R&S®NRX Power Meter User Manual

1178556602

User Manual

Version 07

ROHDE&SCHWARZ

This manual describes the R&S®NRX (1424.7005.02) with firmware version FW 02.31 and later.
In addition to the base unit, the following options are described:

- R&S®NRX-B1 (1424.7805.02)
- R&S®NRX-B4 (1424.8901.02)
- R&S®NRX-B8 (1424.8301.02)
- R&S®NRX-B9 (1424.8601.02)
- R&S®NRX-K2 (1424.9208.02)
- R&S®NRX-K4 (1424.9308.02)

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1178.5566.02 | Version 07 | 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.

Contents

1 Preface

This chapter provides an overview of the user documentation and an introduction to the R&S NRX.

1.1 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

1.1.1 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.

1.1.2 User Manual

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 .

The user manual is provided on the R&S NRX for download under:

[System] > "Instrument Info" > "Help & Copyrights"

For further details, see Chapter 11.2.4, "Help & Copyrights", on page 161.

1.1.3 Tutorials

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

1.1.4 Instrument Security Procedures

Deals with security issues when working with the R&S NRX in secure areas. It is available for download on the Internet.

1.1.5 Basic Safety Instructions

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

1.1.6 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

1.1.7 Release Notes and Open Source Acknowledgment (OSA)

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

The open source acknowledgment and the license texts of open source software packages used in the R&S NRX software are provided under:

[System] > "Instrument Info" > "Help & Copyrights"

For further details, see Chapter 11.2.4, "Help & Copyrights", on page 161.

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

1.2 Key Features

The R&S NRX supports:

- Easy RF power measurements
- Multi-channel measurements
- RF pulse analysis
- System integration

The R&S NRX is a versatile, user-friendly base unit.

- Straightforward numerical and graphical display of measured values, plus intuitive operation with touchscreen-based graphical user interface
- Supports up to four R&S NRP and R&S NRQ6 power sensors.
- Supports all sensor-dependent measurement functions
- Hardware interfaces for remote control and triggering
- Code emulation of the R&S NRP2
- Optional high-precision CW and pulse mode reference source module
- Optional power reflection measurements with R&S NRT directional power sensors

See also the R&S NRX fact sheet at www.rohde-schwarz.com.

2 Safety and Regulatory Information

The product documentation helps you use the R&S NRX safely and efficiently. Follow the instructions provided here and in the printed "Basic Safety Instructions". Keep the product documentation nearby and offer it to other users.

Intended use

The R&S NRX is intended for the development, production and verification of electronic components and devices in industrial, administrative, and laboratory environments. Use the R&S NRX only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet.

Where do I find safety information?

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

- The printed "Basic Safety Instructions" provide safety information in many languages and are delivered with the R&S NRX.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

2.1 Korea Certification Class B

이 기기는 가정용(B급) 전자파 적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

3 Getting Started

3.1 Preparing for Use

3.1.1 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.

3.1.1.1 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

3.1.2 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.

3.1.3 Considerations 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.

3.1.4 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.

To place the R&S NRX on a bench top

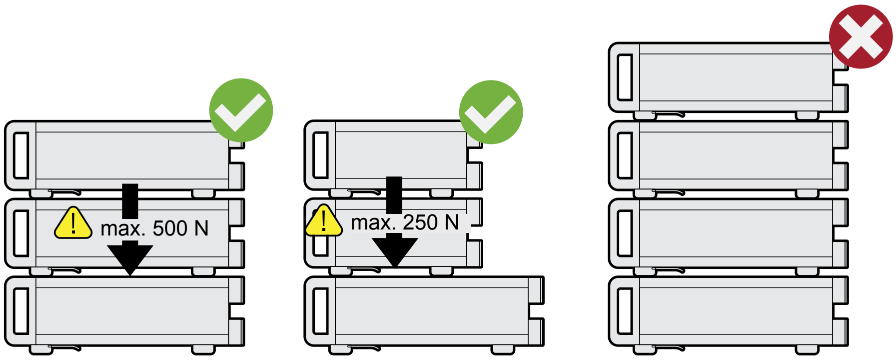
1. Place the R&S NRX on a stable, flat and level surface. Ensure that the surface can support the weight of the R&S NRX. For information on the weight, see the data sheet.
2. **CAUTION!** Foldable feet can collapse. Always fold the feet completely in or out to ensure stability. The feet can collapse if they are not folded out completely or if the product is moved without lifting it. The foldable feet are designed to carry the weight of the product, but not an extra load.

With folded-out feet, do not place anything on top or underneath the instrument.

3. **WARNING!** A stack of products can fall over and cause injury. Never stack more than three products on top of each other. Instead, mount them in a rack.

   Stack as follows:

   - It is best if all instruments have the same dimensions (width and length).
   - The overall load on the lowest instrument must not exceed 500 N.
   - With smaller instruments on top of the lowest instrument, the overall load on the lowest instrument must not exceed 250 N.



4. **NOTICE!** Overheating can damage the product.

   Prevent overheating as follows:

   - Keep a minimum distance of 10 cm between the fan openings of the R&S NRX and any object in the vicinity.
   - Do not place the R&S NRX next to heat-generating equipment such as radiators or other instruments.

3.1.5 Mounting in a Rack

1. Order one of the rack adapter kits designed for the R&S NRX. For the order number, see data sheet.
2. Follow the installation instructions provided with the adapter kit.
3. **NOTICE!** Insufficient airflow can cause overheating and damage the product.

   Design and implement an efficient ventilation concept for the rack.

3.1.6 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.

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.

1. Plug the AC power cable into the AC power connector on the rear panel of the R&S NRX. Only use the power cable delivered with the R&S NRX.
2. Plug the AC power cable into a power outlet with ground contact. The R&S NRX complies with safety class EN61010-1.

   The required ratings are listed next to the AC connector and in the data sheet.

Further information:
- Chapter 3.2.2.5, "AC Supply and Power Switch", on page 29

3.1.7 Switching On or Off

The possible instrument states are described in Chapter 3.2.1.6, "On/Standby Key", on page 27.

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.
   See Chapter 4.1.1, "Start Dialog", on page 31.
   If the previous session ended 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.
   See "Preset" on page 133.

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 9, "Saving and Recalling Settings", on page 132
- Chapter 3.2.1.6, "On/Standby Key", on page 27

3.1.8 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, you have different choices for connecting power sensors.

3.1.8.1 Sensor Connectors A to D

See Chapter 3.2.1.1, "Sensor Connector A and B", on page 24 and Chapter 3.2.2.7, "Sensor Connectors C and D", on page 30.

Suitable for:

- USB and LAN power sensors
- R&S NRQ6
- R&S NRP-Zxx power sensors

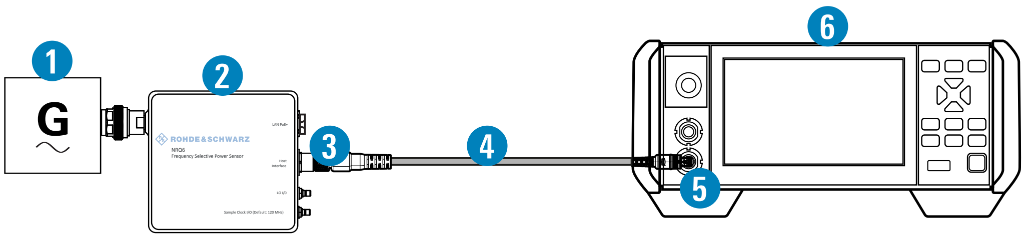


Figure 3-1: Setup with an R&S power sensor (example)

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.

3.1.8.2 Optional Sensor Interface for R&S NRT (R&S NRX-B9)

See Chapter 3.2.1.2, "Module Bay", on page 24.

Suitable for R&S NRT directional power sensors.

Communication between R&S NRT-Zxx power sensor and R&S NRX is only possible with a baud rate setting of 38400 Bd. This setting is the factory default that must be restored if the setting was changed. If the R&S NRT-Zxx power sensor is not recognized by the R&S NRX, check that the baud rate setting of the R&S NRT-Zxx power sensor is 38400 Bd. See the manual of the R&S NRT-Zxx power sensor for details.

1. Connect the R&S NRT-Zxx power sensor between source and load.
   a) Connector (1) to the source.
   b) Connector (2) to the load.
2. Connect the cable of the R&S NRT-Zxx power sensor (3) to the sensor interface for R&S NRT (R&S NRX-B9).

3.1.8.3 LAN Interface

See Chapter 3.2.2.2, "Ethernet Interface", on page 28.

Suitable for LAN power sensors.

R&S power sensors that are connected to the LAN interface are not recognized automatically. Add them, see "To add a LAN power sensor" on page 149.

3.1.8.4 USB 2.0 Host Interfaces

See Chapter 3.2.1.5, "USB Host Interface", on page 27 and Chapter 3.2.2.4, "USB Host Interface", on page 29.

Suitable for USB power sensors. You can increase the number of connected power sensors by using USB hubs.

3.1.9 Connecting USB and External Devices

Apart from connecting power sensors, you can use the USB interfaces to connect USB devices. You can increase the number of connected devices 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, useful USB devices are listed exemplarily:

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

3.2 Instrument Tour

3.2.1 Front Panel Tour

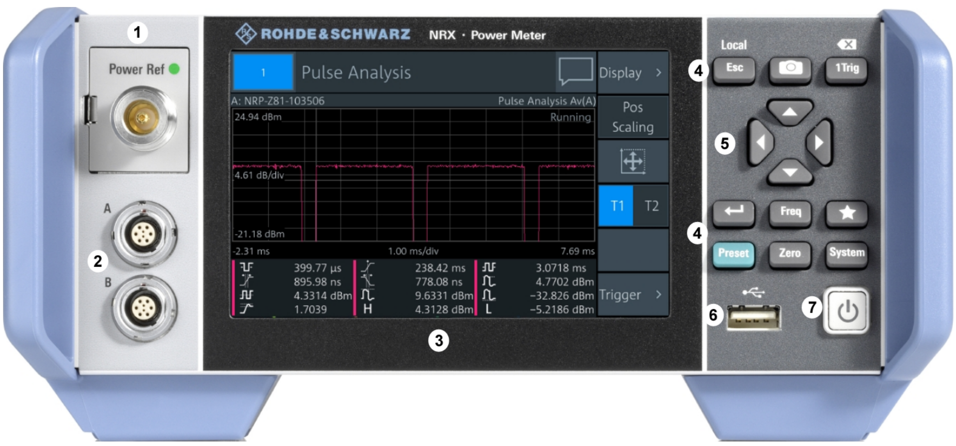


Figure 3-2: Front panel of the R&S NRX

1 = Module bay for optional connectors, see Chapter 3.2.1.2, "Module Bay", on page 24.
2 = Sensor connectors A and B, see Chapter 3.2.1.1, "Sensor Connector A and B", on page 24.
3 = Touchscreen, see Chapter 3.2.1.3, "Touchscreen", on page 25.
4 = Keys, see Chapter 3.2.1.4, "Keys", on page 25.

5 = Cursor keys, see "Cursor keys" on page 27.
6 = USB host interface, see Chapter 3.2.1.5, "USB Host Interface", on page 27.
7 = On/standby key, see Chapter 3.2.1.6, "On/Standby Key", on page 27.

3.2.1.1 Sensor Connector A and B

See (2) in Figure 3-2.

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 3.1.8, "Connecting Power Sensors", on page 21

3.2.1.2 Module Bay

See (1) in Figure 3-2.

Two options fit in this bay. If you have both options, you can exchange them, see "To exchange the option" on page 24.

If no option is installed, the module bay is closed by a cover.

Sensor check source (R&S NRX-B1)

Used as a power reference for testing the connected power sensors and the cabling. The LED of the sensor check source (R&S NRX-B1) shows the state, see Table 3-1.

You can remove the option and send it to Rohde & Schwarz for calibration. Contact the Rohde & Schwarz customer service.

Table 3-1: Possible states

Illumination	State	Signal Output setting
Off	No signal is generated.	"Off"
Steady green	Continuous wave is output.	"CW"
Blinking green	Pulse signal is output.	"Pulse"
Blinking red	Settings conflict exists. For example if "Pulse" is set and the power level is set to 20 dBm.	"CW" or "Pulse"

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.

To exchange the option

1. Press the latch to the right, using your thumb nail or a small pen.

2. Pull the option from its casing.
3. Insert the other option.
4. Press until you hear a click when the latch locks.

Further information:
- Chapter 3.1.8, "Connecting Power Sensors", on page 21
- "Sensor Check Source tab" on page 144
- Chapter 13.8, "Configuring the Test Generator", on page 365

3.2.1.3 Touchscreen

See (3) in Figure 3-2.

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

False triggers can occur

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.

Further information:
- "Using the touchscreen" on page 31

3.2.1.4 Keys

See (4) in Figure 3-2.

[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 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 active measurements.
  See Chapter 4.1.1, "Start Dialog", on page 31.

Further information:
- "Going back to a higher hierarchy level" on page 31
- Chapter 4.3.2, "Returning to Manual Operation (LOCAL)", on page 42

Screenshot

Creates a screenshot of the current display.

See Chapter 4.1.8, "Creating and Saving Screenshots", on page 40.

Remote command:
`SYSTem:HCOPy` on page 219

[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.
  See also "Trigger Mode" on page 62.
- Resets the auxiliary values that provide additional information about the measured values.
  See also "Auxiliary Values" on page 51.
- 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.
- Shows a frame around the control in focus. You can change the focus using the Cursor keys.

[Freq]

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

Remote command:
`[SENSe<Sensor>:]FREQuency[:CW]` on page 319

Favorites

Reserved for future use.

[Preset]

Opens the "Save / Recall / Preset" dialog.

See Chapter 9, "Saving and Recalling Settings", on page 132.

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

See "Preset" on page 133.

If you press the [Preset] key during booting, the R&S NRX starts with the factory default state.

[Zero]

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

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

Also displays status information:

- Zeroing status
- Sensor status

[System]

Opens the "System Overview" dialog.

See Chapter 11, "System Settings", on page 136.

Cursor keys

See (5) in Figure 3-2.

The cursor keys are context-sensitive. The control in focus is indicated by a focus frame. Use the cursor keys as follows:

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

3.2.1.5 USB Host Interface

See (6) in Figure 3-2.

USB 2.0 (universal serial bus) interface of the type A (host USB). Used to connect:

- USB power sensors
- External devices like a keyboard, mouse, or memory stick

Further information:

- Chapter 3.1.8.4, "USB 2.0 Host Interfaces", on page 23
- Chapter 3.1.9, "Connecting USB and External Devices", on page 23

3.2.1.6 On/Standby Key

See (7) in Figure 3-2.

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 3.1.7, "Switching On or Off", on page 20.

3.2.2 Rear Panel Tour

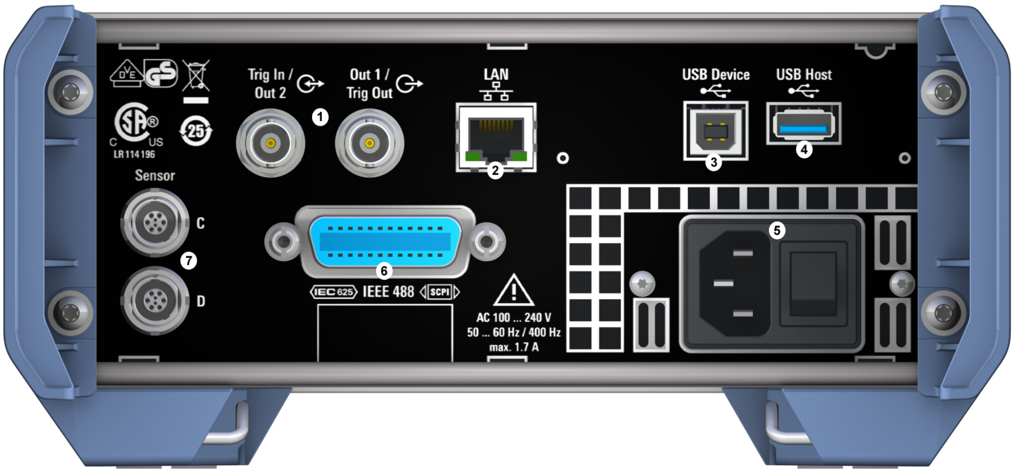


Figure 3-3: Rear panel of the R&S NRX

1 = Trig In / Out 2 and Out 1 / Trig Out connectors, see Chapter 3.2.2.1, "Trig In / Out 2 and Out 1 / Trig Out Connectors", on page 28.
2 = Ethernet interface, see Chapter 3.2.2.2, "Ethernet Interface", on page 28.
3 = USB device interface, see Chapter 3.2.2.3, "USB Device Interface", on page 29.
4 = USB host interface, see Chapter 3.2.2.4, "USB Host Interface", on page 29.
5 = AC supply and power switch, see Chapter 3.2.2.5, "AC Supply and Power Switch", on page 29.
6 = IEC 625/IEEE 488 interface, optional, see Chapter 3.2.2.6, "IEC 625/IEEE 488 Interface", on page 29.
7 = Sensor connectors C and D (optional), used to connect R&S power sensors, see Chapter 3.2.2.7, "Sensor Connectors C and D", on page 30.

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

See (1) in Figure 3-3.

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, both connectors are disabled.

Further information:

- "I/O 1, I/O 2 tabs" on page 145

3.2.2.2 Ethernet Interface

See (2) in Figure 3-3.

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

3.2.2.3 USB Device Interface

See (3) in Figure 3-3.

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.

3.2.2.4 USB Host Interface

See (4) in Figure 3-3.

See Chapter 3.2.1.5, "USB Host Interface", on page 27.

3.2.2.5 AC Supply and Power Switch

See (5) in Figure 3-3.

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 3.1.6, "Connecting to the AC Power Supply", on page 19.

3.2.2.6 IEC 625/IEEE 488 Interface

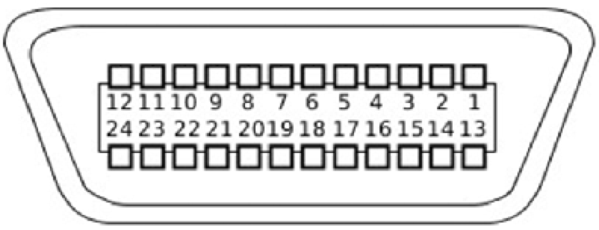
See (6) in Figure 3-3.

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)



3.2.2.7 Sensor Connectors C and D

See (7) Figure 3-3.

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

For more details, see Chapter 3.2.1.1, "Sensor Connector A and B", on page 24.

4 Operating Concepts

4.1 Manual Operation

Using the graphical user interface of the R&S NRX and the keys on the front panel, you can easily configure the settings and measure in the provided measurement modes.

Using the touchscreen

A touchscreen allows you to interact with the software using various finger gestures on the screen. The basic gestures supported by the software and most applications are described here. Further actions using the same gestures may be possible.

Tap = touch the screen quickly, usually on a specific element. You can tap most elements on the screen to access the settings belonging to that element (topic).

In graphs, use the following gestures:

- *Pan* = put your fingers on the touchscreen and move them while keeping contact. Thus, you can bring offscreen extensions of the graph into view.
- *Pinch* = move two fingers toward each other to change the zoom.

Going back to a higher hierarchy level

Esc

The [Esc] key is the essential control element to navigate back, for example after you have opened a dialog by tapping an element.

► Press Esc shortly to change to the next-higher hierarchy level.

► Keep Esc pressed to go to the highest hierarchy level, the start dialog.

4.1.1 Start Dialog

1. Connect a power sensor to the R&S NRX.
   See Chapter 3.1.8, "Connecting Power Sensors", on page 21.
2. Boot the R&S NRX.
   After successful booting, the R&S NRX displays the start dialog.

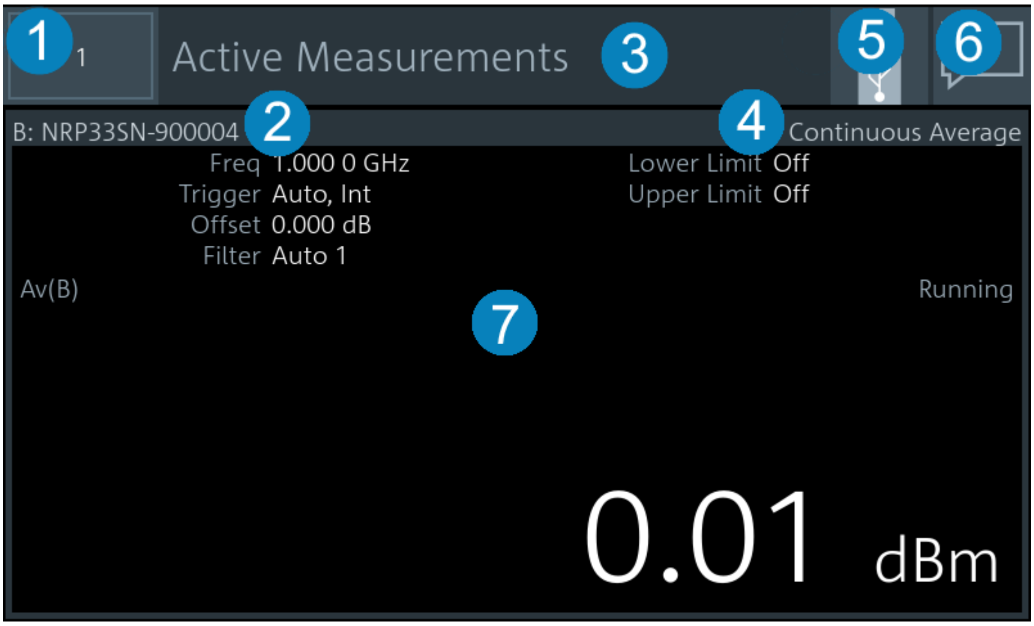


Figure 4-1: Start dialog (example for setup with one power sensor)

1 = Miniature display layout. See Chapter 4.1.5, "Selecting the Display Layout", on page 36.
2 = Connected sensors
3 = Title
4 = Measurement type
5 = Status information. See Chapter 4.1.3, "Status Information", on page 34.
6 = Notification center status, see Chapter 4.1.4, "Notification Center", on page 35.
7 = Measurement pane

In the measurement pane, the settings, results and status of the active measurements are displayed. The layout depends on the selected display layout. See Chapter 4.1.5, "Selecting the Display Layout", on page 36.

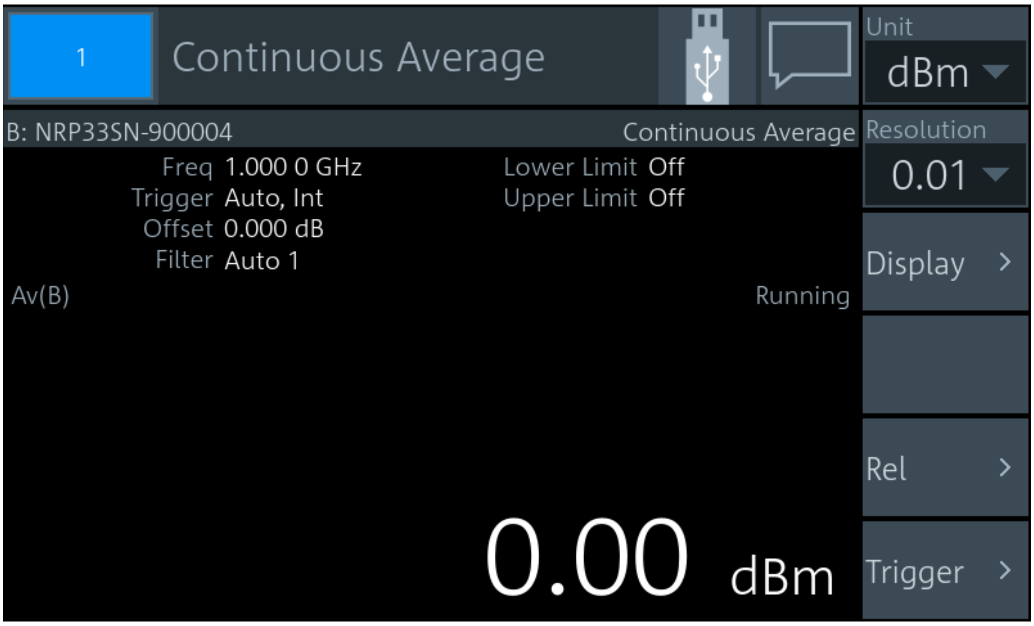
4.1.2 Main Measurement Dialog

From the start dialog, you can access the measurements.

To access a measurement

► In the start dialog, tap the pane of the measurement you want to access. In this example, tap (7) in Figure 4-1.

The selected measurement is displayed in full screen. Its number is highlighted in the miniature display layout in the upper left corner.



Layout of the main measurement dialog

The operating philosophy in the main measurement dialog is independent of the measurement type. The dialog is divided into touch areas that lead to different settings.

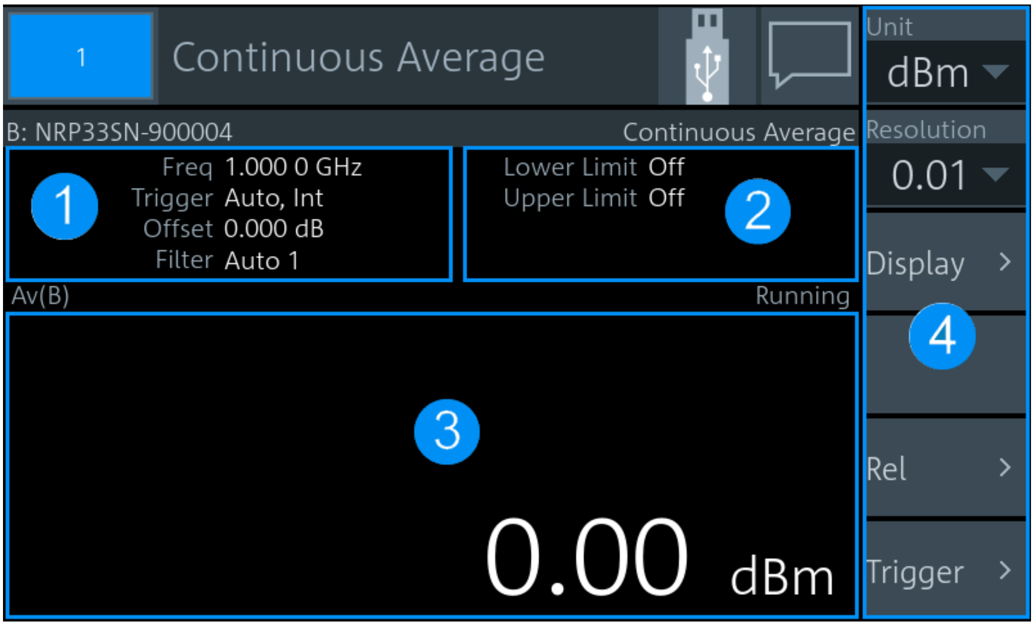


Figure 4-2: Layout of the main measurement dialog (example)

1 = Settings displayed in the measurement pane
2 = Limit values displayed in the measurement pane
3 = Measurement value displayed in the measurement pane
4 = Navigation pane

► Tap the *displayed settings*, (1) in Figure 4-2, to access the sensor settings.

The "Primary Sensor" dialog is displayed.
See Chapter 8, "Sensor Configuration", on page 113.

► Tap the *displayed limit values*, (2) in Figure 4-2, to change limit values.

The "Limit Monitor" dialog is displayed.
See "Limit Monitor" on page 56.

► Tap the *displayed measurement value or graph*, (3) in Figure 4-2, to change the measurement type, assign a sensor, access the sensor settings, ...

The "Measurement Settings" dialog is displayed.
See Chapter 6.4, "Measurement Settings Dialog", on page 66.

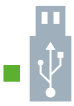
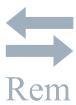
► Tap an *element in the navigation pane*, (4) in Figure 4-2, to configure the trigger, the presentation of the measurement result and further measurement-specific settings.
See Chapter 6, "Configuration for All Measurement Types", on page 49.

Tapping other areas in the measurement pane can open further dialogs, but these dialogs are measurement-specific and there is no general rule that applies to all measurements.

4.1.3 Status Information

The status information is displayed in the upper right corner, left from the notification center. See Figure 4-1.

Table 4-1: Status symbols

Symbol	Description	Further information
	Memory stick is connected and ready for use.	Chapter 3.1.9, "Connecting USB and External Devices", on page 23
	Memory stick is connected and initialization is in progress. When the moving green dot vanishes, the memory stick is ready for use.	
	R&S NRX is in remote control.	Chapter 4.3.2, "Returning to Manual Operation (LOCAL)", on page 42
	LLO means local lockout. R&S NRX is in remote control. Manual operation is disabled.	
	Identification and initialization of a connected power sensor is in progress.	

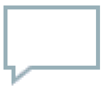
4.1.4 Notification Center

The notification center collects all information, warning and error messages during the operation of the R&S NRX. Its status is displayed in the upper right corner:

- The displayed symbol belongs to the most severe message. For example, if one error and 5 notices are present, the symbol of the error message is displayed.
  The symbols used are explained in Table 4-2.
- The number of all messages is displayed in the color of the most severe message.

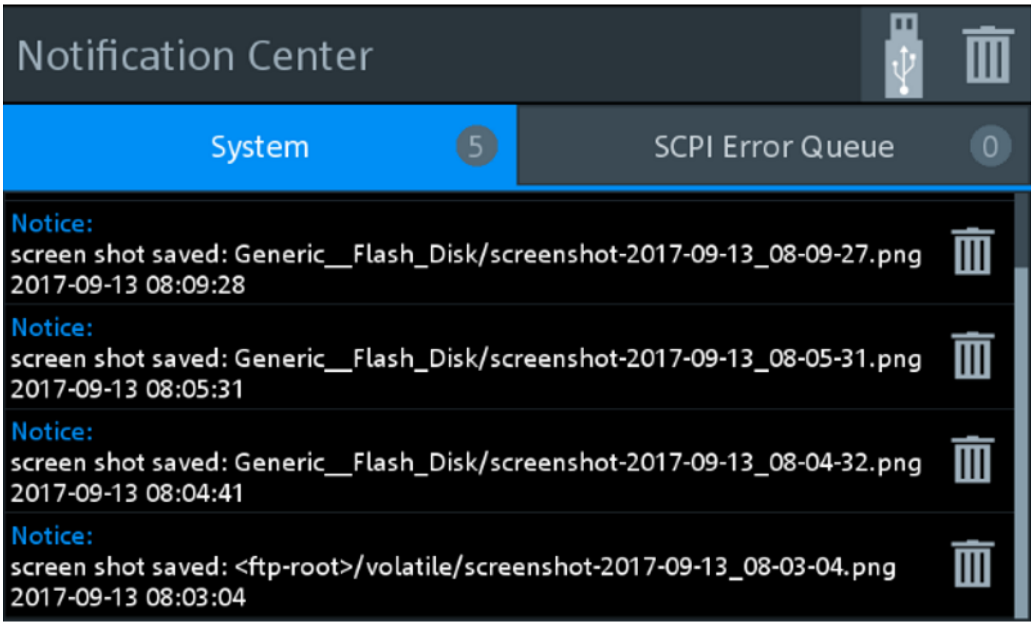
See (6) in Figure 4-1.

Table 4-2: Notification symbols

Symbol	Description
	No message is available.
	Only one or more notices are present.
	At least one warning message is present. Yellow is the assigned color.
	At least one error message is present. Red is the assigned color.

To display the messages

► Tap the notification symbol in the upper left corner.



The "Notification Center" dialog has two tabs:

- "System"
  All messages concerning the instrument are listed.
- "SCPI Error Queue"
  Messages related to the remote command functionality are displayed.

To delete notices no longer needed

► If you want to delete a specific notice, tap the bin symbol next to the notice.

► If you want to delete all notices, tap the bin symbol in the right corner.

4.1.5 Selecting the Display Layout

You can split the measurement display into panes. A maximum number of 4 panes is possible, one for each measurement.

To change the display layout

1. Press and hold [Esc] until the start dialog is displayed.
2. Tap the miniature display layout in the upper left corner.

3. Select how many measurement panes you want to display.
For example, if you select 2 panes, the measurement display looks as follows:

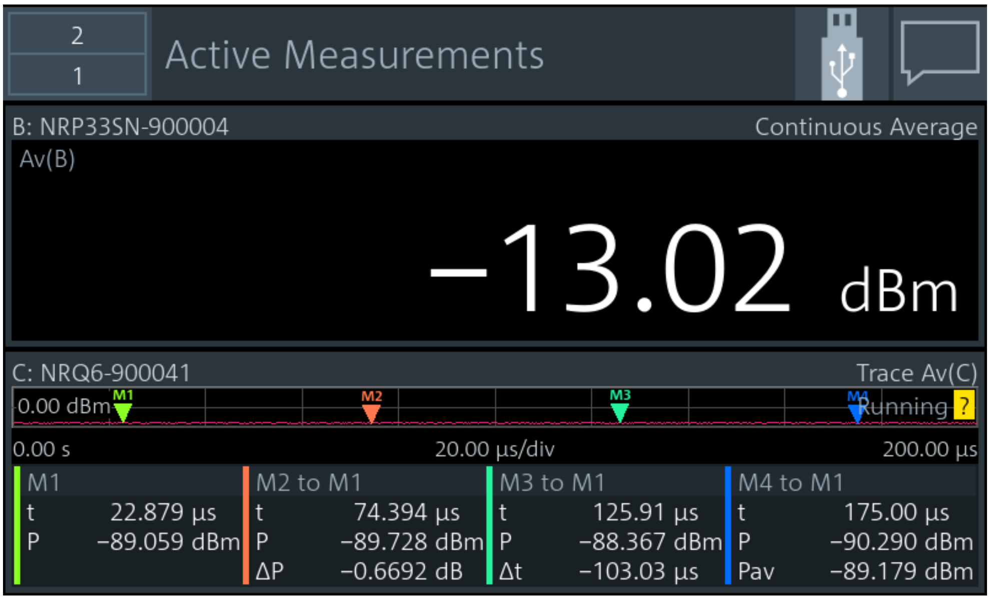


Figure 4-3: Two measurement panes

Remote command:

DISPlay:LAYout on page 191

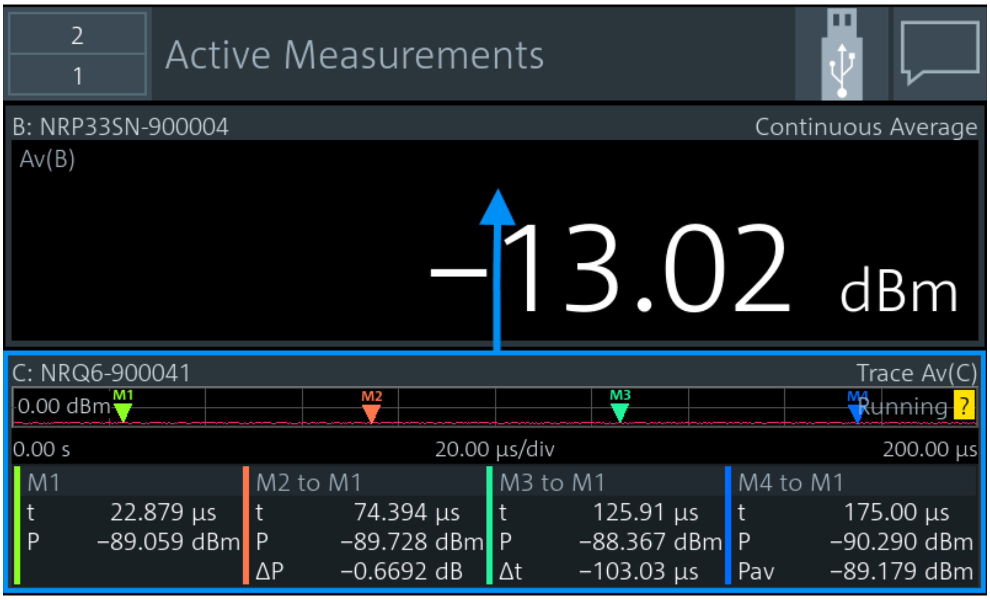
DISPlay[:WINDow<Window>][:STATe] on page 193

4.1.6 Swapping Measurement Panes

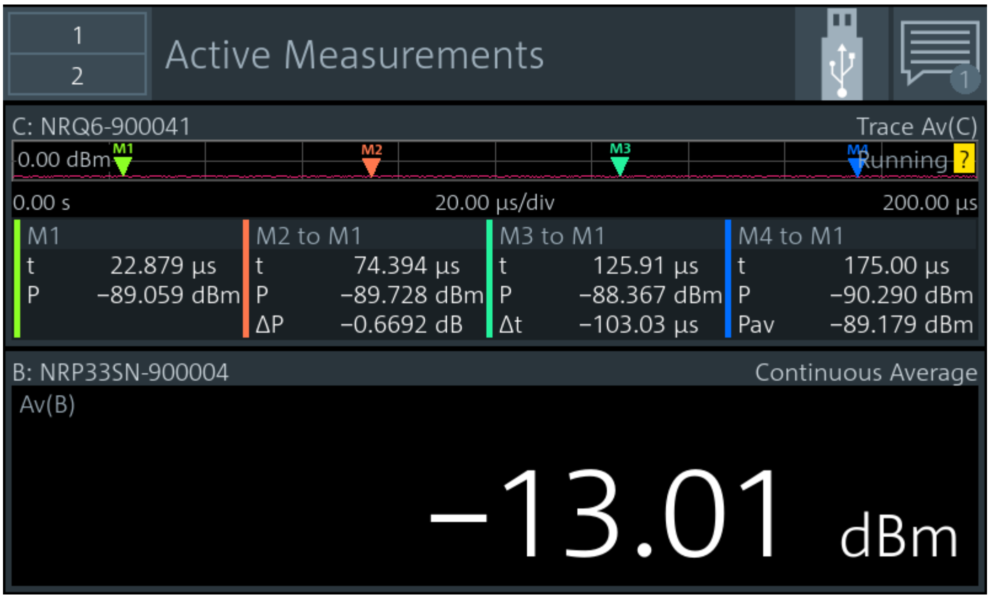
You can swap the position of measurement panes using drag and drop. The numbering of the panes is not changed.

To change the position of a measurement pane

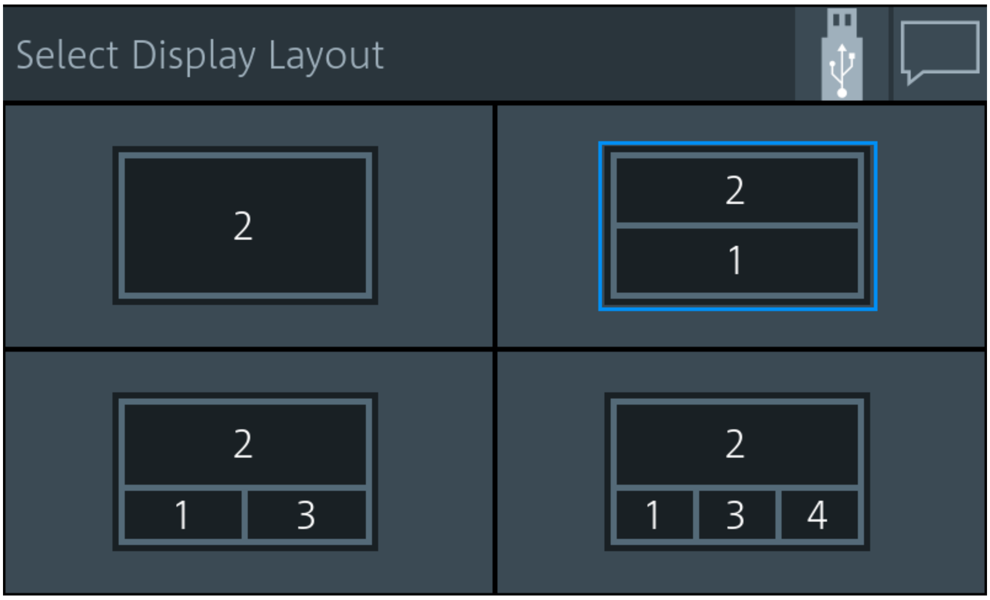
► Touch & hold a measurement pane and drag it into the new position.



The two panes have changed position:



In the "Select Display Layout" dialog, you can see that the positions of pane 1 and pane 2 are exchanged, but the numbering of the panes is unchanged.



Remote command:

`DISPlay[:WINDow<Window>]:POSition` on page 193

4.1.7 Editing Parameters

► Tap a parameter to change its value.

Depending on the selected parameter, a numeric or an alphanumeric editor is displayed.

The numeric editor shows for each parameter the specific value range (min, max).

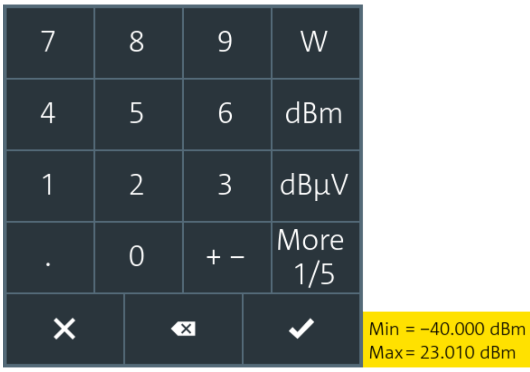


Figure 4-4: Numeric editor

Use the alphanumeric editor as a standard keyboard.

Figure 4-5: Alphanumeric editor

4.1.8 Creating and Saving Screenshots

You can create a screenshot of the current display, for example to save graphical measurement results.

► Press the [Screenshot] key on the front panel.

The R&S NRX saves the screenshot in PNG format.
If a memory stick is connected, the PNG is saved on the memory stick.
Otherwise, the PNG is saved in the volatile directory of the FTP directory. You can download the PNG using FTP. Default user identification and password are *instrument*.
In the "Notification Center", a "Notice" message shows the file path and name.

Remote control:

`SYSTem:HCOPy` on page 219

Further information:

- Chapter 3.1.9, "Connecting USB and External Devices", on page 23
- Chapter 3.2.1.5, "USB Host Interface", on page 27

4.2 Remote Operation

VNC (virtual network computing) simulates the user interface of the R&S NRX. Thus, you can operate the R&S NRX manually from an external computer in the same way as operating the R&S NRX itself. During VNC operation, local operation (manual operation, see Chapter 4.1, "Manual Operation", on page 31) and remote operation have equal access rights. Both users see the same screen contents of the R&S NRX and can operate the R&S NRX simultaneously.

By default, VNC access is enabled. Any user in the network who knows the password and IP address of the R&S NRX can access the R&S NRX. To prevent access, disable the VNC server service under "VNC" on page 157.

Prerequisites

- LAN interface of the external computer is configured for the network.
- R&S NRX and the computer are connected using a LAN network.

To set up a connection using a VNC viewer

1. On the external computer, install the VNC viewer if it is not installed already.
2. Open the VNC viewer.
3. Enter the host name or the IP address of the R&S NRX.
   See also "Overview tab" on page 138.
4. Click "Connect".
5. Enter the session password. The preconfigured password is *instrument*.

To set up a connection using a web browser

1. Open the web browser.
2. Enter as web address: *http://<hostname>* or *http://<IP address>*. For example, *http://nrx-104711*.
   See also "Overview tab" on page 138.
3. Enter the password. The preconfigured password is *instrument*.

4.3 Remote Control

The R&S NRX is equipped with various interfaces for connecting it to a controller for remote control:

- IEC/IEEE bus interface (standard equipment) in line with the standards IEC 60625.1 (IEEE 488.1) and IEC 60625.2 (IEEE 488.2)
- Gigabit Ethernet interface
- USB 2.0 interface for remote control and firmware update

Connectors are installed at the rear of the R&S NRX. See Chapter 3.2, "Instrument Tour", on page 23.

The interfaces support the SCPI (standard commands for programmable instruments) standard, version 1999.0 of May 1999. The SCPI standard is based on the IEEE 488.2 standard. It defines a standardized command language for controlling measuring and test instruments with functions beyond the scope of the IEEE 488.2 standard.

For a detailed description of the remote commands, see Chapter 13, "Remote Control Commands", on page 173.

4.3.1 Switching to Remote Control (REMOTE)

Prerequisites

- A link is established between the controller and the R&S NRX.
- The R&S NRX is configured correctly.

After power-up, the R&S NRX is always in manual control mode, "LOCAL". When the R&S NRX receives a SCPI command, it switches to remote control irrespective of the selected interface.

4.3.2 Returning to Manual Operation (LOCAL)

If the R&S NRX is in remote control, you can display settings using the front-panel keys and the touchscreen, but you cannot change settings. To do that, you have to return to manual operation.

The R&S NRX remains in remote control until you perform one of the following actions. Make sure that the R&S NRX is free for you to use.

► Press the [Esc/Local] key. See "Esc [Esc] / Local" on page 25.
If the manual operation was disabled by the `&LLO` command (local lockout) and the [Esc/Local] key does not work, switch the R&S NRX off and on again.

► Send the `&GTL` command (go to local).

► Tap the symbol on the touchscreen.
See Chapter 4.1.3, "Status Information", on page 34.

5 Measurement Basics

In a measurement, the R&S NRX uses all sensor-dependent measurement functions and displays the results. Thus, you can configure both the measurement and the sensor. The R&S NRX saves all settings.

5.1 Parallel Measurements

An R&S NRX without enhancements supports the configuration of one power sensor for one measurement type. If you want to use more than one power sensor simultaneously, you can extend both to a maximum of 4 with the following options:

- second measurement channel (R&S NRX-K2)
- 3rd and 4th measurement channel (R&S NRX-K4)

For details on ordering information, refer to the brochure of the R&S NRP power meter family.

You can configure the display to accommodate the number of measurements you want to watch simultaneously, see Chapter 4.1.5, "Selecting the Display Layout", on page 36.

If you connect more than 4 power sensors simultaneously, the R&S NRX notifies you. Use the sensor manager to handle more than 4 power sensors, see Chapter 11.1.4, "Sensor Manager", on page 149.

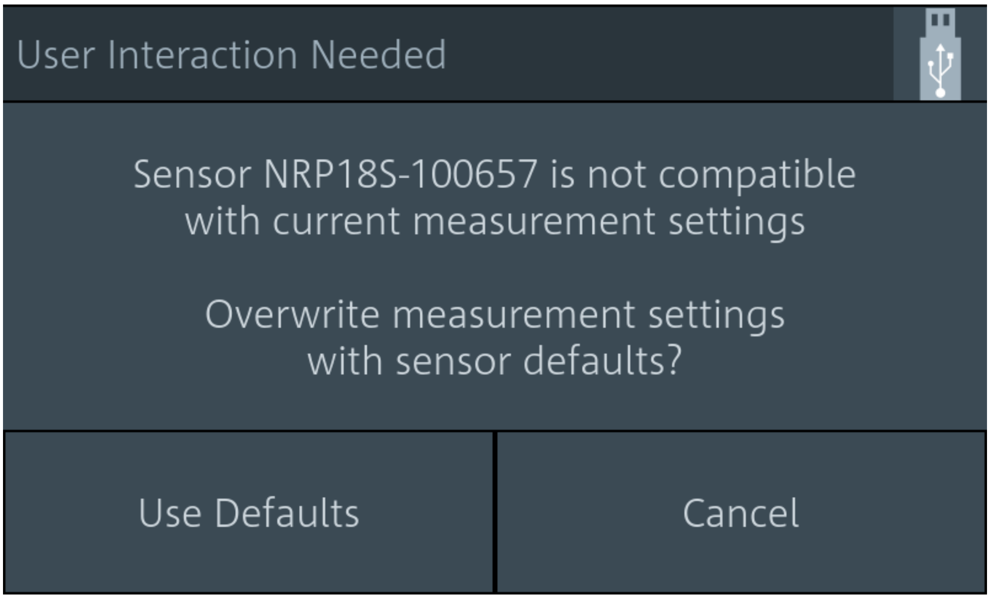
5.2 Sensor Assignment and Memory

When you connect an R&S power sensor to the R&S NRX, the R&S NRX tries to recognize the sensor. The sensor recognition is based on the sensor type and the serial number of the power sensor.

The following scenarios are possible:

- Sensor type has never been connected before.
  The R&S NRX uses its settings for the measurement.
- Sensor type has been connected before.
  The R&S NRX assigns the sensor to the measurement type it was assigned before. The port where the sensor is connected is of no concern. You do not have to use the same port for the same sensor type.
  See "Example: Using different ports for the same sensor type" on page 44.

- Sensor type is different to the sensor type that was previously assigned to the measurement. Decide whether you want to use the settings of the sensor.
  - "Use Default"
    Uses the sensor settings. For details, see the user manual of the sensor.
  - "Cancel"
    Keeps the measurement settings and does not assign the sensor to the measurement.



If conflicting settings occur when connecting a sensor, the R&S NRX shows where the problematic setting is located. See Chapter 5.5, "Settings Conflict", on page 47.

Example: Using different ports for the same sensor type

1. Connect an R&S NRQ6 to port A.
2. Perform a trace measurement.
3. Remove the R&S NRQ6 and connect it to port B.

   The R&S NRX recognizes the sensor type and assigns the R&S NRQ6 to the same measurement.

Example: Using two sensors of the same type

1. Connect the first R&S NRP-Z81 to port A.
2. Connect the second R&S NRP-Z81 to port B.
3. Swap ports.

   The R&S NRX distinguishes sensors of the same type due to their unique serial number and assigns them to the same measurement as before.

The sensor assignment is deleted by a preset, reset or sanitization. If the R&S NRX has no memory of a previous sensor assignment, the R&S NRX assigns the measurements according to the port, to which the power sensors are connected. The number of measurement panes is adapted automatically.

Example: Connecting sensors after a preset

1. Connect an R&S NRQ6 to port A.

   The measurement results are displayed in measurement pane 1.

2. Connect an R&S NRP33SN to port C.

   The display layout is extended to 3 measurement panes. The measurement results of the R&S NRP33SN are displayed in measurement pane 3. Measurement pane 2 is unused.

3. Disconnect the R&S NRP33SN from port C and connect it to port B.

4. Press [Preset].

   The display layout is reduced to 2 measurement panes. The power sensors are assigned according to their port. The assignment of the R&S NRQ6 is unchanged, but the R&S NRP33SN is assigned to measurement pane 2.

