

Selective Radiation Meter

SRM-3000



- Complete solution for selective measurement of RF & microwave electromagnetic fields (100 kHz to 3 GHz)
- Isotropic (non-directional) measurement with triaxial Antenna (75 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 5 MHz for UMTS and W-CDMA
- UMTS P-CPICH Demodulation mode for worst case extrapolation of UMTS Node-B base station emissions

FEATURES

The Selective Radiation Meter (SRM) is a handheld selective measuring device for safety analysis of RF & microwave electromagnetic fields. The SRM can be used by broadcasters, radio network operators, measurement service providers and public authorities to selectively measure the field exposure produced by individual telecom services, and assess the results in accordance with the applicable standards. Most measurements required in the mobile radio sector can be performed directly using the handheld device. The SRM immediately evaluates the results on site.

The SRM consists of a basic unit and a measurement antenna. The basic unit contains a spectrum analyzer for the frequency range 100 kHz to 3 GHz. It can be operated using a triaxial antenna from Narda or in combination with measurement antennas from other manufacturers. The triaxial antenna allows isotropic (non-directional) measurements in the range from 75 MHz to 3 GHz, covering FM radio up to the W-CDMA and UMTS services.

The basic unit and antenna are battery powered, rugged, and easily hand portable, offering all of the functions needed to evaluate, store and document results without a separate PC. However, when required, results can easily be exported to a PC for long term storage or further analysis.



APPLICATIONS

The SRM is a handheld measuring device that was developed for analyzing safety issues in electromagnetic fields. It includes specially designed modes for safety applications. It can also be used as a conventional RF spectrum analyzer for general field strength measurements. Typical applications are as follows:

Comparison measurement in a known field environment

“Site sharing” is the usual situation today: Suppose that several mobile radio service operators have antennas located on a common tower or a roof. The overall electromagnetic radiation exposure from any number of sources needs to remain below a specified limit that usually varies with frequency. The SRM displays the total field exposure and also the contributions of the individual services (absolute value or percentage of permissible limit).

This allows operators, public authorities and measurement service providers to verify directly on site whether the different services comply with emission regulations and if not, decide which operator needs to reduce its output power and by how much.



Overview measurement in an unknown field environment

All of the industrialized nations have stipulated emission limits for both working environments and for the general public. Special care is often taken in sensitive areas such as schools and hospitals.

The SRM allows public authorities and measurement service providers to verify whether operators are complying with the applicable limits. With the SRM it is easy to make a fast scan of all of the field sources in the frequency range of interest. The SRM is so sensitive that even very weak sources such as individual mobile radio channels can be separately evaluated even inside buildings. An overview measurement is also useful for detecting any unknown sources.

Measurement of individual telecom services

Operators are held responsible for the fields produced by their own services. Even in a very complex field environment and in the vicinity of powerful broadcast signals the SRM can be used to measure individual transmit channels or frequencies. The device is capable of integrating over its frequency range and displaying the total value (an absolute value or in percentage terms with respect to a given limit).



For example, for GSM measurements, the SRM can use a 200 kHz resolution bandwidth (RBW) to measure the field strength of an individual control channel (BCCH) which always transmits at full power and estimate the field emissions which all of the traffic channels (TCH) would produce under full load. By using a 5 MHz resolution bandwidth, the SRM can detect an entire UMTS frequency block.

Additionally, the SRM can demodulate the pilot channels (P-CPICH) of individual cells of UMTS base stations and extrapolate the “worst case” electromagnetic exposure level from the results.

