Quick Start Guide

Universal
Radio Communication Tester

R&S® CMU 300
1100.0008.03

ROHDE&SCHWARZ

Test and Measurement Division

www.valuetronics.com

The firmware of the instrument makes use of several valuable open source software packages. The most important of them are listed below together with their corresponding open source license. The verbatim license texts are provided in on the user documentation CD-ROM (included in delivery).

Package	Link	License
STLPort	http://www.stlport.org/	STLPort License
InfoZIP	http://www.info-zip.org	Copyright InfoZIP
UNTGZ	http://www.t-st.org/untgz_f.htm	GNU GPL v. 2 / R&S Copyright
MD5	http://www.rsa.com	Copyright RSA Data Security
Axis2	http://ws.apache.org/axis2/	Apache License v. 2.0
Jetty Server	http://www.mortbay.org/	Apache License v. 2.0
Xerces	http://xerces.apache.org/xerces2-j/	Apache License v. 2.0

This product includes UNTGZ for DOS (http://www.t-st.org/untgz_f.htm), and includes as the GPL'ed source code for this program

Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

The following abbreviations are used throughout this manual:
R&S®CMU is abbreviated as R&S CMU or CMU.
Options R&S®CMU-xxx are abbreviated as R&S CMU-xxx or CMU-xxx (e.g. CMU-B41).

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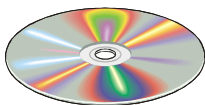
R&S CMU Documentation Map

Quick Start Guide

The present quick start guide describes everything that is needed to put the instrument into operation and helps you to get familiar with the radio communication tester. In particular, the quick start guide describes the safety-related aspects to be observed when setting up or operating the instrument. The guide contains:

- The product brochure and specifications
- Safety instructions
- Certificates
- Customer support information, Rohde & Schwarz addresses
- Chapter 1: Preparation for Use
- Chapter 2: Getting Started
- Index for chapter 1 and chapter 2

Documentation CD-ROM

The CD-ROM provides the complete user documentation for the radio communication testers R&S CMU 200 and R&S CMU 300:

- Printable versions of the complete operating manual (including the contents of this quick start guide) and the service manual
- Printable versions of the manuals for R&S CMU network test options (see order list on the following page) and accessories
- Help systems corresponding to the contents of the quick start guide and to the complete operating manual
- The product brochure and specifications in printable form.
- Application notes and articles
- Links to different useful sites in the R&S internet.

Optional Documentation
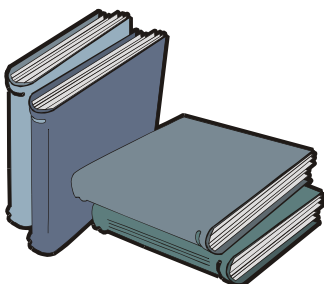
The complete operating manual for the radio communication testers R&S CMU 200 and R&S CMU 300 and the manuals for the network test options provide the complete reference information for operation and programming. The service manual instrument contains the performance test and other service-related information.

Printed versions of the manuals can be ordered as options; see ordering information on the next page.

Note: *The CD-ROM delivered with the instrument contains printable (.pdf) versions of all these manuals.*

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R&S CMU Models

This manual describes the Universal Radio Communication Tester R&S CMU 300, stock no. 1100.0008.03, for GSM and WCDMA base station tests.

The Universal Radio Communication Tester R&S CMU 200 for mobile station tests, stock no. 1100.0008.02/53 is described in a separate quick start guide, stock no. 1100.4978.62.

CE

Certificate No.: 99035, page 1

This is to certify that:

Equipment type	Stock No.	Designation
CMU200	1100.0008.02/.10/.30/.53	Universal Radio Communication Tester
CMU300	1100.0008.03	

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits
  (73/23/EEC revised by 93/68/EEC)

- relating to electromagnetic compatibility
  (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

EN61010-1 : 2001-12
EN61326-1 : 1997 + A1 : 1998

For the assessment of electromagnetic compatibility, the limits of radio interference for Class B equipment as well as the immunity to interference for operation in industry have been used as a basis.

Affixing the EC conformity mark as from 1999

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München

Munich, 2006-02-06   Central Quality Management FS-QZ / Radde

ROHDE&SCHWARZ
EC Certificate of Conformity

CE

Certificate No.: 99035, page 2

This is to certify that:

Equipment type	Stock No.	Designation
CMU-B11	1100.5000.02	Reference Oscillator
CMU-B12	1100.5100.02	Reference Oscillator
CMU-B15	1100.6006.02	Additional RF und IF Connections
CMU-B17	1100.6906.02	IQ and IF Interfaces
CMU-B21	1100.5200.02/.14/.54	Versatile Signalling Unit
CMU-B41	1100.5300.02	Audio Generator and Analyzer
CMU-B52	1100.5400.02/.14	Spreech Codec for Versatile Signalling Unit
CMU-B53	1100.5700.02/.14	Bluetooth Extension
CMU-B54	1150.2604.14	Sig. Module
CMU-B56	1150.1850.14	3GPP Signalling Unit
CMU-B66	1149.9509.02	Versatile Base Band Board
CMU-B68	1149.9809.02	Layer1 Board
CMU-B71	1100.6406.02	ABIS Interface Unit
CMU-B73	1150.2004.02	Analog Telephon Line Interface
CMU-B76	1150.0601.02	Layer1 Board for WCDMA
CMU-B78	1159.1800.02	Layer1 Board for WCDMA

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits
  (73/23/EEC revised by 93/68/EEC)

- relating to electromagnetic compatibility
  (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

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Munich, 2006-02-06   Central Quality Management FS-QZ / Radde

CE

Certificate No.: 99035, page 3

This is to certify that:

Equipment type	Stock No.	Designation
CMU-B81	1100.6506.02	CDMA(IS95) Signalling Unit
CMU-B82	1150.0201.02/.04	ACCESS Board für CDMA Signalling Unit
CMU-B83	1150.0301.02/.04/.12/.14	CDMA2000 Signalling Unit
CMU-B85	1100.7002.02/.04/.12	Speech Codec for CDMA2000
CMU-B87	1150.2404.02/.04	Message Monitor for CDMA2000
CMU-B88	1158.9908.02	1xEV-DO Extension
CMU-B95	1159.0504.02	Additional RF Generator
CMU-B96	1159.1600.02	Additional RF Generator
CMU-B99	1150.1250.02	RF1 Level Range identical to RF2
CMU-U61	1100.5500.02	Floppy Disk Drive
CMU-Z1	1100.7490.02	Memory Card

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits
  (73/23/EEC revised by 93/68/EEC)

- relating to electromagnetic compatibility
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ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München

Munich, 2006-02-06

Central Quality Management FS-QZ / Radde

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built and tested in accordance with the attached EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for any intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories.

Symbols and safety labels

Notice, general danger location Observe product documentation	Caution when handling heavy equipment	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Be careful when handling electrostatic sensitive devices

ON/OFF supply voltage	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double (reinforced) insulation

Tags and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE indicates the possibility of incorrect operation which can result in damage to the product.
In the product documentation, the word ATTENTION is used synonymously.

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: predefined operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of ±10 % shall apply to the nominal voltage and ±5 % to the nominal frequency.

2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or death.

3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or death.

Electrical safety

If the information on electrical safety is not observed either at all to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.

2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with an earthing contact and protective earth connection.

3. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

4. If the product does not have a power switch for disconnection from the AC supply network, the plug of the connecting cable is regarded as the disconnecting device. In such cases, always ensure that the power plug is easily reachable and accessible at all times (corresponding to the length of connecting cable, approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, a disconnecting device must be provided at the system level.

5. Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.

6. The product may be operated only from TN/TT supply networks fused with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).

7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks that result in fire and/or injuries may occur.

8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.

9. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.

10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC60950-1/EN60950-1 or IEC61010-1/EN 61010-1 standards that apply in each case.

11. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.

12. If a product is to be permanently installed, the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.

13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.

14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.

15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.

16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1. Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.

17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.

18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

1. Operating the products requires special training and intense concentration. Make sure that persons who use the products are physically, mentally and emotionally fit enough to do so; otherwise, injuries or material damage may occur. It is the responsibility of the employer/operator to select suitable personnel for operating the products.

2. Before you move or transport the product, read and observe the section titled "Transport".

3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.

4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal", item 1.

5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.

6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.

7. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.

2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.

3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.

4. Keep cells and batteries out of the hands of children. If a cell or a battery has been swallowed, seek medical aid immediately.

5. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.

6. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.

7. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.

8. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.

2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.

3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Waste disposal

1. If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.

2. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

Informaciones elementales de seguridad

Es imprescindible leer y observar las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad adjunto de la UE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.
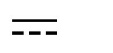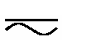
Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o sin tener en cuenta las instrucciones del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del mal uso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Símbolos y definiciones de seguridad

Aviso: punto de peligro general\n\nObservar la documentación del producto	Atención en el manejo de dispositivos de peso elevado	Peligro de choque eléctrico	Adver-tencia: superficie caliente	Conexión a conductor de protección	Conexión a tierra	Conexión a masa	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)

Tensión de alimentación de PUESTA EN MARCHA / PARADA	Indicación de estado de espera (Standby)	Corriente continua (DC)	Corriente alterna (AC)	Corriente continua / Corriente alterna (DC/AC)	El aparato está protegido en su totalidad por un aislamiento doble (reforzado)

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.

⚠ PELIGRO   PELIGRO identifica un peligro inminente con riesgo elevado que provocará muerte o lesiones graves si no se evita.

⚠ ADVERTENCIA   ADVERTENCIA identifica un posible peligro con riesgo medio de provocar muerte o lesiones (graves) si no se evita.

⚠ ATENCIÓN   ATENCIÓN identifica un peligro con riesgo reducido de provocar lesiones leves o moderadas si no se evita.

AVISO   AVISO indica la posibilidad de utilizar mal el producto y, como consecuencia, dañarlo.
En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación del producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de ±10 % sobre el voltaje nominal y de ±5 % sobre la frecuencia nominal.

2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, pueden causarse lesiones o incluso la muerte.

3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.

2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.

3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.

4. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de conexión como interruptor. En estos casos se deberá asegurar que el enchufe siempre sea de fácil acceso (de acuerdo con la longitud del cable de conexión, aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.

5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.

6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).

7. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.

8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.

9. En las mediciones en circuitos de corriente con una tensión U_{eff} > 30 V se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).

10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.

11. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar lesiones, fuego o daños en el producto.

12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.

13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.

14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.

15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.

16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.

17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.

18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.

2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".

3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados, los llamados alérgenos (p. ej. el níquel). Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.

4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación", punto 1.

5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalizar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.

6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.

7. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.

2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.

2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.

3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.

4. Mantener baterías y celdas fuera del alcance de los niños. En caso de ingestión de una celda o batería, avisar inmediatamente a un médico.

5. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.

6. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.

7. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).

8. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.

2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.

3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación

1. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polvos con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.

2. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

Customer Information Regarding Product Disposal

The German Electrical and Electronic Equipment (ElektroG) Act is an implementation of the following EC directives:

- 2002/96/EC on waste electrical and electronic equipment (WEEE) and
- 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).
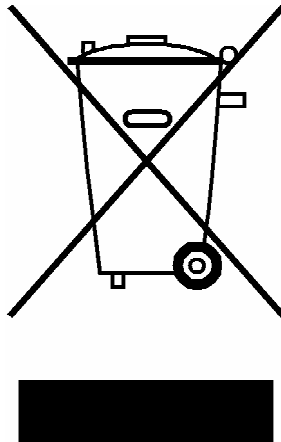
Product labeling in accordance with EN 50419

Once the lifetime of a product has ended, this product must not be disposed of in the standard domestic refuse. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Rohde & Schwarz GmbH & Co. KG has developed a disposal concept for the environmental-friendly disposal or recycling of waste material and fully assumes its obligation as a producer to take back and dispose of electrical and electronic waste in accordance with the ElektroG Act.

Please contact your local service representative to dispose of the product.

ROHDE & SCHWARZ

1171.0200.52-01.01

Certified Quality System

DIN EN ISO 9001 : 2000
DIN EN 9100 : 2003
DIN EN ISO 14001 : 2004

DQS REG. NO 001954 QM UM

QUALITÄTSZERTIFIKAT

Sehr geehrter Kunde,
Sie haben sich für den Kauf eines
Rohde & Schwarz-Produktes ent-
schieden. Hiermit erhalten Sie ein
nach modernsten Fertigungsme-
thoden hergestelltes Produkt. Es
wurde nach den Regeln unseres
Managementsystems entwickelt,
gefertigt und geprüft.
Das Rohde & Schwarz Management-
system ist zertifiziert nach:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:2004

CERTIFICATE OF QUALITY

Dear Customer,
you have decided to buy a Rohde &
Schwarz product. You are thus as-
sured of receiving a product that is
manufactured using the most modern
methods available. This product was
developed, manufactured and tested
in compliance with our quality mana-
gement system standards.
The Rohde & Schwarz quality
management system is certified
according to:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:2004

CERTIFICAT DE QUALITÉ

Cher Client,
vous avez choisi d'acheter un produit
Rohde & Schwarz. Vous disposez
donc d'un produit fabriqué d'après les
méthodes les plus avancées. Le
développement, la fabrication et les
tests respectent nos normes de ges-
tion qualité.
Le système de gestion qualité de
Rohde & Schwarz a été homologué
conformément aux normes:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:2004

ROHDE&SCHWARZ

1171.0200.11-03.00

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Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

USA & Canada	Monday to Friday 8:00 AM – 8:00 PM	(except US public holidays) Eastern Standard Time (EST)
	Tel. from USA From outside USA Fax	888-test-rsa (888-837-8772) (opt 2) +1 410 910 7800 (opt 2) +1 410 910 7801
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East Asia	Monday to Friday 8:30 AM – 6:00 PM	(except Singaporean public holidays) Singapore Time (SGT)
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◆ Sales Locations
◆ Service Locations
◆ National Websites

Contents

1 Preparation for Use

This chapter describes the controls and connectors of the Universal Radio Communication Tester CMU and gives all information that is necessary to put the instrument into operation and connect external devices. Notes on reinstallation of the CMU software and a description of the *VersionManager* appear at the end of this chapter.

Caution!

Please observe the instructions of the following sections so that you cannot cause damage to the instrument or endanger people. This is of particular importance when you use the instrument for the first time. Also observe the general safety instructions at the beginning of this manual.

A more detailed description of the hardware connectors and interfaces can be found in chapter 8 of the complete operating manual. Chapter 2 of the operating manual provides an introduction to the operation of the CMU by means of typical examples of configuration and measurement; for a description of the operating concept refer to Chapter 3.

For remote control of the CMU refer to the general description of the SCPI commands, the instrument model, the status reporting system, and measurement control in Chapter 5 of the operating manual.

Front View

The front panel of the CMU consists of the VGA display with the softkey area (left side) and the hardkey area (right side, see Fig. 1-1). Brief explanations on the controls and connectors of the hardkey area and the rear panel are to be found on the next pages. Operation by means of softkeys is described in Chapter 3 of the operating manual, *Manual Operation*.

Fig. 1-1   CMU front view

Data input

Selection of the most important
CMU functions via menus

Loudspeaker, for
future extensions
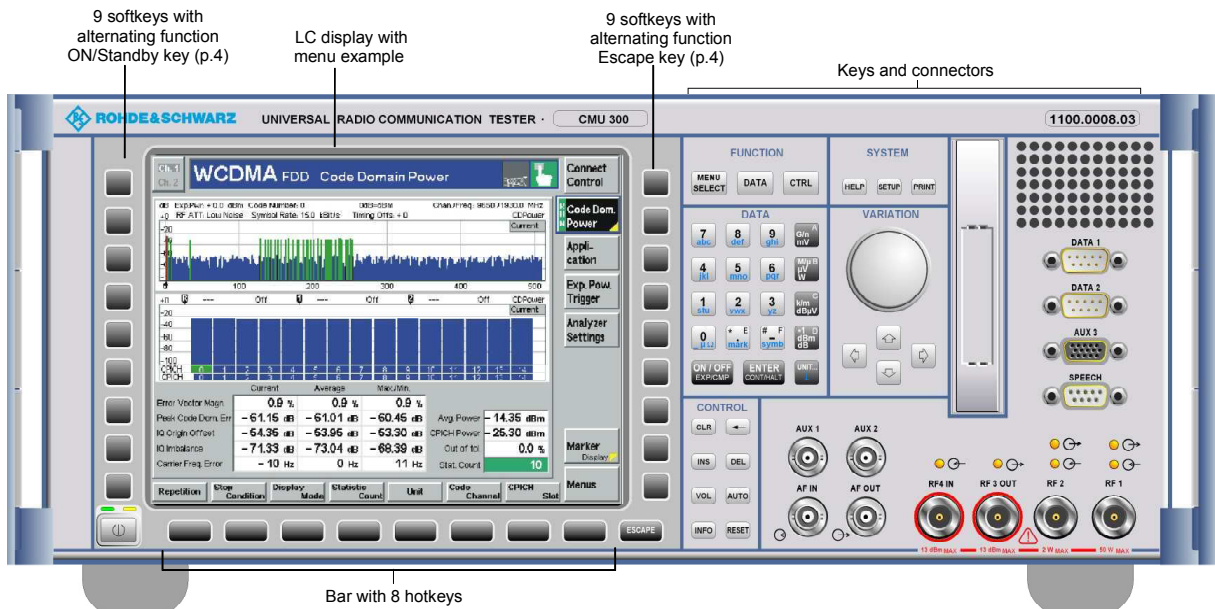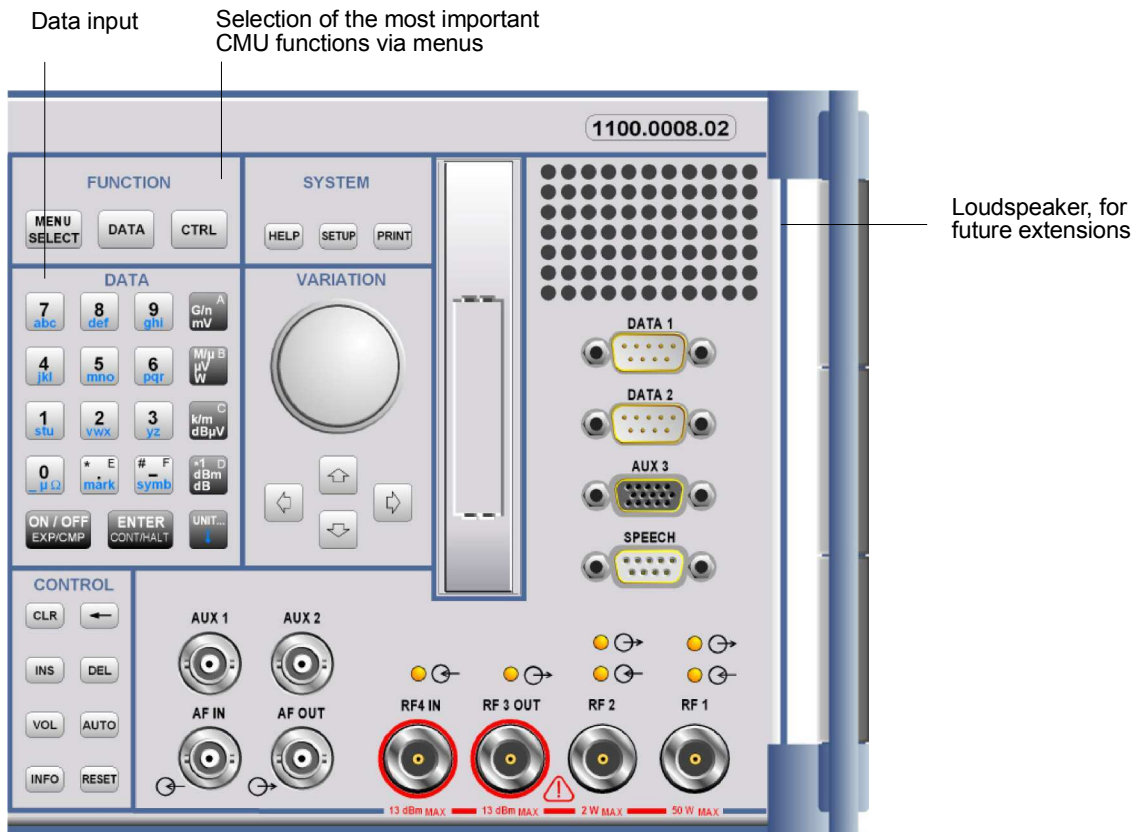
Fig. 1-2   CMU front view – hardkeys