Further information:
- Chapter 13.3, "Addressing Measurements and Sensors", on page 182
  Suffix usage in remote control

5.3 Performing a Measurement

This measurement description is designed to give you a first impression. For further information, see the description of the measurements, their results and their settings:

- Chapter 6, "Configuration for All Measurement Types", on page 49
- Chapter 7, "Measurement Types and Result Displays", on page 70
- Chapter 8, "Sensor Configuration", on page 113

Setup

1. Connect one or more R&S power sensors to the R&S NRX. See Chapter 3.1.8, "Connecting Power Sensors", on page 21.
   How many R&S power sensors you can connect depends on the options of your R&S NRX. See Chapter 5.1, "Parallel Measurements", on page 43.

2. Connect each R&S power sensor to a DUT (signal source). See the user manual of the R&S power sensor for information on topics that need your special attention.

Starting a measurement

1. Preset the R&S NRX and the connected R&S power sensors.

a) Press the [Preset] key.
b) Tap "Preset".

See also Chapter 9, "Saving and Recalling Settings", on page 132.

2. Depending on the power sensor and the measurement conditions, consider to zero the power sensor:
Execute zeroing:
Note: Turn off all measurement signals before zeroing. An active measurement signal during zeroing causes an error.
a) Switch off the power of the signal source.
b) Press the [Zero] key.
c) Tap "Zero All Sensors".

See also Chapter 10, "Zeroing Sensors", on page 134.

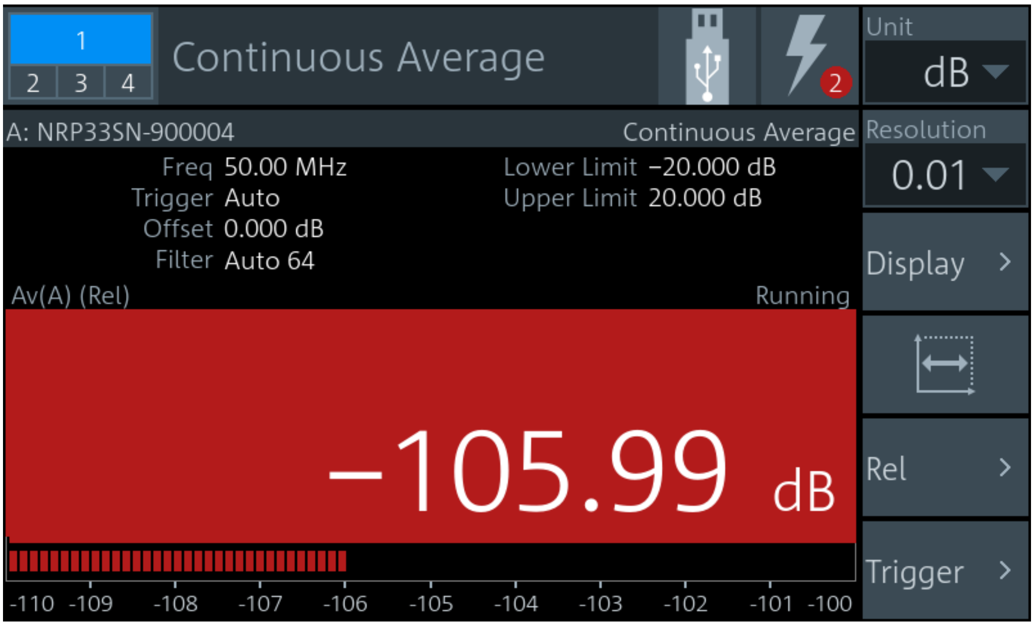
3. Configure the measurement.
a) Open the "Measurement Settings" dialog, as described in Chapter 4.1.2, "Main Measurement Dialog", on page 32.
b) Select the "Measurement Type", for example "Continuous Average".
c) Tap "Quick Setup" > "Auto Set".
4. Switch on the signal source.

The measurement starts, and the result is displayed in dBm.
5. If necessary, perform further settings.

5.4 Limit Violation

If a measured value violates the set limits, it is highlighted in red.

► To change the limit settings, tap the displayed limit values. See also (2) in Figure 4-2.



5.5 Settings Conflict

A settings conflict can occur for the following reasons:

- The sensor assigned to the measurement does not support a set value.
  If it is a numeric value, the suitable range for the sensor is given in the tooltip.
- The sensor assigned to the measurement does not support the measurement type.
- Other contradictory settings, for example the lower limit value is higher than the upper limit value.

Contradictory settings are allowed so that you are not hampered in your workflow. But they cause an error message in the notification center. Furthermore, the contradictory setting is highlighted and the control elements in the hierarchies above that are leading to this setting are highlighted, too. Thus, you can follow the problem across the hierarchies to solve the settings conflict. The only control element that is not highlighted due to a settings conflict is the measurement value. The measurement value is only highlighted in red when it is violating the set limits, as shown in Chapter 5.4, "Limit Violation", on page 46.

Example: The sensor does not support the measurement type

The notification center indicates an error, but the no control element is highlighted.

The error message reports a settings conflict.

Solving the error

1. Tap the *displayed measurement value or graphic*. See also Figure 4-2.

   The "Measurement Settings" dialog is displayed.
   The "Measurement Type" is highlighted.

2. Select another measurement type that the sensor supports, or assign another sensor.

A setting that differs from the preset value is also indicated across the hierarchies by a pencil symbol, if the visualization is enabled. See "Visualize Non-Preset State" on page 165.

6 Configuration for All Measurement Types

The main measurement dialog offers access to all measurement settings. The layout of the dialog and how to open is are described in Chapter 4.1.2, "Main Measurement Dialog", on page 32.

In the navigation pane, you can directly set the unit and the resolution for numeric results. These settings are also available under "Display".

The settings available for all measurements are described in the following, while measurement-specific settings are described in Chapter 7, "Measurement Types and Result Displays", on page 70.

6.1 Display Settings

Access: Main measurement dialog > "Display"

The available display settings depend on the measurement type and whether the result display is numeric or graphical:

- Resolution and unit of a measurement
- Graphical or numerical display of measured values
- Scaling parameters for graphical display

The statistics measurement has no "Display" settings, but you can scale the display.

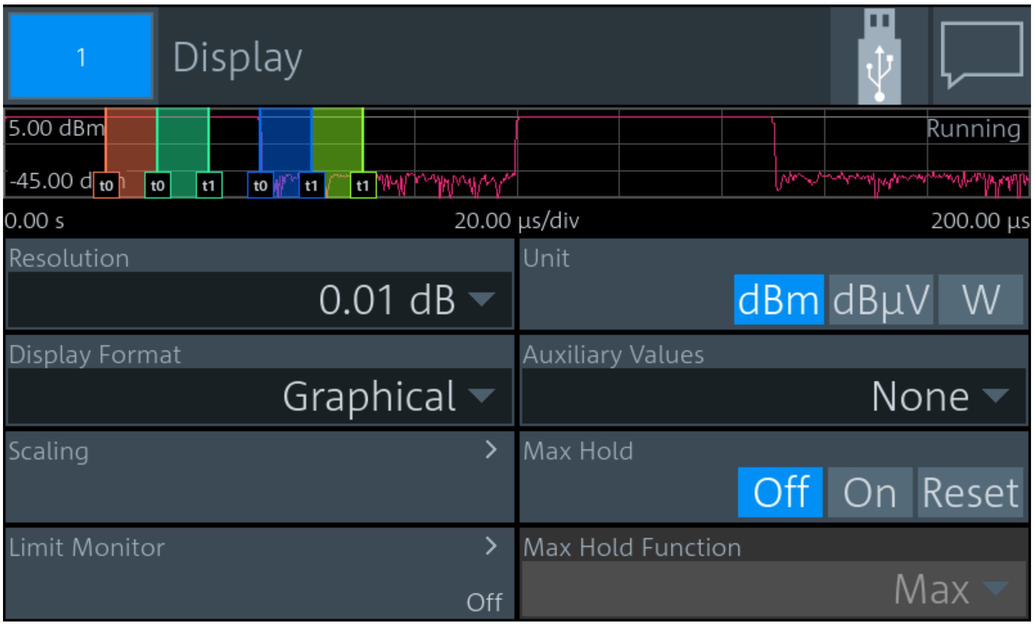


Figure 6-1: Display dialog, example for time gate measurement

Resolution

Configures the resolution of the measurement. For logarithmic power values (dB, dBm or dBµV), the number of decimal places is set directly. For linear power values (W, Δ%, 1), the number of decimal places depends on the selected resolution and the magnitude of the result.

"1 dB | 0.1 dB | 0.01 dB | 0.001 dB "
Sets the resolution to the specified value.

Remote command:
`CALCulate<Measurement>:RESolution` on page 190
`[SENSe<Sensor>:]RRESolution` on page 285

Unit

Sets the unit of the display. The available units depend on the Channel Calculation Function.

"dBm"	Power in dBm
"dBµV"	Power in dBµV
"W"	Power in W
"dB"	Quotient of the power values as dB

"Δ%" Difference between the power values in W, given in %. 0 % means that the powers in both channels are equal.

"x1" Quotient of the power values (non-logarithmic)

Remote command:
`UNIT<Measurement>:POWer[:VALue]` on page 209
`UNIT<Measurement>:POWer:RATio` on page 208

Forward Unit
Available for NRT measurements.

Sets the unit of the forward power measurement.

"dBm" Power in dBm

"dBμV" Power in dBμV

"W" Power in W

Remote command:
`[SENSe<Sensor>:]UNIT:POWer[:VALue]` on page 207
`UNIT<Measurement>:POWer[:VALue]` on page 209
`UNIT<Measurement>:POWer:RATio` on page 208

Display Format
Available for continuous average, burst average, time gate, timeslot, NRT measurements.

Sets the display format of the measured values.

"Scalar Digital" Numeric format

"Scalar Analog"
Numeric format with bar chart

"Graphical" Available for time gate, timeslot measurements.
Measured values are plotted over time.

Remote command:
`CALCulate<Measurement>:DMODe` on page 188

Auxiliary Values
Available for the graphic displays of continuous average, burst average measurements. Only displayed if the measurement result display is shown in full screen.

Determines which additional information about the measured values is shown in the display. If you press [1 Trig / Delete], you reset the auxiliary values.

"None" No additional values are measured.

"Extremes" Displays the maximum, the minimum and the max-min values since the search for extreme values has been started. With logarithmic units, the peak-to-peak value equals the quotient of the measured values converted into linear units.

"Statistics" Displays the long-term mean, the standard deviation and the total number of measurement results that have been evaluated since the search for statistic values has been started.

Remote command:
CALCulate<Measurement>:AVALue on page 188

Scaling
Configures the display scaling. The available parameters depend on the following settings:
- Measurement Type
- "Display Format" on page 51

Scale Lower Limit ← Scaling
If Display Format is set to "Scalar Analog", available for continuous average, burst average, time gate, timeslot measurements.

Defines the lower limit of the bargraph display.

Remote command:
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RCOefficient on page 195
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RFRatio on page 195
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RLOSs on page 196
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:SWR on page 196
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] on page 197
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWer] on page 197

Scale Upper Limit ← Scaling
If Display Format is set to "Scalar Analog", available for continuous average, burst average, time gate, timeslot measurements.

Defines the upper limit of the bargraph display.

Remote command:
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RCOefficient on page 198
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RFRatio on page 198
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RLOSs on page 199
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:SWR on page 199
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] on page 200
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer] on page 200

Forward Scale Lower Limit, Reflection Scale Lower Limit ← Scaling
Available for NRT measurements.

Defines the lower limit of the bargraph display.

Remote command:
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:CCDF on page 195
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RCOefficient on page 195
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RFRatio on page 195
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RLOSs on page 196
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:SWR on page 196
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] on page 197
CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWer] on page 197

Forward Scale Upper Limit, Reflection Scale Upper Limit ← Scaling
Available for NRT measurements.

Defines the upper limit of the bargraph display.

Remote command:
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:CCDF on page 198
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RCOefficient on page 198
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RFRatio on page 198
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RLOSs on page 199
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:SWR on page 199
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] on page 200
CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer] on page 200

Start Time ← Scaling
Available for trace, pulse analysis measurements. If Display Format is set to "Graphical", available for time gate, timeslot measurements.

Defines the position of the left screen edge relative to the delayed trigger. The value can be negative so that signal components are displayed before the trigger event.

Remote command:
CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT on page 201

Time / Div ← Scaling
Available for trace, pulse analysis measurements. If Display Format is set to "Graphical", available for time gate, timeslot measurements.

Sets the time resolution of the results window. The time per division is one tenth of the Trace Length.

Trace Length ← Scaling
Available for trace, pulse analysis measurements. If Display Format is set to "Graphical", available for time gate, timeslot measurements.

Sets the duration of the trace.

Remote command:
`CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth` on page 201

Power Reference ← Scaling
Available for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value. The reference value is assigned to the top line of the grid.

Remote command:
`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DB` on page 203
`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBM` on page 203
`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBUV` on page 204
`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DPCT` on page 204
`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:ONE` on page 204
`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:WATT` on page 205

Power / Div ← Scaling
Available for trace, pulse analysis, time gate, timeslot, statistics measurements.

Sets the vertical scaling. The power per division is one tenth of the Power Span.

The combination of Power Reference and this parameter define the vertical orientation of the trace.

Remote command:
`[SENSe<Sensor>:]TRACe:TIME` on page 206

Power Span ← Scaling
Available for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range.

Remote command:
`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DB` on page 201
`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBM` on page 202
`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBUV` on page 202
`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DPCT` on page 202
`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:ONE` on page 202
`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:WATT` on page 203

Unit ← Scaling
Sets the unit of the power axis.

Relative Measurements
Available for NRT measurements.

Groups the settings for relative measurements.

Forward Reference Value, Reflection Reference Value ← Relative Measurements
Available for NRT measurements.

Available if Forward Relative State, Reflection Relative State is set to "On" or "Set".

Sets the reference value.

Remote command:
`CALCulate<Measurement>:RELative<DirectionalChannel>[:MAGNitude]` on page 233
`CALCulate<Measurement>:RELative<DirectionalChannel>:CCDF` on page 279
`CALCulate<Measurement>:RELative<DirectionalChannel>:POWer[:MAGNitude]` on page 280
`CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RCOefficient` on page 280
`CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RFRatio` on page 280
`CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RLOSs` on page 281
`CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:SWR` on page 281
`CALCulate<Measurement>:RELative<DirectionalChannel>:RATio[:MAGNitude]` on page 282
`[SENSe<Sensor>:]POWer:REFerence` on page 235

Forward Relative State, Reflection Relative State ← Relative Measurements
Available for NRT measurements.

Allows you to relate measured power to a reference value.

Off	Displays the absolute power or power ratio.
On	Displays the relative power or power ratio. As reference value, the value specified under Forward Reference Value, Reflection Reference Value is used.
Set	Assigns the current measurement result as reference value and displays the relative power.

Remote command:
`CALCulate<Measurement>:RELative<DirectionalChannel>:STATe` on page 234

Max Hold
If enabled, displays the highest value measured for each point (pixel) of the selected display type.

Remote command:
`CALCulate<Measurement>:HOLD[:STATe]` on page 190

Max Hold Function

For all measurement functions, the R&S NRX stores the maximum and minimum values and the calculated differences between these values.

The selected setting applies to both power and reflection indication. You can change at any time.

"Max"	Maximum value
"Min"	Minimum value
"Max − Min"	Difference between maximum and minimum value

Remote command:
CALCulate<Measurement>:HOLD:FUNCtion on page 189

Limit Monitor

Available for continuous average, burst average, time gate, timeslot, NRT measurements.

For each window with digital or digital/analog result display, you can set an upper and a lower limit.

Lower Limit State ← Limit Monitor

Available for continuous average, burst average, time gate, timeslot measurements.

Enables or disables the monitoring function for the lower limit.

Remote command:
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer:STATe
on page 214

Lower Limit ← Limit Monitor

Available for continuous average, burst average, time gate, timeslot measurements.

Available if Lower Limit Stateis set to "On".

Defines a lower limit.

Remote command:
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]
on page 211
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:
POWer on page 214
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:
RATio:RCOefficient on page 212
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:
RATio:RFRatio on page 212
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:
RATio:RLOSs on page 212
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:
RATio:SWR on page 213
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:
RATio[:VALue] on page 213

Upper Limit State ← Limit Monitor

Available for continuous average, burst average, time gate, timeslot measurements.

Enables or disables the monitoring function for the upper limit.

Remote command:
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer:STATe`
on page 218

Upper Limit ← Limit Monitor
Available for continuous average, burst average, time gate, timeslot measurements.

Available if Upper Limit Stateis set to "On".

Defines an upper limit.

Remote command:
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]`
on page 214
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:POWer` on page 217
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RCOefficient` on page 215
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RFRatio` on page 215
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RLOSs` on page 216
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:SWR` on page 216
`CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue]` on page 217

Forward Lower Limit State, Reflection Lower Limit State ← Limit Monitor
Available for NRT measurements.

Enables or disables the monitoring function for the lower limit.

Remote command:
`CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer:STATe`
on page 214

Forward Lower Limit, Reflection Lower Limit ← Limit Monitor
Available for NRT measurements.

Defines a lower limit.

Remote command:
`CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]`
on page 211
`CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:CCDF` on page 211
`CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:POWer` on page 214
`CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:RCOefficient` on page 212
`CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:RFRatio` on page 212

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:RLOSs on page 212
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:SWR on page 213
CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] on page 213

Forward Upper Limit State, Reflection Upper Limit State ← Limit Monitor
Available for NRT measurements.

Enables or disables the monitoring function for the upper limit.

Remote command:
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer:STATe on page 218

Forward Upper Limit, Reflection Upper Limit ← Limit Monitor
Available for NRT measurements.

Defines an upper limit.

Remote command:
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA] on page 214
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:CCDF on page 215
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:POWer on page 217
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RCOefficient on page 215
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RFRatio on page 215
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RLOSs on page 216
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:SWR on page 216
CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] on page 217

6.2 Controlling the Measurement

The power sensor offers a bunch of possibilities to control the measurement:

- Do you want to start the measurement immediately after the initiate command or do you want to wait for a trigger event?
- Do you want to start a single measurement cycle or a sequence of measurement cycles?
- Do you want to output each new average value as a measurement result or do you want to bundle more measured values into one result?

Further information:

- Chapter 6.3, "Triggering", on page 59
- See the power sensor user manual for examples on the interplay of the controlling mechanisms.

6.2.1 Controlling the Measurement Results

The R&S NRX can cope with the wide range of measurement scenarios with the help of the so-called "termination control". Depending on how fast your measurement results change, you can define, how the measurement results are output.

Repeating termination control

Outputs a measurement result when the entire measurement has been completed. This means that the number of measurement cycle repetitions is equal to the set average count. If the average count is large, the measurement time can be very long.

Useful if you expect slow changes in the results, and you want to avoid outputting redundant data.

Moving termination control

Outputs intermediate values to facilitate early detection of changes in the measured quantity. This means that for each partial measurement, a new average value is output as a measurement result. Thus, the measurement result is a moving average of the last partial measurements. How many of the partial measurements are averaged is defined by the average count.

Useful if you want to detect trends in the result during the measurement.

6.3 Triggering

In a basic continuous measurement, the measurement is started immediately after the initiate command. However, sometimes you want that the measurement starts only if a specific condition is fulfilled. For example, if a signal level is exceeded, or in certain time intervals. For these cases, you can define a trigger for the measurement.

6.3.1 Trigger States

The power sensor has trigger states to define the exact start and stop time of a measurement and the sequence of a measurement cycle. The following states are defined:

- Idle
  The power sensor performs no measurement. After powered on, the power sensor is in the idle state.
- Waiting for trigger
  The power sensor waits for a trigger event that is defined by the trigger source. When the trigger event occurs, the power sensor enters the measuring state.

- Measuring
  The power sensor is measuring data. It remains in this state during the measurement. When the measurement is completed, it exits this state immediately.

6.3.2 Trigger Sources

The possible trigger conditions and the execution of a trigger depend on the selected trigger mode and trigger source.

If the signal power exceeds or falls below a reference level set by the trigger level, the measurement is started after the defined delay time. Waiting for a trigger event can be skipped.

Trigger source	Description	Remote commands to initiate the measurement
"Hold"	Waits for a trigger event. Press [1Trig] to trigger the measurement. Depending on the sensor type, the trigger is executed by the trigger bus or by remote command. See the user manual of the power sensor for details.	TRIGger<Measurement>[:IMMediate]
"Immediate"	Measures immediately, does not wait for trigger condition.	-
"Internal"	Uses the input signal as trigger signal.	TRIGger<Measurement>[:IMMediate]
"Internal A" , "Internal B" , "Internal C" , "Internal D"	Receives the trigger signal from the trigger master. The trigger master is the sensor connected to port A, B, C, or D. See "Trigger Master State" on page 64.	TRIGger<Measurement>[:IMMediate]
"External"	Uses the external trigger signal that is supplied at the Trig In / Out 2 connector. See Chapter 3.2.2.1, "Trig In / Out 2 and Out 1 / Trig Out Connectors", on page 28.	TRIGger<Measurement>[:IMMediate]
"External 2"	Requires a power sensor with a trigger input/ output. Uses the external trigger signal that is supplied at the trigger input/output of the power sensor.	TRIGger<Measurement>[:IMMediate]
"Sensor Check Source"	Requires the sensor check source (R&S NRX-B1) option. If enabled, the sensor check source (R&S NRX-B1) sends trigger signals using the internal trigger bus. See "Sensor Check Source tab" on page 144.	*TRG TRIGger<Measurement>[:IMMediate]
"Bus (*TRG)"	Waits for a trigger event. Press [1Trig] to trigger the measurement. Depending on the sensor type, the trigger is executed by the trigger bus or by remote command. See the user manual of the power sensor for details.	*TRG TRIGger<Measurement>[:IMMediate]

6.3.3 Dropout Time

The dropout time is useful when dealing with signals with several active slots, for example GSM signals, see Figure 6-2. When measuring in sync with the signal, a trigger event is to be produced at A, but not at B or C.

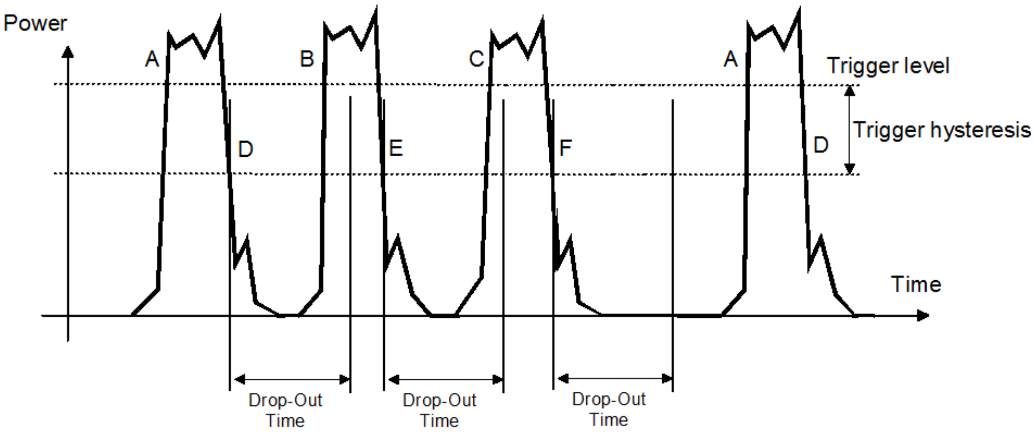


Figure 6-2: Significance of the dropout time

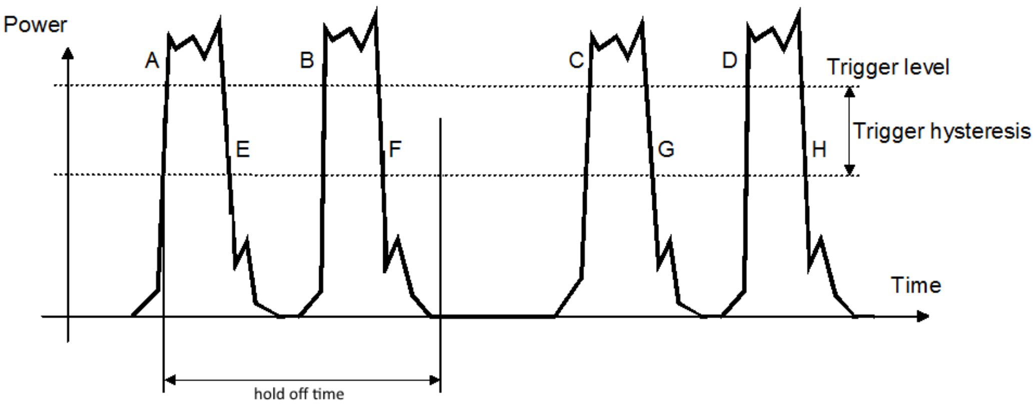
The RF power between the slots is below the threshold defined by the trigger level and the trigger hysteresis. Therefore, the trigger hysteresis alone cannot prevent triggering at B or at C. Therefore, set the dropout time greater than the time elapsed between points D and B and between E and C, but smaller than the time elapsed between F and A. Thus, you ensure that triggering takes place at A.

Because the mechanism associated with the dropout time is reactivated whenever the trigger threshold is crossed, you can obtain also unambiguous triggering for many complex signals.

If you use a hold-off time instead of a dropout time, you can obtain stable triggering conditions - regular triggering at the same point. But you cannot achieve exclusive triggering at A.

6.3.4 Hold-Off Time

During the hold-off time, a period after a trigger event, all trigger events are ignored.



6.3.5 Trigger Settings

Access: Main measurement dialog > "Trigger"

For trace or pulse analysis measurements, the access is: Main measurement dialog > "Trigger" > "Sensor Trigger"

Trigger Mode

Controls the trigger execution depending on the settings under "Trigger Source" on page 63.

"Normal"	Continuous triggering with regular trigger events.
"Freerun"	Enables a continuous measurement. The power sensor executes one measurement cycle after the other.
"Single"	Disables continuous triggering so that only one trigger event at a time is executed. To enable triggering again, press [1Trig].

"Auto" Automatically starts a measurement if no trigger event has occurred after 300 ms.

Remote command:
`TRIGger<undef>:ALL:MODE` on page 225
`TRIGger<Measurement>:MODE` on page 225

Trigger Source
For primary and secondary power sensors.

Sets the source for the trigger event. See Chapter 6.3.2, "Trigger Sources", on page 60.

Remote command:
`TRIGger<undef>:ALL:SOURce` on page 227
`TRIGger<Measurement>[:CHANnel<Channel>]:SOURce` on page 227

Trigger Level
For primary and secondary power sensors.

Sets the trigger threshold for internal triggering derived from the test signal.

The trigger level is displayed as dotted red line. The trigger time is displayed as small rhomb on the trigger level line.

Remote command:
`TRIGger<undef>:ALL:LEVel` on page 224
`TRIGger<Measurement>[:CHANnel<Channel>]:LEVel` on page 224

Trigger Advanced
For primary and secondary power sensors.

Groups further trigger settings.

Source ← Trigger Advanced
See "Trigger Source" on page 63.

Slope ← Trigger Advanced
Determines which edge of the envelope power (internal triggering) or increasing voltage (external triggering) is used for triggering.

"Positive" Rising edge

"Negative" Falling edge

Remote command:
`TRIGger<undef>:ALL:SLOPe` on page 226
`TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe` on page 226

Level ← Trigger Advanced
See "Trigger Level" on page 63-

Delay ← Trigger Advanced
Sets the delay between the trigger event and the beginning of the actual measurement.

Remote command:
TRIGger<undef>:ALL:DELay[:VALue] on page 222
TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue] on page 222

Dropout ← Trigger Advanced
If the trigger level has been underrun with internal triggering, it is sometimes useful to wait some time (drop-out time) before retriggering. The measurement of unwanted signal components can thus be suppressed. See Chapter 6.3.3, "Dropout Time", on page 61.

Remote command:
TRIGger<undef>:ALL:DTIMe on page 222
TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe on page 222

Holdoff ← Trigger Advanced
Sets the hold-off time, see Chapter 6.3.4, "Hold-Off Time", on page 61.

Remote command:
TRIGger<undef>:ALL:HOLDoff on page 223
TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff on page 223

Hysteresis ← Trigger Advanced
Sets the hysteresis. A trigger event occurs, if the trigger level:
- Falls below the set value on a rising slope.
- Rises above the set value on a falling slope.

Thus, you can use this setting to eliminate the effects of noise in the signal for the edge detector of the trigger system.

Remote command:
TRIGger<undef>:ALL:HYSTeresis on page 223
TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis on page 223

Specific Trigger
Not available for each sensor type. Groups the specific trigger settings.

Jitter Suppression ← Specific Trigger
Defines the method how to cope with the misalignment between the trigger event and the sample point.

"Compensate"	Compensation means resampling of trace result.
"Measure"	Does not perform resampling, but stores the measured trigger jitter.

Remote command:
TRIGger<Measurement>[:CHANnel<Channel>]:JITTer:METHod on page 224

Trigger Master State ← Specific Trigger
Enables or disables the power sensor as trigger master. If enabled, the power sensor outputs a digital trigger signal in sync with its own trigger event. The trigger signal is output at the port selected under "Trigger Master Port" on page 65.

The trigger master has to use its internal trigger source. Set the trigger source for the trigger slaves to "Internal [A to D]", where [A to D] is the port to which the trigger master is connected. The trigger signal generated by the trigger master is routed to the R&S NRX and from there it is distributed to the trigger slaves and, if Trigger Source for Trigger Output is set to "Sensor [A to D]", also to the trigger output.

Remote command:
TRIGger<Measurement>[:CHANnel<Channel>]:MASTer[:STATe] on page 226

Trigger Master Port ← Specific Trigger
Sets the port where the trigger master sensor outputs a digital trigger signal.

Remote command:
TRIGger<Measurement>[:CHANnel<Channel>]:MASTer:PORT on page 225

Trigger Synchronize State ← Specific Trigger
Usually used if "On" is set under "Trigger Master State" on page 64.

If enabled, blocks the external trigger bus as long as the power sensor remains in the measurement state. Thus, ensures that a new measurement is only started after all power sensors have completed their measurements.

Make sure that the number of repetitions is the same for all power sensors involved in the measurement. Otherwise, the trigger bus is blocked by any power sensor that has completed its measurements before the others and has returned to the idle state.

Remote command:
TRIGger<undef>:ALL:SYNChronize[:STATe] on page 228
TRIGger<Measurement>[:CHANnel<Channel>]:SYNChronize[:STATe]
on page 228

Trigger Synchronize Port ← Specific Trigger
Sets the internal or external connection for the sync output of the sensor. For more information, see "Trigger Synchronize State" on page 65.

Remote command:
TRIGger<Measurement>[:CHANnel<Channel>]:SYNChronize:PORT
on page 227

Trigger 2 Input Impedance ← Specific Trigger
Requires a power sensor with a trigger input.

Sets the termination resistance of the external trigger signal that is supplied at the trigger input/output of the power sensor. Choose a setting that fits the impedance of the trigger source to minimize reflections on the trigger signals.

Remote command:
TRIGger<Measurement>[:CHANnel<Channel>]:EXTernal<Port>:IMPedance
on page 222

6.4 Measurement Settings Dialog

Access: In the main measurement dialog, tap the *displayed measurement value or graphic*. See also "Layout of the main measurement dialog" on page 33.

In this dialog, you select the measurement type and the channel calculation function. Based on the selected measurement and function, you can assign one or two sensors. The assigned sensors are called primary sensor and secondary sensor.

The functions described here apply to the continuous average, burst average, trace, pulse analysis, time gate, timeslot. For the other measurements, see:

- Statistics: Chapter 7.7.3, "Measurement Settings Dialog", on page 102
- NRT: Chapter 7.8.3, "Measurement Main Configuration Dialog", on page 111

For configuring the assigned power sensors, see:

- Quick Setup
- Chapter 8, "Sensor Configuration", on page 113

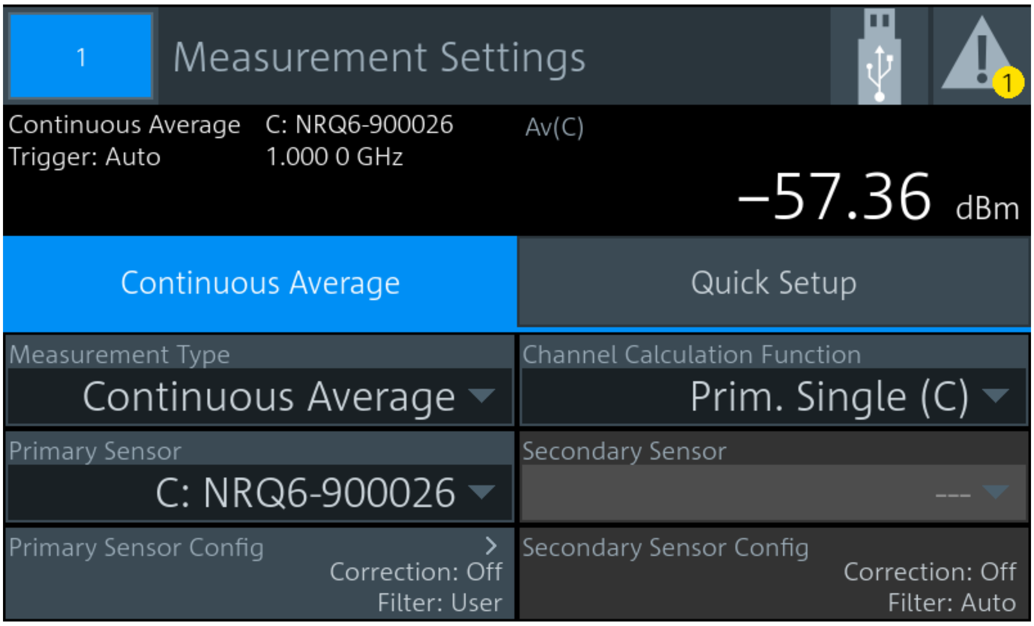


Figure 6-3: Example: continuous average

Measurement Type

Sets the measurement type.

Remote command:

`CALCulate<Measurement>:TYPE` on page 231

Primary Sensor, Secondary Sensor

Available for continuous average, burst average, trace, pulse analysis, time gate, timeslot measurements.

Assigns the primary or secondary sensor. You can choose any of the sensors that are connected to a sensor port of the R&S NRX. The port letter, to which the sensor is connected, is displayed in front of the hostname of the sensor.

Example: C: NRP33SN-104711; C is the port, NRP33SN-104711 is the sensor name.

If "Prim. Single" is set under Channel Calculation Function, the secondary sensor is disabled.

If a power sensor does not support the selected Measurement Type, a settings conflict is displayed. See also Chapter 5.5, "Settings Conflict", on page 47.

Remote command:

`CALCulate<Measurement>[:CHANnel<Channel>]:SENSe:INDex` on page 232

`[SENSe<Sensor>:]CATalog?` on page 232

Primary Sensor Config, Secondary Sensor Config

Available for continuous average, burst average, trace, pulse analysis, time gate, timeslot measurements.

For configurating the primary and secondary sensors, assigned under Primary Sensor, Secondary Sensor.

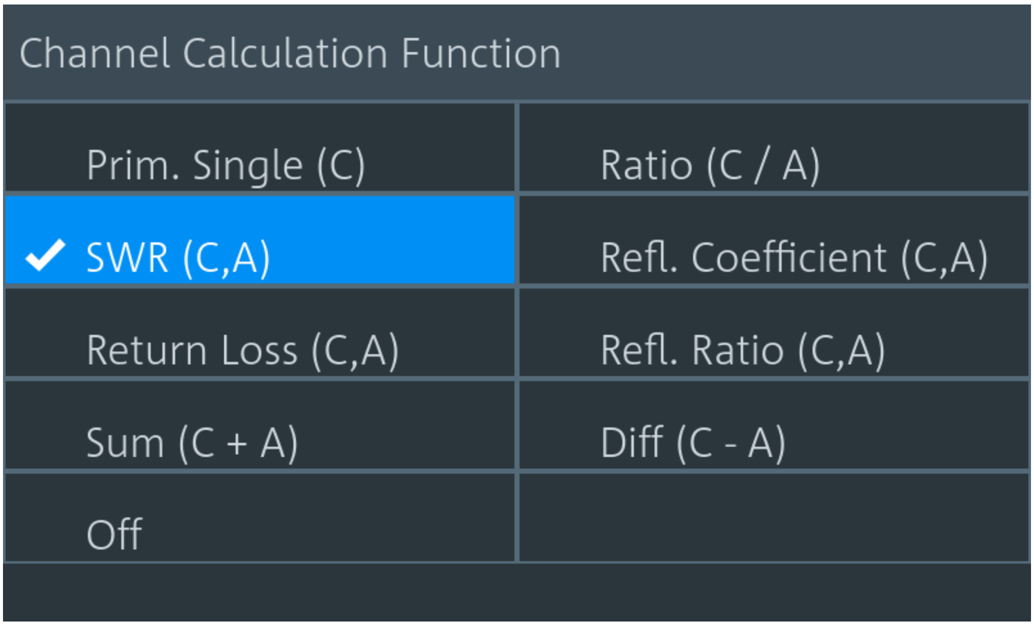
See Chapter 8, "Sensor Configuration", on page 113.

Channel Calculation Function

Available for continuous average, burst average, trace, pulse analysis, time gate, timeslot measurements.

You can combine the measured values from the primary and secondary sensor using a mathematical function. The primary and secondary sensors are assigned under Primary Sensor, Secondary Sensor.

Apart from the "Prim. Single" function, all functions require values measured by two sensors.



The letters in brackets indicate the port to which the primary or secondary sensor is connected. In this example, the primary sensor is connected to port C, and the secondary sensor is connected to port A.

Remote command:
CALCulate<Measurement>:MATH[:EXPRession] on page 287
CALCulate<Measurement>:MATH[:EXPRession]:CATalog? on page 289

Quick Setup
Available for continuous average, burst average, trace, pulse analysis, time gate, timeslot measurements.

Groups the settings for quick sensor configuration. Alternatively, you can use Primary Sensor Config, Secondary Sensor Config.

Parameter Set ← Quick Setup
Selects a parameter set to preconfigure the power sensor. Tap Recall Parameter Set to load the selected set.

See Chapter 13.7.6.2, "Preconfigured Settings", on page 341.

Remote command:
SYSTem:STANdard:PRESet on page 340

Auto Set ← Quick Setup
Configures the power sensor automatically.

Preserve Window Settings ← Quick Setup
Specifies whether the display settings are kept unchanged when tapping Recall Parameter Set.

Off	Configures the power sensor and the display settings of the R&S NRX. See Chapter 13.7.6.3, "Display Configuration", on page 351.
On	Only configures the power sensor.

Remote command:
`SYSTem:STANdard:PWSettings` on page 341

Recall Parameter Set ← Quick Setup

Loads the parameters set selected under Parameter Set.

Remote command:
`SYSTem:STANdard:PRESet` on page 340

7 Measurement Types and Result Displays

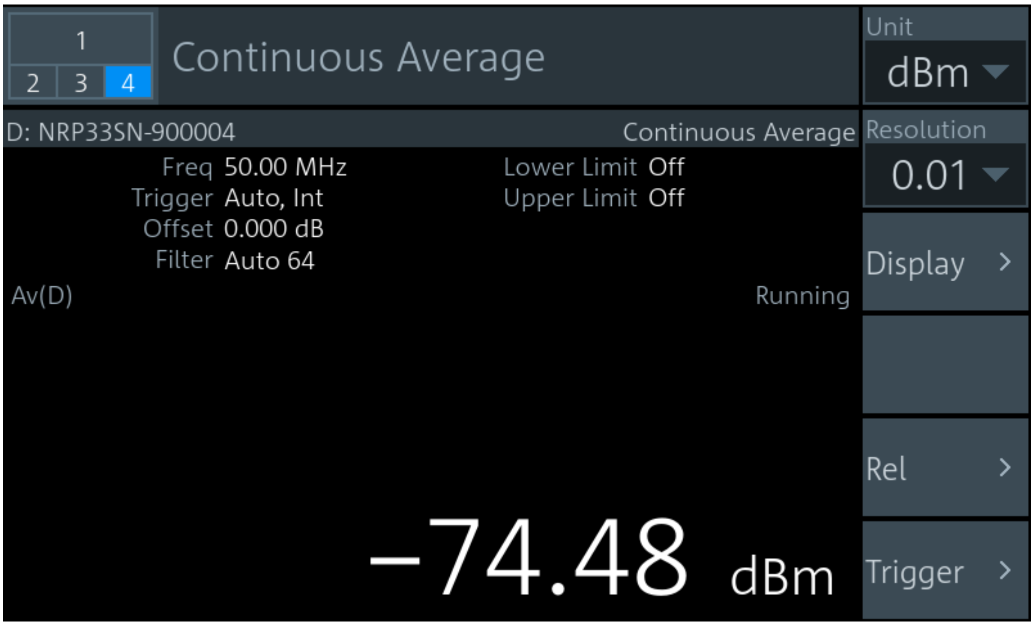
The different measurement types and their specific configuration settings are described in the following. For settings available for all measurements, refer to Chapter 6, "Configuration for All Measurement Types", on page 49.

7.1 Continuous Average

The power sensor measures the signal average power asynchronously within a defined time interval, the so-called aperture or sampling window. After a trigger event, the power is integrated over the time interval.

The continuous average measurement type is the preferred measurement method if the measurement is not to be, or cannot be, synchronized with a specific signal event. It is the only available measurement type for thermal power sensors because they are too slow for the other measurement types.

7.1.1 Continuous Average Result Display



The measurement result is a single scalar value, either an absolute value or related to a reference value.

7.1.2 Continuous Average Settings

Access: "Measurement Settings" > "Measurement Type" > "Continuous Average"

Unit
See "Unit" on page 50.

Resolution
See "Resolution" on page 50.

Display
See Chapter 6.1, "Display Settings", on page 49.

Rel
Groups the settings for relative measurements.

Reference Value ← Rel
Available if Relative Measurements is set to "On" or "Set".

Sets the reference value.

Remote command:
CALCulate<Measurement>:RELative<DirectionalChannel>[:MAGNitude] on page 233
CALCulate<Measurement>:RELative<DirectionalChannel>:CCDF on page 279
CALCulate<Measurement>:RELative<DirectionalChannel>:POWer[:MAGNitude] on page 280
CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RCOefficient on page 280
CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RFRatio on page 280
CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RLOSs on page 281
CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:SWR on page 281
CALCulate<Measurement>:RELative<DirectionalChannel>:RATio[:MAGNitude] on page 282
[SENSe<Sensor>:]POWer:REFerence on page 235

Relative Measurements ← Rel

Allows you to relate measured power or a power ratio to a reference value. Whether the power is measured by one power sensor or whether it is a combined value measured by two power sensors, is set by "Channel Calculation Function" on page 67.

Off	Absolute power or power ratio
On	Relative power or power ratio. As reference value, the value specified under Reference Value is used.
Set	Uses the current measurement result as reference value and enables the relative measurement.

Remote command:

`CALCulate<Measurement>:RELative<DirectionalChannel>:STATe` on page 234

`CALCulate<Measurement>:RELative<DirectionalChannel>[:MAGNitude]:AUTO` on page 233

Trigger

See Chapter 6.3, "Triggering", on page 59.

7.2 Burst Average

The power sensor measures the average burst power of pulsed signals. The burst average measurement is available with multipath and wideband power sensors.

No external trigger signal is required, because the power sensor detects the start and end of the burst itself. The time interval in which the average power is measured starts when the power exceeds the trigger level and ends when the trigger logic detects the end of the pulse.

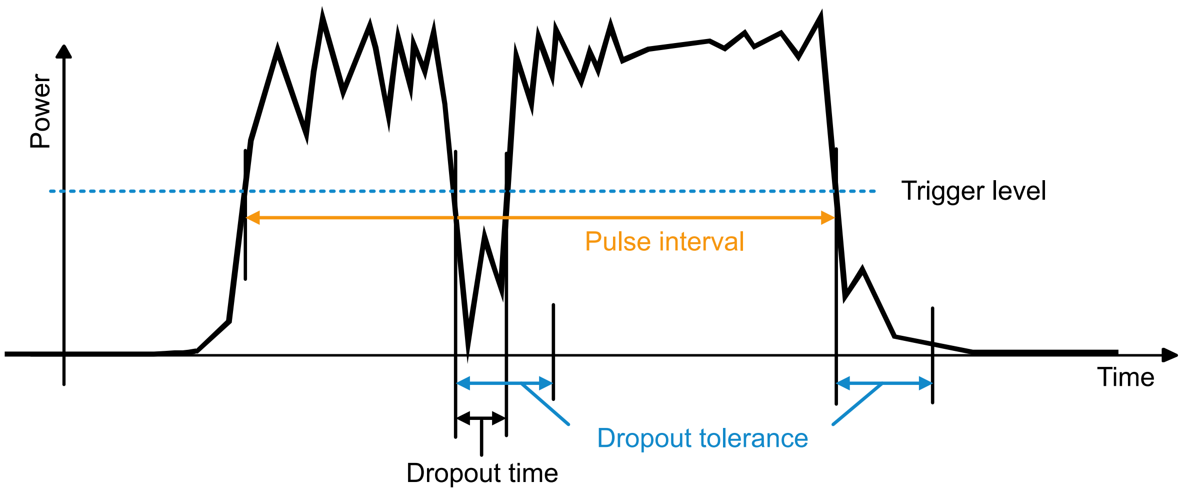
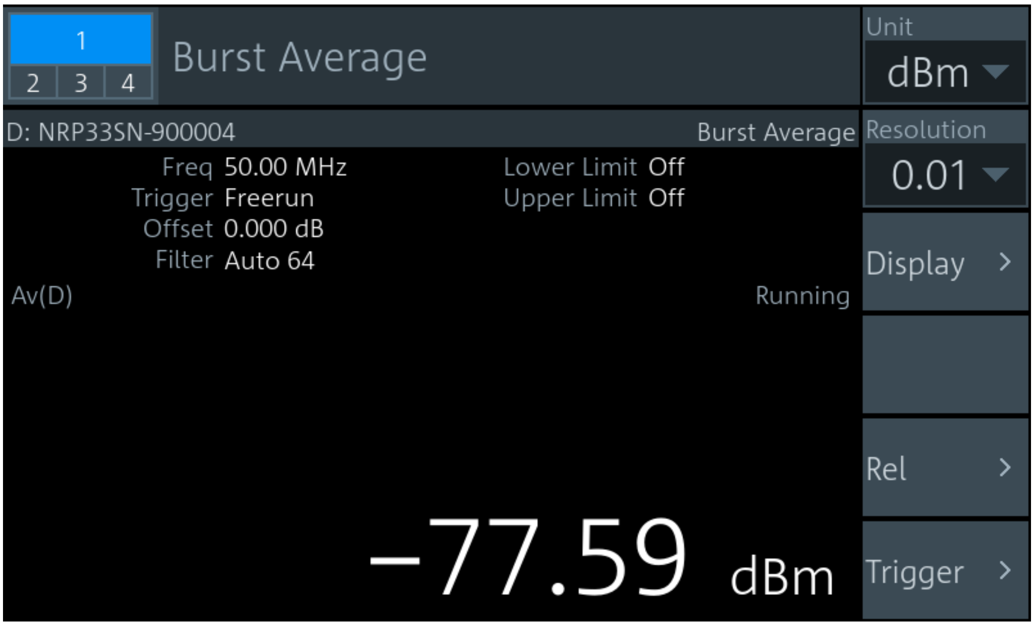


Figure 7-1: Burst average measurement parameters

To prevent power drops due to modulation from being erroneously interpreted as the end of a pulse, you must define the dropout tolerance. The dropout tolerance is a time interval in which the pulse end is only recognized if the signal level no longer exceeds the trigger level.

Useful parameters:
- "Trigger Level" on page 63
- "Dropout" on page 64
- "Dropout Tolerance" on page 116
- "Exclude from Start, Exclude from End" on page 116

7.2.1 Burst Average Result Display



The measurement result is a single scalar value, either an absolute value or related to a reference value.

7.2.2 Burst Average Settings

Access: "Measurement Settings" > "Measurement Type" > "Burst Average"

Unit
See "Unit" on page 50.

Resolution
See "Resolution" on page 50.

Display
See Chapter 6.1, "Display Settings", on page 49.

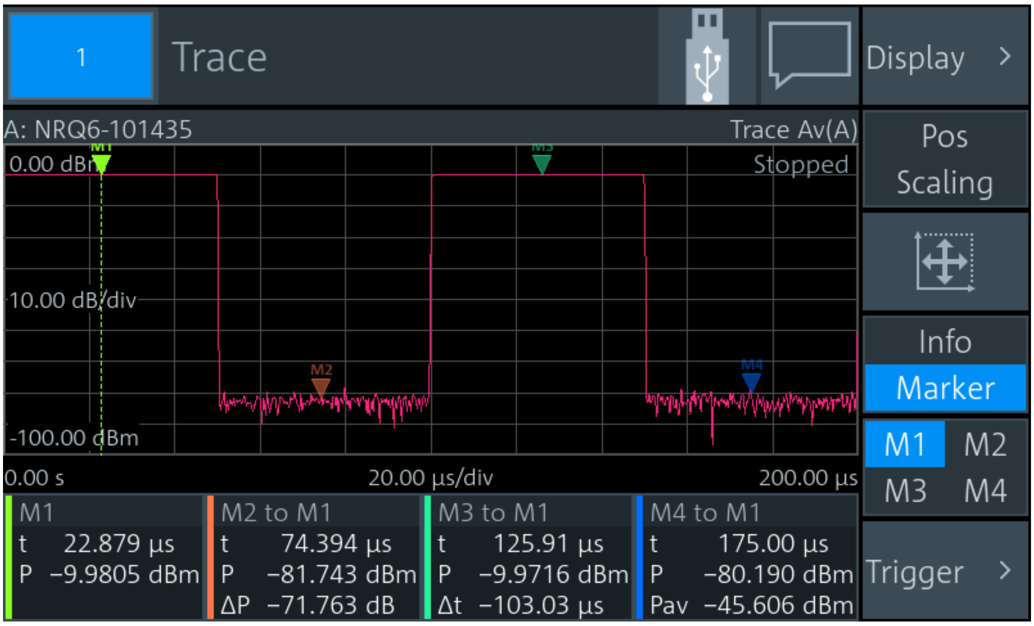
Rel
See "Rel" on page 71.

