R&S®M3TR
Software Defined Radios
Multiband, Multimode, Multirole Radio Family for Tactical Applications

7 Years of Driving Innovation

ROHDE&SCHWARZ

Secure Communications

Product Brochure | 03.00

Content

R&S®M3TR Software Defined Radios

A new generation of high-performance digital radios

The challenge

Today's military missions are characterized by joint operations of multinational armed forces. Interoperability of the equipment, especially in the field of communications, is therefore the primary objective of the international partners responsible for creating one of the most important aspects for efficient cooperation. The R&S®M3TR features maximum flexibility in terms of frequency bands and waveforms for practically all services and platforms.

The solution

The R&S®M3TR software defined radio family is a new generation of high-performance digital radios. It represents a revolutionary change, both technically and economically, in the tactical communications sector. The heart of the new integrated communications system is the lightweight R&S®MR300xH/U manpack transceiver (1.5 MHz to 108 MHz or 25 MHz to 512 MHz), which offers solutions for all aspects of tactical communications as well as uniform and reduced interservice logistics. A lightweight handheld version (R&S®MR3000P) complements the radio family. Like the manpack radios, the R&S®MR3000P supports both open and secure communications modes.

R&S®MR300xH/U manpack radio.

R&S®M3TR Software Defined Radios

At a glance

Base units

- R&S®MR300xH advanced multiband tactical radio
- R&S®MR300xU advanced multiband tactical radio
- R&S®MR3000P VHF tactical handheld radio

Key features

- Multiband capability
- Multiwaveform capability
- High data rate of up to 72 kbit/s
- Software-configurable and upgradeable (P³I)
- Selective links in one net
- Low volume/weight
- Power-saving mode
- Removable front panel for flexible use and integration
- User-friendly HMI
  (single-knob control for basic operation)

Logistics and readiness

- Minimum volume and weight for drop-in replacement programs
- Maximum autonomy by strict power-saving management
- Built-in test down to module level
- Common logistics concept for reduced costs throughout life cycle
- Common human-machine interface (R&S®MR300xH/U)
- Less training required
- Excellent flexibility
- High MTBF

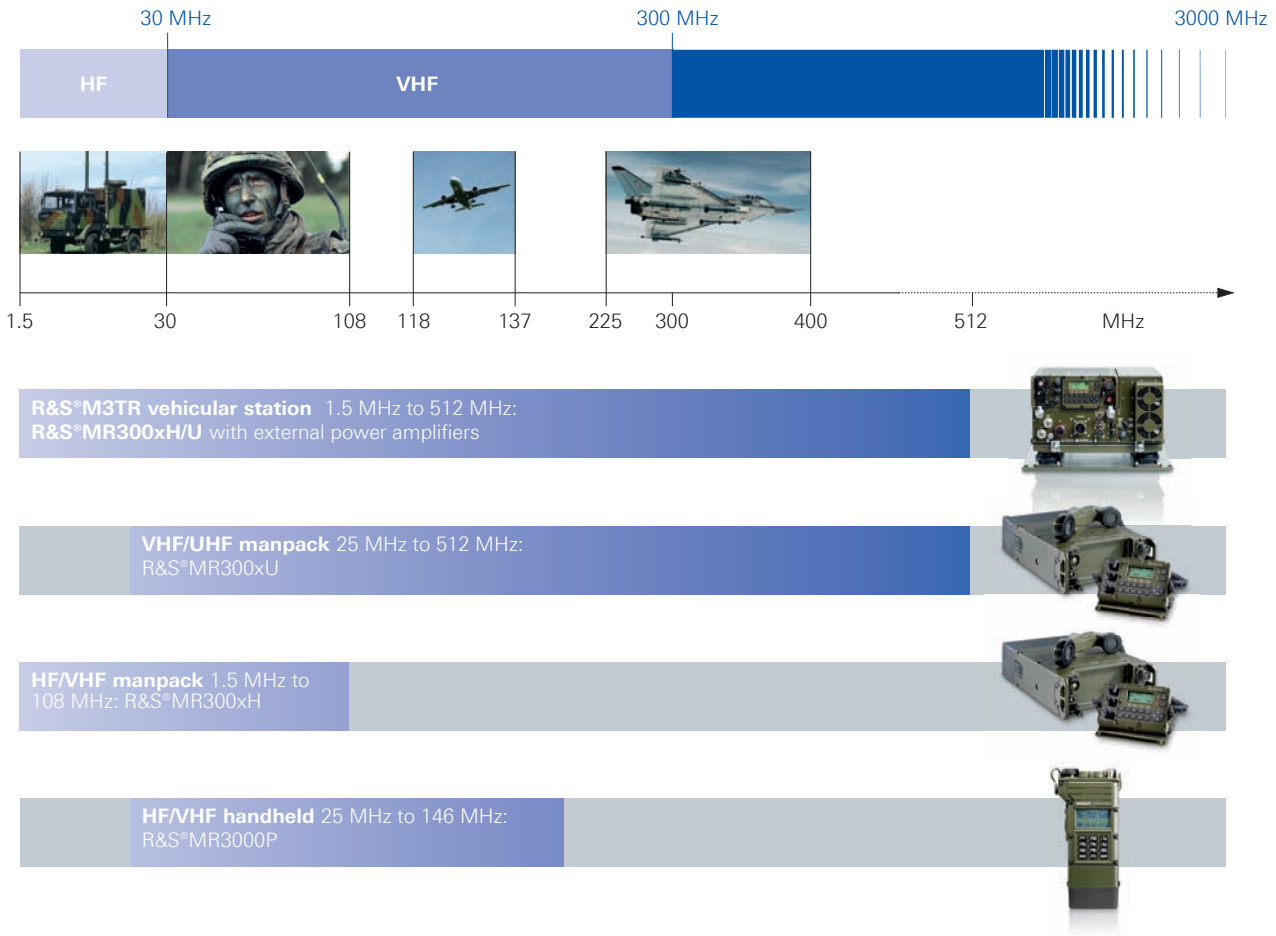
R&S®MR3000P handheld radio.

The three Ms

Multiband

For applications using various services and networks, different types of radio units were previously required. The R&S®M3TR covers the entire spectrum from the HF via the VHF to the UHF band, thus allowing interoperability as well as uniform and reduced interservice logistics. The frequency flexibility of the R&S®M3TR meets various national and international regulations, thus providing global operation in fast-changing missions and environments.

Multiband tactical radio family



Multimode

A software radio not only offers flexible network solutions but also integrates existing national or company standards into a single unit. Due to optimized protocols and waveforms, the R&S®M3TR attains maximum throughput rates for digital voice, data, video, and position location.

Available waveforms

BLOS

- 2nd generation (2G) ALE in line with FED-STD-1045/46/49
- 3nd generation (3G) ALE in line with STANAG 4538
- EPM (ECCM) in line with R&S®SECOM-H, full interoperability with R&S®M3SR Series 4100
- Modem waveforms in line with
  - STANAG 4539
  - STANAG 4285
- FF modulation in line with
  - AM, FM, SSB

LOS

- EPM (ECCM) in line with
  - R&S®SECOM-V
  - R&S®SECOM-P
  - R&S®SECOS 516 TDMA
  - HAVE QUICK I, II
- Modem waveforms
  - R&S®SECOM-V data, up to 16 kbit/s
  - VHF/UHF FF modem, up to 72 kbit/s

Security

- Embedded COMSEC, 256-bit key
- Compatible with various external COMSEC devices

Digital voice

- Vocoders adapted to mode of operation and bandwidth

Multirole

The multirole features of a software defined radio are mainly determined by its ease of integration into tactical communications networks. In addition to its use as a functional terminal in the individual subnet, e.g. CNR or PRN, it can also act as an interface between the various subnets. The R&S®M3TR can be used on diverse platforms and features interfaces to fixed networks such as WAN and LAN, as well as intelligent gateway and relay/rebroadcast functions such as routing of selective calls for subscribers inside/outside the home network.

R&S®MR300xH/U advanced multiband tactical radios

Brief description

The R&S®MR300x transceivers form a family of high-performance digital radios covering the HF, VHF/FM, and VHF/UHF bands. Owing to different high-speed data modes and protocols as well as different antijam modes for HF, VHF/FM, and VHF/UHF, they perfectly integrate into tactical communications networks.

The radios are software-configurable and reprogrammable, including preplanned product improvement (P³I). Manpacks of the R&S®M3TR family are based on one mechanical platform, with a common logistics concept and one human-machine interface (HMI).

Key features

- Multiband capability (1.5 MHz to 512 MHz with external devices)
- Multiwaveform capability
- Embedded EPM (ECCM) in line with R&S®SECOM-V/H/P
- High data rate of up to 72 kbit/s
- Software-configurable and upgradeable (P³I)
- Selective links in one net
- Low volume/weight
- Power-saving mode
- Integrated GPS and position report
- Removable front panel for flexible use and integration
- User-friendly HMI

R&S®MR3000P VHF tactical handheld radio

Brief description

The R&S®MR3000P is a small, lightweight, handheld radio that perfectly complements the R&S®M3TR family. Despite its compact size, the R&S®MR3000P has all the features required of a tactical radio. It provides reliable connections, even in topographically difficult terrain, and is suitable for flexible integration into tactical networks. Since the radio can interoperate with the R&S®M3TR, it enables continuous radiocommunications both within and between forces. The expanded frequency range of the handheld radio also supports interoperability. It covers not only tactical VHF but also parts of the HF and VHF aeronautical radio range.

Due to its jam-resistant digital waveform (R&S®SECOM-P), the R&S®MR3000P provides high-quality connections. Moreover, its transmit power of up to 5 W allows high ranges, even in difficult terrain. For network planning and configuration purposes, established R&S®M3TR tools such as R&S®RNMS3000 can be used. Seamless integration into tactical networks with R&S®M3TR fixed and vehicle stations as well as highly mobile forces is thus possible without any problem. The R&S®MR3000P features an integrated crypto module of the highest security level which provides protection for confidential messages.

Key features

- Multiband capability
- Embedded EPM (ECCM) in line with R&S®SECOM-P (frequency hopping and digital encryption)
- 5 W RF output power
- Secure transmission of voice, data, and short messages
- Selective call with sender authentication
- Interoperability with the R&S®M3TR family
- GPS position report

Configuration with external power amplifiers

The R&S®M3TR is designed to provide exceptional flexibility for networking services via RF networks on air. The transceivers can be used in portable, vehicular, and stationary applications including installations in movable containers and shelters. Their rugged hardware complies with the individual MIL-STDs dealing with environmental conditions. Shockmounts are provided for mobile use.

A wide range of antennas adapted to the various applications (portable, mobile, base station) is available. Radio functions can be remote-controlled by means of an RC unit.

Available frequency ranges and power levels versus configuration.

Covered frequency ranges and RF power for different configurations

Configuration			RF frequency in MHz/max. power		
			HF	Tactical VHF	ATC Air Defense
TRX	**HF external PA**	**VHF/UHF external PA**	**1.5 MHz to 29.9 MHz**	**30 MHz to 107.9 MHz**	**108 MHz to 511.9 MHz**
R&S®MR300xH			20 W [1]	10 W	[2]
R&S®MR300xH	•		150 W	10 W	[2]
R&S®MR300xH		•	20 W [1]	50 W	50 W
R&S®MR300xH	•	•	150 W	50 W	50 W
R&S®MR300xU			[2]	10 W	10 W
R&S®MR300xU	•		150 W	10 W	10 W
R&S®MR300xU		•	[2] [3]	50 W	50 W
R&S®MR300xU	•	•	150 W	50 W	50 W

[1] At 50 Ω.
[2] RX; TX: max. 1 mW.
[3] 10 W at 25 MHz to 30 MHz.