FUNCTION   *Operating manual*

Preselection of the menus:

MENU SELECT	Menu selection	☞ Chap. 3
DATA	File manager	Chap. 4
CTRL	For GSMxxx-MS Signalling tests: Measurement Wizard	

DATA   *Operating manual*

Data input:

0 ... 9	Numerical input (letters for string editors)	☞ Chap. 3
* . E	Special characters, dec. point, hex value "E"	
# - F	Spec. characters, sign change, hex value "F"	
G/n mV A	Factor $10^9/10^{-9}$, unit, hex value "A"	
M/μ μV W	Factor $10^6/10^{-6}$, unit, hex value "B"	
k/m dB μV	Factor $10^3/10^{-3}$, unit, hex value "C"	
*1 dBm dB	Factor 10^0, unit, hex value "D"	
ON / OFF	Switching on/off editors/measurements *EXP/COMP*	
ENTER *CONT/HALT*	Confirmation of entry in editors Calling/quitting editors, measurement control	
UNIT ⇩	For future extensions	

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System control   Variation of numeric values and
group selection in popup menus
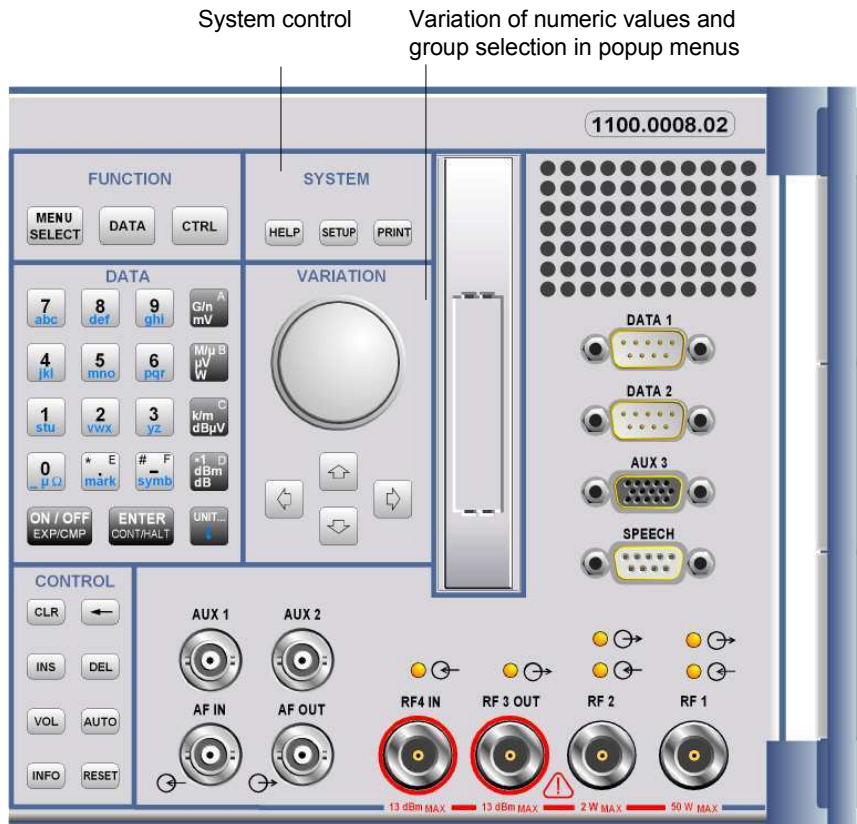
Fig. 1-3   CMU front view – hardkeys

SYSTEM   *Operating manual*

System control:

HELP	Displays online help	☞ Chap. 3
SETUP	Instrument settings	
PRINT	Initialize printing of a screenshot	

VARIATION   *Operating manual*

Value variation and group selection:

Rotary knob	Value variation in input fields and parameters, line selection in tables, field selection in popup menus. Press to expand/compress tables and pull-down lists and to confirm entries and selections.	☞ Chap. 3
Cursor key vertical	Group selection in popup menus (vertical)	
Cursor key horizontal	Group selection in popup menus (horizontal), Cursor positioning in editors and tables	

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Extended editor
and instrument
control functions
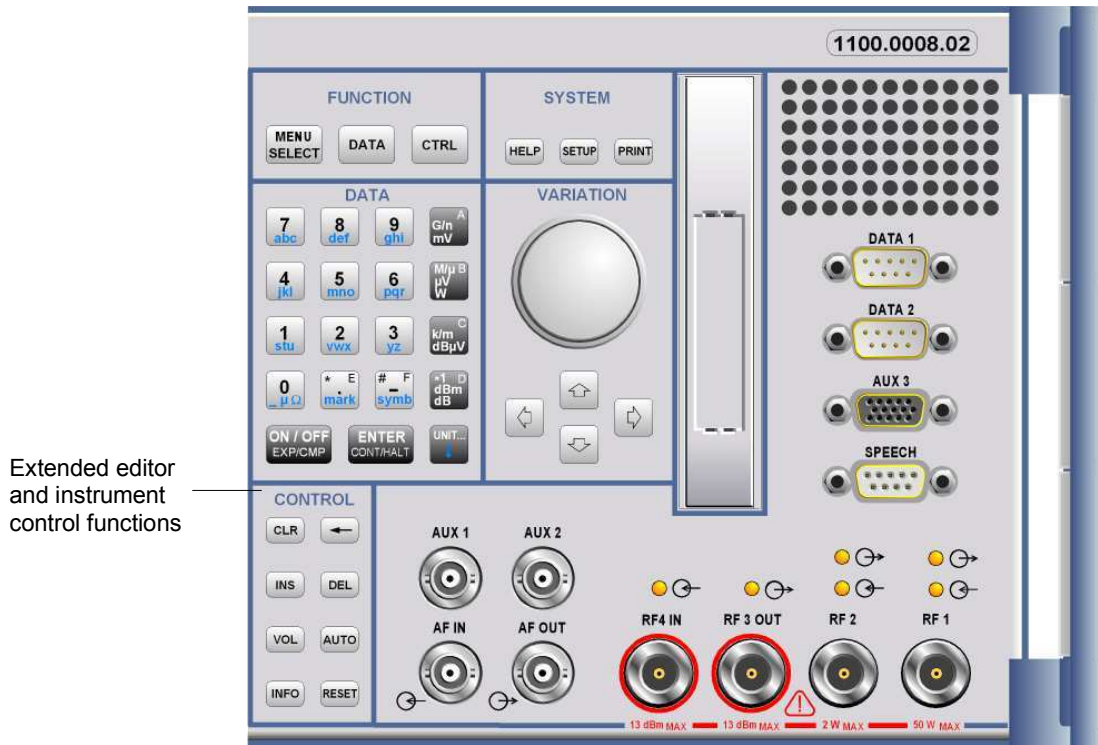
Fig. 1-4   CMU front view – hardkeys

CONTROL   *Operating manual*

Extended control functions:

CLR	Clears the complete editor string	☞ Chap. 3
⇦	Deletes the character to the left of the cursor (back space)	
INS	Changes between insertion and overwriting in the editor	
DEL	Deletes the character marked by the cursor	
VOL	For future extensions	
AUTO	For future extensions	
INFO	System info and hardware diagnosis	
RESET	Resets to default values	

Further Keys   *Operating manual*

ESCAPE	Quits popup menus, closes an editor discarding the entries made	☞ Chap. 3

ON/STANDBY	Switches between operation (green LED) and standby (orange LED)
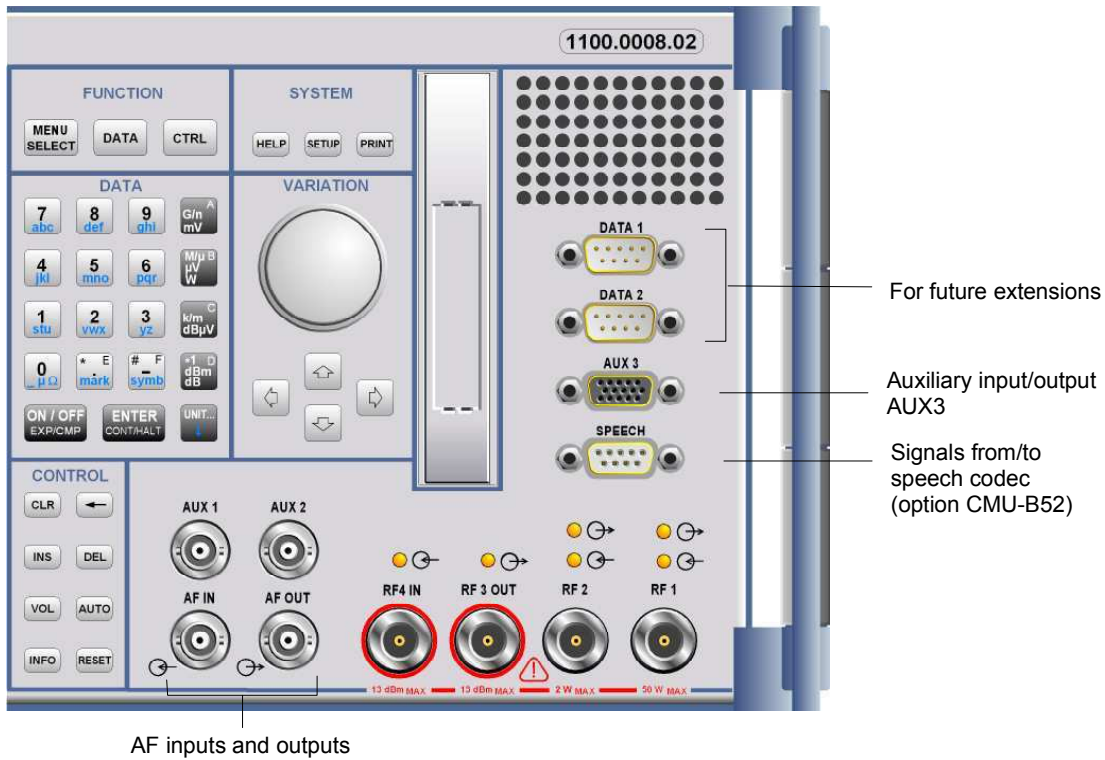
Fig. 1-5   CMU front view connectors

DATA1, DATA2   *Operating manual*
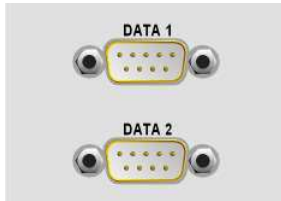
For future extensions   ☞   Chapter 8, "Hard-
                                                               ware connectors"

AUX 3 and SPEECH   *Operating manual*
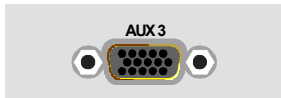
Input/output for timing and external trigger signal,   ☞   Chapter 8, "Hard-
                                                                 ware connectors "
External trigger signal forwired synchronization
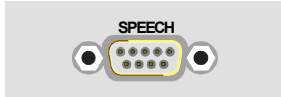
Signals from/to speech codec (option CMU-B52)   ☞   Chapter 8, "Hard-
                                                                ware connectors"

AF connectors   *Operating manual*
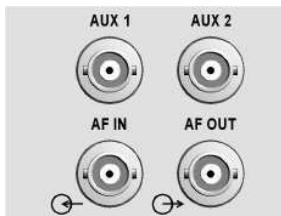
Connectors for audio signals:

AUX1/2   Additional input/output for audio sig-   ☞   Chapter 4, "Audio
            nals that may be used in remote con-   Generator and
            trol (secondary audio analyzer)   Analyzer";
                                                           Chapter 8, "Hard-
AF IN/OUT Standard input/output for the (primary)   ware connectors"
            audio analyzer

Caution: *Note the maximum permissible input levels*
             for all AF connectors according to the data
             sheet in order to prevent damage to the in-
             strument!
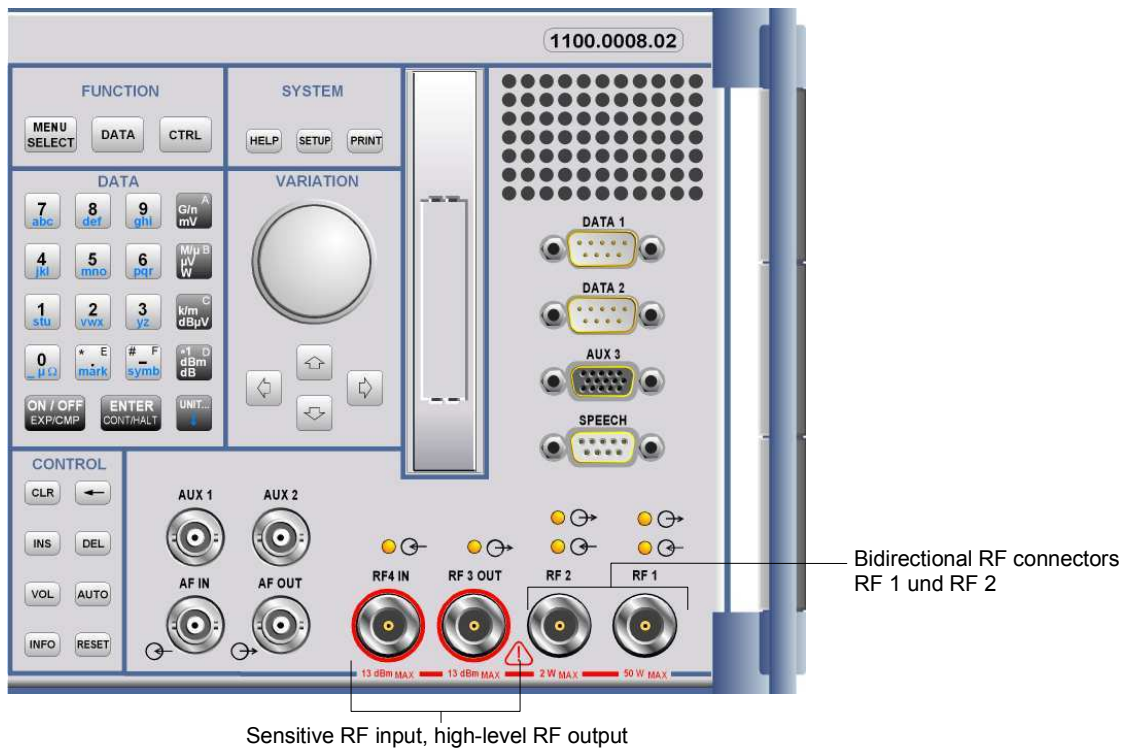
Fig. 1-6   CMU front view– connectors

RF connectors   *Operating manual*
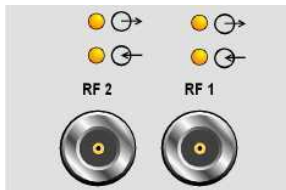
Bidirectional RF connectors for various power ranges according to the data sheet.

The two LEDs above the connectors are illuminated as long as the CMU sends signals ↱ or is ready for reception ↳.

☞ Chapter 8, "Hardware connectors "
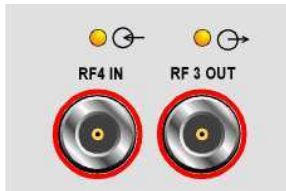
Connector with high output level and connector for sensitive RF measurements (antennas). Power ranges according to the data sheet. Maximum permissible input and output level according to the label on the front panel.

☞ Chapter 8, "Hardware connectors"

The two LEDs above the connectors are illuminated as long as the CMU sends signals ↱ or is ready for reception ↳.

Caution:

Note the maximum permissible input levels for all RF connectors according to the label on the front panel or the data sheet in order to prevent damage to the instrument!
RF connectors may warm up very much when high RF power is fed in!

Fig. 1-7   CMU front view – Compact Flash card slot

Compact Flash (CF) Card Slot   *Operating manual*

CF or PCMCIA card reader.

- PCMCIA slots are available on instruments equipped with a front module controller version FMR6 or earlier. These instruments also support an alternative floppy disk drive (option R&S CMU-U61).

☞ Chap. 1
Chap. 4

- CF card slots are installed on instruments equipped with a front module controller version FMR7.

Front module controller version FMR7 provides a larger RAM size. This can speed up measurements because it avoids swapping of software modules.

Note: *The CF card must be inserted in the slot **before** the R&S CMU is started. To be read by the R&S CMU, CF cards must support the* True IDE *mode.*

Attention!   Risk of CF slot malfunctions

⚠

To avoid EMC problems and ensure failure-free operation, do not place external cables close to the compact flash card .

If the CF card is temporarily removed while the R&S CMU is switched on, the screen may freeze for a few seconds, and instrument may not be able to read the card any more (error message "Drive is not ready").

Always switch R&S CMU to standby mode before removing the CF card. To cure the symptoms described above, power off the instrument and then power it on again.