Trigger
See Chapter 6.3, "Triggering", on page 59.

7.3 Trace

The power sensor measures power over time. Define the number of measurement points and the measurement time. The length of an individual measurement is determined from the ratio of total time and the defined number of measurement points. The entire result is called a "trace". Each trace must be triggered separately.

7.3.1 Trace Result Display



Displays the waveform. Use the markers to determine exact x- and y-values. In sum, 4 markers are provided for the 2 traces. See also "Info / Marker" on page 75.

7.3.2 Trace Settings

Access: "Measurement Settings" > "Measurement Type" > "Trace"

Display

See Chapter 6.1, "Display Settings", on page 49.

Pos / Scaling

Defines the effect of the cursor keys on the displayed trace.

"Pos"	Shifts the position. Press one of the cursor keys to shift the trace in x- and y-direction.
"Scaling"	Changes the scaling. Press one of the cursor keys to expand or compress the trace.

Autoscale

Adapts the scaling of the power axis to the trace. The scaling of the time axis is adapted only if the power sensor supports it.

Info / Marker

Shows or hides additional information below the graph.

"Info"	Displays measurement settings.
"Marker"	Displays the marker results according to the set measurement, see "Measurement Mode" on page 79. If you tap here, the "Trace Marker" dialog opens, see Chapter 7.3.3, "Trace Marker Dialog", on page 76. Shows buttons to select a marker, see "M1 / M2 / M3 / M4" on page 75.

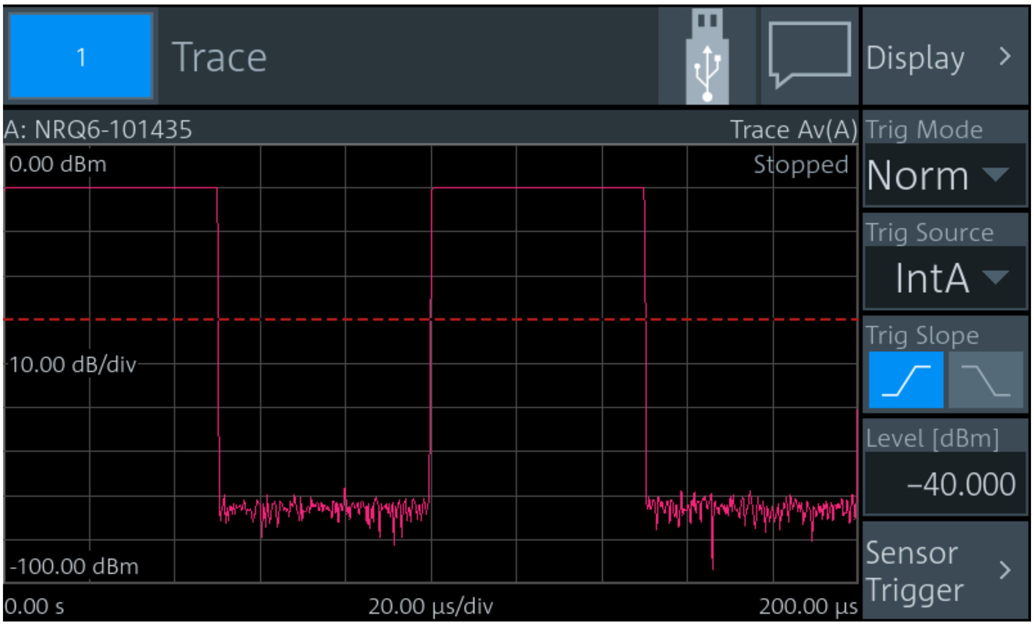
Remote command:
CALCulate<Measurement>:DMODe on page 188

M1 / M2 / M3 / M4

Shows the selected marker in the trace.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MARKer<Undef>:SELection on page 247

Trigger
Gives quick access to selected trigger settings.



Shows the trace. The trigger level is indicated as dotted red line.

Display ← Trigger
See Chapter 6.1, "Display Settings", on page 49.

Trig Mode ← Trigger
See "Trigger Mode" on page 62.

Trig Source ← Trigger
See "Trigger Source" on page 63.

Trig Slope ← Trigger
See "Slope" on page 63.

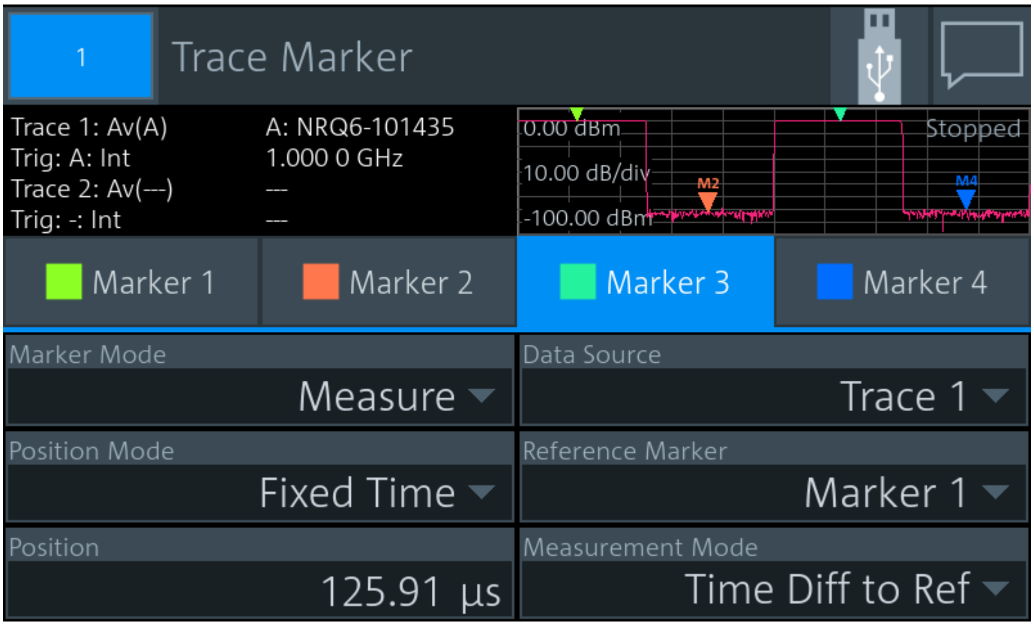
Level ← Trigger
See "Trigger Level" on page 63.

Sensor Trigger ← Trigger
See Chapter 6.3, "Triggering", on page 59.

7.3.3 Trace Marker Dialog

Access: Select Marker and tap the marker results that are displayed below the trace.

Used for configuring markers. Each marker is configured individually. Select the marker you want to configure.



Marker Mode

Enables or disables the marker. Also defines the appearance of the marker.

"Off" Disables the marker.

"Ruler" Shows a line at the marker position. Useful if you use the marker as Reference Marker.

"Measure" Shows a triangle at the marker position.

Remote command:

`DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:MODE` on page 242

Position Mode

Defines where the marker is placed.

"Fixed Time" At a fixed time, set by Position.

"Fixed Power" At a fixed power value, set by Position.

"Relative to Ref Position"
At a time difference of Position to the x-position of the Reference Marker.

"Relative to Ref Power"
At a power difference of Position to the y-position of the Reference Marker.

"From Ref Power <-"
Starting from the right border, at a power difference of Position to the y-position of the Reference Marker.

"From Ref Power ->"
Starting from the left border, at a power difference of Position to the y-position of the Reference Marker.

"Peak Search" Measured maximum power

"Min Search" Measured minimum power

"Peak Search from Ref <-", "Min Search from Ref <-"
Maximum or minimum power measured left from the Reference Marker.

"Peak Search from Ref ->", "Min Search from Ref ->"
Maximum or minimum power measured right from the Reference Marker.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE on page 242

Position

Sets an absolute or relative time or power value for the marker position defined under Position Mode.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:TIME on page 246
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:TIME on page 246
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:DBM on page 243
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:DBUV on page 244
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:WATT on page 245
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:DB on page 244
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:DPCT on page 245
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:O on page 245
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:WATT on page 245
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:RATio:DB on page 244
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:RATio:DPCT on page 245
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:RATio:O on page 245

Data Source
Available if "Measure" is set under Marker Mode.

Selects the trace.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:FEED:INDex
on page 241

Reference Marker
Defines a marker as reference marker.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:REFerence
on page 246

Measurement Mode
Available if "Measure" is set under Marker Mode.

Defines the measurement. The marker result is displayed under Info / Marker.

"Trace Value " Measures the power of the trace.
Marker result is "p".

"Power Ratio to Ref"
Measures the power ratio in relation to the reference marker.
Marker result is "Δp".

"Time Diff to Ref"
Measures the time difference in relation to the reference marker.
Marker result is "Δt".

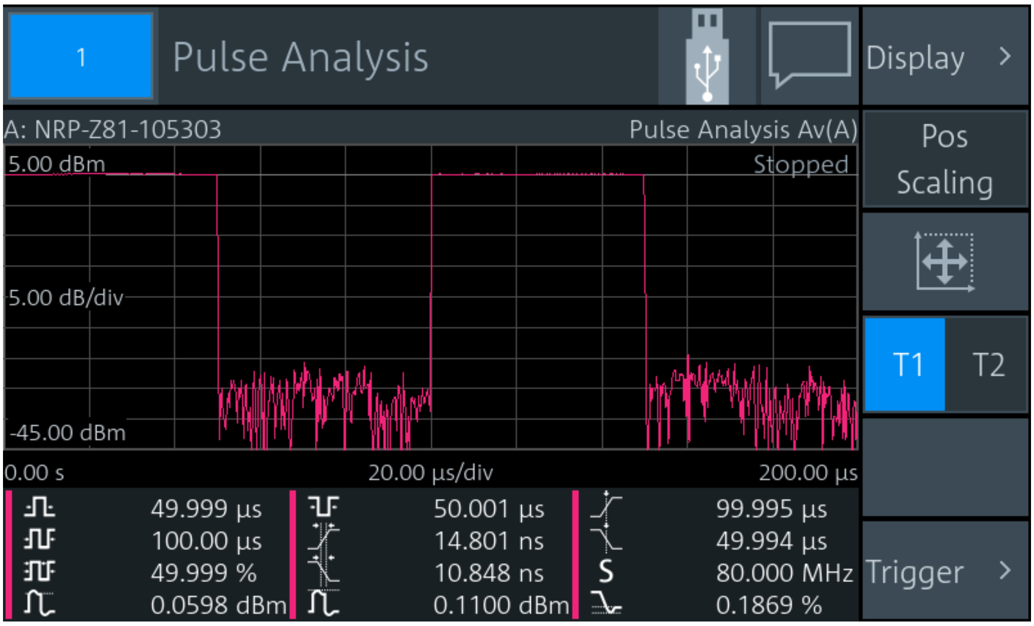
"Average Power to Ref"
Measures the average power between time positions of the marker and its reference marker.
Marker result is "Pav".

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:FUNCtion on page 241

7.4 Pulse Analysis

Supported by wideband power sensors. Use this measurement type for automatic analysis of pulsed signals. You can measure either power over time over the whole trace, or restrict the measurement to a defined portion of the pulse signal. Trigger each trace separately.

7.4.1 Pulse Analysis Result Display



Shows a pulse signal in trace presentation. 2 traces are available. The measurement results are displayed below the trace. Each measurement result is represented by a symbol that is also used to select the result. You can choose which results you want to display, see Chapter 7.4.3, "Pulse Analysis Dialog", on page 81.

7.4.2 Pulse Analysis Settings

Access: "Measurement Settings" > "Measurement Type" > "Pulse Analysis"

Display

See Chapter 6.1, "Display Settings", on page 49.

Pos / Scaling

See "Pos / Scaling" on page 75.

Autoscale

See "Autoscale" on page 75.

T1 / T2

Selects the displayed trace.

Remote command:

`DISPlay[:WINDow<Window>]:TRACe:MEASurement:SELection` on page 261

Trigger
Gives quick access to selected trigger settings. See "Trigger" on page 76.

7.4.3 Pulse Analysis Dialog

Access: Tap the measurement results that are displayed below the trace.

On the "Time" and "Power" tabs, select the measurement results that are displayed below the trace. The R&S NRX can display a maximum of 12 measurement results. If you select more, a warning is displayed.

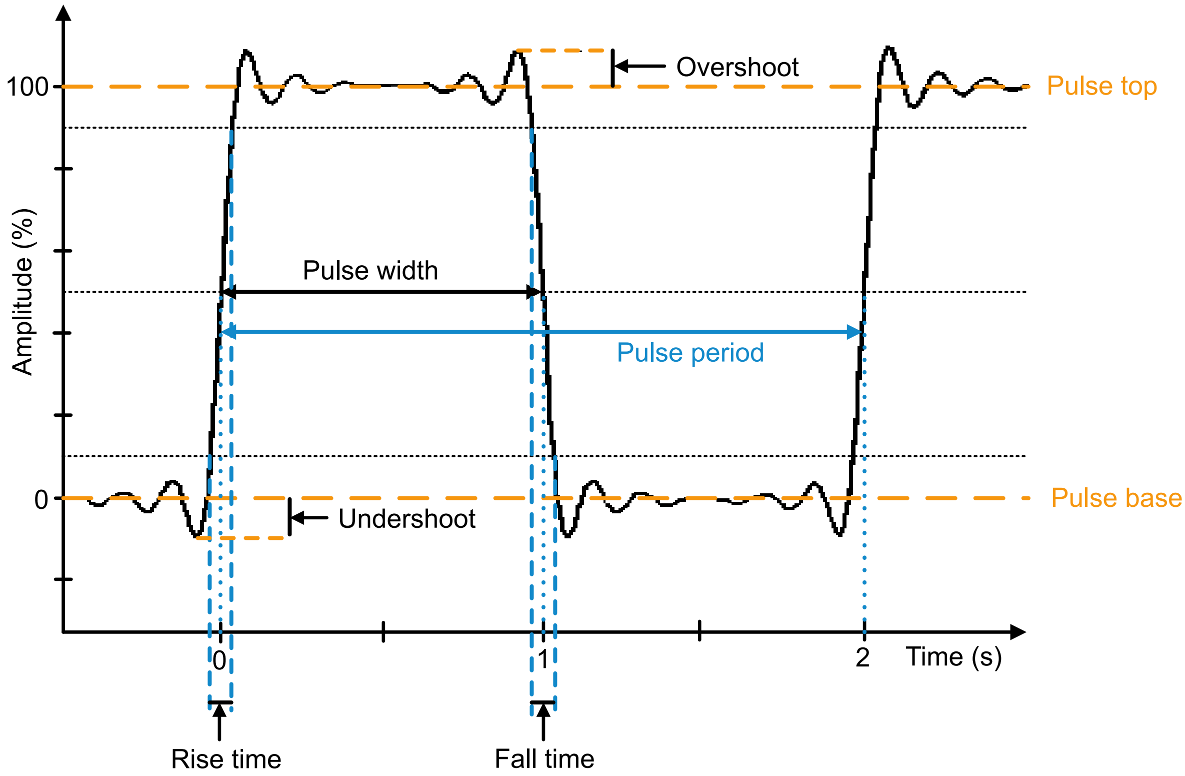
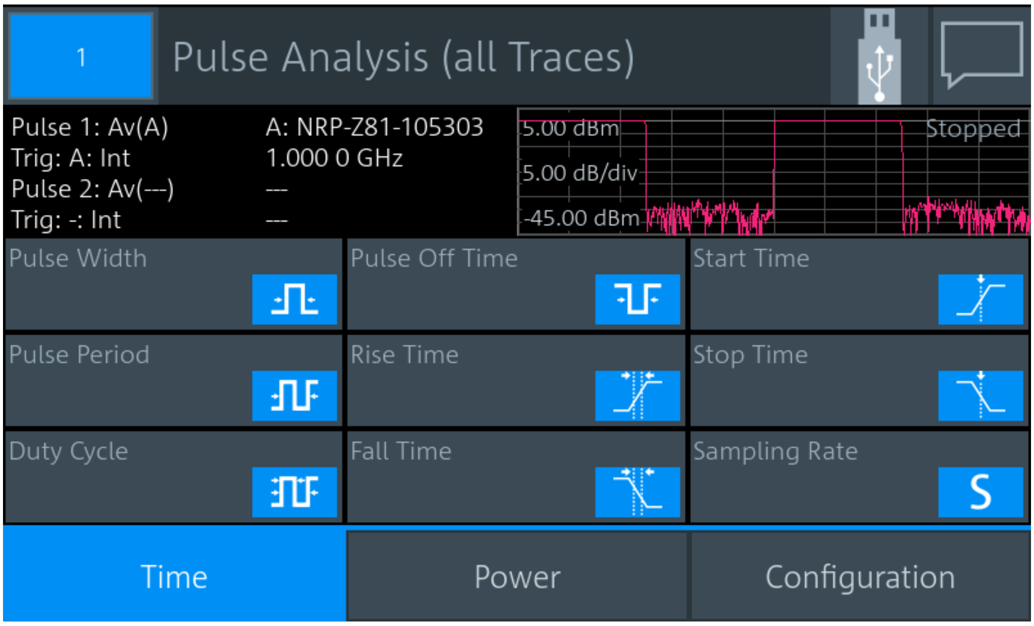
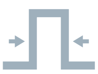


Figure 7-2: Main pulse analysis parameters and characteristic values

Time tab

Selects the time-related measurement results that are displayed below the trace. The selections on this tab apply to all traces.





Pulse Width ← Time tab

Time between the first positive edge and the subsequent negative edge of the pulse, where the edges occur at crossings of the mid threshold.

Remote command:

`DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:DURation[:STATe]` on page 259

`CALCulate<Measurement>:TRACe:MEASurement:PULSe:DURation?` on page 253

Pulse Period ← Time tab
Time between two consecutive edges of the same polarity in seconds. During this time, the pulse signal completes one cycle.

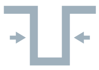
Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:PERiod[:STATe] on page 260
CALCulate<Measurement>:TRACe:MEASurement:PULSe:PERiod? on page 254

Duty Cycle ← Time tab

$$\text{Duty cycle} = \frac{\text{Pulse width}}{\text{Pulse period}}$$

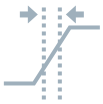
The ratio is expressed as a value between 0 and 1.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:DCYCle[:STATe] on page 259
CALCulate<Measurement>:TRACe:MEASurement:PULSe:DCYCle? on page 253



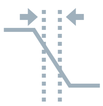
Pulse Off Time ← Time tab
Time between the first negative edge and the subsequent positive edge of the pulse in seconds, where the edges occur at crossings of the mid threshold. During this time, the pulse remains at the pulse base level.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:SEParation[:STATe] on page 260
CALCulate<Measurement>:TRACe:MEASurement:PULSe:SEParation? on page 254



Rise Time ← Time tab
Time the pulse requires to transition from the pulse base level to the pulse top level.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:POSitive:DURation[:STATe] on page 262
CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:DURation? on page 255



Fall Time ← Time tab
Time the pulse requires to transition from the pulse top level to the pulse base level.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:NEGative:DURation[:STATe] on page 261
CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:DURation? on page 254

Start Time ← Time tab
Time when the signal passes through the medial reference power level with rising edge, referenced to the delayed trigger event. Indicates the start point of the first power pulse within the analysis window.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:POSitive:OCCurrence[:STATe] on page 262
CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:OCCurrence? on page 256

Stop Time ← Time tab
Time when the signal passes through the medial reference power level with falling edge, referenced to the delayed trigger event. Indicates the stop point of the first power pulse within the analysis window.

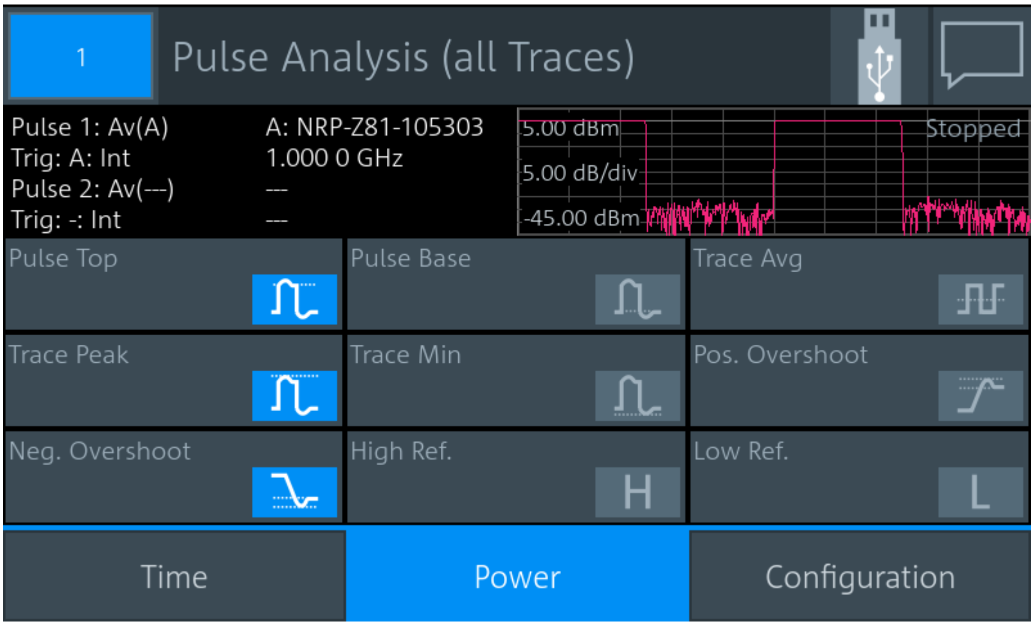
Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:NEGative:OCCurrence[:STATe] on page 261
CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OCCurrence? on page 255

S

Sampling Rate ← Time tab
Number of samples per second.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:RESolution[:STATe] on page 260
CALCulate<Measurement>:TRACe:MEASurement:TRANsition:SPERiod? on page 256

Power tab
Selects the power-related measurement results that are displayed below the trace. The selections on this tab apply to all traces.



Pulse Top ← Power tab

Pulse top power level detected by the selected Algorithm. This value is used as a reference (100 %) to determine other parameter values such as the rising or falling thresholds.

Remote command:

`DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:TOP[:STATe]` on page 259

`CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:TOP?` on page 253

Trace Peak ← Power tab

Maximum power measured within the analysis window.

Remote command:

`DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:MAXimum[:STATe]` on page 257

`CALCulate<Measurement>:TRACe:MEASurement:POWer:MAX?` on page 252

Neg. Overshoot ← Power tab

Height of the local minimum before a rising edge, divided by the pulse amplitude:

$$\text{Negative overshoot} = 100\ \% \times \frac{\text{Pulse base power - minimum power}}{\text{Pulse amplitude}}$$

Depends on the setting under Reference Levels relate to.

Remote command:

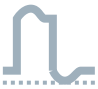
`DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:NEGative:OVERshoot[:STATe]` on page 262

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OVERshoot?` on page 255

Pulse Base ← Power tab

Pulse base power level detected by the selected Algorithm. This value is used as a reference (0 %) to determine other parameter values such as the rising or falling thresholds.

Remote command:
`DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:BASE[:STATe]` on page 258
`CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:BASE?` on page 252



Trace Min ← Power tab

Minimum power measured within the analysis window.

Remote command:
`DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:MINimum[:STATe]` on page 257
`CALCulate<Measurement>:TRACe:MEASurement:POWer:MIN?` on page 252

High Ref. ← Power tab

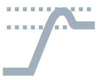
Power level at High Reference Level.

Remote command:
`DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:HREFerence[:STATe]` on page 258
`CALCulate<Measurement>:TRACe:MEASurement:POWer:HREFerence?` on page 251

Trace Avg ← Power tab

Average power during the time the pulse is active.

Remote command:
`DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:AVG[:STATe]` on page 257
`CALCulate<Measurement>:TRACe:MEASurement:POWer:AVG?` on page 251



Pos. Overshoot ← Power tab

Height of the local maximum before a falling edge, divided by the pulse amplitude:

$$\text{Positive overshoot} = 100\ \% \times \frac{\text{Max. power - pulse top power}}{\text{Pulse amplitude}}$$

Depends on the setting under Reference Levels relate to.

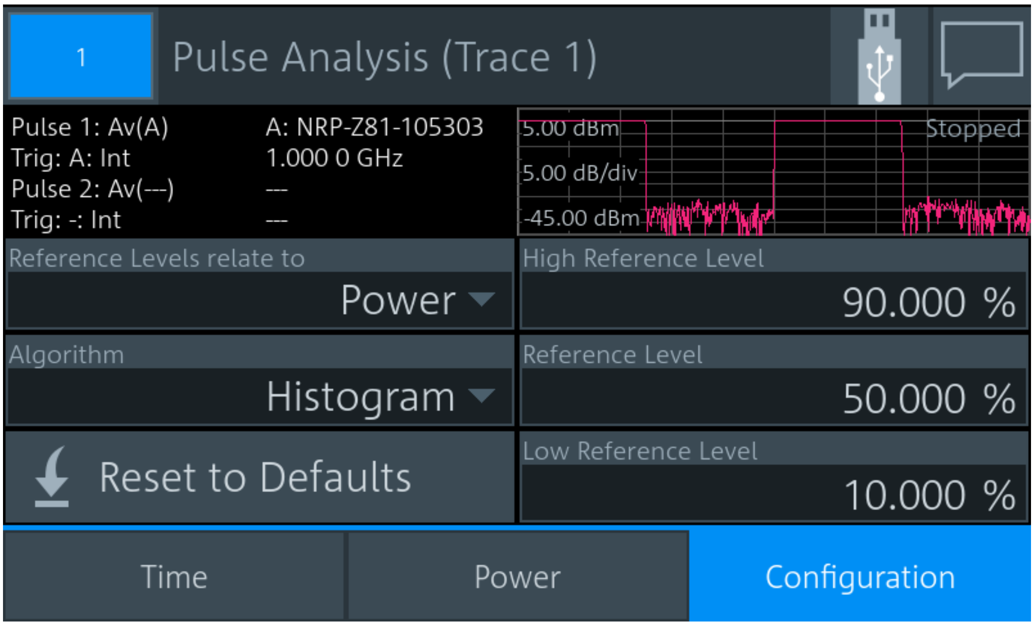
Remote command:
`DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:POSitive:OVERshoot[:STATe]` on page 263
`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:OVERshoot?` on page 256

L

Low Ref. ← Power tab
Power level at Low Reference Level.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:LREFerence[:STATe] on page 258
CALCulate<Measurement>:TRACe:MEASurement:POWer:LREFerence? on page 252

Configuration tab
Defines the reference levels for the pulse timing. All values are specified in percent of the pulse amplitude. The settings on this tab are trace-specific.



Reference Levels relate to ← Configuration tab
Selects whether the reference levels are voltage-related or power-related.

Remote command:
DISPlay[:WINDow<Window>]:TRACe:MEASurement:RRELation on page 261

Algorithm ← Configuration tab
Selects the analysis algorithm for detecting the pulse top and the pulse base power of a pulsed signal. From these power levels, the reference levels are derived.

"Histogram" Analyzes the histogram of the trace data. The average of all points representing the pulse top is taken as pulse top power. Similarly, the pulse base is determined.
This algorithm is suitable for most pulse signals.

"Integration" Fits a rectangle pulse of the same energy into the pulse signal as a reference and thus determines the pulse top power.

This algorithm is recommended for:
- Pulse signals with modulation
- If the pulse energy is considered
For example, if you compare the measurement result to a measurement result of a thermal power sensor.

"Peak" Assigns the pulse peak power to the pulse top power.

Remote command:
CALCulate<Measurement>:TRACe:MEASurement:ALGorithm on page 250

High Reference Level ← Configuration tab
Defines the end of the rising edge and the start of the falling edge of the pulse. Used for the measurement of the rise or fall time.

Remote command:
CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:HREFerence on page 250

Reference Level ← Configuration tab
Defines the pulse width, pulse start time and pulse stop time.

Remote command:
CALCulate<Measurement>:TRACe:MEASurement:DEFine:DURation:REFerence on page 250

Low Reference Level ← Configuration tab
Defines the start of the rising edge and the end of the falling edge of the pulse. Used for the measurement of the rise or fall time.

Remote command:
CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:LREFerence on page 251

Reset to Defaults ← Configuration tab
Resets all parameters on the Configuration tab

7.5 Time Gate

In combination with the R&S NRX, all power sensors that support the timeslot measurement, can use also this measurement type. The power sensor measures the average power in time intervals chosen by you. These time intervals are called time gates. You can configure up to 4 different gates, but use only one at a time for measuring. The time resolution is determined by the sampling rate of the power sensor. An external trigger signal or internal signal triggering is required for synchronization.

7.5.1 Time Gate Result Display

You can choose between a scalar or graphical result display.

To change the display format

1. Select the time gate measurement type:
   "Measurement Settings" > "Measurement Type" > "Time Gate"
2. Select the display format:
   "Display" > "Display Format"

Scalar display

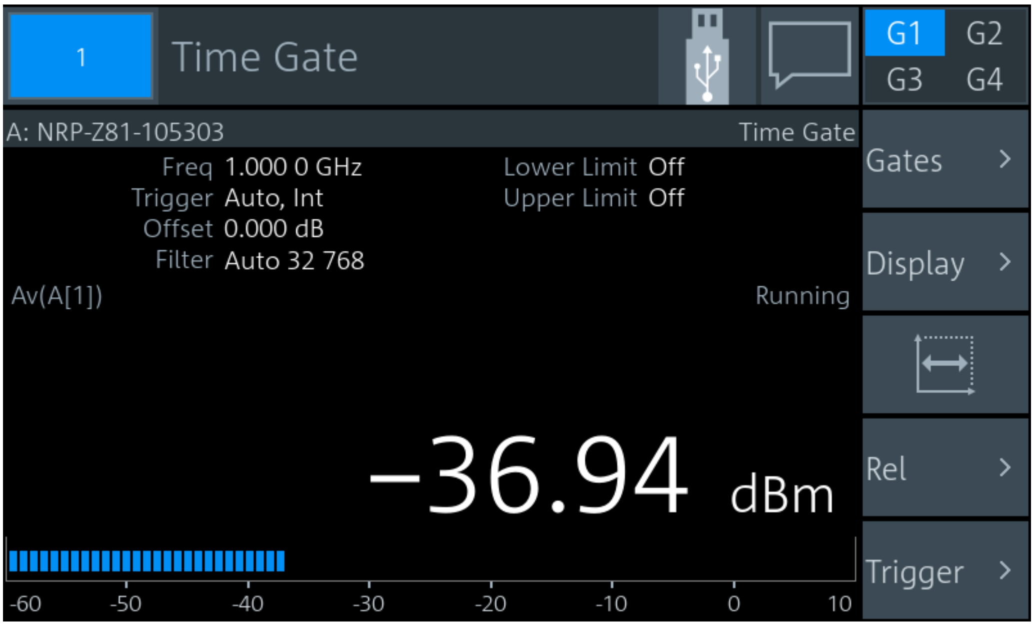


Figure 7-3: Time gate, scalar digital display

The measurement result is a single scalar value. It refers to the selected time gate. If "Scalar Analog" is set as Display Format, a bar chart visualizes the measurement result.

Graphical display

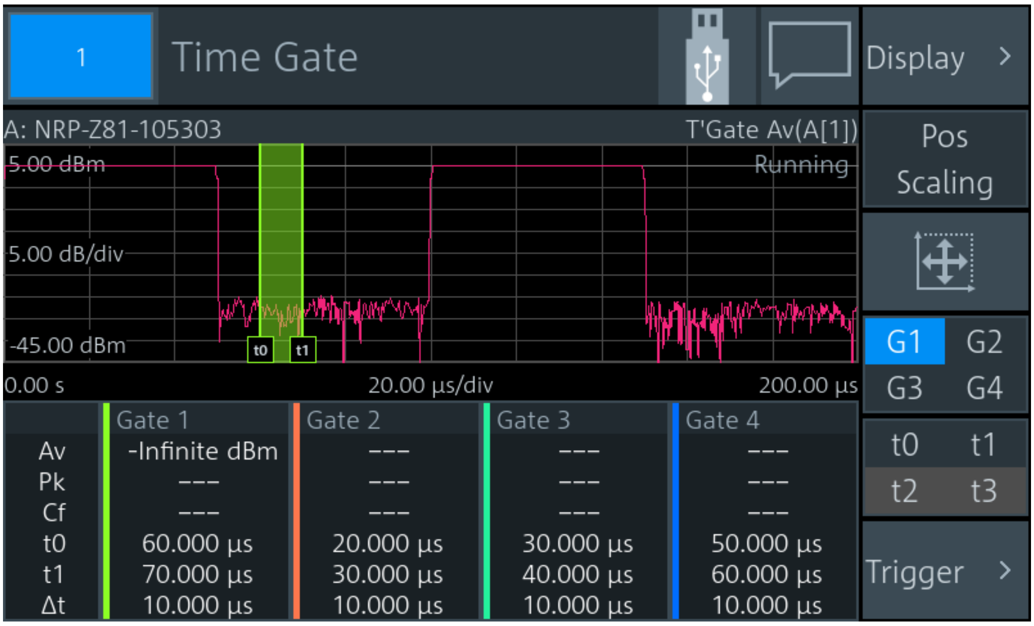


Figure 7-4: Time gate, graphical display

In the upper pane, the measurement result is shown as a single trace measurement of the primary sensor. The active gate is indicated as colored area. The color is matching the color assigned to the gate. You can change the gate configuration directly by using touch gestures. If you have a channel calculation function running that involves 2 power sensors, a legend in the upper right corner shows the assignment of curve to measurement channel.

In the lower pane, the 4 gates are displayed with:

- Assigned color
- Measurement values:
  - "Av"
    Average power within gate
  - "Pk"
    Peak power within gate
  - "Cf"
    Crest factor
- Borders, see t0 / t1 / t2 / t3.
- Length Δt

If you tap the lower pane, the Gate Configuration Dialog opens.

7.5.2 Time Gate Settings

Access: "Measurement Settings" > "Measurement Type" > "Time Gate"

The available settings depend on the selected result display.

G1 / G2 / G3 / G4

Selects the active gate for the measurement.

Remote command:
`CALCulate<Measurement>[:POWer]:TGATe<Undef>[:AVG]:SELection`
on page 265

Gates

Available for the scalar displays.

Opens the "Gate Configuration" dialog, see Chapter 7.5.3, "Gate Configuration Dialog", on page 92.

Display

See Chapter 6.1, "Display Settings", on page 49.

Resolution

Available for the scalar displays.

See "Resolution" on page 50.

Pos / Scaling

Available for the graphical display.

Defines the effect of the cursor keys on the displayed trace.

"Pos"	Shifts the position. Press one of the cursor keys to shift the trace in x- and y-direction.
"Scaling"	Changes the scaling. Press one of the cursor keys to expand or compress the trace.

Autoscale

Available for the graphical display.

Adapts the scaling of the power axis to the trace. The scaling of the time axis is adapted only if the power sensor supports it.

t0 / t1 / t2 / t3

Available if:
- Graphical display is enabled.
- Pos / Scaling is disabled.

Selects a gate or fence border so that you can change the start time or length. The selected border is displayed as dashed line.

"t0"	Start of Gate
"t1"	Length of Gate
"t2"	Start of Fence. Only available if Fence is enabled.
"t3"	Length of Fence. Only available if Fence is enabled.

Rel

Available for the scalar displays.

See "Rel" on page 71.

Trigger

See Chapter 6.3, "Triggering", on page 59.

7.5.3 Gate Configuration Dialog

Access depends on the selected measurement type and display format:

- Time gate, scalar display: "Time Gate" > "Gates"
- Time gate, graphical display: Tap the lower pane where the gate information is displayed.
- Statistics: "Statistics" > "Evaluate" > "Statistics Timing", tap the lower pane where the gate information is displayed.

Used for configuring gates. The gates are used in the time gate and statistics measurements. Each gate is configured individually. Select the gate you want to configure.

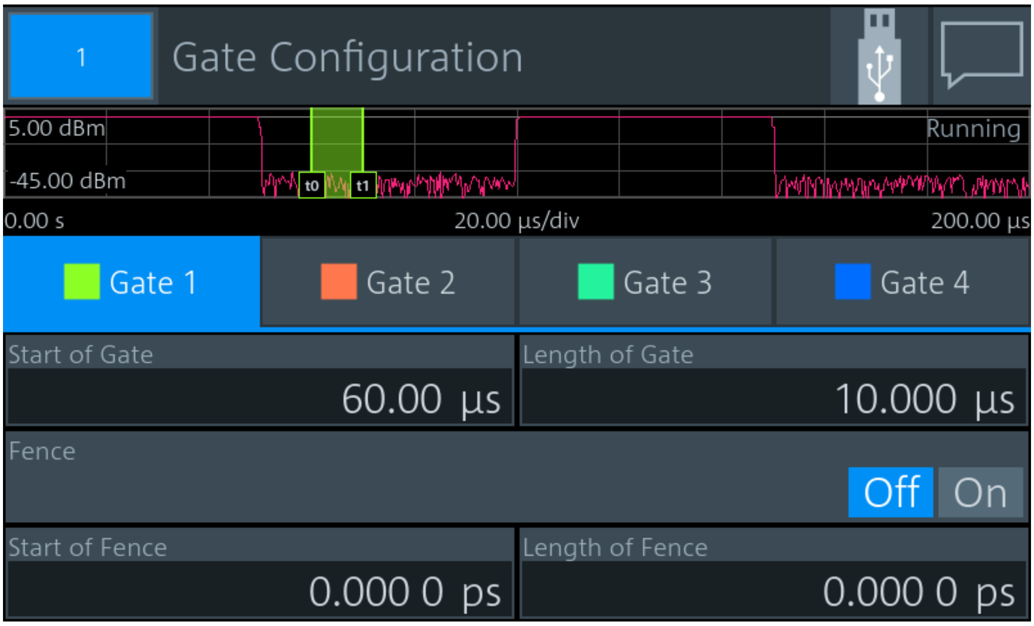


Figure 7-5: Example for time gate measurement type

Start of Gate

Sets the start time of the gate.

Remote command:
`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME` on page 264

Length of Gate

Sets the length of the gate.

Remote command:
`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]` on page 263

Fence

Enables or disables an exclusion interval for the selected gate. This exclusion interval is called fence. The interval where the fence overlaps with the gate is excluded from the measurement.

Like a gate, a fence is defined by its start time and its length.

Remote command:
`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]` on page 265

Start of Fence

Sets the start time of the fence. The start time refers to the start of the gate.

Remote command:
`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:TIME` on page 264

Length of Fence

Sets the length of the fence.

Remote command:
`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:OFFSet[:TIME]` on page 264

7.6 Timeslot

Supported by multipath and wideband power sensors. The power sensor measures the average power in successive timeslots. You can define the number and characteristics of the timeslots. But different to time gate measurements, where each gate is defined individually, the timeslots all share the characteristics. Thus, the timeslots are arranged in a frame structure with equal spacing and are suitable for periodic signals. The time resolution is determined by the sampling rate of the power sensor. An external trigger signal or internal signal triggering is required for synchronization.

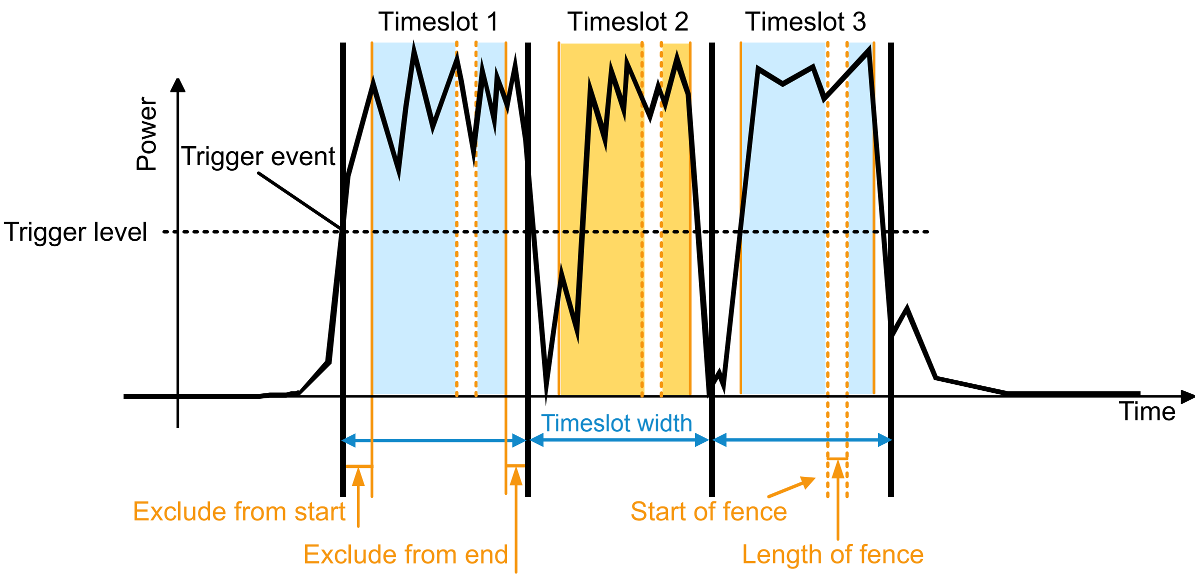


Figure 7-6: Timeslot measurement parameters

Adopt the timeslot width to the test signal. You can restrict the measurement to the relevant part of a timeslot by excluding intervals at the start and the end of the timeslot. Also, you can define an exclusion interval, a so-called fence, within the timeslot.

7.6.1 Timeslot Result Display

You can choose between a scalar or graphical result display.

To change the display format

1. Select the timeslot measurement type:
   "Measurement Settings" > "Measurement Type" > "Timeslot"
2. Select the display format:
   "Display" > "Display Format"

Scalar display

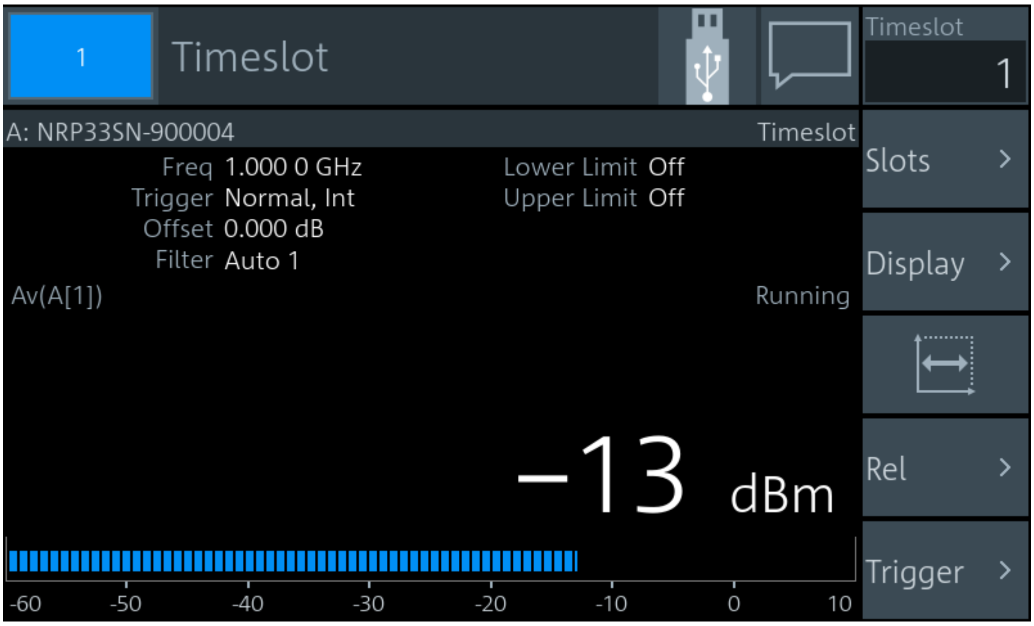


Figure 7-7: Timeslot, scalar digital display

The measurement result is a single scalar value. It refers to the selected timeslot. If "Scalar Analog" is set as Display Format, a bar chart visualizes the measurement result.

Graphical display

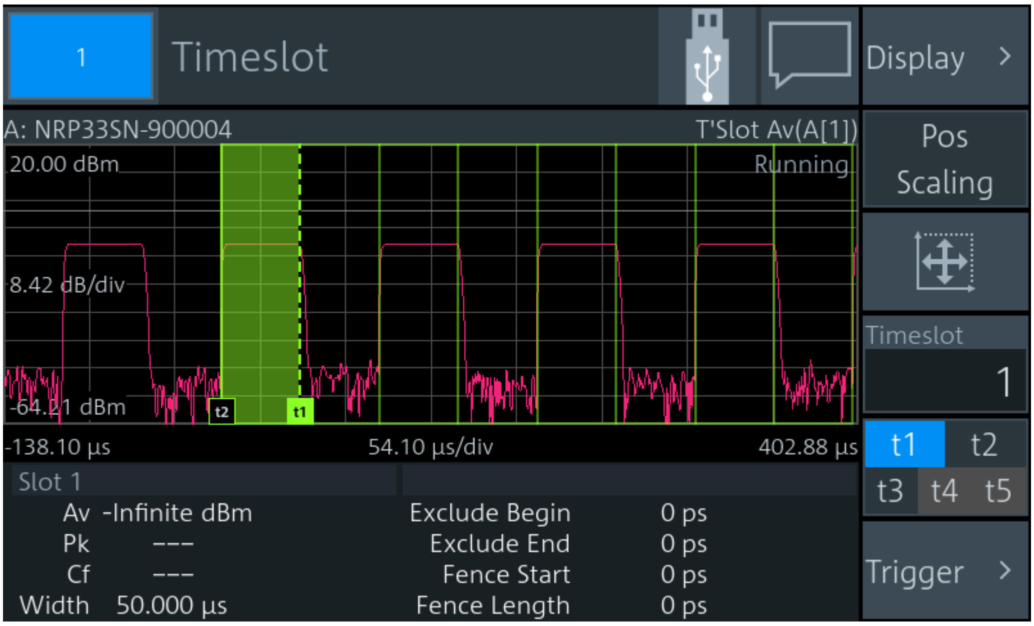


Figure 7-8: Timeslot, graphical display

In the upper pane, the measurement result is shown as a single trace measurement of the primary sensor. The timeslots are indicated as rectangles. The selected timeslot is indicated as colored area. You can change the timeslot configuration directly by using touch gestures. If you have a channel calculation function running that involves 2 power sensors, a legend in the upper right corner shows the assignment of curve to measurement channel.

In the lower pane, the selected timeslot is displayed with:

- Measurement values:
  - "Av"
    Average power within gate
  - "Pk"
    Peak power within gate
  - "Cf"
- Width
- Borders, see t1, t2, t3, t4, t5.

If you tap the lower pane, the Timeslot Configuration Dialog opens.

7.6.2 Timeslot Settings

Access: "Measurement Settings" > "Measurement Type" > "Timeslot"

The available settings depend on the selected result display.

Timeslot
Selects a timeslot for the measurement.

Remote command:
`CALCulate<Measurement>[:POWer]:TSLot[:AVG]:SELection` on page 267

Slots
Available for the scalar displays.

Opens the "Timeslot Configuration" dialog, see Chapter 7.6.3, "Timeslot Configuration Dialog", on page 97.

Display
See Chapter 6.1, "Display Settings", on page 49.

Resolution
Available for the scalar displays.

See "Resolution" on page 50.

Pos / Scaling
Available if:

- Graphical display is enabled.
- t1, t2, t3, t4, t5 is disabled.

Scales or moves the graph.

Autoscale
Available for the graphical display.

Adapts the scaling of the power axis to the trace. The scaling of the time axis is adapted only if the power sensor supports it.

t1, t2, t3, t4, t5
Available if:

- Graphical display is selected.
- Pos / Scaling is disabled.

Selects a border so that you can change the timeslot length and included/excluded intervals. The selected border is displayed as dashed line.

"t1"	Nominal Width
"t2"	Exclude from Start
"t3"	Exclude from End
"t4"	Start of Fence. Only available if Fence is enabled.
"t5"	Length of Fence. Only available if Fence is enabled.

Rel
Available for the scalar displays.

See "Rel" on page 71.

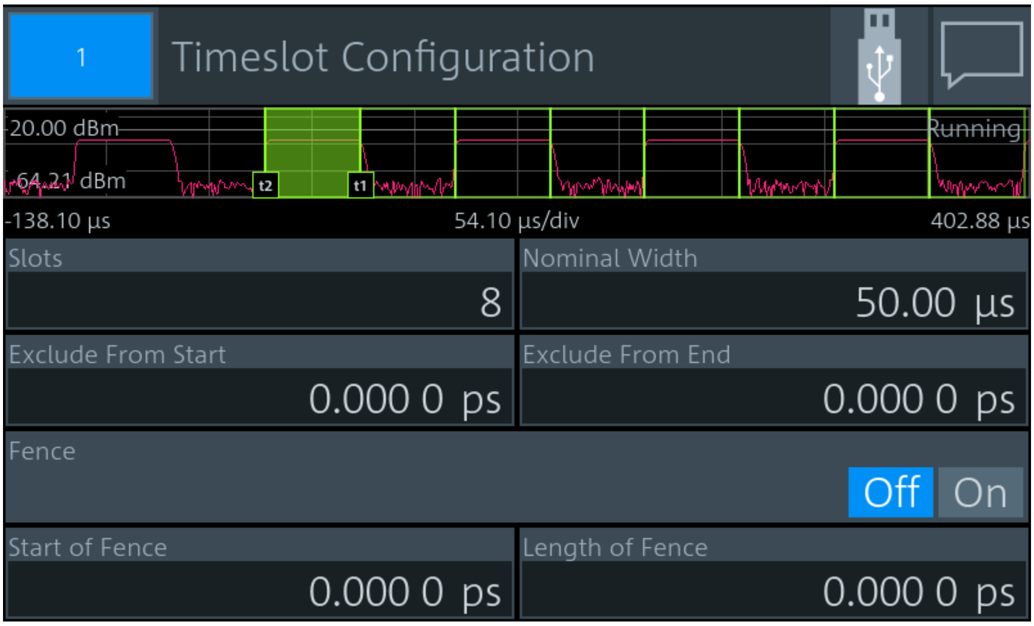
Trigger
See Chapter 6.3, "Triggering", on page 59.