Configuration overview of vehicle/ command post station

This example of a radio station consists of the manpack transceiver with audio and data accessories, and two power amplifiers. Amplifiers are available as compact versions or as standalone units. A compact amplifier (R&S®VT3050C) also includes the frame for mechanically fastening a radio in a vehicular installation and can be equipped with options for connecting external audio distribution systems or field telephones. Standalone amplifiers are connected to a compact amplifier to further increase the usable frequency range of the system. Amplifiers increase output power up to 50 W in the VHF and UHF bands and up to 150 W or 500 W in the HF band.

If these power amplifiers are used, a single R&S®M3TR radio (R&S®MR300xH or R&S®MR300xU) spans the entire frequency range from 1.5 MHz to 512 MHz without any gaps.

Audio/data accessories

- Handsets/headsets
- Speakers
- Vehicle intercom
- Radio wire integration

VHF/UHF antennas

- VHF
- UHF
- Multiband

HF antennas

- Whip
- Wire
- NVIS

R&S®VT3050C VHF/UHF compact amplifier

R&S®VK3150 HF amplifier

R&S®FK3150 antenna coupler

Remote control

- RC units
- RC software

Data transmission/networking

- Tactical PC/PDA
- Message handling software
- Blue force tracking

Mission planning

- Fillguns
- Mission planner software
- Remote device loader software

Configuration overview of manpack radio

Audio accessories

- R&S®GA3001 handset
- R&S®GA3002 headset
- R&S®GA3003 microphone/speaker
- R&S®GA3005 loudspeaker

Chargers and batteries

- R&S®IC3001 vehicle charger
- R&S®IC3000 workshop charger
- R&S®IB3001/3002 battery pack

Data communications

- Tactical notepad, R&S®T@cMan software
- Cables, e.g. R&S®GK3024 data/remote cable

Radio configuration

- R&S®GP3000 fillgun

R&S®MR300xH/U manpack radio + software options

Other accessories

- R&S®MZ3088 manpack bag
- R&S®GK3005 front-panel extension
- R&S®GK3009 power/LAN adapter

Manpack antennas

- R&S®HV3003 GPS antenna
- R&S®HV3004 VHF manpack antenna
- R&S®HV3007 HF whip antenna
- R&S®HV3009 VHF/UHF manpack antenna

Configuration overview of handheld radio

Mission planning

- R&S®GP3021 fillgun
- Mission planner software
- Data loader software

Audio accessories

- R&S®GA3023 microphone/ loudspeaker

R&S®MR3000P handheld radio

Chargers and batteries

- R&S®IB3022 battery pack
- R&S®IC3023 vehicle charger
- R&S®IC3022 universal charger

Other accessories

- R&S®MZ3021 bag
- R&S®MZ3023 set bag
- R&S®IV3021 vehicle support

Handheld antennas

- R&S®HV3031 GPS receiver
- R&S®HD3088 VHF hang-up antenna
- R&S®HV3022 short whip antenna
- R&S®HV3021 long whip antenna
- R&S®HD3001 VHF directional manpack antenna

Ease of operation

The R&S®M3TR radios offer many diverse functions that help ensure straightforward, secure, and error-free operation.

The functions are available via hierarchically structured menus and context-sensitive softkeys. The well-thought-out concept and the arrangement of the control elements allow the intuitive control of the radio even under difficult conditions from outside and without having the removable front panel in view.

Operation of the R&S®MR300xH/U

5th generation technology for the digital battlefield

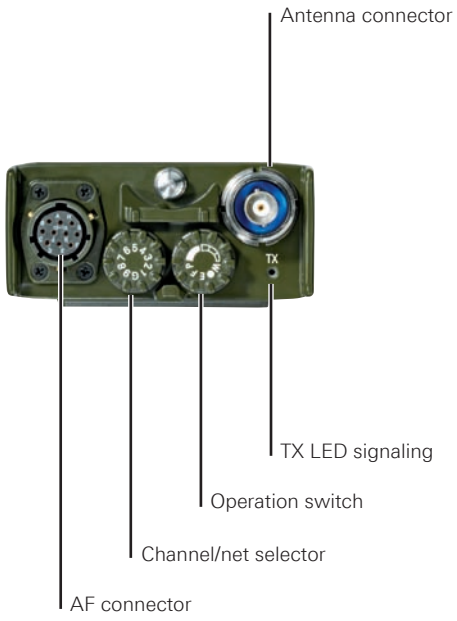
Menu-oriented user interface and PC-based tools

The R&S®MR300xH/U user interface is menu-oriented and easy to use. Its eleven-step rotary switch for the operating mode allows direct access to the nine most often used modes (nets) of the radio. These modes contain the complete setting of parameters such as the transmit power, the hailing frequency, the link mode, the EPM (ECCM) procedure, and other net-specific adjustments. These preset pages are conveniently prepared with a PC or at a central location using the R&S®RNMS3000 radio net management software, and are loaded into the radio over the data connector before a mission starts.

Convenient and easy link establishment

The link establishment is convenient and easy. The operator chooses a mode (position 1 to 9 of the rotary switch) and activates the push-to-talk key or data transmission mode on the terminal. Everything else is done automatically. Two additional positions are available: "MAN" to use the radio in manual mode for fixed-frequency operation and "MORE" to access up to 90 additional preset pages via the radio keypad.

Operation of the R&S®MR3000P



5th generation technology for the digital battlefield

Software options

As a software defined radio, the R&S®M3TR is able to run a wide variety of waveforms. To provide radio systems that perfectly fit customer needs and applications, radio software can be ordered on the basis of communications requirements.

Upgrades by adding new waveforms or extending the frequency range of radio networks are also possible in this concept. Communications networks can therefore be tailored to always find the best compromise between current communications needs and budgetary setup.

EPM waveforms

Type	Designation	Runs in frequency range (in MHz)	Support of waveform by			
			R&S®MR3000H/U	R&S®MR3001H/U	R&S®MR3002H/U	R&S®MR3003H/U
R&S®GS3001S	R&S®SECOM-H	1.5 to 29.9	•	•	•	•
R&S®GS3030S	R&S®SECOM-V	30 to 107.9 / 121 to 511.9	•	•	•	•
	R&S®SECOM-P	30 to 87.9	•	•	•	•
R&S®GS3006S	HAVE QUICK I/II	225 to 399.9		•		•
R&S®GS3007S	HAVE QUICK I	225 to 399.9		•		•
R&S®GS3516S	R&S®SECOS 516 TDMA	225 to 399.9		•		•

ALE – automatic link establishment

Type	Designation	Runs in frequency range (in MHz)	Support of waveform by			
			R&S®MR3000H/U	R&S®MR3001H/U	R&S®MR3002H/U	R&S®MR3003H/U
R&S®GS4101S	ALE 2G, FED-STD-1045/46/49	1.5 to 29.9			•	•
R&S®GS4155S	ALE 2G, FED-STD-1045/46/49 ALE 3G, STANAG 4538, (FLSU, LP, HDL, LDL, OD, RLSU)	1.5 to 29.9			•	•

Modem waveforms

Type	Designation	Runs in frequency range (in MHz)	Support of waveform by			
			R&S®MR3000H/U	R&S®MR3001H/U	R&S®MR3002H/U	R&S®MR3003H/U
R&S®GM4120S	HF Modem STANAG 4285, STANAG 4529, STANAG 4539, STANAG 4415	1.5 to 29.9			•	•
R&S®GS3030S	VHF/UHF modem 72 kbit/s	30 to 511.9	•	•	•	•

EPM (ECCM) waveforms

R&S®SECOM-V and R&S®SECOM-H

The R&S®SECOM waveform (R&S®SECOM-V for the VHF and UHF bands, R&S®SECOM-H for HF) with its high hop rates and secure synchronization is setting new standards. It ensures powerful protection against detection, interception, jamming, and spoofing. User data (digital voice or data) is transmitted completely digitally and in encrypted form. Within one R&S®SECOM-V net, several subnets and sublinks can be established simultaneously in the point-to-point and point-to-multipoint modes. Network synchronization and access can be planned and controlled individually for each user. Methods such as late net entry or hailing (R&S®SECOM-V) are available for this purpose.

R&S®SECOM is a combination of COMSEC and TRANSEC for encrypted voice and data communications in the frequency-hopping mode.

The COMSEC part of the R&S®SECOM method is based on the R&S®RSCA crypto algorithm developed by Rohde&Schwarz. The method uses key lengths of up to 256 bit (approx. 10^{77} variants). Assuming uninterrupted transmission, the same bit sequence would be repeated after about 2×10^{9} years. The keys required can be distributed by means of a key distribution device or directly from a PC. All keys are encrypted and the deciphered original is present only in the read-protected security processor. Crypto units complying with NATO standards or from other manufacturers may be used as an external option.

R&S®SECOM-V (R&S®GS3030S, op-code)

R&S®SECOM-V is optimized for the tactical VHF band. It is implemented as a software option running on all R&S®MR300xH/U tactical transceivers.

R&S®SECOM-V was developed to meet as closely as possible the network demands of the primarily land-based mobile users of tactical radio services. R&S®SECOM-V is attuned to the requirements of land forces, where the implementation and management of complex network structures for up to a few hundred users are in the foreground. The primarily hierarchical command structure of the armed forces should be mapped as closely as possible to the communications network. To this end, users can be organized in networks using the same frequency pool and the same key – one each for TRANSEC and COMSEC.

Possible address modes are point-to-point, point-to-multipoint, and broadcast. Network synchronization and access can be controlled by each user. Late net entry is available for this purpose.

R&S®SECOM-H (R&S®GS3001S, op-code)

R&S®SECOM-H is a Rohde&Schwarz proprietary frequency-hopping HF radiocommunications waveform. R&S®SECOM-H is based on a multiwaveform concept and is designed to operate in environments where a certain percentage of the hop set frequencies are blocked due to either intentional disturbances (i.e. jamming) or unintentional ones, as well as environments experiencing severe Doppler spread and/or multipath delay. It is furthermore based on modem waveforms that can be adapted to the specific characteristics of the HF channel and its propagation.

R&S®SECOM-H provides digital voice (low bit rate vocoder at 1200 bit/s or 2400 bit/s, adjustable) and data services (up to 2400 bit/s). User data (including digital voice) is always transmitted in encrypted form (COMSEC, R&S®RSCA crypto algorithm). To plan communications networks and links, a PC-based radio network management system is available. The tool allows users to generate keysets, plan frequency resources, define user channels and services, and set up complete networks of radios. After the desired networks have been defined, the resulting data can be easily distributed to the respective radios by means of a fillgun or directly by using one of the digital interfaces of the radio (e.g. LAN, serial interface).

Note: To run R&S®SECOM-H on an R&S®MR300xU transceiver, the R&S®VK3150(C) HF power amplifier and other system components are required.

R&S®SECOM-P (R&S®GS3030S, op-code)

R&S®SECOM-P is the standard EPM method for the R&S®MR3000P handheld transceiver. It was especially optimized for use on small, lightweight terminal equipment. Even for this platform, R&S®SECOM-P offers maximum performance and battery operating time. Since R&S®SECOM-P can also be loaded into R&S®MR300xH/U equipment as a software option, R&S®SECOM-P provides full interoperability between all R&S®MR300x transceivers in mixed networks.

R&S®SECOS 5/16 TDMA (R&S®GS3516S, op-code)

The R&S®SECOS air-ground-air waveform provides interoperability in the EPM mode between the R&S®M3TR and the R&S®M3AR and R&S®M3SR transceivers. Besides digital voice mode, data transmission with data rates of up to 16 kbit/s is supported. Both TDMA and non-TDMA modes are implemented. For details on R&S®SECOS implementation in the R&S®M3TR, refer to the related Technical Information (R&S®M3TR SECOS).

