

R&S® M3SR Series4400 Software Defined Radios VHF/UHF radio family for stationary and ship- borne communications



75 Years of
Driving
Innovation


ROHDE & SCHWARZ

R&S®M3SR Series4400 Software Defined Radios At a glance

The R&S®M3SR Series4400 VHF/UHF radio family is designed for stationary air defense, civil and military air traffic control and shipborne applications. It belongs to a generation of stationary VHF/UHF radios that feature innovative designs, high modularity and in particular outstanding specifications.

For civil applications, the R&S®M3SR Series4400 systems were developed in line with international civil air traffic control guidelines (EN 300676) while integrating the requirements for the UHF band I in line with EN 302617.

The R&S®M3SR Series4400 offers military customers a wide range of interfaces and associated proprietary frequency hopping waveforms, as well as radiocommunications schemes that conform to NATO standards. Military data transmission methods such as LINK 11 and LINK 22 are also supported. To ensure that existing R&S®M3SR Series4400 systems remain up-to-date, their functionality can be enhanced through subsequent software downloads and, if necessary, by using new hardware modules.

With this range of functions, the R&S®M3SR Series 4400 radio family serves as a seamless communications bridge between the various military forces and civil units.

Key facts

- Extended frequency range from 100 MHz to 512 MHz
- Output power up to 100 W for deployment with EPM (ECCM) waveforms
- Very high frequency stability by means of state-of-the-art OXCO technology
- Highly modular design, enabling subsequent expansion and easier service
- TCP/IP interface for remote control and for service/maintenance activities
- Continuous transmission at temperatures up to +55°C



R&S®M3SR Series4400 Software Defined Radios Benefits and key features

Unrivaled radio parameters

- Excellent RF characteristics
- Robust design for unfavorable RF conditions
- Integratable UHF circulator with VHF bypass function (optional)
- Frequency-agile pre-/postselector for best interference free operation (optional)

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Flexible range of applications through high modularity

- Highly modular design enables scalable radio systems
- Flexibility when selecting the voltage source (multirange AC power supply, direct DC input)
- Software defined radio concept

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Secure communications

- NATO and proprietary EPM (ECCM) waveforms (optional)
- Interface module for connecting IP-based UHF data modems (optional)
- Methods for secure data transmission over TDMA-based radio networks (optional)
- Interface for external encryption devices
- Network management for "black keys"
- Support for various LINK methods

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Low maintenance effort

- IP-based maintenance tool
- Powerful built-in test (BIT)
- Automatic adaptation to ambient conditions
- No tuning of the RF modules required
- High reliability

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R&S® M3SR Series4400 Software Defined Radios

Benefits and key features

Ease of operation

- ▮ Intuitive graphical user interface (HMI)
- ▮ Password-protected access
- ▮ Plain-text status and warning messages
- ▮ Automatic remote-control access management
- ▮ PC-based training software

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Flexible and safe investment for the future

- ▮ Hardware and software upgrades
- ▮ Integrated in the NATO logistics structure
- ▮ Low life-cycle costs

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Modular design of the
R&S® M3SR Series4400
radio family.

Unrivaled radio parameters

Excellent RF characteristics

The R&S®M3SR Series4400 radio family features excellent RF characteristics. The combination of analog and digital technology provides high signal purity that results in optimal transmission quality and extremely clear voice communications. Very fast frequency hopping in addition to compatible filter methods yield an optimal RF signal spectrum. This significantly reduces collocation influence that is typically caused by adjacent transmit and receive stations.

Frequency generation in the R&S®M3SR Series4400 systems is performed by a special, state-of-the-art synthesizer module to provide spectrally-pure signals and to ensure high-quality radio links. Very rapid frequency generation and frequency setting enables the use of fast EPM (ECCM) waveforms without having to sacrifice the high quality of the RF signals.

Robust design for unfavorable RF conditions

R&S®M3SR Series4400 radio systems are prepared for operation in unfavorable RF environments. Even antennas that create a high voltage standing wave ratio (VSWR) can be connected without difficulty. The negative impact of high receive levels is compensated for by the excellent RF large-signal immunity, leading to outstanding voice and data transmission quality. Protection circuits prevent damage from occurring to the R&S®M3SR Series4400 modules.

Integratable UHF circulator with VHF bypass function (optional)

The R&S®M3SR Series4400 radio family can be equipped with an optional UHF circulator. These circulators help to significantly reduce intermodulation products, which further improves system compatibility.

Integrating a circulator in the radio avoids the need for complex external circuitry and measures. The R&S®GD4400 circulator is equipped with a bypass for the VHF band and is available as an upgrade kit.

Frequency-agile pre-/postselector for best interference free operation (optional)

Many radios require a large number of antennas that must be properly decoupled to prevent the effects of collocation from influencing the operation of the radio system. To minimize these influences, the R&S®M3SR Series4400 radio family can be equipped with an optional filter system. The R&S®FD4430 filter is bidirectional and provides additional RF decoupling of adjacent equipment to permit vastly interference-free operation in demanding RF environments. Wideband noise generated by the radio system as well as the influence of crossmodulation are considerably reduced.

The R&S®FD4430 filter works with EPM (ECCM) waveforms. The ability to integrate the filter into the radio system saves additional space and reduces installation effort.

Flexible range of applications through high modularity

In order to meet the individual needs of the customers, the R&S®M3SR Series4400 radio family features a highly modular design. Depending on the mission scenario the radios are configured provide the specific functions that are required. Furthermore, the functional characteristics of the R&S®M3SR Series4400 radios are defined by means of the specially-designed software.

