

R&S® UMS400 UNIVERSAL MONITORING SYSTEM

Outdoor spectrum monitoring and
radiolocation solution



Product Brochure
Version 02.00

ROHDE & SCHWARZ

Make ideas real



AT A GLANCE

The R&S®UMS400 universal monitoring system can be used for spectrum monitoring and radiolocation from 8 kHz to 8 GHz and can be extended up to 20 GHz with the R&S®CS-MC20 microwave converter. The compact outdoor housing allows a wide range of use cases, including event monitoring and temporary missions in remote areas.

The ever-increasing frequency range of wireless communications services calls for monitoring stations up to 8 GHz, in some cases even up to 20 GHz. Typically, this requires a monitoring sensor installed close to the antenna(s) in order to keep cable losses as low as possible for highest sensitivity. This is possible for both the R&S®UMS400 and R&S®CS-MC20, thanks to an outdoor housing.

Its compact size and low power consumption make the R&S®UMS400 ideal for temporary missions such as event monitoring and radiolocation of sporadic interferers.

In addition, the R&S®UMS400 can be installed in remote controlled fixed monitoring stations or in mobile monitoring stations. Various Rohde&Schwarz monitoring and single-channel DF antennas are supported.

The R&S®UMS400 supports signal measurements in line with ITU Recommendations and can be integrated into monitoring systems running the R&S®ARGUS spectrum monitoring software or other control software easily thanks to its open interface.

The R&S®UMS400 supports the time difference of arrival (TDOA) and angle of arrival (AoA) radiolocation as option.

KEY FACTS

- ▶ Frequency range from 8 kHz to 8 GHz for monitoring and TDOA (up to 20 GHz as option)
- ▶ Frequency range from 20 MHz to 8 GHz for AoA (depending on DF antenna)
- ▶ Compact outdoor housing with integrated computer, hard disk and wireless connectivity
- ▶ Monitoring and streaming of I/Q data (optional) with a real-time bandwidth of 40 MHz
- ▶ Measurements in line with ITU Recommendations as option

TYPICAL APPLICATIONS

Spectrum monitoring

Fixed and mobile spectrum monitoring and radiolocation

Spectrum monitoring helps verify compliance with licenses, regulations and communications standards and facilitates network management and planning. The R&S®UMS400 universal monitoring system in combination with Rohde&Schwarz monitoring and direction-finding antennas is the basis for fixed and mobile spectrum monitoring stations. With R&S®ARGUS spectrum monitoring software, several stations equipped with the R&S®UMS400 can be networked for radiolocation and other monitoring tasks such as automated detection, identification and localization of interfering signals and unlicensed emissions. In addition, the R&S®UMS400 supports the measurement of signals in line with ITU Recommendations.



Fixed monitoring station with the R&S®UMS400 and the R&S®HE600 active receiving antenna

Spectrum monitoring at major events

During large scale events such as the Olympic Games, radiocommunications equipment use is restricted inside the event area and requires a special license to avoid radio frequency interference. This requires the temporary installation monitoring stations in the event area. The compact outdoor housing of the R&S®UMS400 allows for easy installation on existing lamp posts. Wireless connectivity allows for easy networking between multiple R&S®UMS400 systems for radiolocation.

Radiolocation of sporadic emissions

The R&S®UMS400 supports radiolocation of sporadic interference or short radio message sources. Multiple transportable monitoring stations based on the R&S®UMS400 are deployed temporarily on hills or the roofs of tall buildings. Measurement starts automatically and an alarm is triggered when the emission of interest starts. Thanks to its low power consumption, monitoring stations based on the R&S®UMS400 can be operated with the R&S®CS-BAT battery kit.