Note: To run R&S®SECOS on an R&S®MR3001H or R&S®MR3003H transceiver, the R&S®VT3050 or R&S®VT3050C VHF/UHF power amplifier is required.

R&S®SECOS guard receiver

The guard receiver function monitors up to two channels in background mode. This allows operators who are occupied with R&S®SECOS voice or data traffic and receive an emergency call to transmit on one of these dedicated frequencies without having to use another radio.

HAVE QUICK I/II (R&S®GS3006S/3007S, op-code)

The NATO ground-air-ground (GAG) waveform HAVE QUICK provides interoperability in the EPM mode between the R&S®M3TR and various types of legacy equipment. In particular, it allows the integration of R&S®M3TR transceivers into networks based on the R&S®M3AR and R&S®M3SR transceivers.

Note: To run HAVE QUICK on an R&S®MR3001H or R&S®MR3003H transceiver, the R&S®VT3050 or R&S®VT3050C VHF/UHF power amplifier is required.

R&S®MR300xH/U supported services

Voice communications

Analog voice

Depending on the software configuration, the radio is able to transmit and receive the following signal modulations in the VHF/UHF band:

- J3E (USB, LSB)
- A3E (AM)
- F3E (FM)
- F1B/F1D (FSK)
- J2D (USB)

Squelch

The R&S®M3TR supports the following squelch types:

- Received signal strength indication (RSSI)
- 150 Hz tone squelch
- Signal squelch
- Syllabic squelch (digital recognition of voice components in signal)

Digital voice (optional)

For communications under the EPM methods R&S®SECOM-V, R&S®SECOM-H, R&S®SECOM-P, and R&S®SECOS 516 TDMA, voice is transmitted in digital form. The following vocoders are available:

R&S®SECOM-V

- AMBE vocoder 2.4/4.8/9.6/16 kbit/s
- CVSD vocoder 16 kbit/s

AMBE is the standard vocoder for voice transmission under R&S®SECOM-V. It makes use of the R&S®SECOM-V 16 kbit/s channel with vocoder-specific FEC. This voice mode provides reliable good-quality and jam-proof communications. The data rate can be selected by HMI.

R&S®SECOM-H

- MMBE vocoder 1200 bit/s
- AMBE vocoder 2400 bit/s

The 1200 bit/s vocoder was specially developed for the demanding task of setting up reliable links with good quality under the poor channel conditions usually found in the HF range (1.5 MHz to 30 MHz). As an integral component of the R&S®SECOM-H HF EPM waveform, it is optimized for use together with this frequency-hopping method. For interoperability with R&S®SECOM-V in rebroadcast applications, the 2400 bit/s vocoder can also be selected in the R&S®SECOM-H mode.

R&S®SECOM-P

- CVSD vocoder 16 kbit/s

R&S®SECOS digital voice

- CVSD vocoder 16 kbit/s
- AMBE vocoder 16 kbit/s

In the R&S®SECOS mode, the CVSD and AMBE vocoder types are supported. The vocoder type is to be preconfigured by the R&S®RNMS3000 net management tool.

R&S®MR300xH/U supported services

Data communications

The R&S®M3TR provides the following optional data transmission modes:

- STANAG 4285 single tone waveform (HF 1.5 MHz to 29.999999 MHz)
- R&S®SECOM-H data mode, up to 2400 bit/s (HF 1.5 MHz to 29.999999 MHz)
- FSK modulation
- R&S®SECOM-V data mode (VHF, 30 MHz to 107.975 MHz, UHF 121 MHz to 511.975 MHz)
- 72 kbit/s high-speed modem (VHF/UHF, 30 MHz to 511.975 MHz)
- R&S®SECOS 516 TDMA (TDMA and non-TDMA data modes)
- IP over air data mode

Note: To run HF waveforms on an R&S®MR300xU radio, the R&S®VK3150 power amplifier together with a docking station and accessories such as an antenna coupler and an appropriate antenna are required.

STANAG 4285 data mode (R&S®GM4120S, optional)

The STANAG 4285 HF modem is a transparent modem for narrowband (3 kHz) data communications in the HF band with a user data rate of up to 3600 bit/s. The following user data rates can be selected via radio HMI:

- 75 bit/s
- 150 bit/s
- 300 bit/s
- 600 bit/s
- 1200 bit/s
- 2400 bit/s
- 3600 bit/s

STANAG 4539 data mode (R&S®GM4120S, optional)

The STANAG 4539 HF modem enables self-identifying (auto-baud) data communications (up to 12800 bit/s) in a 3 kHz channel in the HF frequency range.

STANAG 4539 is based on more than one standardized modem waveform.

- STANAG 4415 (very robust traffic waveform at 75 bit/s)
- MIL-STD-188-110B (low and medium rate serial tone waveforms from 150 bit/s to 2400 bit/s)
- MIL-STD-188-110B App. C (high data rate waveforms from 3200 bit/s to 12800 bit/s)

For backward interoperability, a STANAG 4539 modem is compatible with the following non-self-identifying NATO standards.

- STANAG 4285 (low and medium rate HF waveform from 75 bit/s to 3600 bit/s)
- STANAG 4529 (low and medium rate maritime HF waveform with 1240 Hz bandwidth from 75 bit/s to 1800 bit/s)

R&S®SECOM-H data mode (optional)

The R&S®SECOM-H high-frequency (HF) electronic protection measures (EPM) system is a frequency-hopping HF radiocommunications system.

R&S®SECOM-H is designed to operate in environments where a certain percentage of hop set frequencies are blocked due to either intentional jamming or environmental interferences, e.g. atmospheric noise, thunderstorms, or other electrical disturbances.

R&S®SECOM-H provides the following user data rates:

- 300 bit/s
- 600 bit/s
- 1200 bit/s
- 2400 bit/s

The data rates are selectable by HMI.

R&S®SECOM-V data mode (optional)

In R&S®SECOM-V, data rates up to 16 kbit/s are possible. User data rates span from 600 bit/s up to 9.6 kbit/s depending on FEC share and number of retransmissions. R&S®SECOM-V uses binary continuous phase FSK modulation with a shift of 6.25 kHz. R&S®SECOM-V hopping works in the frequency range from 30 MHz to 107.975 MHz and 121 MHz to 511.975 MHz. For detailed information, refer to the related Technical Information (R&S®SECOM-V).

72 kbit/s VHF/UHF modem (optional)

For mobile radiocommunications, military users often employ terminal equipment of narrow bandwidth and with limited channel capacity. Such equipment has limited data transmission capability. The new software-based high-speed modem for the R&S®M3TR allows the transmission of radio data at high rates:

- Up to 72 kbit/s
- Bandwidth efficiency up to 3 bit/s/Hz
- Auto-baud capability
- Embedded solution for R&S®MR300xH/U transceiver
- For complete VHF/UHF range from 30 MHz to 512 MHz

Depending on the data rate and the selected bandwidth, there may be different signal-code constructs. Their main differences are:

- Number of carriers
- Type and distribution of individual carrier modulation
- Number of pilot tones

These parameters ensure optimal matching to the data rate and the required bandwidth. The modem provides a transparent channel without integrated protocol. It can be operated under the control of a higher layer protocol outside the radio. It supports ten different waveforms with different data rates. All waveforms are operable in the VHF/UHF frequency range from 30 MHz to 512 MHz.

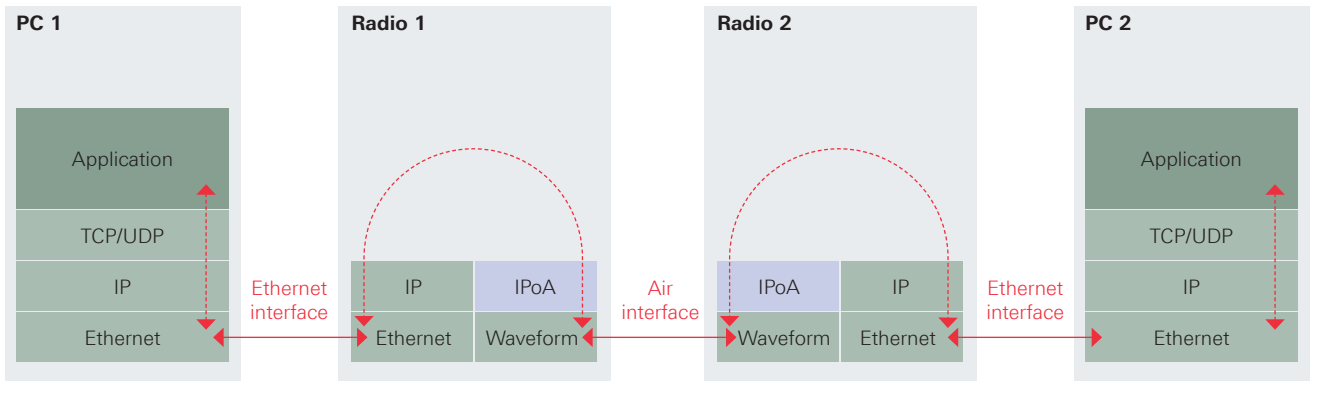
User data rates

The modem supports ten different waveforms with allocated bandwidths which can be selected by the user.

Waveform	Data rate	Bandwidth
72/36	72 kbit/s	36 kHz
72/24	72 kbit/s	24 kHz
64/36	64 kbit/s	36 kHz
64/24	64 kbit/s	24 kHz
56/24	56 kbit/s	24 kHz
48/24	48 kbit/s	24 kHz
36/36	36 kbit/s	36 kHz
32/24	32 kbit/s	24 kHz
24/24	24 kbit/s	24 kHz
16/12	16 kbit/s	12 kHz

The data rates as well as the subsciber data rates are selectable by HMI or can be preconfigured (R&S®RNMS3000).

IPoA – transparent IP data transfer over air



IPoA – IP radio transmission (optional)

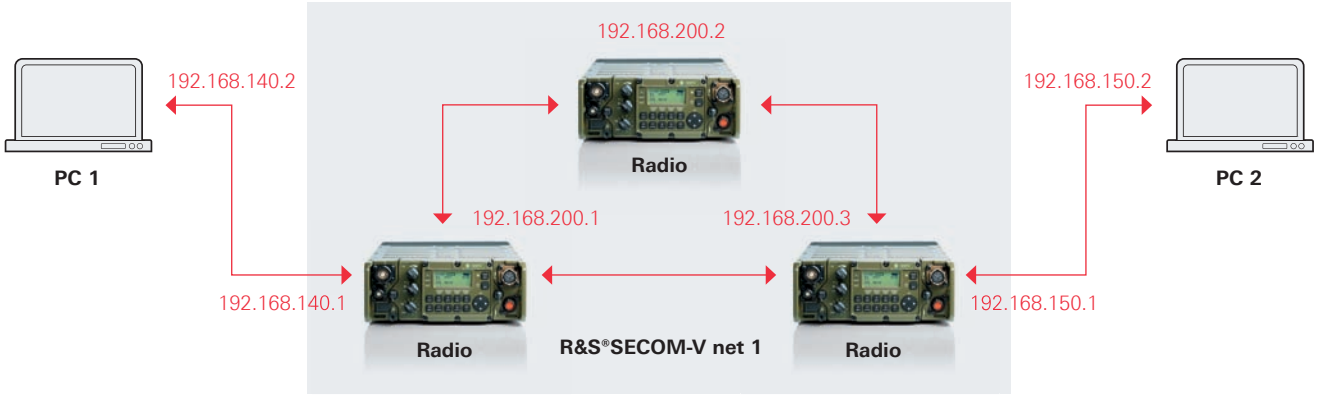
The IPoA embedded radio protocol provides transparent IP functionality over the air. It can be used to set up communications systems that require a transparent connection of IP networks over radio links. IP-based applications – such as situational awareness or message handling systems – are enabled to exchange their data over such radio links.