OPERATION

The SRM basic unit contains the spectrum analyzer with the RF input unit, measurement/operations processor, input panel and display. All of the functions and parameters can be set directly using softkeys and/or a thumbwheel. The SRM can also compute results as follows:

- Field strength level or percentage of permissible exposure level
- Single source or single channel
- List of sources or channels
- Contribution from a given telecom service
- Contribution from all services and their percentage of the total field strength

The SRM automatically recognizes the following data:

- **Antenna factors for converting the antenna output voltage into field strength values**
By means of a separate control cable, the SRM automatically recognizes the individual correction factors from an EEPROM built into the antenna. If the antenna is connected to the basic unit via a Narda extension cable, the SRM will also recognize the frequency-dependent loss factors for the cable from an EEPROM in the cable. For antennas and cables from other manufacturers, the user can input the relevant correction factors using the PC software supplied and transfer the data to the SRM via the serial or USB interface. All that is then needed to make measurements is to select the antenna and cable type from the configuration menu.
- **Exposure limits from common safety guidelines and standards**
Exposure limits are stored in the SRM and can be easily selected via a simple menu. Other limits can be transferred to the SRM as an update via the serial or USB interface.
- **Assignment of telecom services to frequency bands**
User-editable tables are provided in the PC software supplied. A service table (e.g. "GSM-900") is a list of individual operators by name along with the upper and lower limits of the assigned frequency band. These lists are transferred to the SRM via the serial or USB interface.

Measurements using Narda's triaxial antenna

Such measurements automatically produce isotropic (i.e. non-directional) results. These measurements can be made in three different ways.

- Antenna connected directly to the basic unit. This makes it possible to perform measurements in the entire mobile radio band. The SRM is well suited for use on radio masts and towers where it is difficult to make conventional narrowband measurements. As a true hand-held device the SRM is relatively easy to use in these awkward environments.
- Antenna connected to basic unit via a cable. This is useful if you need to take measurements over a given volume in order to find the location with the highest field strength. It is also possible to hang the basic unit from a belt or harness and hand carry the antenna.
- Antenna mounted on a tripod and connected to basic unit via a cable. This arrangement produces the most reliable results since the field being measured is not influenced by the presence of the basic unit or the user.

Measurements using antennas from other manufacturers

This is also possible with the SRM. Of course, single-axis antennas will produce directional results. For example, you can connect a directional antenna to the SRM via a cable and carry it in your hand to determine the main direction of radiation or 'main beam' from a source.

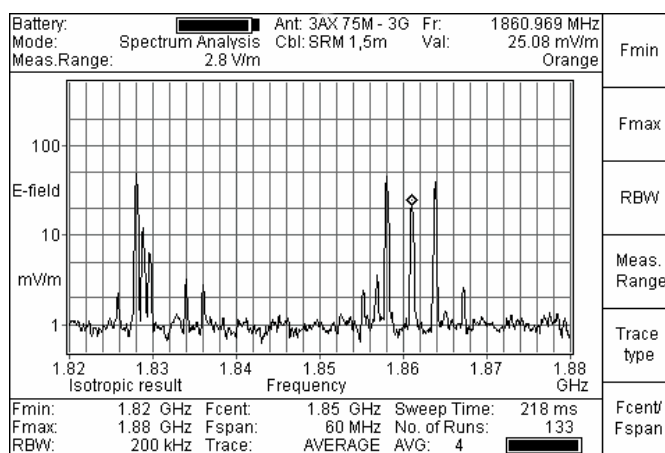
The SRM can also measure three axes with a single-axis antenna. To do this, a special apparatus on the tripod must be used to arrange the receiving axis of the antenna in three mutually orthogonal positions in succession. The SRM saves the result for each of the axes and then computes the field strength.

OPERATING MODES

Since it is built for everyday use, the SRM has both general and special modes which are tailored to the main applications.

Spectrum Analysis

Spectrum Analysis mode is useful for identifying all of the field sources within the chosen frequency range.



In multi-frequency environments, the 'Spectrum Analysis' mode provides an overview of all of the frequency components with their field strengths. The user just has to set the desired frequency range. The SRM will only accept values which do not exceed the frequency limits of the connected antenna. The spectrum is clearly displayed, and the markers and zoom function can be used to quickly make a field strength assessment. Peak tables show all of the field strength values above a certain value along with their frequencies.

One special feature is the ability to integrate over a desired frequency range. This allows the user to display the power of a transmit channel with a bandwidth greater than the resolution bandwidth (RBW) of the measurement. A further application for this integration capability would be for measuring the broadband level over the entire frequency range.