Communications intelligence (COMINT) and communications electronic support measures (CESM)

Full scale tactical operations

Mobile tactical electronic warfare (EW) vehicles are essential to modern land operations and most are now fully integrated into a battlegroup panel of ISR sensors. The R&S®UMS400 is a good fit for platform systems as a core COMINT constituent due to brilliant ratio performance/SWAP. The combination of AoA/TDOA direction finding capabilities also matches different operational use cases, making it indispensable for actionable intelligence for situational awareness and participation to larger ISR multi-sensor missions.

Operations focusing on force protection

Force protection is a constant concern for commanders in theaters of operations. An ESM system based on the R&S®UMS400 has key monitoring and localization advantages, including protection for different-sized static areas (MOB, FOB, COP) or convoy protection during tactical movement. Warning of threats to a force is essential to situational awareness, individually and collectively, when deployed in unknown situations and complex environments.

Small scale emitter hunting operations

Small scale EW operations include emitter hunting missions and long-term monitoring missions close to targets, with light EW teams, embarked or disembarked. Carried out often in isolation or out of EW reachback, in harsh environments; these missions require equipment that offer autonomy, reliability and ruggedization. The R&S®UMS 400 operational concept synthesizes demanding EW tactical requirements and RF performance.



Transportable monitoring station with the R&S®UMS400 and the R&S®ADD307 collapsible VHF/UHF DF antenna with accessories

FEATURES

Frequency extension up to 20 GHz

The frequency range of the R&S®UMS400 can be extended up to 20 GHz with the R&S®CS-MC20 microwave converter. The compact outdoor housing means the R&S®CS-MC20 can be installed together with the R&S®UMS400 using the R&S®CS-OMK outdoor mounting kit.

Detection of short burst emissions and covered signals

The R&S®UMS400 offers rapid spectrum scans with the R&S®CS-PS panorama scan option. In panorama scan mode, fast overlapping FFT ensures reliable detection of even shortest burst emissions.

With the R&S®CS-PC polychrome display option, the R&S®UMS400 can separate superimposed, pulsed signals that cannot be differentiated with conventional methods such as spectrum, waterfall and the max. hold detector. To detect such pulsed interferers in a complex signal scenario, the frequency of the signal level occurrence is color-coded in the spectrum. The waterfall display can track changes in signal variation over time adding another dimension to characterize the signal.

Signal measurements in line with ITU Recommendations

The table shows all signal parameters that can be measured with the R&S®UMS400 and its respective options:

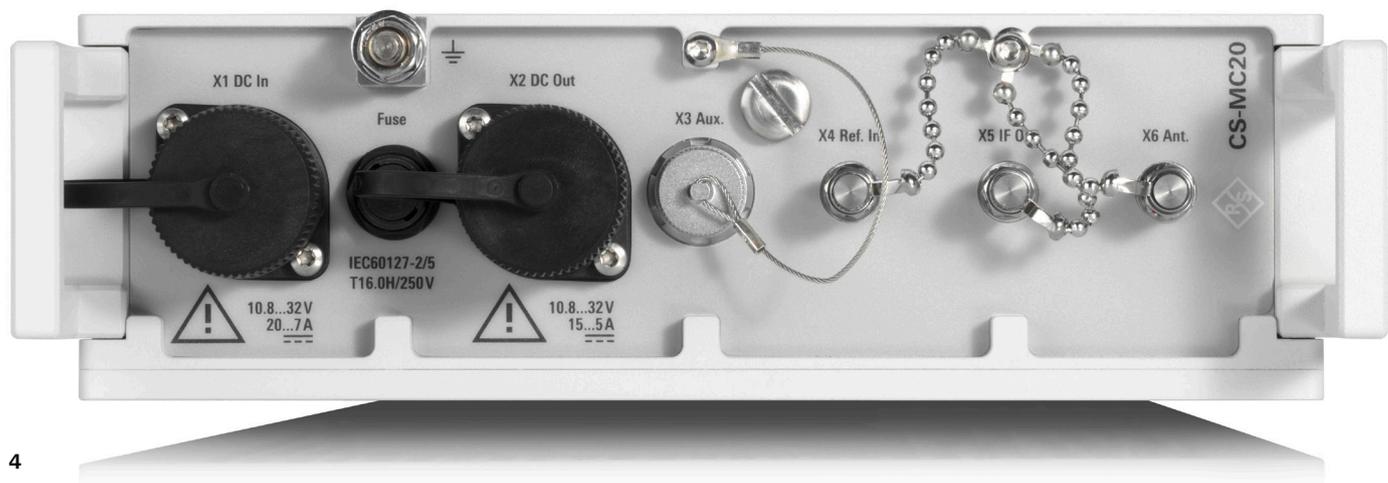
Support of radiolocation

The R&S®UMS400 and the R&S®CS-TSA timestamp accuracy option support accurate radiolocation with the time difference on arrival (TDOA) method in combination with R&S®ARGUS spectrum monitoring software.

The R&S®UMS400 can be upgraded to direction finding (DF) with the R&S®CS-DF direction finding option in combination with an Rohde&Schwarz DF antenna. The following Rohde&Schwarz DF antennas are supported: R&S®ADD107, R&S®ADD207(P), R&S®ADD307 and R&S®ADD317.

Parameter	Reference	Required option
Field strength	In line with Recommendation ITU-R SM.378-7	R&S®CS-FS
Frequency and frequency offset	In line with Recommendation ITU-R SM.377-4	R&S®CS-TSA and R&S®CS-ZNAV
Bandwidth (x dB and ß% methods)	In line with Recommendation ITU-R SM.328-11 and SM.443-4, and the ITU Handbook on Spectrum Monitoring, edition 2010, chapter 4.5	R&S®CS-SPM
AM modulation depth, FM frequency deviation and PM phase deviation	In line with the ITU Handbook on Spectrum Monitoring, edition 2010, chapter 4.6	R&S®CS-MM
Channel power measurement	n.a.	R&S®CS-SPM

R&S®CS-MC20 microwave converter



Wireless remote control and autonomous operation

The R&S®UMS400 can be equipped with a wireless modem for remote control. Two different wireless modems are available:

- ▶ R&S®CS-UM2 wireless modem for LTE-TDD, LTE-FDD and HSPA+ support
- ▶ R&S®CS-UM3 wireless modem for LTE-TDD, LTE-FDD, HSPA+ and T-SCDMA support

The R&S®UMS400 can be powered by the R&S®CS-BAT battery pack for several hours of autonomous operation (the exact operating time depends on the type of antenna(s) connected).

Integrated antenna switch

The R&S®UMS400 features an antenna switch for two monitoring antennas. Both antenna connectors can be equipped with an R&S®CS-UDC DC feed to directly support active antennas.

When used with the R&S®CS-MC20 microwave downconverter is used, it occupies one of the antenna connectors.

One Rohde&Schwarz DF antenna can be connected to the R&S®UMS400 directly. The R&S®CS-YCS DF antenna adapter can have two R&S®ADDx07 compact DF antennas connected to the R&S®UMS400. If an antenna connector is used for a DF antenna, the R&S®CS-UDC DC feed cannot be used for this connector.

Measurement in frequency and time domain

When combined with the R&S®CS-ZS zero span option, the R&S®UMS400 can visualize the behavior of a signal versus time. This is especially useful when displaying time-slots for a TDMA based transmission system. It reveals the time-dependent behavior of any signal and enables observation of individual pulses for a digital signal.