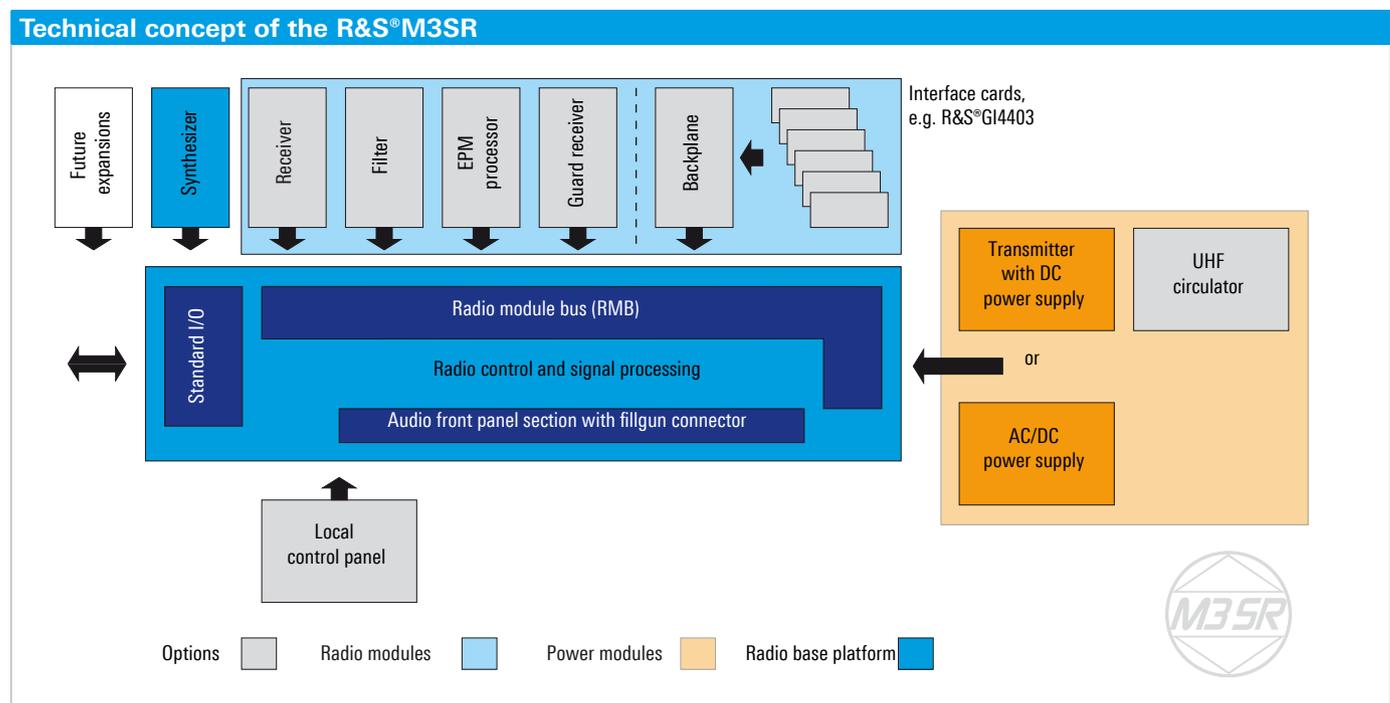
Highly modular design enables scalable radio systems

The R&S®M3SR Series4400 radio family features a highly modular design. This structure is maintenance-friendly, leads to correspondingly short repair times (MTTR) and makes it easy to adapt the system to the customer requirements. All R&S®M3SR Series4400 radio systems have the same base configuration that serves as a logistical platform for adapting them as needed.

The radio modules are updated by replacing them with new versions, which offers scalability. The modular design allows the radio system to be equipped with new functions and options.

Flexibility when selecting the voltage source (multirange AC power supply, direct DC input)

All R&S®M3SR Series4400 radios come standard with two independent DC inputs. One input is used for the main power supply, and the second for a redundant source. The radio monitors both inputs and automatically switches them when required. An external multirange AC power supply available from Rohde&Schwarz enables operation of the radio with conventional AC power grids. The power supply is monitored automatically by means of a BIT function in the R&S®M3SR Series4400 radio. The AC power supply complies with current standards and contains active power factor correction. Supply voltage fluctuations are compensated for without affecting operation of the radio.



Software defined radio concept

All software elements of the radio system, including the waveforms and software options, can be loaded into the radio as needed by using the R&S®ZS4400 service and maintenance tool. Numerous software packages are available for this purpose. This approach also allows functional enhancements to be loaded at a later time with this approach. That means existing software functions can be enhanced without opening the radio or replacing hardware modules.

The current status of the software is shown in a comprehensive inventory report, which contains the status of all versions of the software and its components.

R&S®M3SR Series4400 in an R&S®MX400 mobile tower.



ATC/air defense applications of the R&S®M3SR Series4400.



R&S®M3SR Series4400 naval application.

Secure communications

The R&S®M3SR Series4400 radio family features a range of different methods for transmitting voice and data, which are loaded in the radio as software. The R&S®M3SR Series4400 radio family also has diverse standardized interfaces for connecting external modems in order to support special transmission methods. This leads to higher data throughput rates due to the larger transmission bandwidth.



NATO and proprietary EPM (ECCM) waveforms (optional)

In addition to supporting the well-established NATO EPM (ECCM) UHF waveforms HAVE QUICK I/II and SATURN, the R&S®M3SR Series4400 radio family also features a range of proprietary schemes. For HAVE QUICK I/II and SATURN, the R&S®M3SR Series4400 radio family has interfaces that permit the use of NATO-standard fillgun devices for loading the EPM (ECCM) configuration. The required voice and data interfaces conform to NATO specifications.

Encryption devices such as the ELCRODAT 4-2, which are used in NATO applications in conjunction with EPM (ECCM) waveforms, can be easily connected to and operated with the R&S®M3SR Series4400.

Proprietary EPM (ECCM) waveforms such as R&S®SECOS contain embedded software encryption for secure communications. Together with customer-specific algorithms and methods for secure data transfer, users benefit from a comprehensive, versatile communications package.

Multiple EPM (ECCM) waveforms can be loaded into a radio — for instance HAVE QUICK I/II together with R&S®SECOS. The desired method can be selected by using the remote control unit or the built-in local control panel.

Interface module for connecting IP-based UHF data modems (optional)

The R&S®UX4401 IF interface module with 70 MHz IF interface is designed for use with a variety of existing external modems that have a standard IF interface. This RF interface allows the use of diverse waveforms with larger transmission bandwidths, through which high data rates can be achieved. The external UHF amplifiers and integrated UHF filters of the R&S®M3SR Series4400 can continue to be utilized in this case. These waveforms can thus be used even in demanding RF environments with unfavorable collocation conditions. Fine adjustment of the radio parameters helps achieve low bit error rates, which makes it possible, in particular, to attain longer ranges. The R&S®UX4401 IF interface module can also be integrated in existing R&S®M3SR Series4400 systems at a later point with the R&S®UX4401-U upgrade kit.

Methods for secure data transmission over TDMA-based radio networks (optional)

The R&S®M3SR Series4400 radio family supports different data transmission modes via the R&S®SECOS method. One of these modes is based on time division multiple access (TDMA). In a TDMA network, a large number of participants can be part of a structured data network over which data information is automatically exchanged. Network participants can also switch dynamically between different TDMA networks. Multiple TDMA data networks can be combined into a large data network. Data can be exchanged across all subnetworks involved. Data transmission is encrypted with the option of using either fixed frequency mode or frequency hopping. The figure below depicts a typical scenario. An R&S®SECOS TDMA network can be utilized for joint armed forces operations. In addition to the R&S®M3SR Series4400, R&S®M3AR and R&S®M3TR radios are also deployed.

