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Quick Start Guide



Universal Radio Communication Tester

R&S® CMU 200

1100.0008.02/53

Printed in Germany

ROHDE&SCHWARZ
Test and Measurement Division

1100.4961.62-01

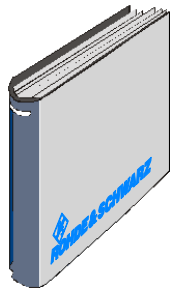
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R&S CMU Documentation Map

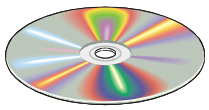
Quick Start Guide



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

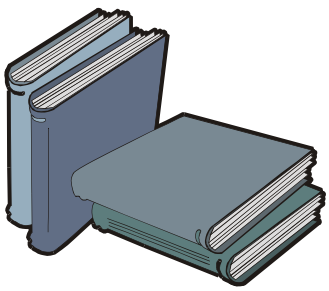
Documentation CD-ROM



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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List of Printed Manuals

The following operating manuals are related to the Universal Radio Communication Tester R&S CMU 200 and to network test options for the R&S CMU 200. Printed manuals can be ordered from Rohde & Schwarz using the order numbers listed below.

Manual	Order Number	For Options		
		Type	Description	Stock No.
Operating Manual CMU 200/300	1100.4984.12	 CMU 200 CMU 300	Univ. Radio Communication Tester for mobile stations / UE for base stations	 1100.0008.02/53 1100.0008.03
Service Manual Inst. CMU 200/300	1100.4903.82	CMU 200 CMU 300	Univ. Radio Communication Tester for mobile stations / UE for base stations	 1100.0008.02/53 1100.0008.03
Operating Manual CMU-K20/-K21/- K22/-K23/-K24/-K26	1115.6088.12	CMU-K20 CMU-K21 CMU-K22 CMU-K23 CMU-K24 CMU-K26 CMU-K42 CMU-K43 CMU-K44 CMU-K45 CMU-K47 CMU-K92	GSM400-MS for CMU-B21 GSM900-MS for CMU-B21 GSM1800-MS for CMU-B21 GSM1900-MS for CMU-B21 GSM850-MS for CMU-B21 GSM GT800 for CMU-B21 GPRS software extension for GSM EGPRS software extension for GSM Dual Transfer Mode AMR GSM for CMU200 Smart Alignment @ GSM-MS (E)GPRS Application Testing	1115.5900.02 1115.6007.02 1115.6107.02 1115.6207.02 1115.6307.02 1115.6507.02 1115.4691.02 1115.6907.02 1157.4277.02 1150.3100.02 1157.4477.02 1157.4077.02
Operating Manual CMU-K27/-K28	1115.6688.12	CMU-K27 CMU-K28	TDMA800-MS for CMU-B21 TDMA1900-MS for CMU-B21	1115.6607.02 1115.6707.02
Operating Manual CMU-K29	1115.6888.12	CMU-K29	AMPS-MS for CMU-B21	1115.6807.02
Operating Manual CMU-K53	1115.5081.12	CMU-K53	Bluetooth for CMU	1115.5000.02
Operating Manual CMU-K61…-K69	1115.4962.12	CMU-K65 CMU-K66 CMU-K67 CMU-K68 CMU-K69 CMU-K61 CMU-K62 CMU-K63 CMU-K64	WCDMA UE TX Test (3GPP/FDD) WCDMA UE DL Generator WCDMA UE Band III Signalling WCDMA UE Band I Signalling WCDMA UE Band II Signalling WCDMA UE Band IV Signalling WCDMA UE Band V Signalling WCDMA UE Band VI Signalling HSDPA 3.6 Mbps	1115.4891.02 1115.5100.02 1150.3000.02 1115.5300.02 1115.5400.02 1157.3670.02 1157.3770.02 1157.3870.02 1157.3970.02
Operating Manual CMU-K81/-K82	1115.5581.12	CMU-K81 CMU-K82	CDMA800-MS (IS95) for CMU-B81 CDMA1900-MS (IS95) for CMU-B81	1115.5500.02 1115.5600.02
Operating Manual CMU-K83/-K84/ -K85/-K86	1150.0382.12	CMU-K83 CMU-K84 CMU-K85 CMU-K86 CMU-K87	CDMA2000-MS (450 MHz band) CDMA2000-MS (cellular band) CDMA2000-MS (PCS band) CDMA2000-MS (IMT-2000 band) CDMA2000 Data Testing	1150.3500.02 1150.3600.02 1150.3700.02 1150.3800.02 1150.4007.02
Operating Manual CMU-K88	1150.3998.12	CMU-K88	1xEV-DO for CMU-B88	1150.3900.02

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R&S CMU 200 – Equipment Supplied

The R&S CMU is delivered with the following items:

- Universal Radio Communication Tester R&S CMU 200
- An AC power cable
- The following documentation (see documentation map on the previous pages):
  - The present quick start guide for R&S CMU 200
  - The documentation CD-ROM

Please note the instructions for unpacking and setting up the instrument starting on p. 1.10.

R&S CMU Models

This manual describes the following models of the Universal Radio Communication Tester R&S CMU:

- Universal Radio Communication Tester R&S CMU 200, stock no. 1100.0008.02, for all mobile station and user equipment tests including Bluetooth™ device tests.
- Universal Radio Communication Tester R&S CMU 200, stock no. 1100.0008.53, only for Bluetooth™ device tests.

The Universal Radio Communication Tester R&S CMU 300, stock no. 1100.0008.03, is described by a separate operating manual, stock no. 1100.4978.62.

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Supplement to the Quick Start Guide for Universal Radio Communication Tester R&S CMU 200

Addendum to the data sheet, no. 0758.0039.22 (V06.00, May 2004)

For CMU 200 instruments delivered with WCDMA MS SW ≥ V3.60 the WCDMA RF generator signal quality specification on **page 25** is extended for 16QAM as follows:

Signal quality	16QAM	
Error vector magnitude (EVM)	Global EVM for 16QAM reference setup: 3GPP TS34.121 FRC H-Set3 for 16 QAM	<8 %, rms

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Before putting the product into operation for the first time, make sure to read the following

Safety Instructions

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the 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, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz 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 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 an 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 operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

							
Observe operating instructions	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

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

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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 putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in other parts of the documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by Rohde & Schwarz, including instruments, systems and all accessories.

Tags and their meaning

DANGER	This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries.
WARNING	This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries.
CAUTION	This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries.
ATTENTION	This tag indicates the possibility of incorrect use that can cause damage to the product.
NOTE	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products:
   IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the instrument must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel 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).
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.
4. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.

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5. Operating the products requires special training and intense concentration. Disabled persons should not use the products unless it is made certain that their disability has no adverse effects while they are operating the products.
6. Prior to switching on the product, it must be ensured 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.
7. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
8. 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.
9. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
10. Never use the product if the power cable is damaged. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.
11. The product may be operated only from TN/TT supply networks fused with max. 16 A.
12. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.
13. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
14. 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.
15. Ensure that the connections with information technology equipment comply with IEC950/EN60950.
16. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.
17. 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 skilled electrician.
18. 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 suitable protection is provided for users and products.
19. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
20. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.

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21. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.
22. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.
23. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
24. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
25. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.
26. Please be aware that in the event of a fire, toxic gases that may be hazardous to your health may escape from the product.
27. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.
28. 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).
29. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.
30. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.

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Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes informaciones de seguridad



Informaciones de seguridad

Es el principio de Rohde&Schwarz de tener a sus productos siempre al día con los estandards de seguridad y de ofrecer a sus clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. Este producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estandards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, deberá el usuario atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. 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 solamente fue elaborado para ser utilizado en la indústria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del maluso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones del correspondiente manual del uso y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso de los productos hace necesarios conocimientos profundos y el conocimeinto del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso de los productos a personas péritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

Símbolos y definiciones de seguridad

							
Ver manual de instrucciones del uso	Informaciones para maquinaria con uns peso de > 18kg	Peligro de golpe de corriente	¡Cuidado! Superficie caliente	Conexión a conductor protector	Conexión a tierra	Conexión a masa conductora	¡Cuidado! Elementos de construción con peligro de carga electroestática

					
potencia EN MARCHA/PARADA	Indicación Stand-by	Corriente continua DC	Corriente alterna AC	Corriente continua/alterna DC/AC	El aparato está protegido en su totalidad por un aislamiento de doble refuerzo

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Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en otro capítulo de esta documentación y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por Rohde&Schwarz bajo la denominación de „producto“, entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

PELIGRO	Indica un punto de peligro con gran potencial de riesgo para el ususario.Punto de peligro que puede llevar hasta la muerte o graves heridas.
ADVERTENCIA	Indica un punto de peligro con un protencial de riesgo mediano para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas .
CUIDADO	Indica un punto de peligro con un protencial de riesgo pequeño para el usuario. Punto de peligro que puede llevar hasta heridas leves o pequeñas
ATENCIÓN	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.
INFORMACIÓN	Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo.

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue:
   modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S.Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales.Despues de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).
3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el aluminio). Si se producieran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averigurar los motivos de estas reacciones.

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4. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar areas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.
5. La utilización de los productos requiere instrucciones especiales y una alta concentracion en el manejo. Personas minusválidas solamente deberán utilizar estos productos si está por seguro de que a causa de su handicap no podrá surgir ninguna restricción en el manejo del producto.
6. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del prodcuto.
7. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
8. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.
9. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (medida del cable de distribución aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para la el corte de la red eléctrica. Si los productos sin interruptor están integrados en construciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.
10. No utilice nunca el producto si está dañado el cable eléctrico. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
11. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A.
12. 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. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
13. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
14. En las mediciones en circuitos de corriente con una tensión de entrada de Ueff > 30 V se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
15. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.
16. Nunca abra la tapa o parte de ella si el producto está en funcionamiento. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
17. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efecutadas por un electricista especializado.

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18. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, deberá la toma de corriente estar protegida de manera que los productos o los usuarios estén suficientemente protegidos.
19. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego heridas.
20. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.
21. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente o de daños en el producto lo cual también puede llevar al peligro de personas.
22. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.
23. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.
24. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.
25. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención celulas de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Baterías y acumuladores son deshechos problemáticos. Por favor tirenlos en los recipientes especiales para este fín. Por favor tengan en cuenta las prescripciones nacionales de cada país referente al tratamiento de deshechos. Nunca sometan a las baterías o acumuladores a un corto circuito.
26. Tengan en consideración de que en caso de un incendio pueden escaparse gases tóxicos del producto, que pueden causar daños a la salud.
27. Por favor tengan en cuenta el peso del producto. Muevanlo cuidadosamente ya que el peso puede causar lesiones de la espalda u otros daños físicos.
28. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).
29. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo y el fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
30. Dado el caso de que esté integrado und producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

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EC Certificate of Conformity

CE

Certificate No.: 99035, page 1

This is to certify that:

Equipment type	Stock No.	Designation
CMU200	1100.0008.02/.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

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Munich, 2004-09-10

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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	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

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

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

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EC Certificate of Conformity

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

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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* and the RF user correction 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 and Rear 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*.

