurement
	27 – 85 MHz		+2.4 / -3.3 dB	+ 3.2 / -4.7 dB
	> 85–900 MHz		+2.4 / -3.4 dB	+2.5 / -3.6 dB
	> 900-1400 MHz		+2.3 / -3.1 dB	+2.5 / -3.4 dB
	> 1400-1600 MHz		+2.3 / -3.1 dB	+2.6 / -3.8 dB
	> 1600-1800 MHz		+1.8 / -2.3 dB	+2.2 / -3.0 dB
	> 1800-2200 MHz		+1.8 / -2.3 dB	+2.4 / -3.3 dB
	> 2200-2700 MHz		+1.9 / -2.4 dB	+2.7 / -3.8 dB
	> 2700-3000 MHz		+1.9 / -2.4 dB	+3.3 / -5.3 dB
Calibration uncertainty	< 1.5 dB			
GENERAL SPECIFICATIONS				
Operating temperature range	-10 °C to +50 °C same as SRM basic unit			
RF immunity	200 V/m between 27 MHz and 3 GHz			
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C	
		Transport	2K4 (IEC 60721-3)	
		Operating	7K2 (IEC 60721-3)	
	Mechanical	Storage	1M3 (IEC 60721-3)	
		Transport	2M3 (IEC 60721-3)	
		Operating	7M3 (IEC 60721-3)	
	ESD and EMC	EN 61326:2006		
	Safety	EN 61010-1:2004		
	EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS), 2002/96/EG 27.01.2003 (WEEE)		
CE (European Community)	Yes			
Air humidity	< 29 g/m³ (< 93 % at +30 °C)			
Weight	450 g			
Dimensions	450 mm length; 120 mm antenna head diameter			
Calibration	20 reference points: 26; 45; 75; 100; 200; 300; 433; 600; 750; 900 MHz 1; 1,2; 1,4; 1,6; 1,8; 2; 2,2; 2,45; 2,7; 3 GHz The SRM basic unit applies linear interpolation between reference points			
Recommended calibration interval	24 months			
Country of origin	Germany			

a Typical measurement dynamic range for 10 dB signal to noise ratio (RBW = 1 kHz); 800 MHz to 1.8 GHz
b Typical values
c Typical value, with k = 2 (k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

Three axis antenna (E-Field) 3502/01				
Frequency range	420 MHz to 6 GHz The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.			
Antenna type	E-field			
Sensor type	Three axis design with scanned axes			
Dynamic range [a]	0.14 mV/m to 160 V/m			
CW damage level	435 V/m or 50 mW/cm²			
Intrinsic noise display in conjunction with the SRM basic unit (separate measurement of a single axis) [b]	33 µV/m at 900 MHz with RBW = 1 kHz 25 µV/m at 2.1 GHz with RBW = 1 kHz			
Intrinsic noise display in conjunction with the SRM basic unit (for isotropic result) [b]	60 µV/m at 900 MHz with RBW = 1 kHz 43 µV/m at 2.1 GHz with RBW = 1 kHz			
Measurement range limit (for single CW signal)	200 V/m			
Max. measurement range (in conjunction with the SRM basic unit) [b]	160 V/m (without restrictions for total span of 420 MHz to 6 GHz)			
RF connector	N-Connector, 50 Ω			
MEASUREMENT UNCERTAINTY				
Extended measurement uncertainty [c] (in conjunction with SRM basic unit and 1.5 m RF cable)	Frequency range		Single axis measurement with isotropic antenna	Isotropic measurement
	420-750 MHz		+2.1 / -2.9 dB	+2.6 / -3.8 dB
	> 750-1600 MHz		+2.0 / -2.7 dB	+2.2 / -2.9 dB
	> 1600-2000 MHz		+1.7 / -2.2 dB	+1.9 / -2.4 dB
	> 2000-4000 MHz		+1.7 / -2.2 dB	+2.0 / -2.6 dB
	> 4000-4500 MHz		+1.8 / -2.3 dB	+2.2 / -3.0 dB
	> 4500-5000 MHz		+1.9 / -2.5 dB	+2.5 / -3.5 dB
	> 5000-6000 MHz		+1.9 / -2.5 dB	+2.9 / -4.3 dB
Calibration uncertainty	< 1.5 dB			
GENERAL SPECIFICATIONS				
Operating temperature range	-10 °C to +50 °C same as SRM basic unit			
RF immunity	200 V/m			
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C	
		Transport	2K4 (IEC 60721-3)	
		Operation	7K2 (IEC 60721-3)	
	Mechanical	Storage	1M3 (IEC 60721-3)	
		Transport	2M3 (IEC 60721-3)	
		Operation	7M3 (IEC 60721-3)	
	ESD and EMC	EN 61326:2006		
	Safety	EN 61010-1:2004		
	EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS), 2002/96/EG 27.01.2003 (WEEE)		
CE (European Community)	Yes			
Air humidity	< 29 g/m³ (< 93 % at +30 °C)			
Weight	400 g			
Dimensions	450 mm length; 120 mm antenna head diameter			
Calibration	21 reference points: 420 MHz, 600 MHz, 750 MHz; 900 MHz 1; 1.2; 1.4; 1.6; 1.8; 2; 2.2; 2.45; 2.7; 3; 3.5; 4; 4.5; 5; 5.5; 5.8; 6 GHz The SRM basic unit applies linear interpolation between reference points.			
Recommended calibration interval	24 months			
Country of origin	Germany			

