R&S®NRX
Power Meter
Getting Started

1424707002

Getting Started

Version 04

ROHDE&SCHWARZ

This document describes the following R&S®NRX models:

- R&S®NRX (1424.7005.02)

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1424.7070.02 | Version 04 | R&S®NRX

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®NRX is indicated as R&S NRX.

Safety Instructions
Instrucciones de seguridad
Sicherheitshinweise
Consignes de sécurité

⚠ WARNING

Risk of injury and instrument damage

The instrument must be used in an appropriate manner to prevent electric shock, fire, personal injury or instrument damage.

- Do not open the instrument casing.
- Read and observe the "Basic Safety Instructions" delivered as printed brochure with the instrument.
- Read and observe the safety instructions in the following sections. Note that the data sheet may specify additional operating conditions.
- Keep the "Basic Safety Instructions" and the product documentation in a safe place and pass them on to the subsequent users.

⚠ ADVERTENCIA

Riesgo de lesiones y daños en el instrumento

El instrumento se debe usar de manera adecuada para prevenir descargas eléctricas, incendios, lesiones o daños materiales.

- No abrir la carcasa del instrumento.
- Lea y cumpla las "Instrucciones de seguridad elementales" suministradas con el instrumento como folleto impreso.
- Lea y cumpla las instrucciones de seguridad incluidas en las siguientes secciones. Se debe tener en cuenta que las especificaciones técnicas pueden contener condiciones adicionales para su uso.
- Guarde bien las instrucciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

⚠ WARNUNG

Gefahr von Verletzungen und Schäden am Gerät

Betreiben Sie das Gerät immer ordnungsgemäß, um elektrischen Schlag, Brand, Verletzungen von Personen oder Geräteschäden zu verhindern.

- Öffnen Sie das Gerätegehäuse nicht.
- Lesen und beachten Sie die "Grundlegenden Sicherheitshinweise", die als gedruckte Broschüre dem Gerät beiliegen.
- Lesen und beachten Sie die Sicherheitshinweise in den folgenden Abschnitten; möglicherweise enthält das Datenblatt weitere Hinweise zu speziellen Betriebsbedingungen.
- Bewahren Sie die "Grundlegenden Sicherheitshinweise" und die Produktdokumentation gut auf und geben Sie diese an weitere Benutzer des Produkts weiter.

⚠ AVERTISSEMENT

Risque de blessures et d'endommagement de l'appareil

L'appareil doit être utilisé conformément aux prescriptions afin d'éviter les électrocutions, incendies, dommages corporels et matériels.

- N'ouvrez pas le boîtier de l'appareil.
- Lisez et respectez les "consignes de sécurité fondamentales" fournies avec l’appareil sous forme de brochure imprimée.
- Lisez et respectez les instructions de sécurité dans les sections suivantes. Il ne faut pas oublier que la fiche technique peut indiquer des conditions d’exploitation supplémentaires.
- Gardez les consignes de sécurité fondamentales et la documentation produit dans un lieu sûr et transmettez ces documents aux autres utilisateurs.

Contents

1 Documentation Overview

This section provides an overview of the R&S NRX user documentation. Unless specified otherwise, you find the documents on the R&S NRX product page at:

www.rohde-schwarz.com/manual/NRX

1.1 Getting Started Manual

Introduces the R&S NRX and describes how to set up and start working with the product. A printed version is delivered with the instrument.

1.2 User Manuals and Help

Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual .

1.3 Tutorials

Tutorials offer guided examples and demonstrations on operating the R&S NRX. They are provided on the product page of the internet.

1.4 Basic Safety Instructions

Contains safety instructions, operating conditions and further important information. The printed document is delivered with the instrument.

1.5 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S NRX. It also lists the firmware applications and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/NRX

1.6 Release Notes and Open Source Acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation.

The open source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/NRX

1.7 Application Notes, Application Cards, White Papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/NRX

2 For Your Safety

The R&S NRX is designated for use in industrial, administrative, and laboratory environments. Use the R&S NRX only for its designated purpose. Observe the safety and usage instructions documented in the user manual, as well as operating conditions and performance limits stated in the data sheet.

The product documentation helps you to use the R&S NRX safely and efficiently. Keep the product documentation in a safe place and pass it on to the subsequent users.