7.6.3 Timeslot Configuration Dialog

Access depends on the selected display format:

- Scalar display: "Timeslot" > "Slots"
- Graphical display: Tap the lower pane where the gate information is displayed.

Used for configuring the characteristics of the timeslots.



Slots

Sets the number of simultaneously measured timeslots.

Remote command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt` on page 266

Nominal Width

Sets the length of the timeslot.

Remote command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh` on page 267

Exclude from Start

Defines an interval at the start of the timeslot that is excluded from the measurement.

Remote command:

`CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt` on page 266

Exclude from End

Defines an interval at the end of the timeslot that is excluded from the measurement.

Remote command:

`CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP` on page 266

Fence
Enables or disables an exclusion interval in the timeslots. This exclusion interval is called fence. The fence is defined by its start time and its length.

Remote command:
`CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe]` on page 268

Start of Fence
Sets the start time of the fence. The start time refers to the start of the timeslots.

Remote command:
`CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID:TIME` on page 267

Length of Fence
Sets the length of the fence.

Remote command:
`CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID:OFFSet[:TIME]` on page 267

7.7 Statistics

Supported by wideband power sensors. The power sensor measures power over time. Using the statistics measurement type, you can analyze the statistical distribution of the envelope power. The duration of the sampling window is either defined by the chosen gate or a set aperture time. The measurement is repeated until the minimum number of samples is collected.

7.7.1 Statistics Result Display

You can choose between a tabular or graphical result display.

In the lower pane, the following measurement results are provided for the 2 traces:

- "Peak"
  Peak power
- "Avg"
  Average power
- Measurement result at the x-marker position. The marker is set using [dBm] / [dB] marker.
-

Power value at the y-marker position. The marker is set using [%] marker.

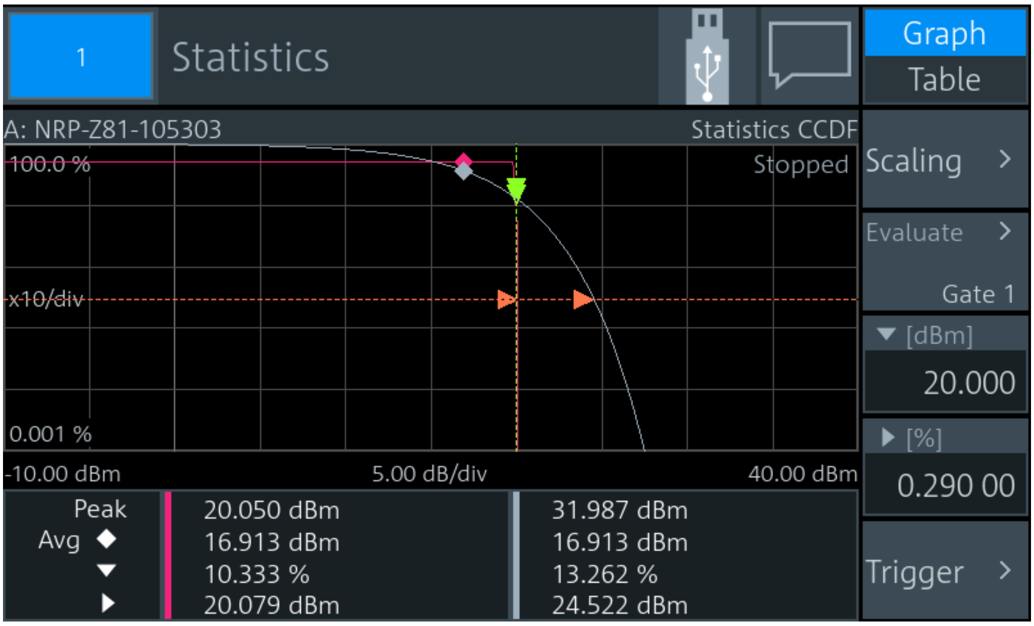


Figure 7-9: Statistics, graphical display

The graph displays the waveform of the selected trace.

Tap Table to display the measurement results in tabular format. The table contains the measurement results for 2 traces. The second trace is measured by a second power sensor or generated by an internal AWGN source.

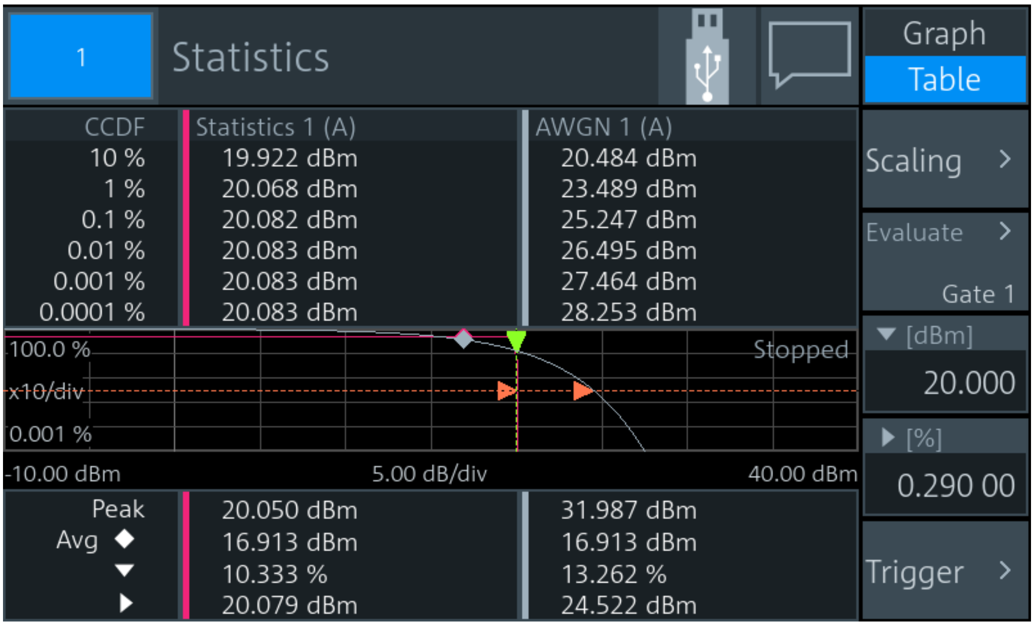


Figure 7-10: Statistics, tabular display

7.7.2 Statistics Settings

Access: "Measurement Settings" > "Measurement Type" > "Statistics"

Graph / Table
Available if "CCDF" or "CDF" is set under Statistics Function.

Shows or hides the measurement results table.

Remote command:
`CALCulate<Measurement>:DMODe` on page 188

Scaling
Opens the "Scale Configuration" dialog, see Chapter 7.7.4, "Scale Configuration Dialog", on page 103.

Evaluate
Opens the "Statistics Timing" dialog, see Chapter 7.7.5, "Statistics Timing Dialog", on page 105.

[dBm] / [dB] marker
Positions the x-marker to a power value. The associated measurement result is displayed in the lower pane, see Figure 7-10.

Remote command:
`CALCulate<Measurement>:STATistics:MARKer:X:POSition:RELative`
on page 278
`CALCulate<Measurement>:STATistics:MARKer:X:POSition[:ABSolute]`
on page 278

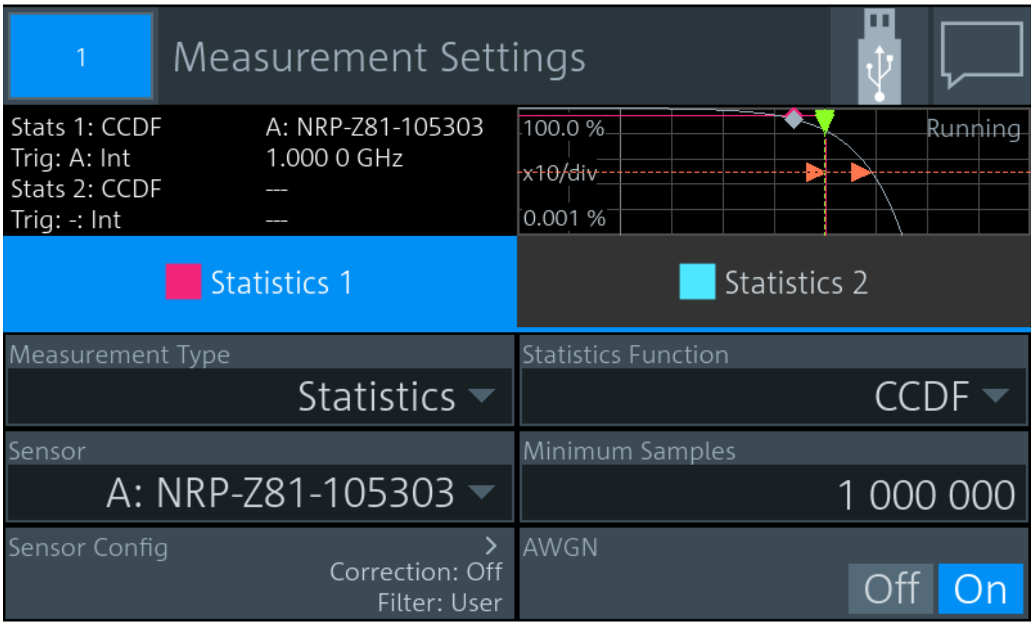
[%] marker
Positions the y-marker to a measurement value. The associated power value is displayed in the lower pane, see Figure 7-10.

Remote command:
`CALCulate<Measurement>:STATistics:PDF:MARKer:Y:POSition`
on page 278
`CALCulate<Measurement>:STATistics[:CDF]:MARKer:Y:POSition`
on page 277

Trigger
See Chapter 6.3, "Triggering", on page 59.

7.7.3 Measurement Settings Dialog

Access: In the "Statistics" dialog, tap the *displayed table or graph*.



The settings in the left column are the same as for the other measurement types:

- "Measurement Type", see "Measurement Type" on page 67.
- "Sensor", see "Primary Sensor, Secondary Sensor" on page 67.
- "Sensor Config" > "Aperture"
  See "Aperture" on page 115.

The settings in the right column are specific for statistics measurements.

Statistics Function

Sets the function used for analyzing the statistical distribution of the envelope power.

"CCDF" Complementary cumulative distribution function
Probability that the envelope power is higher than the corresponding x-axis power value. Linear or logarithmic scale.

"CDF" Cumulative distribution function
Probability that the envelope power is lower than the corresponding x-axis power value. Linear or logarithmic scale.

"PDF" Probability density function
Normalized distribution density of the envelope power. The measurement results are dimensionless and independent of the magnitude of the average power value (Av).
Only linear scale is available.

Remote command:
CALCulate<Measurement>[:CHANNel<Channel>]:FEED<Channel>
on page 229

Minimum Samples

Sets the minimum number of samples.

Remote command:
CALCulate<Measurement>:STATistics:SAMPles[:MINimum] on page 270

AWGN

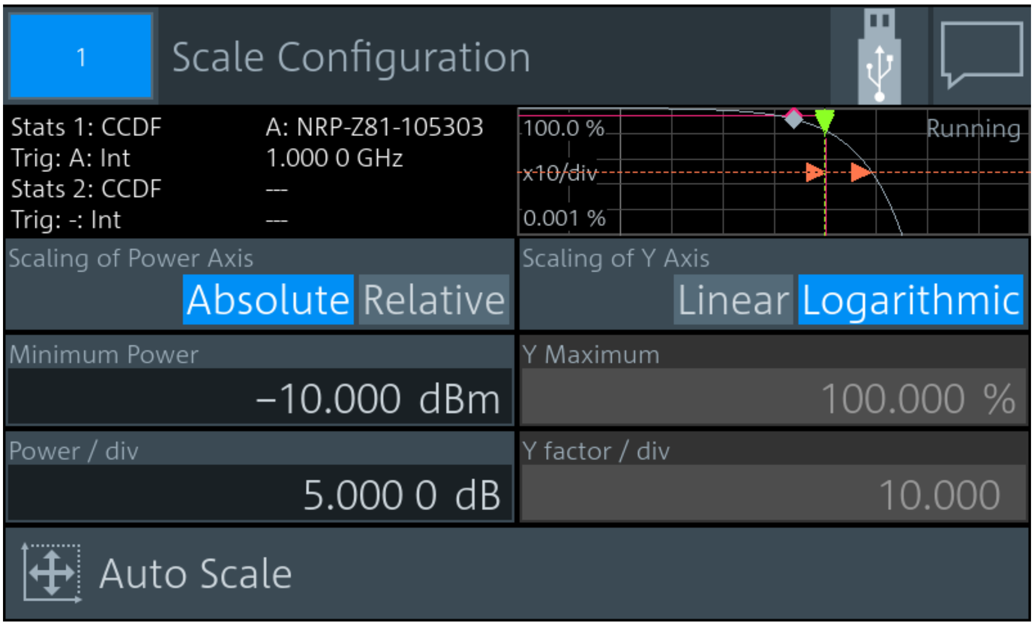
Enables or disables the internal, additional white Gaussian noise (AWGN) source. If enabled, you cannot measure with a second power sensor.

Remote command:
CALCulate<Measurement>:STATistics:AWGN[:STATe] on page 270

7.7.4 Scale Configuration Dialog

Access: "Statistics" > "Scaling"

Used for configuring the axes of the display.



Scaling of Power Axis
Sets relative or absolute scaling for the x-axis.

"Absolute" Absolute power in dBm.

"Relative" Relative power in dB, referenced to the average power.

Remote command:
CALCulate<Measurement>:STATistics[:SCALe]:X:MODE on page 274

Minimum Power
Sets the lower limit of the level range as reference for the graphical display.

Remote command:
CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel[:ABSolute] on page 276
CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel:RELative on page 275

Power / div
Sets the scaling of the power axis.

Remote command:
CALCulate<Measurement>:STATistics[:SCALe]:X:POINts on page 275
CALCulate<Measurement>:STATistics[:SCALe]:X:RANGe on page 275

Scaling of Y Axis
Sets linear or logarithmic scaling for the y-axis.

Remote command:
CALCulate<Measurement>:STATistics[:SCALe]:Y:SPACing on page 276

Y Maximum
Available if "Linear" is set under Scaling of Y Axis.

Sets the maximum value of the y-axis.

Remote command:
CALCulate<Measurement>:STATistics:PDF[:SCALe]:Y:TOP on page 273
CALCulate<Measurement>:STATistics[:CDF][:SCALe]:Y[:LINear]:TOP on page 274

Y / div
Available if "Linear" is set under Scaling of Y Axis.

Sets the scaling of the y-axis.

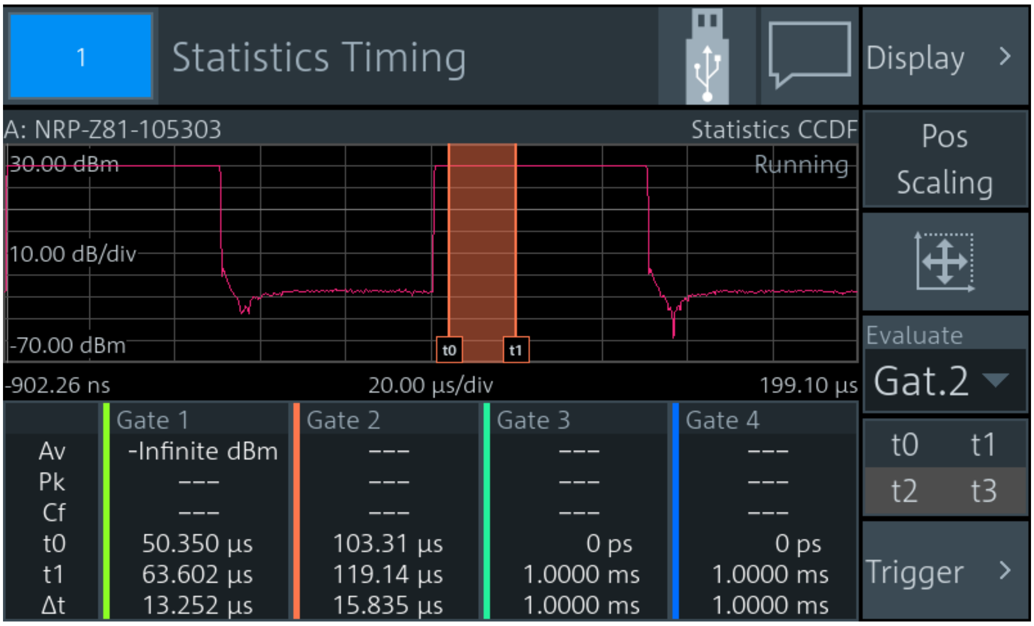
Remote command:
CALCulate<Measurement>:STATistics:PDF[:SCALe]:Y:PDIVision on page 273
CALCulate<Measurement>:STATistics[:CDF][:SCALe]:Y[:LINear]:PDIVision on page 274

Auto Scale
Adapts the scaling of the power axis to the trace.

7.7.5 Statistics Timing Dialog

Access: "Statistics" > "Evaluate"

Configures the sampling window of the measurement.



If you tap the lower pane, the "Gate Configuration" dialog opens, see Chapter 7.5.3, "Gate Configuration Dialog", on page 92.

Display

Opens the "Trace Configuration" dialog that contains the scaling functions:
- "Start Time" on page 53
- "Time / Div" on page 53
- "Power Reference" on page 54
- "Power / Div" on page 54
- "Unit" on page 54

Pos / Scaling

Defines the effect of the cursor keys on the displayed trace.

"Pos"	Shifts the position. Press one of the cursor keys to shift the trace in x- and y-direction.
"Scaling"	Changes the scaling. Press one of the cursor keys to expand or compress the trace.

Autoscale

Adapts the scaling of the power axis to the trace.

Evaluate
Opens the "Evaluate" dialog to configure the sampling window.

"Gate 1" / "Gate 2" / "Gate 3" / "Gate 4"
Select the gate that you want to configure and use for the measurement.

Continuous Sets unsynchronized acquisition. Set the duration of the sampling window using Aperture.

Remote command:
`CALCulate<Measurement>:STATistics:TGATe:SELection` on page 270

t0 / t1 / t2 / t3
Available if Pos / Scaling is disabled.

The same gates are used in the time gate and statistics measurements. See "t0 / t1 / t2 / t3" on page 91.

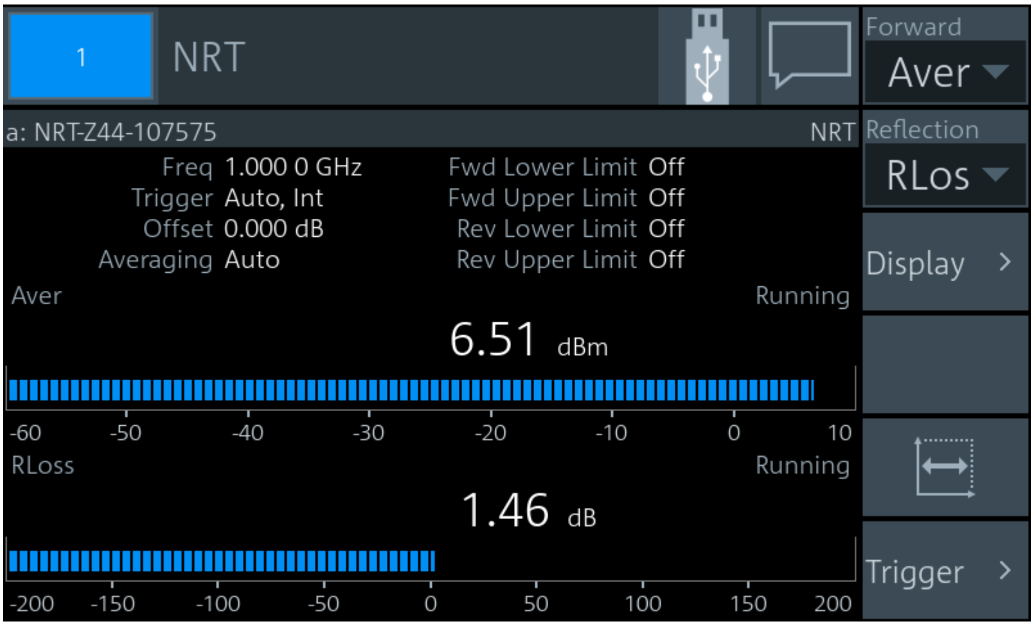
7.8 NRT

Requires the sensor interface for R&S NRT (R&S NRX-B9), see Chapter 3.2.1.2, "Module Bay", on page 24.

Used for power reflection measurements with the R&S NRT directional power sensors. The power sensor measures the forward and reverse power. The forward power is the power flux from the source to the load. For configuring the power sensor, see Chapter 8.5, "NRT Measurement Type", on page 126.

7.8.1 NRT Result Display

The R&S NRX displays the forward and reverse power simultaneously.



Displays two scalar values, one for the selected Forward measurement and one for the Reflection measurement. In this example, Average ("Aver") and Return Loss ("RLos") are selected.

7.8.2 NRT Settings

Access: "Measurement Settings" > "Measurement Type" > "NRT"

Forward

Opens a dialog to measure power, power differences and envelope parameters.

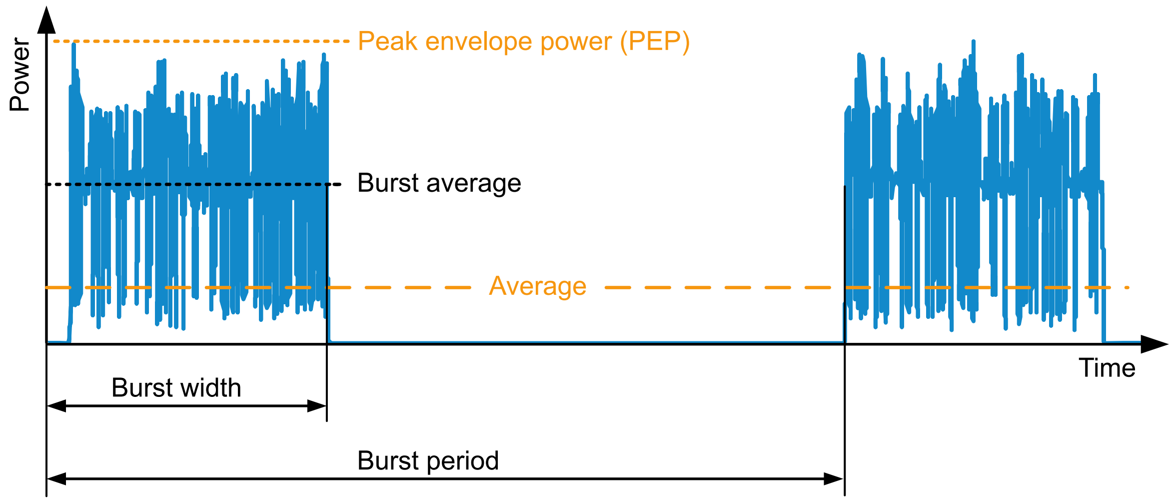


Figure 7-11: Forward power measurement parameters

Average ← Forward
Average power

Remote command:
CALCulate<Measurement>[:CHANNel<Channel>]:FEED<Channel> "POWer:FORWard:AVERage"

CCDF ← Forward
Complementary cumulative distribution function. Probability that the envelope power is higher than the threshold set under "CCDF Threshold" on page 128.

Suitable for assessing the power distribution of spread-spectrum signals, for example CDMA.

Remote command:
CALCulate<Measurement>[:CHANNel<Channel>]:FEED<Channel> "POWer:FORWard:CCDFunction"

Peak Envelope Power (PEP) ← Forward
Peak power of an amplitude-modulated signal. Depending on the selected Video Bandwidth, this parameter allows detecting short-time overshoots at the beginning of a burst.

The peak envelope power (PEP) is an important parameter for describing the modulation characteristics of transmitter output stages.

Remote command:
CALCulate<Measurement>[:CHANNel<Channel>]:FEED<Channel> "POWer:FORWard:PEP"

Absorption Average ← Forward
Absorbed average power. Difference between the forward and reverse Average measurement.

This parameter measures the effective power transmitted to the load. With good matching, the difference between forward power and absorbed power is less than one percent.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>
"POWer:ABSorption:AVERage"

Crest Factor (CF) ← Forward
Level difference between the peak envelope power and the average power in dB.

$$\text{Crest factor} = 10\ \text{dB x log}\ \frac{\text{Peak envelope power}}{\text{Average power}}$$

Allows recognizing larger modulation distortions quickly.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>
"POWer:CFACtor"

Absorption PEP ← Forward
Absorbed peak envelope power (PEP). Difference of Peak Envelope Power (PEP) between forward and reverse power measurement.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>
"POWer:ABSorption:PEP"

Burst Average ← Forward
Average power within a burst. The R&S NRX determines the average burst power by multiplying the average power with the ratio of burst period to burst width:

$$\text{Burst average} = \text{Average}\ \frac{\text{Burst period}}{\text{Burst width}}$$

Burst period and burst width are derived depending on the setting of "Burst Mode" on page 127.

For pulsed RF signals, the burst average defines the average carrier power within the burst. If the burst is unmodulated and has no overshoots, the average burst is equal to the Peak Envelope Power (PEP).

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>
"POWer:FORWard:AVERage:BURSt"

Absorption Burst ← Forward
Absorbed burst average. Difference of Burst Average between forward and reverse power measurement.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>
"POWer:ABSorption:AVERage:BURSt"

Reflection
Opens a dialog to measure reflection parameters.

The ratio of forward and reverse power is a measure for the matching of the load that can be expressed as standing wave ratio (SWR), return loss or reflection coefficient.

Off ← Reflection
Disabled.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>`
`"POWer:OFF"`

Reverse Power ← Reflection
Reverse power in W or dBm.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>`
`"POWer:REVerse"`

Standing Wave Ratio (SWR) ← Reflection

$$\text{Standing wave ratio} = \frac{1 + \text{Reflection coefficient}}{1 - \text{Reflection coefficient}}$$

See also "Reflection Coefficient" on page 110.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>`
`"POWer:SWRatio"`
`UNIT<Measurement>:POWer:REFLection`

Return Loss ← Reflection

$$\text{Return loss} = 10 \times \log \frac{\text{Forward power}}{\text{Reverse power}}$$

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>`
`"POWer:RLOSs"`
`UNIT<Measurement>:POWer:REFLection`

Reflection Coefficient ← Reflection

$$\text{Reflection coefficient} = \sqrt{\frac{\text{Reverse power}}{\text{Forward power}}}$$

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>`
`"POWer:RCOefficient"`
`UNIT<Measurement>:POWer:REFLection`

Reflection Ratio ← Reflection

$$\text{Reflection ratio} = 100\,\frac{\text{Reverse power}}{\text{Forward power}}$$

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>
"POWer:RFRatio"
UNIT<Measurement>:POWer:REFLection

Display
See Chapter 6.1, "Display Settings", on page 49.

Autoscale
Adapts the scaling of the graphical display.

Remote command:
[SENSe<Sensor>:]POWer:REFLection:RANGe:AUTO on page 283
[SENSe<Sensor>:]POWer[:POWer]:RANGe:AUTO on page 283

Trigger
Opens the "Measurement Trigger Configuration" dialog:
- "Trigger Mode" on page 62
- "Trigger Source" on page 63

7.8.3 Measurement Main Configuration Dialog

Access: In the "NRT" dialog, tap the *displayed table or graph*.

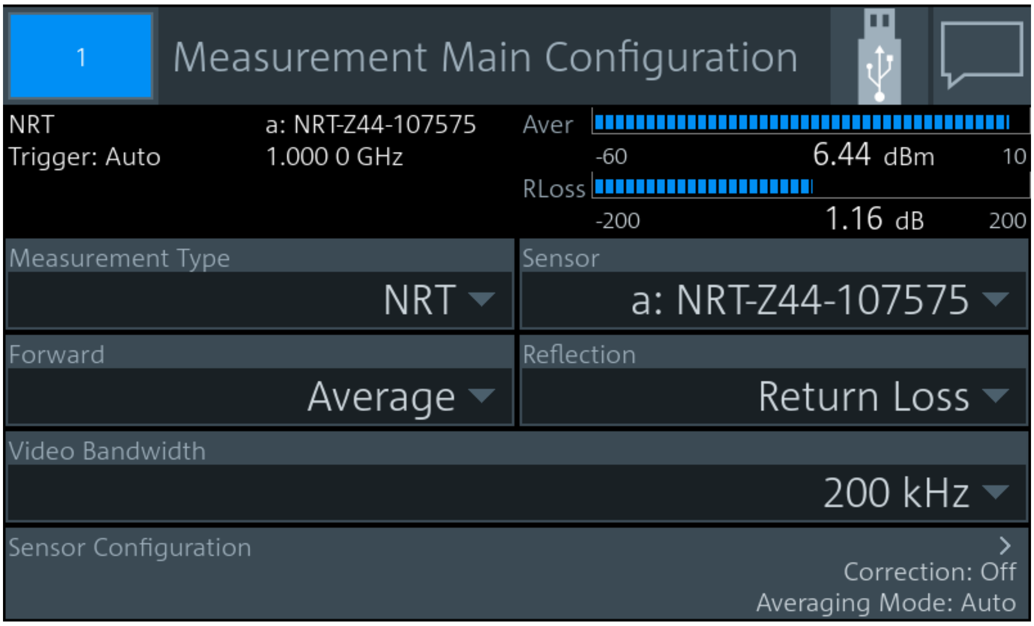


Figure 7-12: Measurement Main Configuration dialog

Measurement Type
See "Measurement Type" on page 67.

Sensor
Assigns the power sensor to the NRT measurement. Suitable are R&S NRT directional power sensors connected to the sensor interface for R&S NRT (R&S NRX-B9).

See also "Primary Sensor, Secondary Sensor" on page 67.

Trigger Mode
See "Trigger Mode" on page 62.

Trigger Source
See "Trigger Source" on page 63.

Forward
See "Forward" on page 107.

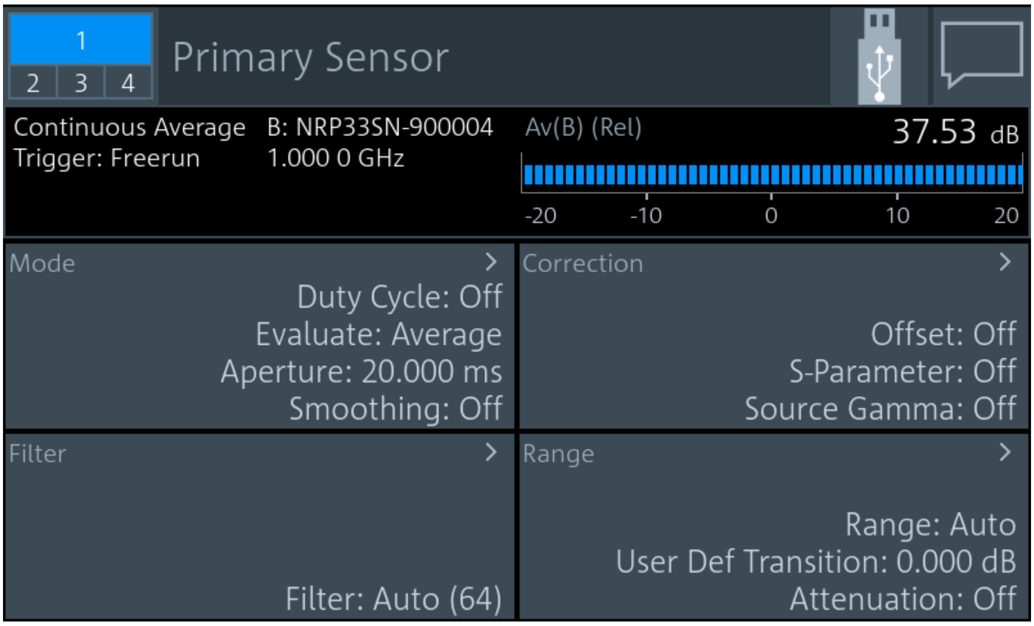
Reflection
See"Reflection" on page 110.

Video Bandwidth
See "Video Bandwidth" on page 131.

Sensor Configuration
See Chapter 8.5, "NRT Measurement Type", on page 126.

8 Sensor Configuration

Access: "Measurement Settings" > "Primary Sensor Config" or "Secondary Sensor Config"



You can define two sensor configurations in parallel, a primary and a secondary sensor configuration. To these configurations, you can assign a sensor that is connected to one of the sensor ports of the R&S NRX. These sensors are called primary sensor and secondary sensor.

Further information:

- "Primary Sensor, Secondary Sensor" on page 67
- Chapter 7, "Measurement Types and Result Displays", on page 70
- Chapter 13.7.6, "Standardized Signals", on page 340

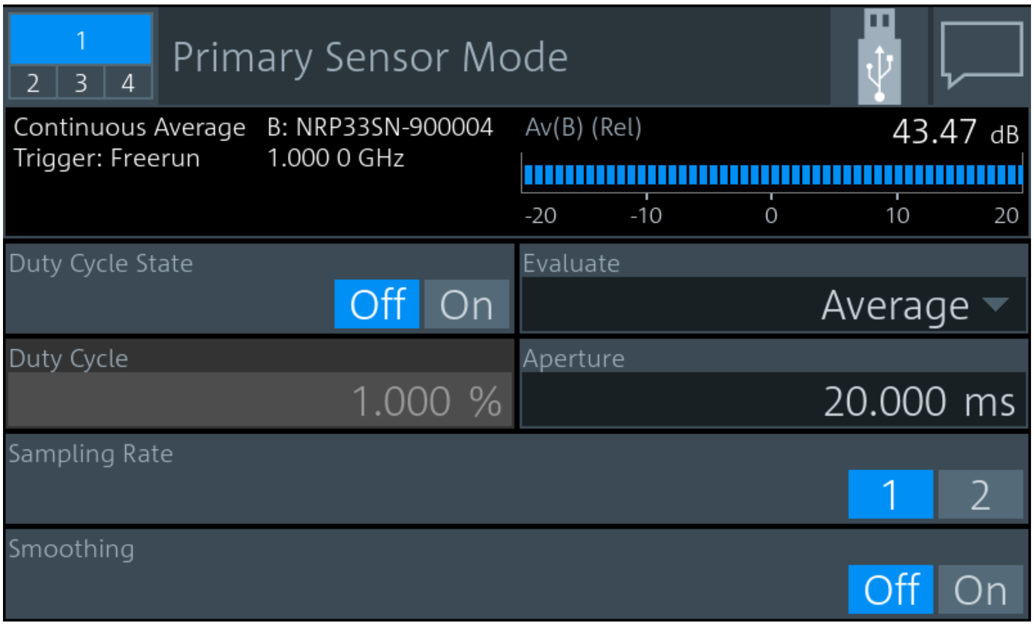
8.1 Mode Settings

Access:

"Measurement Settings" > "Primary Sensor Config" > "Mode"

"Measurement Settings" > "Secondary Sensor Config" > "Mode"

Available for all measurement types.



Duty Cycle State

Available for continuous average measurements.

Enables or disables the duty cycle correction.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe` on page 321

Duty Cycle

Available for continuous average measurements.

Sets the duty cycle for measuring pulse-modulated signals. The duty cycle defines the percentage of one period during which the signal is active. If the duty cycle is enabled, the R&S NRX takes this percentage into account when calculating the signal pulse power from the average power.

For thermal power sensors or multipath power sensors, the duty cycle correction is the only way to determine the power of pulsed signals.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]` on page 321

Equivalent Time Sampling
Available for trace, pulse analysis measurements.

Enables or disables the automatic equivalent sampling that allows for high-resolution measurements.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:ESAMpling` on page 322
`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:ESAMpling:AUTO[:STATe]` on page 324

Evaluate
Available for continuous average, burst average, trace, pulse analysis, time gate, timeslot measurements.

Sets the display type.

"Average"	Average power value, resulting in a flicker-free display and smooth trace.
"Random"	Power of a randomly selected sample, i.e. a realistic display with signal details.
"Peak"	Highest power measured (peak power).

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>` on page 229

Aperture
Available for continuous average, statistics measurements.

Sets the width of the sampling window. The usage depends on the measurement type.
- Continuous average measurement
  When measuring modulated signals, the measurement can show fluctuation due to the modulation. If that is the case, adapt the size of the sampling window exactly to the modulation period to get an optimally stable display. If the modulation period varies or is not precisely known, you can also enable Smoothing.
- Statistics measurement
  Applies for unsynchronized acquisition, that is if Evaluate is set to "Continuous".

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]` on page 323
`CALCulate<Measurement>:STATistics:APERture` on page 270

Sampling Rate
Available for continuous average measurements.

Sets the sampling rate.

If the sampling frequency is located within the video bandwidth, aliasing can occur, that is when spectral components near the sampling frequency cause beating effects. If you change the sampling rate, the beating effects usually disappear.

"1"	Normal sampling rate

"2" Lower sampling rate
Recommended to avoid measurement errors caused due to aliasing effects. However, this setting extends the measurement time.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:SAMPling` on page 322

Smoothing
Available for continuous average measurements.

Enables or disables the smoothing filter, a steep-edge digital lowpass filter. The filter reduces result fluctuations caused by modulation.

"Off" If the modulation frequency is known, set the Aperture time exactly to an integer multiple of the modulation period and disable smoothing.
Otherwise, the modulation can have a considerable influence, even if the sampling window is much larger than the modulation period.
300 to 3000 periods are required to obtain the same effect as with smoothing enabled. The sampling values are considered equivalent and are averaged in a sampling window, which yields an integrating behavior of the measuring instrument.

"On" If the modulation period varies or is not precisely known, enable smoothing.
The selected sampling window has to be 5 to 9 times larger than the modulation period so that the fluctuations caused by modulation are sufficiently reduced. The sampling values are subjected to weighting (raised-von-Hann window), which corresponds to video filtering.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]` on page 324

Dropout Tolerance
Available for burst average measurements.

Detects the falling edge of a burst. If the power keeps low for at least the set time, the end of the burst is assumed. Modulation-specific power drops that are shorter than the set value are ignored.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance` on page 323

Exclude from Start, Exclude from End
Available for burst average measurements.

Sets the time interval at the beginning or end of bursts that is excluded from the measurement. Thus, signal overshoots are omitted.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:BURSt:TIMing:EXCLude:STARt` on page 320
`CALCulate<Measurement>[:CHANnel<Channel>]:BURSt:TIMing:EXCLude:STOP` on page 321

8.2 Correction Settings

Access:

"Measurement Settings" > "Primary Sensor Config" > "Correction"

"Measurement Settings" > "Secondary Sensor Config" > "Correction"

Available for all measurement types.

Offset corrections

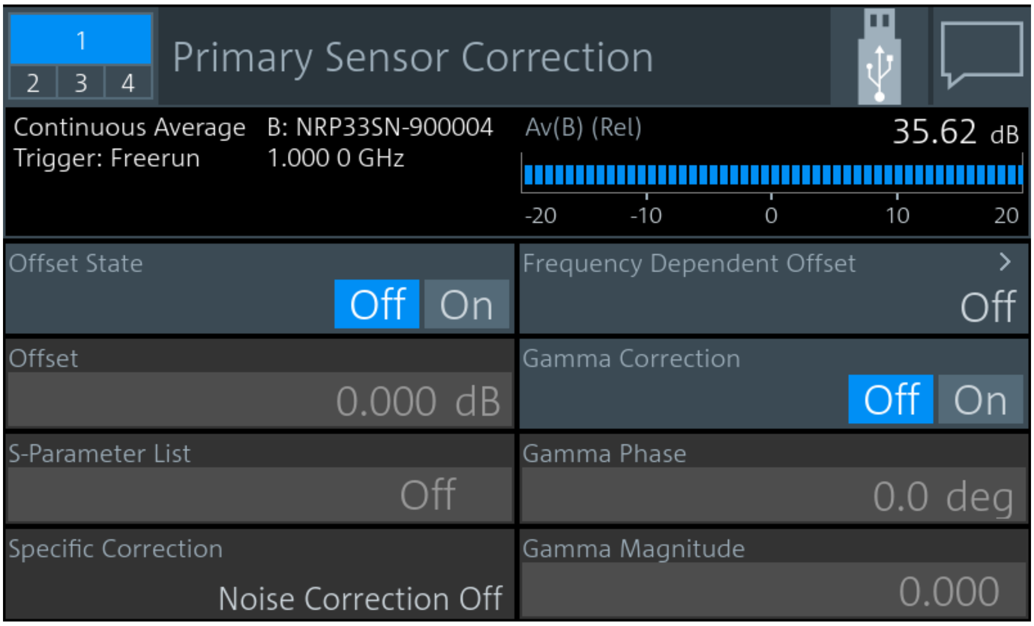
Add a fixed level offset in dB to compensate for external losses or gains. If you take the attenuation of an attenuator located ahead of the power sensor or the coupling attenuation of a directional coupler into account, use a positive offset. That means the power sensor calculates the power at the input of the attenuator or the directional coupler. If you want to correct the influence of an amplifier connected ahead, use a negative offset.

S-Parameter corrections

Used to compensate for losses and reflections introduced by a two-port component that is attached to a power sensor, such as an attenuator, directional coupler, or matching pad. Using S-parameters instead of a fixed offset increases the measurement accuracy, because the interaction between the power sensor and the component is considered. For information on how to proceed, see the user manual of the power sensor.

S-Gamma corrections

Using the complex reflection coefficient, you can determine the power delivered by the signal source with considerably greater accuracy. For information on how to proceed, see the user manual of the power sensor.



Offset State

Enables or disables the offset entered under Offset.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:STATe` on page 326

Offset

Sets a fixed offset for compensating external signal losses or gains. See also "Offset corrections" on page 117.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet[:MAGNitude]` on page 328

S-Parameter List

Enables or disables the S-parameter data set stored in the calibration data of the power sensor. See also "S-Parameter corrections" on page 117.

Remote command:
`[SENSe<Sensor>:]CORRection:SPDevice:STATe` on page 325
`[SENSe<Sensor>:]CORRection:SPDevice:SELect` on page 325
`[SENSe<Sensor>:]CORRection:SPDevice:LIST?` on page 325

Frequency Dependent Offset

Opens the Primary Sensor Offsets, Secondary Sensor Offsets dialogs.

Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset

Configures the power sensor offsets.

Remote command:
`MEMory:TABLe:...`, see Chapter 13.12, "Managing Setups and Correction Tables", on page 380.

Frequency dependent offset active ← Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset
Enables or disables the selected table.

If enabled, the measurement results are corrected using the specified offset. If the exact frequency value is not available in the table, the values of the table are interpolated. If the selected frequency is outside the specified frequency range, the first or last offset value of the table is used.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe[:STATe]` on page 327

Frequency dependent offset table ← Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset
Selects one of the available offset tables.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe:INDex` on page 327
`MEMory:TABLe:SELect` on page 387

Edit table name ← Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset
Enter the table name.

Remote command:
`MEMory:TABLe:MAP` on page 386

Edit table "<table name>" ← Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset
Opens a dialog to edit the selected table.

Remote command:
`MEMory:TABLe:FREQuency` on page 385
`MEMory:TABLe:FREQuency:POINts?` on page 385
`MEMory:TABLe:GAIN:POINts?` on page 385
`MEMory:TABLe:GAIN[:MAGNitude]` on page 386

Export file name, Import file name ← Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset
Edits the filename for export/import.

Export table to file, Import table from file ← Primary Sensor Offsets, Secondary Sensor Offsets dialogs ← Frequency Dependent Offset
Exports or imports the table specified under Export file name, Import file name.

Gamma Correction
Enables or disables the gamma correction. See also "S-Gamma corrections" on page 117.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:CORRection:STATe on page 328

Gamma Phase

Available if Gamma Correction is enabled.

Sets the phase angle of the complex reflection coefficient of the source.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:PHASe on page 328

Gamma Magnitude

Available if Gamma Correction is enabled.

Sets the magnitude of the complex reflection coefficient of the source.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma[:MAGNitude]
on page 329

8.3 Filter Settings

Access:

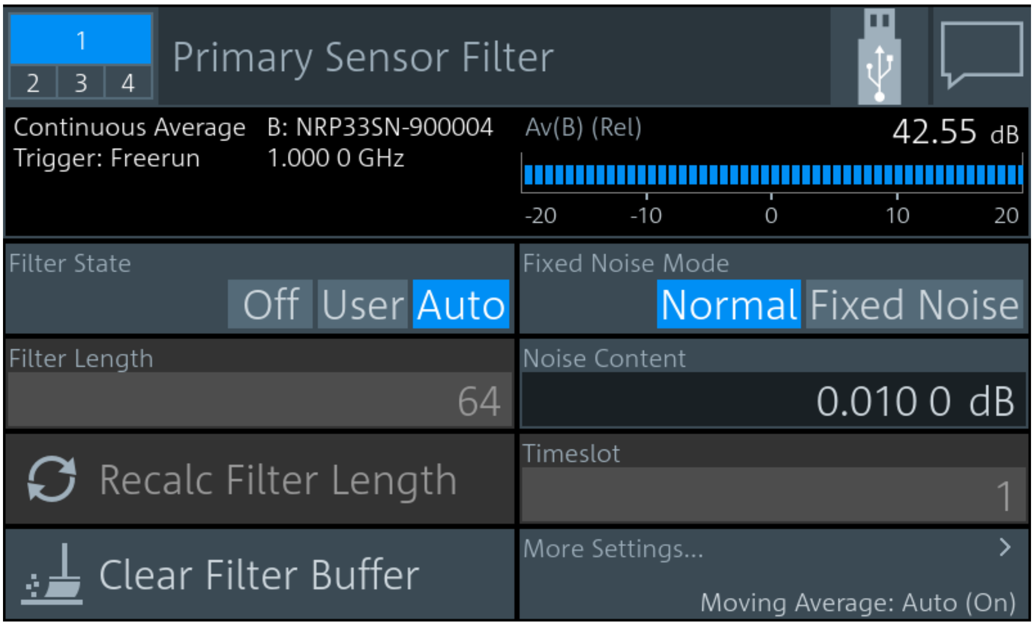
"Measurement Settings" > "Primary Sensor Config" > "Filter"

"Measurement Settings" > "Secondary Sensor Config" > "Filter"

Available for all measurement types.

Use the averaging filter to reduce fluctuations in the measurement results. Such fluctuations can be caused by inherent noise of the power sensor, modulation of the measurement signal or beats from the superposition of adjacent carriers. A more stable display is traded off against longer measurement times, caused by longer settling times when the power changes. As a starting point, always use automatic filtering. If the automatically selected filter setting proves to be not adequate, you can increase or decrease the averaging number manually.

If you want to learn more about methods how to control the measurement, see the user manual of the power sensor.



Filter State

Enables or disables the averaging filter. If enabled, the number of measured values is averaged. Averaging reduces the effect of noise so that more reliable results are obtained.

Remote command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage[:STATe]
on page 334

CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage[:STATe]
on page 336

Filter Length

Sets the number of readings that are averaged for one measured value. The higher the count, the lower the noise, and the longer it takes to obtain a measured value.

If Filter State is set to "Auto", this parameter is read-only.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]` on page 363
`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage:COUNt[:VALue]` on page 334

Recalc Filter Length
Available for continuous average, burst average, time gate measurements.

Recalculates the number of readings that are averaged for one measured value.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe]` on page 362

Clear Filter Buffer
Available for continuous average, burst average, time gate measurements.

Clears the filter buffer.

Remote command:
`[SENSe<Sensor>:]AVERage:RESet` on page 330

Fixed Noise Mode
Available for continuous average, burst average measurements.

Sets the autofilter.

"Normal"	Sets the averaging number so that the intrinsic noise of the power sensor, 2 standard deviations, does not exceed the specified "Noise Content" on page 122.
"Fixed Noise"	Limits the averaging number as specified in Maximum Settling Time to avoid very long settling times.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:TYPE` on page 332

Noise Content
If Fixed Noise Mode is set to "Normal", available for continuous average, burst average measurements.

Sets the averaging number so that the intrinsic noise of the power sensor does not exceed the specified value.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:NSRatio` on page 331

Maximum Settling Time
If Fixed Noise Mode is set to "Fixed Noise", available for continuous average, burst average measurements.

Sets an upper time limit, a maximum time, that is never exceeded.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:MTIMe` on page 330

Timeslot
Available for continuous average, burst average measurements.

Sets a timeslot from which the measured value is used to determine the filter length automatically. The timeslot number must not exceed the number of the currently set timeslots.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:SLOT` on page 331

Moving Average State
Available for continuous average, burst average, trace, pulse analysis, timeslot, statistics measurements.

Enables or disables the automatic termination control.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol:AUTO` on page 332
`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage:TCONtrol:AUTO` on page 335

Moving Average
Available for continuous average, burst average, trace, pulse analysis, timeslot, statistics measurements.

Defines how the measurement results are output. This is called termination control.

On	Outputs intermediate values to facilitate early detection of changes in the measured quantity. In the settled state, that means when the number of measurements specified by the average count has been performed, a moving average is output.
Off	Specifies that a measurement result is not output until the entire measurement has been completed. This means that the number of measurement cycle repetitions is equal to the set average count. If the average count is large, the measurement time can be very long.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol[:ENUM]` on page 333
`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage:TCONtrol[:ENUM]` on page 335

Averaging Domain
Requires an R&S frequency selective power sensor.

Sets the averaging method. See also the user manual of the power sensor.

"Power"	Power averaging
"Video"	Logarithmic averaging

"Linear" Amplitude averaging

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TYPE on page 333

Video Bandwidth
Requires a wideband power sensor.

Sets the video filter bandwidth. Reducing the video bandwidth also increases the trigger sensitivity.