I/Q snapshot recording

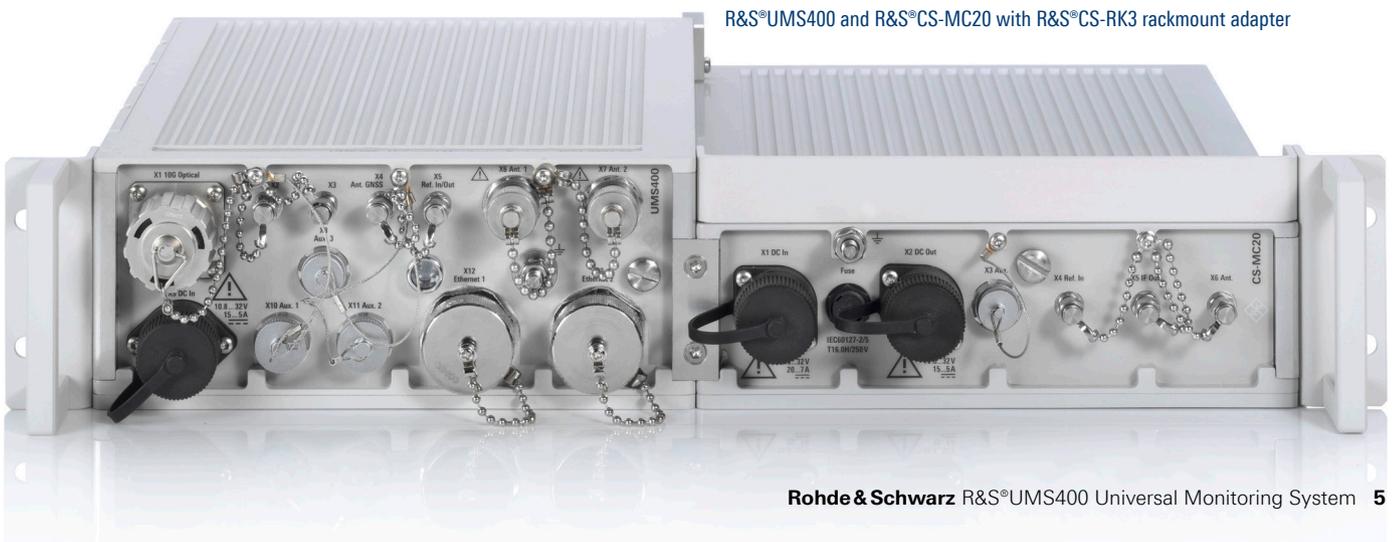
The R&S®CS-IQ I/Q snapshot recording option supports the recording of digital I/Q data up to 40 MHz real-time bandwidth on the internal memory of the R&S®UMS400. A wide range of user-definable trigger conditions is available to start a recording. These include triggering via the AUX 2 port (caused by events such as gate, positive/negative edge) and a control software defined level trigger.

Linux operating system version

The R&S®UMS400 comes in two different models depending on the operating system:

- ▶ Model .02: R&S®UMS400 with pre-installed Windows operating system (suitable for R&S®ARGUS spectrum monitoring software and R&S®RAMON radiomonitoring software)
- ▶ Model .03: R&S®UMS400 with pre-installed Linux operating system (optimized for system integrators with their own control software)

For demanding software applications, the random-access memory of the integrated PC can be upgraded to 16 Gbyte with the R&S®CS-U16G 16 Gbyte DRAM upgrade option.



R&S®UMS400 and R&S®CS-MC20 with R&S®CS-RK3 rackmount adapter

SPECIFICATIONS IN BRIEF

Specifications in brief

Frequency range	monitoring and TDOA	8 kHz to 8 GHz
	monitoring with R&S [®] CS-MC20 microwave converter	8 kHz to 20 GHz
Real-time bandwidth	direction finding (AoA)	20 MHz to 8 GHz
	in VHF/UHF/SHF range	40 MHz
Power consumption	R&S [®] UMS400, with heater turned off	40 W (meas.)
	R&S [®] UMS400, with heater turned on	100 W (meas.)
	R&S [®] CS-MC20, with heater turned on	15 W (meas.)
Protection class	R&S [®] UMS400 and R&S [®] CS-MC20	IP65 and IP67
Dimensions (W × H × D)	R&S [®] UMS400	approx. 227 mm × 88 mm × 341 mm (8.9 in × 3.5 in × 13.4 in)
	R&S [®] CS-MC20	approx. 227 mm × 65 mm × 366 mm (8.9 in × 2.6 in × 14.4 in)
Weight	R&S [®] UMS400	approx. 8.5 kg (18.7 lb)
	R&S [®] CS-MC20	approx. 4 kg (8.8 lb)