Safety information is part of the product documentation. It warns you about the potential dangers and gives instructions how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In the "Basic Safety Instructions", safety issues are grouped according to subjects. For example, one subject is electrical safety. The "Basic Safety Instructions" are delivered with the R&S NRX in different languages in print.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation. Always read the safety instructions carefully. Make sure to comply fully with them. Do not take risks and do not underestimate the potential danger of small details such as a damaged power cable.

3 Key Features

The R&S NRX offers the following key features:

- Simple touchscreen operation on a 5" color touchscreen
- Straightforward numerical and graphical display of measured values
- Expandable to up to four measurement channels
- Frequency-range from DC to 110 GHz (sensor-dependent)

4 Preparing for Use

4.1 Unpacking and Checking

Check the equipment for completeness using the delivery note and the accessory lists for the various items. Check the R&S NRX for any damage. If there is damage, immediately contact the carrier who delivered the R&S NRX. Make sure not to discard the box and packing material.

Packing material

Retain the original packing material. If the instrument needs to be transported or shipped later, you can use the material to protect the control elements and connectors.

4.1.1 Accessory List

The R&S NRX comes with the following accessories:

- Printed getting started manual
- Multilingual safety brochure
- Additive data sheet ref. China ROHS
- Country-specific power cable

4.2 Operating Conditions

Specific operating conditions are required to ensure accurate measurements and to avoid damage to the R&S NRX and connected devices. Before switching on the R&S NRX, observe the information on appropriate operating conditions provided in the basic safety instructions and the data sheet of the R&S NRX.

In particular, ensure the following:

- The R&S NRX is dry and shows no sign of condensation.
- The ambient temperature does not exceed the range specified in the data sheet.
- Signal levels at the input connectors are all within the specified ranges.

- Signal outputs are connected correctly and are not overloaded.

4.3 Important Aspects for Test Setup

Preventing electrostatic discharge (ESD)

Electrostatic discharge is most likely to occur when you connect or disconnect a DUT or test fixture to the instrument's test ports.

► **NOTICE!** Risk of electrostatic discharge (ESD). Electrostatic discharge (ESD) can damage the electronic components of the R&S NRX and the device under test (DUT).

Ground yourself to avoid electrostatic discharge (ESD) damage:

- Use a wrist strap and cord to connect yourself to the ground.
- Use a conductive floor mat and heel strap combination.

EMI impact on measurement results

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated electromagnetic interference (EMI):

- Use suitable shielded cables of high quality. For example, use double-shielded RF and LAN cables.
- Always terminate open cable ends.
- Note the EMC classification in the data sheet.
- Do not use USB connecting cables exceeding 5 m.

4.4 Placing on a Bench Top

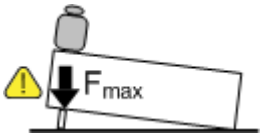
Place the R&S NRX on a stable and level surface. The R&S NRX can be used in horizontal position, standing on its feet, or with the support feet on the bottom extended. Do not place anything on top of the R&S NRX, if the R&S NRX is not in a level position.

⚠ WARNING

Risk of injury if feet are folded out

The feet can fold in if they are not folded out completely or if the instrument is shifted. Collapsing feet can cause injury or damage the instrument.

- Fold the feet completely in or out to ensure stability of the instrument. Never shift the instrument when the feet are folded out.
- When the feet are folded out, do not work under the instrument or place anything underneath.
- The feet can break if they are overloaded. The overall load on the folded-out feet must not exceed 500 N.