An R&S®M3TR radio equipped with IPoA includes standard static IP router functionality. The network structure can be configured very easily by entering IP subnets to be routed to different destinations over the air interface. Besides the standard IP address of the physical Ethernet interface (which is used, for example, for remote control), a second IP address represents the air interface of the radio. The radio can be connected via an Ethernet connector (RJ-45) to 10BaseT and 100BaseT network equipment (such as hubs, switches, routers) provided by the R&S®KG3031, R&S®KG3032 docking station and the R&S®VT3050C compact amplifier. If IPoA functionality is to be used with manpack radios, the RS-232-C interface (R&S®M3TR data connector at the front panel) is to be used. A PPP connection will be established between the radio and the external system for this application

IPoA protocol functionality

The embedded IPoA protocol currently supports IPv4 (Internet protocol version 4). An internal address mapping function ensures that data is delivered to the correct recipient. The IP packets are transmitted transparently over the radio channel. Performance of the data link depends on the current channel properties and propagation conditions of the radio link. An error detection mechanism prevents the protocol from delivering erroneous data to the connected network; further error correction techniques (e.g. ARQ secured data) are implemented.

IPoA – example with R&S®SECOM-V VHF/UHF waveform



R&S®M3TR supported services

GPS services

GPS reporting

Operators can send their own position in a waveform-specific net (R&S®SECOM-V or R&S®SECOM-P). A dedicated radio (GPS controller) can poll the positions of all other net members. The GPS controller can be connected to an external application (i.e. command and control software system) to make GPS information available on a digital map, for example. The external application can poll the GPS controller to get the latest GPS information of all members of the network.

Transmission of GPS information

The polling of GPS information is initiated by the GPS controller. After initiation of transmission, all active GPS providers send their GPS information sequentially to the GPS controller. The transmission of GPS information can be switched on/off at the GPS controller. GPS reporting can thus be stopped. Collisions between individual transmissions of GPS information are prevented.

GPS controller

The GPS controller is a manpack or vehicular radio (R&S®MR300xH/U). GPS controllers request the GPS information from the GPS providers either at a user's request or periodically.

GPS position information

The latest GPS information of each radio is stored in an internal table by the GPS controller. This table is updated each time when a GPS information is received by the GPS controller. The GPS information is not stored in the GPS controller when the radio is switched off. The following GPS information is provided by each GPS provider radio:

- Position (WGS84, GEO, UTM, MGRS)
- Velocity
- UTC time
- Fix quality (number of satellites that are visible)

GPS receiver module on the R&S®MR300xH and R&S®MR300xU

The GPS receiver module is built into the R&S®M3TR (manpack). The R&S®HV3003 GPS antenna or other embedded GPS antennas, e.g. R&S®HV3012, R&S®HV3013, R&S®HV3015, R&S®HV3019, are required to receive GPS signals.

GPS receiver module on the R&S®MR3000P (option)

A GPS receiver module is available for the R&S®MR3000P (handheld). It integrates both the GPS antenna and the receiver module and is connected to the audio connector of the handheld radio. External audio equipment can still be used with the GPS module installed.

R&S®HV3031 GPS receiver module for the R&S®MR3000P.

R&S®MR300xH/U supported services ALE (R&S®GS4101S, R&S®GS4155S, op-code)

Automatic link establishment (ALE, optional)

The common basic protocol standard for ALE is FED-STD-1045/46, known as 2nd generation or 2G ALE. 2G ALE uses non-synchronized scanning of channels, and it takes about several seconds to half a minute to repeatedly scan through an entire list of channels looking for calls.

The latest ALE standard uses accurate time synchronization via GPS-locked clocks or a time server to achieve faster and more dependable linking. It is generally known as 3rd generation or 3G ALE. Through synchronization, the calling time to achieve a link may be reduced to less than 10 seconds. Although 3G ALE is better and more reliable, the existence of a large, installed base of 2G ALE radio systems and the wide availability of the equipment have made 2G the baseline standard for global interoperability.

The R&S®MR3002H/U and R&S®MR3003H/U transceivers support both the 2nd and 3rd generation of ALE in accordance with FED-STD-1045/46 and STANAG 4538.

Note: To run ALE on an R&S®MR300xU radio, the R&S®VK3150 power amplifier together with a docking station and accessories such as an antenna coupler are required.

R&S®MR300xH/U supported services BIT

Built-in test system

All components of the R&S®M3TR radio system are equipped with a BIT system that provides three modes:

- Power-on BIT (PBIT)
- Initiated BIT (IBIT)
- Continuous BIT (CBIT)

The PBIT is always performed after powering up the unit. The initiated BIT is executed after manual activation by the operator. The continuous BIT is continuously performed during operation.

The BIT enables fault location down to the module level of functional groups.

Faults are stored in a fault journal for later evaluation.

R&S®M3TR supported services

Channel/net memory

A radio can store different presets containing radio link data:

Nets

A net is a set of parameters specifying a configured FF or FH network containing all relevant data for link setup and traffic. Nets are stored in preset pages accessible by the rotary switch of the radio or by the keypad, respectively. Depending on the actual configuration, up to nine (R&S®MR3000P) or up to 99 (R&S®MR300xH/U) presets can be defined and stored in the radio.

Channels (R&S®MR300xH/U)

A channel is a set of parameters specifying an FF channel (e.g. TX and RX frequency, modulation, RF power, etc.). Channel data can be stored in both the manual preset or on one of the remaining 99 presets. In total, 450 channels are available:

First 400 channels

- Can be generated during R&S®RNMS3000 configuration
- Can be entered directly at radio HMI
- Available on PP 0 (manual PP)

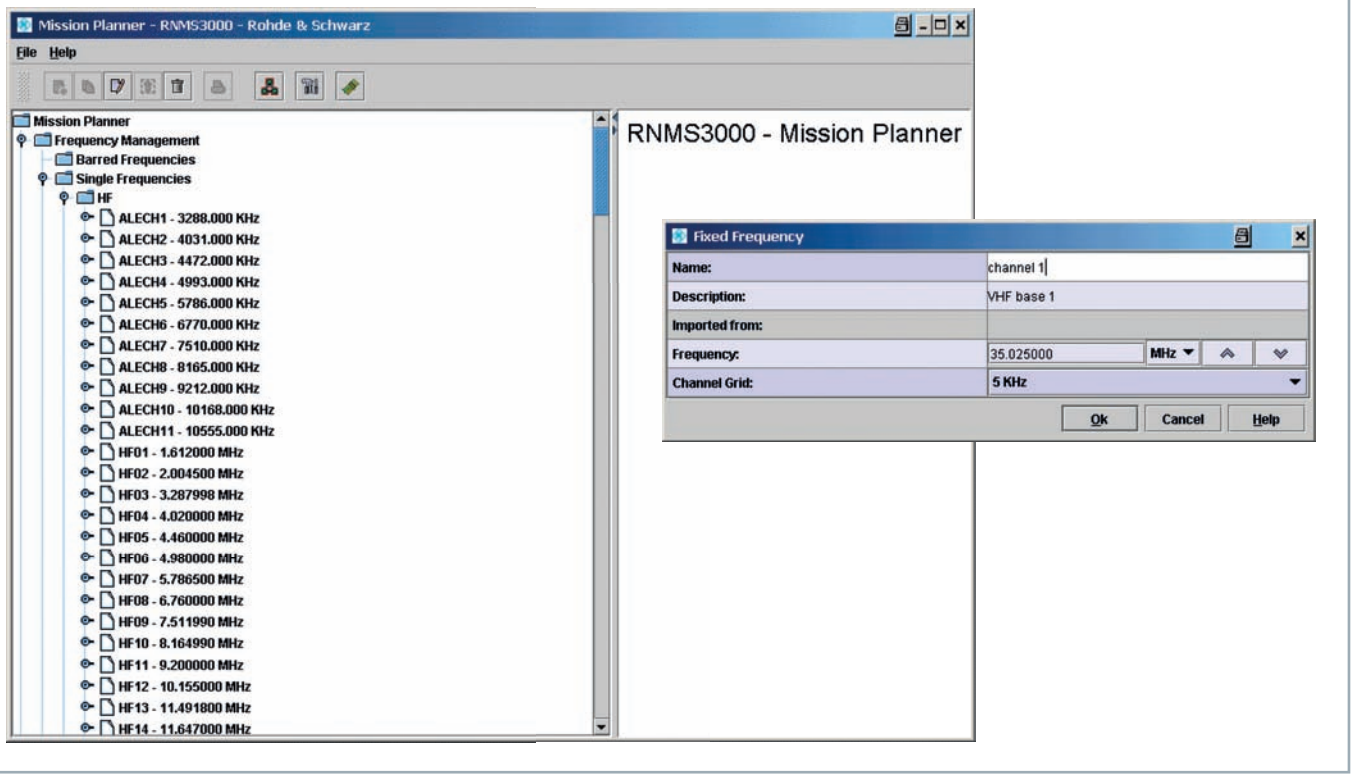
Locked channels

- If the above channels are locked during the R&S®RNMS generation process, they cannot be changed at the radio HMI

Remaining 50 channels

- To be generated during R&S®RNMS configuration only
- Will appear on their own preset page

Mission planner – FF channel management



Accessories for the R&S®MR300xH/U Headset/handsets

	Designation, description	Type
	**R&S®GA3001 handset with PTT, microphone, and earpiece** The R&S®GA3001 handset can be connected to the audio connector of the R&S®MR300xH and R&S®MR300xU transceivers, as well as to the remote control unit and other system components of the R&S®M3TR transceiver family	R&S®GA3001 Handset
	**R&S®GA3002 headset with PTT, microphone, and earpiece** The R&S®GA3002 is a headset for single/double ear use, and can be worn on both the right or left ear. A flexible cut-out polymer ear pad makes for user convenience without masking outside noise. The microphone is fitted to an adjustable flexible support	R&S®GA3002 Headset (one earpiece) R&S®GA3002 Headset (two earpieces)
	**R&S®GA3003 microphone/speaker** The R&S®GA3003 consists of a loudspeaker box with built-in audio amplifier and microphone	R&S®GA3003 Microphone/speaker
	**R&S®GA3005 active loudspeaker box** Loudspeaker with through-connection to handset/headset	R&S®GA3005 Loudspeaker (available with 2 m, 5 m or 10 m cable)

Batteries and battery chargers

	Designation, description	Type
	**R&S®IB3001 standard battery pack, Li-Ion, rechargeable** **R&S®IB3002 combat battery pack, LiSO2, non-rechargeable** The R&S®IB3001/3002 are sealed power packs with a watertight connector to the radio. They provide highest energy density, low weight, and high autonomy. Two versions are available: a rechargeable Li-Ion battery (R&S®IB3001) and a non-rechargeable combat battery (R&S®IB3002)	R&S®IB3001 Standard battery pack R&S®IB3002 Combat battery pack
	**R&S®IC3000 battery charger, stationary** Automatic charging of up to eight R&S®IB3001 Li-Ion batteries	R&S®IC3000 Battery charger A power supply cable is supplied with each charger
	**R&S®IC3001 battery charger** The R&S®IC3001 is a vehicular charger for the R&S®IB3001 Li-Ion battery pack. One battery at a time can be charged	R&S®IC3001 Battery charger R&S®GK3020 Power supply cable for R&S®IC3001 battery charger

