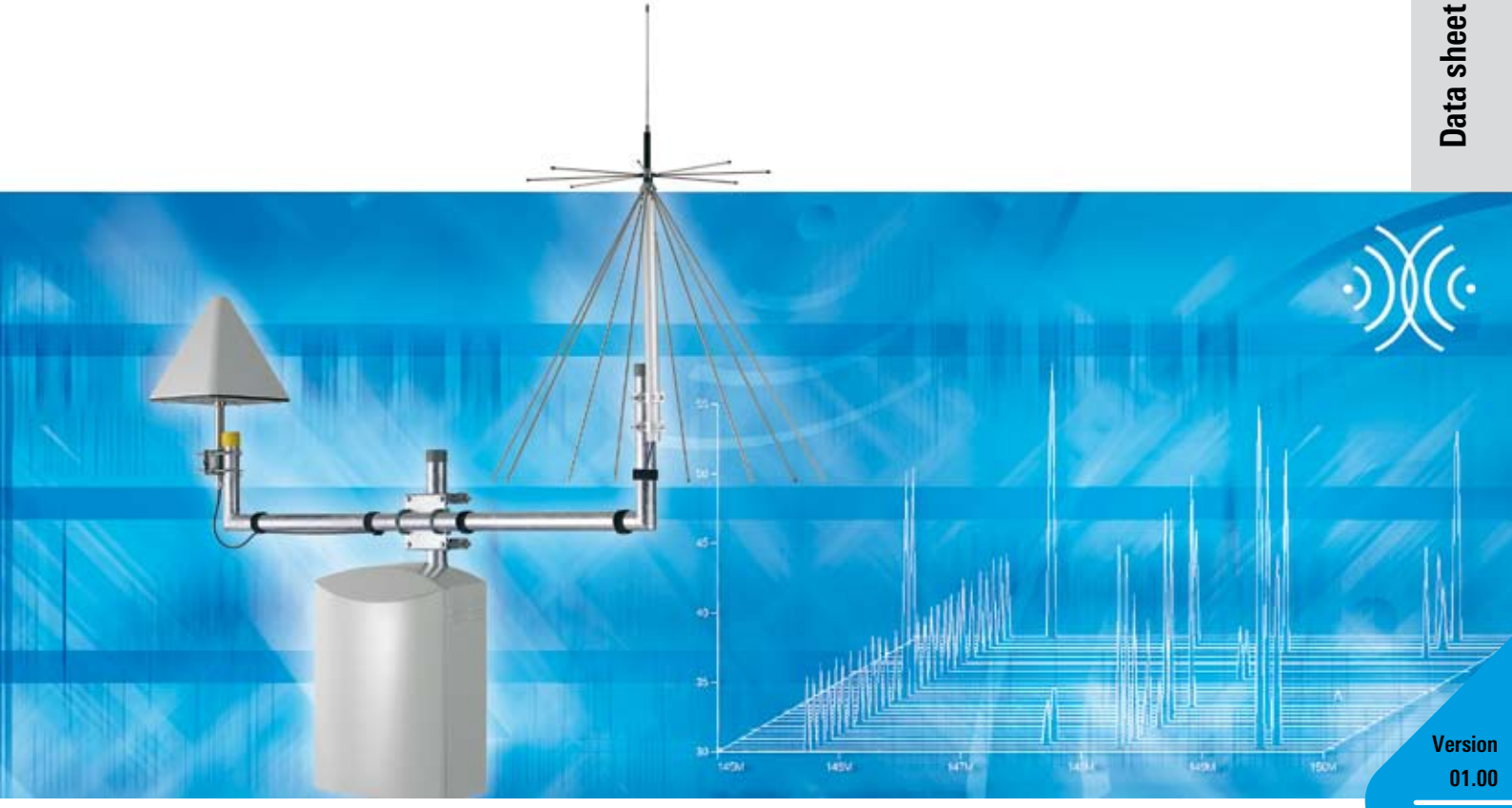
Data sheet



Version 01.00

August 2006

# Monitoring System R&S®UMS 100

## Compact monitoring system from 100 kHz to 6 GHz

- The ideal solution for efficient and cost-effective monitoring of the electromagnetic environment
- Compact design, easy to mount and put into operation (plug & play)
- Suitable for indoor and outdoor use as well as vehicle integration
- Designed for fully automatic and standalone operation (built-in processor and memory)
- Frequency range 20 MHz to 1.3 GHz (100 kHz to 6 GHz with options)
- Universal power supply (AC and DC)
- Low power consumption
- Remote control via LAN and mobile phone networks
- Easy integration into R&S®ARGUS radiomonitoring networks