ORDERING INFORMATION

Designation	Type	Order No.
Base unit		
Universal monitoring system, with Windows operating system	R&S®UMS400	4501.9001.02
Universal monitoring system, with Linux operating system	R&S®UMS400	4501.9001.03
Hardware options		
RAM extension (16 Gbyte DRAM upgrade)	R&S®CS-U16G	4502.0608.02
10G Ethernet interface	R&S®CS-U10G	4502.0508.02
DC feed for active antennas	R&S®CS-UDC	4502.0408.02
Software options		
Panorama scan	R&S®CS-PS	4500.7070.02
Polychrome spectrum	R&S®CS-PC	4500.7040.02
Timestamp accuracy	R&S®CS-TSA	4500.7170.02
Direction finding	R&S®CS-DF	4500.7370.02
Spectral measurement	R&S®CS-SPM	4500.7311.02
Modulation measurement	R&S®CS-MM	4500.7340.02
Field strength measurement	R&S®CS-FS	4500.7211.02
Time domain measurement	R&S®CS-ZS	4500.7111.02
Snapshot record and replay	R&S®CS-IO	4500.7270.02
Trace recording	R&S®CS-IR	4500.7240.02
Accessories		
Wireless modem, support of LTE-FDD, LTE-TDD and HSPA+	R&S®CS-UM2	4502.0308.02
Wireless modem, support of LTE-FDD, LTE-TDD, HSPA+ and TD-SCDMA	R&S®CS-UM3	4502.0308.03
Microwave converter 20 GHz	R&S®CS-MC20	4502.4503.02
Outdoor mounting kit, for R&S®UMS400 with R&S®CS-MC20 and R&S®CS-BAT	R&S®CS-OMK	4502.0720.02
Mast stand, for R&S®UMS400	R&S®UMS12-H1	3035.1154.02
Rackmount adapter, for a single R&S®UMS400	R&S®CS-RK1	4502.1156.00
Rackmount adapter, for two R&S®UMS400 side-by-side	R&S®CS-RK2	4502.1210.00
Rackmount adapter, for R&S®UMS400 with R&S®CS-MC20	R&S®CS-RK3	4502.1256.00
Rackmount adapter, for R&S®EM200 with R&S®CS-MC20	R&S®CS-RK4	4502.1327.00
DF antenna cable set, for mast and tripod installation, length: 10 m	R&S®CS-CM10	4502.1640.00
DF antenna cable set, for mast and tripod installation, length: 5 m	R&S®CS-CM5	4502.1633.00
DF antenna cable set, for vehicle installation, length: 5 m	R&S®CS-CV5	4502.1627.00
Battery supply set, including battery (BB2590/U), charger and cable	R&S®CS-BAT	4502.1656.00
DF antenna adapter cable, for R&S®UMS400, for connection of two compact DF antennas	R&S®CS-YCS	4502.1610.00
Antenna mounting kit, for R&S®HE600 or R&S®HF907OM, for mast installation	R&S®CS-AMK	4502.0837.00
Active GNSS antenna	R&S®CS-ZNAV	4500.7440.00
External mains adapter, for power supply of R&S®UMS400 and R&S®UMS300	R&S®UMS30-H1	3051.7799.02
Documentation		
Documentation of calibration results	R&S®CS-DCV	4500.7011.02
Service options		
Extended warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty, three years	R&S®WE3	
Extended warranty, four years	R&S®WE4	

Service that adds value

- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

Rohde & Schwarz

The Rohde&Schwarz technology group is among the trail-blazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks&cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

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