Safety Evaluation

In this mode, the SRM displays the field strength results in tabular format, broken down into the contributions of the individual telecom services. The total exposure is also displayed. The frequency bands for individual services can be user-defined. The results can be displayed as a percentage of an exposure limit, or as absolute values in V/m, A/m or W/m² and mW/cm². Safety Evaluation mode provides the user with an immediate overview of contributions from individual services which make up the total field strength level. This is very useful where several operators are sharing an antenna site.

Safety Evaluation mode enables contributions from individual telecom services to be compared with the total field strength value. Here, the results are shown as a percent of the permissible exposure level.

Battery:	██████████	Ant:	3AX 75M - 3G Funkdienste D	Sel. first service
Mode:	Safety Evaluation	Cbl:	SRM 1,5m	
Meas.Range:	20 %	Std:	ICNIRP Pub	
	Service	Value	Frequency	Sel. last service
	UKW	0.02128 %	87.500 MHz to 108.000 MHz	Sel. all service
	Band II/DAB	0.01647 %	174.000 MHz to 230.000 MHz	
	Band IV/V/DTVB	0.03157 %	470.000 MHz to 790.000 MHz	
	GSM 900	0.22253 %	890.000 MHz to 960.000 MHz	
	GSM 1800	14.53 %	1710.000 MHz to 1880.000 MHz	
	UMTS	0.01499 %	1920.000 MHz to 2170.000 MHz	
	Others	0.12204 %		Meas. Range
	Total	14.96 %	87.500 MHz to 2170.000 MHz	Trace type
	Isotropic result			
Fmin:	87.5 MHz	Process Time: 1.386 s		
Fmax:	2.17 GHz	No. of Runs: 33		
RBW:	5 MHz(Auto) Trace:	ACT		

The SRM displays the results as a percentage or as absolute values in V/m, A/m or W/m² and mW/cm² of the given exposure limit. Safety Evaluation mode is based on spectrum analysis followed by integration across certain frequency ranges. The measurement process is fully automated. The SRM measures the entire frequency range for all selected services and automatically sets its resolution bandwidth (RBW) to fit the smallest frequency span to be measured. It saves the absolute field strength values from the selective measurements, evaluates the data based on the selected standard and stores these results too. Integration over the frequency ranges of the individual services provides the individual contributions. The SRM groups together the frequency ranges between the selected services as 'Others' and includes them in the overall total result.

UMTS P-CPICH Demodulation (optional)

In UMTS P-CPICH Demodulation mode, the SRM can decode the primary common pilot channels (P-CPICH) of each UMTS cell detected in a 5 MHz UMTS frequency block.

The UMTS P-CPICH Demodulation option allows the SRM to decode all the pilot channels (P-CPICH) contained in a 5 MHz bandwidth UMTS frequency block and can thus correlate the measured field strengths to the respective pilot channels.

Battery: ██████████				Ant: 3AX 75M-3G		Fcent
Mode: UMTS P-CPICH Dem.				Cbl:		
Meas.Range: 2.25 V/m				Std:		
Ind.	Scr.	Value	Max.Value	Cell Name		Table Reset
1	138	0.000 $\mu\text{V}/\text{m}$	1.564 mV/m			
2	182	2.752 mV/m	4.179 mV/m			
3	198	0.000 $\mu\text{V}/\text{m}$	9.278 mV/m			
4	213	5.150 mV/m	26.52 mV/m	Tower North 2		
5	293	5.977 mV/m	40.74 mV/m			Max Reset
						Meas. Range
Total		8.356 mV/m	49.05 mV/m			Result type
Analog		13.12 mV/m	67.10 mV/m			
Isotropic Result						
SENSITIVE		Fcent:	2.167 2 GHz	Process Time: 1.922 s		
		Result:	ACT	No. of Runs: 68		

The instrument provides the results in a table arranged according to the scrambling codes used to identify the various cells. The SRM displays the results as percentages of a limit value or as absolute values in V/m , A/m or W/m^2 and mW/cm^2 . In addition to the sum of all the demodulated field strength results (Total), the SRM also determines the actual overall analog channel power level of the UMTS frequency block being evaluated.