Interface for external encryption devices

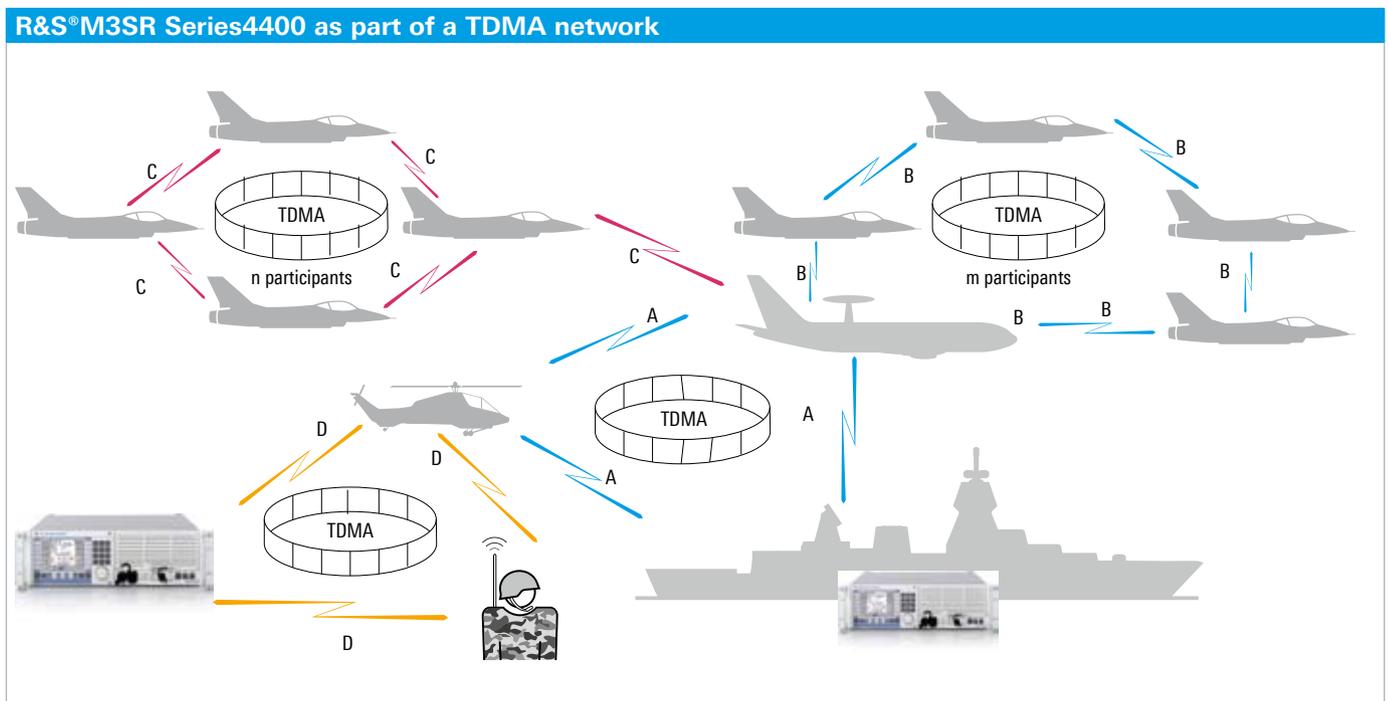
The wideband interfaces of the R&S®M3SR Series4400 are specially designed for operation with external encryption devices. The required frequency responses and bandwidths are optimized accordingly. This leads to optimal transmission results, which are reflected in the attainable range and the high transmission quality.

Network management for "black keys"

In conjunction with the proprietary EPM (ECCM) waveform, encrypted configuration data can be loaded directly in the R&S®M3SR Series4400 radios via the remote control interface. This data can consist of new keys or data sets, which are used for secure communications. This vastly simplifies the management, structure and configuration of such systems.

Support for various LINK methods

Besides EPM (ECCM) waveforms, the R&S®M3SR Series4400 radio family supports tactical digital information link (TADIL) methods such as LINK 11 and LINK 22. Both methods are an integral part of the current and future NATO communications structure.



Low maintenance effort

The R&S®M3SR Series4400 radios were developed with low maintenance effort in mind. A variety of control and monitoring functions are available that furnish the user with detailed status information about the radios. In addition, built-in test functions permit service and maintenance tasks to be carried out in a targeted manner. The radio systems can be remotely analyzed, eliminating the need for on-site service. Resistance to vibrations and a wide operating temperature range allow the systems to be used in diverse applications.

IP-based maintenance tool

The IP-based R&S®ZS4400 service and maintenance tool is a vital accessory for the R&S®M3SR Series4400 radio systems. It works in any standard IP network, requires no additional cable or device drivers and is ready to be used on conventional laptop computers.

A wealth of useful functions are available that can not only track the status of the radios in detail, but also transfer configurations from one radio to another. This function, described as cloning, permits the fast, time-saving and error-free dissemination of radio-specific settings to the R&S®M3SR Series4400 systems. Cloning makes it easier to replace a system with another system of the same type such as when service and maintenance is required. The R&S®ZS4400 service and maintenance tool is also used to load the radio software.

Powerful built-in test (BIT)

In addition to the normal power-up BIT (PBIT) and continuous BIT (CBIT), the R&S®M3SR Series4400 also features an initiated BIT (IBIT) for checking the receive and transmit functions of the system. The transmitter and receiver are tested simultaneously by means of an internal loopback that routes the transmitter signal directly back to the receiver. The radio then analyzes the signal on the receive side and documents any deviations. The R&S®GB4000C remote/local control unit contains an IBIT that can also be used to perform an on-site interactive check of the functions. The IBIT can be carried out after expanding and reconfiguring the radio, following a software download or also in regular cycles, all without external test equipment.

Automatic adaptation to ambient conditions

When ambient conditions such as temperature, supply voltage or VSWR are outside the permissible range, the transmitter will decrease its own power stepwise in order to maintain operation as long as possible. If ambient conditions return to normal, the transmitter will revert to normal operation without requiring any manual intervention. The user is notified of this status via a message. The radio is monitored by means of temperature sensors. Cooling levels are automatically adapted to the ambient conditions.

R&S®GB4000C remote/local control unit.



No tuning of the RF modules required

The R&S®M3SR Series4400 radio family requires neither additional settings nor calibration. Even if a module is replaced or if a radio is retrofitted with additional modules, no manual settings are required on the modules. The module parameters can be modified after delivery by using the R&S®GB4000C remote/local control panel.

A built-in, high-grade oven controlled crystal oscillator (OCXO) ensures high frequency accuracy.

High reliability

Rohde & Schwarz boasts decades of experience in the design and production of electronic modules, particularly in the field of RF technology, which ensures that its R&S®M3SR Series4400 radios provide a high level of reliability and functional readiness.

The perfect synergy of mechanics, temperature monitoring and cooling makes sure that high ambient temperatures, vibrations and humidity do not impact performance or cause damage to the radio. The extremely powerful, software-controlled cooling assures stable continuous operation and long life even in unfavorable ambient conditions such as low air pressure (10 000 m above sea level). The MTBF achieved in practice is more than 50 000 operating hours.

R&S®ZS4400 service and maintenance tool



Ease of operation

Rohde & Schwarz has extensive experience with stationary radio systems, which is reflected in the operating concept of the R&S®M3SR Series4400 radios. The displays and control elements are arranged in a user-friendly manner and are easy to understand.

Intuitive graphical user interface (HMI)

Complex radio methods require a simple user interface (human machine interface, HMI). The user interface of the R&S®M3SR Series4400 radio family is clearly laid out and uses icons for intuitive control. These icons allow the user to immediately draw conclusions regarding the current operating mode of the radio without pressing a key, which significantly increases ease of operation. They also simplify the orientation in the menu structure of the control unit to ensure fast and reliable configuration of the radio system.