Note: The video bandwidth must never be smaller than the RF bandwidth of the signal.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:VBWidth:ENUM
on page 336

8.4 Range Settings

Access:

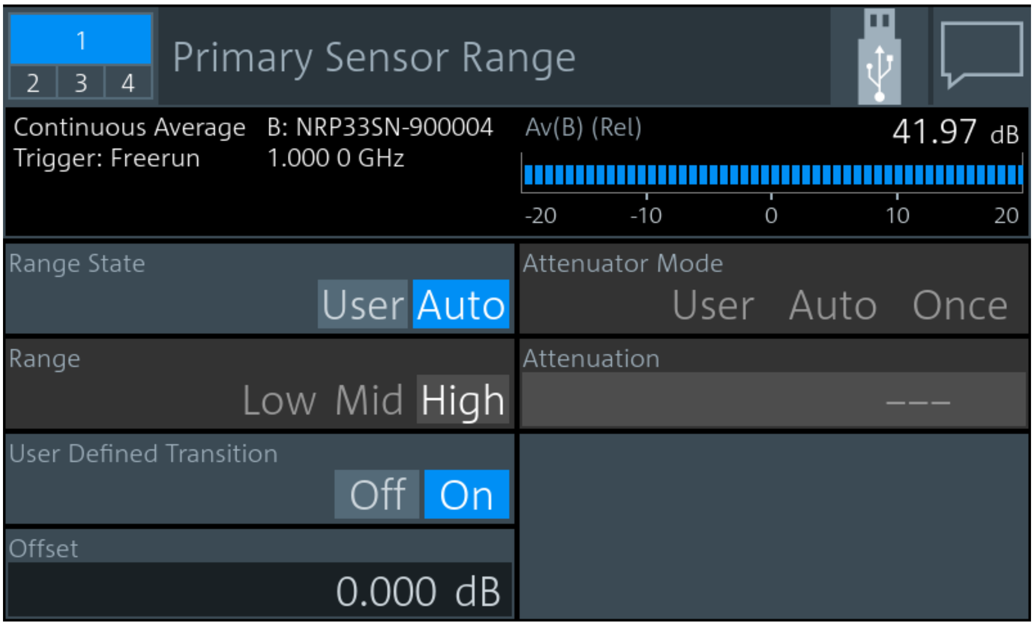
"Measurement Settings" > "Primary Sensor Config" > "Range"

"Measurement Settings" > "Secondary Sensor Config" > "Range"

Available for continuous average, burst average, trace, pulse analysis, time gate, timeslot, statistics measurements.

Some power sensors have only one measurement range, others have two or three measurement ranges. For details, see the data sheet of the power sensor.

The measurement ranges are also called measurement paths. All available paths are continuously and simultaneously measured. Adjacent paths overlap by about 6 dB, and the final measurement result is achieved by appropriately weighting the measurement results of all paths.



Range State

Enables or disables the automatic measurement path selection.

Remote command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:AUTO on page 338

Range

Available if Range State is set to "User".

Sets the active measurement path in which the power sensor is measuring.

Remote command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe[:VALue] on page 339

User Defined Transition

Available if Range State is set to "Auto".

Enables or disables the reduction of the transition range between the measurement paths, entered under Offset.

Remote command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:CLEVel:STATe on page 338

Offset
Reduces the transition range between the measurement paths, 0 -> 1 and 1 -> 2, by the set value, the so-called cross-over level. Thus, you can improve the measurement accuracy for signals with a high peak-to-average ratio, since the headroom for modulation peaks becomes larger. However, the S/N ratio is reduced at the lower limits of the transition ranges.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:CLEVel[:VALue]` on page 339

Attenuator Mode
Requires an R&S frequency selective power sensor.

"User" Disables the automatic setting of the input attenuation.

"Auto" Enables the automatic setting of the input attenuation.

"Once" Adjusts the input attenuation one time, then disables the automatic setting.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation:AUTO` on page 337

Attenuation
Requires an R&S frequency selective power sensor.

Available if Attenuator Mode is set to "User".

Sets the input attenuation. Only two values are possible, 0.0 dB and 30.0 dB. The entered value is rounded to the next value.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation[:VALue]` on page 338

8.5 NRT Measurement Type

Requirements:

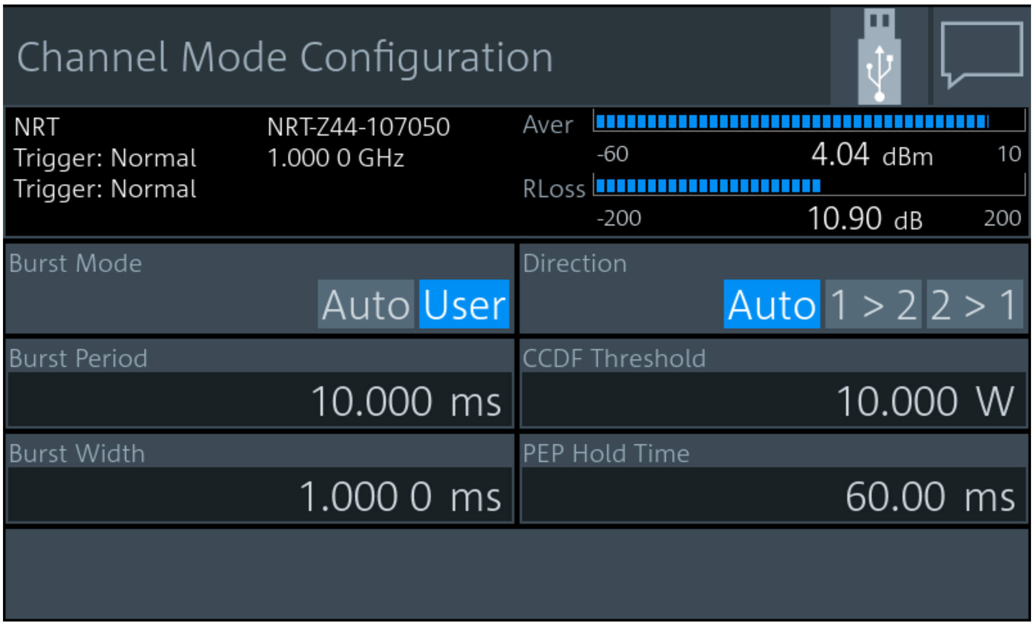
- "Measurement Settings" > "Measurement Type" > "NRT"
- Sensor interface for R&S NRT (R&S NRX-B9), see Chapter 3.2.1.2, "Module Bay", on page 24.
- R&S directional power sensors

Further information:

- Chapter 7.8, "NRT", on page 106

8.5.1 NRT Mode Settings

Access: "Measurement Main Configuration" > "Sensor Configuration" > "Mode"



Burst Mode

Defines how the average burst power is determined.

"Auto" Not supported by all power sensors.
The power sensor automatically recognizes the duty cycle of the burst series and calculates the average burst power from this duty cycle and the average power. Set an appropriate Video Bandwidth.

"User" Define the duty cycle by:
- Burst Period
- Burst Width

The R&S NRX calculates the average burst power from these values.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:MODE`
on page 355

Burst Period

Available if "User" is set under "Burst Mode" on page 127.

Sets the burst period.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:PERiod
on page 356

Burst Width
Available if "User" is set under "Burst Mode" on page 127.

Sets the burst width.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:WIDTh
on page 357

Direction
Defines how the forward power is determined.

"Auto" Determines the power flow direction automatically. The greater value of two measured values is automatically assigned as forward power.

"1 > 2", "2 > 1" Sets a fixed direction of the forward power, either from port 1 to port 2, or from port 2 to port 1.
The two ports are indicated on the directional power sensor.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DIRection
on page 357
INPut<Sensor>:PORT:SOURce:AUTO on page 358
INPut<Sensor>:PORT:SOURce[:VALue] on page 359

CCDF Threshold
Sets the threshold for the complementary cumulative distribution function, CCDF.

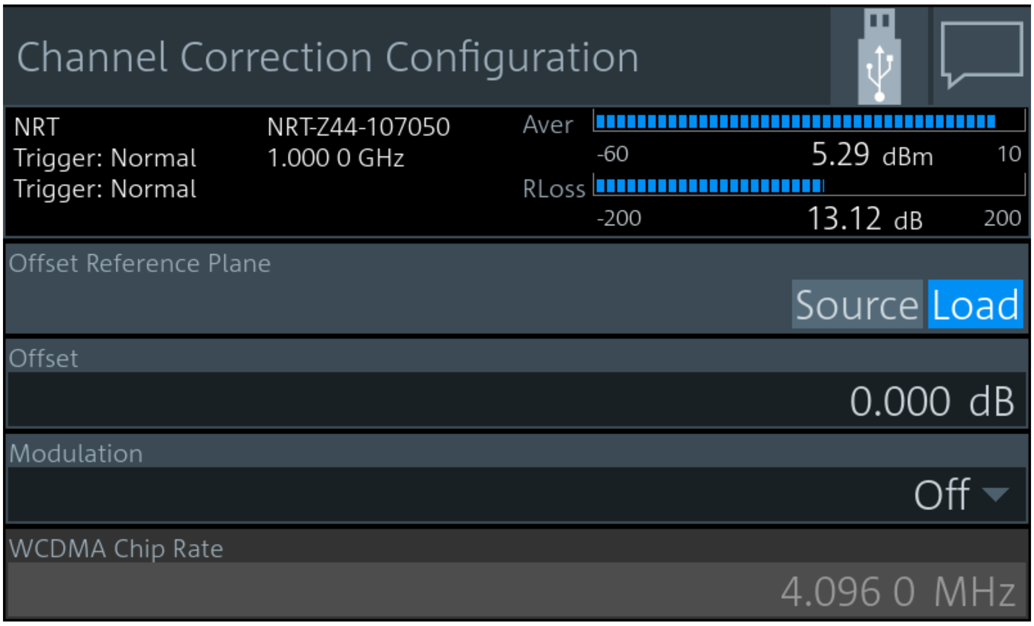
Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:CCDF:THReshold
on page 357

PEP Hold Time
Sets the hold time of the peak hold circuit of the power sensor. See also Peak Envelope Power (PEP).

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:PEP:HOLD:TIME
on page 358

8.5.2 NRT Correction Settings

Access: "Measurement Main Configuration" > "Sensor Configuration" > "Correction"



Offset Reference Plane

Selects the power sensor port to which the measurement results are referred to.

"Source" Source connector of the R&S NRT-Zxx power sensor

"Load" Load connector of the R&S NRT-Zxx power sensor

Remote command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:RPLane` on page 360

`INPut<Sensor>:PORT:POSition` on page 361

Offset

Considers the transmission loss in a cable that connects the desired measurement point, set by Offset Reference Plane, and the power sensor.

Remote command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:STATe` on page 326

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet[:MAGNitude]` on page 328

`INPut<Sensor>:PORT:OFFSet` on page 361

Modulation

Sets a communication standard for the modulation correction to reduce systematic deviations occurring in power measurements.

"Off" Disabled.

"IS95"	IS- 95 CDMA standard for base stations.
"WCDMA"	WCDMA standard for base stations.
"DVBT"	DVB-T standard for terrestrial DVB TV transmitters.
"DAB"	DAB standard for radio transmitters.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation[:VALue] on page 360
[SENSe<Sensor>:]DM:STATe on page 359
[SENSe<Sensor>:]DM:STANdard on page 360

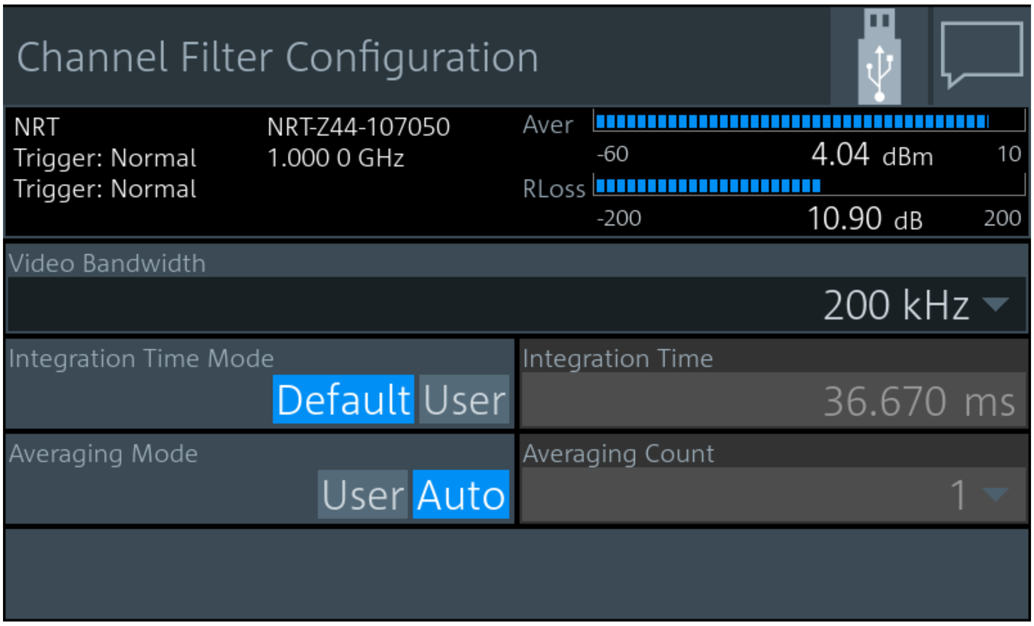
WCDMA Chip Rate
Available if "WCDMA" is set under Modulation.

Sets the chip rate for the WCDMA communication standard.

Remote command:
CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation:WCDMa:CRATe on page 361

8.5.3 NRT Filter Settings

Access: "Measurement Main Configuration" > "Sensor Configuration" > "Filter"



Video Bandwidth

For measuring the peak envelope power, specify the video bandwidth that the power sensor uses for measuring the detected RF signal.

"4 kHz" | "200 kHz" | "Full"
"Full" means that the maximum bandwidth of the power sensor is used.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:VBWidth[:VALue]` on page 364
`[SENSe<Sensor>:]BANDwidth:VIDeo:FNUMber` on page 365
`[SENSe<Sensor>:]BWIDth:VIDeo:FNUMber` on page 365

Integration Time Mode

Specifies which integration time is used for a single measurement.

"Default" Uses the default settings.

"User" Define a value under Integration Time.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture:MODE` on page 363

Integration Time

Available if Integration Time Mode is set to "User".

Defines the integration time for a single measurement.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture[:VALue]` on page 364

Averaging Mode

Sets the averaging mode.

"User" Define the value under Averaging Count.

"Auto" Determines the average count automatically from the level of the input signal.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe]` on page 362

Averaging Count

Available if Averaging Mode is set to "User".

Sets the number of readings that are averaged for one measured value. The higher the count, the lower the noise, and the longer it takes to obtain a measured value.

Remote command:
`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]` on page 363

9 Saving and Recalling Settings

When shutting down, the R&S NRX saves the measurement settings. When booting the next time, the R&S NRX uses the settings from the last session. See also Chapter 3.1.7, "Switching On or Off", on page 20.

If you want to return to a defined initial state, perform a preset. See "Preset" on page 133.

If you want to save specific measurement settings to reuse at another time, save the setup in a file. The R&S NRX offers 20 setup files for this purpose.

Access: [Preset] > "Save / Recall / Preset" dialog

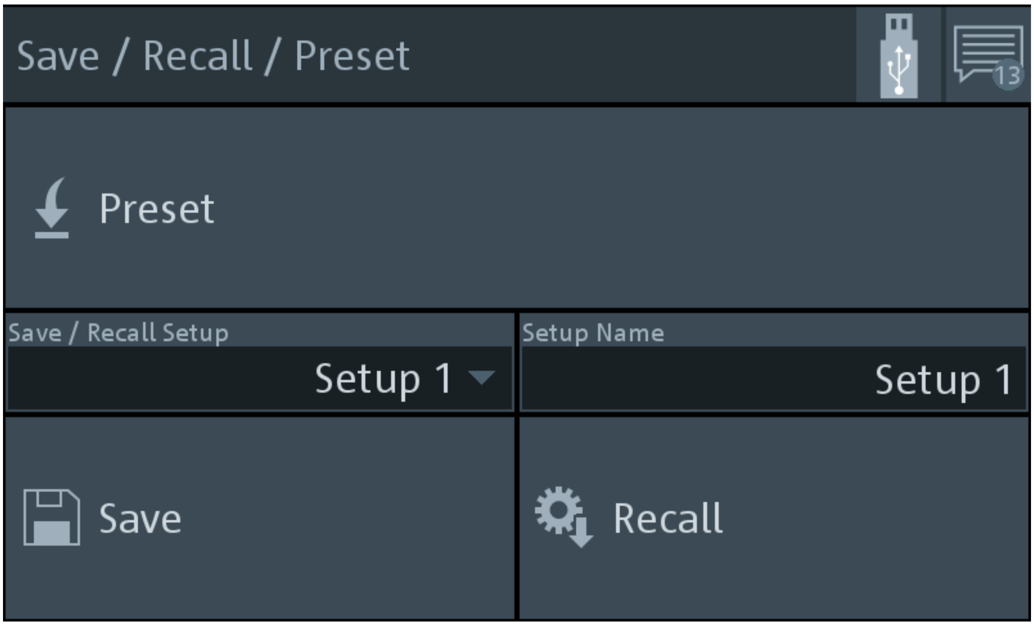


Figure 9-1: Save / Recall / Preset dialog

To save settings

1. Press [Preset].
2. Under "Save / Recall Setup", select a setup, for example "Setup 2".
3. If you want to give the setup a meaningful name, enter a new name under "Setup Name".
4. Tap "Save".

To recall settings

1. Press [Preset].
2. Under "Save / Recall Setup", select the setup you want to load, for example "Setup 2".

3. Tap "Recall".

Preset
Sets the R&S NRX and the connected R&S power sensors to a defined initial state. Thus, you can change parameter values from a well defined starting point.

If the default setting of the R&S NRX is not compatible with the sensor, either the default settings are adapted for the sensor or a setting conflict results. See also Chapter 5.5, "Settings Conflict", on page 47.

For details on sensor settings, see the user manual of the R&S power sensor.

Remote command:
`SYSTem:PRESet` on page 388
`*RST` on page 179

Save / Recall Setup
Selects the setup file in which the instrument settings are saved.

Remote command:
`MEMory:STATe:DEFine` on page 384
`MEMory:STATe:MAP` on page 384

Save
Saves the current instrument settings in the selected setup file.

Remote command:
`*SAV` on page 179

Setup Name
Selects the setup file from which to load the instrument settings.

Remote command:
`MEMory:STATe:DEFine` on page 384
`MEMory:STATe:MAP` on page 384

Recall
Restores the selected instrument settings.

Remote command:
`*RCL` on page 179

10 Zeroing Sensors

Zeroing removes offset voltages from the analog circuitry of the sensors, so that there are only low powers displayed when there is no power applied.

Zeroing is recommended if:

- The temperature has varied by more than 5 K.
- The sensor has been replaced.
- No zeroing was performed in the last 24 hours.
- Signals of very low power are to be measured, for instance, if the expected measured value is less than 10 dB above the lower measurement range limit.

Access: [Zero] > "Zeroing Sensors" dialog

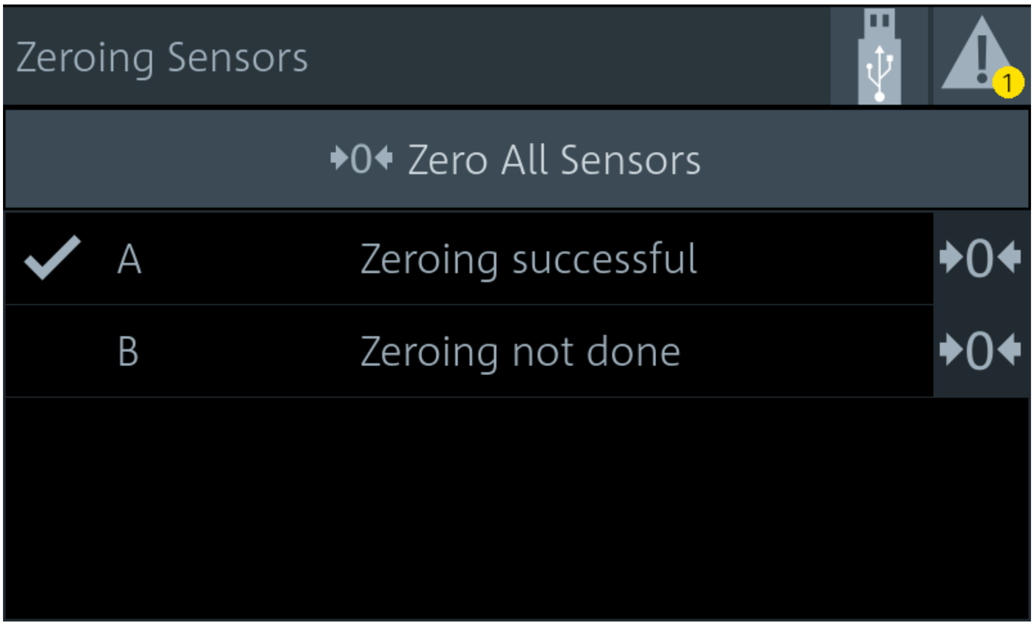


Figure 10-1: Zeroing Sensors dialog

The table below "Zero All Sensors" shows all connected sensors with:

- Port name, A to D
- Zeroing status: not done, in progress, successful

Sensors zeroed successful are also checked: ☑

To zero sensors

1. Disconnect the sensors you want to zero from all power sources. Any signal present at the RF input of a sensor is taken into account. You can either switch off the RF output of a DUT or disconnect the sensor physically from any power source.

   Note: An active test signal during zeroing causes an error.
2. Press [Zero].

3. You can zero an individual sensor or all sensors at once:
   - Tap "Zero All Sensors".
   - Tap  in the row of the sensor you want to zero.

   The status changes from in progress to successful.

Remote command:

- See Chapter 13.10, "Zeroing", on page 376.

11 System Settings

The system settings do not affect the measurements directly.

Access: [System]

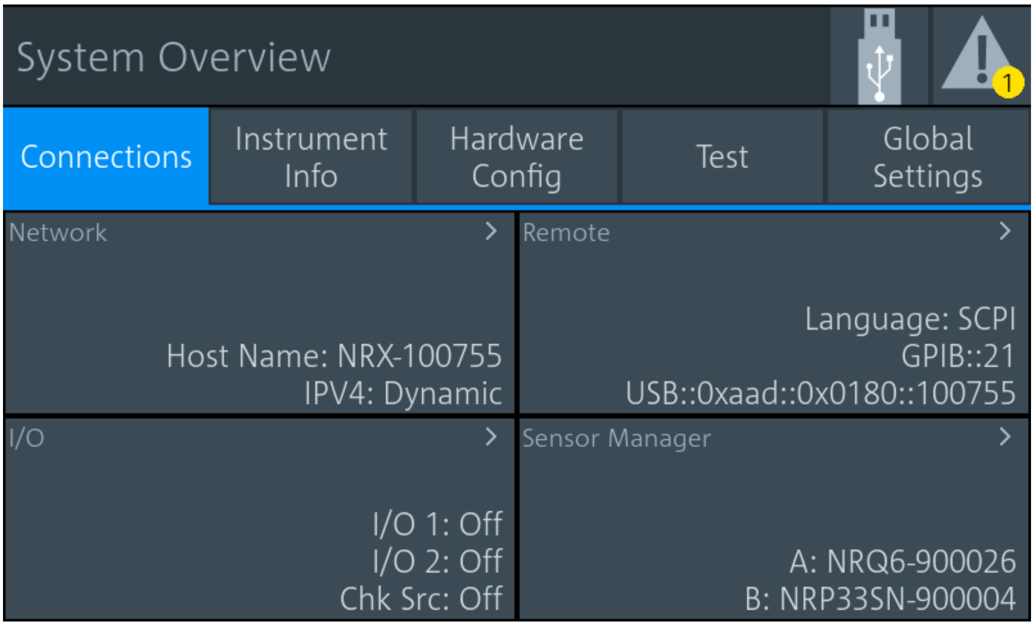


Figure 11-1: System Overview dialog

The "System Overview" dialog is divided into the following tabs:

11.1 Connections

Access: [System] > "Connections"

See Figure 11-1.

On this tab, you display and configure the following settings:

11.1.1 Network Settings

Access: [System] > "Connections" > "Network"

Contains the settings for integrating the R&S NRX in a network. There are two methods to establish a network connection between R&S NRX and computer:

► Connect both to a common network (infrastructure network).

► Connect R&S NRX and computer only over the switch (peer-to-peer network).
  In this case, the use of a static IP address is recommended.

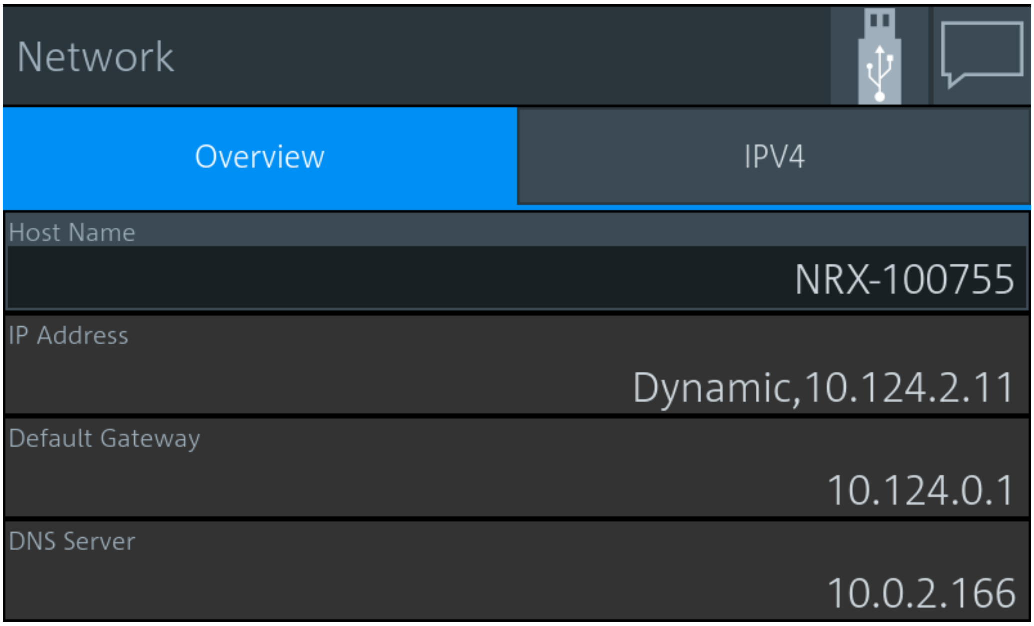
Connection errors can affect the entire network. If your network does not support DHCP, or if you choose to disable dynamic TCP/IP configuration, assign a valid address information before connecting the R&S NRX to the LAN. Contact your network administrator to obtain valid IP addresses.

After integrating the R&S NRX into a network, you can set up the following connections:

- Remote control connection to control the R&S NRX using SCPI commands.
  See Chapter 4.3, "Remote Control", on page 41.
- Remote desktop connection for remote operation or file transfer.
  See Chapter 4.2, "Remote Operation", on page 40.

The "Network" dialog is divided into the following tabs:

Overview tab



Apart from the Host Name, the other parameters are only displayed here. Configure them on the "IPv4 tab" on page 139.

Host Name ← Overview tab

Sets the individual hostname of the R&S NRX.

In a LAN that uses a domain name system server (DNS server), you can access each connected instrument using a unique hostname instead of its IP address. The DNS server translates the hostname to the IP address. Using a hostname is especially useful if a DHCP server is used, as a new IP address can be assigned each time the R&S NRX is restarted.

When you change the hostname, the R&S NRX restarts its connection to the network, which can take several seconds. During this time, you cannot address the R&S NRX. After the restart, you can only address the R&S NRX using the newly set hostname.

Note: It is recommended that you do not change the default hostname to avoid problems with the network connection. However, if you change the hostname, be sure to use a unique name.

Remote command:
`SYSTem:COMMunicate:NETWork[:COMMon]:HOSTname` on page 392

IP Address ← Overview tab

Displays the IP address, and whether it is static or dynamic.

Set the parameters under:

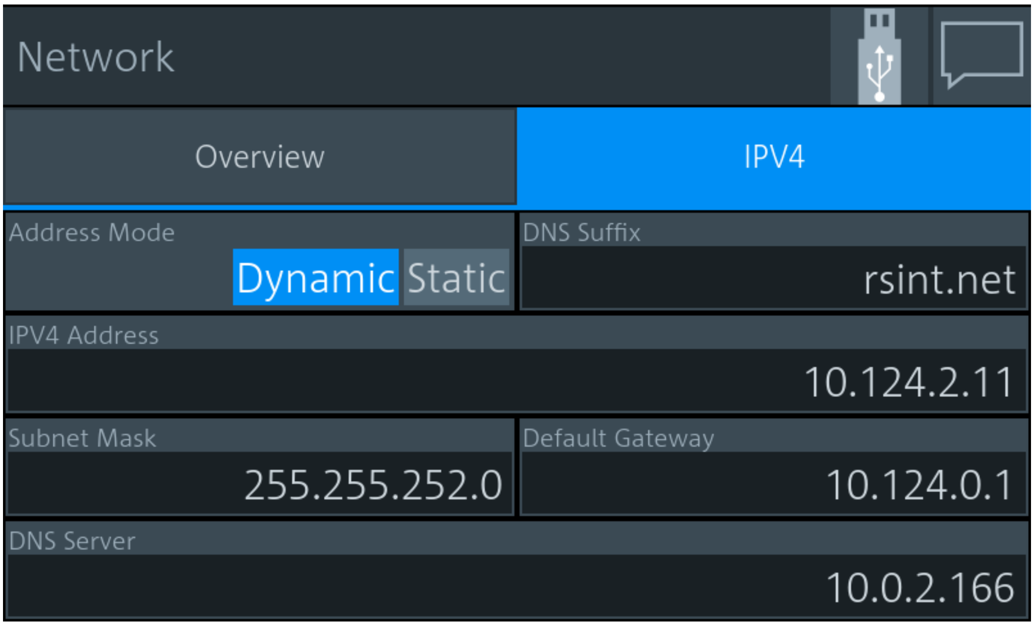
- "Address Mode" on page 139
- "IPv4 Address" on page 139

Default Gateway ← Overview tab

Displays the IP address of the default gateway of the local subnet. Set the parameter under "Default Gateway" on page 140.

DNS Server ← Overview tab
Displays the IP address of the DNS server of the local subnet. Set the parameter under "DNS Server" on page 140.

IPv4 tab



Addresses consist of 4 number blocks separated by dots. In maximum, each block contains 3 digits, for example *100.100.100.100*. Fewer digits in a block are also allowed.

Address Mode ← IPv4 tab
Sets how the IP address is assigned.

"Dynamic" Assigns the IP address automatically, provided the network supports the dynamic host configuration protocol (DHCP).

"Static" Enables assigning the IP address manually.

Remote command:
`SYSTem:COMMunicate:NETWork[:IPADdress]:MODE` on page 392
`SYSTem:COMMunicate:INET[:SELF]:MODE` on page 392

DNS Suffix ← IPv4 tab
Sets the primary DNS suffix, that means the domain name. DNS uses the suffix for registration and name resolution to identify the R&S NRX uniquely in the entire network.

Remote command:
`SYSTem:COMMunicate:NETWork[:COMMon]:DOMain` on page 391
`SYSTem:COMMunicate:INET[:SELF]:DNS:SUFFix` on page 391

IPv4 Address ← IPv4 tab
Available if "Static" is set under Address Mode.

Sets the IP address of the R&S NRX.

Remote command:
`SYSTem:COMMunicate:NETWork[:IPADdress][:ADDRess]` on page 391
`SYSTem:COMMunicate:INET[:SELF]:ADDRess` on page 391

Subnet Mask ← IPv4 tab
Available if "Static" is set under Address Mode.

Sets the subnet mask of your local subnet.

Remote command:
`SYSTem:COMMunicate:NETWork[:IPADdress]:SUBNet:MASK` on page 392
`SYSTem:COMMunicate:INET[:SELF]:SUBNetmask:ADDRess` on page 392

Default Gateway ← IPv4 tab
Available if "Static" is set under Address Mode.

Sets the IP address of the default gateway.

Remote command:
`SYSTem:COMMunicate:NETWork[:IPADdress]:GATeway` on page 392
`SYSTem:COMMunicate:INET[:SELF]:GATeway:ADDRess` on page 392

DNS Server ← IPv4 tab
Available if "Static" is set under Address Mode.

Sets the DNS server address of your local subnet.

Remote command:
`SYSTem:COMMunicate:NETWork[:IPADdress]:DNS` on page 391
`SYSTem:COMMunicate:INET[:SELF]:DNS:ADDRess` on page 391

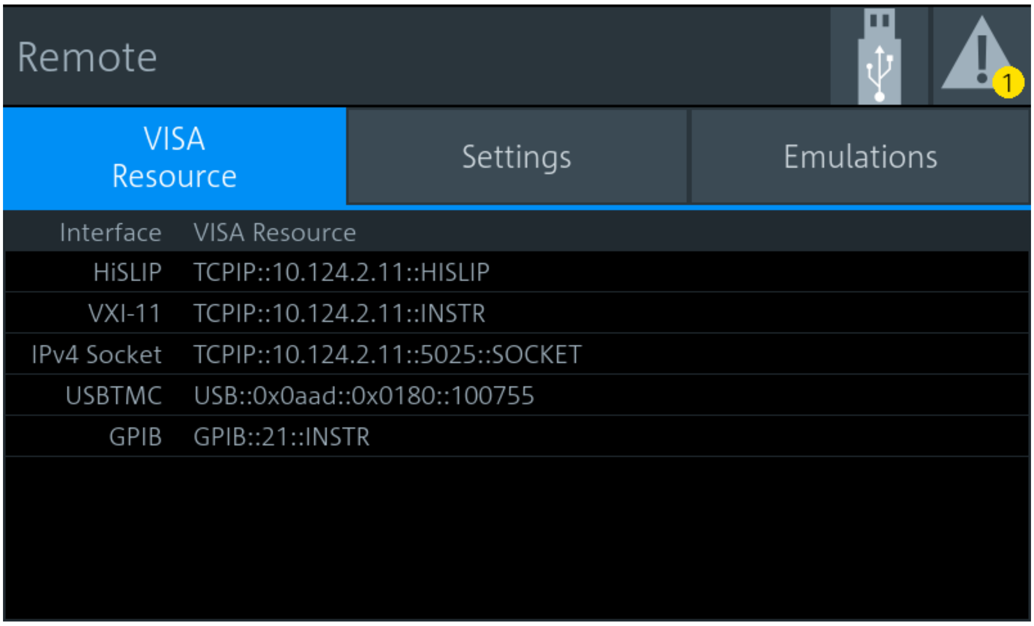
11.1.2 Remote Settings

Access: [System] > "Connections" > "Remote"

Contains the settings for remote control.

The "Remote" dialog is divided into the following tabs:

VISA Resource tab

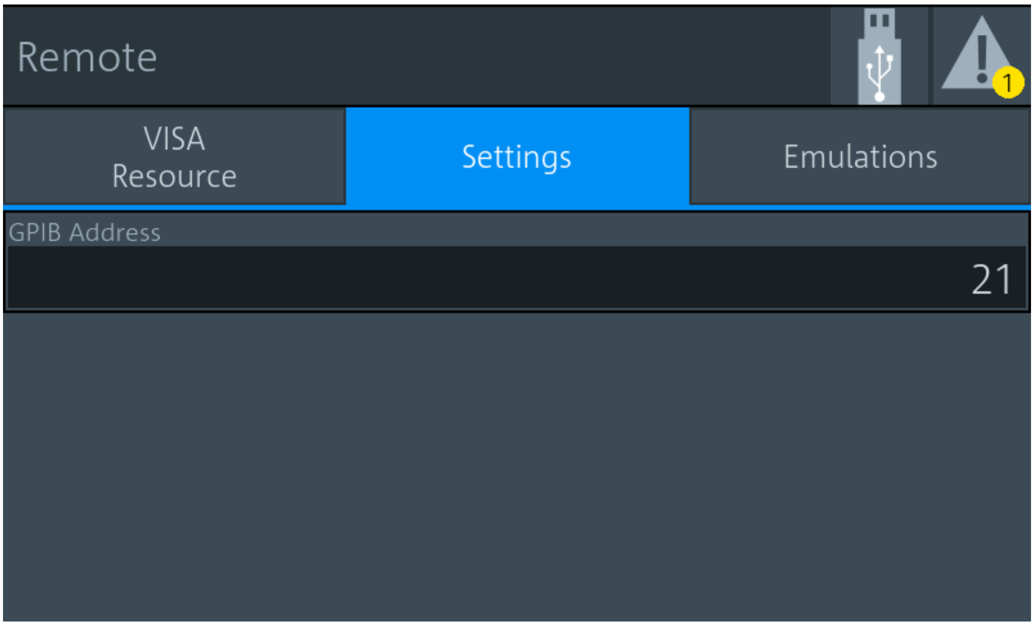


Interface - VISA Resource table ← VISA Resource tab

Displays the VISA resource strings of the interfaces available for remote control.

In a LAN, the VISA resource string is required to establish a communication session between the controller and the R&S NRX. The resource string is a unique identifier, composed of the specific IP address of the instrument and some network and VISA-specific keywords. The resource string depends on the interface used for remote control, see Table 14-1.

Settings tab



GPIB Address ← Settings tab

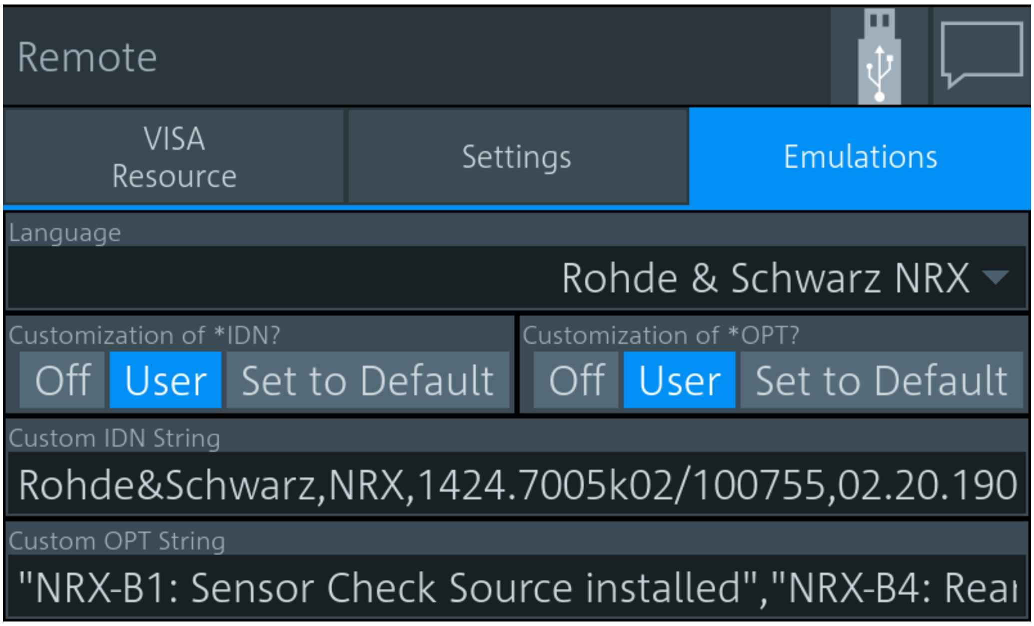
Sets the GPIB address. See also Chapter 14.1.3, "GPIB Interface", on page 453.

"1" to "30" Channel address

Remote command:

`SYSTem:COMMunicate:GPIB[:SELF]:ADDRess` on page 393

Emulations tab



Language ← Emulations tab

Sets the language for the remote commands.

"Rohde & Schwarz NRX"

Native remote command set of the R&S NRX, based on the standard commands for programmable instruments (SCPI-99).

"Rohde & Schwarz NRP2" Emulation for the predecessor, the R&S NRP2.

Remote command:

`SYSTem:LANGuage` on page 395

Customization of *IDN? ← Emulations tab

Sets which identification string is used.

"Off" Default identification string

"User" Customized identification string. Enter the customized instrument identification string under Custom IDN String.

"Set to Default" Sets the content of Custom IDN String to the default identification string.

Remote command:
`SYSTem:IDN:MODE` on page 395
`SYSTem:IDN:AUTO` on page 395

Customization of *OPT? ← Emulations tab
Sets which option string is used.

"Off"	Default option string
"User"	Customized option string. Enter the customized option string under Custom OPT String.
"Set to Default"	Sets the content of Custom OPT String to the default identification string.

Remote command:
`SYSTem:OPT:MODE` on page 396
`SYSTem:OPT:AUTO` on page 396

Custom IDN String ← Emulations tab
Available if Customization of *IDN? is set to "User".

Sets the customized instrument identification string so that you can identify each R&S NRX individually.

Remote command:
`SYSTem:IDN:ANSWer` on page 394

Custom OPT String ← Emulations tab
Available if Customization of *OPT? is set to "User".

Sets the customized option identification string.

Remote command:
`SYSTem:OPT:ANSWer` on page 396

11.1.3 Input/Output Settings (I/O)

Access: [System] > "Connections" > "I/O"

The "I/O" dialog is divided into the following tabs:

Sensor Check Source tab
Requires the sensor check source (R&S NRX-B1). If the option is installed, this tab is displayed as first tab.

Configures the sensor check source (R&S NRX-B1) that is installed in the module bay. See "Sensor check source (R&S NRX-B1)" on page 24.

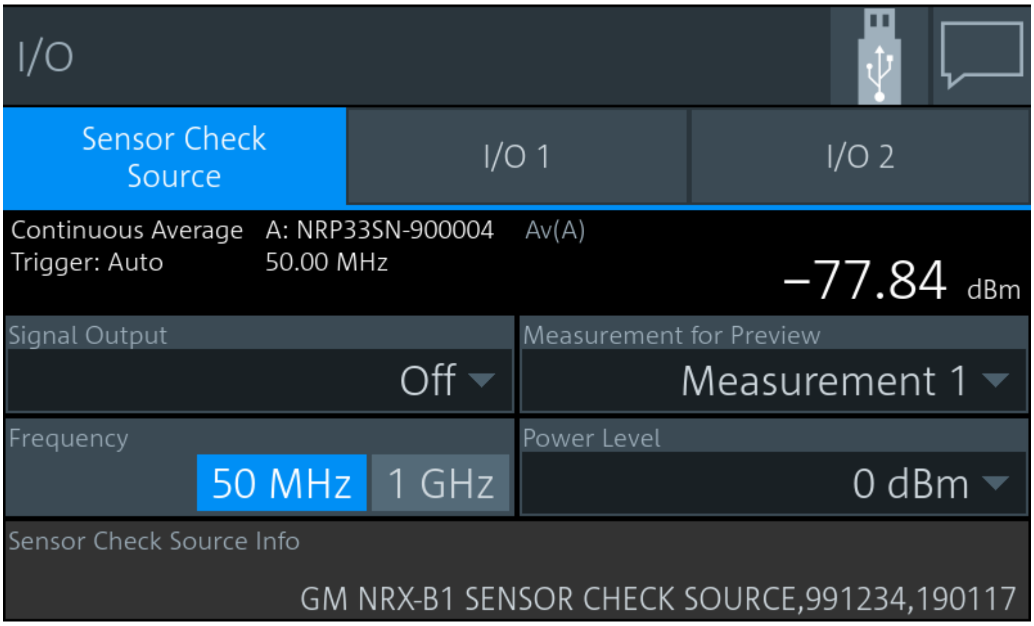


Figure 11-2: Sensor Check Source tab

In the upper pane, the result display shows the effect of parameter changes on the measurement.

Signal Output ← Sensor Check Source tab
Disables the output or sets the signal type, continuous wave or pulses.

Remote command:
`SOURce:OUTPut:STATe` on page 365
`OUTPut:SOURce:STATe` on page 365
`SOURce:PULM:STATe` on page 366

Frequency ← Sensor Check Source tab
Sets the frequency of the output signal.

Remote command:
`SOURce[:RF]:FREQuency[:VALue]` on page 366

Measurement for Preview ← Sensor Check Source tab
Selects the measurement that is displayed in the upper right corner.

Power Level ← Sensor Check Source tab
Sets the power level for the output signal.

Remote command:
`SOURce:POWer[:VALue]` on page 366
`SOURce:UNIT:POWer` on page 207

Sensor Check Source Info ← Sensor Check Source tab
The firmware of the R&S NRX includes a package for the sensor check source (R&S NRX-B1), but the sensor check source (R&S NRX-B1) is not updated automatically. If a new version is available, a warning message is displayed in the notification center and the new version is displayed here as shown in Figure 11-3. Tap the info field to update the sensor check source (R&S NRX-B1).

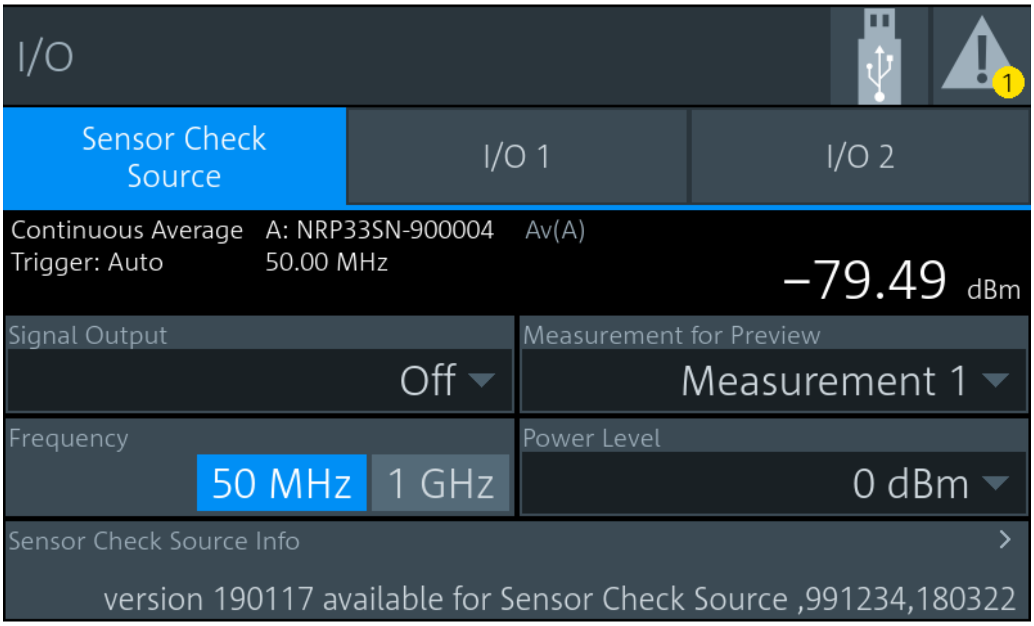


Figure 11-3: New version available for installation

I/O 1, I/O 2 tabs
Configures the two multifunctional BNC connectors at the rear of the R&S NRX, see Chapter 3.2.2.1, "Trig In / Out 2 and Out 1 / Trig Out Connectors", on page 28.
- Use the "I/O 1" tab for Out 1 / Trig Out connector.
- Use the "I/O 2" tab for Trig In / Out 2 connector.

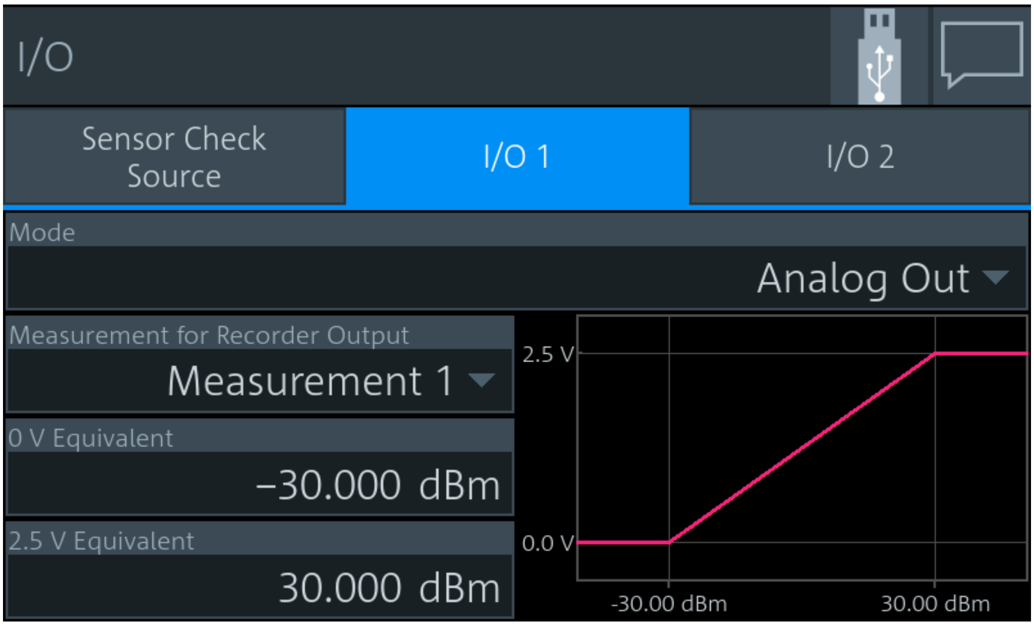


Figure 11-4: Example

Mode ← I/O 1, I/O 2 tabs

Sets the functionality of the Out 1 / Trig Out and Trig In / Out 2 connectors.

"Off" Disables the connector.

"Analog Out" Available for continuous average, burst average, time gate, timeslot measurements.
Provides an analog voltage that is proportional to the displayed value.

"Forw Analog Out", "Refl Analog Out"
Available for NRT measurements.
Provides an analog voltage that is proportional to the displayed value.

"Limit Violation"
Available for:
- continuous average, burst average, time gate, timeslot measurements
- Out 1 / Trig Out BNC connector ("I/O 1" tab)

Sets the fail voltage that is output if a measured value causes a limit violation.

"Forw Limit Violation"
Available for:
- NRT measurements
- Out 1 / Trig Out BNC connector ("I/O 1" tab)

Sets the fail voltage that is output if a value of the forward measurement causes a limit violation.

"Refl Limit Violation"
Available for the Out 1 / Trig Out BNC connector ("I/O 1" tab).
Sets the fail voltage that is output if a value of the reflection measurement causes a limit violation.

"Trigger Out" Available for the Out 1 / Trig Out BNC connector "I/O 1" tab.
Provides a trigger signal at the Out 1 / Trig Out connector. Select the trigger source under Trigger Source for Trigger Output.

"Trigger In" Available for the Trig In / Out 2 BNC connector ("I/O 2" tab).
Apply an external trigger signal at the Trig In / Out 2 connector. Set the termination resistance under Impedance for Trigger Input.

Remote command:
`[SENSe<Sensor>:]POWer:REFLection:RANGe:LIMit[:STATe]` on page 284
`[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit[:STATe]` on page 284
`OUTPut:MODE<output>` on page 368

Measurement for Recorder Output ← I/O 1, I/O 2 tabs
Available if Mode is set to:
- "Analog Out"
- "Forw Analog Out"
- "Refl Analog Out"

Sets the measurement of which the results are output.

