

Version  
01.00December  
2006

## R&S® UMS120 Monitoring System

Modular monitoring system from 100 kHz to 6 GHz

The R&S® UMS120 is a new member of the R&S® UMS family. Its components and antennas can be combined as desired to yield a system optimized to the customer's requirements.

- ◆ Integration into standard or customized cabinets as appropriate for environmental conditions to suit any desired indoor and outdoor application
- ◆ Module-based configuration of desired frequency range in four stages (from 100 kHz to 6 GHz)
- ◆ Remote control via LAN interface or mobile radio network
- ◆ Optional integration of different communications modules ex factory for control of system via mobile radio networks (GSM, CDMA, etc)
- ◆ Support of various Rohde & Schwarz monitoring antennas (passive, active, horizontal and vertical polarization)
- ◆ Universal DC and AC power supply concept with low current consumption
- ◆ Easy integration into R&S® ARGUS radiomonitoring systems

**ROHDE & SCHWARZ**

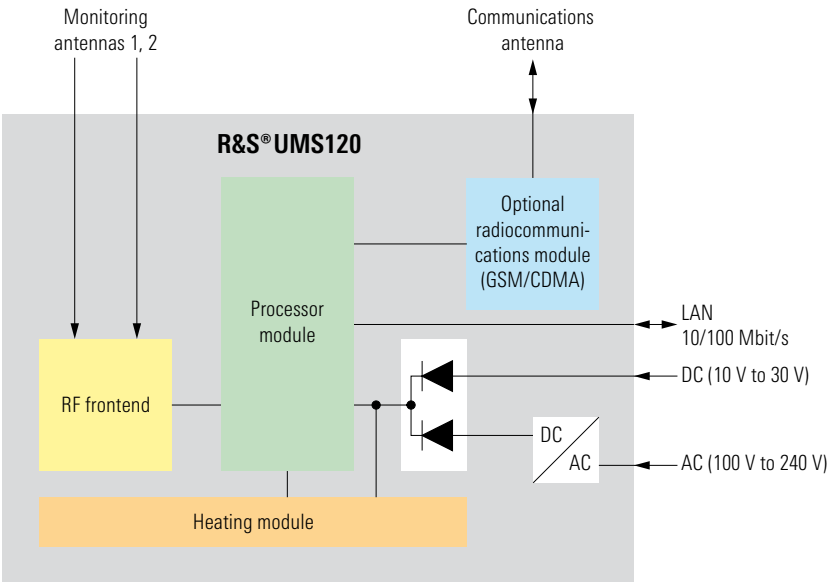


### Design

All system components are accommodated in a closed box. A lockable door on the front of the box provides access to the fuses and the SIM card slot. The sockets for connecting external components are provided on the bottom; these include sockets for two receiving antennas, one communications antenna, an Ethernet LAN, DC and AC power supply input, protective ground and DC output. The DC output socket allows the connection of active antennas via an optional DC feed.

### Typical applications

- ◆ Radiomonitoring of large areas with an appropriate number of R&S® UMS120 systems (e.g. national borders, coastlines, harbors, military exercise areas, large industrial areas, etc)
- ◆ Detection of new (illegal) signals that may impair sensitive communications and radiolocation systems (e.g. around airports)
- ◆ Monitoring of licensed transmitter systems for compliance with operating parameters (even in the immediate vicinity of transmitters)
- ◆ Monitoring of rooms and buildings to detect the use of illegal transmitters (e.g. airports, hospitals)
- ◆ Mobile search for new signals and monitoring of existing signals with the R&S® UMS120 integrated in vehicles



## Installation

The R&S®UMS120 box can be installed in any type of protective cabinet, e.g. to shield the system against adverse weather conditions. For this purpose, four mounting holes are provided on the rear of the box. The protective cabinet offered by Rohde&Schwarz allows the monitoring system to be used in a temperature range from  $-40^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$  in the shade (or to  $+55^{\circ}\text{C}$  with an appropriate sunshield). If customized cabinets are used, further user-specific temperature and environmental conditions can be met.