Configuration of the radio and the modules, including their comprehensive functions, is displayed via clearly-arranged tabs, which can be used to quickly select and configure the settings. This makes navigation fast, straightforward and simple.

The HMI is presented on the TFT display of the R&S®GB4000C control unit, which is available as a stand-alone or built-in version.

Password-protected access

The areas that contain the settings for maintenance and configuration of the radio are protected by a password. This ensures that only authorized personnel can carry out maintenance or in-depth configuration of the radio. This concept is based on many years of practical experience.

Plain-text status and warning messages

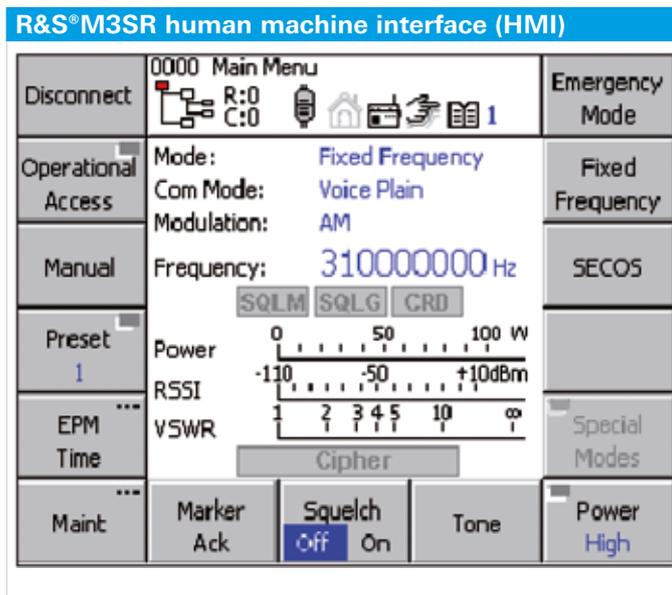
Because status and warning messages are highly important to the user, they are visually differentiated from the rest of the display. Messages are displayed in a menu in plain text so that any user can immediately comprehend them. Critical and waveform-dependent status messages are color-coded and a warning tone is generated. All warning messages are stored in the radio for later analysis. Readout and storage in an external medium is possible with the R&S®ZS4400 service and maintenance tool.

Automatic remote-control access management

For large-scale systems that have multiple local or remote control units, access management is necessary in order to enable remote control of the radio systems using several control units and to coordinate access. The HMI graphically displays the access authorization level and the status of the links, for immediate identification.

PC-based training software

The human machine interface (HMI) of the R&S®M3SR Series4400 is available as a software-based training version. This makes it possible to conduct training on the operation of the radio using a commercially available PC. Simulations and training can be performed in a near-real environment.



Flexible and safe investment for the future

R&S®M3SR Series4400 radios offer a safe investment for the future. The flexible concept is designed for long-term use. The functionality of the system can be expanded via hardware and software so that it scales to new requirements.

Hardware and software upgrades

The software defined architecture of the R&S®M3SR Series4400 radios makes it possible to procure equipment with the required, up-to-date functionality. Upgrading and reconfiguring at a later point enables the system to adapt to changing requirements and needs. This permits a timely response to new standards and customer requirements and as a result is the most cost-effective approach to procuring radio equipment.

Integrated in the NATO logistics structure

The R&S®M3SR Series 4400 radio family is included in the NATO logistics structure. Current R&S®M3SR Series4400 radio models have a corresponding NATO stock number (NSN).

The parts and components were selected specifically with reliability and long-term availability in mind to assure their reliable procurement over a longer time frame. For selection, Rohde & Schwarz relied on its decades of experience in the production of high-quality electronic equipment.

Low life-cycle costs

The R&S®M3SR Series4400 radio family features convincingly low life-cycle costs that are achieved through the following features:

- Minimum training efforts due to the user-friendly HMI concept
- No cyclical calibration of the radio required
- Fast on-site repairs due to module replacement; very low MTTR (15 min)
- Integrated, highly-precise, maintenance-free and stable clocking source (OCXO)
- Washable and reusable dust protection
- Software-regulated cooling fans
- High MTBF

Sample application

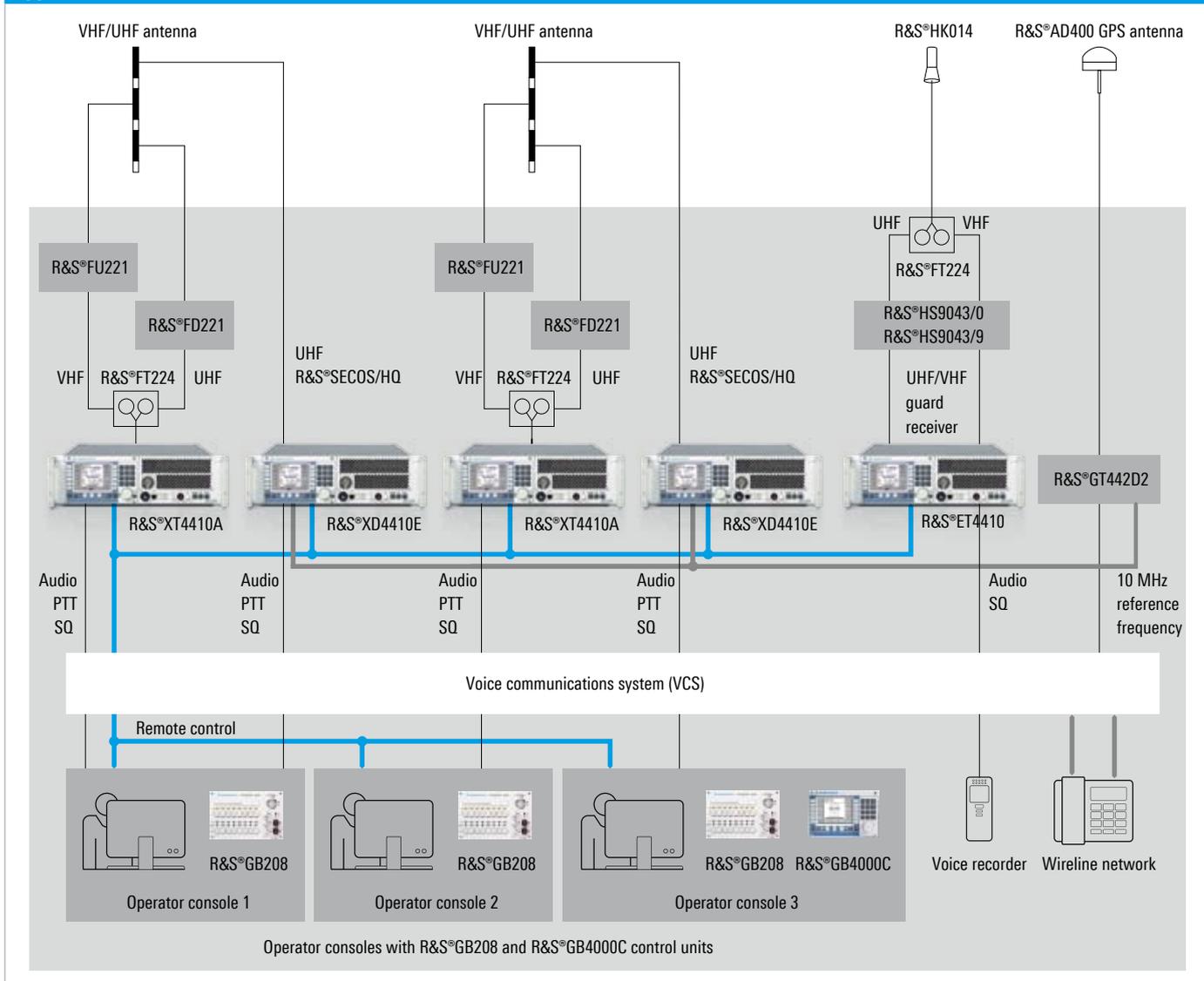
Radio systems in the R&S®MX400 mobile ATC tower