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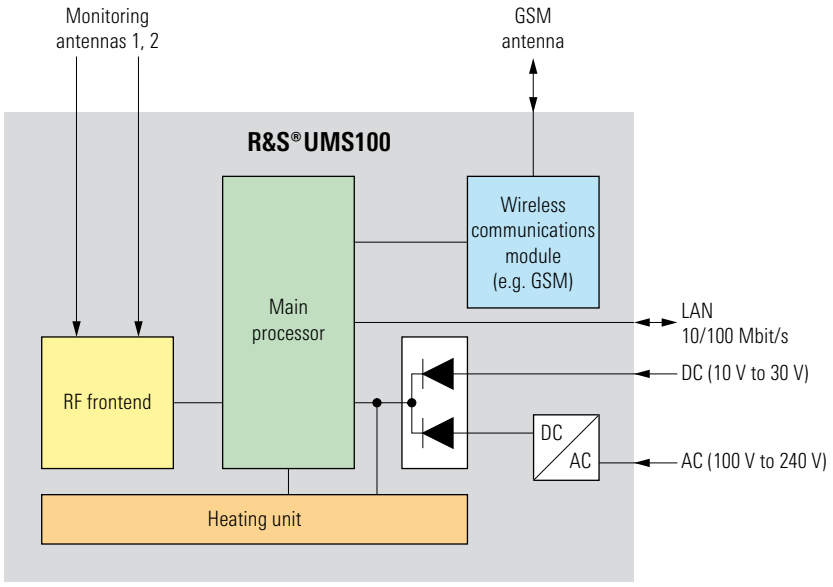
## Typical applications

- Automated measurement and surveillance tasks
- Monitoring of large areas with an appropriate number of R&S®UMS 100 (e.g. national borders, coastlines, harbors, military training areas)
- Search for new (illegal) signals that may cause harm to critical communications (e.g. near airports)
- Monitoring of licensed transmitters for operating compliance
- Monitoring of rooms and buildings to detect the use of illegal transmitters (e.g. airports, hospitals, schools)
- Mobile search for new signals and monitoring of existing signals via integration of the R&S®UMS 100 in conventional vehicles




***Block diagram***

## Description

Besides the automatic measurements used in unattended operation, interactive measurements can be performed to obtain more detailed information about the radio spectrum of interest.

**Search for unknown signals**
If it is necessary to check an entire frequency range for unknown signals, a scan can be initiated by defining the lower and upper frequencies. The R&S®UMS 100 is fast enough to detect all signals of interest.

**Monitoring of fixed frequencies**
In the non-scan mode, the R&S®UMS 100 can measure level, frequency and offset values for defined frequencies. By using AM or FM demodulation, remote listening to audio signals can be performed.

If you need to monitor several defined frequencies, you can perform the measurements using a frequency list. After these predefined lists have been processed, the measurement results will be output on a graphic display.

All the measurement equipment except the antennas is integrated in a closed container. To optimize outdoor use, the main container is covered by a second, external box. This box provides additional mechanical as well as weather protection. Ventilation slots provide permanent air convection. For temperatures above 45 °C, an optional sun protection shield is necessary.

The box can be mounted indoors as well as outdoors e.g. on the roof of a building. The mounting material, which is included in the equipment supplied, allows the box to be easily mounted on a wall, ceiling or a mast.

All connectors are protected at the bottom of the container. The plug connections are waterproof, either through the use of the cable connectors or with waterproofed caps if no cables are connected.

The two antenna inputs are connected to the RF frontend, which is the most important component of the system. It processes the measurement data and controls the interface to the internal main processor of the R&S®UMS 100.

***Container for mechanical and weather protection***

***Antenna configuration for frequencies from 100 kHz to 6 GHz***

This main processor consists of a motherboard and a microprocessor with an embedded operating system. Special firmware allows the R&S®UMS 100 to be remote-controlled from an external control PC. As a minimum requirement, Control Software R&S®ARGUS-UMS must be installed on the control PC. R&S®ARGUS-UMS is specially adapted to the tasks and functionality of the R&S®UMS 100.

Nevertheless, the standard R&S®ARGUS software can also control the R&S®UMS 100 and other devices if the appropriate software options are installed.

The data connection to the R&S®UMS 100 can be set up via a LAN cable or, in wireless operation, via a mobile phone network connection (e.g. GSM). Both capabilities are always provided by the R&S®UMS 100.

The advantages of the integrated main processor become apparent especially when using the remote control function via GSM or similar networks. If R&S®ARGUS is used in the control station, the mobile radio connection is required only for a very short period of time in order to define and transfer the measurement settings. After that, the connection can be terminated, and the R&S®UMS 100 will automatically perform the measurements from start to finish. This reduces costs for network communications.

The measurement results are saved internally. They can be retrieved from the PC in the control station when needed. A permanent data connection is not necessary while the measurement is running.