Rear View

Synchronization inputs and outputs

Signal inputs and outputs | Interfaces for remote control and peripheral equipment | Mains connector with switch
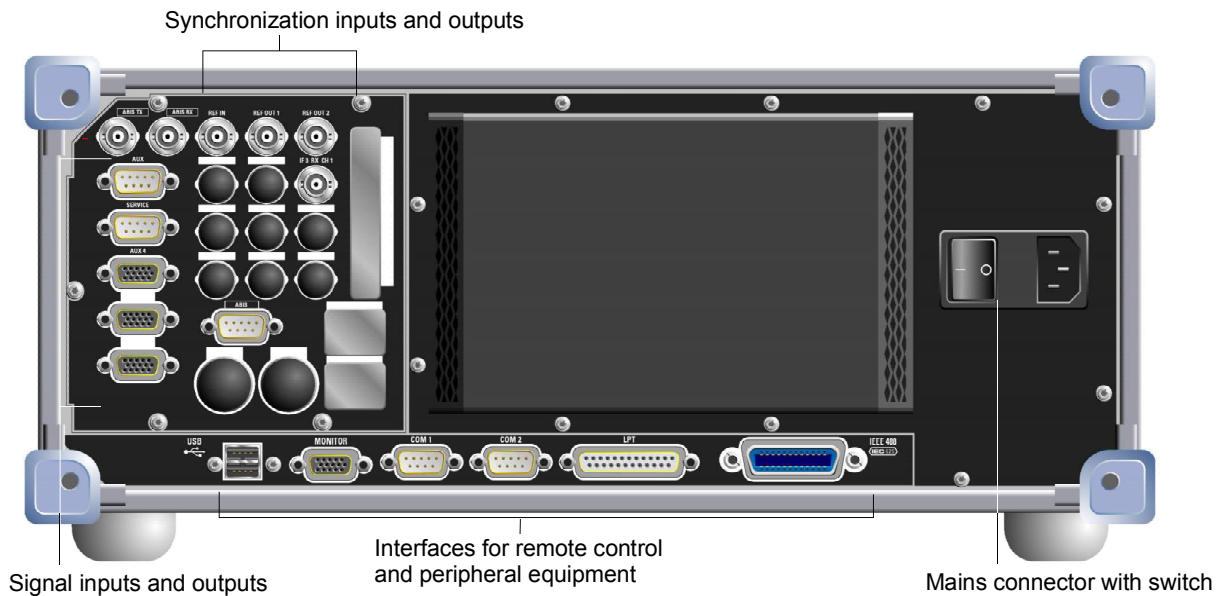
Fig. 1-7   CMU rear view

Mains switch		*Operating Manual*
Mains power switch	☞	Chapter 1, "Switching on the Instrument, Startup test"
Mains connector	☞	Chapter 1, "Connecting the instrument to the AC supply"
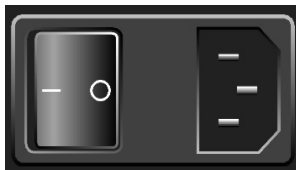
Interfaces		*Operating Manual*
GPIB-bus connector (IEEE 488 / IEC 625),	☞	Chapter 8, "Hardware Interfaces "
Parallel interface: 25-contact printer connector, Centronics-compatible	☞	Chapt. 1, "Connecting an Output Device" Chapter 8, "Hardware Interfaces"
Connector for serial interface 1: 9-contact Sub-D connector	☞	Chapter 8, "Hardware Interfaces"
Connector for serial interface 2: 9-contact Sub-D connector	☞	Chapter 8, "Hardware Interfaces"
Connector for an external VGA monitor: 15-contact Sub-D connector	☞	Chapter 1, "Connecting a Monitor" Chapter 8, "Hardware Interfaces"
USB connector for external keyboard only (not for other pointing or storage devices)	☞	Chapter 1, "Connecting an External Keyboard" Chapter. 8, "Hardware Interfaces"
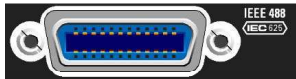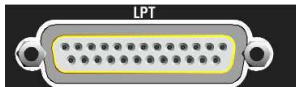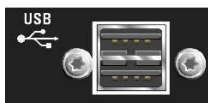
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Inputs and outputs for reference frequency and network-specific clock frequency

Auxiliary and
service connectors,
I/Q interface

Intermediate
frequency
from CMU receiver,
IF interface
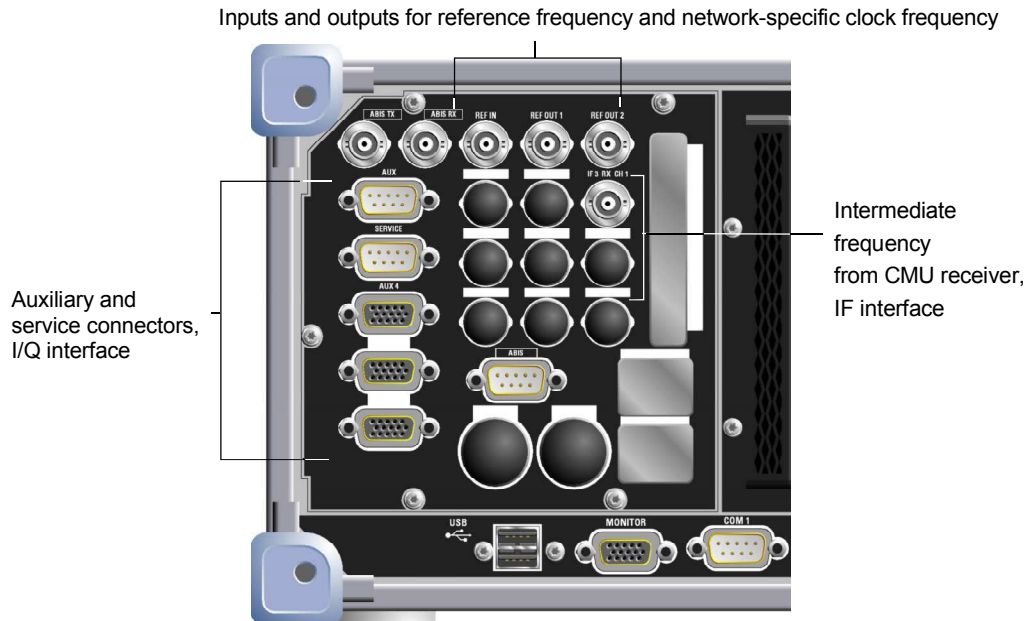
Fig. 1-8   CMU rear view – signal inputs and outputs

Intermediate frequency   *Operating Manual*

	IF3 RX CH1 (BNC connector) from CMU receiver	☞	Chapter 8, "Hardware Connectors"

Reference frequency   *Operating Manual*

REF IN	Input for external reference frequency	☞	Chapter 8, "Hardware Connectors
REF OUT 1	Output of reference frequency of CMU: 10 MHz or the signal of input REF IN		
REF OUT 2	Output for network-specific clock frequency	☞	Chapter 3, "RF Connection Control"

Caution!

Do not use open or unshielded cables in order to comply with EMC directives!

AUX, SERVICE, AUX4, extensions   *Operating Manual*
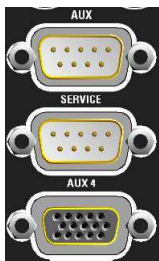
Two 9-contact and one 15-contact SUB-D connectors:		☞	Chapter 8, "Hardware Connectors
AUX	Auxiliary connector providing a DC voltage to supply external equipment such as CMU-Z6		
SERVICE	Service connector for RXTX board (only for internal test purposes)		
AUX4	Bidirectional input/output for digital status, control, and trigger signal		
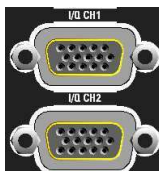
The remaining 15-contact SUB-D connectors are reserved for future extensions.	☞	Chapter 8, "Hardware Connectors

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Input and output for Abis interface

Balanced Abis interface
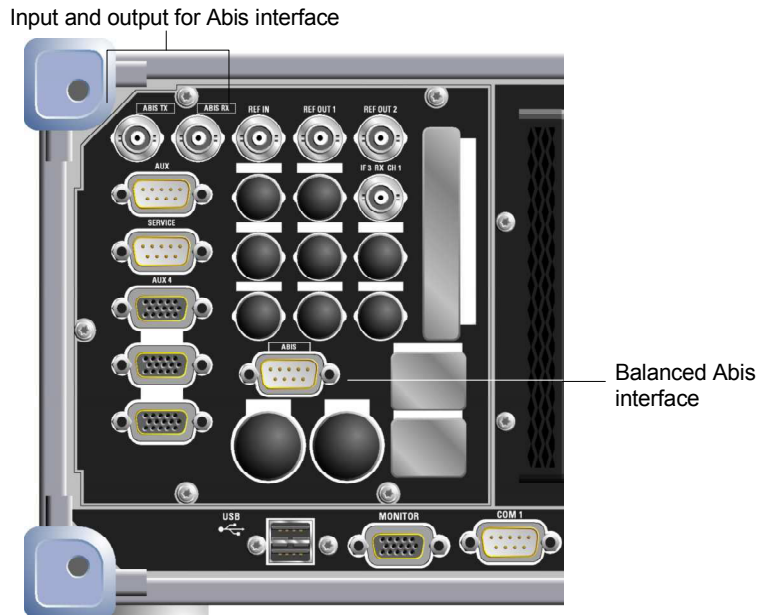
Fig. 1-9   CMU rear view – Abis inputs and outputs

Abis connectors (CMU300 with option CMU-B71) *Operating Manual*

Two 75 Ω BNC connectors for option CMU-B71, *Abis Interface Unit for CMU*:

ABIS TX	For future extensions
ABIS RX	Input for PCM signals from a BTS under test to be applied to the CMU's Abis interface

☞ Operating manual CMU-K30/-K31/-K32/-K33/-K34

9-contact SUB-D connector with alternative 120 Ω balanced input for Abis interface.

☞ Chapter 8, "Hardware Connectors"

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Putting the Instrument into Operation

This section describes the basic steps to be taken when setting up the CMU for the first time.

> ⚠️ **Caution!**
>
> *Please make sure to observe the instructions of the following sections so that you cannot cause damage to the instrument or endanger people. This is of particular importance when you use the instrument for the first time.*

Unpacking the Instrument

When receiving your instrument, first perform the following steps.

1. Remove the instrument from its packaging and check the equipment for completeness using the delivery note and the accessory lists for the various items.
2. First, pull off the polyethylene protection pads from the instrument's rear feet and then carefully remove the pads from the instrument handles at the front.
3. Pull off the corrugated cardboard cover that protects the rear of the instrument.
4. Carefully unthread the corrugated cardboard cover at the front that protects the instrument handles and remove it.
5. Check the instrument for any damage. If there is damage, immediately contact the carrier who delivered the instrument. In this case, make sure not to discard the box and packing material.

It is advisable to keep the original packing material in order to prevent control elements and connectors from being damaged in case the instrument is to be transported or shipped at a later date.

Setting up the Instrument

The R&S CMU is designed for use under laboratory conditions, either on a bench top or in a rack. The general ambient conditions required at the operating site are as follows:

- The ambient temperature must be in the ranges specified for operation and for compliance with specifications (see data sheet).
- All fan openings including the rear panel perforations must be unobstructed. The distance to the wall should be at least 10 cm.

Notes: *For safe and convenient operation of the instrument note the following:*

> ➢ Avoid moisture condensation. If it occurs, the instrument must be wiped dry before switching on.
> ➢ Note the warm-up time of the temperature-controlled OCXO reference oscillator (Option CMU-B11/B12), see data sheet.

Bench Top Operation

Permissible operating positions of the CMU:

- Horizontal position, standing on the feet.

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- For applications in the laboratory or on a work bench, it is recommended that the support feet on the bottom of the instrument be extended. For the LCD display, this provides the optimum viewing angle which typically ranges from perpendicular to the display front to approximately 30° below.

| Warning! | Danger of injury |

The feet may fold in if they are not folded out completely or if the instrument is shifted. The feet may break if they are overloaded. Fold the feet completely in or completely out to ensure stability of the instrument and personal safety. To avoid injuries, never shift the instrument when its feet are folded out.

The overall load (the instrument's own weight plus that of the instruments stacked on top of it) on the folded-out feet must not exceed 500 N.

Place the instrument on a stable surface. Secure the instruments stacked on top of it against slipping (e.g. by locking their feet on the top front frame).

When the instrument is standing on its folded-out feet, do not work under the instrument and do not put anything under it, otherwise injuries or material damage could occur.

<500N
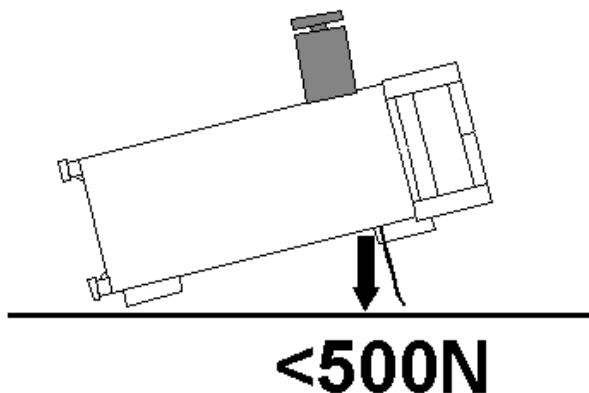
The instrument can be used in each of the positions shown here.
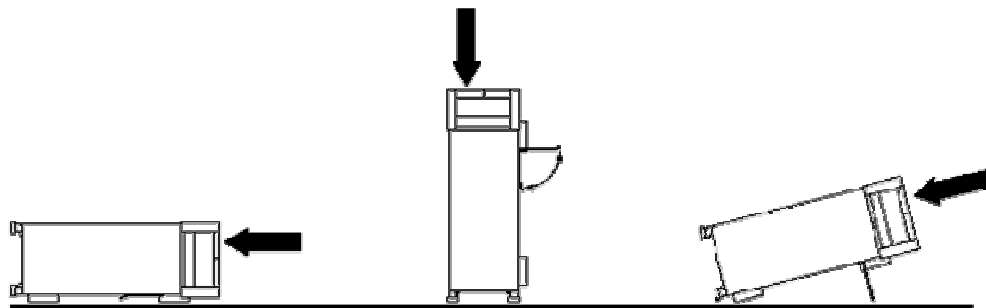
Warning!

The feet must be fully folded in or out. Only in this way can the stability of CMU be guaranteed and reliable operation be ensured. With the feet out, the weight of other units put onto CMU must not exceed 30 kg. The units must be secured against slipping (e.g. by locking the feet of the unit at the top side of the enclosure).

When moving the unit with the feet out, the feet might collapse and fold in. To avoid injuries, the unit must therefore not be moved with the feet out.

Mounting in a Rack

Using the adapter ZZA-411 (order number 1096.3283.00) the instrument can be mounted in 19" racks according to the mounting instructions supplied with the rack adapter.

Note: *For convenient operation of the instrument note the following:*

> ➢ Allow for sufficient air supply in the rack.
>
> ➢ Make sure that there is sufficient space between the ventilation holes and the rack casing.

Connecting the Instrument to the AC Supply

Caution!

After moisture condensation, allow the instrument to dry before switching on.

Note the permissible ambient temperature according to the data sheet.

Do not cover the lateral and rear ventilation holes.

The CMU may be connected to one-phase AC supplies with nominal voltages ranging from 100 V to 240 V and nominal frequencies ranging from 50 Hz to 400 Hz (see inscription on the rear panel and data sheet). Depending on the options installed, the power consumption ranges from 120 W to 230 W.

Note: *The CMU is automatically adapted to the AC supply voltage applied. External switchover or adaptation of the fuses are not necessary.*
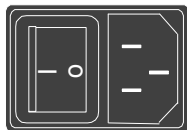
Mains connector
For the mains connection use the supplied mains connector.

As the instrument is designed according to the regulations for safety class EN61010, it must be connected to a grounded power outlet.

Switching on the Instrument / Startup Test
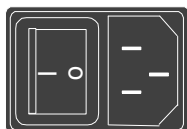
The CMU can be switched on using the mains switch at the rear of the instrument and the *ON/STANDBY* key at the bottom left of the instrument front.

Mains switch
The *mains switch* can be set to two positions:

0   The *0* position implies an all-pole disconnection of the instrument from the mains.

I   In the *I* position, the instrument is in standby mode or in operation, depending on the position of the ON/STANDBY key at the front of the instrument.

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STANDBY

ON
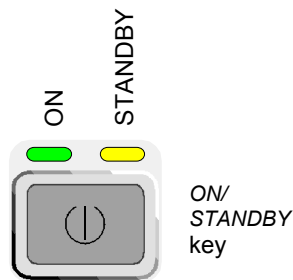
ON/ STANDBY key

The *ON/STANDBY* key activates two different operating modes indicated by colored LEDs:

Standby   Only the OCXO reference frequency oscillator (Option CMU-B11/B12), if installed, is supplied with operating voltage. The orange LED (STANDBY) on the right is illuminated.

Operation In this operating mode, all modules of the instrument are supplied with operating voltage. The green LED (ON) on the left is illuminated.

Start procedure

➢ To switch on the CMU set the mains switch to the position I.

The CMU enters standby mode.

• Set the CMU to operating mode by pressing the *ON/STANDBY* key once.

Note: *To be read by the R&S CMU, a compact flash card must be inserted in the slot **before** the R&S CMU is started and not be removed during operation. Refer to the description of the CF card slot earlier in this chapter.*

Startup menu

After activation of the operating mode, the startup menu appears for a few seconds. While it is displayed the CMU performs a startup test.
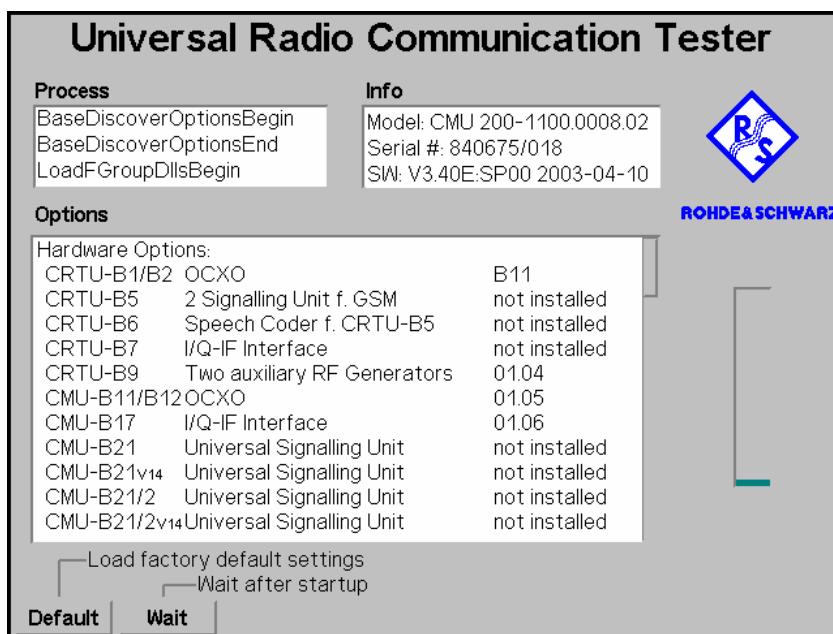
Displays in startup menu

The display windows of the startup menu provide information on

• The startup procedure (*Process)*

• Instrument model, serial number and version of the CMU base software *(Info).*

• Installed hardware and software options and equipment *(Options)*. Available software options are listed with their version numbers.

• Progress of the startup procedure (*Startup* bar graph).

After terminating the startup procedure, the instrument changes to the last main menu or graphical measurement menu of the previous session.

Switching off the Instrument
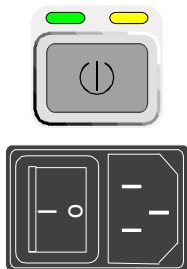
To keep all settings that have been made, proceed in the following order to switch off the CMU:

➢ Remove any storage medium from the PCMCIA interface or floppy disk drive.

➢ **Shortly** press *ON/STANDBY* to initiate the shutdown process and save the current data to the internal hard disk.

➢ Wait until the shutdown process has been terminated before setting the mains switch at the rear to the 0 position.

In standby mode, it is save to remove a compact flash card from the card reader. Refer to the description of the CF card slot earlier in this chapter.