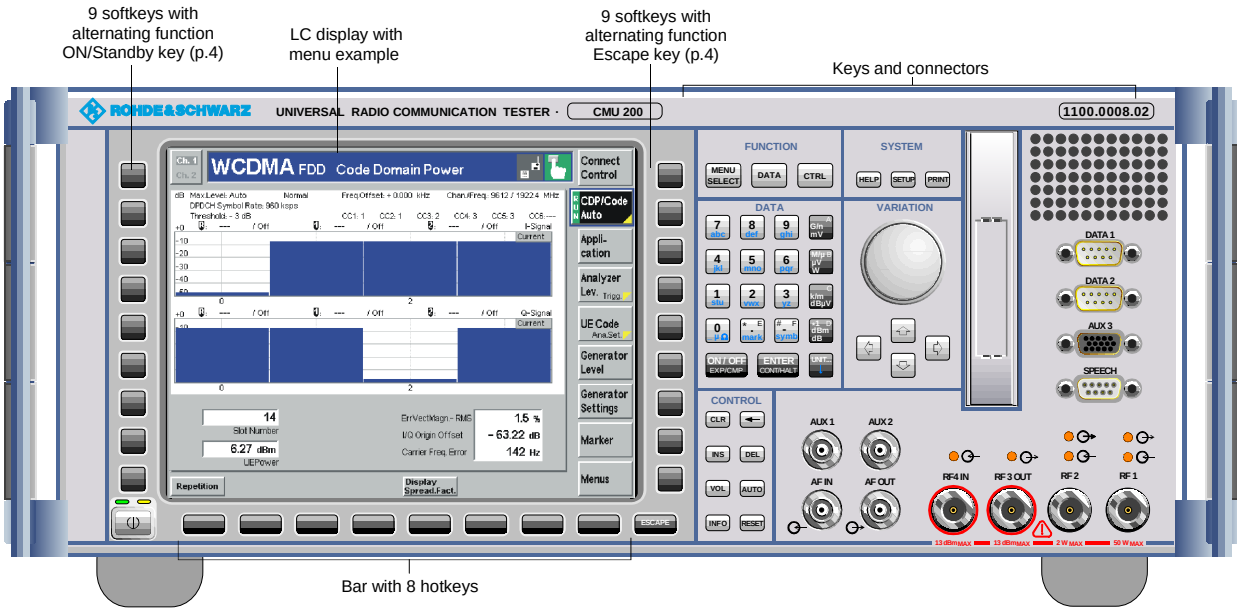


Fig. 1-1 CMU front view

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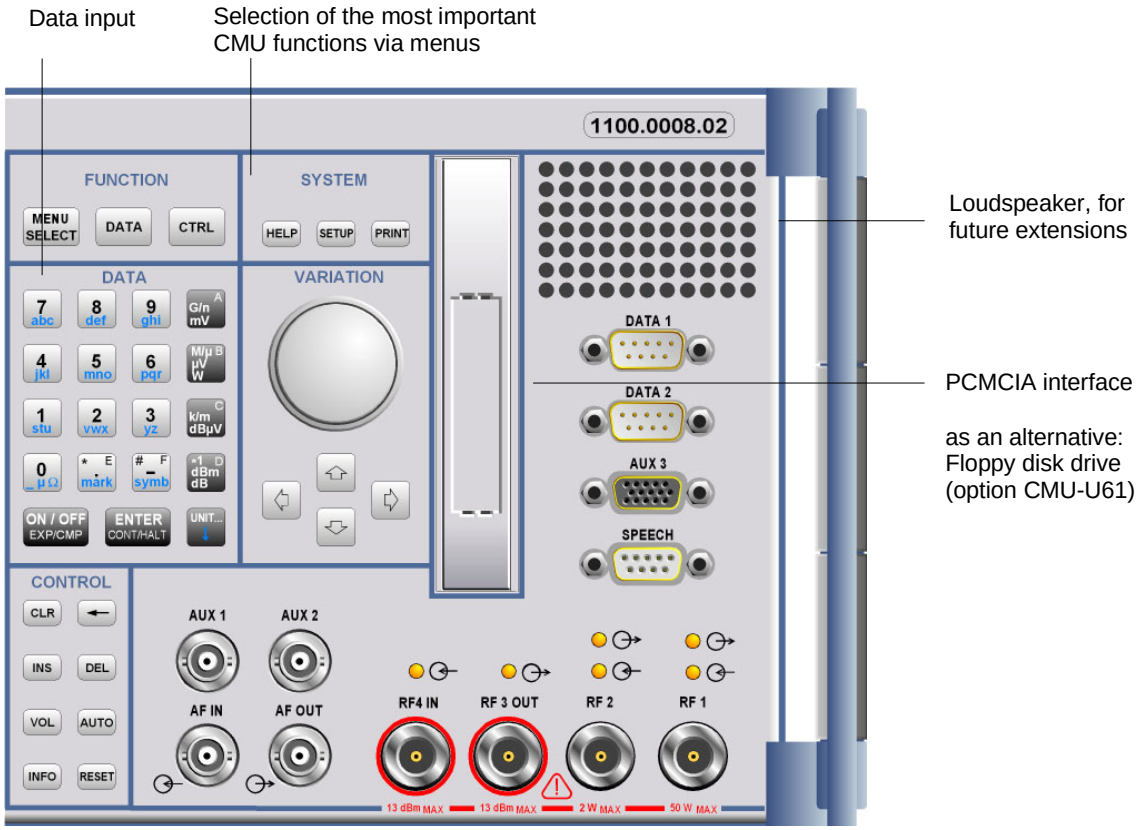


Fig. 1-2 CMU front view – hardkeys

FUNCTION *Operating manual*



Preselection of the menus:

MENU SELECT	Menu selection
DATA	File manager
CTRL	For GSMxxx-MS Signalling tests: Measurement Wizard

☞ Chap. 3
Chap. 4

DATA *Operating manual*



Data input:

0 ... 9	Numerical input (letters for string editors)
** . 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	Confirmation of entry in editors
CONT/HALT	Calling/quitting editors, measurement control
UNIT ⇩	For future extensions

☞ Chap. 3

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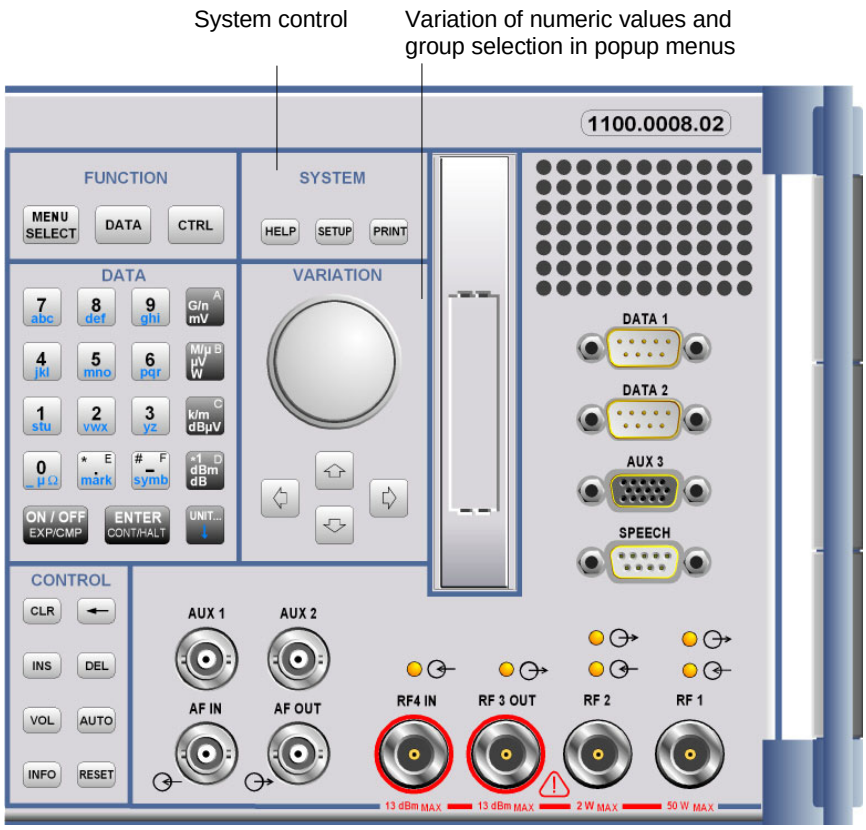


Fig. 1-3 CMU front view – hardkeys

SYSTEM

Operating manual

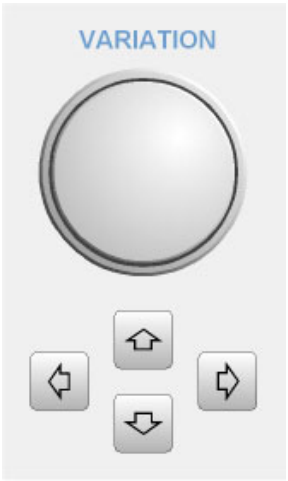


System control:

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

VARIATION

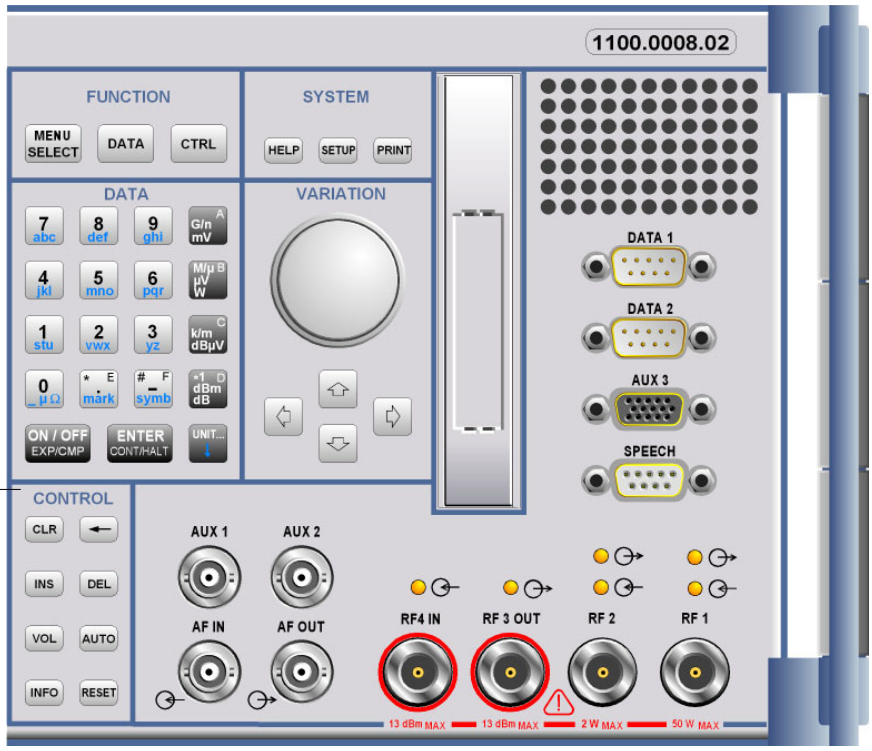
Operating manual



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
⇦	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

☞ Chap. 3

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)

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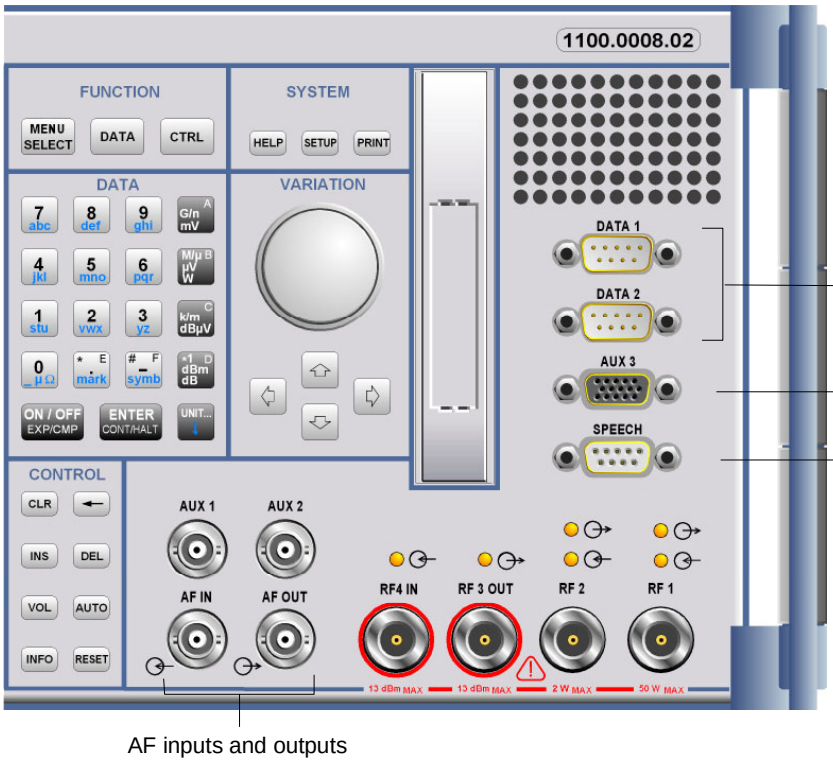
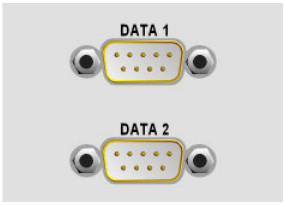