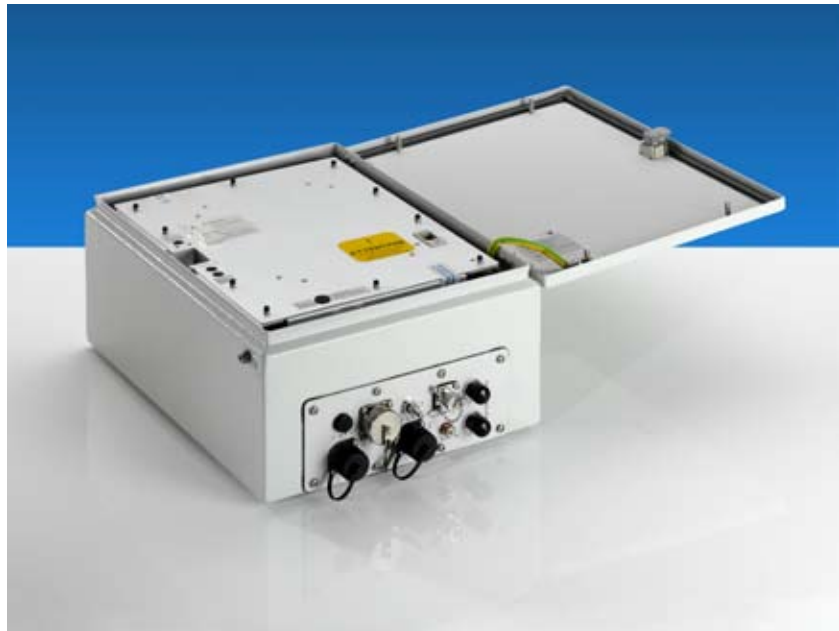
A wide variety of custom-tailored configurations can be implemented using the accessory components available from Rohde&Schwarz, including a base mast with a tripod, an antenna boom, sets of cables of different lengths for connecting antennas, as well as a complete set of installation material for attaching the R&S®UMS120 to a mast or a wall.

## Functional description

The main components of the system are the RF frontend with a signal preprocessing unit and the processor module with an embedded operating system.

The RF frontend, which is provided with two antenna inputs, processes the received signals, demodulates them if necessary and routes them on to the processor module.

The processor module is equipped with the required interfaces and a micro-processor. Special firmware allows the R&S®UMS120 to be remote-controlled from an external PC on which the R&S®ARGUS-UMS software must be in-



stalled. The R&S®ARGUS-UMS software has been specially adapted to match the functionality and applications of the R&S®UMS120 monitoring system. Of course, the standard R&S®ARGUS software can also be used to control the R&S®UMS120 and other devices if the appropriate software options are installed.

A data link to the R&S®UMS120 can be established via the integrated LAN interface or, in wireless operation, via a radio module<sup>1)</sup> enabling communications with mobile phone networks.

The advantages of the integrated processor module 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,

<sup>1)</sup> Optionally available ex factory for different standards (GSM, CDMA, etc).

the connection can be terminated, and the R&S®UMS120 will automatically perform the measurements from start to finish. This reduces costs for network communications.

Results are saved to the processor module and can be retrieved as required by setting up the radio link again. A permanent connection during the measurements is thus not necessary.

## Power supply

The R&S®UMS120 features a universal power supply concept that allows the system to operate on AC (100 V to 240 V) as well as DC supply voltages (10 V to 30 V). The two power supplies can also be connected in parallel, enabling uninterrupted system operation in the event of a failure of the primary supply.

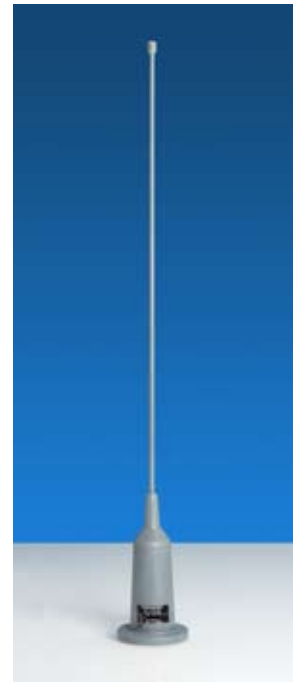
Special emphasis was placed on minimum power consumption. For ambient temperatures above  $0^{\circ}\text{C}$ , power consumption is as low as approx. 25 W. Additional power is needed only at very low temperatures for heating the system.

## System configuration

For many applications, a single antenna will be sufficient. The full frequency range of 100 kHz to 6 GHz can be covered by connecting a second antenna.