The SRM simultaneously displays the current values (Value) and the maximum values that occurred for each cell since the last Max Reset.


UMTS channel selection is made by entering the center frequency or the corresponding channel number. For quick and easy identification of the various scrambling codes, user defined cell name tables can be selected, in which each scrambling code is assigned a user defined alphanumeric comment.

Time Analysis

In Time Analysis mode, the SRM measures the field strength values at a user-definable center frequency and with a selectable resolution bandwidth between 6.4 kHz and 6 MHz.

The measurement algorithm employed ensures that the measurement results are recorded, processed and saved in real time without any gaps (as determined by the sampling rate).

In Time Analysis mode, the SRM measures one peak value or RMS value against time. Changes in the measured values over a period of time can be recorded in this way.

Battery: 	Ant: 3AX 75M-3G	Fcent	
Mode: Time Analysis	Cbl:	Detector	
Meas.Range: 2.25 V/m	Std:	RBW	
<div style="border: 1px solid black; padding: 10px; text-align: center;"> Value: 228.2 $\mu\text{V/m}$ </div>		Meas. Range	
		Result type	
		Isotropic Result	
		Fcent: 900 MHz Detector: RMS No. of Runs: 24 RBW: 6.4 kHz Result: AVG AVG: 6 min <input type="text"/>	

Either a peak value detector (PEAK) or an RMS detector can be selected in Time Analysis mode.

The current or “actual” value (ACT) or the maximum value (MAX) can be displayed numerically when the PEAK detector is used.

The average value (AVG) or maximum average value (MAX AVG) can additionally be determined and displayed numerically when the RMS detector is used. The averaging time can be set between 0.96 seconds and up to 30 minutes, which includes the “6-minute average” required by many standards.

The SRM uses channel filters with steep cutoff characteristics in Time Analysis mode, so that a specific service can be monitored over a period of time without being influenced by neighboring services.

PRODUCT INFORMATION (BASIC UNIT)

BASIC UNIT SRM-3000		
Frequency range	100 kHz to 3 GHz	
Modes	Spectrum Analysis Safety Evaluation	UMTS – P-CPICH Demodulation Time Analysis
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 < - 120dBc (1 Hz)
	Reference frequency	Original deviation < 1.5 ppm Aging < 0.5 ppm/year Thermal drift < 2.0 ppm (within specified temperature range)
Amplitude	Upper limit of measurement range (MR)	-27 dBm to +23 dBm (in steps of 1 dB)
	Display range	From noise floor up to +26 dBm
	Maximum RF power	+30 dBm
	Maximum DC voltage	50 V
	Intrinsic noise	-120 dBm for 1 kHz RBW, f > 20 MHz and no RF attenuation
	RF attenuation	0 to 50 dB in steps of 1 dB (coupled with measurement range)
	2 nd order intermodulation products	≤ -57 dBc for two signals of level 9 dB below MR and a spectral line spacing of more than 100 kHz
	3 rd order intermodulation products	≤ -70 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 (worst of both) < -60 dBc for a carrier spacing of 72 MHz
	Spurious responses (residual)	< -94 dBm or MR -67 dB for frequencies above 20 MHz
RF input	Units	dBm, dBV, dBmV, dBμV Field strength units available in case a measurement antenna (antenna) is used (see under “Measurement functions”)
	Type	N connector, 50 Ω
	Return loss	< 11dB for f ≤ 2.4 GHz

SPECTRUM ANALYSIS MODE		
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	
Sweep time	200 ms to 1 s (depending on sweep span)	
Filter	Type	Gauss filter
	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 (display of current ("actual") spectrum) MAX (Max Hold function) AVRG (averaging over a selectable number of spectra [4 to 64]) MAX AVRG (Max Hold function after averaging over the defined number of spectra)	
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 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 (adjusts left-hand frequency of zoom window) Zoom Max (adjusts right-hand frequency of zoom window) Move Zoom Area (moves adjusted zoom window over frequency) Reduce/Enlarge Zoom Area (scales zoom window size) Zoom to Marker (moves zoom area to actual marker position) Execute Zoom (sets Zoom Min to Fmin and Zoom Max to Fmax)	
SAFETY EVALUATION MODE		
Measurement principle	Spectrum analysis, followed by integration over user-defined frequency bands ("Services")	
Resolution bandwidths (-3 dB)	Automatically set as a function of the narrowest user-defined service	
Filter	See Spectrum Analysis mode	
Detection	RMS (integration time = $\frac{1}{2 \times \text{RBW}}$)	
Result Type	See Spectrum Analysis mode	
Display	Tabular format with service names, field strength contribution and frequency band (maximum three columns)	