Antenna tuning unit and other equipment

	Designation, description	Type
	**R&S®FK3150 150 W antenna tuning unit, 1.5 MHz to 30 MHz**	R&S®FK3150 HF antenna tuning unit Recommended extra: R&S®KS3150F shockmount
	**R&S®GB3031R single remote control unit** The R&S®GB3031R is intended for remote control and remote operation of one R&S®MR300xH/U radio (manpack or installed in the R&S®KG3031A single docking station)	The R&S®GB3031R is available with cable sets in different lengths. The cable sets (control, audio, data) are included in the equipment supplied The R&S®GB3031R single remote control unit includes loudspeaker, audio and RS-232-C interface 3.5 m cable 8 m cable 12 m cable
	**R&S®GK3005 cable and fixture for detachable front panel**	R&S®GK3005 Fixture for detachable front panel
	**R&S®GP3000 fillgun** PC-programmable for transmitting all relevant preset information, as well as TRANSEC/COMSEC keys	R&S®GP3000 R&S®GP3001 fillgun (HQI/II mode) R&S®GK3021 USB cable, fillgun to PC

Docking stations

	Designation, description	Type
	**R&S®KG3031 single docking station for R&S®M3TR manpack radios** For installation of one R&S®MR300xH or R&S®MR300xU manpack radio	R&S®KG3031A Single docking station for R&S®M3TR manpack radios
	**R&S®KG3032 dual docking station for R&S®M3TR manpack radios** For applications requiring the simultaneous operation of two radio stations	R&S®KG3032A Dual docking station for R&S®M3TR manpack radios
	**R&S®IV3001, power supply unit for R&S®M3TR manpack radios** Power supply and mounting frame for operation of one radio in vehicular and stationary applications	R&S®IV3001

Antenna selection chart – HF

Model	Frequency range	Power	Type	Application	Mast	Antenna coupler
R&S®HV3007 	1.5 MHz to 30 MHz	20 W	Whip	Manpack	N/A	R&S®MR3000H
R&S®AK3001 [1] 	1.5 MHz to 30 MHz	150 W	Wire	Manpack	R&S®KM3032	R&S®MR3000H
R&S®AK3031 [2] 	2 MHz to 90 MHz	20 W	Wire dipole	Manpack	R&S®KM3032	Not required
R&S®HV3011	1.5 MHz to 30 MHz	150 W	Rod	Vehicle	N/A	R&S®MR3000H/ R&S®FK3150
R&S®HA104 	1.5 MHz to 30 MHz	150 W	Rod	Vehicle	N/A	R&S®MR3000H/ R&S®FK3150
R&S®AK503 [3] 	1.5 MHz to 30 MHz	150 W	Wire	Vehicle Semi-stationary	R&S®KM011	R&S®MR3000H/ R&S®FK3150
R&S®HX3000 	1.6 MHz to 30 MHz	150 W	Half loop	NVIS vehicular antenna	N/A	R&S®HX3000

[1] Long wire adapter, R&S®GK3019 model 04 required.
[2] BNC adapter, R&S®GK3019 model 02 required.
[3] Long wire adapter, R&S®HZ3503 model 02 required.

Antenna selection chart – VHF tactical

Model	Frequency range	Power	Type	Application	Mast
R&S®HV3004 	30 MHz to 88 MHz	10 W	Whip	Manpack standard whip antenna	N/A
R&S®HV3021 	30 MHz to 88 MHz	5 W	Whip	Handheld whip antenna	N/A
R&S®HV3022 	30 MHz to 88 MHz	5 W	Whip	Handheld whip antenna	N/A
R&S®HD3088[1] 	30 MHz to 88 MHz	10 W	Wire	Manpack/handheld hang-up antenna	R&S®KM3032
R&S®HD3001[1)] 	30 MHz to 88 (108) M Hz	25 W	Wire	Manpack handheld high-gain directional antenna	R&S®KM3032
R&S®HV3015 	30 MHz to 108 MHz	50 W	Rod	Vehicle/semi-stationary, no ground plane needed due to dipole design, with lightning protection	R&S®KM3031
R&S®HV3012 	30 MHz to 108 MHz	50 W	Rod	Vehicle, optimized for low profile	N/A
R&S®HL3031 	30 MHz to 108 MHz	100 W	Log-periodic dipole	(Semi-) stationary, high-gain antenna	R&S®KM3031

[1)] BNC adapter, R&S®GK3019 model 02 required.

Antenna selection chart – VHF/UHF and multiband

Model	Frequency range	Power	Type	Application	Mast
R&S®HV3009 	118 MHz to 400 MHz	10 W	Whip	Manpack	N/A
R&S®HV3013 	225 MHz to 512 MHz	50 W	Rod	Vehicle/semi-stationary, no ground plane needed due to dipole design, with lightning protection	R&S®KM3031
R&S®HV3018 	108 MHz to185 MHz	50 W	Rod	Vehicle/semi-stationary	R&S®KM3031
R&S®HV3019 	118 MHz to 400 MHz	50 W	Rod	Vehicle/semi-stationary, no ground plane needed due to dipole design, with lightning protection	R&S®KM3031
R&S®HL3032 	220 MHz to 405 MHz	50 W	Log-periodic dipole	(Semi-) stationary, high-gain antenna	R&S®KM3031
R&S®HL3033	30 MHz to 512 MHz	50 W	Log-periodic dipole	(Semi-) stationary, high-gain antenna	R&S®KM3031
R&S®HK055L1 	30 MHz to 512 MHz	50 W	Rod	Tracked vehicle/stationary	N/A

Accessories for the R&S®MR3000P VHF tactical handheld radio

	Designation, description	Type
	**R&S®GA3023 handheld microphone/speaker**	R&S®GA3023 Handheld microphone/speaker
	**R&S®IB3022 Li-Ion battery pack** Particularly high capacity due to Li-Ion technology	R&S®IB3022 Battery pack
	**R&S®IC3022 battery charger, AC, stationary** Automatic charging of up to eight R&S®IB3022 Li-Ion batteries	R&S®IC3022 Battery charger
	**R&S®IV3021 vehicle support** Vehicle mount with charger	R&S®IV3021 Vehicle support
	**R&S®GP3021 fillgun** For transmitting all relevant preset information, as well as COMSEC/TRANSEC keys	R&S®GP3021 Fillgun

External amplifiers

Configuration overview with docking station and power amplifiers

External amplifiers – overview

- 50 W VHF/UHF power amplifier (compact version)
- 50 W VHF/UHF power amplifier, standalone unit
- 150 W HF power amplifier, standalone unit
- 500 W HF power amplifier

VHF/UHF antennas

- VHF
- UHF
- Multiband

HF antennas

- Whip
- Wire
- NVIS

R&S®KG3031A docking station

R&S®VT3050 50 W VHF/UHF power amplifier

R&S®VK3150 HF amplifier

R&S®FK3150 antenna coupler

Power supply

R&S®VT3050 50 W VHF/UHF power amplifier

Brief description

The R&S®VT3050 50 W VHF/UHF power amplifier supports continuous operation across the 30 MHz to 512 MHz band with 50 W transmit power.

The R&S®VT3050 is a member of the R&S®M3TR family of multiband tactical radio systems. This power amplifier meets the need for military voice and data communications in all analog and digital fixed-frequency and frequency-hopping modes supported by the R&S®MR300xH/U tactical radio. The amplifier is especially designed for high linearity to satisfy the requirements of the R&S®M3TR's high-speed radio modem for 72 kbit/s. Furthermore, it supports medium to fast frequency hopping.

Collocation options are available for VHF Low (30 MHz to 88 MHz). The co-site filter is factory-installed. Fully automatic operation (controlled from the host transceiver) and rapid tuning capability make pre-/postselector operation transparent to the user.

Operational configuration and BITE/fault status reporting are performed via the transceivers. The R&S®VT3050 uses rugged tactical packaging and meets the same environmental specifications for temperature, shock, vibration, and submersibility as the rest of the R&S®M3TR family. Operation is fully automatic. Built-in test equipment (BITE) and diagnostic testing are fully integrated into the transceiver system. The VHF/UHF amplifier is mounted separately with an independent shockmount. This provides additional flexibility when installing tactical radio systems into vehicles.

An R&S®M3TR VHF/UHF system can be easily upgraded to multiband operation. The R&S®M3TR's serial control bus allows combinations of transceivers with up to two external amplifiers. By adding an R&S®VK3150 HF amplifier and an R&S®FK3150 antenna tuning unit, the system can be expanded to a frequency range of 1.5 MHz to 512 MHz.

For use with standard VHF and UHF antennas, the amplifier features two configurable RF outputs. The frequency that splits the available frequency range of 30 MHz to 512 MHz is user-selectable. Possible settings could be, for instance, 30 MHz to 108 MHz for the RF_{Low} output leaving 108.025 MHz to 512 MHz for the RF_{High} output. If a multiband antenna such as the R&S®HK055L1 is used, the entire range of 30 MHz to 512 MHz can be routed to one of the outputs.

R&S®VT3050C 50 W VHF/UHF compact power amplifier

Brief description

The R&S®VT3050C 50 W VHF/UHF compact power amplifier accommodates an R&S®MR300xU or R&S®MR300xH manpack radio.

The R&S®VT3050C is a member of the R&S®M3TR family of multiband tactical radio systems. The power amplifier supports continuous operation across the 30 MHz to 512 MHz band with 50 W transmit power. The R&S®VT3050C accepts an R&S®MR300xU or R&S®MR300xH manpack radio (not included in the equipment supplied) as a plug-in exciter. Because each R&S®MR300xH/U manpack radio features a rear system connector, the radio can be mounted and dismounted quickly. Connectors at the front panel provide the most important interfaces such as RF, audio, power supply lines, and a digital bus to control external equipment. For standard applications, it is not necessary to plug cables to the radio's front panel. This provides "jerk and run" capability in an emergency, or convenient handling if the radio is temporarily used as a manpack. The R&S®VT3050C operates on 12 V or 24 V vehicle power supply.

Key features

- Frequency range from 30 MHz to 512 MHz
- Very compact size, easy to install
- Output power 50 W CW and PEP
- Frequency-hopping capability (NATO HAVE QUICK I/II, R&S®SECOM-V, R&S®SECOM-P, R&S®SECOS)
- Protected against antenna mismatch, overload, overvoltage
- High MTBF
- Scalable for multiband operation (1.5 MHz to 512 MHz)

Options for the R&S®VT3050C

Co-site filter

A collocation option is available for VHF Low (30 MHz to 88 MHz). The co-site filter is factory-installed. Fully automatic operation (controlled from the host transceiver) and rapid tuning capability make pre-/postselector operation transparent to the user.

Field telephone interface

This option provides a two-wire interface to connect the amplifier to a field telephone. The operator can select four modes for routing telephone calls from and to the radio:

- Audio-Radio: audio interface connected to radio
- Radio-Phone: field telephone connected to radio
- Audio-Phone: field telephone connected to audio interface
- Audio-Radio-Phone: field telephone connected to radio and audio interface

Audio/data interface

This option provides a versatile audio/data interface including power lines, audio, data, and control signals. It is used to connect external devices such as an R&S®MMC3000 or KY57 cipher unit.

The R&S®VT3050C with all options, including R&S®KS3001V and R&S®MR300xH/U (radio not supplied with amplifier).

R&S®VK3150 150 W HF power amplifier

Brief description

The R&S®VK3150 150 W HF power amplifier increases the HF output power of the R&S®MR300xH/U manpack radios to 150 W PEP or 100 W average.

The R&S®VK3150 provides medium-power/medium-range communications links. Typical applications include mobile or base station installations for general-purpose HF SSB voice and data communications.

Continuous coverage is provided over the 1.5 MHz to 30 MHz frequency range. The power amplifier section is of broadband design and fully supports frequency-agile operating modes (automatic link establishment, slow frequency hopping). When used with the automatic R&S®FK3150 HF antenna tuning unit, the output of the R&S®VK3150 is automatically matched to most rod and whip antennas.

Built-in self-test features permit operators or maintenance personnel to fully check the transceiver and the power amplifier down to module level. Fault conditions are displayed on the transceiver's front-panel display.