Fig. 1-5 CMU front view connectors

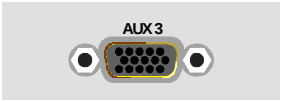
DATA1, DATA2 *Operating manual*



For future extensions

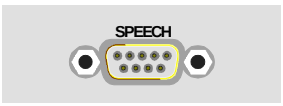
☞ Chapter 8, "Hardware connectors"

AUX 3 and SPEECH *Operating manual*



Input and output for status, control, and trigger signals:
CMU 300: External trigger signal for wired synchronization

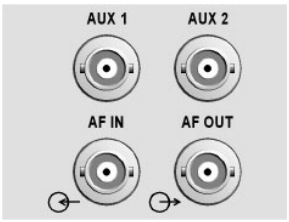
☞ Chapter 8, "Hardware connectors "



Signals from/to speech codec (option CMU-B52)

☞ Chapter 8, "Hardware connectors"

AF connectors *Operating manual*



Connectors for audio signals:

AUX1/2 Additional input/output for audio signals that may be used in remote control (secondary audio analyzer)

AF IN/OUT Standard input/output for the (primary) 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 instrument!*

☞ Chapter 4, "Audio Generator and Analyzer"; Chapter 8, "Hardware connectors"

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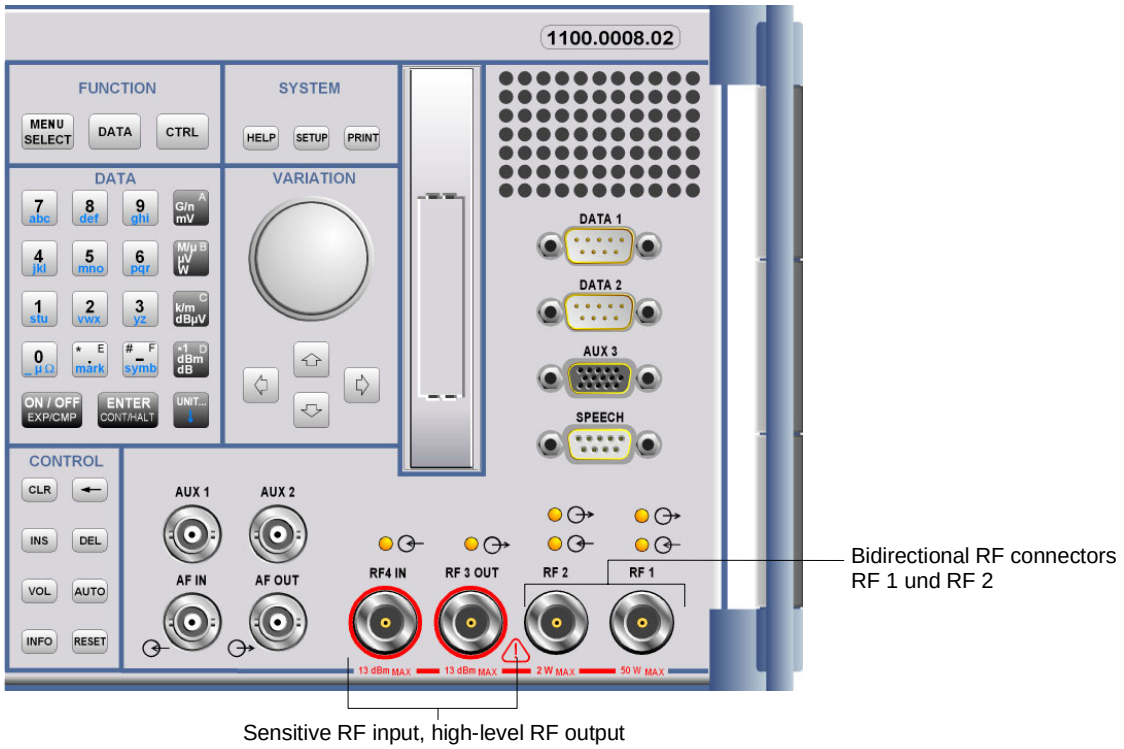
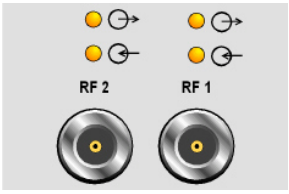


Fig. 1-6 CMU front view– connectors

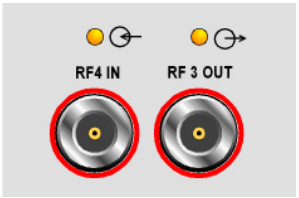
RF connectors *Operating manual*



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.

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

☞ Chapter 8, "Hardware connectors"



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!

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Rear View

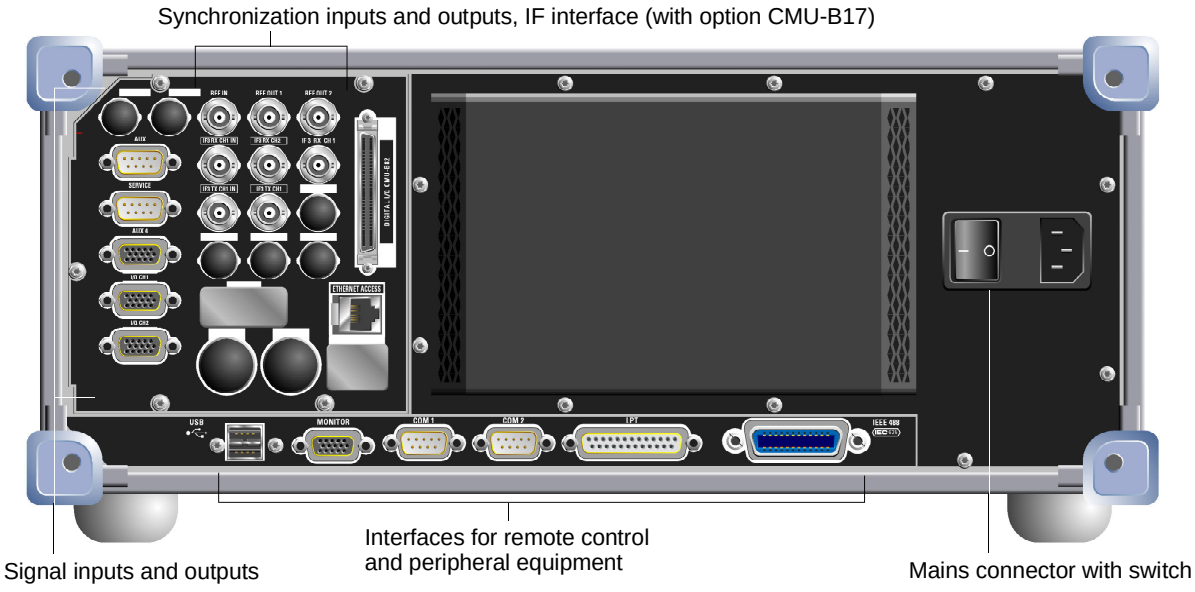
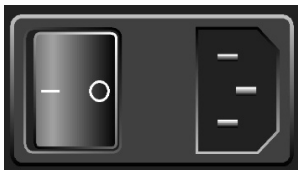


Fig. 1-7 CMU rear view

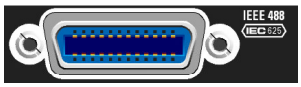
Mains switch *Operating manual*



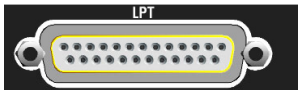
Mains power switch ☞ Chapter 1, "Switching on the Instrument, Startup test"

Mains connector ☞ Chapter 1, "Connecting the instrument to the AC supply"

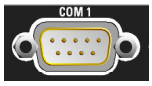
Interfaces *Operating manual*



GPIB-bus connector (IEEE 488 / IEC 625), ☞ Chapter 8, "Hardware Interfaces "



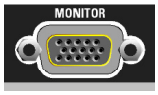
Parallel interface: 25-contact printer connector, Centronics-compatible ☞ Chapt. 1, "Connecting an Output Device" Chapter 8, "Hardware Interfaces"



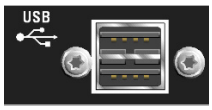
Connector for serial interface 1: 9-contact Sub-D connector ☞ Chapter 8, "Hardware Interfaces"



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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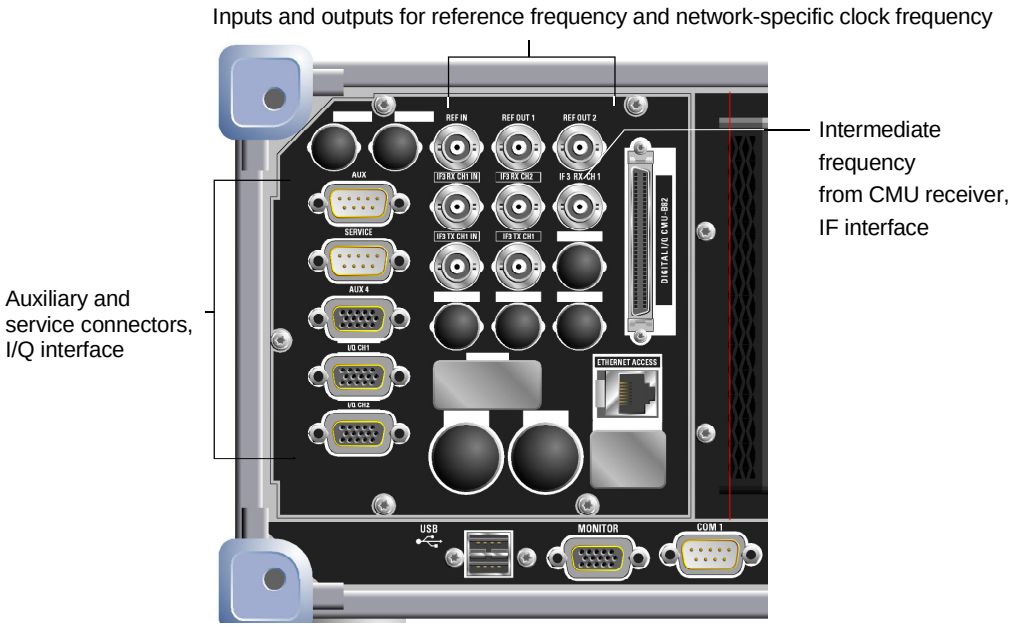


Fig. 1-8 CMU rear view – signal inputs and outputs

Intermediate frequency *Operating manual*



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

Reference frequency *Operating manual*



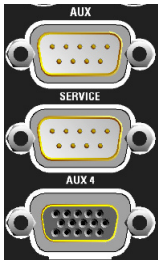
REF IN	Input for external reference frequency	☞	Chapter 8, "Hardware Connectors
REF OUT 1	Output of reference frequency of CMU: 10 MHz or the signal of input REF IN		
REF OUT 2	Output for network-specific clock frequency	☞	Chapter 3, "RF Connection Control"



Caution!

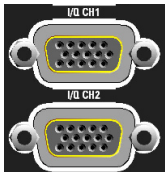
Do not use open or unshielded cables in order to comply with EMC directives!