UMTS P-CPICH DEMODULATION MODE (optional)		
UMTS channel selection		By entering the center frequency By entering the channel number
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	$\alpha = 0.22$
Selectable units for P-CPICH		With antenna dBV/m, dBmV/m, dB μ V/m, dBA/m, A/m, mW/cm ² , W/m ² , % of selected safety standard (based on power) Without use of antenna dBm, dBV, dBmV, dB μ V
Possible units for P-CPICH		dBV/m, dBmV/m, dB μ V/m, dBA/m, A/m, mW/cm ² , W/m ² , % of selected safety standard (based on power) dBm, dBV, dBmV, dB μ V
Possible result types		Actual (ACT) and maximum (MAX) values displayed constantly Averaging selectable (on/off) for actual und max. values (averaged number selectable between 4 and 64)
Received / demodulated signal		P-CPICH
Display	Up to 16 scrambling codes simultaneously	
	Table format with columns for Index, Scr. Code, Value, Max. Value, Cell Name	
	Total sum of all ACT and MAX P-CPICH values	
	Actual and max. channel power	
	User defined cell names (from cell name tables)	
	Number of runs (sweeps) since last reset	
TIME ANALYSIS MODE		
Measurement principle		Selective level measurement at a fixed frequency
Detection		RMS (integration time = 480 ms) Peak
Filter	Type	Steep cutoff channel filter
Resolution bandwidth RBW (-6dB)		6.4 kHz to 6 MHz
Trace display (Result Type)		ACT (display of current ("actual") spectrum) AVG (Time Averaging using RMS detector) MAX (Max hold function) MAX AVG (Max hold function after averaging over a defined number of spectra using RMS detector)
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)

MEASUREMENT FUNCTIONS		
Field strength measurements	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" included in delivery)
	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	V/m, A/m, W/m ² or mW/cm ² , dBV/m, dBA/m
RF human safety measurements	Isotropic Measurements	Automatic switching of the antenna axes when using Narda's triaxial 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)
	Correlation of results with telecom services	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 TSsoftware.
Memory	Memory modes	Storage of current result: SPECTRUM in Spectrum Analysis mode, TABLE in Safety Evaluation mode, VAL in P-CPICH Demodulation UMTS Conditional storage of results when a threshold is violated (in all modes)
	Memory capacity	16 MB from F-Series 48 MB (up to 512 spectra in Spectrum Analysis mode or tables in Safety Evaluation mode)

GENERAL SPECIFICATIONS			
Operating temperature range		-10 °C to +50 °C during normal operation 0 °C to +40 °C when charging	
Air humidity (operating range)		< 29 g/m ³ (< 93 % at +30°C)	
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	1M2 (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	
Weight		1.9 kg (including rechargeable cell)	
Dimensions		255 mm x 195 mm x 60 mm	
Display	Type	Monochrome, LCD (transreflective) with backlighting for indoor or outdoor use	
	Size, resolution	115 mm x 80 mm, 480 x 320 pixels	
Interface	Type	RS 232, electrical or optical (with additional accessory) USB	
	Transfer rate	115.2 kbaud	
Power supply	Rechargeable cell	Lithium-Ion cell Typical 4 hour cell 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	
Calibration interval		24 months (recommended)	