## Power supply

The R&S®UMS 100 comes with a universal power supply concept. The system can be operated with 10 V to 30 V DC as well as with 100 V to 240 V AC or even simultaneously. For example, failure of the AC power supply will cause the R&S®UMS 100 to switch to battery power without any interruption in operation.

Special emphasis has been placed on minimum power consumption. For typical ambient temperatures between 0 °C and +55 °C, power consumption is only approx. 25 W. Additional power is needed for heating the R&S®UMS 100 – but only if the ambient temperature is extremely low.

## Installation

The Monitoring System R&S®UMS 100 is supplied together with a complete set of installation material, allowing it to be placed into operation very quickly. For easy assembly, a toolset with all necessary wrenches and screwdrivers is included.

In most cases, it is sufficient to connect one monitoring antenna. A broadband discone antenna covers the frequency range 20 MHz to 1.3 GHz. To extend the frequency range, the R&S®UMS 100 provides two antenna inputs. It is also possible to connect alternate/additional antennas, e.g. a wideband antenna for the frequency range 100 kHz to 1.3 GHz and an antenna for the range 1.3 GHz to 6 GHz.

Due to the connectivity of the R&S®UMS 100, it is easy to establish a network of multiple R&S®UMS 100.

## Operation

The R&S®UMS 100 has no local control elements. The integrated LAN connection and the mobile phone network interface, e.g. GSM, make it possible to control the system from a remote external computer.

Control Software R&S®ARGUS-UMS is based on Spectrum Monitoring Software R&S®ARGUS, which incorporates many years of experience. Owing to the intuitive, user-friendly graphical user interface of R&S®ARGUS-UMS, even complex measurement tasks can be performed extremely efficiently. R&S®ARGUS-UMS can also handle a large number of R&S®UMS 100 units.

Measurements can be performed both automatically and interactively:

- During manual "live" measurements, it is possible to simultaneously perform audio transfer, listen to AM/FM demodulated signals and record sampled signals, even with "low speed" links such as GSM
- The automatic mode is especially well suited for use on the R&S®UMS 100

Measurement tasks can quickly and conveniently be defined and sent to the monitoring stations, where they will run completely automatically. This makes it possible to perform a large number of measurements simultaneously and to monitor large areas continuously – providing high efficiency with a minimum of resources.

An important feature is the capability to compare measurement results with reference data in realtime while the measurement is running. Thus, deviations from nominal values, overshoots or undershoots of user-defined thresholds, or unknown transmitters are detected, and an alarm will automatically be sent to the control center.

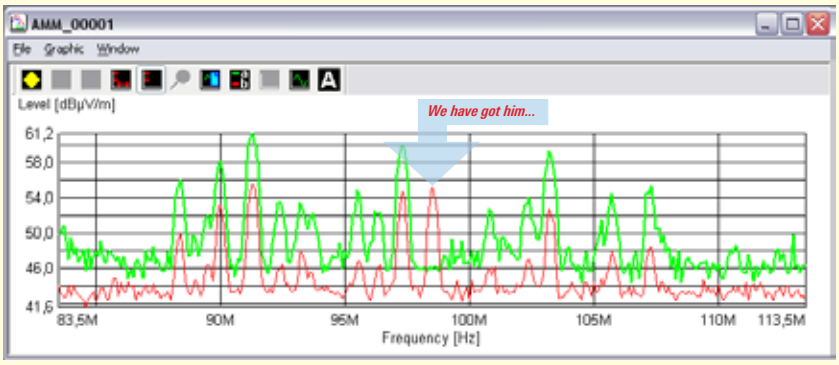
Control Software R&S®ARGUS-UMS therefore comes with innovative alarm handling, providing either automatic message-receiving from the R&S®UMS 100 or – if preferred – a configurable polling function that cyclically queries the R&S®UMS 100 for alarms.

The measurement results can be displayed as tables as well as graphs, and all data can be saved for later evaluation and analysis. Dedicated workflows for the various measurement tasks are available.

A further means of remote control is the mobile phone network module (e.g. GSM), which is integrated into every R&S®UMS 100. Depending on where the R&S®UMS 100 is installed, this module is ideal for remote control.

For many applications, the user merely has to send a measurement task to the R&S®UMS 100. Sending can be performed in wireless operation via a mobile phone network connection. The measurements will then be performed by the R&S®UMS 100, and the results can be retrieved later – again simply by means of GSM, etc.

The R&S®UMS 100 has been designed as a very efficient, compact, robust, standalone monitoring system. It reliably detects signals with a minimum duration of typ. 1 to 2 seconds. It also indicates the presence of transmitting GSM mobile phones.




**Finding unwanted signals**
The screenshot shows the result of a live measurement (red). A user-defined limit line is superimposed (green). The overshoot at 98.5 MHz is clearly visible, indicating that a "new" carrier has been detected. Depending on the configuration, the overshoot can trigger an alarm in the control center and/or automatically initiate in-depth analysis of the signal.