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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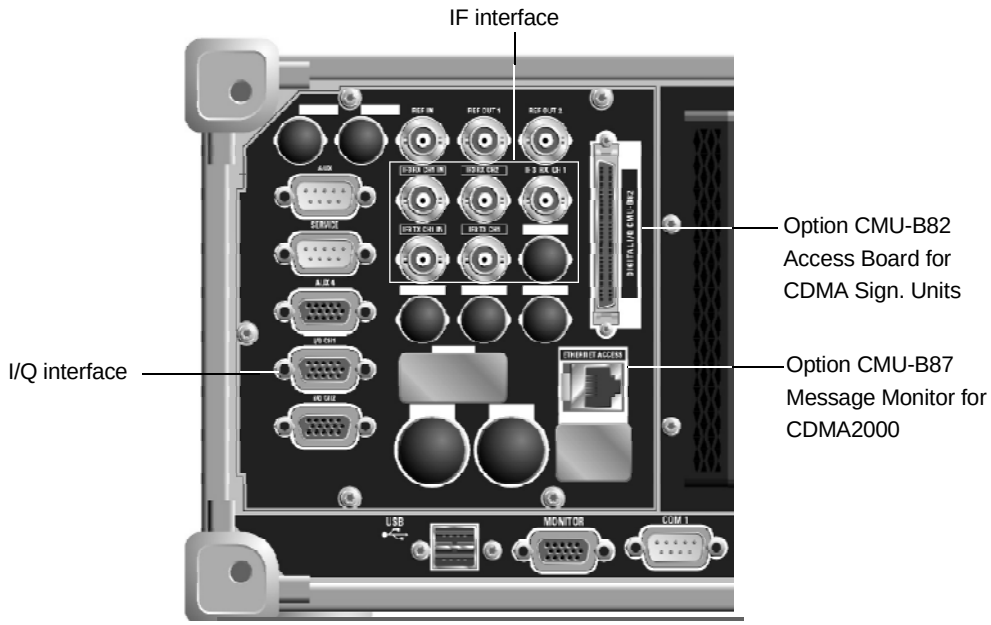


Fig. 1-9 CMU rear view – I/Q-IF inputs and outputs

I/Q-IF Interface (with option CMU-B17)

Operating manual



Four 50 Ω BNC connectors for option CMU-B17, *I/Q and IF Interface*:

IF3 RX CH1 IN	RX path, IF IN
IF3 RX CH1 OUT	RX path, IF OUT
IF3 TX CH1 IN	TX path, IF IN
IF3 TX CH1 OUT	TX path, IF OUT

☞ Chapter 4, "Hardware Connectors"

Chapter 8, "Hardware Connectors"



15-contact SUB-D connector for input and output of I/Q signals (option CMU-B17, *I/Q and IF Interface*)

The SUB-D connector below IQ CH 1 is not used.

☞ Chapter 8, "Hardware Connectors"

Optional interfaces for data applications



Digital I/Q connector for option R&S CMU-B82, *Access Board for CDMA Signalling Units*

☞ Installation instructions for options



Ethernet connector e.g. for option R&S CMU-B87, *Message Monitor for CDMA2000*

An additional Ethernet connector can be fitted below, e.g. for option R&S CMU-Z46, *WCDMA Message Analyzer and Recorder*.

☞ Installation instructions for options

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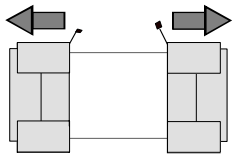
Putting the Instrument into Operation

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



remove protective caps

- Take the instrument out of the shipping box and check whether the items listed in the packing list (see page 3 at the beginning of this manual) are all included.
- Remove the two protective caps from the front and rear of the CMU and carefully check the instrument for damage.

Should the instrument be damaged, immediately notify the forwarder who shipped the instrument to you and keep the box and packing material.

For further transport or shipment of the CMU the original packing should be used, too. It is recommended to keep at least the two protective caps for front and rear side in order to prevent damage to the controls and connectors. The caps are also necessary if the CMU is transported in its transit case that can be ordered from Rohde & Schwarz.

Setting up the Instrument

Permissible operating positions of the CMU:

- Horizontal position, standing on the feet.
- 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!

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.

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

- Do not cover the rear and lateral ventilation holes.
- Note the permissible ambient temperature according to the data sheet.
- Avoid moisture condensation. If it occurs, the instrument must be wiped dry before switching on.

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- Note the warm-up time of the temperature-controlled OCXO reference oscillator (Option CMU-B11/B12), see data sheet.

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!

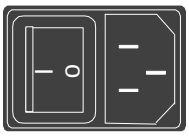
After moisture condensation, allow the instrument to dry before switching on.

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.*

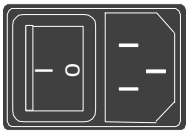


Mains connector

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



Mains switch

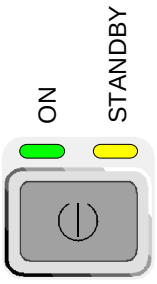
The CMU can be switched on using the mains switch at the rear of the instrument and the *ON/STANDBY* key at the bottom left of the instrument front.

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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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.

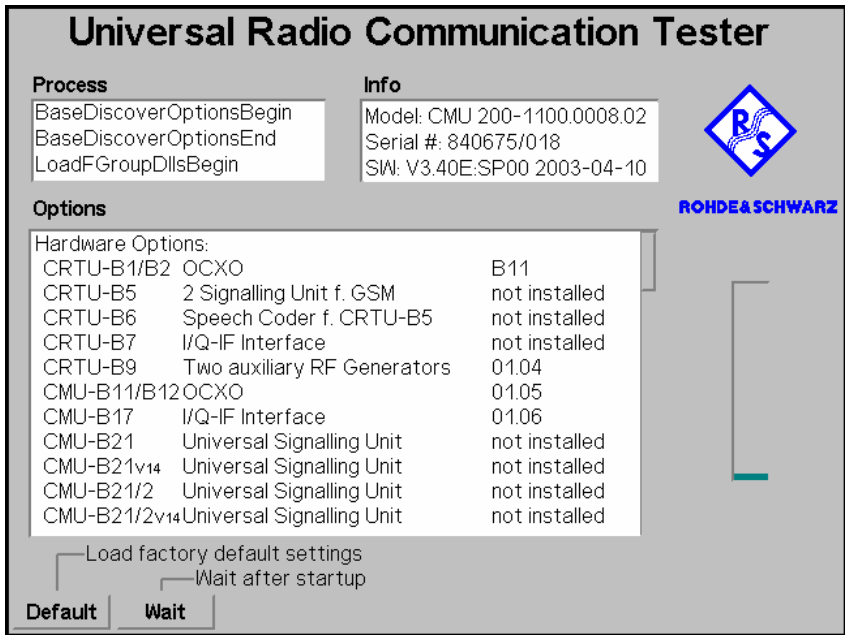
- Set the CMU to operating mode by pressing the *ON/STANDBY* key once.



Caution! *When switching on the CMU, no disk should be inserted in the drive; otherwise, one of the actions stored on the flash disk will be performed.*

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

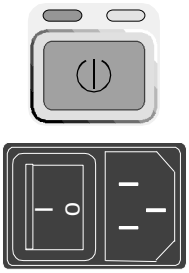
The display windows of the startup menu provide information on

- 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.

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Switching off the Instrument



In order not to lose any 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.

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 doubleshielded 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:

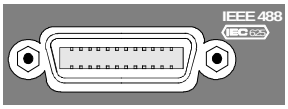
Connect external devices and peripherals only when the instrument is switched off or in STANDBY mode. Otherwise, future errors cannot be excluded.

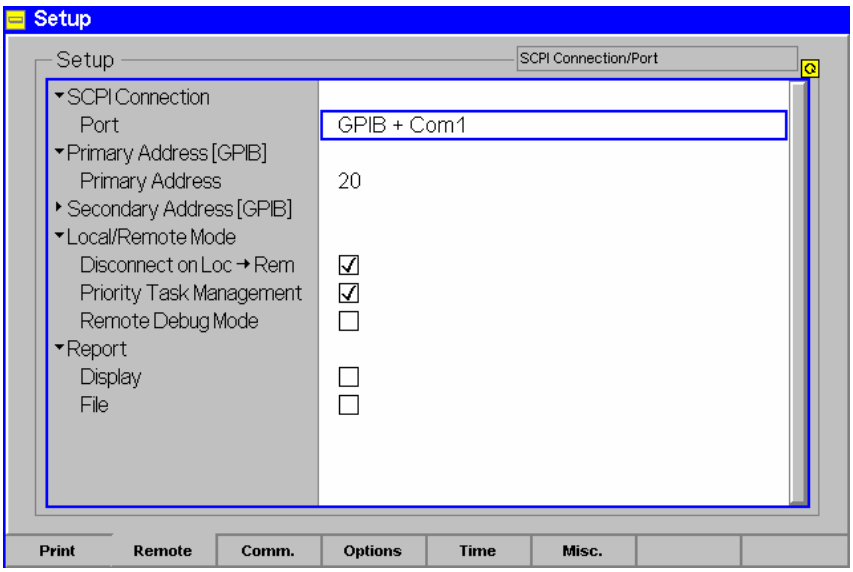
Connecting a Controller

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*).

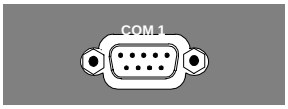
- To open the *Setup - Remote* menu, press the *SETUP* key at the front of the instrument and activate the *Remote* hotkey at the lower edge of the screen.
- Use the rotary knob to move the focus onto the *SCPI Connection* section of the *Setup* table. If necessary, press the rotary knob or the *ON/OFF* key to expand the parameters in the table (see Chapter 3 of the operating manual).

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➢ 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

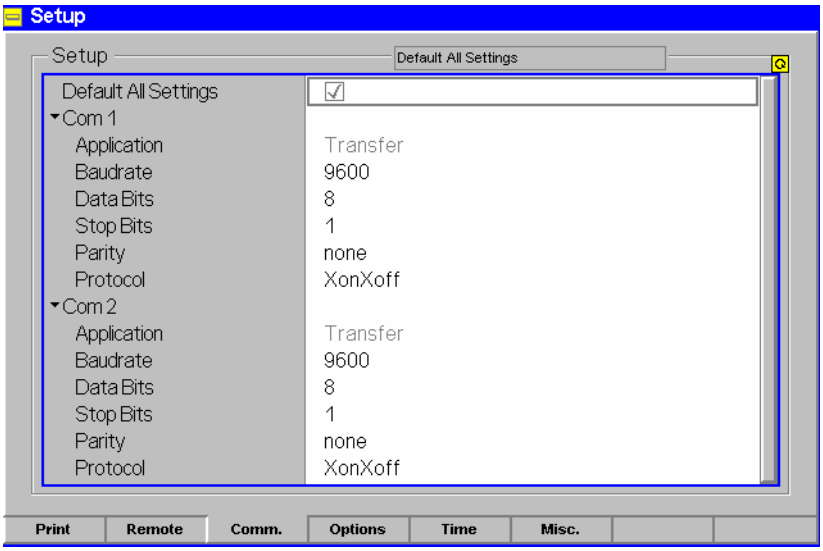
In the default configuration the CMU accepts commands from either the GPIB or COM 1 interface. The COM 2 interface must be selected explicitly.

➢ 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:

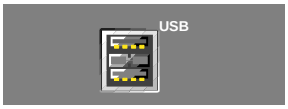


➢ To open the *Setup – Comm.* tab press the *SETUP* key at the front of the instrument and activate the *Comm.* hotkey at the lower edge of the screen.

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

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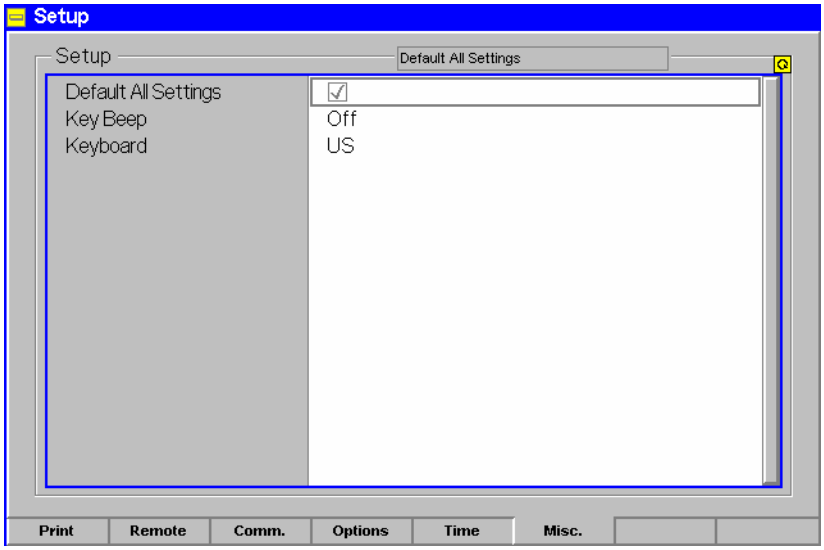
Connecting an External Keyboard



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.