PRODUCT INFORMATION ISOTROPIC ANTENNA

Triaxial Antenna			
Frequency range	75 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	Triaxial design with scanned axes		
Dynamic range ¹⁾	0.25 mV/m to 200 V/m		
CW damage level	435 V/m or 50 mW/cm ²		
RF connector	N connector, 50Ω		
UNCERTAINTY ²⁾			
Intrinsic noise display in conjunction with the SRM basic unit (separate measurement of a single axis)	50 μV/m at 900 MHz with 1 kHz resolution bandwidth 70 μV/m at 2.1 GHz with 1 kHz resolution bandwidth		
Intrinsic noise display in conjunction with the SRM basic unit (for isotropic result)	87 μV/m at 900 MHz with 1 kHz resolution bandwidth 120 μV/m at 2.1 GHz with 1 kHz resolution bandwidth		
Measurement range limit (for single CW signal)	300 V/m 1000 V/m for $f \leq 110$ MHz		
Max. measurement range (in conjunction with the SRM basic unit)	200 V/m (without restrictions for total span of 75 MHz to 3 GHz)		
Extended measurement uncertainty ³⁾ (in conjunction with SRM basic unit and 1.5m RF cable)	Frequency range	Single-axis measurement with isotropic antenna	Isotropic measurement
	75-900 MHz	+2.4 / -3.4 dB	+2.4 / -3.3 dB
	901-1400 MHz	+2.3 / -3.1 dB	+2.4 / -3.3 dB
	1401-1600 MHz	+2.2 / -3.1 dB	+2.6 / -3.7 dB
	1601-1800 MHz	+1.8 / -2.2 dB	+2.2 / -3.0 dB
	1801-2200 MHz	+1.8 / -2.2 dB	+2.4 / -3.3 dB
	2201-2700 MHz	+1.8 / -2.3 dB	+2.6 / -3.6 dB
2701-3000 MHz	+1.9 / -2.4 dB	+3.2 / -5.3 dB	
Calibration uncertainty	< 1.5 dB		

1) Characteristic measurement dynamic range for 10 dB signal to noise ratio (RBW =1kHz)

2) Characteristic values

3) K = 2 (K= extrapolation or correction factor for determining the assessment value); +15 °C to +30°C

GENERAL SPECIFICATIONS			
Operating temperature range		-10 °C to 50 °C	
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	1M2 (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		< 29 g/m ³ (< 93 % at +30°C)	
Weight		450 g	
Dimensions		450 mm length; 120 mm Antenna head diameter	
Calibration		18 reference points 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 applies linear interpolation between reference points.	
Calibration interval		24 months (recommended)	

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 ¹⁾	90 µV/m to 80 V/m		
CW damage level	> 300 V/m or 25 m W/cm ²		
RF connector	N connector, 50Ω		
UNCERTAINTY ²⁾			
Intrinsic noise display in conjunction with the SRM basic unit ³⁾	30 µV/m from 100 MHz to 2.1 GHz with 1 kHz resolution bandwidth		
Measurement range limit (for single CW signal)	100 V/m		
Extended measurement uncertainty ⁴⁾ (in conjunction with SRM basic unit and 1.5m RF cable)	Frequency range	Single-axis measurement	
	36-300 MHz	2.1 dB	
	301-433 MHz	2.3 dB	
	434-1600 MHz	2.1 dB	
	1601-3000 MHz	1.8 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	1M2 (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	< 29 g/m ³ (< 93 % at +30°C)		
Weight	450 g		
Dimensions	450 mm length, 135 mm x 90 mm antenna head dimension		
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.		
Calibration interval	24 months (recommended)		

1) Characteristic measurement dynamic range for 10 dB signal to noise ratio (RBW =1 kHz)

2) Characteristic values

3) Intrinsic noise increases by 0.5 dB per 100 MHz above 2 GHz

4) K = 2 (K= extrapolation or correction factor for determining the assessment value); +15 °C to +30°C