Remote command:
`OUTPut:RECorder<output>:FEED:INDex` on page 369

0 V Equivalent ← I/O 1, I/O 2 tabs
Available if Mode is set to:
- "Analog Out"
- "Forw Analog Out"
- "Refl Analog Out"

Enter the measurement value that corresponds to 0 V output voltage.

Remote command:
`OUTPut:RECorder<output>:LIMit:LOWer:CCDF` on page 369
`OUTPut:RECorder<output>:LIMit:LOWer:POWer` on page 370
`OUTPut:RECorder<output>:LIMit:LOWer:RATio:RCOefficient` on page 370
`OUTPut:RECorder<output>:LIMit:LOWer:RATio:RFRatio` on page 371
`OUTPut:RECorder<output>:LIMit:LOWer:RATio:RLOSs` on page 371
`OUTPut:RECorder<output>:LIMit:LOWer:RATio:SWR` on page 371
`OUTPut:RECorder<output>:LIMit:LOWer:RATio[:VALue]` on page 372
`OUTPut:RECorder<output>:LIMit:LOWer[:VALue]` on page 370

2.5 V Equivalent ← I/O 1, I/O 2 tabs
Available if Mode is set to:
- "Analog Out"
- "Forw Analog Out"
- "Refl Analog Out"

Enter the measurement value that corresponds to 2.5 V output voltage.

Remote command:
`OUTPut:RECorder<output>:LIMit:UPPer:CCDF` on page 372
`OUTPut:RECorder<output>:LIMit:UPPer:POWer` on page 373
`OUTPut:RECorder<output>:LIMit:UPPer:RATio:RCOefficient` on page 373
`OUTPut:RECorder<output>:LIMit:UPPer:RATio:RFRatio` on page 374

OUTPut:RECorder<output>:LIMit:UPPer:RATio:RLOSs on page 374
OUTPut:RECorder<output>:LIMit:UPPer:RATio:SWR on page 375
OUTPut:RECorder<output>:LIMit:UPPer:RATio[:VALue] on page 375
OUTPut:RECorder<output>:LIMit:UPPer[:VALue] on page 373

Measurement for Limit Output ← I/O 1, I/O 2 tabs
Available if Mode is set to:
- "Limit Violation"
- "Forw Limit Violation"
- "Refl Limit Violation"

Sets the measurement that is monitored.

Remote command:
[SENSe<Sensor>:]POWer:REFLection:RANGe:LOWer on page 284
[SENSe<Sensor>:]POWer[:POWer]:RANGe:LOWer on page 284
[SENSe<Sensor>:]POWer:REFLection:RANGe[:UPPer] on page 285
[SENSe<Sensor>:]POWer[:POWer]:RANGe[:UPPer] on page 285
OUTPut:LIMit:FEED:INDex on page 368

Fail Voltage ← I/O 1, I/O 2 tabs
Available if Mode is set to:
- "Limit Violation"
- "Forw Limit Violation"
- "Refl Limit Violation"

Sets the fail voltage that is output if a measured value causes a limit violation.

"Low"	0 V
"High"	3.3 V

Remote command:
[SENSe<Sensor>:]POWer:REFLection:RANGe:AUTO on page 283
[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit:DETect on page 284
OUTPut:LIMit:FAIL on page 368

Trigger Source for Trigger Output ← I/O 1, I/O 2 tabs
Available if Mode is set to "Trigger Out".

Sets the trigger source.

Remote command:
OUTPut:TRIGger:SOURce on page 375

Impedance for Trigger Input ← I/O 1, I/O 2 tabs
Available if Mode is set to "Trigger In".

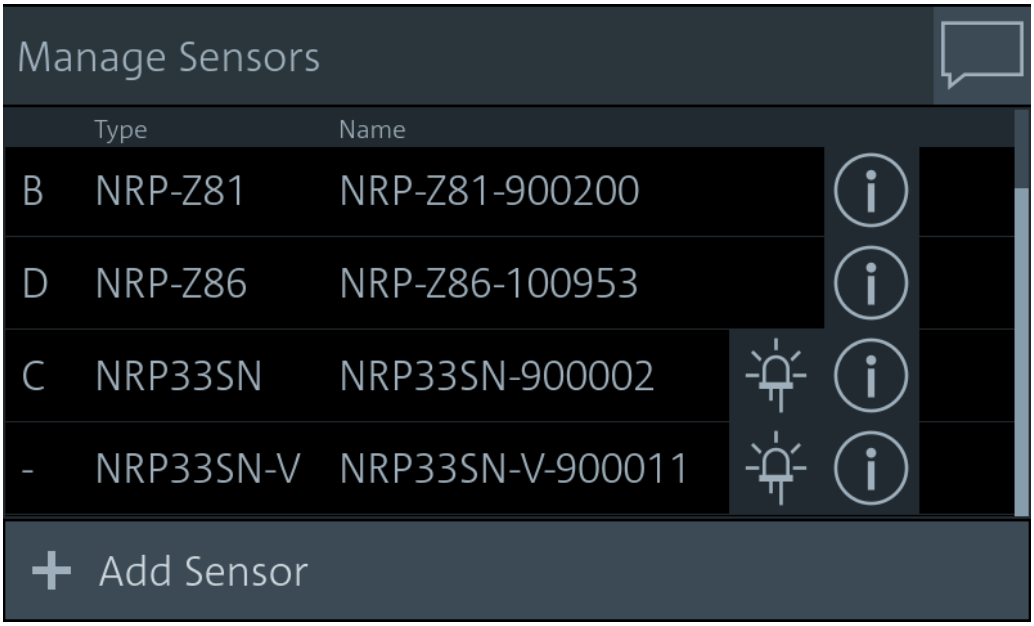
Sets the termination resistance of the external trigger signal that is supplied at the Trig In / Out 2 connector. Choose a setting that fits the impedance of the trigger source to minimize reflections on the trigger signals.

Remote command:
INPut<undef>:TRIGger:IMPedance on page 367

11.1.4 Sensor Manager

Access: [System] > "Connections" > "Sensor Manager"

Helps you to manage power sensors, for example, if more than 4 power sensors are connected, or if you want to connect a LAN power sensor.



The R&S NRX recognizes and adds the following power sensors:

- Connected to the ports A to D. They are assigned the letter of the port.
- Connected to one of the USB host interfaces; directly or indirectly, by USB hub. They are assigned the letters E to M.

R&S power sensors that are connected to the LAN interface are not recognized automatically. Add them, see "To add a LAN power sensor" on page 149.

Symbol	Description
	LED icon Tap to identify a connected power sensor. If the power sensor has a status LED, it flashes yellow for 5 seconds.
	Info icon Tap to open the "Sensor Info" dialog, see "Sensor Info" on page 150.

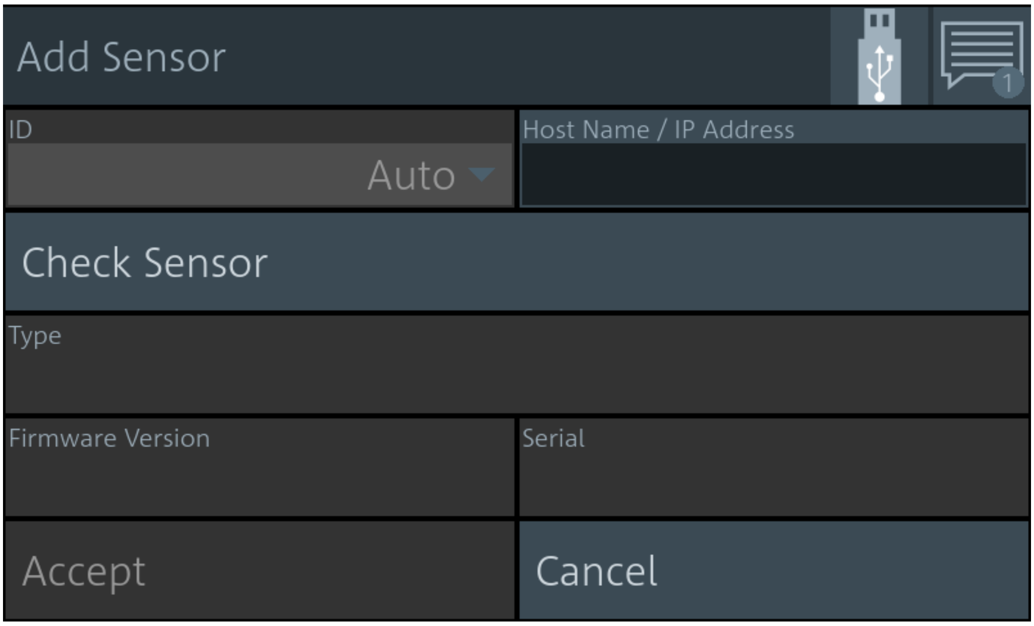
To add a LAN power sensor

1. In the "Manage Sensors" dialog, tap "Add Sensor".
2. Enter the hostname or IP address of the power sensor.
3. Tap "Check Sensor".
4. Tap "Accept".

The sensor manager gives access to:

Add Sensor

Adds a LAN power sensor. See "To add a LAN power sensor" on page 149.

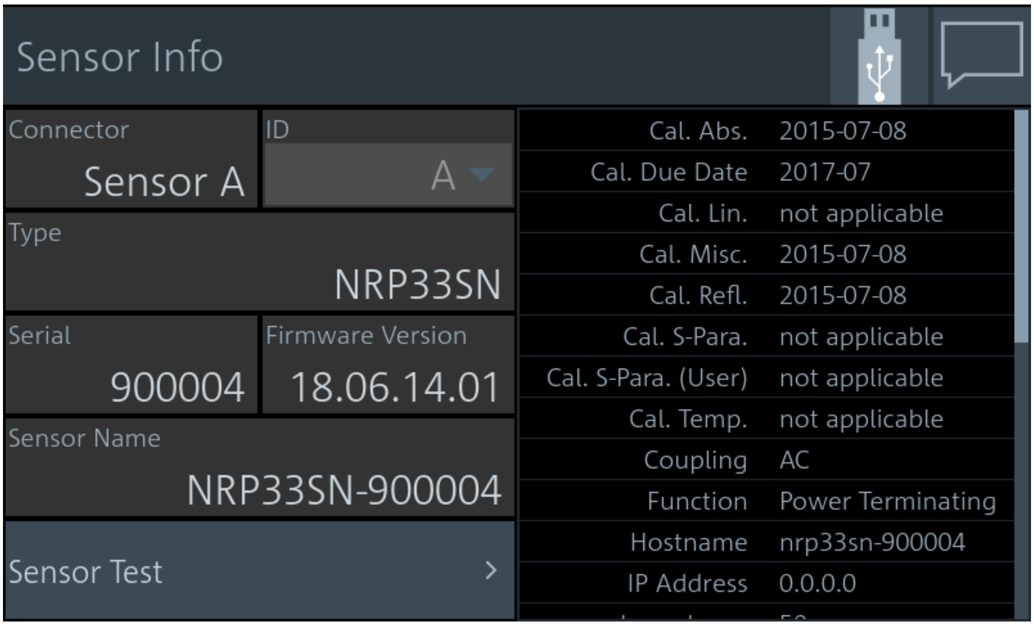


Remote command:
[SENSe<Sensor>:]ADD on page 397

Sensor Info

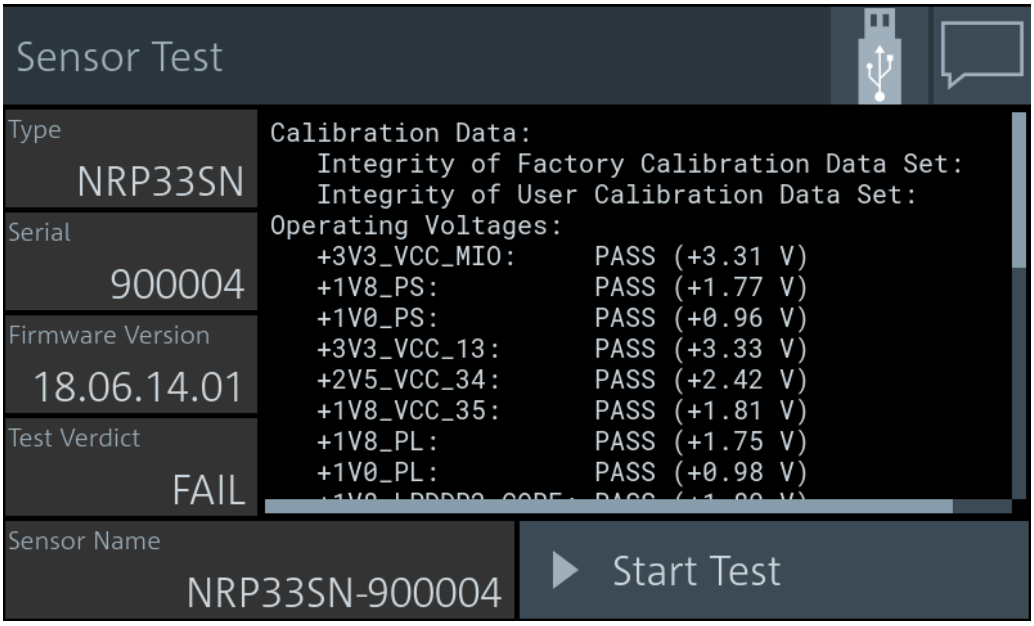
Access: [System] > "Connections" > "Sensor Manager" >

Displays information about the selected power sensor, including calibration data.



Remote command:
`SYSTem:SENSor<Sensor>:INFO?` on page 397

Sensor Test ← Sensor Info
Tap "Start Test" to start a selftest of the connected power sensor. The selftest provides detailed information that you can use for troubleshooting.



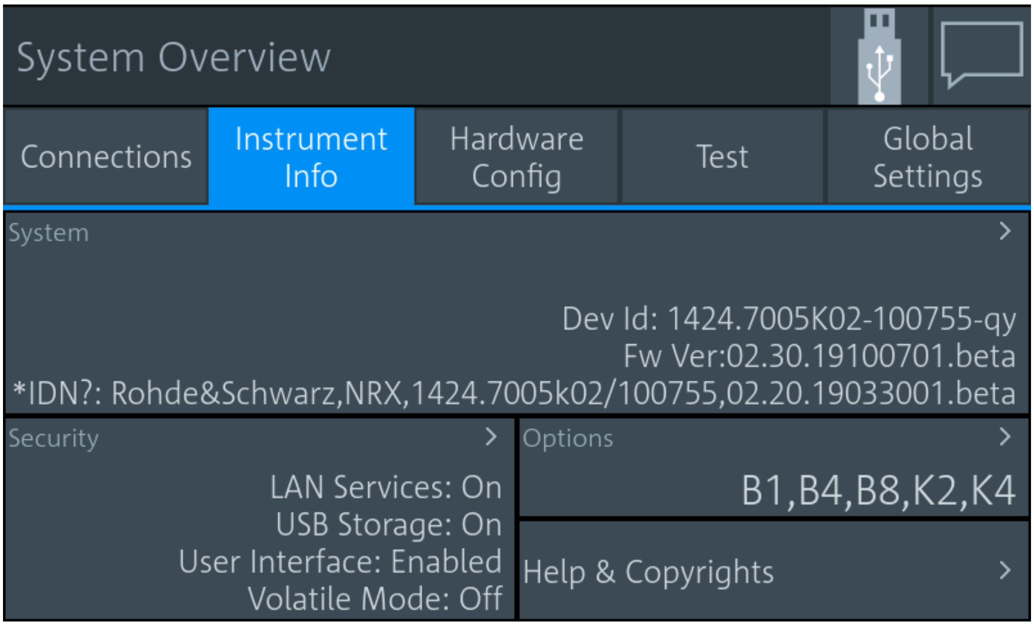
"Test Verdict" Shows the status of the selftest.

Remote command:
`SYSTem:SENSor<Sensor>:TEST?` on page 380
`TEST:SENSor<Sensor>?` on page 380

11.2 Instrument Info

Access: [System] > "Instrument Info"

For displaying information on a connected power sensor, see "Sensor Info" on page 150.

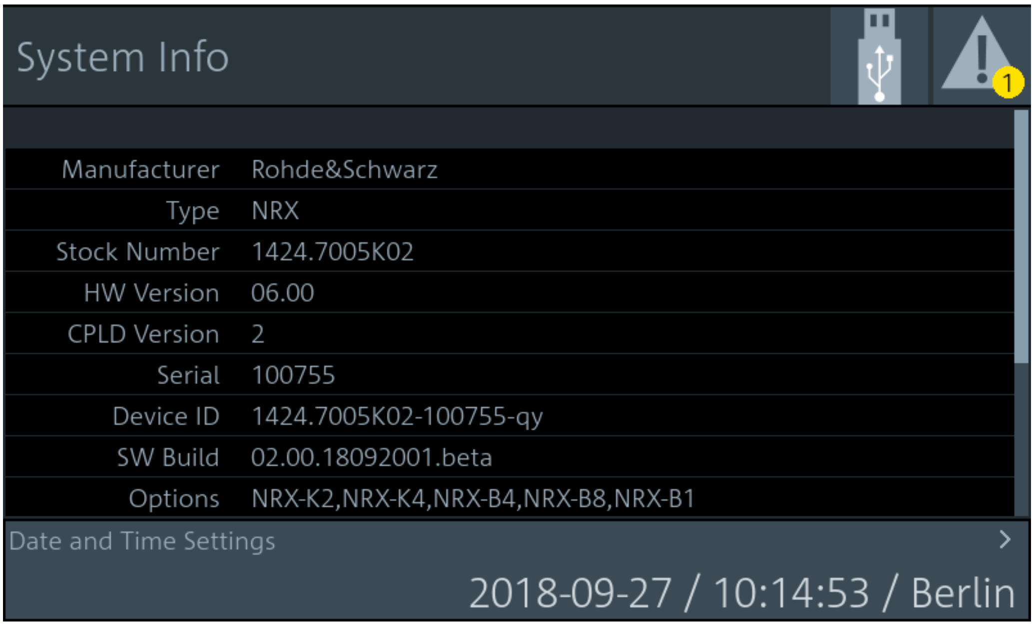


On this tab, you display and configure the following settings:

11.2.1 System Info

Access: [System] > "Instrument Info" > "System"

Displays a list of instrument-specific parameters.



System Info

Displays the information on the R&S NRX:

- "Manufacturer"
- "Type"
- "Stock Number"
- "HW Version"
- "CPLD Version"
  Complex programmable logic device (CPLD) version
- "Serial"
- "Device ID"
- "SW Build"
  Version of software build
- "Options"
  Short names of the installed options
- "MAC Address"
  Ethernet hardware address
- "Hostname"
- "IP Address"
- "*IDN?"
  Instrument identification string: <manufacturer>,NRX,<serial number>,<firmware version>
- "*OPT?"
  Option identification string; lists the installed options: <option 1>, <option 2>, ...
- "Uptime"

Operating time of the R&S NRX

Remote command:
SYSTem:INFO[:INFO]? on page 399
SYSTem:DID? on page 398
SYSTem:DEVice:ID? on page 398

Date and Time Settings
Opens the "Date and Time" dialog.

Date ← Date and Time Settings
Sets the date in the format YYYY-MM-DD.

Remote command:
SYSTem:DATE on page 400
SYSTem:DATE:UTC on page 400
SYSTem:DATE:LOCal on page 400

Time ← Date and Time Settings
Sets the time in the format HH:MM:SS.

Remote command:
SYSTem:TIME on page 401
SYSTem:TIME:UTC on page 401
SYSTem:TIME:LOCal on page 401

Time Zone Region ← Date and Time Settings
Sets the time zone region.

Remote command:
SYSTem:TIME:DSTime:RULE on page 401
SYSTem:TIME:DSTime:RULE:CATalog? on page 402

Time Zone ← Date and Time Settings
Sets the time zone.

Remote command:
`SYSTem:TIME:DSTime:RULE` on page 401
`SYSTem:TIME:DSTime:RULE:CATalog?` on page 402

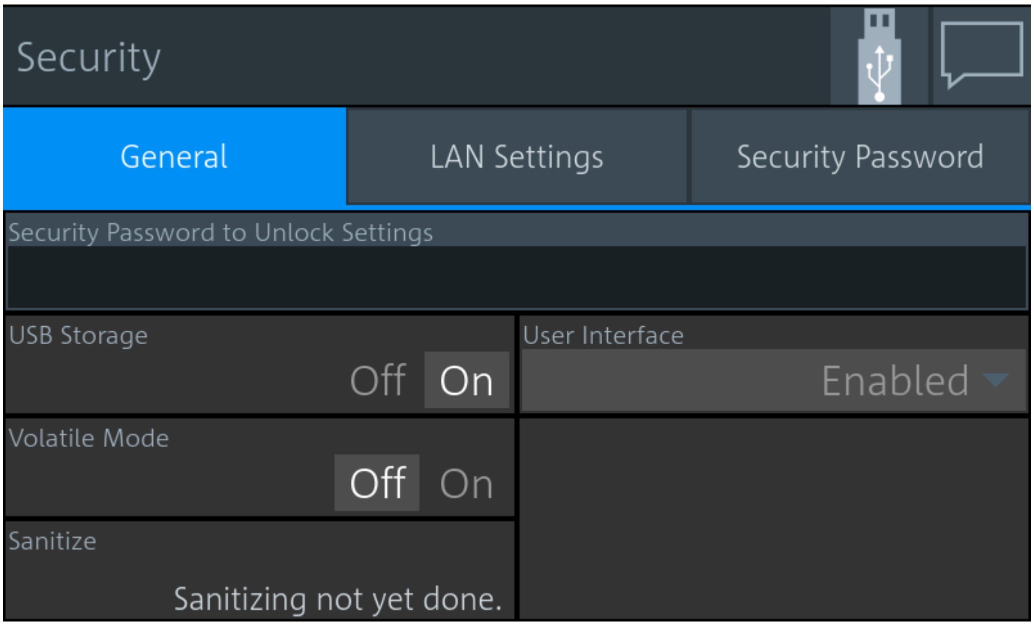
11.2.2 Security Settings

Access: [System] > "Instrument Info" > "Security"

Contains the settings for access rights, LAN security and passwords.

The "Security" dialog is divided into the following tabs:

General tab
Configures the access rights for storage devices and restrictions for the user interface.



Security Password to Unlock Settings ← General tab
Enter the password that is required to enable the settings protected by a security password. When you leave the "Security" dialog, the settings are disabled automatically.

For default value and further information, see "Security Password tab" on page 157.

USB Storage ← General tab
Enables or disables the file transfer via USB storage.

Volatile Mode ← General tab
If enabled, the R&S NRX does not save changed settings in the non-volatile memory. After a reboot, the R&S NRX has the same configuration as at the time when you enabled the volatile mode.

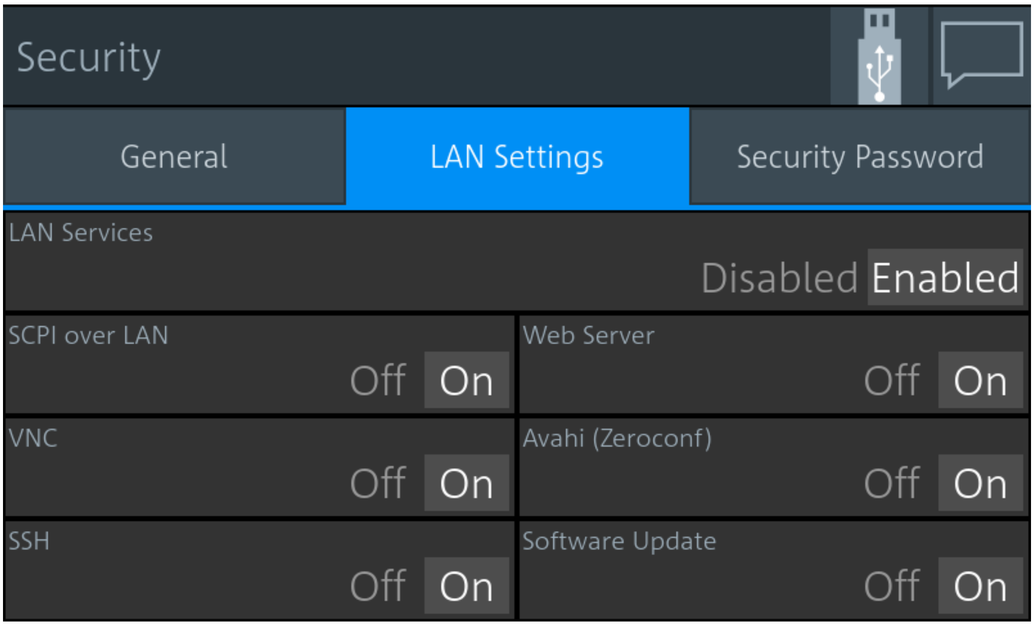
Use the volatile mode if you want to reboot with a defined configuration for a measurement setup, regardless off any settings made manually or by remote control.

Enabling the volatile mode requires the security password. If you change into the volatile mode or back, a reboot is required.

Sanitize ← General tab
Sanitizes the internal memory. Sanitization requires the security password. For details, see the Instrument Security Procedures.

User Interface ← General tab
Enabled. Fixed setting.

LAN Settings tab
Configures the LAN interface in general or all LAN services individually.



LAN Services ← LAN Settings tab
Enables or disables the LAN services in general. If enabled, it provides remote access via all unlocked services.

SCPI over LAN ← LAN Settings tab
Enables or disables the access over LAN to control the R&S NRX remotely by using SCPI (standard commands for programmable instruments) commands.

Web Server ← LAN Settings tab
Enables or disables a web server that is required to access using a web application.

VNC ← LAN Settings tab
Enables or disables access using a virtual network computing (VNC) interface, a graphical desktop sharing system that uses RFB protocol to control the R&S NRX remotely.

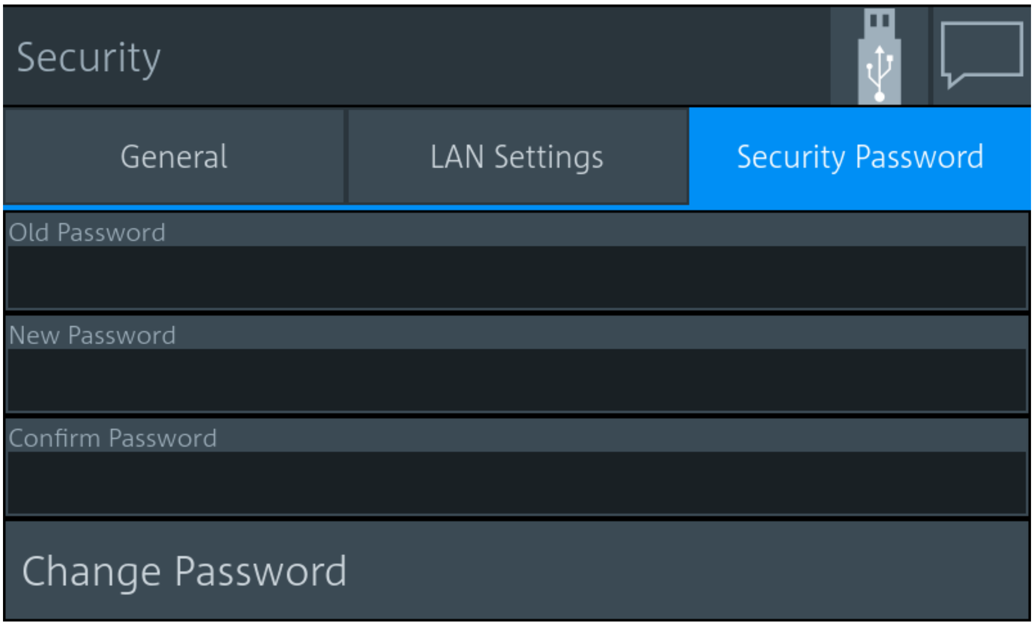
See Chapter 4.2, "Remote Operation", on page 40.

Avahi (Zeroconf) ← LAN Settings tab
Enables or disables Avahi, a service for automatic configuration of the R&S NRX in a network environment.

SSH ← LAN Settings tab
Enables or disables access using a secure shell (SSH), a network protocol for secure data communication.

Software Update ← LAN Settings tab
Enables or disables the software update over LAN.

Security Password tab
Used to change the security password.



Old Password ← **Security Password tab**
Currently used security password. The default password is *123456*.

Note: We recommend that you change the default password before connecting the R&S NRX to a network.

The security password is required for changing security settings in the "Security" dialog.

New Password ← **Security Password tab**
New security password.

Confirm Password ← **Security Password tab**
New security password for confirmation.

Note: The new password is not assigned until you tap "Change Password".

Change Password ← **Security Password tab**
Sets the new password as security password.

11.2.3 Option Settings

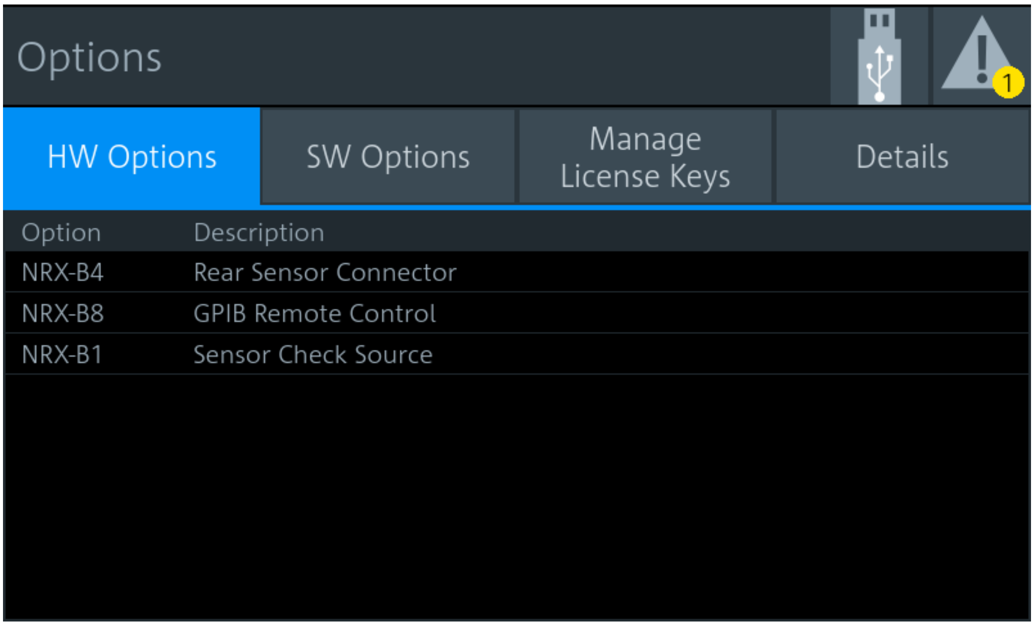
Access: [System] > "Instrument Info" > "Options"

Displays installed options and offers an interface to install new options.

The "Options" dialog contains the following parameters:

HW Options tab

Displays the installed hardware options.

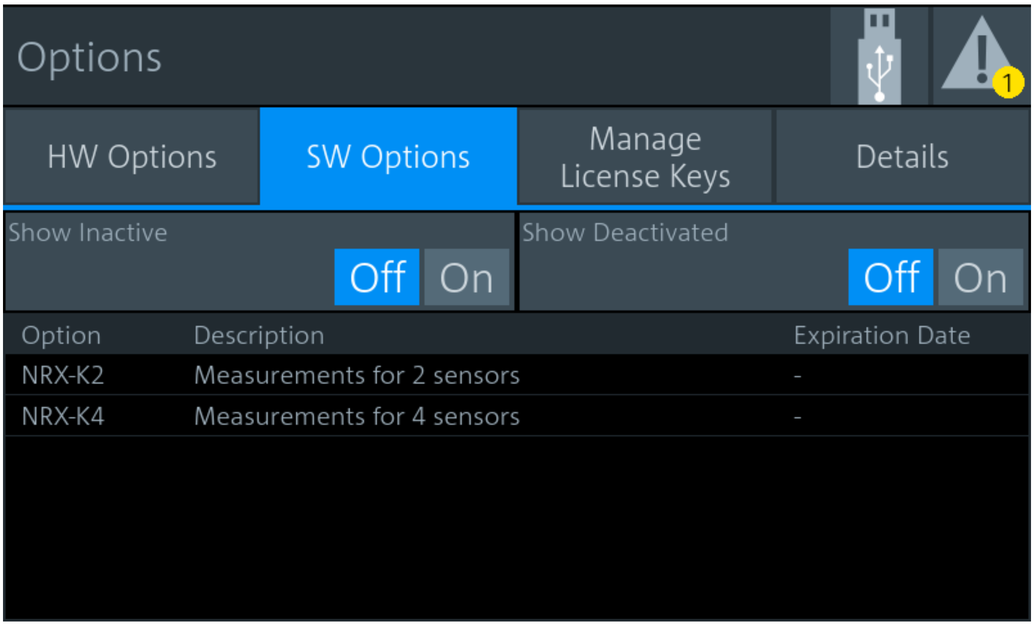


Remote command:

`*OPT?` on page 178

SW Options tab

Displays all software options and their status.

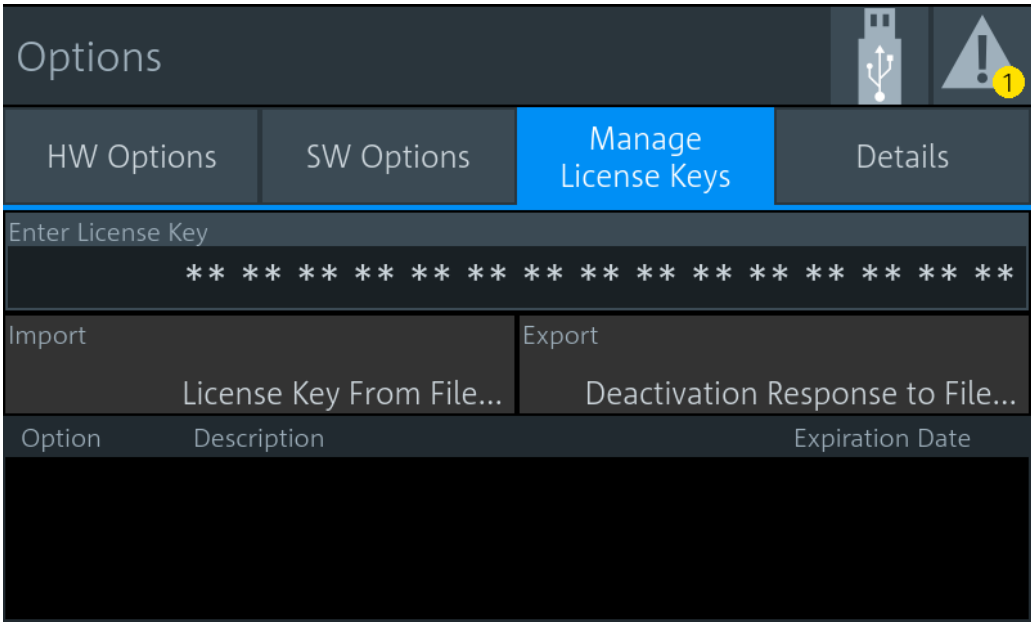


You can filter the displayed list by the following criteria:

"Show Inactive On | Off"	Shows or hides inactive software options. These software options are available in the firmware version but are not installed.
"Show Deactivated On | Off"	Shows or hides deactivated software options. These software options have been installed but are not active any more, for example because the license key is expired.

Remote command:
`*OPT?` on page 178

Manage License Keys tab
Used to install or deinstall software options.



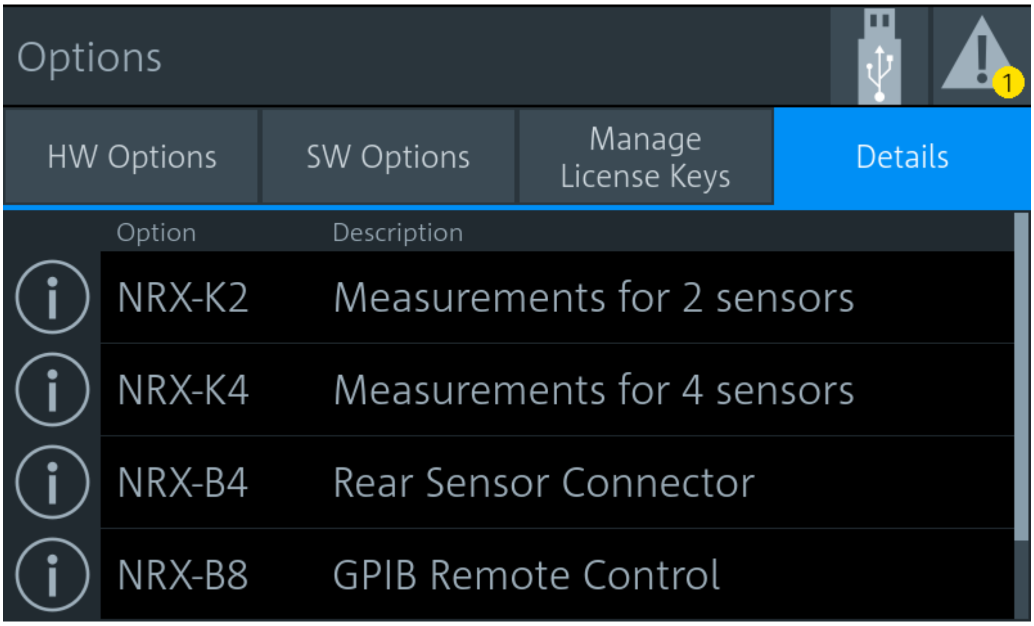
The list gives details on the installed or deinstalled options.

Enter License Key ← Manage License Keys tab
Enter the license key manually.

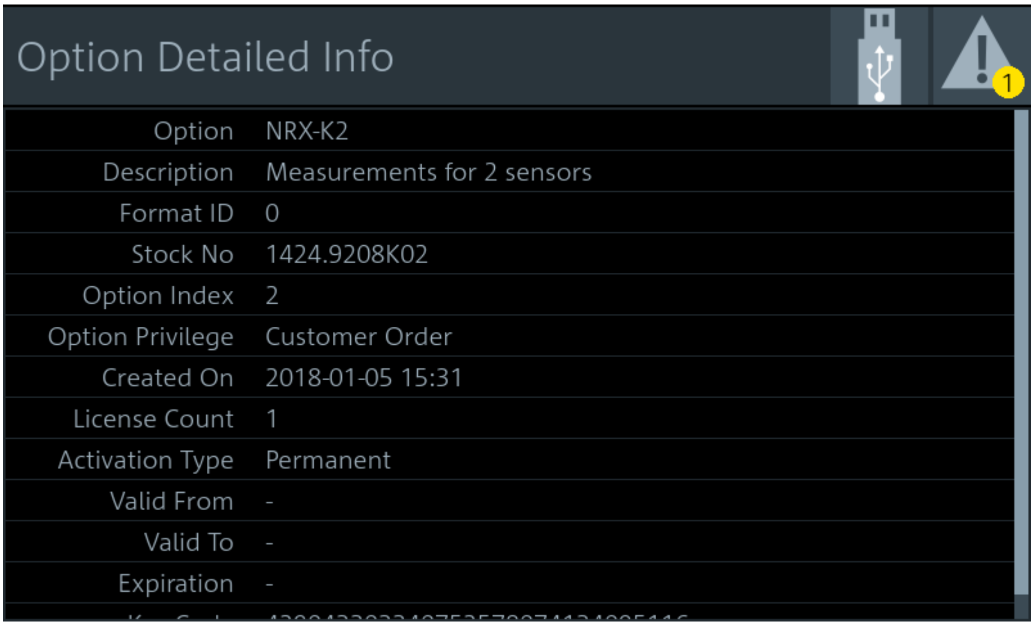
Import ← Manage License Keys tab
For future use.

Export ← Manage License Keys tab
For future use.

Details tab
Displays a list of all installed hardware and software options.



If you want to see more information on a specific option, tap ⓘ.



11.2.4 Help & Copyrights

Access: [System] > "Instrument Info" > "Help & Copyrights"

Gives access to the user manual, open source acknowledgement and license information.

Export User Documentation to USB Stick
Downloads the user manual to a connected USB stick. If no USB stick is connected, the file is saved to the volatile directory of the FTP directory. Information to the download is displayed in the "Notification Center". See also Chapter 4.1.4, "Notification Center", on page 35.

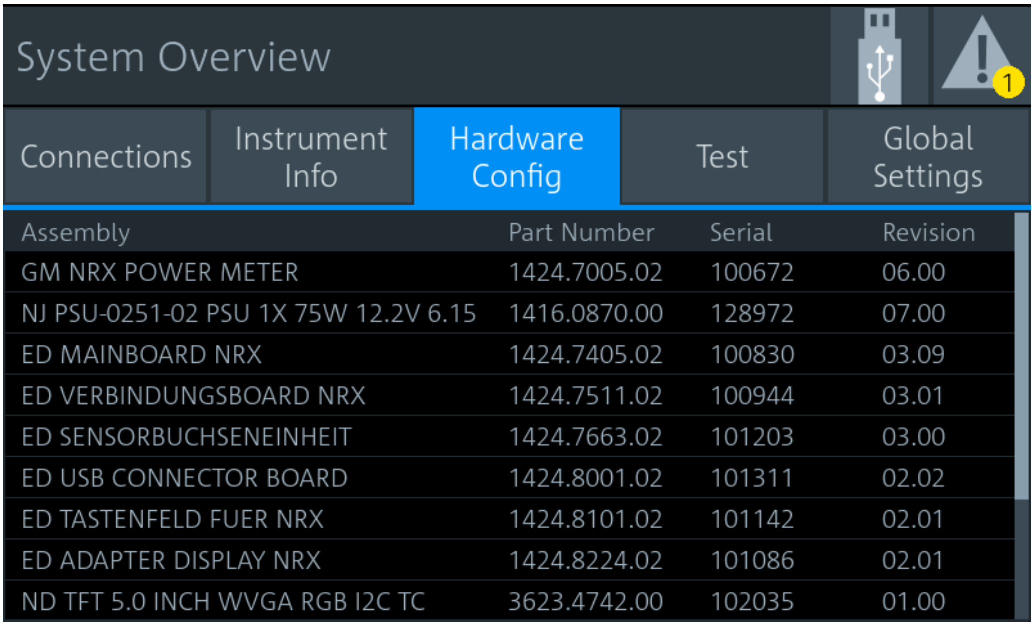
Open Source Achnowledgement
Displays the open source acknowledgement.

Open Source Licenses
Displays the license texts of open source software packages used in the R&S NRX software. Under "Component", select the open source software package you want to display the license text of.

LucasFonts RsCorpid EULA
Displays the end-user license agreement (EULA) of LucasFonts.

11.3 Hardware Configuration

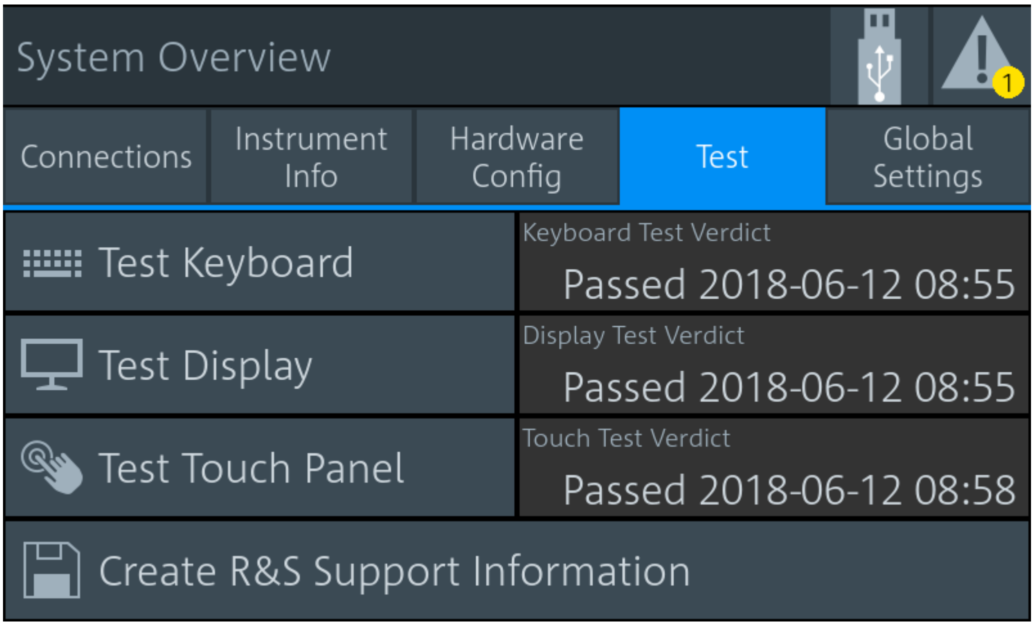
Access: [System] > "Hardware Config"



Lists the hardware details of the R&S NRX assemblies. This tab can be useful for looking up the revision of hardware, for example when troubleshooting.

11.4 Test

Access: [System] > "Test"



On this tab, you can test whether the user interfaces are in working order and create information useful for troubleshooting.

For testing a connected power sensor, see "Sensor Test" on page 151.

Testing the user interfaces

1. Tap the test you want to perform.
   A dialog with detailed test instructions is displayed.
2. Read and follow the instructions.
3. Exit the test.
   Note: "Exit with PASS" only becomes available when the test is finished successfully.
   The results, passed or failed, are displayed for each test.

Remote command:

`TEST:DEVice[:ALL]` on page 379

`TEST:DEVice:RESult?` on page 379

Creating information for troubleshooting

You can save information for troubleshooting on a memory stick.

1. Connect a memory stick to one of the USB interfaces.
2. Tap "Create R&S Support Information".
   The created archive file (`*.tar.gz`) contains the following information:
   - Software errors
   - Hardware status
   - Current device footprint
   - Current device settings

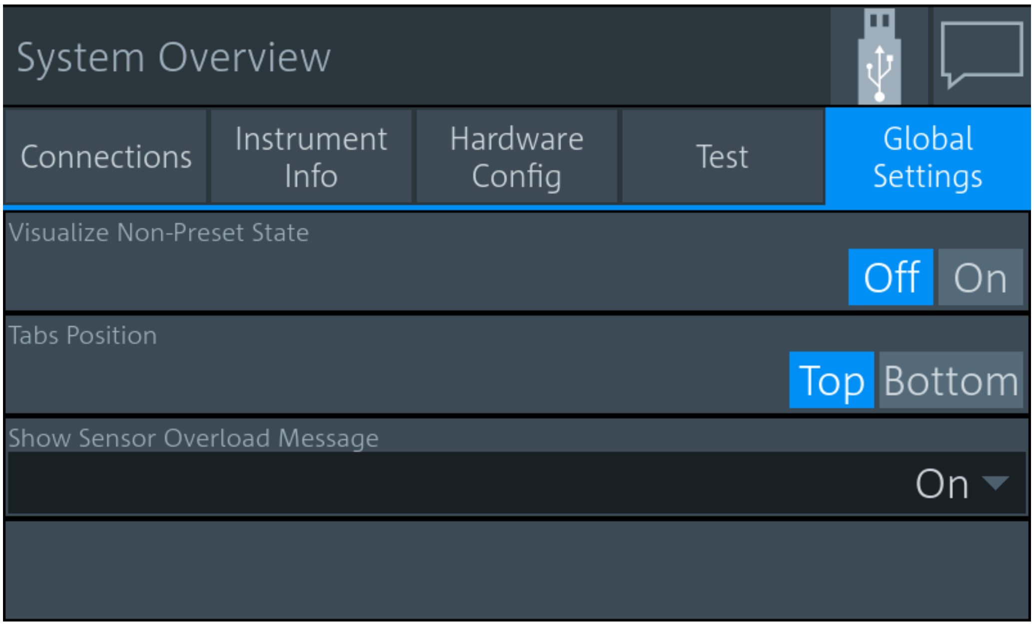
   If a memory stick is connected, the archive file is saved there.
   Alternatively, you can transfer the information using secure shell (SSH). See "SSH" on page 157.

Remote command:

`TEST:USB:STORage?` on page 380

11.5 Global Settings

Access: [System] > "Global Settings"



On this tab, you configure the following settings:

Visualize Non-Preset State

If enabled, a setting that differs from the preset value is indicated by a pencil symbol.

The control elements in the hierarchies above that are leading to this setting are marked, too. Thus, you can find the setting easily if you want to use a preset value.

Tabs Position

Specifies the position of the tabs in dialogs, top or bottom.

Hide Sensor Overload Message

If enabled, hides the sensor overload message. But be aware that overload can damage the power sensor, depending on the amount of power and the duration of the overload condition. The maximum power is specified in the data sheet of the power sensor.

Or you can query the maximum power using `SYSTem:SENSor<Sensor>:INFO?`.

Remote command:
`DISPlay:OVERload[:STATe]` on page 192

12 Firmware Update

This chapter contains information on installing/updating the firmware on the R&S NRX.

The latest firmware update files are available on our Internet site at www.rohde-schwarz.com.

NOTICE

Potential damage to the firmware of the device

Disconnecting the power supply while an update is in progress can lead to missing or faulty firmware.

Special care must be taken on not disconnecting the power supply while the update is in progress. Interrupting the power supply during the firmware update will most likely lead to an unusable device which needs to be sent in for maintenance.

12.1 Firmware Update via PC and USB or Ethernet Connection

This chapter contains information on installing/updating the firmware on the R&S NRX via PC and USB or Ethernet connection.

Use the Firmware Update program (PureFW) to load new firmware for the R&S NRX. It is part of the R&S NRP Toolkit.

12.1.1 Hardware and Software Requirements

The system requirements to perform a firmware update via PC are as follows:

- PC with free USB port (alternatively: PC and instrument are connected to an Ethernet network)
- USB cable (USB-A plug to USB-B plug) (alternatively: Ethernet cable)
- Operating system Microsoft Windows 7, Microsoft Windows 8 or Microsoft Windows 10
- **VISA software must be installed on your PC.**
- The R&S NRP Toolkit software must be installed on your PC (includes Firmware Update program).
- A Rohde & Schwarz update file (*.rsu) for the sensor must be available.