## Specifications

| | |
|---|---|
| **Antennas** | |
| Basic antenna<br><br><br>Weight<br>W × H × D (basic configuration) | 20 MHz to 1.3 GHz<br>passive omnidirectional discone, vertical polarization<br>≤1.4 kg<br>850 mm × 1700 mm × 850 mm |
| HF antenna<br><br><br>Weight<br>W × H × D (HF option, replaces basic antenna) | 100 kHz to 1.3 GHz<br>passive omnidirectional monopole, vertical polarization<br>≤1.5 kg<br>300 mm × 1900 mm × 100 mm |
| SHF antenna<br><br><br>Weight<br>W × H × D (SHF option) | 1.3 GHz to 6 GHz<br>passive omnidirectional discone, vertical polarization<br>≤1.1 kg<br>400 mm × 600 mm × 600 mm |
| **System data** | |
| Frequency range<br>Extendable via options (including antennas):<br>HF option<br>SHF option | 20 MHz to 1.3 GHz (basic model)<br><br><br>100 kHz to 20 MHz<br>1.3 GHz to 6 GHz |
| Tuning resolution | 1 Hz |
| Tuning error | 1 ppm |
| Input | 50 Ω, nominal |
| VSWR | ≤2.5 |
| 2nd order intercept | ≥180 dBµV/m (with attenuation) |
| 3rd order intercept | ≥150 dBµV/m (with attenuation) |
| IF bandwidths | 100 Hz, 300 Hz,<br>1 kHz, 3 kHz, 10 kHz, 30 kHz,<br>100 kHz, 200 kHz, 300 kHz, 1 MHz |
| Sensitivity | ≤–10 dBµV/m (100 kHz to 20 MHz)<br>≤–5 dBµV/m (20 MHz to 6 GHz)<br>with MGC = +15 dB and 100 Hz IF bandwidth |
| IF rejection | 80 dB |
| Image rejection | 80 dB |
| Scan speed | max. 300 channels/0.6 s |
| Signal level error | ≤1.5 dB, typ. 0.5 dB |
| Signal level resolution | 0.1 dB |

| | |
|---|---|
| Demodulation | AM, FM |
| AGC | ≥130 dB |
| Data exchange bandwidth LAN | 10 Mbit/s / 100 Mbit/s (physical) |
| Data exchange bandwidth GSM | up to 9600 bps (physical), depending on network performance |
| Audio output | line-out connector at control PC with R&S®ARGUS-UMS software |
| Remote control operation | Ethernet/LAN or GSM<br>remote control PC with R&S®ARGUS-UMS software |
| **Interfaces** | |
| Two antenna inputs | N female, 50 Ω |
| GSM antenna connector | GSM 900/1800, N female |
| LAN connector | Ethernet, RJ-45 female |
| DC power supply | 7-terminal circular plug |
| AC power supply | 4-terminal circular plug |
| **General data** | |
| Operating temperature range | –40 °C to +55 °C<br>+45 °C to +55 °C only with additional sun protection shield |
| Storage temperature range | –40 °C to +80 °C |
| Humidity | 95 % cyclic test, +25 °C/+40 °C |
| Protection class | IP55 |
| Vibration<br>Sinusoidal<br>Random<br>Shock | <br>5 Hz to 150 Hz<br>10 Hz to 500 Hz<br>40 g shock spectrum |
| EMC | CISPR 11, group 1, class B<br>compliant with EU EMC guideline (89/336/EEC) and German EMC laws |
| Quality standard | ISO 9001 |
| MTBF | 21 500 h |
| Power supply<br>AC<br>DC<br>Power consumption | <br>100 V AC to 240 V AC, 50 Hz to 60 Hz<br>10 V DC to 32 V DC<br>typ. 25 VA (0 °C to +55 °C ambient air temperature)<br>max. 100 VA (incl. heating when temperature falls below 0 °C) |
| Dimensions, system unit (W × H × D) | 380 mm × 530 mm × 240 mm |
| Weight, system unit (box) | 15 kg |

## Ordering information

| Order designation | Type | Order No. |
|---|---|---|
| Monitoring System | R&S®UMS 100 | 3030.3013.02 |
| **Options** | | |
| Frequency Range Extension 0.1 MHz to 20 MHz (incl. wide frequency range antenna) | R&S®UMS 100HF | 3030.3020.02 |
| Frequency Range Extension 1.3 GHz to 6 GHz (incl. 1.3 GHz to 6 GHz antenna and boom) | R&S®UMS 100SHF | 3030.3036.02 |
| Control Software (incl. hardlock) | R&S®ARGUS-UMS | 3034.0090.02 |



More information at
www.rohde-schwarz.com
(search term: UMS100)

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