Note: *Instruments equipped with a Front Module controller FMR 6 display the message* Shutdown in Progress *after the ON/STANDBY key has been pressed. Keeping ON/STANDBY pressed for about 4 s on those instruments initiates a hardware shutdown where data may be lost.*

How to Ensure EMC

In order to avoid electromagnetic interference, the instrument may only be operated when it is closed and with all shielding covers fitted.

REF OUT 1 and REF OUT 2: Use double shielded cables and match signal with 50 Ω in order to comply with EMC directives!

Input Level

Caution!

−   *In order to prevent damage to the instrument note the maximum permissible input levels at the AF inputs AF IN and AUX 1 as well as for the RF inputs RF 1, RF 2 and RF 4 IN at the front of the instrument.*

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Connecting the CMU to the Test Setup

Warning:

Connect external devices and peripherals only when the instrument is switched off or in STANDBY mode. Otherwise, future errors cannot be excluded.

Connecting a Controller

The CMU can be connected to an external controller via the GPIB bus (IEEE bus according to standard IEEE 488; throughout this documentation we will primarily use the term GPIB bus which is also used in the operating menus and in the SCPI command syntax) or via serial interface:

Connection via GPIB bus
The CMU is connected to the GPIB interface of the controller via the GPIB bus connector (IEEE 488 / IEC 625) at the rear of the instrument and a shielded cable. The technical specifications of the GPIB interface are listed in section *Hardware Interfaces* in Chapter 8 of the operating manual.
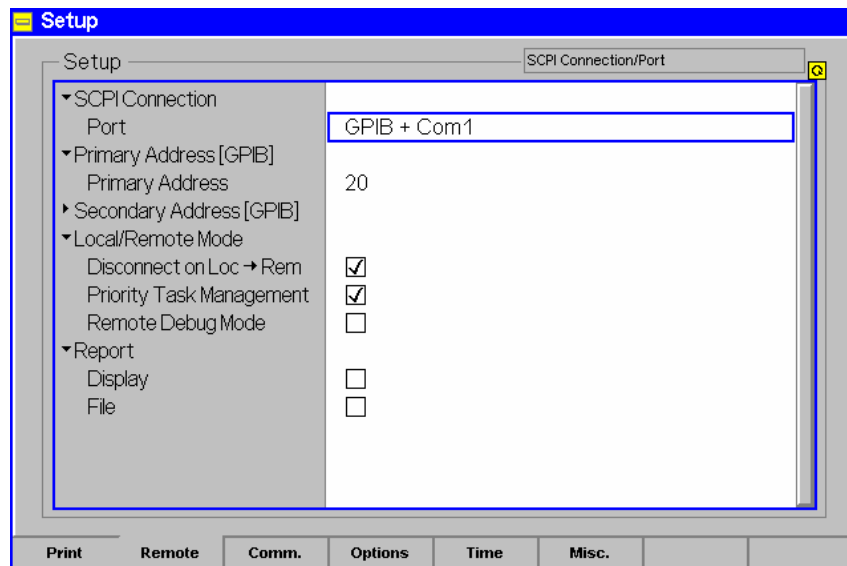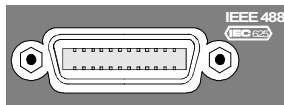
GPIB Bus Configuration
In the default configuration the CMU accepts commands from either the GPIB or COM 1 interface. The parameters for GPIB bus control of the CMU are set in the *Remote* tab of the *Setup* popup menu (in the following abbreviated by *Setup – Remote,* see also Chapter 4 of the operating manual, *Settings for Remote Control*).

➢ To open the *Setup - Remote* menu, press the *SETUP* key at the front of the instrument and activate the *Remote* hotkey at the lower edge of the screen.

➢ Use the rotary knob to move the focus onto the *SCPI Connection* section of the *Setup* table. If necessary, press the rotary knob or the *ON/OFF* key to expand the parameters in the table (see Chapter 3 of the operating manual).

> ➢ In the *Port* table row select either *GPIB + Com 1* or *GPIB* bus interface for transmission.

The bus address is factory-set to 20. It can be changed in the *Primary Address* input field.

Connection via serial interface
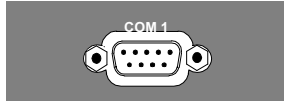
The CMU can be connected to the serial interface of a controller via one of the serial interfaces COM 1 or COM 2 and a so-called null-modem cable. The pin assignment and wiring of a null-modem cable are described in section *Handshake* of Chapter 8 of the operating manual. The technical specifications of the serial (RS-232-C) interface are also discussed in Chapter 8 (refer to section *Hardware Interfaces*).

Either a 25-pin or a 9-pin connector can be used on the controller side. It may be necessary to use an appropriate adapter (see Chapter 8, *Hardware Interfaces*).

Selection

In the default configuration the CMU accepts commands from either the GPIB or COM 1 interface. The COM 2 interface must be selected explicitly.

> ➢ Proceed as described above to activate the *Remote* tab of the *Setup* menu.

> ➢ In the *Port* table row, select *GPIB + Com 1* or *COM 1* or *COM 2* to activate one of the RS-232 interfaces for data transfer.

Configuration

After selection of a serial interface, the transmission parameters must be set to comply with the parameters of the addressed device. This is done in *the Comm. (communications)* tab of the *Setup* menu:
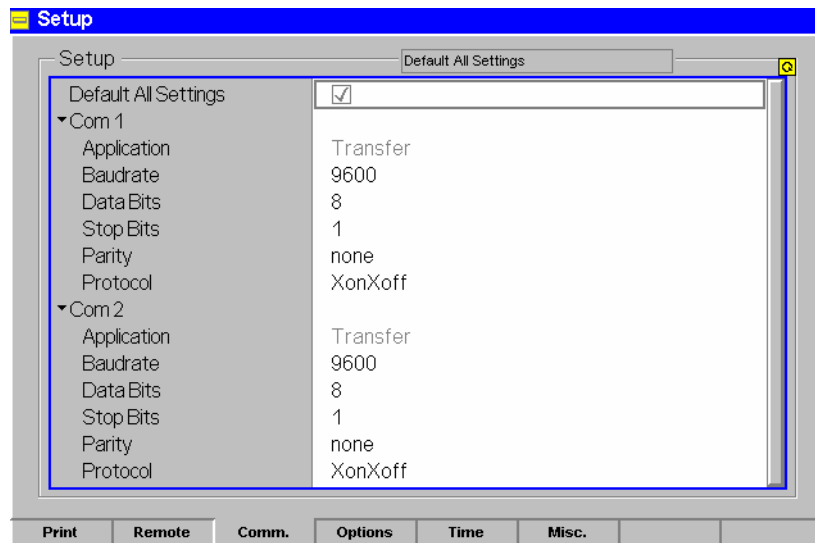
> ➢ To open the *Setup – Comm.* tab press the *SETUP* key at the front of the instrument and activate the *Comm.* hotkey at the lower edge of the screen.

> ➢ In the table section corresponding to the selected COM port check the settings for the *Baudrate, Data Bits, Parity,* and *Protocol.*

Connecting an External Keyboard

An external PC keyboard to the CMU can be connected to the USB connector at the rear of the instrument. An external keyboard facilitates the input of numbers and texts.

For the interface description see section *Hardware Interfaces* in Chapter 8 of the operating manual.

The key assignment can be changed in the *Misc.* tab of the *Setup* menu:
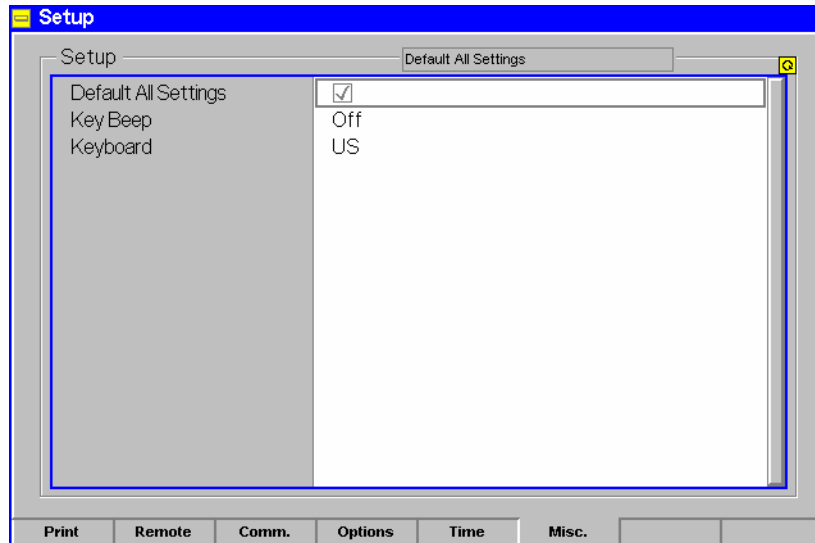
Language assignment
> To open the *Setup – Misc.* tab press the *SETUP* key at the front of the instrument and activate the *Misc.* hotkey at the lower edge of the screen.
> Use the rotary knob to select *Keyboard* and set the desired language *(US or German).*

Connecting a Monitor
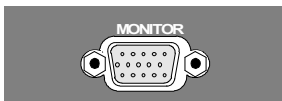
An external VGA monitor can be connected to the 15-contact Sub-D connector at the rear of the instrument.

For the interface description see section Hardware Interfaces in Chapter 8 of the operating manual.

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Connecting a Printer
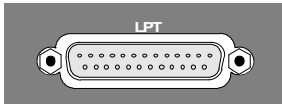
A printer can be connected via the 25-contact parallel interface *LPT* at the rear of the instrument (recommended) or one of the serial interfaces COM 1 or COM 2. For the interface description see section *Hardware Interfaces* in Chapter 8 of the operating manual.

The printer type and port must be set in the *Print* tab of the *Setup* menu:

Setup	
Setup	Default All Settings
Default All Settings	☑
▾Printer	
Type	HP DeskJet 1600CM (PostScript)
Port	Lpt1
▾Page Settings	
Resolution	150 dpi
Paper Size	ISO A4
Black & White Print	☐
▾Header	
Print Header	☐
Header Text	Header-Text
Print Date & Time	☐
▾Filename Default	[Filepath\]filename or [filepath\]fname??? Use "???" for auto-increment
Filename	print???

| Print | Remote | Comm. | Options | Time | Misc. | |

➢ To open the *Setup – Print* tab press the *SETUP* key at the front of the instrument and activate the *Print* hotkey at the lower edge of the screen.

➢ In the *Printer* section set the printer type and port *(COM 1* or *COM 2* for the serial (RS-232) ports; *LPT 1* for the parallel printer port)*.

It is recommended to connect the output device to the parallel interface *LPT*, if possible: With this selection, configuration of the interface is not necessary; besides, the serial connectors may be used for GPIB bus etc.

Synchronization with External Devices; Connection of Further Components
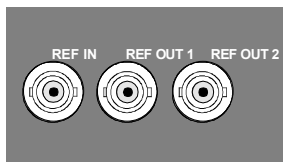
The three BNC female connectors REF IN, REF OUT 1, REF OUT 2 are provided for synchronization of the CMU with external devices.

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Software Update and Version Management

Your CMU was delivered with the latest software and firmware version available. New firmware can be easily installed via the CF / PCMCIA card or the floppy disk drive (option CMU-U61) on the front of the instrument.

Note: *When copying an installation version to a CF/ PCMCIA card or floppy, ensure that all folders containing a base system version or network option (the lowest-level folders in Fig. 1-9 below) are in the root directory. Otherwise the R&S CMU will not be able to detect the firmware and start the installation. If a Versions.new text file (see section File Versions.new on p. 1.28 ff.) is used, it must also be in the root directory of the external storage medium.*

New software options must be enabled by means of a key code entered in the Setup – Options *menu (see Chapter 4 of the operating manual). This is necessary only once; all options remain enabled after a software update.*

Installation of new firmware versions and the use of different applications and versions on the same instrument is made easier by the following tools:

- The R&S *Remote Service Tool* (see p. 1.20 ff.) transfers software versions to the instrument.
- The *VersionManager* (see p. 1.29 ff.) is designed to manage different software versions stored on the instrument.

Installation instructions are also given in Chapter 1 of the operating manuals for the individual software options.

Is not required to perform a recalibration of the R&S CMU200/300 after a software upgrade or downgrade. To ensure that the R&S CMU TX and RX is working according to the specification after a software change the following tests are performed during the type approval of every new software release:

Test 1:
- Adjustment (measurement of correction values) and verification with the latest official software.
- Upgrade to the new software and verification.

Test 2:
- Adjustment and verification with the new software.
- Downgrade to the latest official software and verification.

The tests are passed if all verification results show comparable values. Rohde & Schwarz is certified according to ISO 9001 since May 1995.

R&S Remote Service Tool

The R&S Remote Service Tool organizes the exchange of data between the R&S CMU and an external PC or laptop, in particular to:

- Copy software versions and install them on the R&S CMU.
- Copy or move data files (e.g. screenshots created with the Print menu of model R&S CMU).
- Send remote control commands to the instrument.

The tool is available for download on the CMU Customer Web (https://gloris.rohde-schwarz.com/gloris/1cmp/cmucustomer/index.html). It consists of a single *.exe file which can be copied to any directory. When the executable file is started (double-clicked), the R&S Remote Service Tool opens the following main application window.

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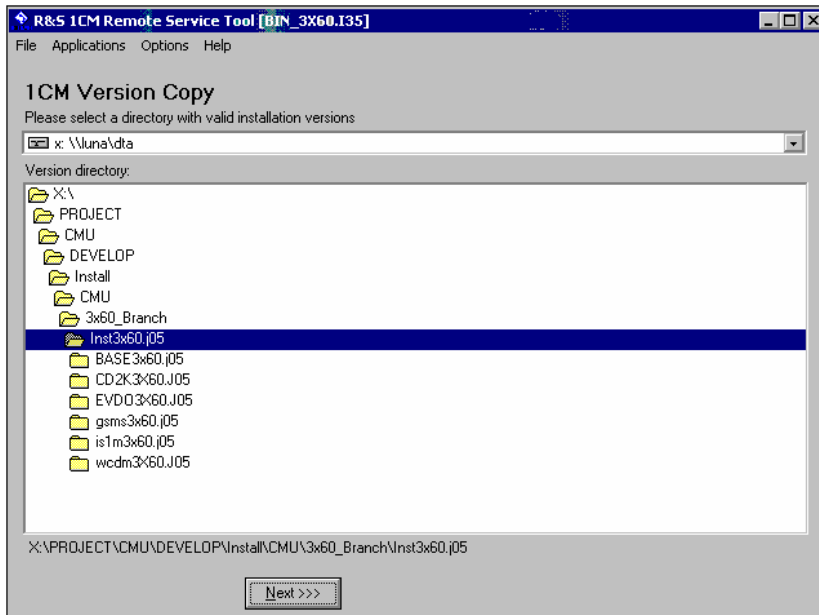
Fig. 1-9   Remote Service Tool main screen (example)

Connecting the R&S CMU

The R&S Remote Service Tool can communicate with the R&S CMU via the GPIB (IEEE 488) or a RS-232 interface. To ensure fast transmission, it is recommended to use the GPIB interface, connecting the GPIB cable to the *IEEE 488 / IEC 625* connector on the rear panel of the instrument.

Note: *The GPIB settings of the Remote Service Tool and of the R&S CMU must be the same. Refer to section Connecting a Controller on p. 1.16 to learn how to configure the R&S CMU's GPIB settings.*

1. Connect the GPIB cable to the *IEEE 488 / IEC 625* connector on the rear panel of the instrument.

2. Start the *Remote Service Tool*.

3. Click the *Options* menu and make sure that *Use GPIB* is selected.

4. Click *Options – GPIB Options* and check that the *Board Index* and *Primary Address* settings are equal to the R&S CMU configuration (CMU default settings: board index GPIB0, primary address 20).

Installing software versions

To copy a new software version to the CMU…

1. Switch on and start up your R&S CMU.

2. Select *Applications – Version Copy* from the menu bar of the *Remote Service Tool.*

3. In the *Version directory* of the main application window, select the folder from where you want to copy your software version and click *Next >>>*.

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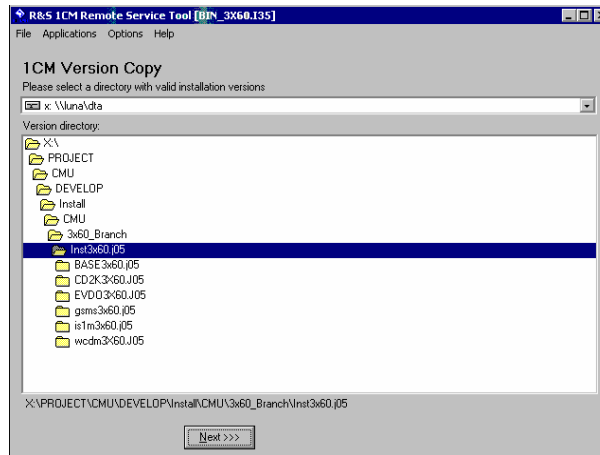
4. Select the software version you wish to install and click *Start* >>>.
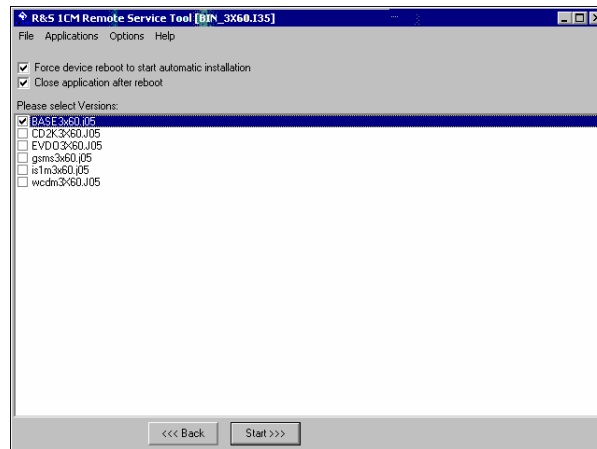
The software version is copied to the internal drive *C:\INTERNAL\INSTALL* of your R&S CMU. In addition, a text file named *Versions.new* (see section *File Versions.new* on p. 1.28 ff.) is generated and copied to the same directory. With default installation options (see figure above), the following happens after the file transfer is completed:

- The CMU is rebooted and the new software version is installed and activated (a key code must be entered once when a new software package is installed; see section *Hardware and Software Options* in chapter 4 of the operating manual).

- The *Remote Service Tool* is closed automatically.

Old software versions are not affected. You can delete or activate an old software version using the *Version Manager* (see p. 1.29 ff.).

Note: *You can also copy a software version to the internal hard disk and use the VersionManager for the installation.*

Listing and modifying software versions

The *Remote Service Tool* can not only install firmware versions but also display and modify the installed firmware configurations.