The R&S®MR300xH/U manpack acts as an exciter for the power amplifier, avoiding the disadvantages of transceiver/booster solutions with respect to unwanted emissions. The HF power amplifier is mounted separately on an independent shockmount with room for proper air flow. This provides additional flexibility when installing tactical radio systems into vehicles.

The R&S®VK3150 uses rugged tactical packaging and meets the same environmental specifications for temperature, shock, vibration, and submersibility as the rest of the R&S®M3TR family.

R&S®MG3500 500 W HF power amplifier

Brief description

The R&S®MG3500 power amplifier increases the HF output power of an R&S®MR300xH/U transceiver in the HF range up to max. 500 W.

Thus, it makes reliable medium- and long-range connections via groundwave and skywave possible. Typical applications include stationary and semi-mobile installations for tactical radio networks.

Key features

- Frequency range from 1.5 MHz to 30 MHz
- Output power 500 W CW and PEP
- Frequency-hopping capability (R&S®SECOM-H)
- Protected against mismatch and short-circuit
- High MTBF

The R&S®MG3500 500 W power amplifier with the R&S®MR300xH/U transceiver in shock-mounted frame (option); the transceiver is not part of the equipment supplied.

Operating modes

The amplifier operates in the entire HF range from 1.5 MHz to 30 MHz. In addition to the analog modes (AM, FM, SSB), frequency-agile radio techniques such as ALE and the R&S®SECOM-H EPM method offered in the R&S®M3TR are also supported.

Broadband antennas (VSWR < 2) can be directly connected to the amplifier. If the R&S®FK4190M antenna tuning unit is added, standard rod, whip or wire antennas can also be operated. In this case, the R&S®FK4190 is automatically controlled and tuned by the receiver. Furthermore, hop sets and scan groups for the frequency-agile modes are learned for the connected antenna, and the associated data records are stored in the tuning unit. The tuning processes are largely performed automatically and do not require the operator to take any special steps.

Reliability

The R&S®MG3500 is fully integrated into the built-in test (power-on test and continuous test) of the transceiver. Error messages from the amplifier are output on the transceiver HMI for the operator. To make service easier, error messages down to the module level can be called up.

Power supply

The R&S®MG3500 can operate in either the single-phase or three-phase mode. In addition, emergency operation from a 24 V DC power supply is possible (max. HF output power is then 100 W).

Environmental and EMC properties

Like all system components of the R&S®M3TR family, the R&S®MG3500 has also been subjected to rigorous quality testing. It meets the requirements of the MIL-STD-810F and MIL-STD-461E standards.

Multiband extension

All R&S®MR300xH/U transceivers support multiband operation. The frequency range of an R&S®M3TR HF system equipped with the R&S®MG3500 can also be extended to cover the VHF/UHF range. This is done by connecting the R&S®MG3500 to the extension port of an R&S®VT3050C amplifier. This combination then permits continuous operation at all frequencies between 1.5 MHz and 512 MHz. Moreover, this configuration supports all R&S®M3TR EPM and modem options in the VHF and UHF range.

Design

The R&S®MG3500 HF power amplifier is modular with 19" rackmount design.

Any R&S®MR300xH/U transceiver can be operated as an exciter for controlling the R&S®MG3500 power amplifier. It can be replaced without requiring tools, or it may be used temporarily as a manpack transceiver.

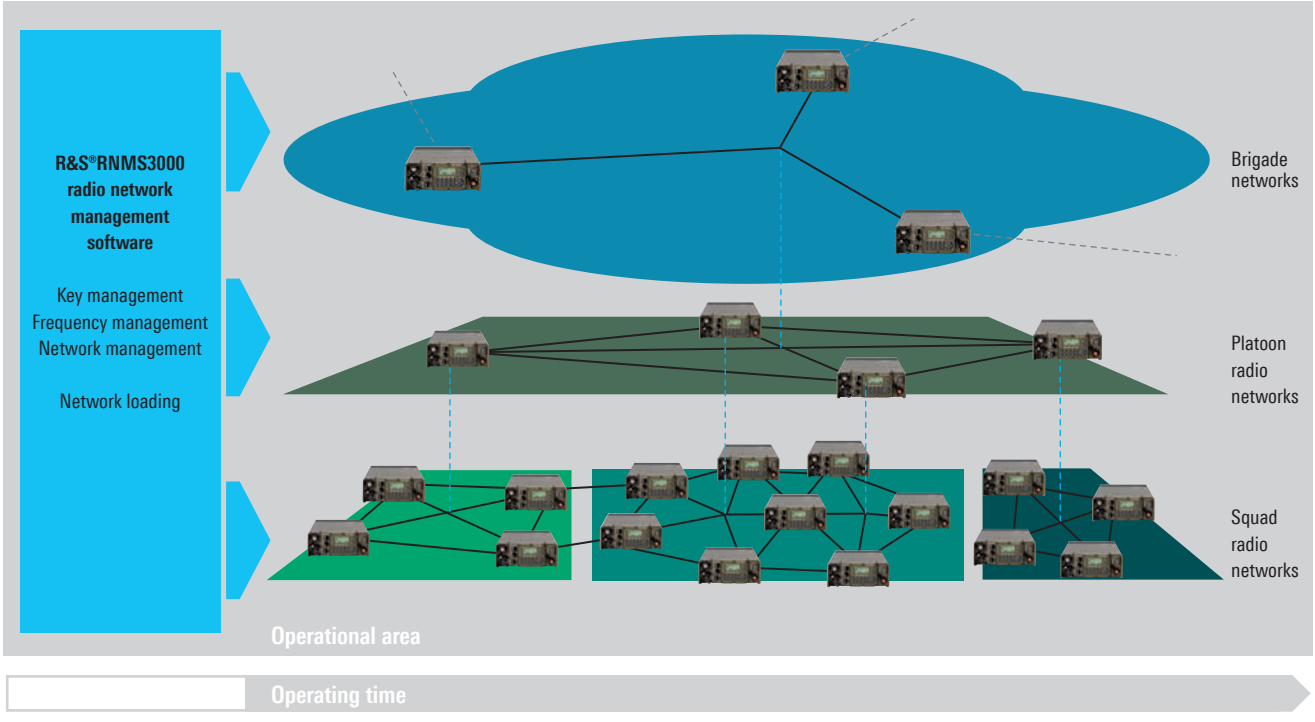
The interfaces on the manpack transceiver (audio, serial data/control, GPS antenna connector, etc.) of course remain accessible even after the transceiver has been installed in the R&S®MG3500.

R&S®RNMS3000 management software

Network, crypto, and frequency management capabilities

Today's armed forces apply communications planning in order to transform their combat radio equipment into a robustly networked communications system. They need a system that optimally supports the forces in accomplishing the mission at hand.

R&S®RNMS3000 for configuring Rohde&Schwarz radio networks



Brief description

R&S®RNMS3000 provides military leaders with the software they need to create such a system with their Rohde&Schwarz radios. R&S®RNMS3000 runs on a standard Windows-based PC or laptop, and allows military radiocommunications planning to become an integral part of the commanders' strategy. The HMI is optimally designed to provide a structural mission planning approach, as well as a graphical display, where the designed communications system can be overlayed with the tactical mission planning.

Key features

To provide mission-tailored and secure radiocommunications networks, the R&S®RNMS3000 software system offers the following functions:

Security key management

By means of R&S®RNMS3000, the user can generate keys or upload externally generated keys in black form, depending on the utilized waveform. This builds the necessary trust in the secure operation of the radiocommunications system.

Frequency assignments

As part of its planning function, R&S®RNMS3000 permits matching frequency assignments with current and future deployment scenarios and enables the user to do the following:

- Manage and assign single frequencies, frequency hopping (FH) and restricted frequencies
- Generate and manage hop sets

Establishment of logical networks

In order to provide maximum flexibility in the application of secure waveforms, R&S®RNMS3000 supports network management for the following waveform families:

- NATO-specific waveforms
- Waveforms based on the HF house
- R&S®SECOM waveforms
- R&S®SECOS waveforms

Centralized and decentralized system management

The R&S®RNMS3000 software supports centralized system management, i.e. where one central organizational unit performs all mission planning step. It also supports decentralized management, where the various configuration steps are accomplished at different echelons in the military hierarchy.

Moreover, the R&S®RNMS3000 software system provides a single data set that – when distributed to the required radios either via a fill device or a LAN connection – includes all parameters relevant to the immediately use of the radios within the defined logical network structure.

R&S®T@cMan

Transforming information into shared battlespace awareness

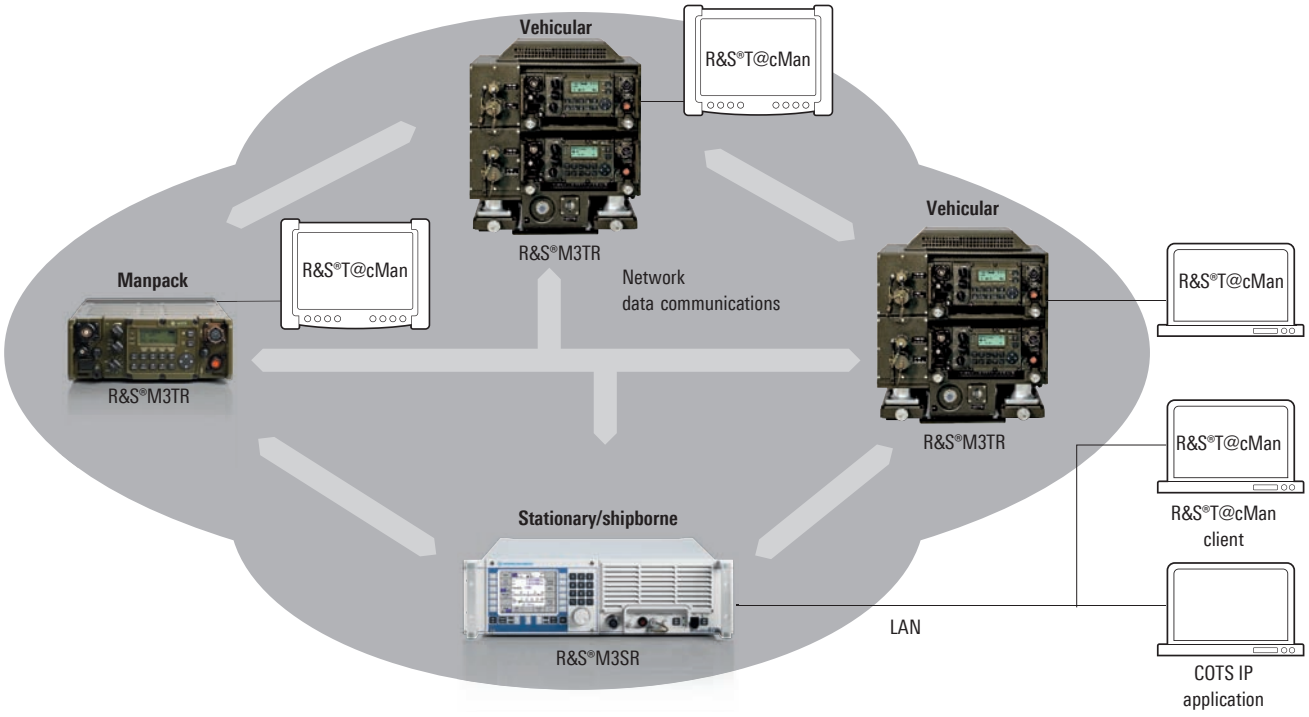
As the world faces new military challenges at the beginning of the 21st century, almost all modern armed forces are adapting from the industrial age to the information age. The new warfare is characterized by the ability of geographically dispersed forces to attain a high level of the shared operational picture that is exploited to achieve operational and tactical objectives.