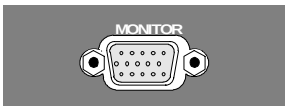
The key assignment can be changed in the *Misc.* tab of the *Setup* menu:



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

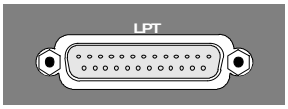


An external VGA monitor can be connected to the 15-contact Sub-D connector at the rear of the instrument.

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

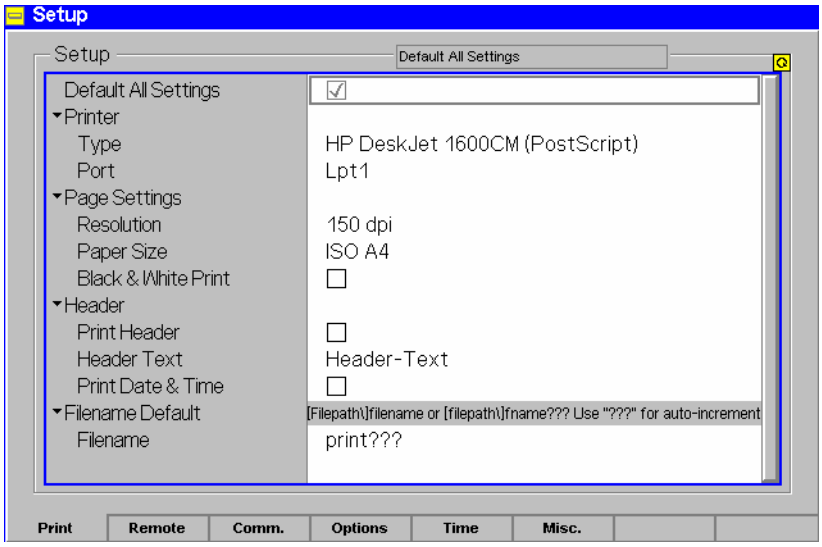
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Connecting a Printer



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.

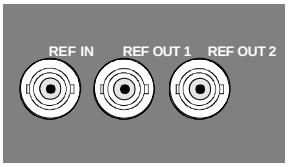
The printer type and port must be set in the *Print* tab of the *Setup* menu:



- 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 floppy disk drive (option CMU-U61) or the PCMCIA interface on the front of the instrument.

Note: *When copying an installation version to a 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. 1.26 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. 1.18 ff.) transfers software versions to the instrument.
- The *VersionManager* (see p. 1.27 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.

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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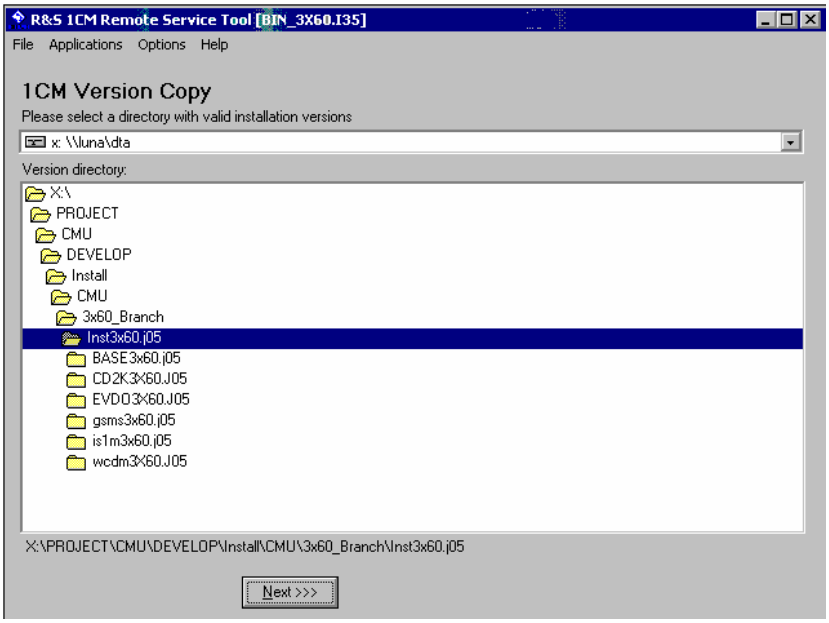


Fig. 1-9 Remote Service Tool main screen (example)

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. 1.14 to learn how to configure the R&S CMU's GPIB settings.*

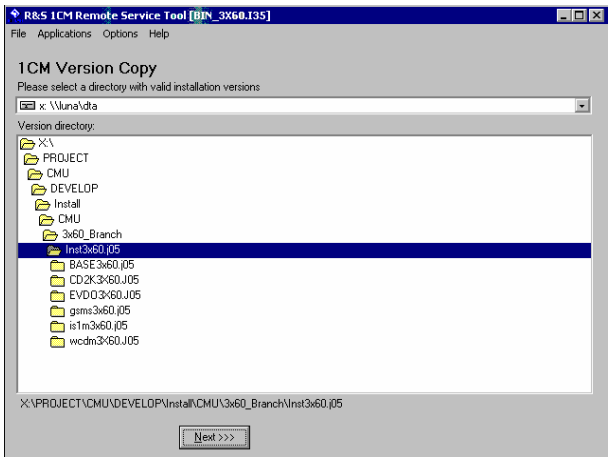
1. Connect the GPIB cable to the *IEEE 488 / IEC 625* connector on the rear panel of the instrument.
2. Start the *Remote Service Tool*.
3. Click the *Options* menu and make sure that *Use GPIB* is selected.
4. Click *Options – GPIB Options* and check that the *Board Index* and *Primary Address* settings are equal to the R&S CMU configuration (CMU default settings: board index GPIB0, primary address 20).

Installing software versions

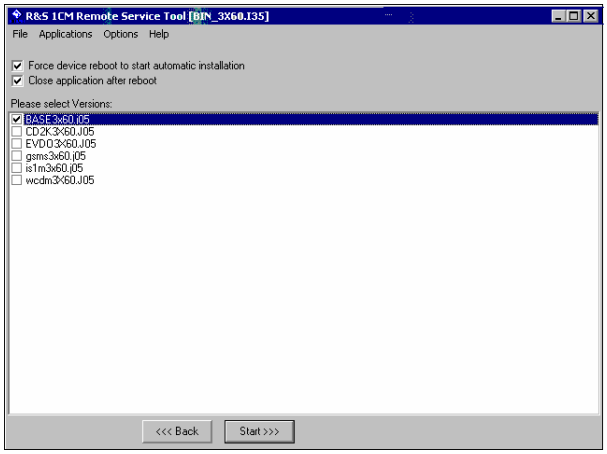
To copy a new software version to the CMU…

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. 1.26 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.
- 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. 1.27 ff.).

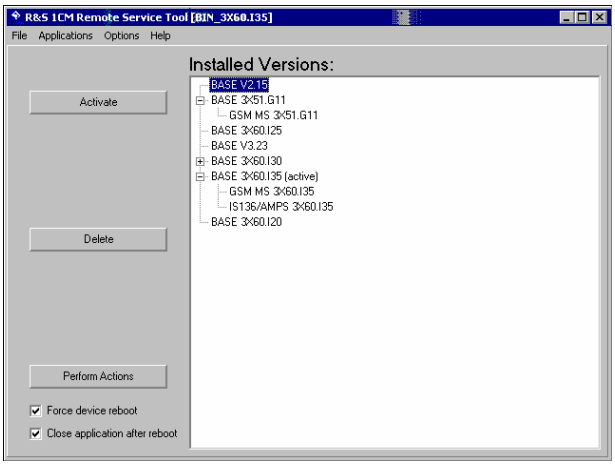
Listing and modifying software versions

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.

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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. 1.26 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.*

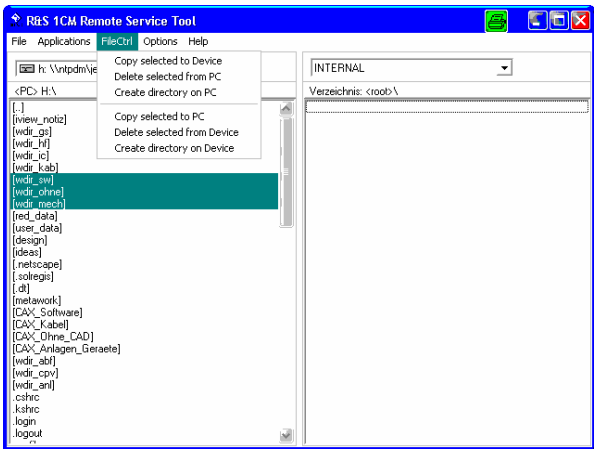
Copying files

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.

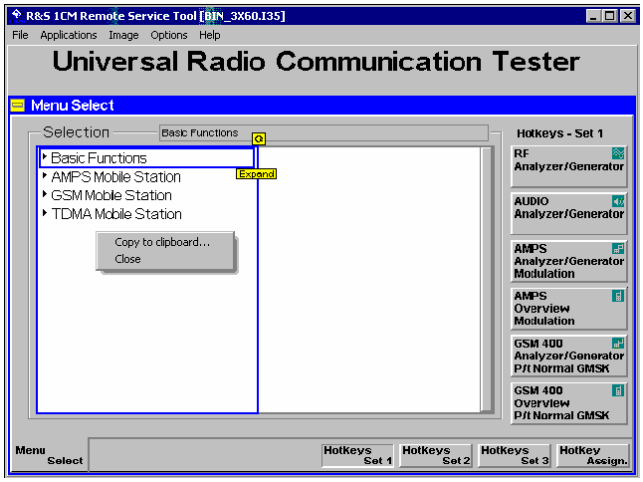
Extracting screenshots

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

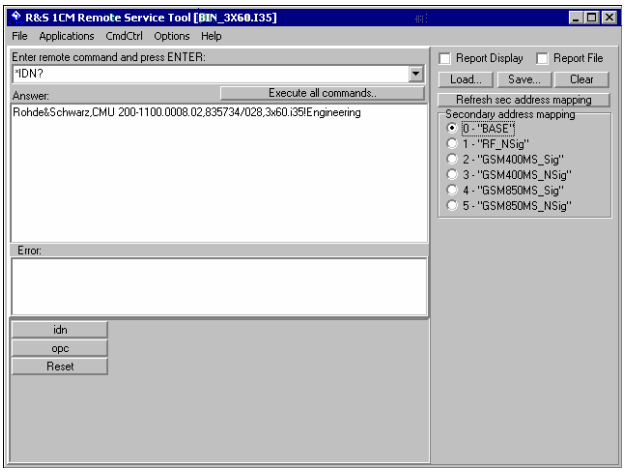
You can use the *Remote Service Tool* to transfer remote control commands or command scripts to be executed on the R&S CMU.

To transfer a single command or command sequence…

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

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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 *Remote Control of the R&S CMU* on p. 1.25 ff.

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. 1.25 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. 1.14 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. 1.14 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.