Single-axis antenna (E-field) 3531/02

Frequency range	100 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 ¹⁾	125 µV/m to 36 V/m		
CW damage level	> 1000 V/m		
RF connector	N connector, 50Ω		
UNCERTAINTY ²⁾			
Intrinsic noise display in conjunction with the SRM basic unit	40 µ V/m in the range from 100 MHz to 300 MHz with 1 kHz resolution bandwidth RBW		
Measurement range limit (for single CW signal)	50 V/m		
Extended measurement uncertainty ³⁾ (in conjunction with SRM basic unit and 1.5m RF cable)	Frequency range	Single-axis measurement	
	0.1-20 MHz	2.7 dB	
	20.1-300 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	1M2 (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	< 29 g/m ³ (< 93 % at +30°C)		
Weight	550 g		
Dimensions	460 mm length; 135 mm x 90 mm antenna head dimension		
Calibration	141 reference points The SRM applies linear interpolation between reference points.		
Calibration interval	24 months (recommended)		

1) Characteristic measurement dynamic range for 10 dB signal to noise ratio (RBW =1 kHz)

2) Characteristic values

3) K = 2 (K= extrapolation or correction factor for determining the assessment value); +15 °C to +30°C

Single-axis Antenna (H-field) 3551/01

Frequency range	100 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 ¹⁾	0.4 μ A/m to 71 mA/m		
CW damage level	> 2.65 A/m above 1 MHz		
RF connector	N connector , 50 Ω		
UNCERTAINTY ²⁾			
Intrinsic noise display in conjunction with the SRM basic unit	0.17 μ A/m for each frequency > 20 MHz with 1 kHz resolution bandwidth RBW		
Measurement range limit (for single CW signal)	100 mA/m		
Extended measurement uncertainty ³⁾ (in conjunction with SRM basic unit and 1.5m RF cable)	Frequency range	Single-axis measurement	
	0.1-20 MHz	2.7 dB	
	20.1-300 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	1M2 (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	< 29 g/m ³ (< 93 % at +30°C)		
Weight	450 g		
Dimensions	460 mm length; 43 mm x 100 mm antenna head dimension		
Calibration	141 reference points The SRM applies linear interpolation between reference points.		
Calibration interval	24 months (recommended)		

1) Characteristic measurement dynamic range for 10 dB signal to noise ratio (RBW =1 kHz)

2) Characteristic values

3) K = 2 (K= extrapolation or correction factor for determining the assessment value); +15 °C to +30°C

ORDERING INFORMATION

SRM-3000	Order number
Set comprising: <ul style="list-style-type: none"> – Selective Radiation Meter SRM, basic unit, calibrated – Triaxial antenna, E-field, 75 MHz to 3 GHz, calibrated – RF cable, 100 kHz to 3 GHz, 1.5 m, calibrated – Carry strap for basic unit SRM-3000 – Operating manual – Power supply 12.0 VDC, 100 – 240 VAC, with various line connectors – SRM Tools configuration software – USB 2.0 cable – DB9 / DB9 cable for serial interface 	Choice of set container: <ul style="list-style-type: none"> – Transport case 3001/101 <p style="text-align: center;">or</p> <ul style="list-style-type: none"> – Trolley 3001/103

Options	Order number
UMTS P-CPICH Demodulation: Option for demodulating P-CPICH pilot channels of UMTS signals	3701/02

Optional Antennas	Order number
Single-axis Antenna (E-field) 27 MHz to 3 GHz	3531/01
Single-axis Antenna (E-field) 100 kHz to 300 MHz	3531/02
Single-axis Antenna (H-field) 100 kHz to 300 MHz	3551/01

PC software	Order number
SRM-TS PC evaluation and remote control software for SRM	3001/93.10

Accessories	Order number
RF cable, 100 kHz to 3 GHz, 5 m, calibrated	3601/02
Antenna holder for single axis and triaxial antennas	3501/90.01
Antenna holder for triaxial antennas (horizontal/vertical)	3501/90.02
Additional battery pack for SRM, rechargeable	3001/90.01
Basic unit tripod adapter	3001/90.06
External charger set for SRM battery packs	3001/90.07
Tripod, non conductive, 1,65 m, with carrying bag	2244/90.31
Adapter USB to serial interface / USB 2.0 to DB9	2260/90.53
Trolley	3001/90.05
Transport case	3001/90.03
Optical / electric converter	2260/90.05
Optical cable, length	2260/90.42
	10 m
	2260/90.44
	30 m
	2260/90.46
	50 m
	2260/90.48
	100 m



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