The challenge

Consequently, this warfare must translate information advantage into combat power in the following ways:

- Effectively linking friendly forces within the battlespace
- Providing a much improved shared situation picture
- Enabling more rapid and effective decision-making at all levels of military operations
- Allowing for increased speed of execution

R&S®T@cMan



Brief description

R&S®T@cMan is a reliable, robust and comprehensive data communications solution for middle- to low-level forces, enabling them to do the following:

- Achieve improved information sharing
- Enhance the quality of information and shared situation picture
- Improve sustainability and speed of command
- Increase mission effectiveness

All these competitive edges have a direct impact on the full range of military actions that are part of major combat, stability and peacekeeping operations.

During military missions, time is of key essence. The soldiers do not have time to concentrate on the handling of their deployed systems. Consequently, R&S®T@cMan provides flawless and intuitive applications that build trust while maximizing the time for the soldiers' primary combat duties.

R&S®T@cMan is specially designed for tactical missions. In particular the multirole capability of these radios from Rohde&Schwarz provides maximum flexibility for manpack, vehicular or stationary deployment.

Key features

The following features characterize R&S®T@cMan as a state-of-the-art data transmission solution for modern forces:

Blue force tracking: broadcast of all relevant position information

For divisions down to the soldier on the front line, the key success factor for operating in line with the mission target is supported by R&S®T@cMan blue force tracking. Each BFT station collects the GPS positions of the units' members and consolidates the location report graphically on a digital map. As a result, the value of subordinate initiatives in operational speed and responsiveness is enhanced.

Operational awareness through chat feature

The observation of military situations is shared in near-real-time by the R&S®T@cMan chat application, which is used to create short text messages, prioritize them and transmit them simultaneously.

Mission-adequate e-mail

The intuitive e-mail feature provides all required functions for rapid creation and mission-optimized exchange of e-mail messages including attachments

Convenient use with the human-machine interface

For all its applications, R&S®T@cMan uses a human-machine interface (HMI) that is tailored to the military. It allows mission-critical information to be sent and received even during combat, without the soldiers neglecting their primary duty. The HMI especially supports the use of rugged tablet PCs with touch-screen mode.

Transcending the network limits via IP gateway

The IP gateway feature enables mobile forces to be connected beyond the radio network and to access mission-critical data provided via IP networks.

Increased unit safety with radio remote control

The radio remote control feature makes it possible to optimally utilize the connected radio from Rohde & Schwarz by monitoring and adjusting its performance. At the same time, the essential requirements for soldier safety are met, since the operator is spatially separated from the radio.

Ordering information

Designation	Type	Order No.
R&S®M3TR Radio Family		
HF/VHF Tactical Radio, 0.5 W to 10 W (HF up to 20 W)		
Int. GPS receiver, ATU, RS-232-C, and IP interface	R&S®MR3000H	6118.3000.04
Int. GPS receiver, ATU, RS-232-C, and IP interface; prepared for HAVE QUICK I/II and R&S®SECOS 516	R&S®MR3001H	6137.9300.04
Int. GPS receiver, ATU, RS-232-C, and IP interface; prepared for STANAG 4538/4539	R&S®MR3002H	6137.9400.04
Int. GPS receiver, ATU, RS-232-C, and IP interface; prepared for HAVE QUICK I/II, R&S®SECOS 516, and STANAG 4538/4539	R&S®MR3003H	6137.9500.04
VHF/UHF Tactical Radio, 0.5 W to 10 W		
Int. GPS receiver, RS-232-C, and IP interface	R&S®MR3000U	6118.3500.04
Int. GPS receiver, RS-232-C, and IP interface; prepared for HAVE QUICK I/II and R&S®SECOS 516	R&S®MR3001U	6137.9600.04
Int. GPS receiver, RS-232-C, and IP interface; prepared for STANAG 4538/4539	R&S®MR3002U	6137.9700.04
Int. GPS receiver, RS-232-C, and IP interface; prepared for HAVE QUICK I/II, R&S®SECOS 516, and STANAG 4538/4539	R&S®MR3003U	6137.9800.04
Handheld Transceiver		
Handheld Transceiver	R&S®MR3000P	6131.4307.10
Mating Connector Set (R&S®MR300xH/U)		
Connector Kit for R&S®M3TR transceiver	R&S®GK3004	6098.3253.02
R&S®SECOM Support Equipment (R&S®MR300xH/U)		
Key Generation Equipment for R&S®SECOM incl. R&S®KGE3000 key generation module and software for data communications and remote control	R&S®CP3000	6130.7983.XX
Fillgun for transmitting all relevant preset information, as well as COMSEC/TRANSEC keys	R&S®GP3000	6099.3805.02
Fillgun HAVE QUICK I/II for transmitting all relevant preset information	R&S®GP3100	6131.6039.02
Key Distribution Device for R&S®SECOS 516 TDMA	R&S®KDD3750	6131.2010.02
Single Remote Control Unit with 3.5 m connecting cable	R&S®GB3031R	6131.7106.03
Single Remote Control Unit with 8 m connecting cable	R&S®GB3031R	6131.7106.10
Single Remote Control Unit with 12 m connecting cable	R&S®GB3031R	6131.7106.15
Docking Stations and Accessories (R&S®MR300xH/U)		
Single Docking Station with blower; frame only; not operational without additional components	R&S®KG3031	6121.9006.13
Dual Docking Station with blower; frame only; not operational without additional components	R&S®KG3032	6123.1002.13
Ground Plate without shockmounts; standard; for R&S®KG3031/KG3032	R&S®KG3030G	6123.1502.02
Ground Plate without shockmounts; with slides; for R&S®KG3031/KG3032	R&S®KG3030G	6123.1502.12
Ground Plate with shockmounts; standard; for wheeled and tracked vehicles; for R&S®KG3031/KG3032	R&S®KG3032G	6123.1854.02
Ground Plate with shockmounts and slides; for wheeled and tracked vehicles; for R&S®KG3031/KG3032	R&S®KG3032G	6123.1854.12
Auxiliary Box; standard; incl. audio line, Ethernet, audio wideband and multipurpose I/O interface; for R&S®KG3031/KG3032	R&S®GB3130A	6131.5984.02
Auxiliary Box; field telephone; incl. audio line, Ethernet, audio wideband and multipurpose I/O interface; for R&S®KG3031/KG3032	R&S®GB3130A	6131.5984.03
RF Interface Option; rear connector for 2 × N output	R&S®GV3130B	6131.6900.02
RF Interface Option; rear connector for R&S®VT3050 and R&S®VK3150	R&S®GV3130B	6131.6900.03
RF Interface Option; rear connector for R&S®VK3150 and 1 × N output	R&S®GV3130B	6131.6900.04
Power Filter; max. 20 A; for R&S®KG3031	R&S®IZ3030F	6125.9600.02
Power Filter; max. 40 A; for R&S®KG3032	R&S®IZ3030F	6125.9600.03
Vehicular Mounts (R&S®MR300xH/U)		
Mounting Frame with shockmounts		
For R&S®VT3050 or R&S®VK3150 power amplifier	R&S®KS3000V	6099.6104.02
For R&S®VT3050C power amplifier	R&S®KS3001V	6140.9350.02
For R&S®FK3150 antenna tuning unit	R&S®KS3150F	6099.6004.02
Blower Unit for R&S®VK3150 or R&S®VT3050 power amplifiers	R&S®KL3000V	6118.0101.02

Designation	Type	Order No.
Audio Accessories (R&S®MR300xH/U)		
Handset with PTT microphone and earpiece	R&S®GA3001	6098.2505.02
Headset with PPT microphone and two earpieces	R&S®GA3002	6098.2605.02
Headset with PPT microphone and one earpiece	R&S®GA3002	6098.2605.03
Active Loudspeaker/Microphone	R&S®GA3003	6098.3001.02
Active Loudspeaker/Microphone	R&S®GA3023	6131.4707.02
Loudspeaker for connection to R&S®MR300xH/U audio socket with through-connection to R&S®GA3001/GA3002	R&S®GA3005	6137.7537.xx
Length of cable: 2 m		6137.7537.02
Length of cable: 5 m		6137.7537.05
Length of cable: 10 m		6137.7537.10
Batteries and Chargers (R&S®MR300xH/U)		
Standard Battery Pack, Li-Ion, rechargeable; 28.8 V/5.5 Ah	R&S®IB3001	6118.0201.03
Combat Battery Pack, Li-S02, non-rechargeable; 28 V/7.5 Ah	R&S®IB3002	6118.0253.03
Battery Charger, AC, stationary automatic charging of up to eight R&S®IB3001 Li-Ion batteries	R&S®IC3000	6098.2257.02
Battery Charger, DC, mobile automatic charging of one R&S®IB3001 Li-Ion battery	R&S®IC3001	6095.5755.02
(Power supply cables for chargers are to be ordered separately.)		
Power Amplifiers (R&S®MR300xH/U)		
150 W HF Power Amplifier for R&S®MR300xH/U transceivers; 1.5 MHz to 30 MHz	R&S®VK3150	6118.0301.02
50 W VHF/UHF Power Amplifier for R&S®MR300xH/U transceivers; 30 MHz to 512 MHz; with co-site filter	R&S®VT3050	6118.5503.02
50 W VHF/UHF Power Amplifier for R&S®MR300xH/U transceivers; 30 MHz to 512 MHz; without co-site filter	R&S®VT3050	6118.5503.03
50 W VHF/UHF Compact Power Amplifier for R&S®MR300xH/U transceivers	R&S®VT3050C	6140.9250.xx
30 MHz to 512 MHz; with co-site filter		6140.9250.02
30 MHz to 512 MHz		6140.9250.03
30 MHz to 512 MHz; with field telephone and audio/data		6140.9250.07
30 MHz to 512 MHz; with co-site filter, field telephone, and audio/data		6140.9250.17
Control Cables (R&S®MR300xH/U)		
Cable for connection of an R&S®VT3050 and an R&S®VK3150 power amplifier; 0.28 m length	R&S®GK3011	6130.2500.02
Cable for connection of an R&S®VT3050 and an R&S®VK3150 power amplifier; 0.5 m length	R&S®GK3011	6130.2500.03
Control Cable for connection of an R&S®VK3150 power amplifier and an R&S®FK3150 ATU	R&S®GK3012	6123.2909.xx
0.6 m length		6123.2909.02
0.8 m length		6123.2909.12
3 m length		6123.2909.03
20 m length		6123.2909.20
25 m length		6123.2909.25
50 m length		6123.2909.50
(Please note that always two R&S®GK3012 control cables are required.)		
Cable for connection of an R&S®VT3050 power amplifier and an R&S®KG3031/KG3032 docking station		
R&S®VT3050/R&S®VT3050C right-hand side; 1 m length	R&S®GK3030U	6130.2300.02
R&S®VT3050/R&S®VT3050C left-hand side; 1 m length	R&S®GK3030U	6130.2300.03
R&S®VK3150 right-hand side; 1 m length	R&S®GK3030H	6130.2400.02
R&S®VK3150 left-hand side; 1 m length	R&S®GK3030H	6130.2400.03
Data Cables (R&S®MR300xH/U)		
RS-232-C Data Cable for connecting an R&S®MR300xH/U to a PC; 2 m length	R&S®GK3003	6135.2109.02
RS-232-C Data Cable for connecting an R&S®MR300xH/U to a PC; 3 m length	R&S®GK3003	6135.2109.03
Cable for connecting the R&S®KG3031/KG3032 Ethernet interface to a PC; 2 m length	R&S®GK3018	6125.9200.02
USB Cable for connecting the R&S®GP3000 to a PC; 2 m length	R&S®GK3021	6118.1750.02
Cable for RS-232-C remote control and data; for connecting an R&S®MR300xH/U to a PC; 3 m length	R&S®GK3024	6135.2209.03
Cable for RS-232-C remote control; for connecting an R&S®MR300xH/U to a PC; 1 m length	R&S®GK3025	6135.2250.02
Cable for RS-232-C remote control; for connecting an R&S®MR300xH/U to a PC; 3 m length	R&S®GK3025	6135.2250.03
Data Download Cable R&S®KDD373/3750 <--> R&S®MR300xH/U; 3 m length	R&S®GK3026	6133.8380.03
Cable for remote control, RS-232-C data, and audio line; for connecting an R&S®MR300xH/U to external systems; 3 m length	R&S®GK3027	6137.7472.03