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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. 1.22. It is opened by clicking *Application – Command.*

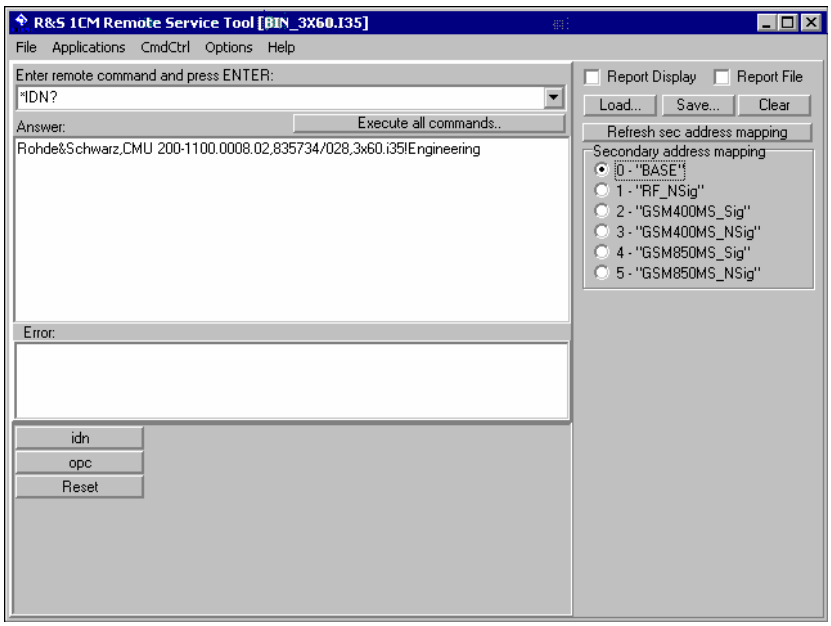


Fig. 1-10 Remote control screen

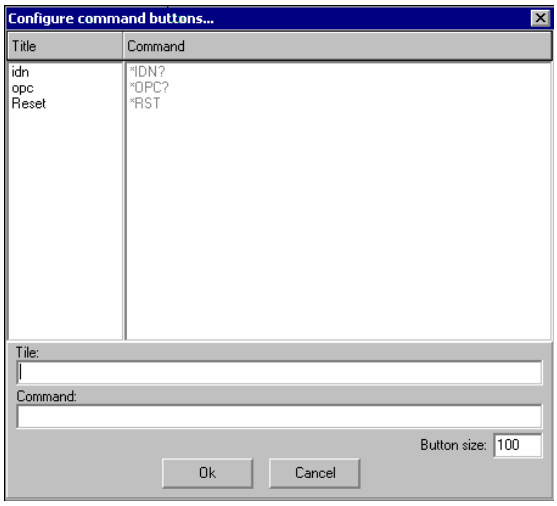
The commands to be executed are entered in the *Enter remote command…* input field; the responses of the R&S CMU and possible error messages are displayed below. Besides the remote control screen provides the following control elements:

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.

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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. 1.25 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. 1.19 and *Listing and modifying software versions* on p. 1.20. 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 a PCMCIA card/floppy disk.

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

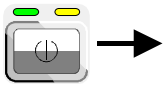
- Copy a *Versions.new* file to the root directory of a PCMCIA card containing several installation versions and insert the card into the R&S CMU's PCMCIA slot.

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

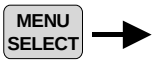
CMU VersionManager

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 / PCMCIA card or



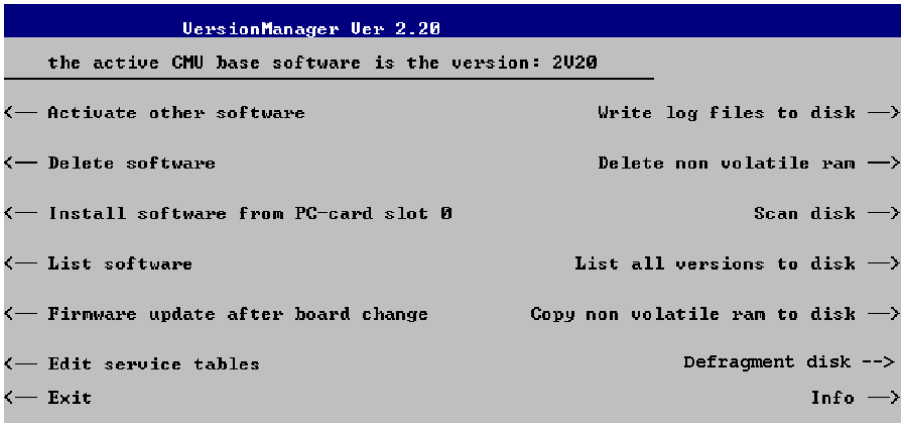


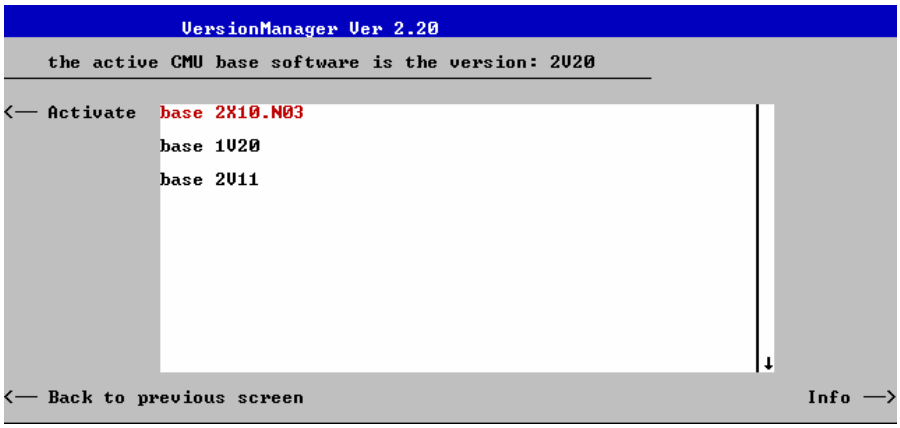
Fig. 1-9 VersionManager main screen (example)

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 software (optional)

Activate other software opens a list of all firmware configurations stored on the 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).

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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.

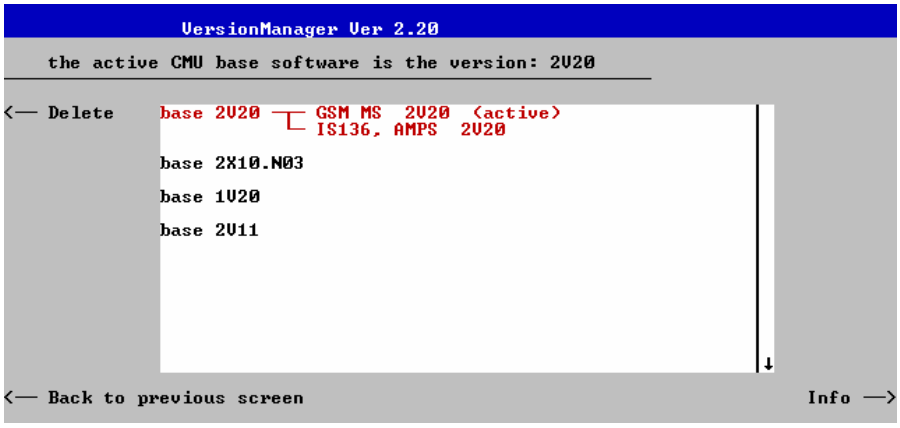
Activate — Activate the current firmware configuration.

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. 1.34. 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.

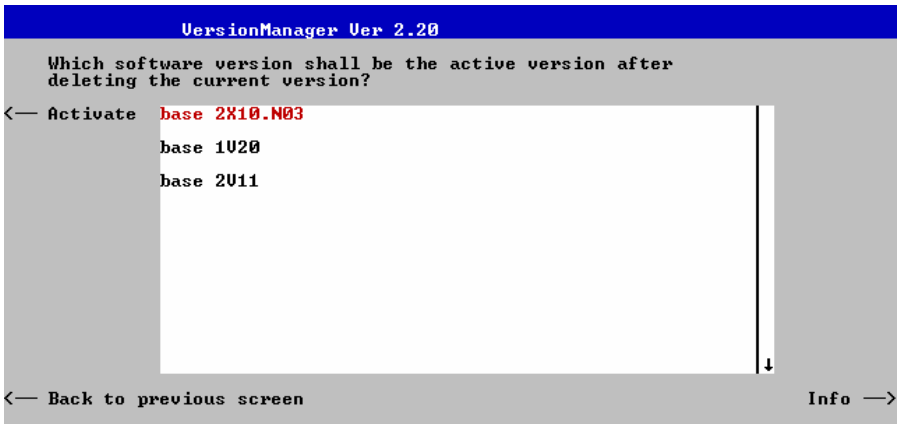


Delete — Delete the current firmware configuration.

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

[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.

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Activate Activate the current firmware configuration.

Install software... *Install software...* opens a list of all firmware installation versions available on an external storage medium (floppy disk/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.

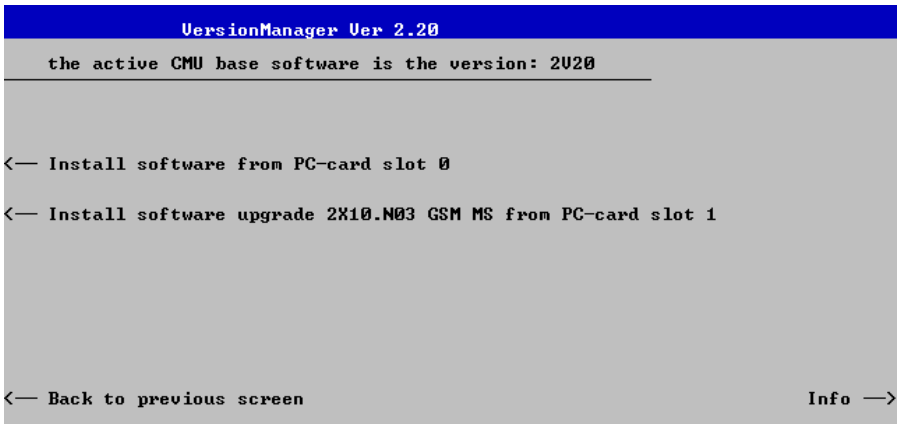
Table 1-3 Software installation with the *VersionManager*

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).
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).
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).

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

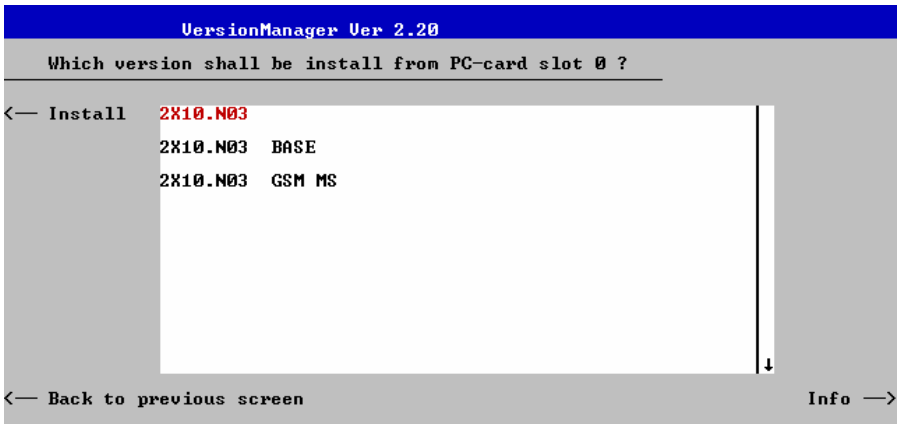
[2] Media without FW installation versions are ignored.

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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.

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

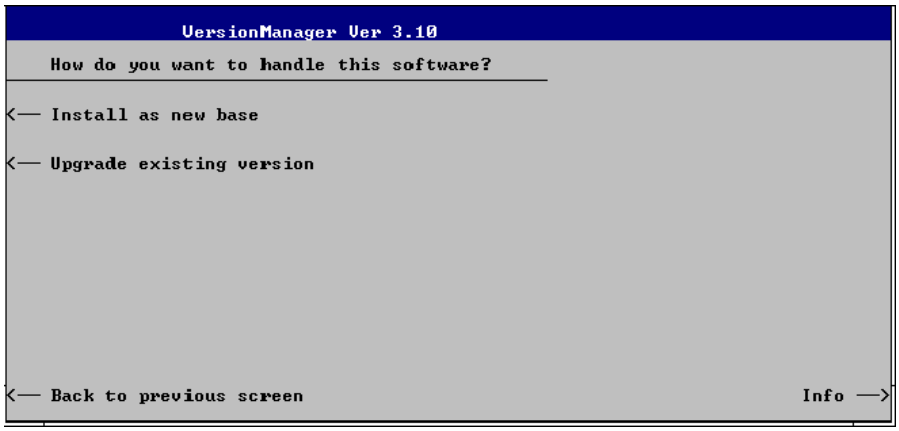


Install Install the current firmware version.