a Typical measurement dynamic range for 10 dB signal to noise ratio (RBW = 1 kHz); 1.8 to 2.2 GHz
b Typical values
c Typical value, with k = 2 (k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

Three axis antenna (H-Field) 3581/02				
Frequency range	9 kHz to 250 MHz The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.			
Antenna type	H-Field			
Sensor type	Triaxial active magnetic loop design with scanned axes			
Dynamic range [a]	2.5 µA/m to 560 mA/m			
CW damage level	250 A/m / f [MHz]			
Max. measurement range (in conjunction with the SRM basic unit) [b]	560 mA/m			
Intrinsic noise display in conjunction with the SRM basic unit (separate measurement of a single axis)	0.5 µA/m for each frequency > 1 MHz with RBW = 1 kHz			
Intrinsic noise display in conjunction with the SRM basic unit (for isotropic result)	0.85 µA/m > 1 MHz with RBW = 1 kHz			
RF connector [c]	N-Connector, 50 Ω			
Measurement uncertainty				
Extended measurement uncertainty [c] (in conjunction with SRM basic unit and 1.5 m RF cable)	Frequency range		Single axis measurement with isotropic antenna	Isotropic measurement
	0.009 - 60 MHz		2.2 dB	2.5 dB
	> 60 - 250 MHz		2.3 dB	3.3 dB
Calibration uncertainty	< 1.5 dB			
GENERAL SPECIFICATIONS				
Operating temperature range	-10 °C to +50 °C same as SRM basic unit			
Immunity	200 V/m between 9 kHz and 250 MHz			
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C	
		Transport	2K4 (IEC 60721-3)	
		Operating	7K2 (IEC 60721-3)	
	Mechanical	Storage	1M3 (IEC 60721-3)	
		Transport	2M3 (IEC 60721-3)	
		Operating	7M3 (IEC 60721-3)	
	ESD and EMC	EN 61326:2006		
	Safety	EN 61010-1:2004		
	EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS) 2002/96/EG 27.01.2003 (WEEE)		
CE (European Community)	Yes			
Air humidity	< 29 g/m³ (< 93 % at +30 °C)			
Weight	470 g			
Dimensions	450 mm length; 120 mm antenna head diameter			
Calibration	178 reference points The SRM basic unit applies linear interpolation between reference points.			
Recommended calibration interval	24 months			
Country of origin	Germany			

a Typical measurement dynamic range for 10 dB signal to noise ratio (RBW = 1 kHz) in frequency range 3 MHz to 250 MHz
b Typical values
c Typical value, with k = 2 (k = extrapolation or correction factor for calculating the assessment value); +15 °C to +30 °C