R&S®M3SR Series4400 radios in conjunction with the R&S®MX400 tower provide mobile solutions for military and civil ATC applications. Since multiple radio systems and their associated antennas must be simultaneously operated in extremely tight quarters, users face a highly demanding RF environment. This can be overcome by deploying integrated R&S®M3SR Series 4400 filters and by using external VHF/UHF filter units from Rohde&Schwarz.

Such filter concepts are essential, particularly for voice and data applications that use EPM (ECCM) waveforms.

The radio systems are operated with local and remote control units from Rohde&Schwarz.

Typical ATC/air defense solution with the mobile air traffic control tower



Sample application

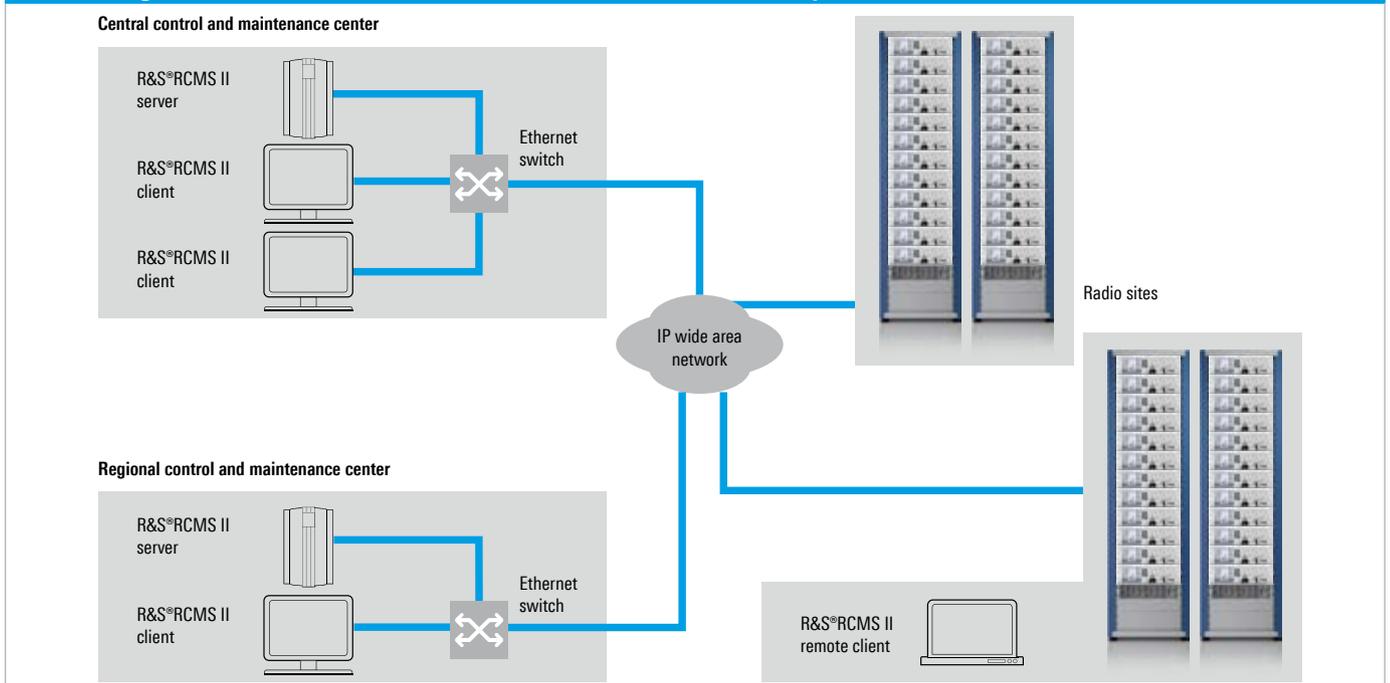
Monitoring and control of radio systems

A vast majority of the military and civil ATC radio systems within a country are interlinked via secure networks. These networks enable the functional and seamless monitoring and remote control of nationwide ATC/air defense systems. Depending on the requirements, multiple remote control and monitoring stations are deployed.

To support this need, the R&S®RCMS II system is available for the centralized remote control and monitoring of Rohde&Schwarz radios from one or more sites. Operators can use this solution to cost-effectively and rapidly react to error conditions and to configure operational parameters for the respective scenarios.

R&S®RCMS II is designed for monitoring scenarios ranging from individual airports to nationwide radio systems. The radios are shown in both a tree view and a map view. The map view shows the location and basic configuration of each radio. Individual radios can be quickly selected and managed. For customers who wish to perform their own statistical analysis, R&S®RCMS II records the relevant data and makes it available via a data export interface. R&S®RCMS II software can be flexibly configured for customer-specific radio systems. The control and monitoring of a nationwide radio system is carried out from a central station. Depending on the requirements, R&S®RCMS II systems can also be utilized locally. For maintenance purposes, R&S®RCMS II clients are deployed at the radio sites. Additional Rohde&Schwarz radios can be brought into the R&S®RCMS II system quickly and easily, including new radios in existing stations or completely new stations.