Designation	Type	Order No.
RF Cables (R&S®MR300xH/U)		
RF Cable N – N for connection of an R&S®VK3150 power amplifier and an R&S®FK3150 ATU	R&S®GK3013	6123.3005.xx
0.6 m length		6123.3005.02
0.9 m length		6123.3005.12
3 m length		6123.3005.03
5 m length		6123.3005.05
20 m length		6123.3005.20
25 m length		6123.3005.25
50 m length		6123.3005.50
RF Cable N – BNC for connection of an R&S®VK3150/VT3050/VT3050C power amplifier and an antenna	R&S®GK3014	6123.3105.xx
2 m length		6123.3105.02
5 m length		6123.3105.05
10 m length		6123.3105.10
20 m length		6123.3105.20
50 m length		6123.3105.50
GPS Cable TNC – SMA	R&S®GK3016	6125.8904.xx
2 m length		6125.8904.02
5 m length		6125.8904.05
10 m length		6125.8904.10
Power Supply Cables (R&S®MR300xH/U)		
Power Supply Cable for R&S®KG3031 and R&S®KG3032; 90° plug; 5 m length	R&S®GK3002	6125.8704.02
Power Supply Cable for R&S®KG3031 and R&S®KG3032; straight plug; 5 m length	R&S®GK3002	6099.3705.02
Power Supply and Ethernet Cable (RJ-45 plug) for R&S®MR300xH/U manpack transceivers (rear connector)	R&S®GK3009	6118.1608.02
Power Supply Cable for R&S®VK3150/VT3050/VT3050C power amplifiers; 5 m length	R&S®GK3015	6123.3205.00
Power Supply Cable for R&S®IC3001 charger ; 3 m length	R&S®GK3020	6118.1508.03
Power Supply Cable for R&S®IC3001 charger; plug 90°; 3 m length	R&S®GK3020	6118.1508.13
Further Cables (R&S®MR300xH/U)		
Cable Rebroadcast for connection of two R&S®MR300xH/U transceivers	R&S®GK3001	6099.3605.xx
2 m length		6099.3605.02
6 m length		6099.3605.06
10 m length		6099.3605.10
Cable for detachable front panel; max. 1.5 m length	R&S®GK3005	6118.1008.02
Manpack Antennas (R&S®MR300xH/U)		
Wire Antenna for manpack or stationary use; 1.5 MHz to 30 MHz; 150 W	R&S®AK3001	6118.1850.02
Wire Dipole Antenna for manpack use; 2 MHz to 90 MHz; 25 W; broadband antenna	R&S®AK3031	6099.8007.02
Wire Dipole Antenna for manpack use; 2 MHz to 90 MHz; 25 W; broadband antenna; with mast	R&S®AK3031	6099.8007.04
Mast for R&S®AK3031 wire dipole antenna; 7 m height	R&S®KM3032	6131.7306.02
Long Wire Antenna; 30 MHz to 88 (108) MHz; 30 W high-gain directional antenna	R&S®HD3001	6131.7406.02
Hang-Up Antenna; terminated with BNC connector; 30 MHz to 88 MHz; power rating 12.5 W into 50 Ω	R&S®HD3088	6092.1859.02
GPS Antenna for manpack and vehicle applications; active; magnetic holder; L1 band	R&S®HV3003	6118.2004.02
Whip Antenna for manpack; 25 MHz to 88 (108) MHz; 20 W	R&S®HV3004	6128.1400.02
Long Whip Antenna for manpack; 1.5 MHz to 30 MHz; 25 W	R&S®HV3007	6118.0853.02
Whip Antenna for manpack; 118 MHz to 400 MHz (88 MHz to 450 MHz); 15 W	R&S®HV3009	6126.5967.02
Vehicular Antennas (R&S®MR300xH/U)		
Whip Antenna for vehicle use; 1.5 MHz to 30 MHz; 400 W	R&S®HV3011	6099.7600.02
Whip Antenna for vehicle use; 30 MHz to 108 MHz; 75 W; low profile	R&S®HV3012	6099.7700.02
Whip Antenna for vehicle use; 30 MHz to 108 MHz; 75 W; low profile; with GPS base	R&S®HV3012	6099.7700.03
Whip Antenna for vehicle or stationary use; 225 MHz to 512 MHz; 50 W; center-fed	R&S®HV3013	6099.7800.02
Whip Antenna for vehicle use; 225 MHz to 512 MHz; 50 W; center-fed; with GPS base	R&S®HV3013	6099.7800.03
Whip Antenna for vehicle or stationary use; 30 MHz to 108 MHz; 50 W; center-fed	R&S®HV3015	6098.8803.02
Whip Antenna for vehicle use; 30 MHz to 108 MHz; 50 W; center-fed; with GPS base	R&S®HV3015	6098.8803.03
Whip Antenna for vehicle or stationary use; 108 MHz to 185 MHz; 50 W; center-fed	R&S®HV3018	6131.7506.02
Whip Antenna for vehicle use; 108 MHz to 185 MHz; 50 W; center-fed; with GPS base	R&S®HV3018	6131.7506.03
Whip Antenna for vehicle or stationary use; 100 MHz to 400 (512) MHz; 50 W; center-fed	R&S®HV3019	6131.7606.02
Whip Antenna for vehicle use; 100 MHz to 400 (512) MHz; 50 W; center-fed; with GPS base	R&S®HV3019	6131.7606.03

Designation	Type	Order No.
Stationary Antennas (R&S®MR300xH/U)		
Log-Periodic Dipole Antennas (high-gain directional antennas)		
30 MHz to 108 MHz; 100 W	R&S®HL3031	6099.9803.02
30 MHz to 108 MHz; 100 W; with mast	R&S®HL3031	6099.9803.04
220 MHz to 405 MHz; 100 W	R&S®HL3032	6099.9903.02
220 MHz to 405 MHz; 100 W; with mast	R&S®HL3032	6099.9903.04
30 MHz to 512 MHz; 100 W	R&S®HL3033	6118.0901.02
30 MHz to 512 MHz; 100 W; with mast	R&S®HL3033	6118.0901.04
Mast for R&S®HL3031, R&S®HL3032, and R&S®HL3033 log-periodic antennas; 8.5 m height	R&S®KM3031	6098.8903.02
Whip Antenna for stationary use; 225 MHz to 512 MHz; 50 W; center-fed; with mast	R&S®HV3013	6099.7800.04
Whip Antenna for stationary use; 30 MHz to 108 MHz; 50 W; center-fed; with mast	R&S®HV3015	6098.8803.04
Coaxial Dipole Antenna for vehicle or stationary use; 115 MHz to 1500 MHz; 250 W	R&S®HV3017	6118.0753.02
Coaxial Dipole Antenna for stationary use; 115 MHz to 1500 MHz; 250 W; with mast	R&S®HV3017	6118.0753.04
Whip Antenna for stationary use; 108 MHz to 185 MHz; 50 W; center-fed; with mast	R&S®HV3018	6131.7506.04
Whip Antenna for stationary use; 100 MHz to 400 (512) MHz; 50 W; center-fed; with mast	R&S®HV3019	6131.7606.04
GPS Antenna Supplement for R&S®HK055L1	R&S®KM055	6135.1825.02
(For further antennas, see the "Antennas HF-VHF/UHF-SF" catalog; PD 0758.0368.)		
Antenna Adapters (R&S®MR300xH/U)		
Long Wire Adapter for use of R&S®AK503 with R&S®FK3150	R&S®HZ3503	6118.2256.02
Long Wire Adapter for use of R&S®AK503 with R&S®MR3000H	R&S®HZ3503	6118.2256.03
Adapter, BNC, R&S®M3TR antenna connector to BNC	R&S®GK3019	6125.9300.02
Adapter, N, R&S®M3TR antenna connector to N	R&S®GK3019	6125.9300.03
Long Wire Adapter for use of wire antennas on R&S®M3TR manpack radios	R&S®GK3019	6125.9300.04
Antenna Tuning Unit (R&S®MR300xH/U)		
Antenna Tuning Unit for R&S®M3TR; 1.5 MHz to 30 MHz; 150 W	R&S®FK3150	6095.5855.02
Rucksacks and Manpack Bags (R&S®MR300xH/U)		
Transport Bag for R&S®KM011 mast; color: olive drab	R&S®MZ3011	6126.5680.03
Rucksack for R&S®AK3031 antenna; color: camouflage	R&S®MZ3031	6126.5580.02
Rucksack for R&S®AK3031 antenna; color: olive drab	R&S®MZ3031	6126.5580.03
Rucksack for R&S®MR300xH/U and accessories; color: camouflage	R&S®MZ3060	6098.2857.02
Rucksack for R&S®MR300xH/U and accessories; color: olive drab	R&S®MZ3060	6098.2857.03
Rucksack for R&S®MR300xH/U, R&S®XV3088 and accessories; color: camouflage	R&S®MZ3088	6092.2603.02
Transport Bag for R&S®AK503 antenna, antenna head, radiators, and ropes; color: olive drab	R&S®MZ3503	6126.5780.03
Test System for Radio Equipment of the R&S®M3xR Family		
I-Level Special Test Equipment (I-STE for R&S®M3AR, R&S®M3SR, R&S®M3TR)	R&S®TS6030	5200.xxxx.xx
Other types on request.		
Handheld Transceiver and Accessories (R&S®MR3000P)		
VHF Tactical Handheld Radio, 25 MHz to 145 MHz; 0.2/5 W; including R&S®SECOM-P EPM (ECCM) waveform (VHF/FM)	R&S®MR3000P	6131.4307.10
Fillgun for handheld transceiver; for transmitting all relevant preset information, as well as COMSEC/TRANSEC keys	R&S®GP3021	6131.4607.03
Handheld Microphone/Speaker	R&S®GA3023	6131.4707.02
Serial Data Cable	R&S®GK3028	6140.4606.02
Power Supply Cable for R&S®IV3021	R&S®GK3029	6131.5255.08
Battery Pack, Li-Ion, for R&S®MR3000P transceiver	R&S®IB3022	6131.4907.02
Battery Charger, AC, stationary, for R&S®MR3000P transceiver; automatic charging of up to eight R&S®IB3022 Li-Ion batteries	R&S®IC3022	6131.4959.02
Vehicle Support; vehicle mount with charger for R&S®MR3000P transceiver	R&S®IV3021	6131.5103.02
Long Tape Antenna for R&S®MR3000P transceiver; 1.1 m	R&S®HV3021	6131.4407.02
Short Tape Antenna for R&S®MR3000P transceiver; 0.5 m	R&S®HV3022	6131.4559.02
Bag for R&S®MR3000P transceiver	R&S®MZ3021	6131.4359.02
Set Bag for R&S®MR3000P transceiver and accessories	R&S®MZ3022	6131.4807.02
Battery Pack Bag for R&S®MR3000P transceiver	R&S®MZ3023	6131.4859.02

Service you can rely on

- In 70 countries
- Person-to-person
- Customized and flexible
- Quality with a warranty
- No hidden terms

About Rohde&Schwarz

Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

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Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

Certified Quality System
EN 9100
DQS REG. NO 310133 ASH

Certified Quality System
AQAP-2110
Audit report GP T3.1-NO 05.03

For data sheet, see
PD 5213.9228.22
PD 5214.0376.22
and www.rohde-schwarz.com

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Data without tolerance limits is not binding | Subject to change

*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.