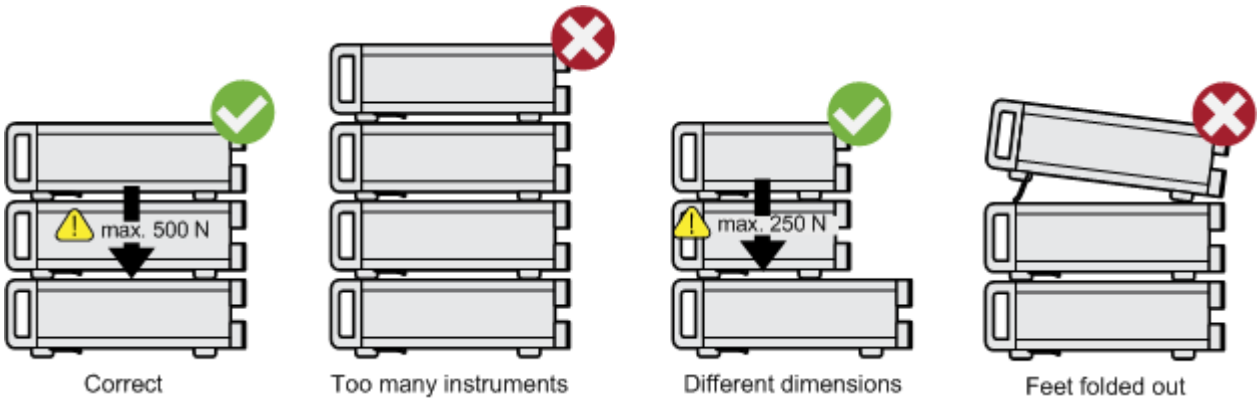
⚠ WARNING

Risk of injury when stacking instruments

A stack of instruments can tilt over and cause injury if not stacked correctly. Furthermore, the instruments at the bottom of the stack can be damaged due to the load imposed by the instruments on top.

Observe the following instructions when stacking instruments:

- Never stack more than three instruments. If you need to stack more than three instruments, install them in a rack.
- The overall load imposed on the lowest instrument must not exceed 500 N.
- It is best if all instruments have the same dimensions (width and length).
  If you need to stack smaller instruments on the top, the overall load imposed on the lowest instrument must not exceed 250 N.
- If the instruments have foldable feet, fold them in completely.



4.5 Connecting to the AC Power Supply

The R&S NRX can be used with different AC power voltages and adapts itself automatically to them. Adjusting the R&S NRX to a particular AC supply voltage is therefore not required. Refer to the data sheet for the requirements of voltage and frequency.

WARNING

Shock hazard

Observe the basic safety instructions at the beginning of this manual, especially the instructions on electrical safety.

Take care that the AC voltage lies within the limits printed on the AC power connector of the R&S NRX and listed in the data sheet.

The power switch can be set to two positions:

- [0]: The instrument is disconnected from the mains.
- [I]: The instrument is power-supplied. It is either ready for operation (STANDBY) or in operating mode.

► Connect the R&S NRX to the AC power supply, using the power cable that is supplied.

The R&S NRX complies with safety class EN61010-1. The power supply of the R&S NRX must be connected to a socket with protective conductor.

Further information:

- Chapter 5.2.5, "AC Supply and Power Switch", on page 20

4.6 Switching On or Off

The possible instrument states are described in Chapter 5.1.7, "On/Standby Key", on page 18.

To switch on the R&S NRX

1. To turn on the power, press the AC power switch at the rear to position [I] (On). After power-up, the R&S NRX is in standby or ready state, depending on the position of the on/standby key.
2. If the R&S NRX is in standby state, press the on/standby key.
   The R&S NRX initiates its startup procedure. It boots the operating system and starts the instrument firmware.
   If the previous session was terminated regularly, the R&S NRX uses the settings from the last session.
3. If you want to return to a defined initial state, perform a preset.

To switch off the R&S NRX

1. Press the [on/standby] key.

   The R&S NRX saves its current settings for reuse in the next session and changes into the standby state.

2. To power down the R&S NRX completely, set the AC power switch to position [0] (Off).

Further information:

- Chapter 5.1.7, "On/Standby Key", on page 18

4.7 Connecting USB and External Devices

Using the USB interfaces, you can directly connect USB devices to the R&S NRX. This number can be increased as necessary by using USB hubs.

Due to the large number of available USB devices, there is almost no limit to the possible expansions. In the following, USB devices that can be useful are listed.

- Memory stick for easy transfer of data to/from a computer (e.g. firmware updates).
- Keyboard for entering comments, file names. etc.
- Mouse if you prefer this way of operation over a touchscreen.

4.8 Connecting Power Sensors

The R&S NRX supports a wide range of R&S power sensors. See the data sheet for detailed information.

Depending on the power sensor, two different sensor connector types are available.

4.8.1 R&S NRPxxS/A/T and R&S NRQ6

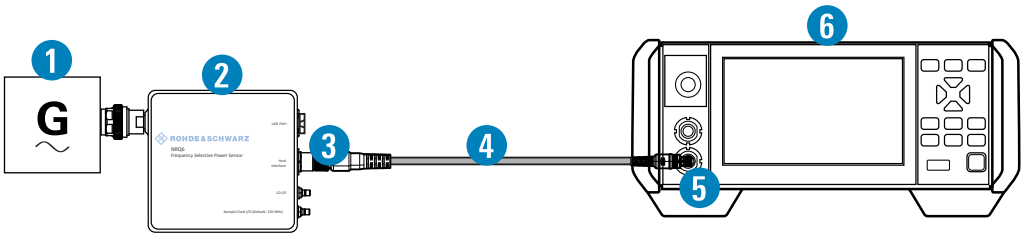


Figure 4-1: Setup with an R&S power sensor (example)

1 = Signal source
2 = R&S power sensor
3 = Host Interface connector

4 = R&S NRP-ZK8
5 = Sensor connector of the R&S NRX
6 = R&S NRX

Use an R&S NRP-ZK8 cable to connect an R&S power sensor to the R&S NRX. If you use an R&S NRP-ZK6 cable, the reference clock and trigger are not supported.