Monitoring and control of a nationwide ATC/air defense radio system

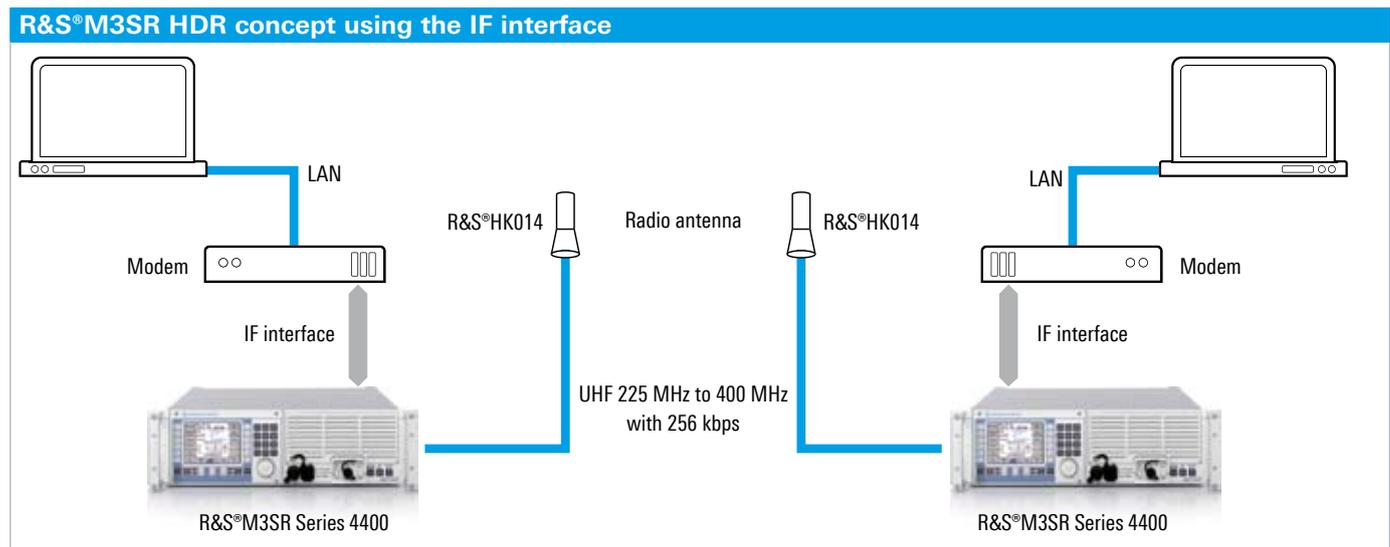


Sample application

High data rate transmissions

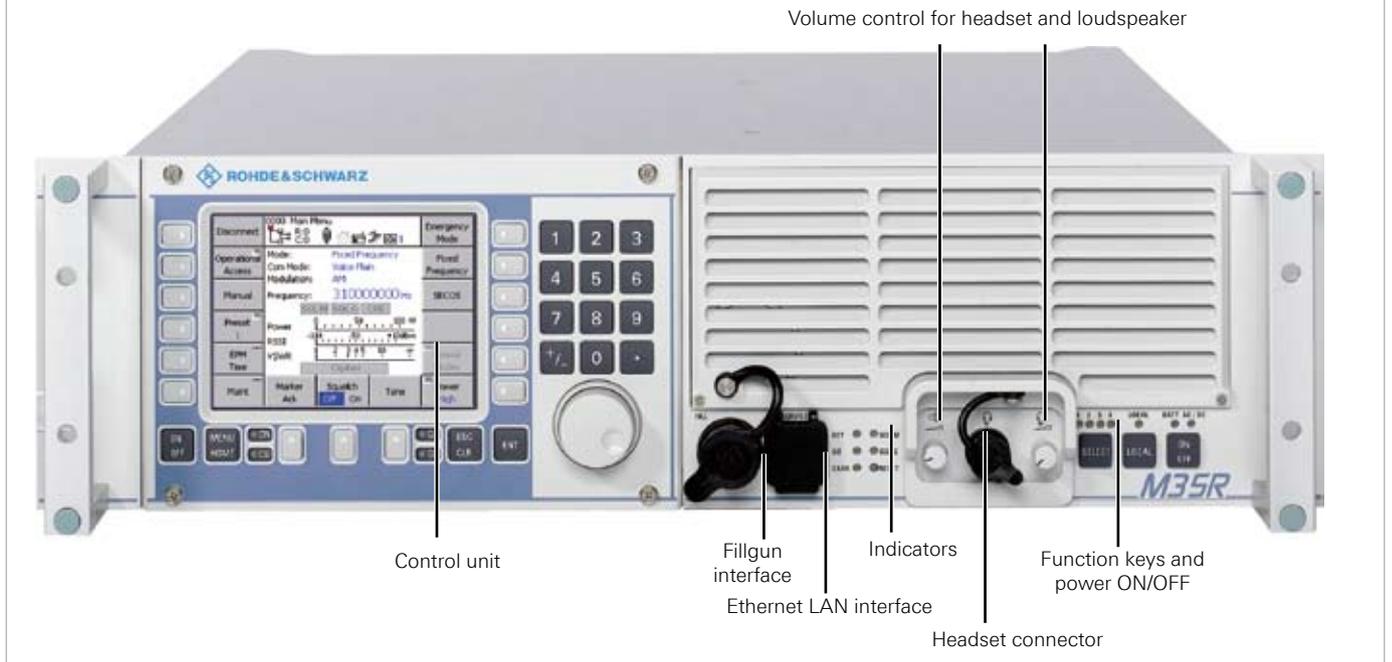
The demand for high data transmission rates grows continuously with the volume of data that is accumulated. This calls for transmission methods that provide high data transmission rates while requiring minimum of RF bandwidth. The HDR concept of the R&S®M3SR Series 4400 radio family meets this need. The optional R&S®UX4401 70 MHz IF interface is used to connect commercially available data modems with IF interfaces to the R&S®M3SR Series 4400 radio family. Conversion of the RF signal to the UHF band is carried out by the R&S®M3SR Series 4400 radios. By optimally matching the internal RF parameters of the R&S®M3SR Series 4400 system to one another, HDR operation is enabled for long ranges and high data rates of up to 256 kbps.

These types of data transmission concepts open up a wide range of interesting naval and air defense applications. Existing R&S®M3SR Series 4400 systems can be retrofitted with the IF interface.