To list the firmware configurations installed on your CMU…

➢ Click Application – List Software.
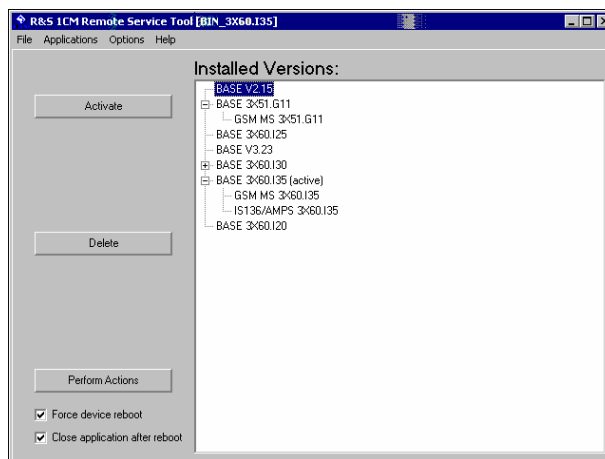
The list of installed versions has a tree structure. Each expandable node ⊞ contains a software configuration consisting of one base system version and one or more network options. The active configuration is marked as *(active)* and also displayed in the title bar of the *Remote Service Tool.* You can use the controls on the left side to do the following:

- Select a configuration in the list and click *Activate* to label the configuration active.

- Select a configuration in the list which is not the active configuration and click *Delete* to label the configuration deleted. Repeat this for all configurations you wish to delete.

Labeled configurations are not deleted immediately. You can simply *Restore* any configuration that you labeled inadvertently.

➢ Click *Perform Actions* to activate and/or delete the labeled configurations.

The labeled configurations are written to the *Versions.new* text file (see section *File Versions.new* on p. 1.28 ff.) which is copied to the internal drive *C:\INTERNAL\INSTALL* of your R&S CMU. In the default configuration where *Force device reboot* is enabled, the R&S CMU is rebooted immediately so that the *VersionManager* can activate and delete the labeled configurations.

Tip: *Disable* Force device reboot *in case you wish to postpone the actions until next time you switch on your instrument.*

Copying files   **To transfer a file from the CMU to the PC or vice versa…**

1.   Switch on and start up your R&S CMU.

2.   Select *Applications – File Transfer* from the menu bar of the *Remote Service Tool.*

The main application window shows the directories and files on your PC and on the *INTERNAL* directory of the CMU's hard disk.

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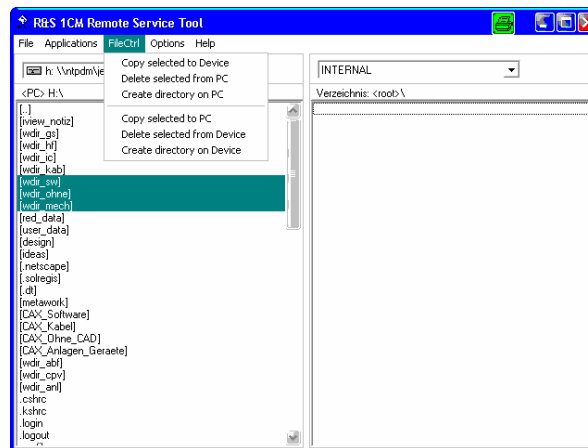
3. Select a directory, a file or several files and use the commands in the *FileCtrl* menu to initiate the file transfer. You can also right-click the file list to open the equivalent context menu.

Extracting screenshots

A screenshot transferred by means of the *Remote Service Tool* can be viewed and copied to the clipboard so that you can use it in another application.

To generate, transfer and further process a screenshot…

1. Press the *PRINT* button on the front panel of the CMU to open the *Print* dialog, select *Internal WMF* as a destination and specify a file name <file>.wmf for the generated image file (without adding a path).

2. Press *OK* to write the file to the *INTERNAL\USERDATA\PRINT* directory of the CMU.

3. Proceed as described above to transfer the file <file>.wmf from the CMU to your PC.

4. Double-click the transferred file (alternative: select the file and press *Enter).*

The *Remote Service Tool* acts as a viewer for the file:
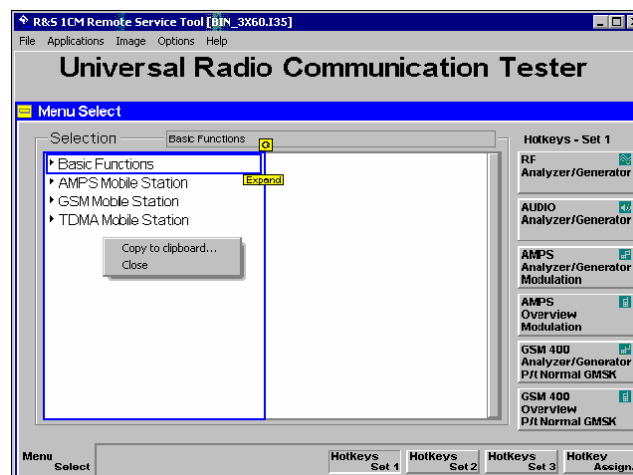
5. Right-click to open a context menu and either copy or close the file*.*

Remote control of the R&S CMU

You can use the *Remote Service Tool* to transfer remote control commands or command scripts to be executed on the R&S CMU.

To transfer a single command or command sequence…

1. Click *Applications – Command* to activate the remote control screen.

2. Select the appropriate function group in the *Secondary address mapping* panel.

3. Enter a command in the *Enter remote command…* input field and press *Enter.*

4. Repeat steps 2 and 3 for all commands you wish to execute.
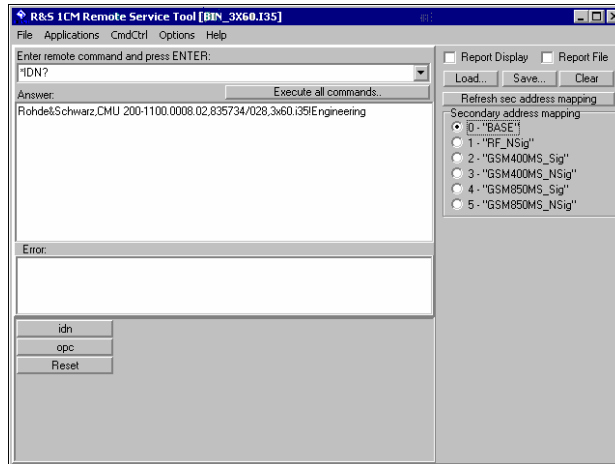
To execute a command script…

5. Generate an ASCII text file of remote control commands, either manually or by saving a previously transferred command sequence *(Save…* button in the remote control screen.

6. In the remote control screen, click *Load…* and open the file.

The script is transferred and executed automatically. The remote control screen provides further control elements to make the command transfer more convenient; see section

Table 1   Overview of R&S Remote Service Tool functions

Menu	Command	Function
File	Close	Close the Remote Service Tool.
Application	Version Copy	Copy a software version to the R&S CMU. See the application example *Installing software versions* above.
	List Software	Display of all software configurations installed on the R&S CMU and activate and/or delete configurations. See the application example *Listing and modifying software versions* above.
	Command	Transfer of remote control commands or command scripts to be executed on the R&S CMU. This command activates an additional *Cmd Ctrl* menu to generate log files and customize the screen. See application example *Transferring remote control commands* above and section *Remote Control of the R&S CMU* on p. 1.27 ff.
	File Transfer	Transfer of data between a PC and the R&S CMU. This command activates an additional *FileCtrl* menu to create directories, copy or delete files. See application examples *Copying files* and *Extracting screenshots* above.
	Error Reports	For future extensions

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Menu	Command	Function
Options	Use GPIB	Use the GPIB bus for communication with the R&S CMU. **Note:** This communication mode is recommended.
	USE RS232	Use the RS232 bus for communication with the R&S CMU. **Note:** Use the *RS 232 Options* quoted below if you choose this communication mode.
	GPIB Options	Change GPIB connection parameters. The default settings for the R&S CMU are: Board Index: 0 Primary Address: 20 **Note:** The GPIB settings of the Remote Service Tool and of the R&S CMU must be the same. Refer to section *Connecting a Controller* on p. 1.16 to learn how to configure the R&S CMU's GPIB settings.
	RS232 Options	Change RS232 transmission parameters. The following settings ensure a reliable connection: Baud Rate: 115200 Data Bits: 8 Stop Bits: 1 Parity: None Protocol: CtsRts (do not change!) **Note:** The RS232 settings of the Remote Service Tool and of the R&S CMU must be the same. Refer to section *Connecting a Controller* on p. 1.16 to learn how to configure the R&S CMU's RS232 settings. Should you experience any problems with the data transfer, first check and possibly exchange the connecting cable.
	Device Clear	Clear the screen.
	Go to Local	Exit remote control mode and return to manual operation.
	Device Reboot	Reboot the R&S CMU.
Help	About	Shows an information box with the current version of the Remote Service Tool.

Remote Control of the R&S CMU

The remote control screen transfers remote control commands or command scripts to be executed on the R&S CMU; see application example *Remote control of the R&S CMU* on p. 1.24. It is opened by clicking *Application – Command.*
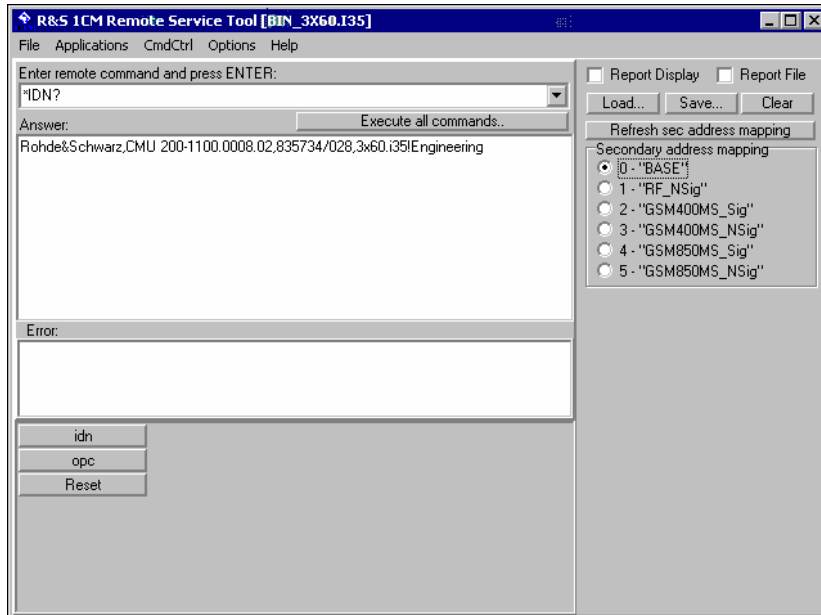
Fig. 1-10   Remote control screen

The commands to be executed are entered in the *Enter remote command…* input field; the responses of the R&S CMU and possible error messages are displayed below. Besides the remote control screen provides the following control elements:

Execute all commands	Execute all commands entered since the *Remote Service Tool* was started or since the list was cleared. The complete command list appears in a pull-down list associated with the *Enter remote command…* input field.
Report Display / Report File	Display the remote report on the R&S CMU's remote screen and create a report file. These functions are identical with the *Report Display* and *Report File* hotkeys in the CMU's remote screen.
Load / Save	Load an ASCII text file (default extension: *.lst, can be changed at will), with a command script to be executed or save the current command list to a text file file.
Clear	Clear the current command list.
Refresh sec. address mapping	Refresh the list of assigned secondary addresses and function groups, e.g. after the mapping was changed on the R&S CMU. Commands are sent to the secondary address selected in the list.

While the remote control screen is active, an additional *Cmd Ctrl* menu is available:

Table 2   Overview of Cmd Ctrl menu in the Remote Service Tool

Command	Function
Filename…	Call up an *Open File* dialog to define the name and location of a log file containing all executed commands and device responses. The responses can be up to 2 MByte in size, so the log file information is often more complete than the remote report displayed on the instrument's remote screen.
Logging	Toggle function: Enable or disable logging.
Append File	Toggle function: If enabled, new information is appended at the end of the log file. Otherwise the log file is overwritten at the beginning of each *Remote Service Tool* session.
Button Setup	Open a dialog to create command buttons, to be used as shortcuts for manual entry of frequently used commands. The command buttons *idn, opc,* and *Reset* in Fig. 1-10 on p. 1.27 are created as follows:

File *Versions.new*

The *Versions.new* file stores the software configurations that the R&S CMU *VersionManager* has to install, delete, or activate. The following *Versions.new* file initiates the installation of a software configuration containing a base system, a GSM network option package, and a IS136 package:

```
BASE3x60.i35
GSMS3x60.i35
IS1M3x60.i35
Automatic Install
```

Creating a *Versions.new* file

The file is most conveniently created using the *Remote Service Tool;* see application examples *Installing software versions* on p. 1.21 and *Listing and modifying software versions* on p. 1.22. The *Remote Service Tool* also copies the file to its location on the CMU's internal hard disk *(C:\INTERNAL\INSTALL)* so that it will be executed when the *VersionManager* is started.

Alternatively, the file can be created manually and copied to the *C:\INTERNAL\INSTALL* directory or to the root directory of an external storage medium.

Restrictions

The information in the *Versions.new* file must be unambiguous: Only one software configuration with 1 base system software can be installed at once.

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Alternatively, the file may list several network options to be combined with an already installed, compatible base system version.

Only one software configuration can be active, however, several configurations can be deleted together. To avoid errors, it is recommended to use different files for installation and deletion/activation.

Typical application   ➢ Copy a *Versions.new* file to the root directory of a CF / PCMCIA card containing several installation versions and insert the card into the R&S CMU's card slot.

After the instrument is booted, the *VersionManager* is started automatically and installs the software packages listed in the file.

CMU VersionManager

The *VersionManager* is a tool designed to activate, delete, install, combine, or list different software versions in a convenient way. Moreover, it provides information on the hardware and software configuration of the instrument *(Edit service tables, Scan disk)*, resets the startup settings stored in the *non volatile ram*, copies information to an external storage medium *(Write log files to disk, List all versions to disk)*, and loads and activates user correction tables (see section Chapter 1 of the complete operating manual).

The *VersionManager* is part of each CMU firmware version. It is opened automatically after the boot-up process if the CMU detects a storage medium in its floppy disk drive/PCMCIA slot that contains an installation version of the CMU firmware. Alternatively, it can be called up by pressing the *Menu Select* key after the boot-up sequence is terminated (from the moment when the CMU display turns black until the end of the 3-beep acoustic signal).

with floppy / CF / PCMCIA card or

MENU SELECT

| VersionManager V5.03 |
| The active CMU base software is the version: 5X00.A55 |
| ←— Activate other version   Write log files to disk —→ |
| ←— Delete software   Delete non volatile ram —→ |
| ←— Install software   Scan disk —→ |
| ←— List software   List all versions to disk —→ |
| ←— Firmware update after board change   Copy non volatile ram to disk —→ |
| ←— Edit service tables   Defragment disk —→ |
| ←— Exit   Info —→ |

Fig. 1-9   VersionManager main screen (example)

The different functions of the *VersionManager* are activated by pressing the corresponding softkeys. Some of them (labeled optional below) are available in a particular configuration of the hard disk only. The upper two softkeys in both softkey bars are not assigned.

Activate other version   *Activate other version* opens a list of all firmware configurations stored on the
(optional)   CMU hard disk except the current configuration. Therefore, this function is not available if the hard disk contains only a single configuration (to retrieve information, *List software* can be used instead).

```
┌──────────────────────────────────────────────────────────────────┐
│                      VersionManager V5.03                          │
│                                                                    │
│     The active CMU base software is the version: 5X00.A55          │
│     ─────────────────────────────────────────────────             │
│                                                              ↑     │
│ <── Activate   base V4.52 ──┬── GSM MS V4.52                 │     │
│                             ├── IS136/AMPS MS V4.50          │     │
│                             └── WCDMA UE V4.52               │     │
│                                                             │     │
│                base V4.52 ──── WCDMA UE V4.52               │     │
│                                                             │     │
│                                                             ↓     │
│                                                                    │
│ <── Back to previous screen                          Info ──>     │
└──────────────────────────────────────────────────────────────────┘
```
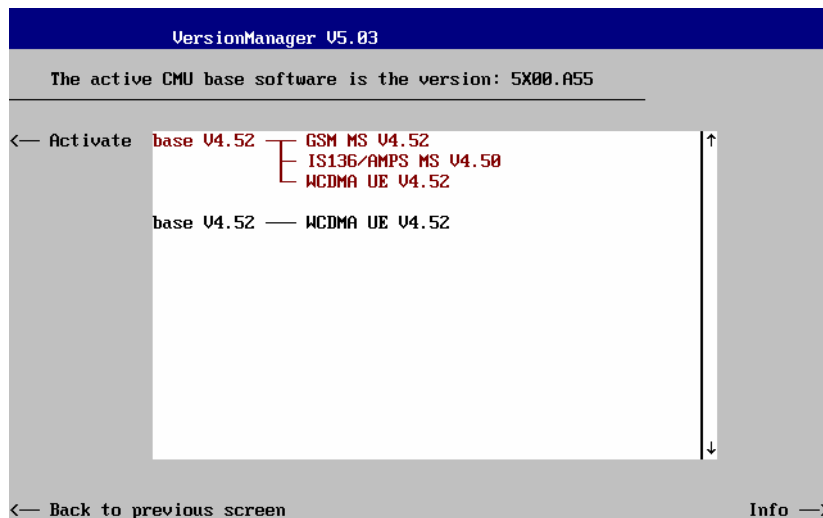
Each entry in the list corresponds to a firmware configuration consisting of exactly one CMU base software version (top level on the left side) plus a set of associated options[1] (network tests, second level). The version to be activated is displayed in red color on top of the list. To select another version, the list can be scrolled using the rotary knob or the cursor keys.

Activate	Activate the current firmware configuration.
Back to previous screen	Close the current screen and go back to the main screen. This option is identical in all *VersionManager* submenus.
Info	Open the *Info* screen associated with the current screen; see *Info on* p. 1.37. This option is identical in all *VersionManager* submenus.

Delete software
(optional)

Delete software opens a list of all firmware configurations stored on the CMU hard disk. The dialog can be operated as explained above; see *Activate software*. The last firmware configuration can not be deleted, so this function is not available if the hard disk contains only a single configuration.

```
┌──────────────────────────────────────────────────────────────────┐
│                      VersionManager V5.03                          │
│                                                                    │
│     The active CMU base software is the version: 5X00.A55          │
│     ─────────────────────────────────────────────────             │
│                                                              ↑     │
│ <── Delete     base V4.52                                   │     │
│                                                             │     │
│                base V4.52 ──┬── GSM MS V4.52                │     │
│                             ├── IS136/AMPS MS V4.50         │     │
│                             └── WCDMA UE V4.52              │     │
│                                                             │     │
│                base V4.52 ──── WCDMA UE V4.52              │     │
│                                                             │     │
│                                                             ↓     │
│                                                                    │
│ <── Back to previous screen                          Info ──>     │
└──────────────────────────────────────────────────────────────────┘
```
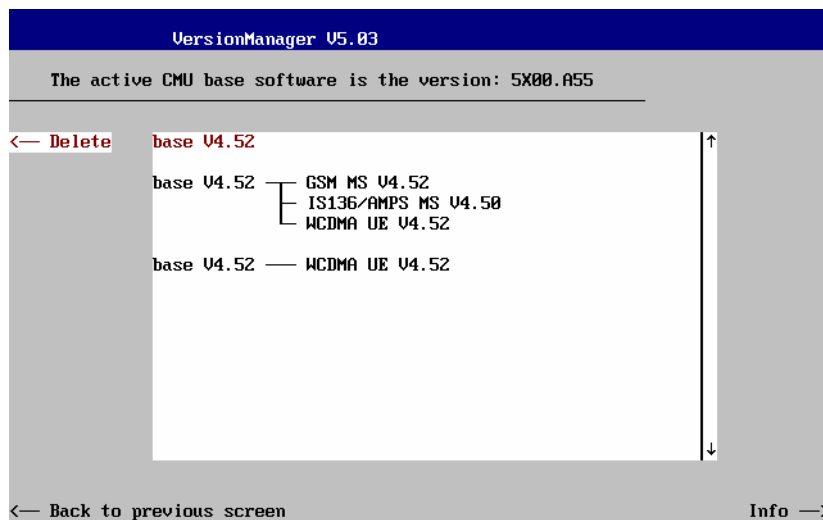
Delete	Delete the current firmware configuration.