The R&S®UMS120 is preconfigured for operation with Rohde & Schwarz monitoring antennas. Passive and active antennas (with DC feed) of horizontal and vertical polarization can be used, e.g.:

| Type          | Frequency range                       | Application                                   |
|---------------|---------------------------------------|---|
| R&S®UMS12-H11 | 100 kHz to 1.3 GHz                    | vertically polarized                          |
| R&S®UMS12-H12 | 20 MHz to 1.3 GHz                     | vertically polarized                          |
| R&S®UMS12-H13 | 1 GHz to 6 GHz                        | vertically polarized                          |
| R&S®HE010     | 10 kHz to 80 MHz                      | active, vertically polarized                  |
| R&S®HE016     | 10 kHz to 80 MHz<br>600 kHz to 40 MHz | active, vertically and horizontally polarized |
| R&S®HK309     | 20 MHz to 1.3 GHz                     | vertically polarized                          |
| R&S®HE309     | 20 MHz to 1.3 GHz                     | active, vertically polarized                  |
| R&S®HK314A1   | 20 MHz to 500 MHz                     | horizontally polarized                        |
| R&S®HF214     | 500 MHz to 1.3 GHz                    | horizontally polarized                        |
| R&S®HF902     | 1 GHz to 3 GHz                        | horizontally and vertically polarized         |
| R&S®HE500     | 20 MHz to 3 GHz                       | active, vertically polarized                  |
| R&S®HL033     | 80 MHz to 2 GHz                       | linearly polarized                            |
| R&S®HL040     | 400 MHz to 3 GHz                      | linearly polarized                            |
| R&S®HL024A1   | 1 GHz to 18 GHz                       | horizontally and vertically polarized         |



Antennas from other manufacturers can also be used. In this case, however, only voltage levels will be displayed; field strengths will not be shown.

*Various monitoring antennas from Rohde & Schwarz (small photos)*



*Configuration with passive antennas from the R&S® UMS family*

## Operation

The R&S®UMS120 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.

R&S®ARGUS-UMS control software is based on R&S®ARGUS spectrum monitoring software, 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®UMS120 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®UMS120

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.

R&S®ARGUS-UMS control software therefore comes with innovative alarm handling, providing either automatic message-receiving from the R&S®UMS120 or – if preferred – a configurable polling function that cyclically queries the R&S®UMS120 for alarms.

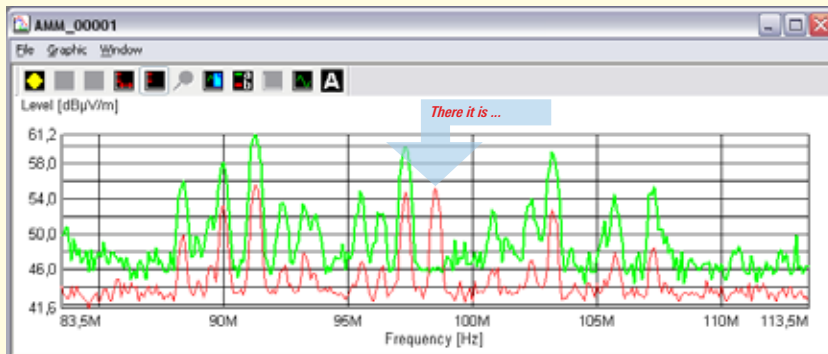
The measurement results can be displayed as tables as well as graphs, and all data can be saved for later evaluation and analysis. Dedicated workflows

for the various measurement tasks are available.

Not every ideal receiving site has a fixed-line interface for data transmission. Linking the R&S®UMS120 via a mobile radio network by means of an optional module (e.g. for GSM) may therefore be the optimum solution.

For many applications, the user merely has to send a measurement task to the R&S®UMS120. Sending can be performed in wireless operation via a mobile phone network connection. The measurements will then be performed by the R&S®UMS120, and the results can be retrieved later – again simply by means of GSM, etc.

The R&S®UMS120 has been designed as a very efficient, compact, robust, stand-alone monitoring system. It reliably detects signals with a minimum duration of typ. 1 s to 2 s. 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 for R&S®UMS120

|                          |   |
|--------------------------|---|
| <b>R&amp;S®UMS12-H11</b> | 100 kHz to 1.3 GHz, passive monopole antenna, omnidirectional characteristic, vertical polarization |
| Dimensions (W × H × D)   | 300 mm × 1900 mm × 100 mm   |
| Weight                   | ≤1.5 kg   |
| <b>R&amp;S®UMS12-H12</b> | 20 MHz to 1.3 GHz, passive discone antenna, omnidirectional characteristic, vertical polarization   |
| Dimensions (W × H × D)   | 850 mm × 1700 mm × 850 mm   |
| Weight                   | ≤1.4 kg   |
| <b>R&amp;S®UMS12-H13</b> | 1.3 GHz to 6 GHz, passive discone antenna, omnidirectional characteristic, vertical polarization    |
| Dimensions (W × H × D)   | 400 mm × 600 mm × 600 mm  |
| Weight                   | ≤1.1 kg   |