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 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:

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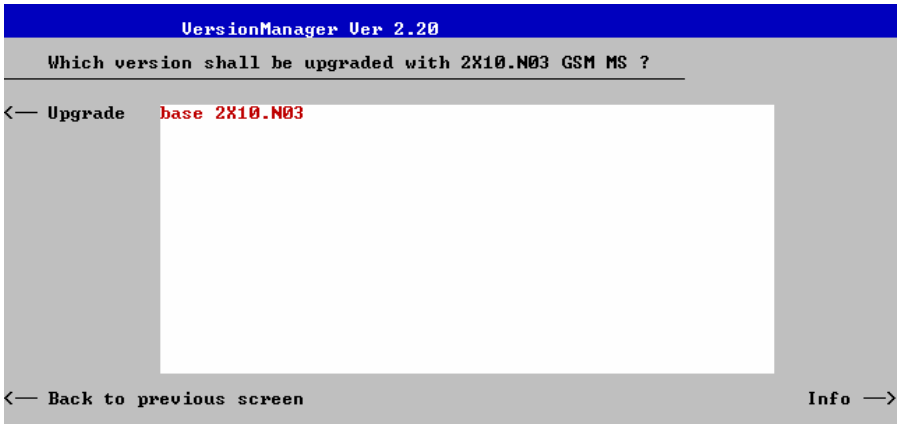
Note: *This dialog is skipped if the new base software version is not compatible with any of the existing configurations. An incompatible new base software must be installed as a new base software.*

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.

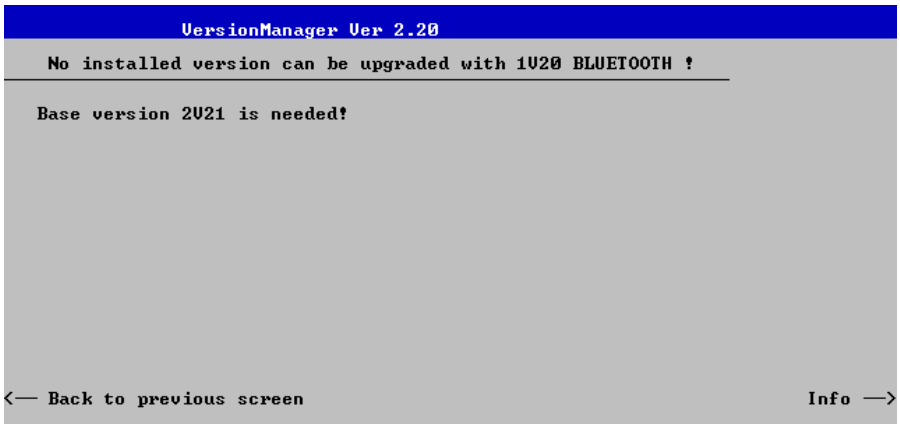
After selection of an upgrade software version compatible with one of the configurations stored on the hard disk, the upgrade selection dialog is called up:



Upgrade Replace the base software version or network option selected in the *software version* selection dialog.

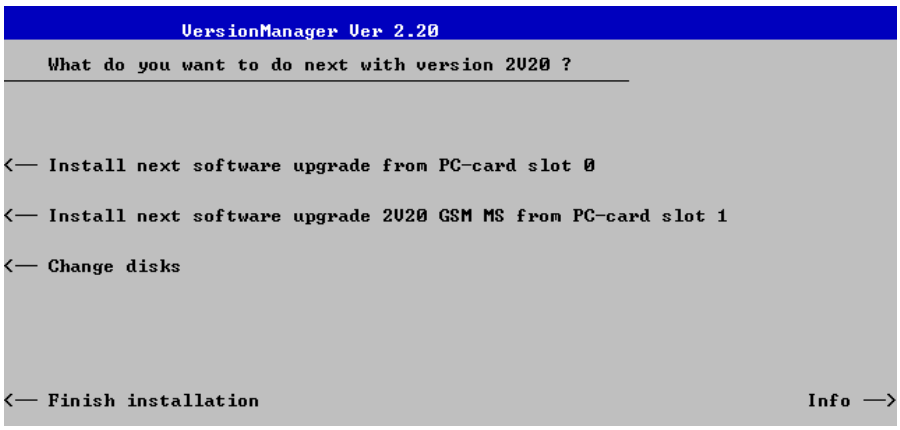
Alternatively, if none of the configurations stored on the hard disk is compatible with the software version selected, an error message is displayed. E.g., for an incompatible Bluetooth version:

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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:



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 1.29.

Change disks Update the current screen after a change of the storage medium.

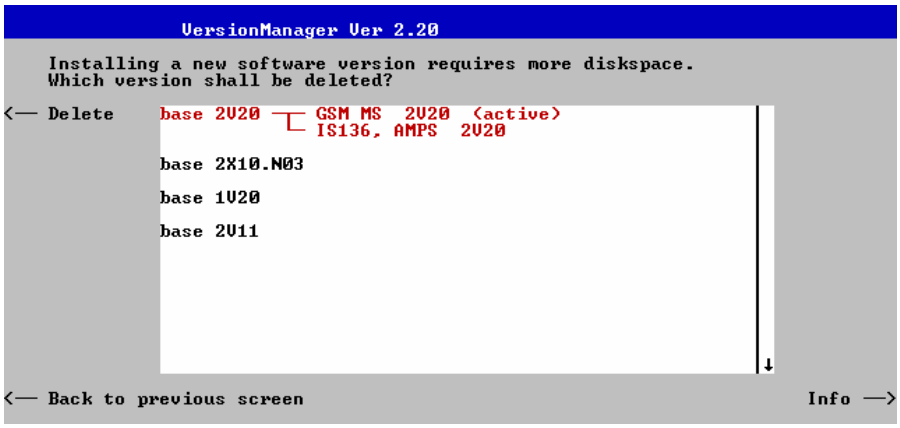
Finish installation Close the *VersionManager* and reboot the CMU (remove the external disk from the disk drive). The installed firmware configurations are then operational. The last configuration installed is taken as the active configuration in the subsequent measurement session.

Note: Notice messages after firmware updates

In most cases firmware updates don't 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.*

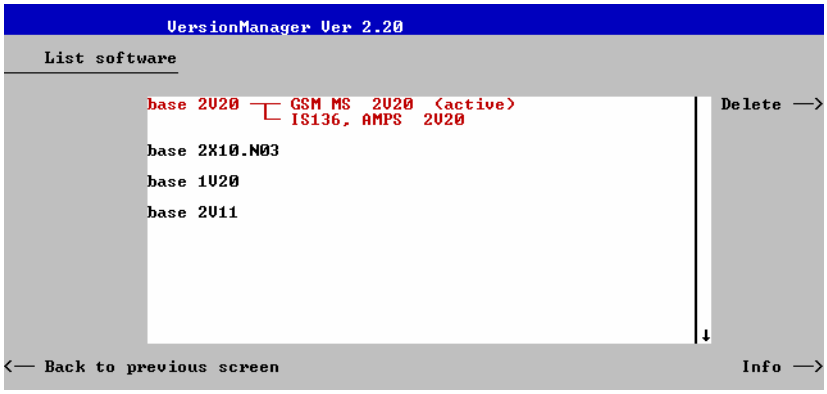
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Lack of disk space: Before installing the next software version, the CMU checks whether there is enough disk space on the hard disk. If not, the following dialog is displayed:



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.



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

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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 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, PCMCIA).
In this way, the settings stored in the non volatile ram can be used on another CMU.

Defragment disk

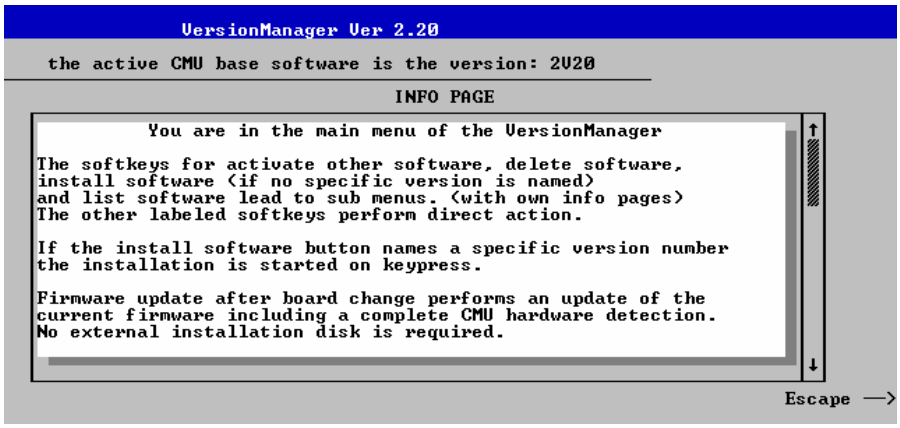
Defragment disk closes the *VersionManager,* executes the MS *Defrag.exe* program and finally returns you to the *VersionManager*. Defragmenting the hard disk is suitable to improve performance after installing and deleting many different software versions. Refer to your *Defrag.exe* documentation for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

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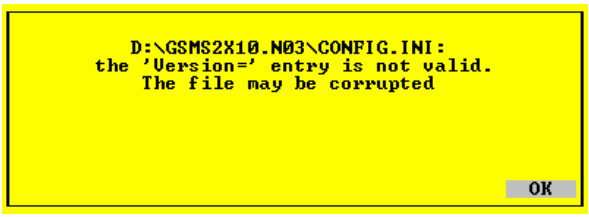


Escape Close the Info screen and return to the previous screen.

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.



- 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.

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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.

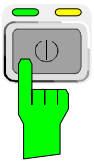
5. A front-panel LED indicates which of the RF connectors is configured as input. In the menu, the measurement can be controlled via the *ON/OFF* and *CONT/HALT* keys (*ON* (green), *OFF* (red) and *HLT* (yellow) states). In the *OFF* state, the LED goes out.

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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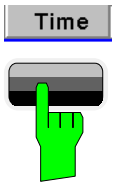
How to access and close menus



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



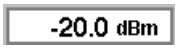
The dialog elements assigned to a softkey are selected by pressing the softkey.



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



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



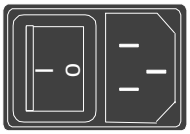
Numeric values can be either incremented/decremented using the rotary knob or entered via the numeric keypad or an external keyboard.

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

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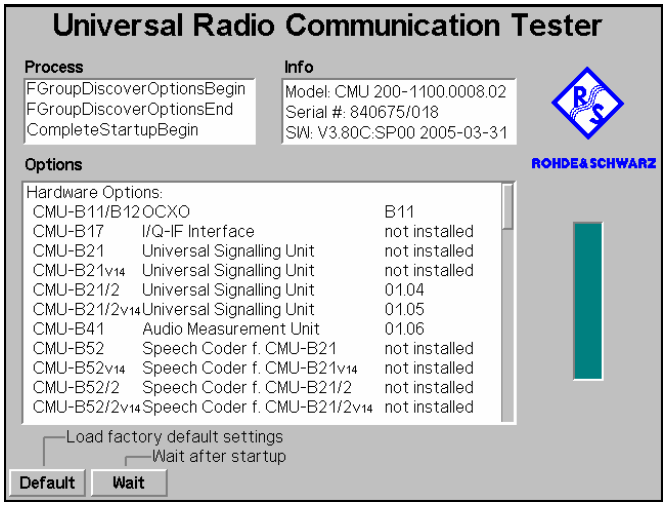
Startup of the CMU

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.