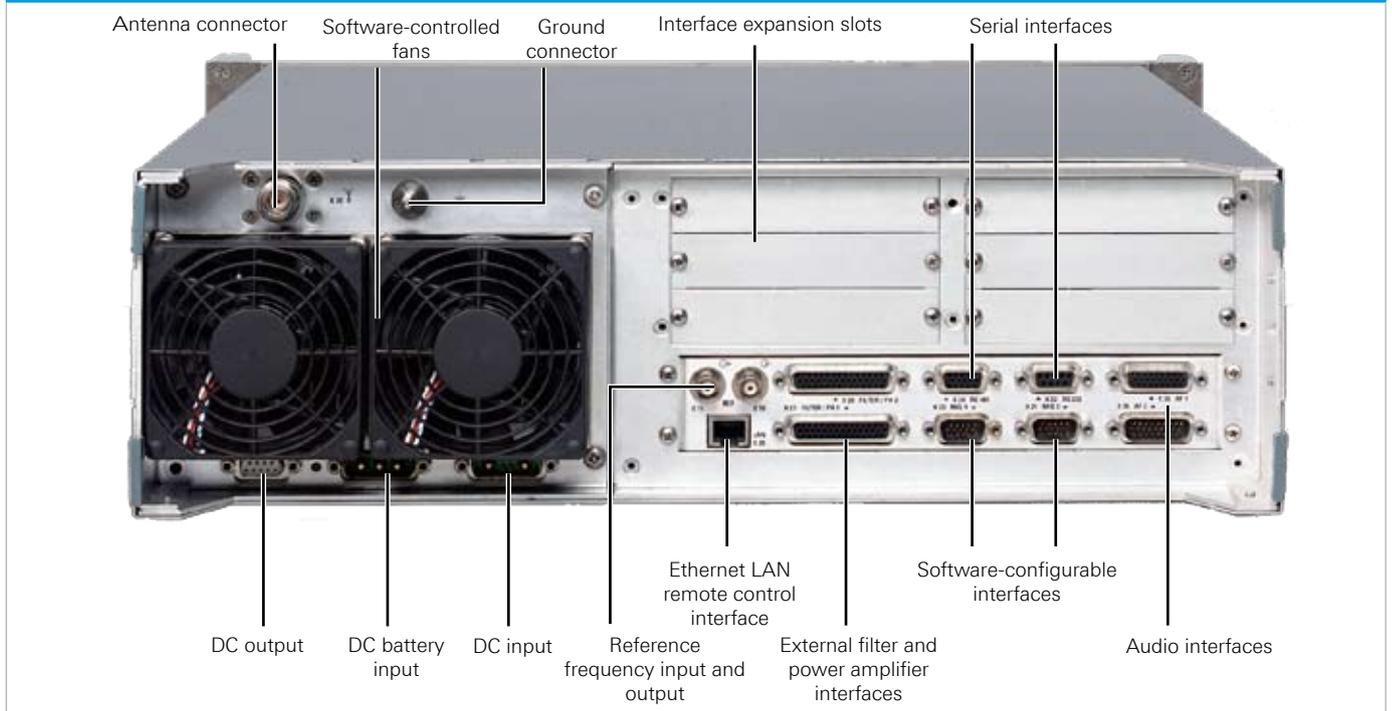


R&S®M3SR Series4400 Software Defined Radios

R&S®M3SR Series4400 front view



R&S®M3SR Series4400 rear view



R&S®M3SR Series4400 Software Defined Radios Options

Due to its modular design, the R&S®M3SR Series4400 radio family features a range of interesting options that can be retrofitted in existing systems.

The options are divided into:

- Hardware options
- Software options
- Combined hardware and software options

The options are managed and activated with the R&S®ZS4400 service and maintenance tool, which belongs to the R&S®M3SR Series4400 equipment family.

Selection of typical retrofittable options for the R&S®M3SR Series4400

Software option	R&S®DS4400A-U	Upgrade kit for LINK 11/Y mode
Software/hardware option	R&S®DS4400J-U	HAVE QUICK I/II upgrade kit with EPM (ECCM) processor
Software/hardware option	R&S®DS4400M-U	SATURN upgrade kit with EPM (ECCM) processor
Software/hardware option	R&S®DS4400L-U	R&S®SECOS 5/16 TDMA upgrade kit with EPM (ECCM) processor
Hardware option	R&S®FD4430-U	Integrated frequency-agile UHF pre-/postselector
Hardware option	R&S®ET4000G-U	Guard receiver for VHF and UHF distress frequencies
Hardware option	R&S®UX4401-U	70 MHz IF interface for UHF data applications
Hardware option	R&S®GI4403-U	Antenna interface upgrade kit for separate receive and transmit antennas



Software option for the R&S®M3SR Series4400 radio family.

Ordering information

Transceiver with fixed frequency functionality (R&S®M3SR Series4400)

Designation	Type	Order No.
VHF/UHF Transceiver (R&S®M3SR Series4400)		
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; fixed frequency; with local control unit, OCXO; ruggedized	R&S®XT4410A	6122.7059.03
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; fixed frequency; with local control unit, OCXO; R&S®ET4400G, UHF circulator and VHF bypass; ruggedized	R&S®XT4410A	6122.7059.52
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; fixed frequency; with local control unit, OCXO, R&S®UX4401, separate main receiver antenna; ruggedized	R&S®XT4410A	6122.7059.70
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; fixed frequency; with local control unit, OCXO, R&S®UX4401; ruggedized	R&S®XT4410A	6122.7059.75
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; fixed frequency; without local control unit; with OCXO; ruggedized	R&S® XT4460A	6122.7007.03
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; fixed frequency; without local control unit; with OCXO, R&S®ET4400G; ruggedized	R&S® XT4460A	6122.7007.31
UHF Transceiver (R&S®M3SR Series4400)		
UHF Transceiver 225 MHz to 400 MHz; 30 W AM/100 W FM; DC; fixed frequency; with local control unit, OCXO; ruggedized	R&S®XD4410A	6122.7107.03
UHF Transceiver 225 MHz to 400 MHz; 30 W AM/100 W FM; DC; fixed frequency; with local control unit, OCXO, LINK; ruggedized	R&S®XD4410A	6122.7107.13
UHF Transceiver 225 MHz to 400 MHz; 30 W AM/100 W FM; DC; fixed frequency; without local control unit; with OCXO; ruggedized	R&S®XD4460A	6122.7120.03
UHF Transceiver 225 MHz to 400 MHz; 30 W AM/100 W FM; DC; fixed frequency; without local control unit; with OCXO, R&S®GI4403 var.02; ruggedized	R&S®XD4460A	6122.7120.05
UHF Transceiver 225 MHz to 400 MHz; 30 W AM/100 W FM; DC; fixed frequency; without local control unit; with OCXO, LINK; ruggedized	R&S®XD4460A	6122.7120.13
VHF Transceiver (R&S®M3SR Series 4400) On request		

Transceiver with HAVE QUICK I/II; R&S®SECOS 5/16 functionality (R&S®M3SR Series 4400)

Designation	Type	Order No.
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; HAVE QUICK I/II and R&S®SECOS 5/16; with local control unit, OCXO; ruggedized	R&S®XT4410E	6122.7259.03
UHF Transceiver (R&S®M3SR Series 4400) On request		

Transceiver with R&S®R&S®SECOS 5/16 functionality (R&S®M3SR Series 4400)

Available equipment as listed, other equipment on request.

Designation	Type	Order No.
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; R&S®SECOS 5/16; with local control unit, OCXO; ruggedized	R&S®XT4410L	6122.7207.03
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; R&S®SECOS 5/16 TDMA; with local control unit, OCXO; ruggedized	R&S®XT4410L	6122.7207.08
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; R&S®SECOS 5/16 TDMA; with local control unit, OCXO, LINK; ruggedized	R&S®XT4410L	6122.7207.18
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; R&S®SECOS 5/16 TDMA; with local control unit, OCXO, R&S®FD4430; ruggedized	R&S®XT4410L	6122.7207.28
UHF Transceivers (R&S®M3SR Series 4400) On request		

Transceiver with HAVE QUICK I/II functionality (R&S®M3SR Series 4400)

Available equipment as listed, other equipment on request.

Designation	Type	Order No.
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; HAVE QUICK I/II; with local control unit, OCXO; ruggedized	R&S®XT4410J	6122.7159.03
UHF Transceiver (R&S®M3SR Series 4400)		
On request		

Transceiver with SATURN/HAVE QUICK I/II functionality (R&S®M3SR Series 4400)

Available equipment as listed, other equipment on request.