---

[1] Several related options may be displayed in a single line. These combinations of options can be installed together and will be simply referred to as "options" through the remainder of this section.

If the active firmware configuration is deleted, the CMU asks which of the remaining versions shall be activated:

```
                    VersionManager V5.03

        Which software version shall be the active version after
        deleting the current version?

<— Activate   base 5X00.A40 ── GSM MS 5X00.A40
                             ├─ IS136/AMPS MS 5X00.A40
                             ├─ WCDMA UE 5X00.A40
                             ├─ CDMA 2000 MS 5X00.A41
                             └─ 1xEV-DO 5X00.A41

              base V4.35

              base 5X00.A55 ── GSM MS 5X00.A55
                             └─ IS136/AMPS MS 5X00.A55

              base V4.52


<— Back to previous screen                                 Info —>
```

Activate   Activate the current firmware configuration.

Install software...   *Install software...* opens a list of all firmware installation versions available on an internal or external storage medium that is accessible from the R&S CMU (floppy disk, CF or PCMCIA card). As explained in *Table 1-3*, this function depends on the type and number of storage media and on the number of installation versions available.

Table 1-3   Software installation with the *VersionManager*

Storage medium with FW installation version[2]	Number of FW installation versions	VersionManager function
Floppy	1	*Install software version <version> from floppy*
	several	*Install software from floppy* –> Open software version selection dialog (see below).
CF / PCMCIA card in slot 0 or 1 (right or left side)	1	*Install software version <version> from PC-card slot <slot_no>*
	several	*Install software from PC-card slot <slot_no>* –> Open software version selection dialog (see below).
CF / PCMCIA card in slot 0 and in slot 1	1 (per PC-card)	*Install software version <version> from PC-card* –> Open PC-card selection dialog (see below).
	several	*Install software from PC-card* –> Open PC-card selection dialog (see below).
Internal drive	1	*Install software version <version> from internal drive* –> Open PC-card selection dialog (see below).
	several	*Install software from internal drive* –> Open PC-card selection dialog (see below).

PC-card selection dialog: The *PC-card* selection dialog selects either CF / PCMCIA card slot 0 (right side) or slot 1 (left side) for installation.

---

[2] Media without FW installation versions are ignored.

```
┌──────────────────────────────────────────────────────────────────┐
│                      VersionManager V5.03                          │
│    The active CMU base software is the version: 5X00.A55           │
│   ─────────────────────────────────────────────────────           │
│                                                                    │
│                                                                    │
│                                                                    │
│  <── Install software from internal drive                          │
│                                                                    │
│  <── Install software upgrade 5X00.A55 Bluetooth from PC-card slot 0│
│                                                                    │
│  <── Install software from PC-card slot 1                          │
│                                                                    │
│  <── Rescan Drives                                                  │
│                                                                    │
│                                                                    │
│                                                                    │
│  <── Back to previous screen                          Info ──>     │
└──────────────────────────────────────────────────────────────────┘
```

Install software...   Select the card in slot 0 or slot 1 as an installation medium. If the medium contains several installation versions, the *software version* selection dialog is called up, see below.

Rescan Drives…   Rescans the external and internal drives in order to detect new software installation versions and update the screen accordingly.

Software version selection dialog: The *software version* selection dialog lists all installation versions on the current medium (floppy, CF / PCMCIA card). The dialog can be operated as explained above; see *Activate software*.

```
┌──────────────────────────────────────────────────────────────────┐
│                      VersionManager V5.03                          │
│    Which version shall be installed from PC-card slot 1 ?          │
│   ─────────────────────────────────────────────────────           │
│                                                                    │
│  <── Install   5X00.A55   BASE                              ┌─┐    │
│                                                             │ │    │
│                5X00.A55   IS136 MS                          │ │    │
│                                                             │ │    │
│                5X00.A55   Bluetooth                         │ │    │
│                                                             │ │    │
│                V4.52  WCDMA UE                              │ │    │
│                                                             │ │    │
│                5X00.A40  WCDMA UE                           │ │    │
│                                                             │ │    │
│                                                             │↓│    │
│  <── Back to previous screen                          Info ──>     │
└──────────────────────────────────────────────────────────────────┘
```
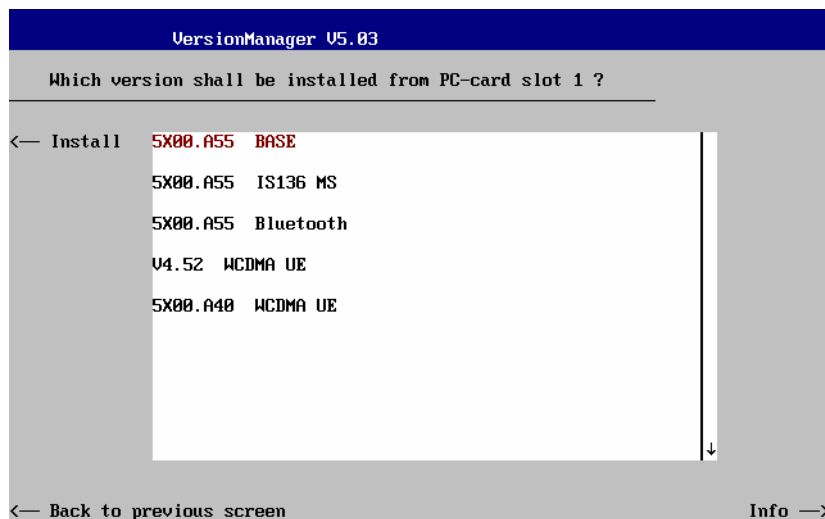
Install   Install the current firmware version.

Upgrade options: In contrast to the *Activate software* dialog, the software selection dialog handles base software versions and network options separately. As a consequence, different versions of the base software can be combined with different options to create new firmware configurations. For example, it is possible to update the base software without affecting the associated network options or vice versa. Moreover, the same base software version can be installed several times and combined with different network options (and vice versa), so it may enter into several firmware configurations. The

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following simple rules apply:

- With a new version of a network option, it is only possible to update one of the existing configurations. The following selection dialog is automatically skipped.
- With a new base software version, it is possible to either update an existing configuration or create a new one. A dialog selecting between the two alternatives is opened:

```
┌─────────────────────────────────────────────────────────────────┐
│                      VersionManager V5.03                        │
│                                                                  │
│      How do you want to handle this software?                    │
│      ──────────────────────────────────────────                 │
│                                                                  │
│                                                                  │
│                                                                  │
│                                                                  │
│ <─── Install as new base                                         │
│                                                                  │
│ <─── Upgrade existing version                                    │
│                                                                  │
│ [ ] Force Verm Update (not recommended)                          │
│                                                                  │
│                                                                  │
│                                                                  │
│                                                                  │
│                                                                  │
│ <─── Back to previous screen                          Info ───>  │
└─────────────────────────────────────────────────────────────────┘
```
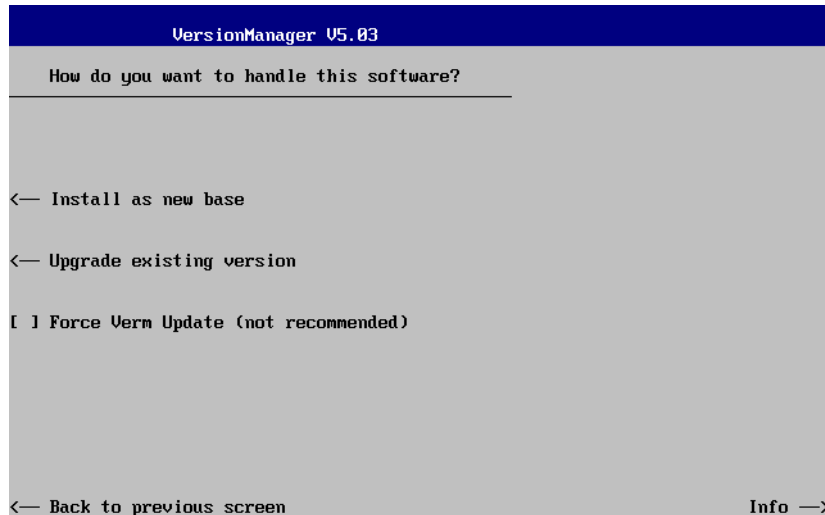
Note: *This dialog is skipped if the new base software version is not compatible with any of the existing configurations. An incompatible new base software must be installed as a new base software.*

Install as new base   Create a new configuration based on the base software to be installed. The upgrade selection dialog described below is skipped. Network options can be assigned to this base software in a second stage of the installation.

Upgrade existing v.   Select an existing configuration and replace the base software of this version. To this end, the upgrade selection dialog described below is opened.

Force Verm update   If the option is checked the current *VersionManager* is overwritten every time that a new base system is installed, even if this means a downgrade of the *VersionManager* version. This feature is primarily for service purposes.

After selection of an upgrade software version compatible with one of the configurations stored on the hard disk, the upgrade selection dialog is called up:

```
┌────────────────────────────────────────────────────────────────────┐
│               VersionManager V5.03                                   │
│                                                                      │
│   Which version shall be upgraded with V4.52 WCDMA UE ?              │
│  ─────────────────────────────────────────────────────             │
│                                                                      │
│ <── Upgrade   base V4.53 ──┬── GSM MS V4.52              ▲          │
│                            ├── WCDMA UE V4.52                        │
│                            ├── CDMA 2000 MS 4X50.A92                 │
│                            └── 1xEV-DO 4X50.A92                      │
│                                                                      │
│               base V4.53 ──┬── WCDMA UE V4.52                        │
│                            ├── CDMA 2000 MS 4X50.A92                 │
│                            └── 1xEV-DO 4X50.A92                      │
│                                                                      │
│               base V4.52                                             │
│                                                                      │
│               base V4.52 ──┬── GSM MS V4.52                          │
│                            ├── IS136/AMPS MS V4.50                   │
│                            └── WCDMA UE V4.52                        │
│                                                                      │
│               base V4.52 ──── WCDMA UE V4.52            ▼           │
│                                                                      │
│ <── Back to previous screen                       Info ──>          │
└────────────────────────────────────────────────────────────────────┘
```
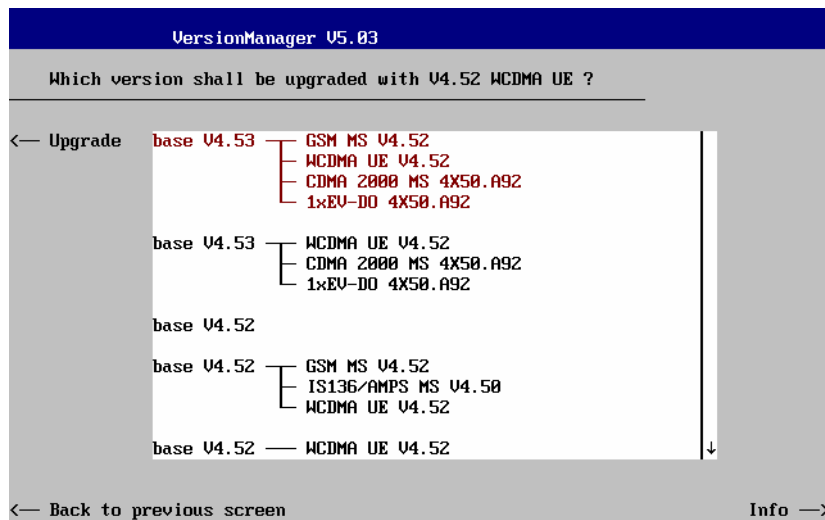
Upgrade   Replace the base software version or network option selected in the *software version* selection dialog.

Alternatively, if none of the configurations stored on the hard disk is compatible with the software version selected, an error message is displayed. E.g., for an incompatible Bluetooth version:

```
┌────────────────────────────────────────────────────────────────────┐
│               VersionManager V5.03                                   │
│                                                                      │
│   No installed version can be upgraded with V4.52 WCDMA UE !         │
│  ─────────────────────────────────────────────────────             │
│                                                                      │
│   Base version V4.52 is needed!                                     │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│ <── Back to previous screen                       Info ──>          │
└────────────────────────────────────────────────────────────────────┘
```
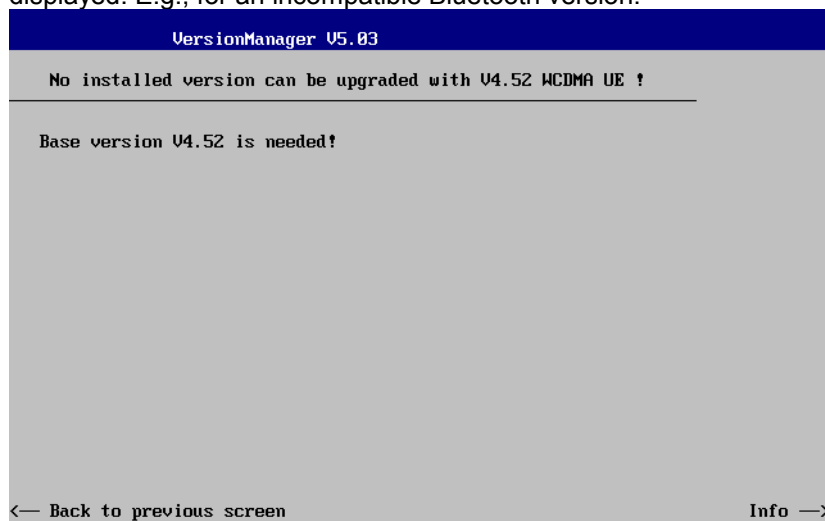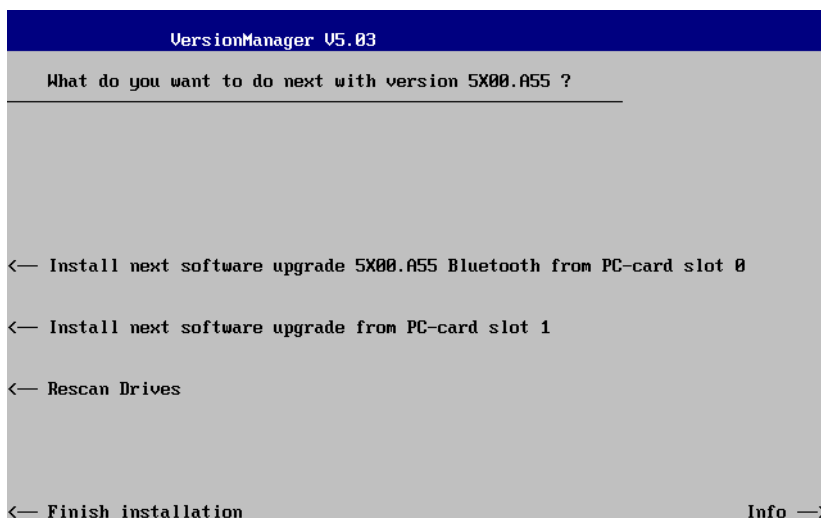
Back to...   Close the current screen and go back to the *software version* selection dialog to select a compatible software version.

Terminating the software update: After successful installation of each software version the CMU displays the following screen:

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```
┌──────────────────────────────────────────────────────────────────┐
│                          VersionManager V5.03                      │
│                                                                    │
│      What do you want to do next with version 5X00.A55 ?           │
│      ──────────────────────────────────────────────────────       │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│   <── Install next software upgrade 5X00.A55 Bluetooth from PC-card slot 0 │
│                                                                    │
│   <── Install next software upgrade from PC-card slot 1            │
│                                                                    │
│   <── Rescan Drives                                                │
│                                                                    │
│                                                                    │
│                                                                    │
│   <── Finish installation                                  Info ──>│
└──────────────────────────────────────────────────────────────────┘
```

Install next software... Go back to the *software version* selection dialog to select additional software modules to be installed in the same *VersionManager* session. This function depends on the storage media and the number of software installation versions available; see *Table 1-3* on page 1.31.
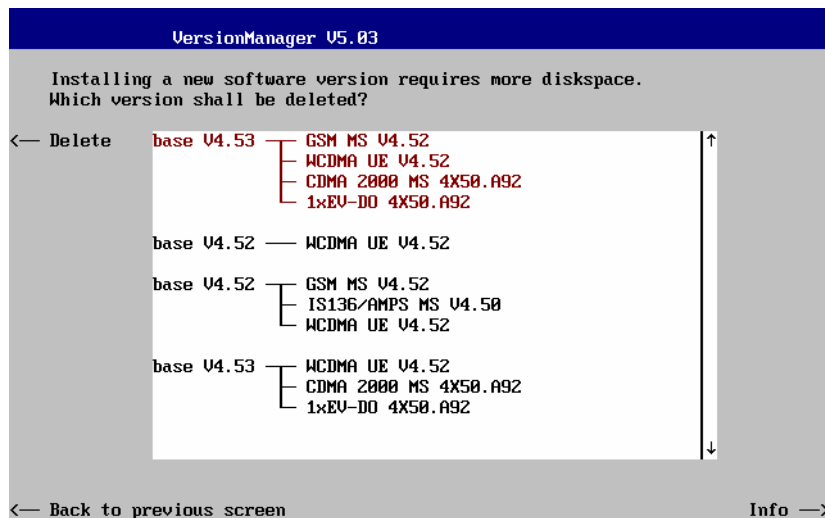
Rescan Drives… Rescans the external and internal drives in order to detect new software installation versions and update the screen accordingly.

Finish installation Close the *VersionManager* and reboot the CMU (remove the external disk from the disk drive). The installed firmware configurations are then operational. The last configuration installed is taken as the active configuration in the subsequent measurement session.

Note: Notice messages after firmware updates

In most cases firmware updates do not affect the accuracy of the measurements. There are some exceptions where a correction procedure must be executed in the Maintenance *menu after the firmware update. The R&S CMU displays a notice message whenever this happens. The box contains the name of the required correction procedure and appears during startup until the correction has been performed.*
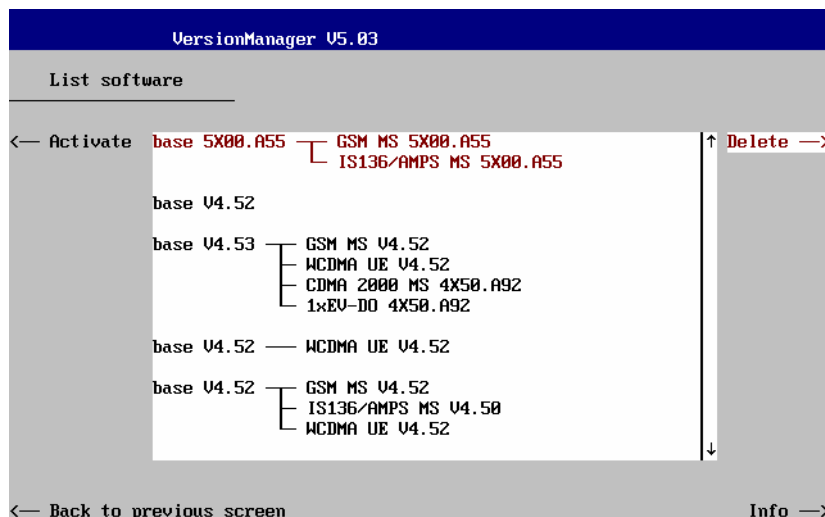
Lack of disk space: Before installing the next software version, the CMU checks whether there is enough disk space on the hard disk. If not, the following dialog is displayed:

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```
┌──────────────────────────────────────────────────────────────┐
│                    VersionManager V5.03                        │
│                                                                │
│   Installing a new software version requires more diskspace.   │
│   Which version shall be deleted?                              │
│                                                                │
│ ┌─ Delete    base V4.53 ─┬─ GSM MS V4.52                      │
│                          ├─ WCDMA UE V4.52                     │
│                          ├─ CDMA 2000 MS 4X50.A92              │
│                          └─ 1xEV-DO 4X50.A92                   │
│                                                                │
│             base V4.52 ─── WCDMA UE V4.52                     │
│                                                                │
│             base V4.52 ─┬─ GSM MS V4.52                        │
│                         ├─ IS136/AMPS MS V4.50                 │
│                         └─ WCDMA UE V4.52                      │
│                                                                │
│             base V4.53 ─┬─ WCDMA UE V4.52                     │
│                         ├─ CDMA 2000 MS 4X50.A92              │
│                         └─ 1xEV-DO 4X50.A92                   │
│                                                                │
│                                                                │
│ ┌─ Back to previous screen                        Info ─┐     │
└──────────────────────────────────────────────────────────────┘
```

Delete	Delete the current version and return back to the previous screen.