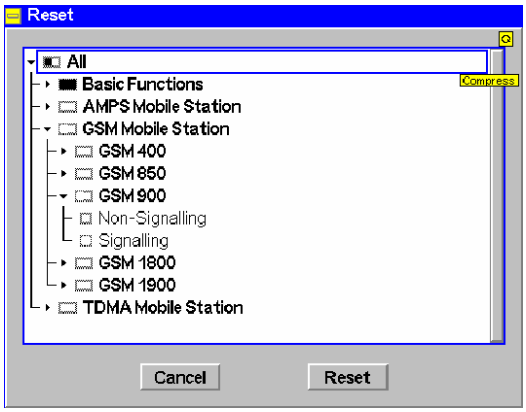












Step 1

- 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.

Operation:
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.

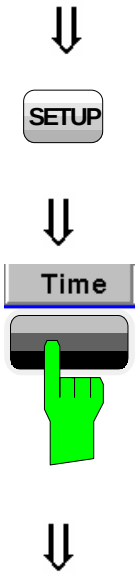
On the other hand, the *Wait* function can be used to access the configuration menus which can be opened by means of the front panel keys before the actual measurement is started.

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.

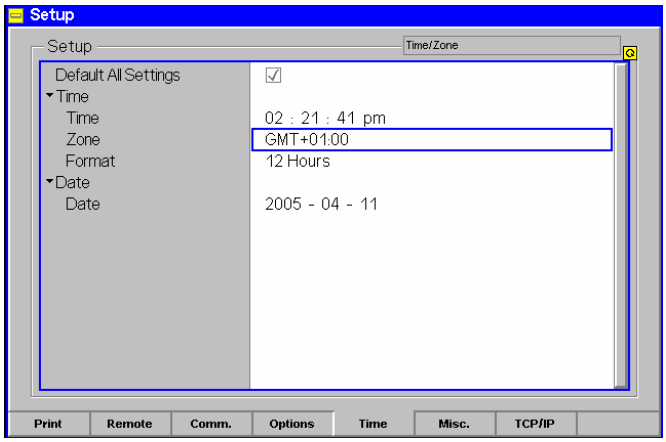
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Step 4

➢ 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



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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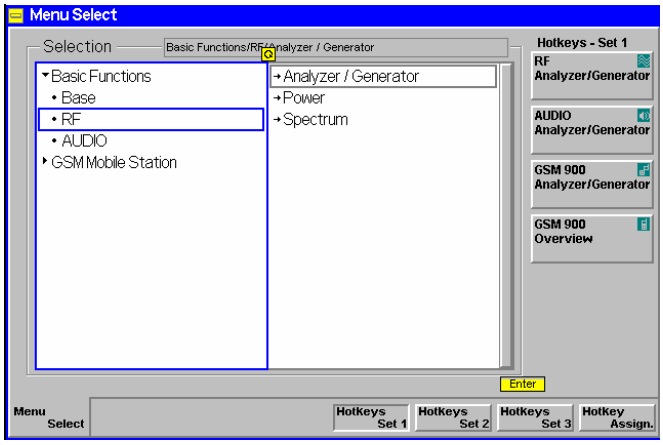
RF Measurements

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.



Step 1

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

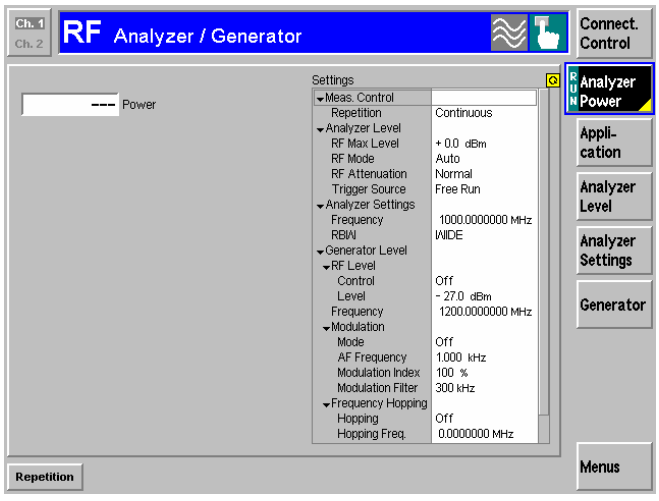


➢ Use the cursor keys and the rotary knob to select the *RF* function group in the left half of the *Selection* table.

➢ 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.

☞ Chapter 4 of the operating manual

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.

☞ Chapter 4 of the operating manual

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.

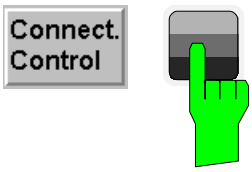
At present no input signal is available so that the *Power* output field shows an invalid result "– – –"

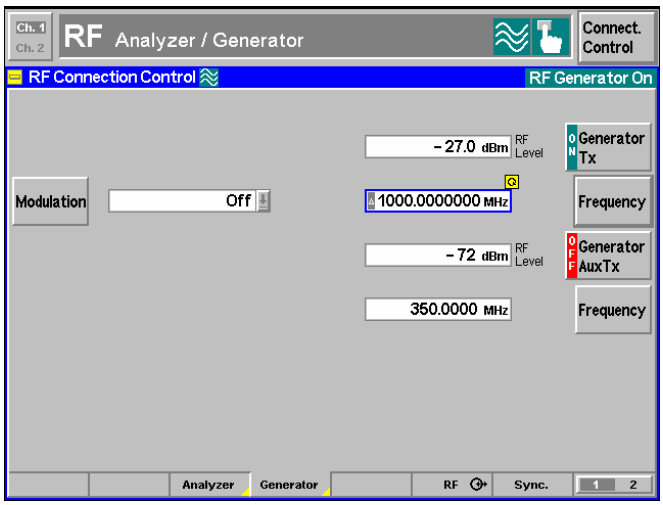
Once the softkey is selected, the *Analyzer Power* measurement can be switched off and on by means of the *ON/OFF* key. In contrast, the *CONT/HALT* toggle key halts the measurement after the next valid result has been obtained.

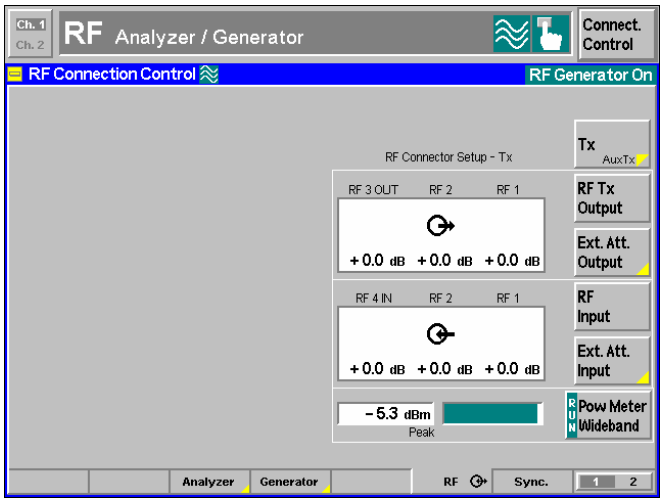
☞ Ch. 4 and Ch. 5

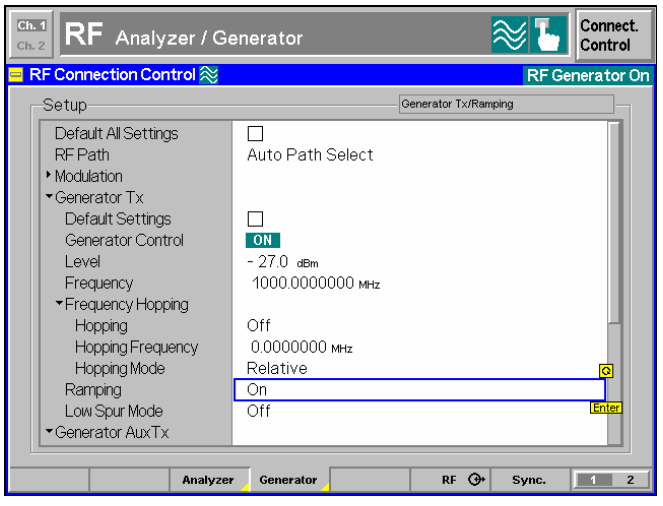
The options for the measurement status are *ON, OFF, or HLT*. The *HLT* state is reached after the end of a single shot measurement (see the section about measurement control in Chapter 5 of the operating manual).

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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.

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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.

☞ Chapter 4 of the operating manual

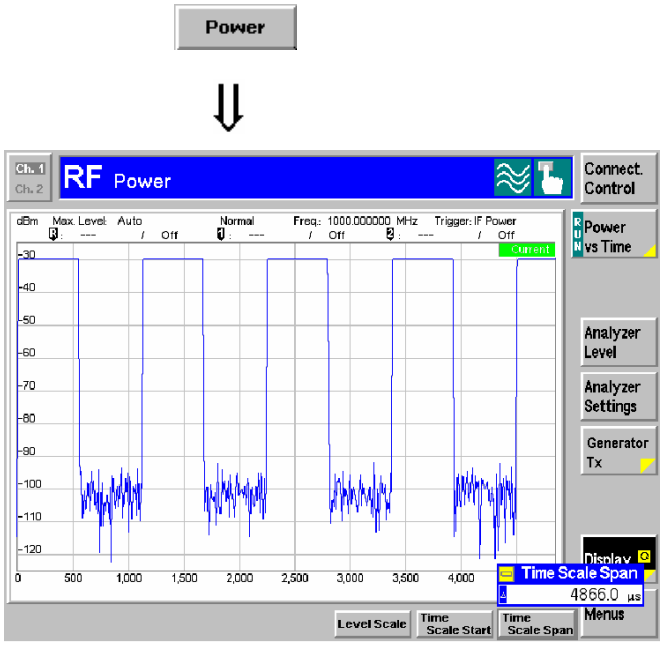
Note that an external attenuation reported to the CMU shifts the nominal permissible ranges of input and output levels.

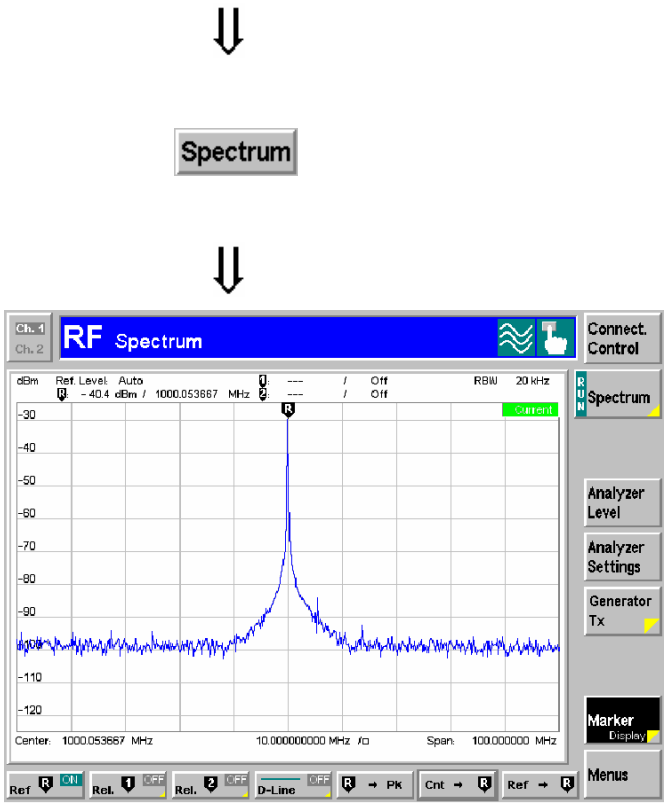
Note: RF User Correction

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.*

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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.

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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 incoming 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.

☞ Chapter 4 of the operating manual

The *Frequency* softkey defines the frequency of the measured signal and the resolution bandwidth. The *Input Level* softkey configures the input level, the power range and an attenuation factor. The *Time* softkey configures 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 R measures the absolute level of the trace, the delta markers 1 and 2 measure the distance between their position and the reference marker. All marker coordinates are shown in the two parameter lines above the diagram.

☞ Chapter 4 of the operating manual

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

③ Resolution bandwidth

A spectrum analyzer can differentiate two spectral lines separated 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 measured.

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

☞ Chapter 4 of the operating manual

... 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 diagram.
- 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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