Designation	Type	Order No.
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; SATURN/HAVE QUICK I/II; with local control unit, OCXO; ruggedized	R&S®XT4410M	6122.7307.03
VHF/UHF Transceiver 100 MHz to 512 MHz; 30 W AM/100 W FM; DC; SATURN/HAVE QUICK I/II; with local control unit, OCXO, LINK, R&S®ET4400G, UHF circulator and VHF bypass; ruggedized	R&S®XT4410M	6122.7307.51

Accessories

Designation	Type	Order No.
Mating connector sets		
Mating Connector Set suitable for all R&S®M3SR Series 4400 radios, with circular connector	R&S®ZF4410	6105.9011.02
Mating Connector Set suitable for all R&S®M3SR Series 4400 radios, without circular connector	R&S®ZF4410	6105.9011.03
Power supplies		
Power Supply, AC/DC, front panel with dust filter and prepared for IP32, ruggedized, 19", 1 HU	R&S®IN4000A	6105.5500.04
Power Supply Cable, R&S®M3SR Series 4400 <-> R&S®IN4000A, length 0.5 m	R&S®GK4103	6105.5639.05
Power Supply Cable, R&S®M3SR Series 4400 <-> R&S®IN4000A, length 1 m	R&S®GK4103	6105.5639.10
Power Supply Cable, R&S®M3SR Series 4400 <-> R&S®IN4000A, length 2.5 m	R&S®GK4103	6105.5639.25
Remote control units		
Control Panel for R&S®M3SR, without audio, with software and LAN, DC, ruggedized	R&S®GB4000C	6105.6006.06/36
Mating Connector Set for R&S®GB4000C	R&S®ZF4410	6105.9011.04
Audio accessories		
Headset including microphone, ruggedized, with cable and NF-7 connector	R&S®GA012	0693.7664.02
Handset, ruggedized, with cable and NF-7 connector	R&S®GA013	0693.7712.02
Headset, dynamic, with cable and NF-7 connector	R&S®GA015	0583.6012.02
Headset, ultralight electret microphone, single earphone (dynamic), with cable and NF-7 connector	R&S®GA015L	6082.9663.02
Microphone, with cable and NF-7 connector, handheld type	R&S® GA016H1	0583.5568.02
Mechanical accessories		
Protective Plate for 19" front panel (for ruggedized R&S®M3SR Series 4400 radios only)	R&S®KA4401	6122.3901.02
Portable Case for R&S®M3SR Series 4400 and R&S®IN4000A power supply, RAL 1002, matt finish, 5 HU	R&S®KK4401	6123.4001.02
Service and maintenance tool		
Service and Maintenance Tool (for WindowsXP, Windows2000)	R&S®ZS4400	6102.2600.03
I-Level Test Equipment (I-STE) for R&S®M3AR, R&S®M3SR, R&S®M3TR	R&S®TS6030	on request

R&S®GT442D2 timing system

Description	Type	Order No.
Timing system		
Timing System with GPS-disciplined rubidium oscillator, GPS antenna and R&S®GT400-S software, 19" rackmount, 3 HU	R&S®GT442D2	6114.4002.02
Signal Distributor for R&S®GT442D2 timing systems	R&S®GV430	6073.2518.02

R&S®VU220L and R&S®VD480L VHF/UHF power amplifiers

Designation	Type	Order No.
VHF/UHF power amplifiers		
VHF Power Amplifier, 200 W, 118 MHz to 144 MHz, 200 W AM/300 W FM with RF bypass relay, 19" 4 HU rackmount, for export outside the European Union only	R&S® VU220L	6083.3517.02
UHF Power Amplifier, 100 W, 225 MHz to 400 MHz, 100 W AM carrier/150 W FM linear amplifier with RF bypass relay, 19" rackmount, 6 HU, 230 V, without control cable	R&S®VD480L	6032.0504.23
UHF Power Amplifier, 100 W, 225 MHz to 400 MHz, 100 W AM carrier/150 W FM linear amplifier with RF bypass relay, 19" rackmount, 6 HU, 110 V, without control cable	R&S®VD480L	6032.0504.33
Programming Device for R&S®VD480L UHF power amplifier	R&S®ZT480L	6043.5948.02
Cable		
Control Cable, R&S®M3SR <--> R&S®VD480L, length 2 m		6127.1007.02
Control Cable, R&S®M3SR <--> R&S®VD480L, length 1.2 m		6127.1007.12

R&S®Fx221 and R&S®Fx213 VHF/UHF filters and multicouplers

Designation	Type	Order No.
VHF/UHF filters and multicouplers		
Multichannel (automatic) filters and multicouplers (R&S®Series221)		
UHF Automatic Filter, 225 MHz to 400 MHz, 300 W FM, 19" rackmount, 5 HU	R&S®FD221	0633.8012.02
UHF Two-Port Automatic Multicoupler, 225 MHz to 400 MHz, 300 W FM, with installation kit for 19" special rack, with two filters	R&S®FD221W2	0643.2517.02
UHF Four-Port Automatic Multicoupler, 225 MHz to 400 MHz, 300 W FM, with installation kit for 19" special rack, with four filters	R&S®FD221W4	0643.4510.02
UHF Three-Port Automatic Multicoupler, 225 MHz to 400 MHz, 300 W FM, with installation kit for 19" special rack, with three filters	R&S®FD221W4	0643.4510.04
VHF Automatic Filter, 100 MHz to 162 MHz, 300 W FM, 19" rackmount, 5 HU	R&S®FU221	0643.6012.02
VHF Two-Port Automatic Multicoupler, 100 MHz to 162 MHz, 300 W FM, with installation kit for 19" special rack, with two filters	R&S®FU221W2	0643.3513.02
VHF Four-Port Automatic Multicoupler, 100 MHz to 162 MHz, 300 W FM, with installation kit for 19" special rack, with four filters	R&S®FU221W4	0643.5516.02
VHF Three-Port Automatic Multicoupler, 100 MHz to 162 MHz, 300 W FM, with installation kit for 19" special rack, with three filters	R&S®FU221W4	0643.5516.04
Filter Control Cable for R&S®M3SR Series4400, length 2 m	R&S®ZT297-3	6115.4412.02
Filter Control Cable for R&S®M3SR Series4400, length 5 m	R&S®ZT297-3	6115.4412.05
Multichannel (automatic) filters with bypass filter for guard receiver (R&S®Fx213A/214A series)		
UHF Automatic Filter 225 MHz to 400 MHz, 50 W AM/100 W FM, 19" rackmount, 3 HU	R&S®FD213A	0637.4311.05
UHF Automatic Filter, 225 MHz to 400 MHz, 19" rackmount, 3 HU, with two filters (2 x UHF)	R&S®FD213A2	0652.5815.05
VHF/UHF Automatic Filter, 100 MHz to 162 MHz/225 MHz to 400 MHz, 50 W AM/100 W FM, 19" rackmount, 3 HU	R&S®FT213A	0637.4011.05
VHF Automatic Filter, 100 MHz to 162 MHz, 50 W AM/100 W FM, 19" rackmount, 3 HU	R&S®FU214A	0637.4611.05
Control Cable for R&S®Fx213A/Fx214A filters, for R&S®M3SR Series4400, length 2 m	R&S®FU214Z2	6115.4429.02

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PD 0758.1093.12 | Version 04.00 | May 2009 | R&S®M3SR Series 4400
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