PRODUCT INFORMATION SINGLE-AXIS ANTENNAS

Single-axis antenna (E-field) 3531 / 01

Frequency range		27 MHz to 3 GHz The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.	
Antenna type		E-Field	
Sensor type		Single axis passive wide band dipole	
Dynamic range [a]		60 µV/m to 160 V/m	
CW damage level		> 300 V/m or 25 m/Wcm²	
Intrinsic noise display in conjunction with		20 µV/m from 100 MHz to 2.2 GHz with RBW = 1 kHz	
Measurement range limit		160 V/m	
RF connector		N connector, 50 Ω	
UNCERTAINTY			
Extended measurement uncertainty [d] (in conjunction with SRM basic unit and 1.5 m RF cable)		Frequency range	Single-axis measurement
		26 - 300 MHz	2.1 dB
		> 301 - 433 MHz	2.4 dB
		> 434 - 1600 MHz	2.2 dB
		> 1601 - 3000 MHz	1.9 dB
Calibration uncertainty		< 1.5 dB	
GENERAL SPECIFICATIONS			
Operating temperature range		-10 °C to 50 °C (same as SRM basic unit)	
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10°C to +50°C
		Transport	2K4 (IEC 60721-3)
		Operating	7K2 (IEC 60721-3)
	Mechanical	Storage	1M3 (IEC 60721-3)
		Transport	2M3 (IEC 60721-3)
		Operating	7M3 (IEC 60721-3)
	ESD and EMC	EN 61326:2006	
	Safety	EN 61010-1:2004	
	EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS) 2002/96/EG 27.01.2003 (WEEE)	
CE (European Community)		Yes	
Air humidity		< 29 g/m³ (< 93 % to +30 °C)	
Weight		450 g	
Dimensions		460 mm length; 135 x 90 mm antenna head dimensions	
Calibration		24 reference points 26, 30, 40, 50, 60, 75, 100, 200, 300, 433, 600, 750, 900 MHz 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.45, 2.6, 2.8 , 3 GHz The SRM applies linear interpolation between reference points.	
Recommended calibration interval		24 months	
Country of origin		Germany	

a Typical measurement dynamic range for 10 dB signal to noise ratio (RBW = 1 kHz); 100 MHz – 2.2 GHz
b Typical values
c Typical value, with k = 2 (k = extrapolation or correction factor for determining the assessment value); +15 °C to +30 °C

Single axis antenna (E-field) 3531/04			
Frequency range	9 kHz to 300 MHz The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.		
Antenna type	E-field		
Sensor type	Single axis active broadband dipole		
Dynamic range [a]	50 µV/m to 16 V/m for 300 kHz to 10 MHz 50 µV/m to 36 V/m for > 10 MHz to 300 MHz		
CW damage level	> 1000 V/m		
Intrinsic noise display in conjunction with the SRM basic unit [b]	20 µV/m for each frequency > 1 MHz with RBW = 1 kHz		
Measurement range limit (for single CW signal) [b]	50 V/m		
RF connector	N connector, 50 Ω		
UNCERTAINTY			
Extended measurement uncertainty [c] (in conjunction with SRM basic unit and 1.5 m cable)	Frequency range	Single-axis measurement	
	0.009 - 300 MHz	2.0 dB	
Calibration uncertainty	< 1.2 dB		
GENERAL SPECIFICATIONS			
Operating temperature range	-10 °C to 50 °C (same as SRM basic unit)		
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
		Transport	2K4 (IEC 60721-3)
		Operating	7K2 (IEC 60721-3)
	Mechanical	Storage	1M3 (IEC 60721-3)
		Transport	2M3 (IEC 60721-3)
		Operating	7M3 (IEC 60721-3)
	ESD and EMC	EN 61326:2006	
	Safety	EN 61010-1:2004	
	EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS) 2002/96/EG 27.01.2003 (WEEE)	
CE (European Community)	Yes		
Air humidity	< 29 g/m³ (< 93 % to +30 °C)		
Weight	550 g		
Dimensions	460 mm length; 135 x 90 mm antenna head dimension		
Calibration	183 reference points The SRM applies linear interpolation between reference points.		
Recommended calibration interval	24 months		
Country of origin	Germany		

a Typical measurement dynamic range for 10 dB signal to noise radio (RBW = 1 kHz)
b Typical values
c Typical value, with k = 2 (k = extrapolation or correction factor for determining the assessment value); +15 °C to +30 °C