### System data

|                              |  |
|------------------------------|--|
| Frequency                    | only adjacent or overlapping ranges can be combined  |
| Frequency range 1            | 100 kHz to 30 MHz  |
| Frequency range 2            | 20 MHz to 1.3 GHz  |
| Frequency range 3            | 1 GHz to 3 GHz   |
| Frequency range 4            | 3 GHz to 6 GHz   |
| Tuning resolution            | 1 Hz   |
| Tuning error                 | 1 ppm per year   |
| RF input                     | 50 Ω, nominal  |
| VSWR                         | ≤2.5   |
| Second order intercept (SOI) | ≥180 dBμV (with attenuation)   |
| Third-order intercept (TOI)  | ≥150 dBμV (with attenuation)   |
| IF bandwidths                | 100/300 Hz, 1/3/10/30/100/200 kHz, 300 kHz, 1 MHz  |
| Sensitivity                  | ≤−10 dBμV (100 kHz to 20 MHz)<br>≤−5 dBμV (20 MHz to 6 GHz)<br>(with MGC = +15 dB and 100 Hz IF bandwidth) |
| IF rejection                 | 80 dB  |
| Image frequency rejection    | 80 dB  |
| Scan speed                   | max. 500 channels/s  |
| Level measurement error      | ≤1.5 dB, typ. 0.5 dB   |
| Level measurement resolution | 0.1 dB   |
| Demodulation                 | AM, FM   |
| AGC range                    | ≤45 dB   |
| Data transmission bandwidth  |  |
| LAN                          | 10/100 Mbit/s (physical)   |
| GSM                          | up to 9 600 bit/s (physical), depending on network   |
| CDMA                         | up to 14 400 bit/s (physical), depending on network  |
| Audio output                 | line-out socket on control PC (requires R&S®ARGUS-UMS software)  |

### Interfaces

|                                      |   |
|--------------------------------------|---|
| Two antenna inputs                   | N socket, 50 Ω  |
| Connector for communications antenna | GSM 900/1800, GSM 850/1900, CDMA 800/1900, N socket                       |
| LAN connector                        | Ethernet, RJ-45 socket  |
| DC input                             | 7-contact circular plug   |
| AC input                             | 4-contact circular plug   |
| DC output                            | 24 V, 0.5 A (for antenna supply via max. two R&S®ARGUS-UMS12-H6 DC feeds) |

### Accessories

|                     |   |
|---------------------|---|
| DC feed for antenna | 100 kHz to 3 GHz, RF insertion loss 0.1 dB, DC voltage 24 V/0.5 A, 2 × N socket (including 0.4 m cable with system plug for DC output and N plug to N plug adapter) |
|---------------------|---|

### General data

|                                       |   |
|---------------------------------------|---|
| Remote control connection             | via Ethernet/LAN or mobile phone network module (option)  |
| Operation                             | via control PC (with R&S®ARGUS-UMS/R&S®ARGUS software)  |
| Operating temperature range           | −30 °C to +40 °C (no exposure to direct sunlight)   |
| With R&S®UMS12-B1 all-weather cabinet | −40 °C to +55 °C (no exposure to direct sunlight)   |
| Storage temperature range             | −40 °C to +80 °C  |
| Relative humidity                     | 95 % cyclic test, at +25 °C/+40 °C  |
| Degree of protection                  | IP54  |
| Vibration, sinusoidal                 | 5 Hz to 150 Hz  |
| Vibration, random                     | 10 Hz to 500 Hz   |
| Shock                                 | 40 g shock spectrum   |
| EMC                                   | ETSI EN 301 489-1, ETSI EN 301 489-22, EN 55022.Class B, EN 300 339 – cabinet radiation only (in line with R & TTE 1999/5/EC Directive) |
| Electrical safety                     | EN 61010 (in line with 73/23/EC Low-Voltage Directive)  |
| MTBF                                  | 21 500 h  |
| Power supply                          |   |
| AC supply                             | 100 V to 240 V AC, 50 Hz to 60 Hz   |
| DC supply                             | 10 V to 30 V DC   |
| Current consumption                   | typ. 25 VA/25 W (at ambient temperature ≥0 °C)<br>max. 200 VA/125 W (including heating at ambient temperature <0 °C)                    |
| Dimensions (W × H × D)                | 300 mm × 445 mm × 175 mm (including connectors)   |
| Weight                                | 8 kg  |
| With R&S®UMS12-B1 option              | 12.2 kg   |