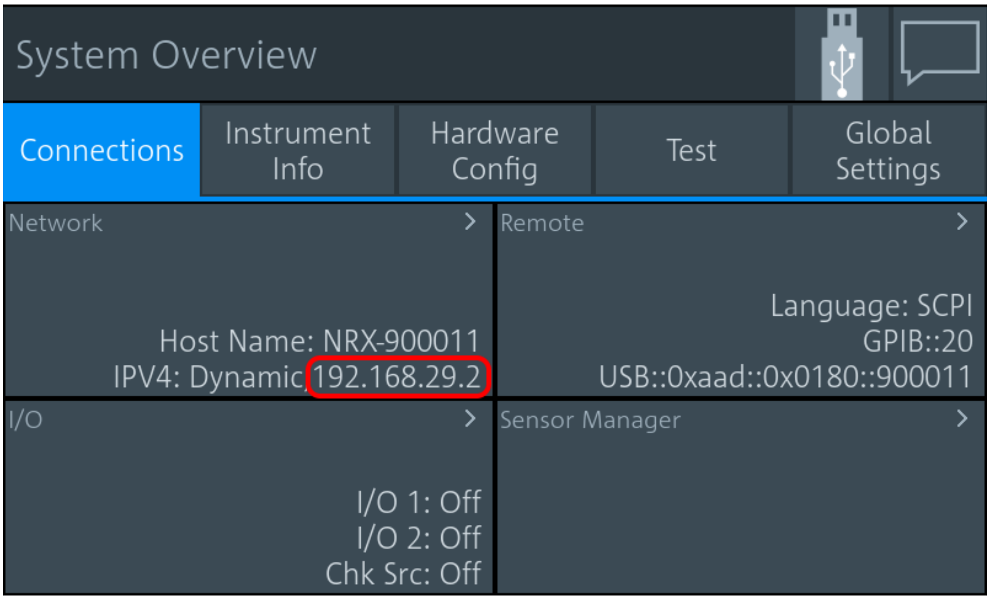
12.1.2 Preparing an Update

To prepare an update via USB connection:

1. Make sure a recent VISA software is installed. Firmware update with PureFW can only be performed with the device recognized as a VISA device.
2. Connect the R&S NRX to the PC using a USB cable. If the instrument is off, switch it on.
   Shortly afterwards, the PC should have identified the new USB hardware in case the instrument is connected via USB.
   If no recent VISA software is installed, Windows will try in vain to find a USB driver for the instrument. If this happens, the instrument is highlighted by a yellow exclamation mark in the Windows device manager.
   ⇒ Abort the installation process and install a recent VISA software.

To prepare an update via network connection:

1. Make sure a recent VISA software is installed. Firmware update with PureFW can only be performed with the device recognized as a VISA device.
2. Connect the R&S NRX to the network. If the instrument is off, switch it on.
   To check that the instrument is assigned an IP address, press the hardkey [System] on the front of the R&S NRX, choose the "Connections" tab, and check the IPv4 status under "Network":



   If the instrument is not assigned an IP address, perform the following:

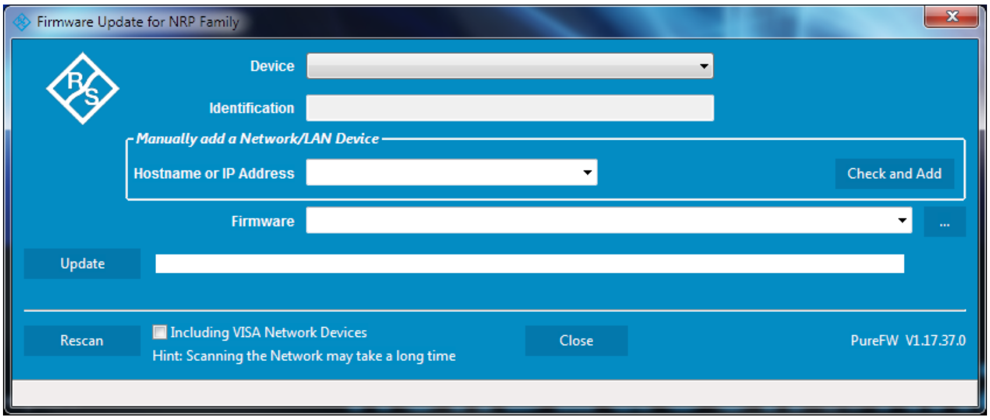
   a) Open the dialog "Network" and check whether the network settings are correct.
   b) Check the cable used to connect the instrument to the network.

3. Register the instrument as a VISA device. Refer to documentation of your VISA software for details.

12.1.3 Updating the Application Firmware

To perform a firmware update:

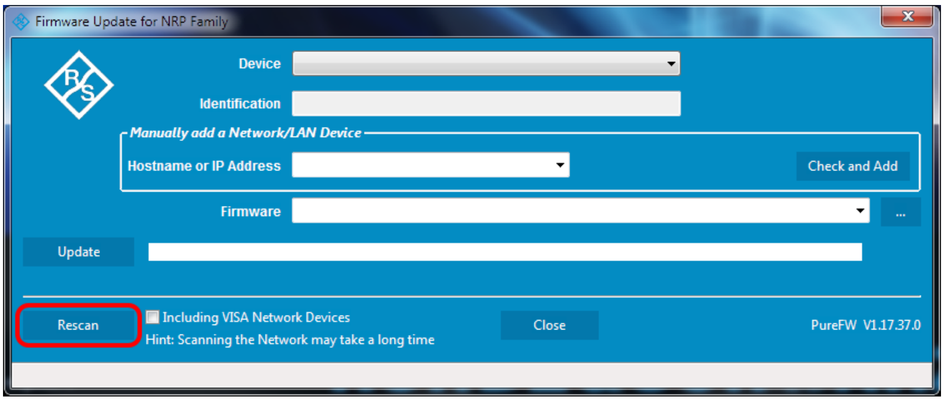
1. Start the Firmware Update program (PureFW) via "Start menu > NRP-Toolkit > Firmware Update". The following window should appear:



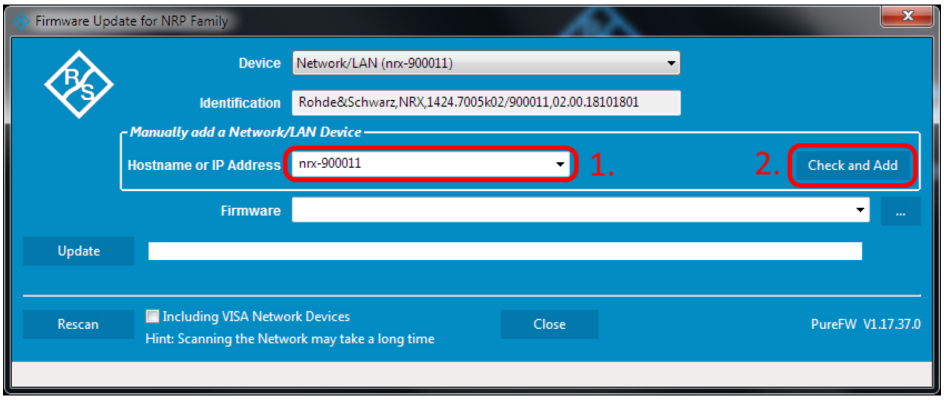
The program automatically starts scanning for R&S power sensors and meters attached via USB. When the scan is completed, all recognized power sensors and meters are listed in the "Device" dropdown control.

2. If the instrument you want to update is not listed in the "Device" dropdown control, perform one of the following:

   a) If the instrument is connected to the PC via USB, press "Rescan" to search for R&S power sensors and meters attached via USB.

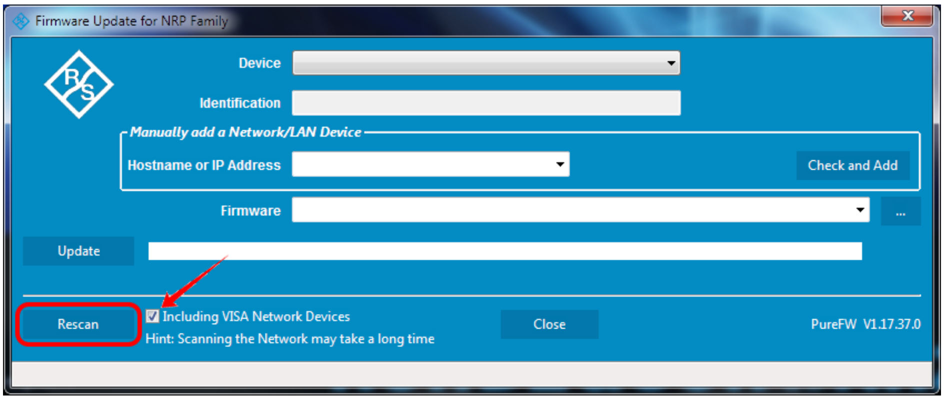


b) If the instrument is connected to the network, enter the hostname or the IP address of the instrument in the field "Manually add a Raw SCPI Device" and then press "Check and Add" or `Enter`.



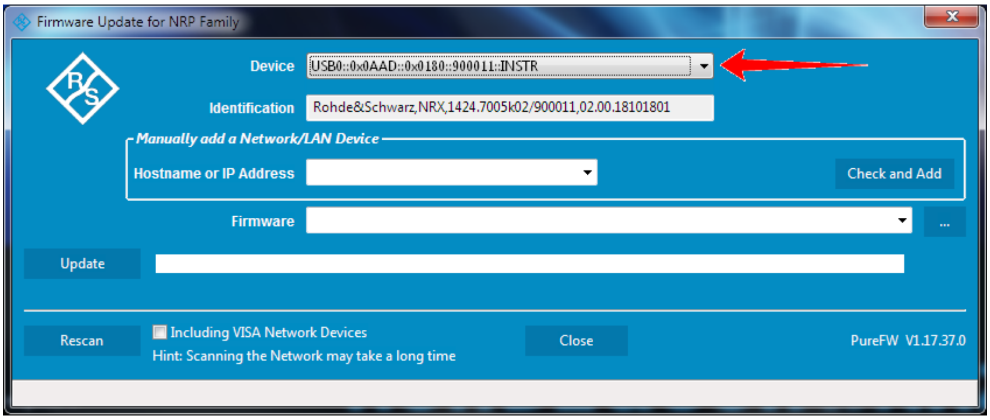
The program searches for the specified instrument on the network and adds it to the "Device" list.

c) It is also possible to scan the local network for VISA network devices automatically. This can be more time-consuming than adding the device manually as described above. To do this, check the setting "Including VISA Network Devices" before you press "Rescan".



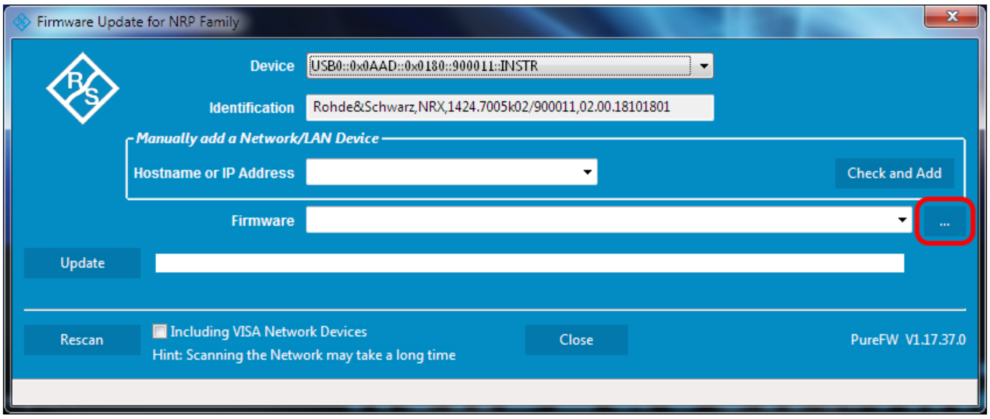
d) Check whether a VISA library is installed on the computer.
If no VISA library is installed on the computer, no VISA instrument will be accessible.
If a network connection is used: Check whether the instrument is registered as a VISA device.

3. In the "Device" line select the instrument you want to update.

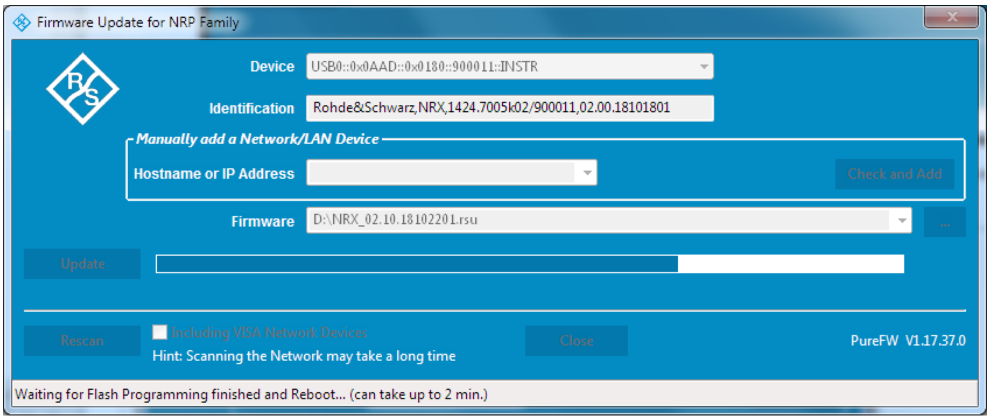


The "Hostname or IP Address" field is not used during this procedure and should therefore be left empty.

4. In the "Firmware" field enter the full path and file name of the update file or press the ellipsis button to browse the file system for it. New firmware for the R&S NRX generally has an `*.rsu` (Rohde & Schwarz Update) extension.

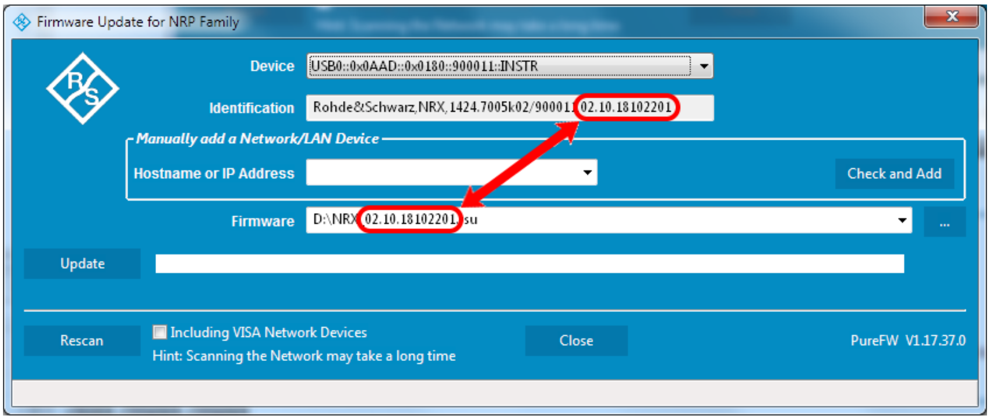


5. Select "Update" to download the new firmware and program it into the flash memory of the instrument.



During the update process the progress is shown through a progress bar. The update sequence may take a couple of minutes.

6. Check if the update was successful. This is the case if the firmware version in the "Identification" field is the same as the one you loaded in the "Firmware" field.



12.2 Firmware Update via a USB Flash Memory Stick

This chapter contains information on installing/updating the firmware on the R&S NRX via a USB flash memory stick.

12.2.1 Hardware and Software Requirements

The system requirements to perform a firmware update via a USB flash memory stick are as follows:

- PC or mobile device with free USB port running any operating system and software that supports copying files to the USB flash memory stick
- USB flash memory stick (USB 2.0 or 3.0, with USB-A plug, FAT32 file system, and sufficient space for the firmware file)
- A Rohde & Schwarz update file (*.rsu) for the sensor must be available.

12.2.2 Preparing an Update

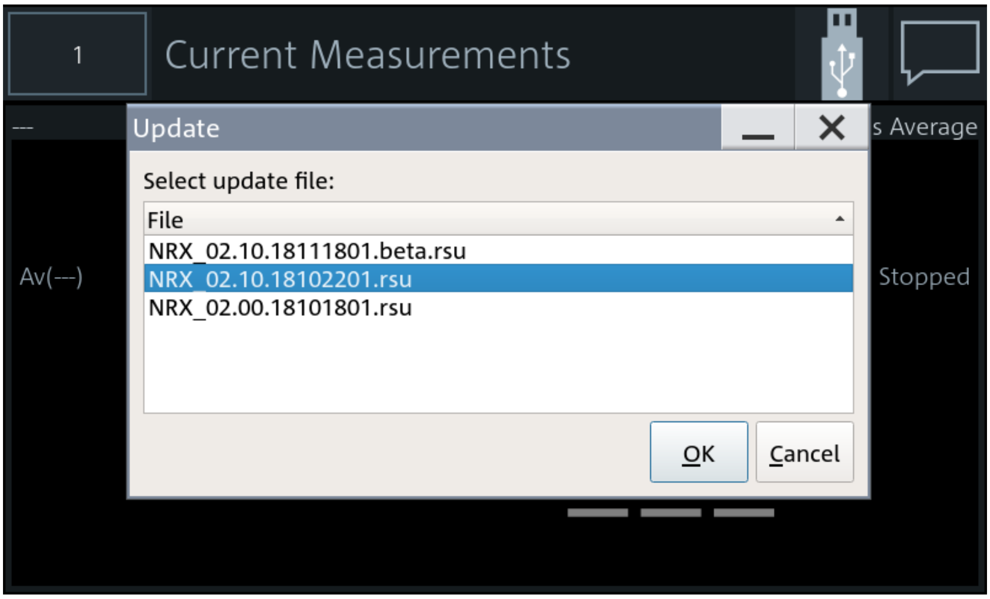
To prepare an update via USB flash memory stick:

1. Copy the Rohde & Schwarz update file to the root directory of the USB flash memory stick.
2. Disconnect the USB flash memory stick from the PC or mobile device. If the instrument is off, switch it on.

12.2.3 Updating the Application Firmware

To perform a firmware update:

1. Connect the USB flash memory stick to the front or rear USB host port of the R&S NRX.
   Shortly afterwards, the instrument should have identified the USB flash memory stick. A dialog will appear that allows selection of the Rohde & Schwarz update file (if there is more than one that matches the instrument) and asks for confirmation to start the update.

2. If there are more than one matching Rohde & Schwarz update files, select the file you want to use for the update. The latest version is on top. Then, press "Update" to start the update process.
3. After copying the Rohde & Schwarz update file to internal memory, a dialog will appear that asks you to remove the installation medium (USB flash memory stick) and press "OK" to reboot the instrument. Remove the stick and confirm with "OK". (If the stick is not removed at this point of the update process, the firmware update process will start another time after the reboot. In this case, interrupt it by pressing "Cancel" when the selection dialog appears.)

13 Remote Control Commands

13.1 Conventions Used in SCPI Command Descriptions

Note the following conventions used in the remote command descriptions:

- **Command usage**
  If not specified otherwise, commands can be used both for setting and for querying parameters.
  If a command can be used for setting or querying only, or if it initiates an event, the usage is stated explicitly.
- **Parameter usage**
  If not specified otherwise, a parameter can be used to set a value and it is the result of a query.
  Parameters required only for setting are indicated as **Setting parameters**.
  Parameters required only to refine a query are indicated as **Query parameters**.
  Parameters that are only returned as the result of a query are indicated as **Return values**.
- **Conformity**
  Commands that are taken from the SCPI standard are indicated as **SCPI confirmed**. All commands used by the R&S NRX follow the SCPI syntax rules.
- **Asynchronous commands**
  A command which does not automatically finish executing before the next command starts executing (overlapping command) is indicated as an **Asynchronous command**.
- **Reset values (*RST)**
  Default parameter values that are used directly after resetting the instrument (`*RST` command) are indicated as ***RST** values, if available.
- **Default unit**
  The default unit is used for numeric values if no other unit is provided with the parameter.

The standard behavior for default units applies to all values that are expressed in a certain unit. Values that can be expressed in more than one unit, show a more complex behavior that is described in Chapter 13.5.1.3, "Units", on page 207.

For further information on units, see also "Units" on page 456.

13.2 Common Commands

The common commands are taken from the IEEE 488.2 (IEC 625–2) standard. The headers of these commands consist of an asterisk * followed by three letters.

&ABO

Device clear

Usage: Event

&DFC

Disable flow control

Usage: Event

&GET

Group execute trigger

Usage: Event

&GTL

Go to local

Usage: Event

&GTM

Go to local with remote state

Usage: Event

&GTR

Go to remote

Usage: Event

&HFC

Hardware flow control

Usage: Event

&LLO

Local lockout

Usage: Event

&NREN

Not remote enabled (go to local)

Usage: Event

***CLS**

Clear status, resets the following:

- Status byte (`STB`)
- Standard event register (`ESR`)

- `EVENt` part of the `QUEStionable` and the `OPERation` register
- Error/event queue

The command does not change the `ENABle` and `TRANsition` parts of the registers.

Usage: Event

***DEV** [<instrument_no>]

Fixed value.

Parameters:
<instrument_no> 0

***DMC** <Label>, <Macro>
***DMC?** <Label>

Defines a macro command.

Parameters:
<Macro>

Parameters for setting and query:
<Label>

***EMC** <Enable>

Enables macro command.

Parameters:
<Enable>

***ESE** <register>

Event Status Enable

Sets the event status enable register to the specified value. The query returns the contents of the event status enable register in decimal form.

Parameters:
<register> Range: 0 to 255
*RST: 0

***ESR?**

Event Status Read query

Returns the contents of the event status register in decimal form (0 to 255) and subsequently sets the register to zero.

Usage: Query only

***GCLS**

Clears all status information in all internal "instruments".

Usage: Event

***GMC?** <Label>

Get macro content.

Query parameters:
<Label>

Return values:
<Macro> <dblock>

Usage: Query only

***GOPC?**

Analogon of `*OPC?` for all instruments in multichannel device.

Return values:
<gopc> "1" is return if all pending operations in all internal "instruments" are finished.

Usage: Query only

***GWAI**

Waits for all pending operations in all internal "instruments".

Usage: Event

***IDN?**

IDeNtification query

Returns a string with information on the sensor's identity (device identification code). In addition, the version number of the installed firmware is indicated.

Usage: Query only

***IST?**

Individual STatus query

Returns the current value of the IST flag in decimal form. The IST flag is the status bit which is sent during a parallel poll.

Usage: Query only

***LMC?**

List macro commands.

Return values:
<Label>

Usage: Query only

***OPC**

OPeration Complete

Sets bit 0 in the event status register when all preceding commands have been executed. This bit can be used to initiate a service request. `*OPC` must be sent at the end of a program message.

The query form returns a "1" when all previous commands have been processed. It is important that the read timeout is set sufficiently long.

Since `*OPC?` waits until all previous commands are executed, "1" is returned in all cases.

`*OPC?` basically functions like the `*WAI` command, but `*WAI` does not return a response.

`*OPC?` is preferred to `*WAI` because with `*OPC?`, the execution of commands can be queried from a controller program before new commands are sent. This prevents overflow of the input queue when too many commands are sent that cannot be executed.

Unlike `*WAI`, `*OPC?` must be sent at the end of a program message.

***OPT?**

OPTion identification query

Returns a comma-separated list of installed options.

Usage: Query only

Manual operation: See "HW Options tab" on page 159
See "SW Options tab" on page 159

***PMC**

Purge macro command.

Usage: Event

***PRE** <register>

Parallel poll Register Enable

Sets the parallel poll enable register to the specified value or queries the current value.

Parameters:

<register>	Range:	0 to 255
	*RST:	0

***PSC** <psc>

Writes/reads the power on status clear flag (PSC).

Parameters:

<psc> Power on status clear flag.

***RCL** <num>

ReCaLl

Recalls the instrument settings from the specified intermediate memory.

Setting parameters:

<number> Number of the intermediate memory

	Range:	0 to 19
	*RST:	0

Usage: Setting only

Manual operation: See "Recall" on page 133

***RMC** <Label>

Remove macro content.

Setting parameters:

<Label>

Usage: Setting only

***RST**

Sets the instrument to a defined initial state, a so-called reset. The default settings are indicated in the description of commands as *RST value.

With the exceptions listed in Table 13-16, this command corresponds to `SYSTem:PRESet`.

Usage: Event

Manual operation: See "Preset" on page 133

***SAV** <num>

SAVe

Saves the current instrument settings in the specified intermediate memory.

Setting parameters:

<number> Number of the intermediate memory

Range: 0 to 19
*RST: 0

Usage: Setting only

Manual operation: See "Save" on page 133

***SRE** <register>

Service Request Enable

Sets the service request enable register to the specified value. This command determines under which conditions a service request is triggered.

Parameters:

<register> Range: 0 to 255
*RST: 0

***SRQ?** [<timeout>]

A generic `srq wait` command to be used without `srq event transport`. It is simply read from the interface.

Query parameters:

<timeout>

Return values:

<srq>

Usage: Query only

***STB?**

STatus Byte query

Returns the contents of the status byte in decimal form.

Usage: Query only

***TRG**

TRiGger

Triggers a measurement. This command is only valid if the power sensor is in the waiting for trigger state and the trigger source is set to `BUS`

See `TRIGger<Measurement>[:CHANnel<Channel>]:SOURce` on page 227

Usage: Event

***TST?**

Selftest query

Triggers a self test of the instrument and outputs an error code in decimal form. `0` indicates that no errors have occurred.

Example: `*TST?`
Query
`0`
Response: Passed

Example: `*TST?`
Query
`1`
Response: Failed

Usage: Query only

***WAI**

WAIt to continue

Prevents the execution of the subsequent commands until all preceding commands have been executed and all signals have settled.

Usage: Event

***XESE** <xese>

Specifies the standard event status enable register (ESE). This register determines which events from the standard event status register (ESR) are summarized in bit 5 (the event summary bit ESB) of the status byte.

Parameters:
<xese> <expr>

***XESR?**

Reads and clears the standard event status register (ESR).

Return values:
<xesr> <expr>

Usage: Query only

***XPRE** <xpre>

Reads or writes the parallel pll enable register (PRE).

Parameters:
<xpre> <expr>
Parallel poll enable register.

***XSRE** <xsre>

Reads or writes the service request enable register. Used to enable service requests.

Parameters:

<xsre> <expr>

Service request enable register (SRE).

***XSTB?**

Reads the status byte.

Return values:

<xstb> <expr>

Status byte (STB).

Usage: Query only

13.3 Addressing Measurements and Sensors

<Measurement> suffix

The R&S NRX memorizes sensor assignments. Thus, a sensor type that has been connected before is assigned to the same measurement type when it is connected again. See also Chapter 5, "Measurement Basics", on page 43.

The sensor assignment is deleted by a preset, reset or sanitization. If the R&S NRX has no memory of a previous sensor assignment, the R&S NRX assigns the measurements according to the port, to which the power sensors are connected. The number of measurement panes is adapted automatically.

Example:

For configuring measurements, the `CALCulate<Measurement>` commands are used.

The first power sensor is connected to port A. It is assigned to the first measurement, addressed by `CALC1`.

The second power sensor is connected to port C. It is assigned to the third measurement, addressed by `CALC3`.

The third power sensor is connected to port B. It is assigned to the second measurement, addressed by `CALC2`.

All three power sensors are the primary sensor in the assigned measurement.

[:CHANnel<Channel>] suffix

If there is only one power sensor assigned to a measurement, you can omit `[:CHANnel<Channel>]`. Otherwise, the primary sensor is always addressed by `CHAN1`, and the secondary sensor is always addressed by `CHAN2`.

If you use calculation functions that process the results of two power sensors, you assign a primary sensor and a secondary sensor. In `CALCulate<Measurement>:MATH[:EXPRession]`, the position of the power sensor in the expression defines the power sensor as primary or secondary sensor.

Example:

For calculating the standing wave ratio (SWR), you use `CALC1:MATH:EXPR "SWR(SENS3,SENS1)"`.

Thus, the power sensor at port C from the example above is assigned as primary sensor, and the power sensor at port A as secondary sensor.

This behavior saves you assigning the power sensors using `CALCulate<Measurement>[:CHANnel<Channel>]:SENSe:INDex`.

Further information:

- "Primary Sensor, Secondary Sensor" on page 67
- "Channel Calculation Function" on page 67
- Assigning measurement panes and traces, see Chapter 13.5, "Measurement Settings and Results", on page 186.

13.4 Starting and Ending a Measurement

In a basic scenario, the measurement is started immediately after the measurement mode is enabled.

If you want to start the measurement only if a specific condition is fulfilled, define a trigger.

Further information:

- Chapter 6.3, "Triggering", on page 59
- Chapter 13.5.2, "Configuring the Trigger", on page 219

ABORt<Measurement>

Immediately interrupts the current measurement. If the measurement has been started as a single measurement (`INITiate<Measurement>[:IMMediate]`), the power sensor goes into the idle state. However, if a continuous measurement is in progress (`INITiate<Measurement>:CONTinuous ON`), the trigger system of the power sensor enters the waiting for trigger state, and if the trigger condition is met, a new measurement is immediately started.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

Usage: Event

ABORt<undef>:ALL

Applies to all connected power sensors. See `ABORt<Measurement>` on page 184.

Suffix:

<undef> 1 to n
No suffix required.

Usage: Event

INITiate<Measurement>:CONTinuous <state>

Enables or disables the continuous measurement mode. In continuous measurement mode, the power sensor does not go into the idle state after a measurement has been completed, but immediately executes another measurement cycle.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<state> If you use `SYSTem:PRESet` instead of `*RST`, the RST value differs. See Table 13-16.

ON
Measurements are performed continuously. If a measurement is completed, the power sensor does not return to the idle state but enters the waiting for trigger state again.

OFF
Ends the continuous measurement mode, and sets the power sensor to the idle state.

*RST: 0

INITiate<Undef>:ALL:CONTinuous <state>

Applies to all connected power sensors. See `INITiate<Measurement>:CONTinuous` on page 184.

Suffix:

<Undef> 1 to n
No suffix required.

Setting parameters:

<state> *RST: 0

Usage: Setting only

INITiate<Measurement>:DISable <state>

Prevents the execution of `INITiate<Measurement>[:IMMediate]`. Thus you can prevent that the specified power sensor starts a measurement if `INITiate<Undef>:ALL[:IMMediate]` is used.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<state> *RST: 0

INITiate<Undef>:ALL:DISable <state>

Applies to all connected power sensors. See `INITiate<Measurement>:DISable` on page 185.

Suffix:

<Undef> 1 to n
No suffix required.

Setting parameters:

<state>

Usage: Setting only

INITiate<Measurement>[:IMMediate]

Starts a single measurement cycle. The power sensor changes from the idle state to the waiting for trigger state. As soon as the trigger condition is fulfilled, the sensor begins the measurement. Depending on the number of trigger events that are required, e.g. for averaging, the power sensor enters the waiting for trigger state several times. Once the entire measurement is completed, a measurement result is available, and the power sensor enters the idle state again.

Use the command only after the continuous measurement mode has been disabled using `INITiate<Measurement>:CONTinuous OFF`.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

Example: If you work in a master/slave setup, you need to trigger the slave before triggering the master. To prevent overlapping execution, use `*WAI`, see also Chapter 14.3, "Command Sequence and Synchronization", on page 460. In this example, sensor 2 is the slave, sensor 1 is the master:

```
INIT2
*WAI
INIT1
```

Usage: Event

INITiate<Undef>:ALL[:IMMediate]

Applies to all connected power sensors. See `INITiate<Measurement>[:IMMediate]` on page 186.

Suffix:

<Undef> 1 to n
No suffix required.

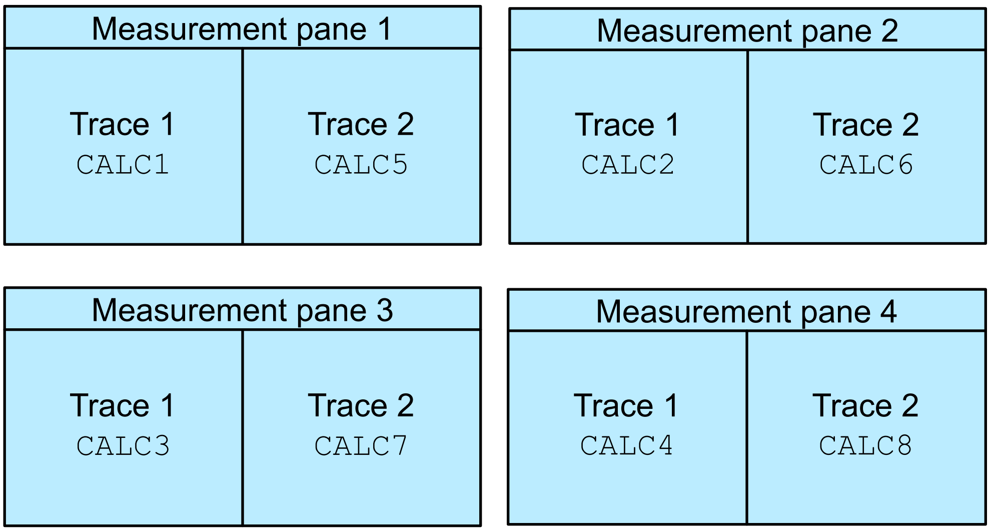
Usage: Event

13.5 Measurement Settings and Results

The R&S NRX supports up to 4 measurement channels. The trace, pulse analysis, statistics measurements support 2 traces. Thus, each measurement channel has 2 separate measurements, adding up to 8 different measurement results that are configured using the commands of the `CALCulate<Measurement>` subsystem.

Table 13-1: Assigned measurement panes and traces

Measurement suffix CALCulate<Measurement>	**Assigned measurement panes** WINDow<Window>	**Assigned traces**
CALC1 to CALC4	WIND1 to WIND4	1
CALC5 to CALC8	WIND1 to WIND4	2



For each measurement, you can define two sensor configurations in parallel, a primary and a secondary sensor configuration.

Further information:

- Chapter 5.1, "Parallel Measurements", on page 43
- Chapter 13.6, "Calculation Functions", on page 287

13.5.1 Configuring Display and Results

Further information:

- Chapter 6.1, "Display Settings", on page 49

13.5.1.1 General Settings

CALCulate<Measurement>:AVALue <value>

Determines which additional information about the measured values is shown in the display.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	NONE | EXTRemes | STATistics *RST: NONE

Manual operation: See "Auxiliary Values" on page 51

CALCulate<Measurement>:DMODe <mode>

Specifies the display format of the measured values.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<mode> SDIGital | SANalog | GRAPhical | MARKer | GRID | INFO | STATistics | TABLe

SDIGital | SANalog
For continuous average, burst average, NRT measurements
Numeric format without/with bar chart

SDIGital | SANalog | GRAPhical
For time gate, timeslot measurements
Numeric format without/with bar chart or measured values plotted over time

MARKer | GRID | INFO
For trace measurements
Shows or hides additional information below the graph.

STATistics | TABLe
For statistics measurements
Waveform or tabular format

*RST: SDIGital

Manual operation: See "Display Format" on page 51
See "Info / Marker" on page 75
See "Graph / Table" on page 101

CALCulate<Measurement>:EXTRemes:RESet

Saves the currently measured value as the new minimum and maximum values.

You can query the minimum and maximum values using:

- `CALCulate<Measurement>:MAXimum:DATA?`
- `CALCulate<Measurement>:MINimum:DATA?`

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Event

CALCulate<Measurement>:HOLD:FUNCtion <function>

For all measurement functions, the R&S NRX stores the maximum and minimum values and the calculated differences between these values.

The selected setting applies to both power and reflection indication. You can change at any time.

Alias: `CALCulate<Measurement>:LIMit<undef>:TYPE`

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<function> MAX | MIN | DIFFerence

MAXimum
Maximum value

MINimum
Minimum value

DIFFerence
Difference between maximum and minimum value

*RST: MAX

Manual operation: See "Max Hold Function" on page 56

CALCulate<Measurement>:HOLD[:STATe] <state>

If enabled, displays the highest value measured for each point (pixel) of the selected display type.

Alias: `CALCulate<Measurement>:LIMit<undef>[:STATe]`

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<state>	OFF | ON | RESet *RST: OFF

Manual operation: See "Max Hold" on page 55

CALCulate<Measurement>:LIMit<undef>:TYPE <type>

Alias for `CALCulate<Measurement>:HOLD:FUNCtion` on page 189.

Suffix:

<Measurement>	1 to 8 Measurement
<undef>	1 to n No suffix required.

Parameters:

<type>	MAX | MIN | DIFFerence *RST: MAX

CALCulate<Measurement>:LIMit<undef>[:STATe] <state>

Alias for `CALCulate<Measurement>:HOLD[:STATe]`.

Suffix:

<Measurement>	1 to 8 Measurement
<undef>	1 to n No suffix required.

Parameters:

<state>	OFF | ON *RST: OFF

CALCulate<Measurement>:RESolution <resolution>

Configures the resolution of the measurement.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<resolution>	I | OI | OOI | OOOI **I** No decimal places, e.g. 1 dBm **OI** 1 decimal place, e.g. 0.1 dBm **OOI** 2 decimal places, e.g. 0.01 dBm **OOOI** 3 decimal places, e.g. 0.001 dBm *RST: OOI

Manual operation: See "Resolution" on page 50

DISPlay:BRIGthness <brightness>

Enables or disables the display backlight.

Parameters:

<brightness>	Range: 0.0 to 1.0 *RST: 1.0

DISPlay:ERRorlist <state>

If enabled, displays a dialog containing the SCPI error queue. You can delete the queue using `SYSTem:ERRor:ALL?`.

pressing the [DEL] key.

Parameters:

<state>

DISPlay:LAYout <layout>

Splits the measurement display into panes. A maximum number of 4 panes is possible, one for each measurement. See also Chapter 4.1.5, "Selecting the Display Layout", on page 36.

Parameters:

<layout>	L1 | L2 | L3 | L4 *RST: L1

DISPlay:MESSage:TEXT:CLEar

Deletes the text for user-defined messages.

Define the message text using DISPlay:MESSage:TEXT[:DATA].

Usage: Event

DISPlay:MESSage:TEXT[:DATA] <string>

Defines the text for user-defined messages.

Parameters:

<string> ASCII characters
String "\n" causes a line break. The max. number of lines depends on the message type: 9 lines for messages and 7 lines for queries.
The length of a line depends on the characters used. Too long lines are cut off.

DISPlay:MESSage:TYPE <type>

Sets the message type for the user-defined messages.

Parameters:

<type> QUERy | MESSage

QUERy
The execution of remote control commands is blocked, until the dialog containing the query is closed.

MESSage
Remote control command processing is immediately continued. Close the dialog containing the message by pressing [Esc] or using DISPlay:MESSage[:STATe] OFF.

*RST: MESSage

DISPlay:MESSage[:STATe] <state>

If enabled, displays a dialog containing a user-defined message.

Define the message text using DISPlay:MESSage:TEXT[:DATA].

Parameters:

<state>

DISPlay:OVERload[:STATe] <state>

If enabled, hides the sensor overload message. But be aware that overload can damage the power sensor, depending on the amount of power and the duration of the overload condition.

You can query the allowed maximum power using SYSTem:SENSor<Sensor>:INFO?, or look it up in the data sheet of the power sensor.

Replaces the following R&S NRP2 command: SERVice:DISPlay:OVERload

Parameters:

<state> OFF | ON | NEVer

*RST: ON; but does not apply if NEVer is set.

Manual operation: See "Hide Sensor Overload Message" on page 165

DISPlay:PIXMap?

Queries the display content. The return value is a binary block data, for example:

`#577110xxxxxx...x`

`#577110` = block data header

`xxxxxx...x` = binary format comprising an 8-bit BMP bitmap of the display content.

Usage: Query only

DISPlay:UPDate <mode>

Sets the update frequency of the measured values in the display.

Parameters:

<mode> NORMal | SLOW | FREeze

`FREeze` is useful if discontinuities in the voltage progress at the analog outputs occur. In this state, the display does not consume CPU time.

*RST: NORMal

DISPlay[:WINDow<Window>][:STATe] <state>

Opens or closes a measurement pane. This action also changes the total number of measurement panes set by `DISPlay:LAYout` and vice versa. See also Chapter 4.1.5, "Selecting the Display Layout", on page 36.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<state> OFF | ON

DISPlay[:WINDow<Window>]:POSition <position>

Swaps the position of measurement panes in the user interface. The numbering of the panes is not changed. See also Chapter 4.1.6, "Swapping Measurement Panes", on page 38.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<position> Range: 0 to 3

*RST: 0

SYSTem:SPEed <mode>

Changes the data processing speed.

Parameters:

<mode> NORMal | FAST | SLOW | FREeze

FAST

The display is switched off and the measured values are no longer displayed, since the continuous update of the screen content requires computation time.

*RST: NORMal

13.5.1.2 Scaling

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:CCDF <value>

Sets the lower limit for the CCDF bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: pct

Manual operation: See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RCOefficient <value>

Sets the lower limit for the reflection coefficient bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -1e18 to 1e18
*RST: 1.0
Default unit: -

Manual operation: See "Scale Lower Limit" on page 52
See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RFRatio <value>

Sets the lower limit for the ratio of the forward/reverse power bargraph display.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: pct

Manual operation: See "Scale Lower Limit" on page 52
See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio: RLOSs <value>

Sets the lower limit for the return loss bargraph display.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -200.0 to 200.0
*RST: -200.0
Default unit: dB

Manual operation: See "Scale Lower Limit" on page 52
See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio: SWR <value>

Sets the lower limit for the standing wave ratio (SWR) bargraph display.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: 0.0 to 1e18 *RST: 1.0 Default unit: -

Manual operation: See "Scale Lower Limit" on page 52
See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] <value>

Sets the lower limit for the power ratio bargraph display.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer:RATio`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: -180.0 to +180.0 *RST: -20.0 Default unit: dB

Manual operation: See "Scale Lower Limit" on page 52
See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWer] <value>

Sets the lower limit for the power value bargraph display.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: -120.0 to +150.0 *RST: -60.0 Default unit: dBm

Manual operation: See "Scale Lower Limit" on page 52
See "Forward Scale Lower Limit, Reflection Scale Lower Limit" on page 52

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:CCDF <value>

Sets the upper limit for the CCDF bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 100.0
*RST: 100.0
Default unit: pct

Manual operation: See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RCOefficient <value>

Sets the upper limit for the reflection coefficient bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -1e18 to 1e18
*RST: 5.0
Default unit: -

Manual operation: See "Scale Upper Limit" on page 52
See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RFRatio <value>

Sets the upper limit for the ratio of the forward/reverse power bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or

Parameters:

<value> Range: 0.0 to 100.0
*RST: 100.0
Default unit: pct

Manual operation: See "Scale Upper Limit" on page 52
See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio: RLOSs <value>

Sets the upper limit for the return loss bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -200.0 to 200.0
*RST: 200.0
Default unit: dB

Manual operation: See "Scale Upper Limit" on page 52
See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio: SWR <value>

Sets the upper limit for the standing wave ratio (SWR) bargraph display.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 1e18
*RST: 2.0
Default unit: -

Manual operation: See "Scale Upper Limit" on page 52
See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] <value>

Sets the upper limit for the power ratio bargraph display.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer:RATio`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -180.0 to +180.0
*RST: +20.0
Default unit: dB

Manual operation: See "Scale Upper Limit" on page 52
See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer] <value>

Sets the upper limit for the power value bargraph display.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -120.0 to +150.0
*RST: +10.0
Default unit: dBm

Manual operation: See "Scale Upper Limit" on page 52
See "Forward Scale Upper Limit, Reflection Scale Upper Limit" on page 53

CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT <value>

Defines the position of the left screen edge relative to the delayed trigger. The value can be negative so that signal components are displayed before the trigger event.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -15.0 to 15.0
*RST: 0.0
Default unit: s

Manual operation: See "Start Time" on page 53

CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth <value>

Sets the duration of the trace.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: 8.3e-9 to 30.0
*RST: 0.01
Default unit: s

Manual operation: See "Trace Length" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DB <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: 0.005 to 400.0
*RST: 50.0
Default unit: dB

Manual operation: See "Power Span" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBM <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.005 to 400.0 *RST: 50.0 Default unit: dBm

Manual operation: See "Power Span" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBUV <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.005 to 400.0 *RST: 100.0 Default unit: dBμV

Manual operation: See "Power Span" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DPCT <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.005 to 2e18 *RST: 200.0 Default unit: dpct

Manual operation: See "Power Span" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:ONE <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range without unit.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: 0.005 to 2e18
*RST: 10.0
Default unit: -

Manual operation: See "Power Span" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:WATT <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power level range.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: 1e-12 to 2e9
*RST: 1e-3
Default unit: W

Manual operation: See "Power Span" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DB <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value. The reference value is assigned to the top line of the grid.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -200.0 to 200.0
*RST: 25.0
Default unit: dB

Manual operation: See "Power Reference" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBM <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value. The reference value is assigned to the top line of the grid.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dBm

Manual operation: See "Power Reference" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBUV <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value. The reference value is assigned to the top line of the grid.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -100.0 to 300.0
*RST: 150.0
Default unit: dBuV

Manual operation: See "Power Reference" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DPCT <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value. The reference value is assigned to the top line of the grid.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -1e18 to 1e18
*RST: 100.0
Default unit: dpct

Manual operation: See "Power Reference" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:ONE <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value without unit. The reference value is assigned to the top line of the grid.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: -1e18 to 1e18 *RST: 10.0 Default unit: -

Manual operation: See "Power Reference" on page 54

CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:WATT <value>

Effective for trace, pulse analysis, time gate, timeslot measurements.

Sets the power reference value. The reference value is assigned to the top line of the grid.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: -1e9 to 1e9 *RST: 1e-3 Default unit: W

Manual operation: See "Power Reference" on page 54

DISPlay[:WINDow<Window>]:ANALog:AUTO <state>
DISPlay[:WINDow<Window>]:METer:AUTO <state>

Automatically determines the scaling for the analog display. The upper and the lower limit value are set depending on the current measurement data.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<state>	ONCE | OFF *RST: OFF

DISPlay[:WINDow<Window>]:ANALog:LOWer <value>
DISPlay[:WINDow<Window>]:METer:LOWer <value>

Sets the lower limit value of the analog scale.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value> Depends on the current output unit of the measured value.

Range: 1e-18 W to1e18 W; -150 DBM to 210 DBM; PCT: 1e-18 PCT to 1e22 PCT; -200 DB to 200 DB

DISPlay[:WINDow<Window>]:ANALog:UPPer <value>
DISPlay[:WINDow<Window>]:METer:UPPer <value>

Sets the upper limit value of the analog scale.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> See `DISPlay[:WINDow<Window>]:METer:LOWer` on page 205.

[SENSe<Sensor>:]TRACe:OFFSet:TIME <time>

Adds an offset to the beginning of the trace sequence. Thus, the trace in the result display is moved in positive or negative x-direction. If you measure with more than one power sensor, you can use this offset to arrange the traces to each other. The start of recording relative to the trigger event is set using `TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]`.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time> Range: -15.0 to 15.0
*RST: 0.0
Default unit: s

[SENSe<Sensor>:]TRACe:TIME <time>

Sets the duration of the trace.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time> Range: 8.3e-9 to 30.0
*RST: 0.01
Default unit: s

Manual operation: See "Power / Div" on page 54

13.5.1.3 Units

If you enter a value that is expressed in a certain unit, for example Hz, you can omit the unit. Then, the default unit provided in the remote command description is used. If you need decimal multiples and submultiples of a unit, you can use SCPI prefixes, see "Units" on page 456.

If you enter a power value or power ratio that can be expressed in more than one unit, you can enter the value together with the unit, and the unit is recognized. If you enter a value without unit, the unit defined by one of the following commands is used:

- `UNIT<Measurement>:POWer[:VALue]`
- `UNIT<Measurement>:POWer:RATio`

After a reset, the default unit is used.

[SENSe<Sensor>:]UNIT:POWer[:VALue] <unit>

Sets the output unit for the measured power values. For NRT measurements, sets the unit of the absolute forward power measurement.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<unit> DBM | DBUV | W

Available units.
If the R&S NRP2 emulation is enabled using `SYSTem:LANGuage`, the unit is fixed to W.

*RST: DBM

Manual operation: See "Forward Unit" on page 51

SOURce:UNIT:POWer <power>

Requires the sensor check source (R&S NRX-B1).

Sets the unit of the power level for the output signal.

Parameters:

<power> DBM | DBUV | W

*RST: DBM

Manual operation: See "Power Level" on page 145

UNIT<Measurement>:POWer:RATio <unit>

Sets the output unit for the measured power ratio values. For NRT measurements, sets the unit of the relative forward power measurement.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<unit> DB | DPCT | O

The character `O` stands for One (x1).

*RST: DB

Manual operation: See "Unit" on page 50
See "Forward Unit" on page 51

UNIT<Measurement>:POWer:REFLection <unit>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>` `"POWer:REVerse"` is set.

Sets how the ratio of forward and reverse power is expressed.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<unit> RCO | RL | SWR | RFR

RCO
Reflection coefficient; 0 to 1, no unit

RL
Return loss in dB

SWR
Standing wave ratio; 1 to ∞, no unit

RFR
Ratio between forward and reverse power; 0 % to 100 %

*RST: SWR

Manual operation: See "Standing Wave Ratio (SWR)" on page 110
See "Return Loss" on page 110
See "Reflection Coefficient" on page 110
See "Reflection Ratio" on page 111

UNIT<Measurement>:POWer:RELative:STATe <state>

Alias for `CALCulate<Measurement>:RELative<DirectionalChannel>:STATe` on page 234.

`ON` corresponds to `ON` and `SET`.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<state> OFF | ON
*RST: 0

UNIT<Measurement>:POWer[:VALue] <unit>

Sets the output unit for the measured power values. For NRT measurements, sets the unit of the absolute forward power measurement.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<unit> DBM | DBUV | W
*RST: DBM

Manual operation: See "Unit" on page 50
See "Forward Unit" on page 51

13.5.1.4 Limits

CALCulate<Measurement>:LIMit<undef>:CLEar:AUTO <mode>

If enabled, automatically resets the limit monitoring state and the internal counter for limit violations if one of the following commands is executed:

- `INITiate<Measurement>[:IMMediate]`
- `INITiate<Measurement>:CONTinuous ON`
- `MEASure<Measurement>...` query
- `READ<Measurement>...` query

Suffix:

<Measurement>	1 to 8 Measurement
<undef>	1 to n No suffix required.