1. 8-pin female connector of R&S NRP-ZK8:
   a) Insert the screw-lock cable connector into the host interface of the R&S power sensor.
   b) Tighten the union nut manually.
2. 8-pin male connector of R&S NRP-ZK8:
   a) Insert this connector into one of the sensor ports of the R&S NRX.
3. Connect the RF connector of the R&S power sensor to the signal source. For details, see the user manual of the R&S power sensor.

   Note: Incorrectly connecting/disconnecting an R&S power sensor can damage the power sensor or lead to erroneous results.

4.8.2 R&S NRP-Zxx

Connect the cable of the R&S NRP-Zxx power sensor to the one of the sensor connectors of the R&S NRX.

4.8.3 R&S NRT-Zxx

Requires the sensor interface for R&S NRT (R&S NRX-B9).

Connect the R&S NRT-Zxx power sensor between source and load.

5 Instrument Tour

5.1 Front Panel Tour

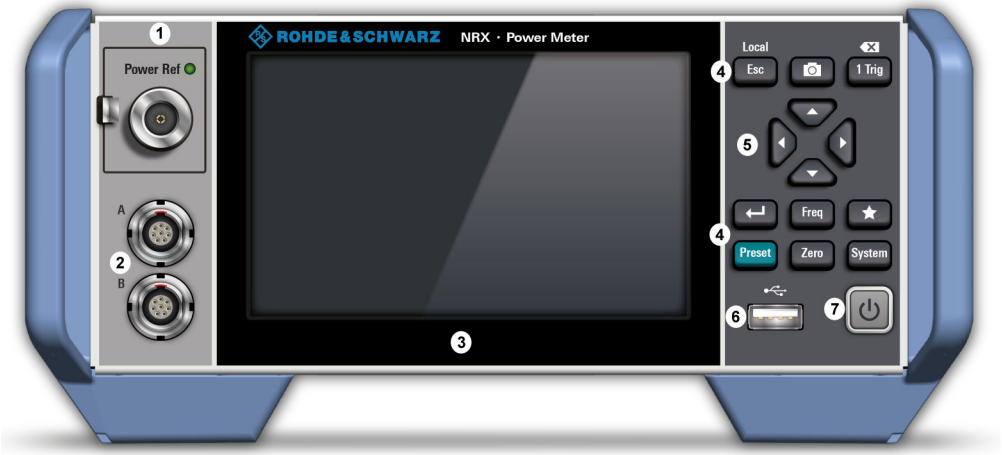


Figure 5-1: Front View of R&S NRX

1 = Module bay for optional connectors, see Chapter 5.1.2, "Module Bay", on page 16.
2 = Sensor connectors A and B, see Chapter 5.1.1, "Sensor Connector A and B", on page 15.
3 = Touchscreen, see Chapter 5.1.3, "Touchscreen", on page 16.
4 = Keys, see Chapter 5.1.4, "Keys", on page 16.
5 = Cursor block for scrolling in the menus, marking of parameters to be set and for numeric entries, see Chapter 5.1.5, "Cursor Block", on page 18.
6 = USB host interface, see Chapter 5.1.6, "USB Host Interface", on page 18.
7 = On/standby key, see Chapter 5.1.7, "On/Standby Key", on page 18.

5.1.1 Sensor Connector A and B

See (2) in Figure 5-1.

Sensor connectors A and B are used to connect the R&S NRP power sensors and the R&S NRQ6. For details on the supported power sensors, see the data sheet.

The complete functional range, including external trigger and reference clock for the synchronization of connected sensors, is provided by these connectors.

Further information:

- Chapter 4.8.1, "R&S NRPxxS/A/T and R&S NRQ6", on page 13
- Chapter 4.8.2, "R&S NRP-Zxx", on page 14

5.1.2 Module Bay

See (1) in Figure 5-1.