List software   *List software* opens a list of all available firmware configurations. It is possible to activate and delete configurations from the list; see description of *Activate software* and *Delete software* functions above.

```
┌──────────────────────────────────────────────────────────────┐
│                    VersionManager V5.03                        │
│                                                                │
│     List software                                              │
│   ─────────────────────                                        │
│                                                                │
│ ┌─ Activate   base 5X00.A55 ─┬─ GSM MS 5X00.A55      ┌ Delete ─┐│
│                              └─ IS136/AMPS MS 5X00.A55│        ││
│                                                                │
│             base V4.52                                         │
│                                                                │
│             base V4.53 ─┬─ GSM MS V4.52                        │
│                         ├─ WCDMA UE V4.52                      │
│                         ├─ CDMA 2000 MS 4X50.A92              │
│                         └─ 1xEV-DO 4X50.A92                   │
│                                                                │
│             base V4.52 ─── WCDMA UE V4.52                     │
│                                                                │
│             base V4.52 ─┬─ GSM MS V4.52                        │
│                         ├─ IS136/AMPS MS V4.50                 │
│                         └─ WCDMA UE V4.52                      │
│                                                                │
│ ┌─ Back to previous screen                        Info ─┐     │
└──────────────────────────────────────────────────────────────┘
```

Firmware update after board change(…)   This function depends on whether a user correction file named *USERCOR1.DAT* is stored in the directory *INTERNAL\USERCOR* of the internal hard disk.

- If no user correction file is available, *Firmware update after board change* performs an update of the current firmware including a complete CMU hardware detection. No external installation disk is required. The update takes some time and should be attempted in case of problems or after a modification of the CMU hardware configuration only (also after a combined hardware/software exchange).

- If a user correction file is found, *Firmware update after board change…* opens a submenu to activate or deactivate the RF user correction; see section Chapter 1 of the complete operating manual.

Edit service tables   *Edit service tables* calls up the *Service Table Editor* menu showing all hardware modules that are possibly fitted in your instrument. For service

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purposes, further information can be obtained by typing a particular board name and board index in the two lines below the table.

Exit   *Exit* closes the *VersionManager* and resumes the CMU start-up procedure.

Write log files to disk   *Write log files to disk* copies all *.log files stored on the CMU hard disk to an external storage medium (floppy or CF / PCMCIA card). The *.log source files on the hard disk are not deleted.

The *Write log files to disk* function opens a blue message box indicating the storage capacity of the external disk needed. The *.log files can be distributed over several disks. If no disk is available, the *VersionManager* displays a warning and does not start copying.

Delete non volatile ram   *Delete non volatile ram* deletes all entries stored in the non volatile ram of the CMU. This memory contains particular settings of the last CMU session that can be reused in the next session (e.g. the last active function group and measurement menu, special configuration etc.).

Deleting the non volatile ram can be useful after an abnormal termination of a CMU measurement session.

Note: *The settings stored in the non volatile ram can also be written to a configuration file and reused in later sessions; see Chapter 3 of the operating manual, section* Saving Configurations.

Scan disk   *Scan disk* closes the *VersionManager,* executes the MS *Scan Disk* program and finally returns you to the *VersionManager*. Refer to your *Scan Disk* documentation for further information.

Note: *This function is not available while a base software version <V3.00 is active.*

List all versions to disk   *List all versions to disk* writes the software configurations indicated via *List software* to an ASCII text file that is stored on the external disk.

Copy non volatile ram to disk   *Copy non volatile ram to disk* copies the contents of the non volatile ram to the external disk (floppy, CF / PCMCIA).
In this way, the settings stored in the non volatile ram can be used on another CMU.

Defragment disk   *Defragment disk* closes the *VersionManager,* executes the MS *Defrag.exe* program and finally returns you to the *VersionManager*. Defragmenting the hard disk is suitable to improve performance after installing and deleting many different software versions. Refer to your *Defrag.exe* documentation for further information.

Note: *This function is not available while a base software version <V3.00 is active.*

Info   *Info* opens an output window displaying information on the current screen. Separate *Info* windows are provided for the different *VersionManager* dialogs.

```
┌─────────────────────────────────────────────────────────┐
│              VersionManager V5.03                        │
├─────────────────────────────────────────────────────────┤
│   The active CMU base software is the version: 5X00.A55  │
│                                                          │
│                       INFO PAGE                          │
│  ┌─────────────────────────────────────────────────┐ ↑  │
│  │      You are in the main menu of the VersionManager│ │  │
│  │                                                   │ ▓  │
│  │ The softkeys for activate other software, delete software,│▓│
│  │ install software (if no specific version is named)│ ▓  │
│  │ and list software lead to sub menus (with own info pages).│▓│
│  │ The other labeled softkeys perform direct action. │ ░  │
│  │                                                   │ ░  │
│  │ If the install software button names a specific version number│
│  │ the installation is started directly when the key is pressed.│
│  │                                                   │    │
│  │ Firmware update after board change performs an update of the│
│  │ current firmware including a complete CMU hardware detection.│
│  │ No external installation disk is required.        │ ↓  │
│  └─────────────────────────────────────────────────┘    │
│  ┌────────────────────────────────────────────────────┐ │
│  └────────────────────────────────────────────────────┘ │
│                                                          │
│                                          Escape ──→      │
└─────────────────────────────────────────────────────────┘
```

Escape   Close the Info screen and return to the previous screen.

Error and notify message

During operation, the *VersionManager* can display two different types of messages:

- Error messages indicating that an action could not be successfully performed are displayed in yellow boxes. All error messages with possible reasons and remedial actions are explained in Chapter 9 of the operating manual.

```
┌─────────────────────────────────────────────┐
│                                             │
│      D:\GSMS2X10.N03\CONFIG.INI:            │
│      the 'Version=' entry is not valid.     │
│         The file may be corrupted           │
│                                             │
│                                             │
│                                             │
│                                 ┌──────┐    │
│                                 │  OK  │    │
│                                 └──────┘    │
└─────────────────────────────────────────────┘
```
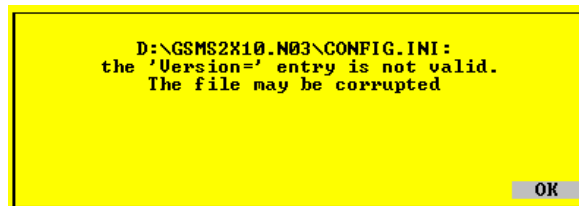
- Notify messages describing ongoing processes of the instrument are displayed in blue boxes. These messages are self-explanatory and do not require an action to be taken by the user.

Contents

2 Getting Started

The following chapter presents a sample session with the universal radio communication tester CMU. It is intended to provide a quick overview of the settings provided in the base system and the *RF* function group. No specific device under test is required. For an introduction to mobile network tests (e.g. tests of GSM900/1800/1900 mobile phones) please refer to the relevant operating manuals.

Before starting any measurement with the CMU, please note the instructions given in Chapter 1 for putting the instrument into operation. In this chapter and in Chapters 3 to 4 of the complete operating manual you will find detailed information on customizing the instrument and the display according to your personal preferences.

The steps to perform are explained on the left side of each double-page together with the results obtained on the CMU screen. On the right side, additional information is given. We also point out alternative settings and related measurements which could not be reported in detail.

For a systematic explanation of all menus, functions and parameters and background information refer to the reference part in Chapter 4 of the operating manual.

A Short Tutorial on CMU Operation

The principles of manual operation – controls, operating menus, dialog elements and measurement control – are discussed in Chapter 3 of the operating manual. Below we list some essentials for first users:

Condensed Operating Instructions

1. Press the *RESET* key on the front panel to set the instrument to the default state before you configure a new measurement.

2. Press *ENTER* to confirm selections, even if *No* or *Yes* is displayed.

3. The *MENU SELECT* front panel key can be pressed in any state of the unit. A large popup menu is then displayed in which the function group (network etc.), signalling mode, and measurement menus can be selected. Activate by pressing *ENTER*.

4. A front-panel LED indicates which of the RF connectors is configured as output. In the menu, the RF generator can be activated or deactivated with *ON/OFF* (green/red). The front-panel LED goes out if the generator is in the *OFF* position.

5. A front-panel LED indicates which of the RF connectors is configured as input. In the menu, the measurement can be controlled via the *ON/OFF* and *CONT/HALT* keys (*ON* (green), *OFF* (red) and *HLT* (yellow) states). In the *OFF* state, the LED goes out.

6. The *SETUP* hardkey allows to make static, measurement-independent default settings such as *Remote* or *Time*, to check which options are installed and to activate new software options.

7. The softkeys to the right of the menus are used to change the hotkeys across the bottom and their functions. Pressing the *Menus* softkey (bottom right) allows a fast switchover between related menus using the hotkeys.

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How to access and close menus
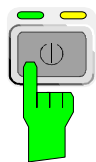
A startup menu is displayed automatically when the CMU is switched on.

Some general configuration and selection menus can be opened via the *MENU SELECT, RESET, INFO, PRINT, HELP* or *SETUP* keys on the front panel.
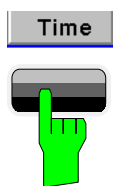
The hotkeys displayed across the bottom of a main menu or graphical measurement menu are used to switch over between different main menus or graphical measurement menus. Tabs in popup menus are also accessible via hotkeys.
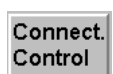
The *Connect. Control* softkey (always at the top right) is available in all measurement menus. This softkey opens a popup menu defining the input and output connectors, the external attenuation, the reference frequency as well as many network-specific settings.

In the *Signalling* test modes of many network options, the *Connection Control* menu is also used to set up and terminate a connection between the CMU and the DUT.

The *Connection Control* menu also contains the input path and the trigger settings for the current function group and signalling state.
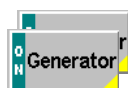
If a special configuration menu exists for a measurement or for a generator the corresponding softkey is marked with a yellow arrow. The configuration menu is opened by pressing the softkey twice.

All CMU popup menus can be closed with the *ESCAPE* key.

Main menus and graphical measurement menus are closed on switching to another main or graphical measurement menu.

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How to use dialog elements in the menus

Time — The dialog elements assigned to a softkey are selected by pressing the softkey.

➩ — Different input fields can be selected by means of the 4 cursor keys (blue frame shows active input field).

WIDE — One of several elements in a list or toggle switch can be selected with the rotary knob.

-20.0 dBm — Numeric values can be either incremented/decremented using the rotary knob or entered via the numeric keypad or an external keyboard.

For a comprehensive introduction to manual operation of the CMU refer to Chapter 3 of the operating manual.

Startup of the CMU

This section describes how to customize the CMU and perform simple RF measurements. As a prerequisite for starting the session, the instrument must be correctly set up and connected to the AC power supply as described in Chapter 1.
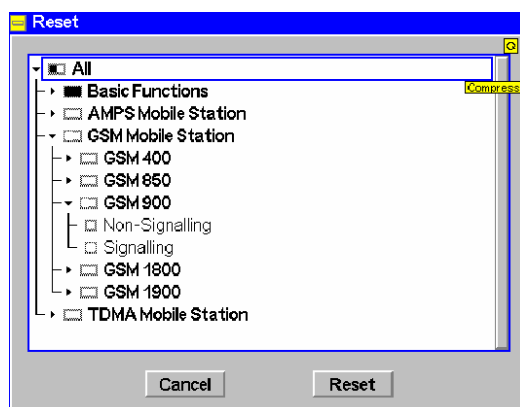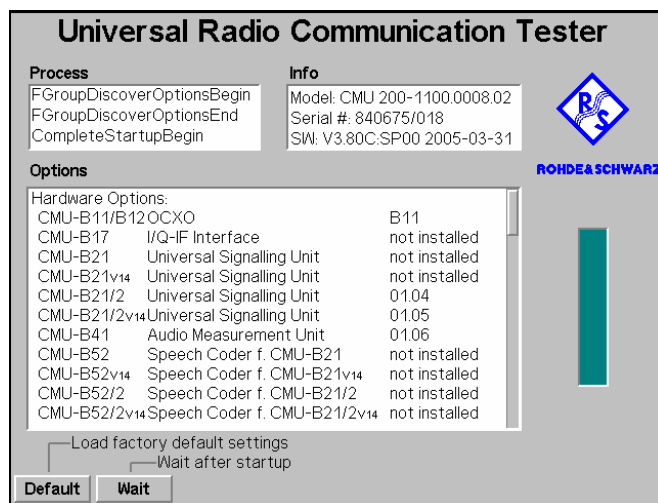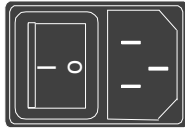
Step 1

➢ Switch on the CMU using the mains switch at the rear. ①

➢ Check the operating mode of the instrument at the *ON/STANDBY* key on the front panel. If the CMU is in standby mode, press the *ON/STANDBY* key. ②

Step 2

The CMU is booted and after a short while displays the startup menu. This menu is usually closed as soon as the instrument software is loaded and the startup test is finished. ③

➢ Press the *Wait* hotkey to prevent the instrument from switching to another menu. ④

The *Wait* hotkey changes to *Cont.* with the additional message *Change to last menu* displayed on top.

➢ Press the *Cont.* hotkey to resume the startup process.

Step 3

➢ Press the *RESET* key to open the *Reset* popup menu.

➢ Proceed as described in Chapter 4 of the operating manual, section *Reset of Instrument Settings,* to expand the tree of function groups.

➢ Select the function groups *Base* and *RF* to be reset (the corresponding nodes must be black).

➢ Use the cursor keys to activate the *Reset* button and press *ENTER.*

➢ In the popup window opened *(Are you sure?)*, select *Yes* to confirm the instrument reset.

The CMU indicates that it performs a partial reset of the two selected function groups and is then ready to carry out the following steps. The *Reset* popup menu is closed automatically.

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Additional Information...

| | Alternative Settings and Measurements |

... on Step 1

① **Mains switch on the rear panel**

When the mains switch at the rear is set to the *O* position, the complete instrument is disconnected from the power supply. When the mains power switch is set to the *I* position, the instrument is in standby mode or in operation, depending on the position of the *ON/STANDBY* key on the front panel.

☞ Chapter 1

The CMU is automatically set to the AC supply voltage and frequency applied. Note the permissible ranges of AC voltages and frequencies indicated at the rear of the instrument and in the data sheet.

② **ON/STANDBY key on the front panel**

The *ON/STANDBY* key at the front of the instrument determines whether the instrument is in standby mode or in operation.

Standby mode:
Only the OCXO reference frequency oscillator (option CMU-B11/B12), if installed, is supplied with operating voltage. The orange LED (STANDBY) is illuminated.

O*peration:*
The green LED (ON) is illuminated and all modules of the instrument are supplied with operating voltage.

☞ Chapter 1

The behavior of the CMU when it is switched off depends on the Front Module controller type installed.

... on Step 2

③ **Startup menu**
The startup menu displays the following information:

* The startup procedure (Process)

* Instrument model, serial number and version of the CMU base software (Info).

* Installed hardware and software options and equipment (Options). Available software options are listed with their version numbers.

* Progress of the startup procedure (Startup bar graph).

☞ Chapter 4 of the operating manual

The *Default* hotkey can be used to load the factory default settings for all function groups. Settings made and stored in the previous session are overwritten.

④ **Wait hotkey**
By default the CMU switches to the last main menu of the previous session after terminating the startup process. This is convenient if an interrupted session is to be resumed or if the instrument is generally used in a definite operating mode.

On the other hand, the *Wait* function can be used to access the configuration menus which can be opened by means of the front panel keys before the actual measurement is started.

While the *Wait* hotkey is active, a reset of the instrument is not possible.

The CMU's user interface has been optimized with the aim of facilitating fast and easy switch-over between the menus and measurement modes. This includes the general configurations which can be accessed from any measurement menu.

The most important selection and configuration menus such as *Reset, Setup, Menu Select* etc.are directly accessible via front panel keys.

⇓

SETUP

⇓

Time

⇓
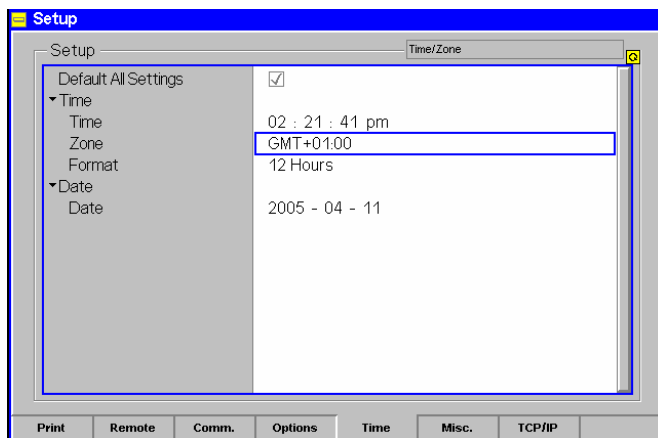
| Step 4 |

➢ Press the *SETUP* key to access general device settings.