## Ordering information

| Designation   | Type          | Order No.    |
|---|---------------|--------------|
| Monitoring System (lockable)  | R&S®UMS120    | 3035.1025K02 |
| Operating Software for external PC (including hardlock)   | R&S®ARGUS-UMS | 3034.0090.02 |
| <b>Software options</b>   |               |              |
| (only adjacent or overlapping frequency ranges can be combined)                                       |               |              |
| Frequency Range 100 kHz to 30 MHz   | R&S®UMS12-B21 | 3035.1102.02 |
| Frequency Range 20 MHz to 1.3 GHz   | R&S®UMS12-B22 | 3035.1119.02 |
| Frequency Range 1 GHz to 3 GHz  | R&S®UMS12-B23 | 3035.1125.02 |
| Frequency Range 3 GHz to 6 GHz  | R&S®UMS12-B24 | 3035.1131.02 |
| <b>Communications modules (options)</b>   |               |              |
| (only ex factory with delivery of R&S®UMS120)   |               |              |
| GSM 900/1800  | R&S®UMS12-B11 | 3035.1060.02 |
| GSM 850/1900  | R&S®UMS12-B12 | 3035.1077.02 |
| CDMA 800/1900   | R&S®UMS12-B13 | 3035.1083.02 |
| <b>Antennas</b>   |               |              |
| HF Wideband Antenna (100 kHz to 1.3 GHz)  | R&S®UMS12-H11 | 3035.1225.02 |
| VHF/UHF Antenna (20 MHz to 1.3 GHz)   | R&S®UMS12-H12 | 3035.1231.02 |
| SHF Antenna (1 GHz to 6 GHz)  | R&S®UMS12-H13 | 3035.1248.02 |
| For further antennas, see Rohde & Schwarz antenna catalog, PD 0758.0368.42                            |               |              |
| <b>Accessories</b>  |               |              |
| All-Weather Cabinet for R&S®UMS120 (including mast-/wall-mounting kit) (lockable)                     | R&S®UMS12-B1  | 3035.1048.02 |
| Base Mast with tripod (height 1.7 m)  | R&S®UMS12-H1  | 3035.1154.02 |
| Boom for supporting two antennas R&S®UMS12-H11 to -H13 or two mounting brackets R&S®UMS12-H31 to -H35 | R&S®UMS12-H2  | 3035.1160.02 |
| Grounding Kit for R&S®UMS120  | R&S®UMS12-H3  | 3035.1177.02 |
| Tool Kit  | R&S®UMS12-H4  | 3035.1183.02 |
| Manual, printed version   | R&S®UMS12-H5  | 3035.1190.02 |
| DC Feed for active antennas   | R&S®UMS12-H6  | 3035.1202.02 |
| Type R&S®EF400 Antenna Cable, 3.5 m (2 × N plug)  | R&S®UMS12-H21 | 3035.1260.02 |
| Type R&S®EF400 Antenna Cable, 3.5 m (1 × N plug, 1 × SMA plug)  | R&S®UMS12-H22 | 3035.1277.02 |
| Type R&S®RG214 Antenna Cable, 5 m (2 × N plug)  | R&S®UMS12-H23 | 3035.1283.02 |
| Type R&S®RG214 Antenna Cable, 10 m (2 × N plug)   | R&S®UMS12-H24 | 3035.1290.02 |
| Type R&S®RG214 Antenna Cable, 15 m (2 × N plug)   | R&S®UMS12-H25 | 3035.1302.02 |
| Type R&S®RG214 Antenna Cable, 20 m (2 × N plug)   | R&S®UMS12-H26 | 3035.1319.02 |
| Mounting Bracket for attaching R&S®HE010 to base mast/boom  | R&S®UMS12-H31 | 3035.1331.02 |
| Mounting Bracket for attaching R&S®HE500 to base mast/boom  | R&S®UMS12-H32 | 3035.1348.02 |
| Mounting Bracket for attaching R&S®HL033 to base mast/boom  | R&S®UMS12-H33 | 3035.1354.02 |
| Mounting Bracket for attaching R&S®HL040 to base mast/boom  | R&S®UMS12-H34 | 3035.1360.02 |
| Mounting Bracket for attaching R&S®HL024A1 to base mast/boom  | R&S®UMS12-H35 | 3035.1377.02 |



More information at  
[www.rohde-schwarz.com](http://www.rohde-schwarz.com)  
(search term: UMS120)



[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

Rohde & Schwarz GmbH & Co. KG · Mühlhofstraße 15 · 81671 München · Germany · P.O.B. 801469 · 81614 München · Germany · Tel. +49 89 4129-0  
UMS Support: Tel. +49 89 4129-12194 · E-mail: [UMS.Support@rohde-schwarz.com](mailto:UMS.Support@rohde-schwarz.com) · Web: [www.ums.rohde-schwarz.com](http://www.ums.rohde-schwarz.com)