There are two options that fit in this bay. If you have both options, you can exchange them. If no option is installed, the module bay is closed by a cover.

- sensor interface for R&S NRT (R&S NRX-B9)
  Provides an optional power sensor connector to connect an R&S NRT-Zxx power sensor. For supported power sensors, see the data sheet.
- sensor check source (R&S NRX-B1)
  Used as a power reference for testing the connected power sensors.

Further information:

- Chapter 4.8.3, "R&S NRT-Zxx", on page 14

5.1.3 Touchscreen

See (3) in Figure 5-1.

The R&S NRX displays results in panes. Depending on the measurement mode, values are displayed digitally or graphically.

False triggers of the touch panel in the presence of static electricity

If an object (e.g. a human finger) that is charged with static electricity is brought near the touch panel, false triggers can occur.

This behavior is caused by the principle of operation of a PCAP (projected capacitive) touch panel.

5.1.4 Keys

See (4) in Figure 5-1.

[Esc] / Local

If you press shortly:

- Changes to the next-higher hierarchy level.
- Escapes from the entry mode in text boxes and lists.
- Closes dialogs and menus without losing any entries that have been made.
- Switches from remote control mode (all controls disabled) to manual operation.

If you press and hold:

- Goes to the start dialog that shows an overview of the current measurements.

Screenshot

Creates a screenshot of the current display.

[1Trig] / Delete

- Controls the measurements depending on the trigger mode:
  – For all trigger modes except "Single", starts and stops the measurement.
  – For the "Single" trigger mode, enables and triggers the measurement.

  Changes of the trigger state apply to all measurements.
- Resets the auxiliary values that provide additional information about the measured values.
- Deletes numbers or text in a field so that you can enter a new value.

Enter

Confirms entries in text fields, dialogs and selections in lists.

[Freq]

Sets the carrier frequency of the applied signal. This value is used for frequency-response correction of the measurement result.

Favorites

Reserved for future use.

[Preset]

Pressing [Preset] opens the "Save / Recall / Preset" dialog.

If you press [Preset] again, the function "Preset" starts.

- Sets the R&S NRX to its default setting. Default settings are sensor specific.
- Sets the R&S NRX to a setting selected from the recall list.

[Zero]

Pressing [Zero] opens the "Zeroing Sensors" dialog.

If you press [Zero] again, "Zero All Sensors" starts.

- Starts the zero calibration.
- Displays zeroing status.
- Displays sensor status.

[System]

Opens the "System Overview" dialog.

5.1.5 Cursor Block

See (5) in Figure 5-1.

The cursor keys are context-sensitive and used as follows:

- Selecting a menu.
- Selecting the active pane.
- Moving the cursor in text boxes.
- Changing the value of an entry in a text box.
- Selecting an element from a list.

5.1.6 USB Host Interface

See (6) in Figure 5-1.

USB 2.0 (universal serial bus) interface of the type A (host USB). Used to connect external devices like a keyboard, mouse, or memory stick. See Chapter 4.7, "Connecting USB and External Devices", on page 13.

5.1.7 On/Standby Key

See (7) in Figure 5-1.

The on/standby key toggles the R&S NRX between standby and ready state.

The following states are possible:

- Off (key is not illuminated)
  The AC power switch on the back of the R&S NRX is switched off. The R&S NRX is disconnected from the AC power supply.
- Ready (green)
  The R&S NRX is ready for operation.
- Standby (red)
  The power supply has the operating voltage supplied to it. Thus, the R&S NRX is still power-supplied.

For operating details, see Chapter 4.6, "Switching On or Off", on page 12.