➢ Press the *Time* hotkey to switch over to the *Time* tab of the *Setup* menu. ①

Setup		
Setup	Time/Zone	
Default All Settings	✓	
▾ Time		
Time	02 : 21 : 41 pm	
Zone	GMT+01:00	
Format	12 Hours	
▾ Date		
Date	2005 - 04 - 11	

| Print | Remote | Comm. | Options | Time | Misc. | TCP/IP |

| Step 5 |

The *Time* tab of the *Setup* menu displays the current time zone, time and date. ②

➢ Use the rotary knob to move the focus onto the *Time* section of the *Setup* table. If necessary, press the rotary knob or the *ON/OFF* key to expand the parameters in the table (see Chapter 3 of the operating manual).

➢ Move to one of the input fields associated to the *Time* parameter, select with *ENTER* and use the rotary knob or the numeric keypad to correct the settings for the current time. Hours, minutes and seconds can be edited separately.

➢ Press *ENTER* to confirm the entries and quit the input fields.

➢ Move to *Zone* select field, activate with *ENTER,* and use the rotary knob to choose your own time zone.

➢ In the same way, activate the *Format* select field and use the rotary knob to switch over between European and North American time conventions.

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| **Additional Information...** | **Alternative Settings and Measurements** |

| **... on Step 4** |

① **Softkeys and hotkeys**

Softkeys and hotkeys are activated by pressing the associated keys on both sides and across the bottom of the display. The general purpose of softkeys is to provide settings, control the generator and the measurements. Hotkeys are used to switch over between different menus and different tabs belonging to a popup menu.

☞ Chapter 3 of the operating manual

| **... on Step 5** |

② **Setup menu**

The *Setup* menu comprises several tabs providing general instrument settings. It is advisable to check and adjust the factory settings when you operate the CMU for the first time.

To switch over between the tabs of the setup menu use the hotkeys displayed at the bottom of the display.

☞ Chapter 4 of the operating manual

The different types of menus and control elements of the graphical user interface is explained in Chapter 3 of the operating manual. In the same chapter you can find a short tutorial on the entry of numbers and characters.

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RF Measurements

In the *RF* function group, a continuous or pulsed RF signal can be generated and a RF signal with definite frequency characteristics can be analyzed. The signal level can be plotted in oscillographical *(Power)* or spectral *(Spectrum)* representation.

MENU SELECT

⇓

⇓

⇓
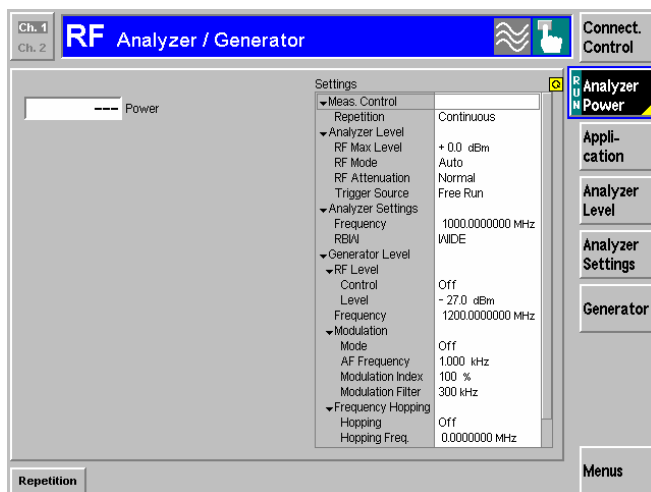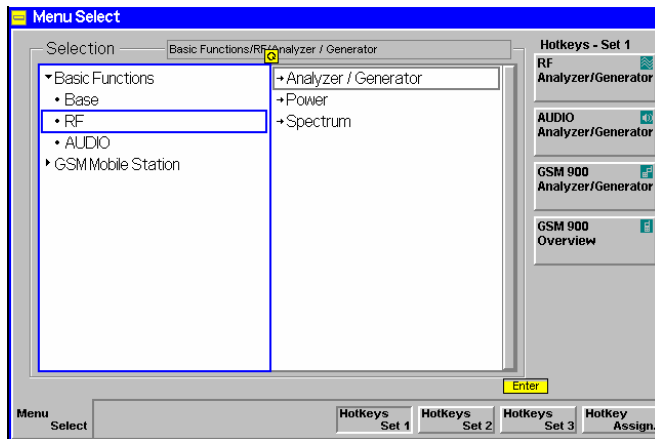
Step 1

➤ Press the *Menu Select* key to open the *Menu Select* menu.①

➤ Use the cursor keys and the rotary knob to select the *RF* function group in the left half of the *Selection* table.

➤ In the right half of the table, select the *Analyzer/Generator* menu.

➤ Press the *Enter* key to activate the measurement selected and open the *RF Analyzer/Generator* menu.

Step 2

In the *Settings* table the *Analyzer/Generator* menu indicates the parameters of the signal generated and those of the signal received and analyzed. ②

At present, all parameters have been reset to factory default values. Different softkey/hotkey combinations and popup menus are provided to change the settings. User-defined parameters will be saved for later sessions when the CMU is switched off.

The *Power* output field in the *Analyzer/Generator* menu shows an invalid result ("---") because at present no RF input signal is applied to the CMU.

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Additional Information...

Alternative Settings and Measurements

... on Step 1

① **Menu Select menu**

The *Menu Select* menu shows all function groups installed on your CMU. If a function group is selected the available test modes and measurement menus are indicated. Function groups representing digital network tests (such as *GSM400/850/900/1800/1900-MS)* are generally subdivided in the two test modes *Non Signalling* and *Signalling*, each containing a number of measurement menus.

The *RF* function group is available on any CMU regardless of the software options purchased. It comprises the three measurement menus *Analyzer/Generator*, *Power* and *Spectrum*. All three measurement menus are directly accessible from the *Menu Select* menu.

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For digital network tests refer to the relevant operating manuals. e.g. *GSM400/850/900/1800/1900-MS.*

... on Step 2

② **Analyzer/Generator menu**

The *Analyzer/Generator* menu contains several softkeys to

• Control the RF signals received and analyzed *(Analyzer Level, Analyzer Settings)*

• Control the RF signals generated *(Generator)*

Defining a level and frequency via the *Generator* softkey and the associated hotkeys implies that a continuous signal (CW) with this level and frequency is generated.

The *RF Max. Level* defined via *Analyzer Level*, however, denotes the maximum input power which can be measured. This is identical with the upper edge of the *Power* diagram (see below). The permissible range of *Max. Level* depends on the input connector and external attenuation used (see section *Analyzer Settings* in Chapter 4).

Defining a (center) *Analyzer Settings – Frequency* implies that only signals around this frequency are analyzed.

The *Analyzer Settings – RBW* hotkey defines the resolution bandwidth of the analyzer.

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The *Generator* softkey provides the most important settings of the *Generator* tab of the *Connection Control* menu.

The *Analyzer Level* and *Analyzer Settings* softkeys correspond to the *Analyzer* tab of the *Connection Control* menu.

③ The status of the *Analyzer Power* measurement is shown in the corresponding softkey. For ongoing measurements, the result in the *Power* output field is constantly updated.

At present no input signal is available so that the *Power* output field shows an invalid result "– – –"

Once the softkey is selected, the *Analyzer Power* measurement can be switched off and on by means of the *ON/OFF* key. In contrast, the *CONT/HALT* toggle key halts the measurement after the next valid result has been obtained.

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The options for the measurement status are *ON, OFF, or HLT*. The *HLT* state is reached after the end of a single shot measurement (see the section about measurement control in Chapter 5 of the operating manual).
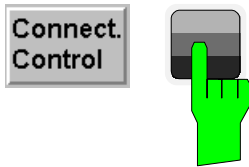
Step 3

➢ Press the *Connect. Control* softkey and use the *Generator* hotkey to open the *Generator* tab. ①
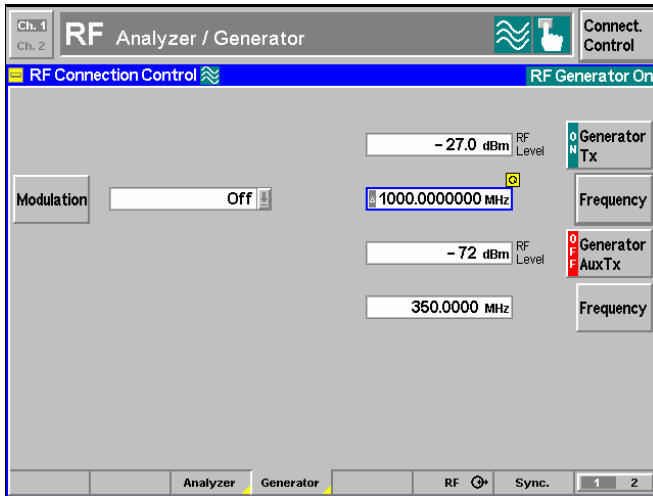
The *Generator* tab controls the RF generator and defines the *Frequency* and *Modulation* of the generated RF signal.

➢ Select the *Generator* softkey by pressing once.

➢ Press the *ON/OFF* key to switch the RF generator on. ③

➢ Set the generator frequency equal to the default frequency of the RF analyzer frequency as shown in the figure.

➢ Press the *RF* ↷ hotkey to open the tab defining the signal connectors and external attenuation.
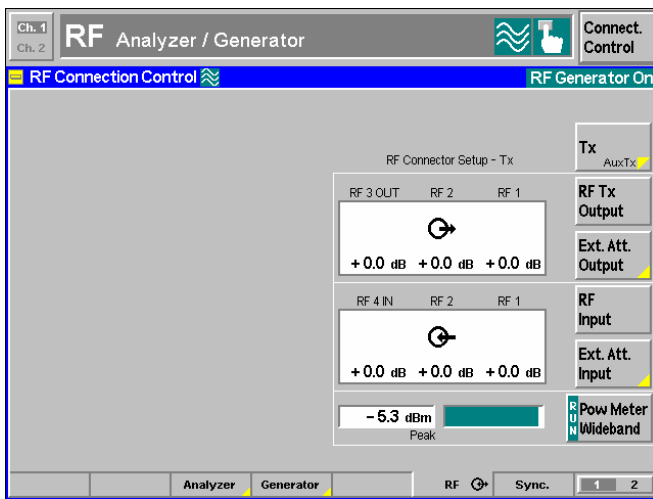
➢ Select RF 2 as output connector, RF 4 IN as input connector. Do not define any external attenuation (all values equal to 0.0 dB).

Two yellow LEDs on the front panel indicate the input and output connectors selected.

➢ Use a coax cable to connect RF 2 to RF 4 IN.

➢ Press the *ESCAPE* key to close the popup menu and return to the *RF Analyzer/Generator* main menu.

The RF level measured is now indicated next to the *Analyzer Power* softkey. Due to the loss in the signal path it should be slightly below the generator power selected. ②
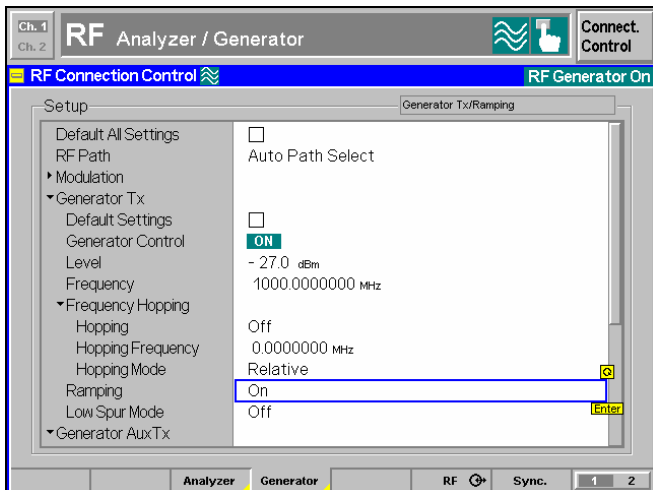
➢ Reopen the *Connection Control* menu and press the *Generator* softkey twice.

The table-oriented version of the *Generator* tab is opened.

➢ Press *ON/OFF* to expand the parameter tree, use the rotary knob to select the *Ramping* parameter, press *Enter* and use the rotary knob again to switch the power ramping *ON*.

Now the generator transmits a pulsed (instead of a continuous) signal.

➢ Press the *Connect. Control* softkey again or the *ESCAPE* key to close the popup menu.

Additional Information...

Alternative Settings and Measurements

| ... on Step 3 |

① **RF connectors**

The *RF Connection Control* menu configures the input and output connectors in the *RF* function group. The four connectors on the front panel differ by their permissible range of input and output powers (see Chapter 4 of the operating manual and data sheet). The values quoted on the left side are compatible with the rated specifications.

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Settings made in the *Connect. Control* menus apply to the entire function group *RF Non Signalling*.

② **External attenuation**

An external attenuation can be reported to the CMU in order to compensate for known losses between the signal source and the device under test or the analyzer.

In our example, the (positive) difference between the analyzer power measured and the generator power can be reported as an external output attenuation at RF 2. The RF generator increases its level to maintain the commanded power of –27 dBm at the analyzer. The nominal generator power set in the RF level field is thus measured and indicated next to the *Analyzer Power* softkey.

Note: RF User Correction

> *In addition to the static external attenuation settings, the CMU provides systematic, frequency and level-dependent correction mechanisms of the generated and measured RF power:*

> • *In many function groups (e.g. the present* RF *group) a frequency-dependent attenuation can be defined after pressing* Ext. Att. Output *or* Ext. Att. Input *twice.*

> • *Global, frequency and level-dependent correction tables can be loaded using the VersionManager; see section* RF User Correction *in Chapter 1 of the complete R&S CMU operating manual.*

☞ Chapter 4 of the operating manual

Note that an external attenuation reported to the CMU shifts the nominal permissible ranges of input and output levels.
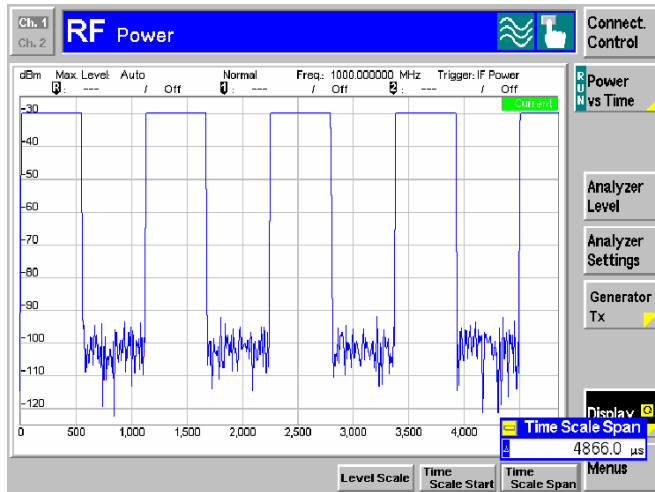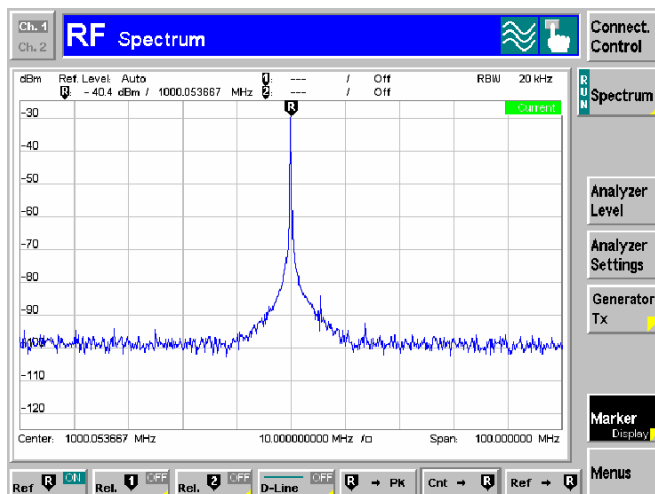
Step 4

➢ Press the *Power* hotkey to switch over to the graphical menu *Power*.

The *Power* menu shows the RF signal power measured as a function of time at a particular frequency and resolution bandwidth. An appropriate trigger condition must be selected to obtain a stable display. ①

Settings (default settings or the ones made in the *Analyzer/Generator* menu) and scalar results are displayed in two parameter lines above the diagram.

Various tools allowing to take a closer look at the measurement results are provided in the graphical measurement menu. ②

➢ Press the *Marker/Display* softkey twice and vary the *Time Scale* to display several pulses in the diagram.

➢ Press the *Analyzer Settings* softkey and vary the resolution bandwidth (hotkey *RBW)*. ③

➢ Press the *Menu* softkey to display the hotkeys used to change over to the other measurement menus.

➢ Press the *Spectrum* hotkey to switch over to the graphical menu *Spectrum*.

Step 5

The *Spectrum* menu shows the signal power in spectral representation, i.e. as a function of the frequency.

The settings and results displayed in the two parameter lines above the diagram are analogous to the ones shown in the *Power* menu.

➢ Press the *Marker* softkey and use the *R to Pk* and the *Cnt to R* hotkeys to center the diagram. ④

➢ Press the *Analyzer Settings* softkey to scale the diagram and adjust the resolution bandwidth.

➢ To close your session set the CMU to standby mode using the power switch on the front panel or use the mains switch at the rear.

Additional Information...	**Alternative Settings and Measurements**

... on Step 4

① **Trigger mode**

The trigger mode is set in the *Analyzer* tab of the *Connection Control* menu or via the *Trigger* softkey in the graphical measurement menus. With the default setting *Free Run* the measurement is not synchronized to the frequency of the in-coming pulses: The trace is permanently shifted in horizontal direction.

To show a signal consisting of rectangular pulses (bursts) it is recommended to trigger by either the rising or falling edge of the IF power.

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The *Frequency* softkey defines the frequency of the measured signal and the resolution band-width. The *Input Level* softkey configures the input level, the power range and an attenuation factor. The *Time* softkey config-ures the time axis.

② **Markers**

Markers are a graphical tool used to locate points on a trace and read out their coordinates. A reference marker and two delta markers may be defined in the *Power* menu.

The reference marker 🚩 measures the absolute level of the trace, the delta markers 🚩 and 🚩 measure the distance be-tween their position and the reference marker. All marker co-ordinates are shown in the two parameter lines above the diagram.

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In addition to markers, a D-line can be used to measure a par-ticular level in the diagram.

③ **Resolution bandwidth**

A spectrum analyzer can differentiate two spectral lines sepa-rated by a minimum distance corresponding to the bandwidth of the resolution filter.

The smaller the bandwidth the better the resolution and the larger the signal-to-noise ratio. If the resolution bandwidth is too large only the envelope of the spectrum can be meas-ured.

In the *Power* measurement, the signal-to-noise ratio improves but the time resolution **deteriorates** when the resolution bandwidth is reduced.

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... on Step 5

④ **Scaling of the spectral diagram**

The tools provided in the *Spectrum* menu are particularly suitable for scaling a spectral diagram with a sharp main lobe and symmetric, lower side lobes:

- The *R to Pk* hotkey (*Marker* softkey) places the reference marker to the maximum (i.e. the main lobe) of the dia-gram.

- The *Cnt to R* hotkey (*Marker* softkey) centers the diagram to the frequency of the main marker.

- Equivalently, the *Center* hotkey *(Frequency/RBW* softkey) can be used to center the diagram.

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