Single-axis antenna (H-field) 3551/02			
Frequency range	9 kHz to 300 MHz The correction factors determined individually during calibration are stored in an EEPROM and are applied automatically when used in conjunction with the SRM basic unit.		
Antenna type	H-field		
Sensor type	Single axis active magnetic loop		
Dynamic range [a]	0.4 µA/m to 71 mA/m		
CW damage level	> 2.65 A/m above 1 MHz		
Intrinsic noise display in conjunction with the SRM basic unit [b]	0.12 µA/m for each frequency > 10 MHz with RBW = 1 kHz		
Measurement range limit (for single CW signal) [b]	100 mA/m		
RF connector	N connector, 50 Ω		
UNCERTAINTY			
Extended measurement uncertainty [c] (in conjunction with SRM basic unit and 1.5 m cable)	Frequency range	Single-axis measurement	
	0.009 – 1 MHz	2.0 dB	
	> 1 - 300 MHz	1.8 dB	
Calibration uncertainty	< 1.2 dB		
GENERAL SPECIFICATION			
Operating temperature range	-10 °C to 50 °C (same as SRM basic unit)		
Compliance	Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
		Transport	2K4 (IEC 60721-3)
		Operating	7K2 (IEC 60721-3)
	Mechanical	Storage	1M3 (IEC 60721-3)
		Transport	2M3 (IEC 60721-3)
		Operating	7M3 (IEC 60721-3)
	ESD and EMC	EN 61326:2006	
	Safety	EN 61010-1:2004	
	EU Guidelines	2003/11/EG 06.02.2003 (PBDE and OBDE) 2002/95/EG 27.01.2003 (RoHS) 2002/96/EG 27.01.2003 (WEEE)	
CE (European Community)	Yes		
Air humidity	< 29 g/m³ (< 93 % at +30 °C)		
Weight	450 g		
Dimensions	460 mm length; 43 x 100 mm antenna head dimension		
Calibration	183 reference points The SRM interpolates between reference points		
Recommended calibration interval	24 months		
Country of origin	Germany		

a Typical measurement dynamic range for 10 dB signal to noise radio (RBW = 1 kHz); for frequencies > 10 MHz
b Typical values
c Typical value, with k = 2 (k = extrapolation or correction factor for determining the assessment value); +15 °C to +30 °C

ORDERING INFORMATION

SRM-3000	Part number
Set comprising: - Selective Radiation Meter, Basic Unit, SRM-3000, Calibrated - Antenna, Three-axis, E-field, 27MHz - 3GHz, Calibrated - RF-Cable SRM, 100kHz - 3GHz, N 50 Ohm, 1.5m - Carrying Strap for SRM-3000 (Basic Unit) - Operating Manual SRM, English or German - Power Supply 12 V DC, 100 V – 240 V AC, universal AC line connector - Software, SRM-Tools - Configuration Software for SRM Basic Unit - Cable, Serial Interface DB9/DB9, 3m - Cable, USB2.0 - Master/Slave, 3m	**Choice of set container:** **Hard Case 3001/101** **or** **Soft Case 3001/103**
OPTIONS	
Option, Time Controlled Storing	**3701/01**
Option, UMTS P-CPICH Demodulation	**3701/02**
Option, Spatial Averaging	**3701/03**
OPTIONAL ANTENNAS	
Antenna, Three-Axis, E-Field, 420 MHz - 6 GHz	**3502/01**
Antenna, Three-Axis, H-Field, 9 kHz - 250 MHz	**3581/02**
Antenna, Single-Axis, E-Field, 27MHz - 3 GHz	**3531/01**
Antenna, Single-Axis, E-Field, 9 kHz - 300 MHz	**3531/04**
Antenna, Single-Axis, H-Field, 9 kHz - 300 MHz	**3551/02**
PC SOFTWARE	
SRM-TS, PC Evaluation and Remote Control Software	**3001/93.10**
ACCESSORIES	
RF-Cable SRM, 100kHz - 3GHz, N 50 Ohm, 5m	**3601/02**
RF-Cable SRM, 9kHz-6GHz, N 50 Ohm, 5m	**3602/02**
Antenna Holder for single axis / three axis antenna	**3501/90.01**
Antenna Holder for three axis antenna (horizontal / vertical)	**3501/90.02**
Battery Pack, Rechargeable, 7V4 / 5100 mAh	**3001/90.01**
Tripod Adapter for SRM Basic Unit	**3001/90.06**
Charger Set for SRM-3000 Battery Pack, External	**3001/90.07**
Tripod, Non-Conductive, 1.65m with Carrying Bag	**2244/90.31**
Cable, Adapter USB 2.0 - RS232, 0.8m	**2260/90.53**
Trolley Soft Case for SRM-3000	**3001/90.05**
Transport Hard Case for SRM-3000	**3001/90.03**
O/E-Converter F-SMA/DB9, 115 kbaud, RS232 - 850 nm; F-SMA, DTE	**2260/90.05**
O/E Converter USB, RP-02/USB	**2260/90.07**
O/E-Converter Set for SRM-3000 (10m), 2x O/E Converter F-SMA/DB9, 10m Fiber Optic Cable	**3001/90.08**
O/E-Converter Set for SRM-3000 (30m), 2x O/E Converter F-SMA/DB9, 10m Fiber Optic Cable	**3001/90.09**

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