5.2 Rear Panel Tour

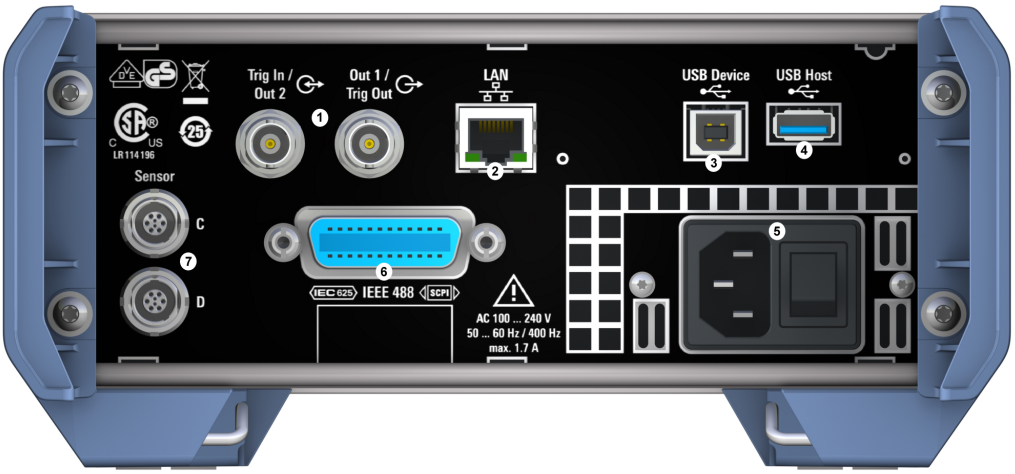


Figure 5-2: RearView of R&S NRX

1 = Trig In / Out 2 and Out 1 / Trig Out connectors, see Chapter 5.2.1, "Trig In / Out 2 and Out 1 / Trig Out Connectors", on page 19.
2 = Ethernet interface, see Chapter 5.2.2, "Ethernet Interface", on page 19.
3 = USB device interface, see Chapter 5.2.3, "USB Device Interface", on page 20.
4 = USB host interface, see Chapter 5.2.4, "USB Host Interface", on page 20.
5 = AC supply and power switch, see Chapter 5.2.5, "AC Supply and Power Switch", on page 20.
6 = IEC 625/IEEE 488 interface, optional, see Chapter 5.2.6, "IEC 625/IEEE 488 Interface", on page 20.
7 = Sensor connectors C and D (optional), used to connect R&S power sensors, see Chapter 5.2.7, "Sensor Connectors C and D", on page 21.

5.2.1 Trig In / Out 2 and Out 1 / Trig Out Connectors

See (1) in Figure 5-2.

The Out 1 / Trig Out BNC connectors supply an analog signal with a voltage between 0 V and 2.5 V. It can be used to output a voltage that is proportional to the measured value (e.g. for level regulation) or a digital signal for limit monitoring.

The Trig In / Out 2 BNC connectors can be used either as an external trigger input with a switchable impedance (10 kΩ or 50 Ω) or as a second analog output.

By default, the Trig In / Out 2 and Out 1 / Trig Out connectors are disabled.

5.2.2 Ethernet Interface

See (2) in Figure 5-2.

The Ethernet connector is an RJ45 socket for remote controlling the R&S NRX via a network.

5.2.3 USB Device Interface

See (3) in Figure 5-2.

USB 2.0 (universal serial bus) interface of the type B (receptacle). Used to connect the R&S NRX to a computer for USB remote control or to perform a firmware update.

5.2.4 USB Host Interface

See (4) in Figure 5-2.

See Chapter 5.1.6, "USB Host Interface", on page 18.

5.2.5 AC Supply and Power Switch

See (5) in Figure 5-2.

When the R&S NRX is connected to the AC supply, it automatically sets itself to the correct range for the applied voltage. The range is printed on the type label. There is no need to set the voltage manually.

For more details, see Chapter 4.5, "Connecting to the AC Power Supply", on page 12.

5.2.6 IEC 625/IEEE 488 Interface

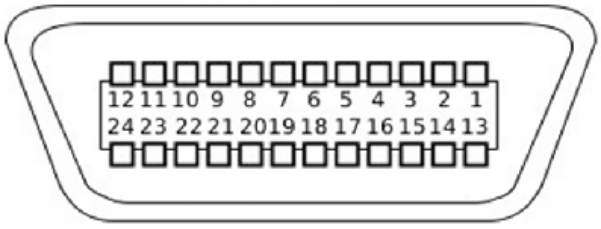
See (6) in Figure 5-2.

Requires GPIB/IEEE488 interface (R&S NRX-B8).

IEC bus (IEEE 488) interface for remote control of the R&S NRX. Used to connect a controller to remote control the R&S NRX. Use a shielded cable for the connection.

Characteristics of the IEC bus (IEEE 488) interface:

- 8-bit parallel data transfer
- Bidirectional data transfer
- Three-wire handshake
- High data transfer rate
- Maximum length of connecting cables 15 m (single connection 2 m)



5.2.7 Sensor Connectors C and D

See (7) Figure 5-2.

Requires 3rd and 4th R&S NRP sensor connector (R&S NRX-B4).

For more details, see Chapter 5.1.1, "Sensor Connector A and B", on page 15.

Index

Symbols

A

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