Parameters:

<mode>	OFF | ON | ONCE

CALCulate<Measurement>:LIMit<undef>:CLEar[:IMMediate]

Resets the limit monitoring state and the internal counter for limit violations.

Suffix:

<Measurement>	1 to 8 Measurement
<undef>	1 to n No suffix required.

Usage: Event

CALCulate<Measurement>:LIMit<undef>:FAIL?

Queries whether upper or lower limits have been violated. If one of the following events occurs, the status is reset:

- R&S NRX is switched on.
- Reset is performed (`*RST`).
- `CALCulate<Measurement>:LIMit<undef>:CLEar[:IMMediate]` is executed.

Suffix:

<Measurement>	1 to 8 Measurement
<undef>	1 to n No suffix required.

Usage: Query only

CALCulate<Measurement>:LIMit<undef>:FCOunt?

Queries the number of limit violations. The counter is reset if one of the following events occurs:

- R&S NRX is switched on.
- Reset is performed (`*RST`).
- `CALCulate<Measurement>:LIMit<undef>:CLEar[:IMMediate]` is executed.

Suffix:

<Measurement>	1 to 8 Measurement	
<undef>	1 to n No suffix required.	

Usage: Query only

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA] <value>

Sets the lower limit for the measured values.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = forward, 2 = reflection (reverse)

Parameters:

<value>

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:CCDF <value>

Sets the lower limit for the complementary cumulative distribution function (CCDF).

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range:	0.0 to 100.0
	*RST:	0.0
	Default unit:	pct

Manual operation: See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio: RCOefficient <value>

Sets the lower limit for the reflection coefficient.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -1e18 to 1e18
*RST: 1.0
Default unit: -

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio: RFRatio <value>

Sets the lower limit for the ratio of forward/reverse power.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: pct

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio: RLOSs <value>

Sets the lower limit for the return loss.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -200.0 to 200.0
*RST: -200.0
Default unit: dB

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:SWR <value>

Sets the lower limit for the standing wave ratio (SWR).

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 1e18
*RST: 1.0
Default unit: -

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] <value>

Sets the lower limit for the measured power ratios.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer:RATio`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -180.0 to +180.0
*RST: -20.0
Default unit: dB

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:POWer <value>

Sets the lower limit for the measured power values.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -120.0 to +150.0
*RST: -60.0
Default unit: dBm

Manual operation: See "Lower Limit" on page 56
See "Forward Lower Limit, Reflection Lower Limit" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer:STATe <state>

Enables or disables the monitoring function for the lower limit.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<state> *RST: OFF

Manual operation: See "Lower Limit State" on page 56
See "Forward Lower Limit State, Reflection Lower Limit State" on page 57

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA] <value>

Sets the upper limit for the measured values.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = forward, 2 = reflection (reverse)

Parameters:
<value>

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:CCDF <value>

Sets the upper limit for the complementary cumulative distribution function (CCDF).

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: 0.0 to 100.0 *RST: 100.0 Default unit: pct

Manual operation: See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RCOefficient <value>

Sets the upper limit for the reflection coefficient.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: -1e18 to 1e18 *RST: 5.0 Default unit: -

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RFRatio <value>

Sets the upper limit for the ratio of forward/reverse power.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 100.0
*RST: 100.0
Default unit: pct

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:RLOSs <value>

Sets the upper limit for the return loss.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -200.0 to 200.0
*RST: 200.0
Default unit: dB

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:SWR <value>

Sets the upper limit for the standing wave ratio (SWR).

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 1e18
*RST: 2.0
Default unit: -

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] <value>

Sets the upper limit for the measured power ratios.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer:RATio`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -180.0 to +180.0
*RST: +20.0
Default unit: dB

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:POWer <value>

Sets the upper limit for the measured power values.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -120.0 to +150.0
*RST: +10.0
Default unit: dBm

Manual operation: See "Upper Limit" on page 57
See "Forward Upper Limit, Reflection Upper Limit" on page 58

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer:STATe <state>

Enables or disables the monitoring function for the upper limit.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or

Parameters:

<state>	*RST: OFF

Manual operation: See "Upper Limit State" on page 56
See "Forward Upper Limit State, Reflection Upper Limit State" on page 58

13.5.1.5 Result Formats and Screenshots

FORMat:SREGister <sregister>

Specifies the format that is used for the return value of `*STB?`.

Parameters:

<sregister>	ASCii | BINary | HEXadecimal | OCTal *RST: ASCii

FORMat[:READings][:DATA] [<data,length>, <arg1>]

Specifies how the controller expects numeric data from the R&S NRX.

Parameters:

<data,length> <REAL,32 | 64>

Floating point numbers as standardized in IEEE 754, 32-bit or 64-bit. If you omit the length, the R&S NRX uses the last used length.
Example for `REAL,32` format:
`#14....<binary float value>....`
Example for `REAL,64` format:
`#18....<binary float value>....`

<arg1> <ASCii[,0 to 12]>

Readable value. The digit defines the number of decimal places. If more values are output, they are separated by commas.
Example: -2.279610E+01

*RST: ASCii,0

The reset value 0 does not restrict the number of decimal places.

FORMat[:READings]:BORDer <border>

Selects the order of bytes in 64-bit binary data.

Parameters:

<border> NORMal | SWAPped

NORMal
The 1st byte is the least significant byte, the 4th/8th byte the most significant byte.
Fulfills the Little Endian (little end comes first) convention, used by x86/x64 CPUs, for example.

SWAPped
The 1st byte is the most significant byte, the 4th/8th byte the least significant byte.
Fulfills the Big Endian (big end comes first) convention.

*RST: NORMal

Example: `FORM:BORD NORM`

SYSTem:HCOPy [<filename>]

Creates a screenshot of the current display. If you supply a filename with the command, this filename is used for the target file. Otherwise, an internal name is generated that you can query using this command.

See also Chapter 4.1.8, "Creating and Saving Screenshots", on page 40.

Parameters:

<filename>

Manual operation: See "Screenshot" on page 26

13.5.2 Configuring the Trigger

Further Information:

- Chapter 6.3, "Triggering", on page 59

TRIGger<undef>:ALL:ATRigger[:STATe] <stat>
TRIGger<Measurement>[:CHANnel<Channel>]:ATRigger[:STATe] <stat>

Controls the automatic trigger function. If enabled, an artificial trigger is generated if the delay time has elapsed after the measurement start and no trigger event has occurred.

The auto delay is set using `TRIGger<Measurement>[:CHANnel<Channel>]:DELay:AUTO` on page 221.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<stat>	ON | OFF *RST: ON

TRIGger<undef>:ALL:COUNt <count>
TRIGger<Measurement>[:CHANnel<Channel>]:COUNt <count>

Sets the number of measurement cycles to be performed when the measurement is started using `INITiate<Measurement>[:IMMediate]`.

This number equals the number of results that can be obtained from the sensor after a single measurement. As long as the defined number of measurements is not executed, the sensor automatically initiates another measurement internally when the current result is available.

This command is particularly useful in conjunction with buffered measurements. For example, to fill a buffer with a predefined size with measurements that have been triggered externally or by `*TRG` without having to start the measurement multiple times.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage` `"NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<count>	Range:	Depends on power sensor
	*RST:	1

TRIGger<undef>:ALL:DELay:AUTO <stat>
TRIGger<Measurement>[:CHANnel<Channel>]:DELay:AUTO <stat>

If enabled, no measurement is started until the power sensor has settled. For this purpose, the delay value is automatically determined.

If a longer period is set using `TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]`, the automatically determined delay is ignored.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage` `"NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<stat>	ON | OFF	
	*RST:	OFF

TRIGger<undef>:ALL:DELay[:VALue] <delay>
TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue] <delay>

Sets the delay between the trigger event and the beginning of the actual measurement.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<delay> Range: -5.0 to 10.0
*RST: 0.0
Default unit: s

Manual operation: See "Delay" on page 63

TRIGger<undef>:ALL:DTIMe <dropout>
TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe <dropout>

If the trigger level has been underrun with internal triggering, it is sometimes useful to wait some time (drop-out time) before retriggering. The measurement of unwanted signal components can thus be suppressed. See Chapter 6.3.3, "Dropout Time", on page 61.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<dropout> Range: 0.0 to 10.0
*RST: 0.0
Default unit: s

Manual operation: See "Dropout" on page 64

TRIGger<Measurement>[:CHANnel<Channel>]:EXTernal<Port>:IMPedance <impedance>

Requires a power sensor with a trigger input.

Sets the termination resistance of the external trigger signal that is supplied at the trigger input/output of the power sensor. Choose a setting that fits the impedance of the trigger source to minimize reflections on the trigger signals.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

<Port> 1 to 2
Power sensor ports; 1 = USB port, 2 = trigger I/O connector

Parameters:

<impedance> HIGH | LOW

HIGH
~10 kΩ

LOW
50 kΩ

*RST: HIGH

Manual operation: See "Trigger 2 Input Impedance" on page 65

TRIGger<undef>:ALL:HOLDoff <holdoff>
TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff <holdoff>

Sets the hold-off time, see Chapter 6.3.4, "Hold-Off Time", on page 61.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<holdoff> Range: 0.0 to 10.0
*RST: 0.0
Default unit: s

Manual operation: See "Holdoff" on page 64

TRIGger<undef>:ALL:HYSTeresis <hysteresis>
TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis <hysteresis>

Sets the hysteresis. A trigger event occurs, if the trigger level:

- Falls below the set value on a rising slope.
- Rises above the set value on a falling slope.

Thus, you can use this setting to eliminate the effects of noise in the signal for the edge detector of the trigger system.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<hysteresis>	Range: 0.0 to 10.0 *RST: 0.0 Default unit: dB

Manual operation: See "Hysteresis" on page 64

TRIGger<Measurement>[:CHANnel<Channel>]:JITTer:METHod <method>

Defines the method how to cope with the misalignment between the trigger event and the sample point.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<method> COMPensate | MEASure | NONE

COMPensate
Compensation means resampling of trace result.

MEASure
Does not perform resampling, but stores the measured trigger jitter.

*RST: COMPensate

Manual operation: See "Jitter Suppression" on page 64

TRIGger<undef>:ALL:LEVel <level>
TRIGger<Measurement>[:CHANnel<Channel>]:LEVel <level>

Effective only if `TRIGger<Measurement>[:CHANnel<Channel>]:SOURce INTernal`.

Sets the trigger threshold for internal triggering derived from the test signal.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<level>	Range: -290.0 to +223.01 *RST: -10.0 Default unit: dBm

Manual operation: See "Trigger Level" on page 63

TRIGger<undef>:ALL:MODE <mode>
TRIGger<Measurement>:MODE <mode>

Controls the trigger execution depending on the setting of the trigger source, see `TRIGger<Measurement>[:CHANnel<Channel>]:SOURce`.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<mode> NORMal | FREerun | SINGle | AUTO

NORMal
Continuous triggering with regular trigger events.

FREerun
Enables a continuous measurement. The power sensor executes one measurement cycle after the other.

SINGle
Disables continuous triggering so that only one trigger event at a time is executed.

AUTO
Automatically starts a measurement if no trigger event has occurred after 300 ms.

*RST: AUTO

Manual operation: See "Trigger Mode" on page 62

TRIGger<Measurement>[:CHANnel<Channel>]:MASTer:PORT <port>

Effective only if the connected sensor is trigger master, see `TRIGger<Measurement>[:CHANnel<Channel>]:MASTer[:STATe]`

Sets the port where the trigger master sensor outputs a digital trigger signal.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<port>	INTernal | EXT2 | EXTernal2 *RST: INTernal

Manual operation: See "Trigger Master Port" on page 65

TRIGger<Measurement>[:CHANnel<Channel>]:MASTer[:STATe] <state>

Enables or disables the power sensor as trigger master. If enabled, the power sensor outputs a digital trigger signal in sync with its own trigger event. The trigger signal is output at the port selected by `TRIGger<Measurement>[:CHANnel<Channel>]:MASTer:PORT`.

The trigger master has to use its internal trigger source. Set the trigger source for the trigger slaves to `INTA` | `INTB` | `INTC` | `INTD`, where [A to D] is the port to which the trigger master is connected. The trigger signal generated by the trigger master is routed to the R&S NRX and from there it is distributed to the trigger slaves and, if `OUTPut:TRIGger:SOURce` `SENS1` | `SENS2` | `SENS3` | `SENS4` is set, also to the trigger output.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<state>	ON | OFF *RST: OFF

Manual operation: See "Trigger Master State" on page 64

TRIGger<undef>:ALL:SLOPe <slope>
TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe <slope>

Determines which edge of the envelope power (internal triggering) or increasing voltage (external triggering) is used for triggering.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<slope> POSitive | NEGative

*RST: POSitive

Manual operation: See "Slope" on page 63

TRIGger<undef>:ALL:SOURce <source>
TRIGger<Measurement>[:CHANnel<Channel>]:SOURce <source>

Sets the source for the trigger event. See Chapter 6.3.2, "Trigger Sources", on page 60.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<source> INTernal | INTA | INTB | INTC | INTD | EXTernal | EXT2 | EXTernal2 | CHKSource | BUS | HOLD | IMMediate

See Chapter 6.3.2, "Trigger Sources", on page 60.

IMMediate
Measures immediately, does not wait for trigger condition.

*RST: INTernal

Manual operation: See "Trigger Source" on page 63

TRIGger<Measurement>[:CHANnel<Channel>]:SYNChronize:PORT <port>

Sets the internal or external connection for the sync output of the power sensor. For more information, see `TRIGger<Measurement>[:CHANnel<Channel>]:SYNChronize[:STATe]` on page 228.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<port> INTernal | EXT2 | EXTernal2
*RST: INTernal

Manual operation: See "Trigger Synchronize Port" on page 65

TRIGger<undef>:ALL:SYNChronize[:STATe] <state>
TRIGger<Measurement>[:CHANnel<Channel>]:SYNChronize[:STATe] <state>

Usually used if `TRIGger<Measurement>[:CHANnel<Channel>]:MASTer[:STATe] ON` is set.

If enabled, blocks the external trigger bus as long as the power sensor remains in the measurement state. Thus, ensures that a new measurement is only started after all power sensors have completed their measurements.

Make sure that the number of repetitions is the same for all power sensors involved in the measurement. Otherwise, the trigger bus is blocked by any power sensor that has completed its measurements before the others and has returned to the idle state.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<state> ON | OFF
*RST: OFF

Manual operation: See "Trigger Synchronize State" on page 65

TRIGger<undef>:ALL[:IMMediate]
TRIGger<Measurement>[:IMMediate]

Starts a measurement.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Event

13.5.3 Selecting the Measurement

Before starting a measurement, select the measurement type.

CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel> "<string>"

Determines the data that are processed. The parameters depend on the measurement type.

The power sensor averages every measured value using a series of samples. If a RANDom feed is selected, the power sensor takes a random value from the samples and forwards it to the R&S NRX as a measured value. PEAK is the maximum of all samples in the measurement interval.

Table 13-2: Parameter to measurement assignment

Measurement type	"<string>"	Measured value
Continuous average	POWer:AVERage POWer:PEAK POWer:RANDom	Average value Peak value Randomly selected value
Burst average	POWer:AVERage POWer:PEAK POWer:RANDom	Average value Peak value Randomly selected value
Trace	POWer:TRACe POWer:PEAK:TRACe POWer:RANDom:TRACe	Measurement sequence Peak value of the samples per test point Randomly selected value
Pulse analysis	POWer:TRACe POWer:PEAK:TRACe POWer:RANDom:TRACe	Measurement sequence Peak value of the samples per test point Randomly selected value
Time gate	POWer:AVERage POWer:PEAK POWer:RANDom	Average value Peak value Randomly selected value
Time gate Graphical display The suffix <1 to 4> selects the time gate.	POWer:AVERage ON SWEep<1 to 4> POWer:PTAVerage ON SWEep<1 to 4> POWer:PEAK ON SWEep<1 to 4>	Average value in time gate 1, 2, 3 or 4 Peak-to-average value in time gate 1, 2, 3 or 4 Peak value in time gate 1, 2, 3 or 4
Timeslot	POWer:AVERage POWer:PEAK POWer:RANDom	Average value Peak value Randomly selected value
Statistics	CCDF:TRACe CDF:TRACe PDF:TRACe	Complementary cumulative distribution function Cumulative distribution function Probability density function

Measurement type	"<string>"	Measured value

NRT, absolute
Forward direction
	`POWer:FORWard:AVERage`
	`POWer:FORWard:PEP`
	`POWer:ABSorption:AVERage`
	`POWer:ABSorption:PEP`
	`POWer:FORWard:AVERage:BURSt`
	`POWer:ABSorption:AVERage:BURSt`
		Average power
		Peak power of an amplitude-modulated signal
		Absorbed average power
		Absorbed peak envelope power (PEP)
		Average power within a burst
		Absorbed burst average

NRT, absolute Reverse direction	`POWer:OFF` `POWer:REVerse`	Reverse power disabled Reverse power
NRT, relative Forward direction	`POWer:FORWard:CCDFunction` `POWer:CFACtor`	Complementary cumulative distribution function Crest factor

NRT, relative
Reverse direction
	`POWer:SWRatio`
	`POWer:RLOSs`
	`POWer:RCOefficient`
	`POWer:RFRatio`
		Standing wave ratio
		Return loss
		Reflection coefficient
		Reflection ratio

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

<Channel> 1 to 2
1 for R&S NRX
2 is allowed for R&S NRP2 compatibility, but only if the first channel suffix is set to 1.

Parameters:

"<string>" The availability depends on the measurement type, see Table 13-2.

*RST: POWer:AVERage

Manual operation: See "Statistics Function" on page 102
See "Average" on page 108
See "CCDF" on page 108
See "Peak Envelope Power (PEP)" on page 108
See "Absorption Average" on page 108
See "Crest Factor (CF)" on page 109
See "Absorption PEP" on page 109
See "Burst Average" on page 109
See "Absorption Burst" on page 109
See "Off" on page 110
See "Reverse Power" on page 110
See "Standing Wave Ratio (SWR)" on page 110
See "Return Loss" on page 110
See "Reflection Coefficient" on page 110
See "Reflection Ratio" on page 111
See "Evaluate" on page 115

CALCulate<Measurement>:TYPE <type>

Sets the measurement type.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<type> CONTav | NRT | TRACe | STATistics | TGATe | BURStav | TSLot | PULSe
*RST: CONTav

Manual operation: See "Measurement Type" on page 67

[SENSe<Sensor>:]AUXiliary <mode>

Enables the measurement of additional measured values that are determined together with the main measured value.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<mode> NONE | MINMax | RNDMax

NONE
No additional values are measured.

MINMax
Minima and maxima of the trace are transmitted together with the measured value.
Usually, extreme values are lost due to averaging the measured values.

RNDMax
Randomly selected samples are transmitted. All evaluations use these values instead of the average values.
*RST: NONE

13.5.4 Selecting the Power Sensor

Further information:
- Chapter 6.4, "Measurement Settings Dialog", on page 66

[SENSe<Sensor>:]CATalog?

Returns a list of all connected power sensors together with the suffix of the port where the power sensor is connected.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Example: `CAT?`
Query
`"2:NRP33SN-900004"`
Response

Usage: Query only

Manual operation: See "Primary Sensor, Secondary Sensor" on page 67

CALCulate<Measurement>[:CHANnel<Channel>]:SENSe:INDex <index>

Effective for continuous average, burst average, trace, pulse analysis, time gate, timeslot measurements.

Assigns the primary or secondary sensor. You can choose any of the sensors that are connected to a sensor port of the R&S NRX. You can query the connected power sensors using `[SENSe<Sensor>:]CATalog?`.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<index> Selects the power sensor by the R&S NRX port to which it is connected.

1 to 4
Sensor connector A, B, C, D

4 to 100
USB connector

101
Optional connector: sensor interface for R&S NRT (R&S NRX-B9)

102 to 128
LAN interface

Range: 0 to 128
*RST: 0

Manual operation: See "Primary Sensor, Secondary Sensor" on page 67

13.5.5 Relative Measurements

Available for continuous average, burst average, time gate, timeslot measurements.

Further information:

- "Rel" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>[:MAGNitude] <value>

Sets the reference value for the measured relative values.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = forward, 2 = reflection (reverse)

Parameters:
<value>

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>[:MAGNitude]:AUTO <state>

Alias for `CALCulate<Measurement>:RELative<DirectionalChannel>:STATe` on page 234.

`ONCE` corresponds to `SET`

Suffix:
<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = forward, 2 = reflection (reverse)

Parameters:
<state> OFF | ONCE

*RST: OFF

Manual operation: See "Relative Measurements" on page 72

CALCulate<Measurement>:RELative<DirectionalChannel>:STATe <state>

Allows you to relate measured power or a power ratio to a reference value. Whether the power is measured by one power sensor or whether it is a combined value measured by two power sensors, is set by:

`CALCulate<Measurement>:MATH[:EXPRession]` on page 287

`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>` on page 229

Alias:

`UNIT<Measurement>:POWer:RELative:STATe`

`CALCulate<Measurement>:RELative<DirectionalChannel>[:MAGNitude]:AUTO`

Suffix:
<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:
<state> OFF | ON | SET

OFF
Absolute power or power ratio

ON
Relative power or power ratio, using the specified reference value.

SET
Uses the current measurement value as reference value and enables the relative measurement.

*RST: OFF

Manual operation: See "Forward Relative State, Reflection Relative State" on page 55
See "Relative Measurements" on page 72

[SENSe<Sensor>:]POWer:REFerence <ref>

Sets the reference value for the relative power indication.

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<ref>	Range: -290.0 to +110.0 *RST: +30.0 Default unit: dBm

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

13.5.6 Continuous Average

Further information:

- Chapter 7.1, "Continuous Average", on page 70

[SENSe<Sensor>:][POWer:][AVG:]BUFFer:CLEar

Effective for continuous average measurements.

Clears the contents of the result buffer.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Event

[SENSe<Sensor>:][POWer:][AVG:]BUFFer:COUNt?

Effective for continuous average measurements.

Queries the number of results that are currently stored in the result buffer.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:][POWer:][AVG:]BUFFer:INFO? [<ITEM>]

Effective for continuous average measurements.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Query parameters:

<ITEM>

Usage: Query only

[SENSe<Sensor>:][POWer:][AVG:]BUFFer:SIZE <count>

Effective for continuous average measurements.

Sets the size of the result buffer.

You can enable the buffer using `[SENSe<Sensor>:][POWer:][AVG:]BUFFer:STATe`.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<count> Range: 1 to 131072
*RST: 1

[SENSe<Sensor>:][POWer:][AVG:]BUFFer:STATe <state>

Enables or disables the buffered continuous average measurement. If enabled, all results generated by trigger events are collected until the buffer is filled. Thus, a higher data rate is achieved.

You can set the size of the buffer with `[SENSe<Sensor>:][POWer:][AVG:]BUFFer:SIZE`.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	ON | OFF	
	*RST:	OFF

13.5.7 Trace

Further information:

- Chapter 7.3, "Trace", on page 74

13.5.7.1 Trace Measurement Settings

In a trace measurement, you can use commands that combine several setting commands. They are described in Chapter 13.5.7.2, "Combining Trace Commands", on page 238.

The same principle is used for the calculation functions, see Chapter 13.6.2, "Using a Calculation Function", on page 289.

CALCulate<Measurement>:TRACe:X:POINts <points>

Sets the number of required values per trace sequence.

Suffix:

<Measurement>	1 to 8 Measurement	

Parameters:

<points>	Range:	1 to 8192
	*RST:	660

[SENSe<Sensor>:]BWIDth:VIDeo:LIST?
[SENSe<Sensor>:]BANDwidth:VIDeo:LIST?

Queries the parameters available for `[SENSe<Sensor>:]BANDwidth:VIDeo` and `[SENSe<Sensor>:]BWIDth:VIDeo`.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:REALtime <state>

Effective for trace measurements.

If disabled, each measurement from the power sensor is averaged. If enabled, only one sampling sequence per measurement is recorded, thus increasing the measurement speed. With a higher measurement speed, the measured values of an individual measurement are immediately delivered.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	ON | OFF *RST: OFF

13.5.7.2 Combining Trace Commands

Parameter list

The following parameters are used.

- <scope_size>
  Mandatory. Number of test points on the time axis.
  Corresponds to `[SENSe<Sensor>:]TRACe:POINts` on page 448.
- <capture_time>
  Mandatory. Period within which measured data are captured in the trace measurements.
  Corresponds to `[SENSe<Sensor>:]TRACe:TIME` on page 206.
- <source_list>
  Mandatory. Primary and secondary sensor. The number for each sensor is preceded by the character @. The entire expression is enclosed in parentheses.
  Example: (@3),(@2)
  Sensor C is the primary sensor, and sensor B is the secondary sensor.

CONFigure<Measurement>:XTIMe[:POWer]? <scope_size>, <capture_time>, <source_list>
FETCh<Measurement>:XTIMe[:POWer]? <scope_size>, <capture_time>, <source_list>
READ<Measurement>:XTIMe[:POWer]? <scope_size>, <capture_time>, <source_list>
MEASure<Measurement>:XTIMe[:POWer]? <scope_size>, <capture_time>, <source_list>

Used to measure power over time.

The used parameters are described in "Parameter list" on page 238.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<scope_size> <expr>

<capture_time> Default unit: s

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:XTIMe[:POWer]:NONE <scope_size>, <capture_time>, <source_list>

Disables trace 2. In contrast, trace 1 is always active.

The used parameters are described in "Parameter list" on page 238.

Suffix:

<Measurement> 1 to 8
Measurement

Setting parameters:

<scope_size> <expr>

<capture_time> Default unit: s

<source_list> <expr>

Usage: Setting only

CONFigure<Measurement>:XTIMe[:POWer]:RATio? <scope_size>, <capture_time>, <source_list>
FETCh<Measurement>:XTIMe[:POWer]:RATio? <scope_size>, <capture_time>, <source_list>
READ<Measurement>:XTIMe[:POWer]:RATio? <scope_size>, <capture_time>, <source_list>
MEASure<Measurement>:XTIMe[:POWer]:RATio? <scope_size>, <capture_time>, <source_list>

Power ratio over time measured by two power sensors.

The used parameters are described in "Parameter list" on page 238.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<scope_size> <expr>

<capture_time> Default unit: s

<source_list> <expr>

Usage: Query only

13.5.7.3 Using Markers

CALCulate<Measurement>:TRACe:MARKer<Marker>:XDELta?

Queries the time difference between two markers.

Suffix:

<Measurement>	1 to 8 Measurement
<Marker>	1 to 4 Marker (M1 to M4)

Usage: Query only

CALCulate<Measurement>:TRACe:MARKer<Marker>:YDELta?

Queries the power difference between two markers.

Suffix:

<Measurement>	1 to 8 Measurement
<Marker>	1 to 4 Marker (M1 to M4)

Usage: Query only

CALCulate<Measurement>:TRACe:MARKer<Marker>:YPOSition?

Queries the position of a marker on the power axis.

Suffix:

<Measurement>	1 to 8 Measurement
<Marker>	1 to 4 Marker (M1 to M4)

Usage: Query only

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:FEED:INDex <index>

Effective if `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:MODE` `MEASure` is set.

Selects the trace.

Suffix:

<Window>	1 to 4 Measurement pane
<Marker>	1 to 4 Marker (M1 to M4)

Parameters:

<index>

0
No trace selected.

1
Trace 1

2
Trace 2

Range: 0 to 2
*RST: 0

Manual operation: See "Data Source" on page 79

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:FUNCtion <function>

Effective if `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:MODE` `MEASure` is set.

Defines the measurement.

Suffix:

<Window>	1 to 4 Measurement pane

<Marker> 1 to 4
Marker (M1 to M4)

Parameters:

<function> POWer | RPOWer | RTIMe | RPAVerage

POWer
Measures the power of the trace.

RPOWer
Measures the power ratio in relation to the reference marker.

RTIMe
Measures the time difference in relation to the reference marker.

RPAVerage
Measures the average power between time positions of the marker and its reference marker.

*RST: POWer

Manual operation: See "Measurement Mode" on page 79

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:MODE <mode>

Enables or disables the marker. Also defines the appearance of the marker.

Suffix:

<Window> 1 to 4
Measurement pane

<Marker> 1 to 4
Marker (M1 to M4)

Parameters:

<mode> OFF | RULer | MEASure

OFF
Disables the marker.

RULer
Shows a line at the marker position. Useful if you use the marker as reference marker, `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:REFerence`.

MEASure
Shows a triangle at the marker position.

*RST: OFF

Manual operation: See "Marker Mode" on page 77

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE <mode>

Defines where the marker is placed.

Suffix:

<Window> 1 to 4
Measurement pane

<Marker> 1 to 4
Marker (M1 to M4)

Parameters:

<mode> FTIMe | FPOWer | RPOSition | RPOWer | RPLeft | RPRight | PSEarch | MSEarch | RPSLeft | RPSRight | RMSLeft | RMSRight

FTIMe
At a fixed time, set by the marker position.

FPOWer
At a fixed power value, set by the marker position.

RPOSition
At a time difference of the marker position to the x-position of the reference marker.

RPOWer
At a power difference of the marker position to the y-position of the reference marker.

RPLeft
Starting from the left border, at a power difference of the marker position to the y-position of the reference marker.

RPRight
Starting from the right border, at a power difference of the marker position to the y-position of the reference marker.

PSEarch
Measured maximum power

MSEarch
Measured minimum power

RPSLeft
Maximum power measured left from the reference marker.

RPSRight
Maximum power measured right from the reference marker.

RMSLeft
Minimum power measured left from the reference marker.

RMSRight
Minimum power measured right from the reference marker.

*RST: FTIMe

Manual operation: See "Position Mode" on page 77

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:DBM <power>

Sets an absolute power value for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window> 1 to 4
Measurement pane

<Marker> 1 to 4
Measurement pane

Parameters:

<power> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dBm

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:DBUV <power>

Sets an absolute power value for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window> 1 to 4
Measurement pane

<Marker> 1 to 4
Marker (M1 to M4)

Parameters:

<power> Range: -100.0 to 300.0
*RST: 0.0
Default unit: dBuV

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:DB <power>
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:RATio:DB <power>

Sets an absolute or relative power value for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window> 1 to 4
Measurement pane

<Marker> 1 to 4
Marker (M1 to M4)

Parameters:

<power> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dB

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:DPCT <power>
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:RATio:DPCT <power>

Sets an absolute or relative value for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window>	1 to 4 Measurement pane
<Marker>	1 to 4 Measurement pane

Parameters:

<power>	Range: -1e18 to 1e18 *RST: 0.0 Default unit: dpct

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:O <power>
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:RATio:O <power>

Sets an absolute or relative value for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window>	1 to 4 Measurement pane
<Marker>	1 to 4 Marker (M1 to M4)

Parameters:

<power>	Range: -1e18 to 1e18 *RST: 0.0 Default unit: -

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:POWer:WATT <power>
DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:POWer:WATT <power>

Sets an absolute or relative power value for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window>	1 to 4 Measurement pane
<Marker>	1 to 4 Marker (M1 to M4)

Parameters:

<power>

Range: -100e-3 to 1e12

*RST: 1e-3

Default unit: W

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:RELative:TIME <time>

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:TIME <time>

Sets an absolute or relative time for the marker position defined under `DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:MODE` on page 242.

Suffix:

<Window>	1 to 4 Measurement pane
<Marker>	1 to 4 Marker (M1 to M4)

Parameters:

<time>

Range: -15.0 to 15.0

*RST: 0.0

Default unit: s

Manual operation: See "Position" on page 78

DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:REFerence <reference>

Defines a marker as reference marker.

Suffix:

<Window>	1 to 4 Measurement pane
<Marker>	1 to 4 Marker (M1 to M4)

Parameters:

<reference>

Range: 1 to 4

*RST: 1

Manual operation: See "Reference Marker" on page 79

DISPlay[:WINDow<Window>]:TRACe:MARKer<Undef>:SELection <markerNo>

Shows the selected marker in the trace.

Suffix:

<Window>	1 to 4 Measurement pane
<Undef>	1 to n No suffix required.

Parameters:

<markerNo>	NONE | M1 | M2 | M3 | M4 *RST: NONE

Manual operation: See "M1 / M2 / M3 / M4" on page 75

13.5.8 Pulse Analysis

Further information:

- Chapter 7.4, "Pulse Analysis", on page 79

[SENSe<Sensor>:]TRACe:MEASurement[:STATe] <value>

Enables or disables automatic pulse measurement. If enabled, the power sensor automatically determines the pulse parameters for the currently measured trace.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> ON | OFF
*RST: OFF

[SENSe<Sensor>:]TRACe:MEASurement:AUTO[:STATe] <value>

Enables or disables the automatic transfer of the measured pulse parameters after each trace. If enabled, the trace and pulse data are synchronously displayed in continuous measurement mode.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<value> *RST: OFF

[SENSe<Sensor>:]TRACe:MEASurement:OFFSet:TIME <value>

Sets the start time of the pulse analysis, referenced to delay set by TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue].

By default, the parameters of the first detected pulse are determined. Using this command, you can determine parameters of another pulse. Make sure that the pulse analysis does not begin until shortly before this pulse.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> Default unit: s

[SENSe<Sensor>:]TRACe:MID:OFFSet:TIME <time>

Sets an offset to the start of the gate in which the pulse analysis is performed. See also [SENSe<Sensor>:]TRACe:MID:TIME on page 249.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time> Range: 0.0 to 30.0
*RST: 0.01
Default unit: s

[SENSe<Sensor>:]TRACe:MID:TIME <time>

Sets the length of the gate in which the pulse analysis is performed. The gate start is referenced to the trigger event.

Used to define a gate on a trace measurement, in which you want to perform a pulse analysis. If the gate length equals the length of the trace measurement, the first detected pulse is analyzed. Using a gate, you can investigate successive pulses.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time> Range: 0.0 to 30.0
*RST: 0.01
Default unit: s

CALCulate<Measurement>:TRACe:MEASurement:ALGorithm <value>

Effective for pulse analysis measurements.

Sets the analysis algorithm for detecting the pulse top and the pulse base power of a pulsed signal. From these two power levels, the reference levels are derived.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> HISTogram | INTegration | PEAK
*RST: HISTogram

Manual operation: See "Algorithm" on page 87

CALCulate<Measurement>:TRACe:MEASurement:DEFine:DURation:REFerence <value>

Effective for pulse analysis measurements.

Sets the pulse width, pulse start time and pulse stop time.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 0.0 to 100.0
*RST: 50.0
Default unit: pct

Manual operation: See "Reference Level" on page 88

CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:HREFerence <value>

Effective for pulse analysis measurements.

Defines the end of the rising edge and the start of the falling edge of the pulse. Used for the measurement of the rise or fall time.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value>	Range: 0.0 to 100.0 *RST: 90.0 Default unit: pct

Manual operation: See "High Reference Level" on page 88

CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition: LREFerence <value>

Effective for pulse analysis measurements.

Defines the start of the rising edge and the end of the falling edge of the pulse. Used for the measurement of the rise or fall time.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.0 to 100.0 *RST: 10.0 Default unit: pct

Manual operation: See "Low Reference Level" on page 88

CALCulate<Measurement>:TRACe:MEASurement:POWer:AVG?

Effective for pulse analysis measurements.

Queries the average power during the time the pulse is active.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Trace Avg" on page 86

CALCulate<Measurement>:TRACe:MEASurement:POWer:HREFerence?

Effective for pulse analysis measurements.

Queries the power level at high reference level set by `CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:HREFerence`.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "High Ref." on page 86

CALCulate<Measurement>:TRACe:MEASurement:POWer:LREFerence?

Effective for pulse analysis measurements.

Queries the power level at low reference level set by `CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:LREFerence`.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Low Ref." on page 86

CALCulate<Measurement>:TRACe:MEASurement:POWer:MAX?

Effective for pulse analysis measurements.

Queries the maximum power measured within the analysis window.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Trace Peak" on page 85

CALCulate<Measurement>:TRACe:MEASurement:POWer:MIN?

Effective for pulse analysis measurements.

Queries the minimum power measured within the analysis window.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Trace Min" on page 86

CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:BASE?

Effective for pulse analysis measurements.

Queries the pulse base power level detected by the selected `CALCulate<Measurement>:TRACe:MEASurement:ALGorithm`. This value is used as a reference (0 %) to determine other parameter values such as the rising or falling thresholds.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Pulse Base" on page 86

CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:TOP?

Effective for pulse analysis measurements.

Queries the pulse top power level detected by the selected `CALCulate<Measurement>:TRACe:MEASurement:ALGorithm`. This value is used as a reference (100 %) to determine other parameter values such as the rising or falling thresholds.

Suffix:

<Measurement> 1 to 8
Measurement

Usage: Query only

Manual operation: See "Pulse Top" on page 85

CALCulate<Measurement>:TRACe:MEASurement:POWer:REFerence?

Effective for pulse analysis measurements.

Queries the power level at reference level. See `CALCulate<Measurement>:TRACe:MEASurement:DEFine:DURation:REFerence` on page 250.

Suffix:

<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:TRACe:MEASurement:PULSe:DCYCle?

Effective for pulse analysis measurements.

Queries the duty cycle of the measured power.

Suffix:

<Measurement> 1 to 8
Measurement

Usage: Query only

Manual operation: See "Duty Cycle" on page 83

CALCulate<Measurement>:TRACe:MEASurement:PULSe:DURation?

Effective for pulse analysis measurements.

Queries the time between the first positive edge and the subsequent negative edge of the pulse, where the edges occur at crossings of the mid threshold.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

Manual operation: See "Pulse Width" on page 82

CALCulate<Measurement>:TRACe:MEASurement:PULSe:PERiod?

Effective for pulse analysis measurements.

Queries the time between two consecutive edges of the same polarity in seconds. During this time, the pulse signal completes one cycle.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

Manual operation: See "Pulse Period" on page 82

CALCulate<Measurement>:TRACe:MEASurement:PULSe:SEParation?

Effective for pulse analysis measurements.

Queries the time between the first negative edge and the subsequent positive edge of the pulse in seconds, where the edges occur at crossings of the mid threshold. During this time, the pulse remains at the pulse base level.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

Manual operation: See "Pulse Off Time" on page 83

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:DURation?

Effective for pulse analysis measurements.

Queries the time that the pulse requires to transition from the pulse top level to the pulse base level.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

Manual operation: See "Fall Time" on page 83

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OCCurrence?

Effective for pulse analysis measurements.

Queries the time when the signal passes through the medial reference power level with falling edge, referenced to the delayed trigger event. Indicates the stop point of the first power pulse within the analysis window.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Stop Time" on page 84

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OVERshoot?

Effective for pulse analysis measurements.

Queries the height of the local minimum before a rising edge, divided by the pulse amplitude:

$$\text{Negative overshoot} = 100\,\% \times \frac{\text{Pulse base power - minimum power}}{\text{Pulse amplitude}}$$

Depends on the setting under `DISPlay[:WINDow<Window>]:TRACe:MEASurement:RRELation`.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Neg. Overshoot" on page 85

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:DURation?

Effective for pulse analysis measurements.

Queries the time that the pulse requires to transition from the pulse base level to the pulse top level.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

Manual operation: See "Rise Time" on page 83

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive: OCCurrence?

Effective for pulse analysis measurements.

Queries the time when the signal passes through the medial reference power level with rising edge, referenced to the delayed trigger event. Indicates the start point of the first power pulse within the analysis window.

Suffix:

<Measurement>		1 to 8 Measurement

Usage: Query only

Manual operation: See "Start Time" on page 83

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive: OVERshoot?

Effective for pulse analysis measurements.

Queries the height of the local maximum before a falling edge, divided by the pulse amplitude:

$$\text{Positive overshoot} = 100\ \% \times \frac{\text{Max. power - pulse top power}}{\text{Pulse amplitude}}$$

Depends on the setting under `DISPlay[:WINDow<Window>]:TRACe:MEASurement:RRELation`.

Suffix:

<Measurement>		1 to 8 Measurement

Usage: Query only

Manual operation: See "Pos. Overshoot" on page 86

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:SPERiod?

Effective for pulse analysis measurements.

Queries the number of samples per second.

Suffix:

<Measurement>		1 to 8 Measurement

Usage: Query only

Manual operation: See "Sampling Rate" on page 84

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:AVG[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the average signal power. See `CALCulate<Measurement>:TRACe:MEASurement:POWer:AVG?` on page 251.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>	*RST: OFF

Manual operation: See "Trace Avg" on page 86

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:MAXimum[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the maximum power measured within the analysis window. See `CALCulate<Measurement>:TRACe:MEASurement:POWer:MAX?` on page 252.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>	*RST: OFF

Manual operation: See "Trace Peak" on page 85

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:MINimum[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the minimum power measured within the analysis window. See `CALCulate<Measurement>:TRACe:MEASurement:POWer:MIN?` on page 252.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>	*RST: OFF

Manual operation: See "Trace Min" on page 86

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:BASE[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the pulse base power. See
`CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:BASE?`
on page 252.

Suffix:
<Window> 1 to 4
Measurement pane

Parameters:
<value> *RST: OFF

Manual operation: See "Pulse Base" on page 86

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:HREFerence[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the power level at high reference level. See
`CALCulate<Measurement>:TRACe:MEASurement:POWer:HREFerence?`
on page 251.

Suffix:
<Window> 1 to 4
Measurement pane

Parameters:
<value> *RST: OFF

Manual operation: See "High Ref." on page 86

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:LREFerence[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the power level at low reference level. See
`CALCulate<Measurement>:TRACe:MEASurement:POWer:LREFerence?`
on page 252.

Suffix:
<Window> 1 to 4
Measurement pane

Parameters:
<value> *RST: OFF

Manual operation: See "Low Ref." on page 86

DISPlay[:WINDow<Window>]:TRACe:MEASurement:POWer:PULSe:TOP[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the pulse top power. See `CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:TOP?` on page 253.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> *RST: OFF

Manual operation: See "Pulse Top" on page 85

DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:DCYCle[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the duty cycle of the measured power. See `CALCulate<Measurement>:TRACe:MEASurement:PULSe:DCYCle?` on page 253.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> *RST: OFF

Manual operation: See "Duty Cycle" on page 83

DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:DURation[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the pulse width. See `CALCulate<Measurement>:TRACe:MEASurement:PULSe:DURation?` on page 253.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> *RST: OFF

Manual operation: See "Pulse Width" on page 82

DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:PERiod[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the time that the pulse signal needs to complete one cycle. See `CALCulate<Measurement>:TRACe:MEASurement:PULSe:PERiod?` on page 254.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> *RST: OFF

Manual operation: See "Pulse Period" on page 82

DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:RESolution[:STATe] <value>

Effective for pulse analysis measurements.

Displays the number of samples per second. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:SPERiod?` on page 256.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> *RST: OFF

Manual operation: See "Sampling Rate" on page 84

DISPlay[:WINDow<Window>]:TRACe:MEASurement:PULSe:SEParation[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the gap between two pulses. See `CALCulate<Measurement>:TRACe:MEASurement:PULSe:SEParation?` on page 254.

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value> *RST: OFF

Manual operation: See "Pulse Off Time" on page 83

DISPlay[:WINDow<Window>]:TRACe:MEASurement:RRELation <refRelation>

Selects whether the reference levels are voltage-related or power-related.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<refRelation>	POWer | VOLTage *RST: POWer

Manual operation: See "Reference Levels relate to" on page 87

DISPlay[:WINDow<Window>]:TRACe:MEASurement:SELection <traceNo>

Selects the displayed trace.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<traceNo>	Range: 1 to 2 *RST: 1

Manual operation: See "T1 / T2" on page 80

DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:NEGative: DURation[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the fall time of the first detected pulse. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:DURation?` on page 254.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>	*RST: OFF

Manual operation: See "Fall Time" on page 83

DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:NEGative: OCCurrence[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the time when the signal passes through the medial reference power level with falling edge. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OCCurrence?` on page 255.

Suffix:
<Window> 1 to 4
Measurement pane

Parameters:
<value> *RST: OFF

Manual operation: See "Stop Time" on page 84

DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:NEGative:OVERshoot[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the relative amount of negative overshoot. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OVERshoot?` on page 255.

Suffix:
<Window> 1 to 4
Measurement pane

Parameters:
<value> *RST: OFF

Manual operation: See "Neg. Overshoot" on page 85

DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:POSitive:DURation[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the rise time of the first detected pulse. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:DURation?` on page 255.

Suffix:
<Window> 1 to 4
Measurement pane

Parameters:
<value> *RST: OFF

Manual operation: See "Rise Time" on page 83

DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:POSitive:OCCurrence[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the time when the signal passes through the medial reference power level with rising edge. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:OCCurrence?` on page 256.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>	*RST: OFF

Manual operation: See "Start Time" on page 83

DISPlay[:WINDow<Window>]:TRACe:MEASurement:TRANsition:POSitive:OVERshoot[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the display of the relative amount of positive overshoot. See `CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:OVERshoot?` on page 256.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>	*RST: OFF

Manual operation: See "Pos. Overshoot" on page 86

13.5.9 Time Gate

Further information:

- Chapter 7.5, "Time Gate", on page 88

CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME] <value>

Sets the length of the gate.

Suffix:

<Measurement>	1 to 8 Measurement
<Gate>	1 to 4 Time gate

Parameters:

<value> Range: 0.0 to 15.0
*RST: 0.0
Default unit: s

Manual operation: See "Length of Gate" on page 93

CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME <value>

Sets the start time of the gate.

Suffix:

<Measurement> 1 to 8
Measurement

<Gate> 1 to 4
Time gate

Parameters:

<value> Range: 50.0e-9 to 0.1
*RST: 1.0e-3
Default unit: s

Manual operation: See "Start of Gate" on page 93

CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:OFFSet[:TIME] <value>

Sets length of the fence.

Suffix:

<Measurement> 1 to 8
Measurement

<Gate> 1 to 4
Time gate

Parameters:

<value> Range: 0.0 to 0.1
*RST: 0.0
Default unit: s

Manual operation: See "Length of Fence" on page 93

CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:TIME <value>

Sets the start time of the fence. The start time refers to the start of the gate.

Suffix:

<Measurement> 1 to 8
Measurement

<Gate>	1 to 4 Time gate

Parameters:

<value>	Range: 0.0 to 0.1 *RST: 0.0 Default unit: s

Manual operation: See "Start of Fence" on page 93

CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe] <value>

Enables or disables an exclusion interval for the selected gate. This exclusion interval is called fence. The interval where the fence overlaps with the gate is excluded from the measurement.

Like a gate, a fence is defined by its start time and its length.

Suffix:

<Measurement>	1 to 8 Measurement
<Gate>	1 to 4 Time gate

Parameters:

<value>	*RST: OFF

Manual operation: See "Fence" on page 93

CALCulate<Measurement>[:POWer]:TGATe<Undef>[:AVG]:SELection <value>

Selects the active gate for the measurement.

Suffix:

<Measurement>	1 to 8 Measurement
<Undef>	1 to n No suffix required.

Parameters:

<value>	Range: 1 to 4 *RST: 1

Manual operation: See "G1 / G2 / G3 / G4" on page 91

13.5.10 Timeslot

Further information:

- Chapter 7.6, "Timeslot", on page 93

CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt <value>

Defines an interval at the start of the timeslot that is excluded from the measurement.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 0.0 to 15.0
*RST: 0.0
Default unit: s

Manual operation: See "Exclude from Start" on page 98

CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP <value>

Defines an interval at the end of the timeslot that is excluded from the measurement.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 0.0 to 15.0
*RST: 0.0
Default unit: s

Manual operation: See "Exclude from End" on page 98

CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt <value>

Sets the number of simultaneously measured timeslots.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 1 to 128
*RST: 8

Manual operation: See "Slots" on page 98

CALCulate<Measurement>[:POWer]:TSLot[:AVG]:SELection <value>

Selects a timeslot for the measurement.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 1 to 128 *RST: 1

Manual operation: See "Timeslot" on page 96

CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh <value>

Sets the length of the timeslot.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 50.0e-9 to 0.1 *RST: 1.0e-3 Default unit: s

Manual operation: See "Nominal Width" on page 98

CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID:OFFSet[:TIME] <value>

Sets the length of the fence.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.0 to 0.1 *RST: 0.0 Default unit: s

Manual operation: See "Length of Fence" on page 99

CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID:TIME <value>

Sets the start time of the fence. The start time refers to the start of the timeslots.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value> Range: 0.0 to 0.1
*RST: 0.0
Default unit: s

Manual operation: See "Start of Fence" on page 99

CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe] <value>

Enables or disables an exclusion interval in the timeslots. This exclusion interval is called fence. The fence is defined by its start time and its length.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> *RST: OFF

Manual operation: See "Fence" on page 99

13.5.11 Statistics

Further information:

- Chapter 7.7, "Statistics", on page 99

13.5.11.1 Statistics Measurement Settings

In a statistics measurement, you can use commands that combine several setting commands. They are described in Chapter 13.5.11.2, "Combining Statistics Commands", on page 271.

The same principle is used for the calculation functions, see Chapter 13.6.2, "Using a Calculation Function", on page 289.

For time gate settings, see also Chapter 13.5.9, "Time Gate", on page 263.

[SENSe<Sensor>:]STATistics:AVERage?

Queries the average power value calculated during a statistics measurement.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]STATistics:OFFSet[:TIME] <time>

Sets the start of the sampling window, referenced to delay set by `TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]`.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>	Range: 0.0 to 10.0 *RST: 0.0 Default unit: s

[SENSe<Sensor>:]STATistics:PEAK?

Queries the peak power value calculated during a CCDF or PDF statistics measurement.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

CALCulate<Measurement>:STATistics:POWer:AVG:DATA?

Effective for statistics measurements.

Queries the average power value in the sampling window.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage` `"NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement

Usage: Query only

CALCulate<Measurement>:STATistics:APERture <value>

Effective for statistics measurements.

Sets the width of the sampling window for unsynchronized acquisition, that is if `CALCulate<Measurement>:STATistics:TGATe:SELection` `0` is set.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 10e-6 to 10.0 *RST: 0.01 Default unit: s

Manual operation: See "Aperture" on page 115

CALCulate<Measurement>:STATistics:AWGN[:STATe] <value>

Effective for statistics measurements.

Enables or disables the internal, additional white Gaussian noise (AWGN) source. If enabled, you cannot measure with a second power sensor.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	*RST: OFF

Manual operation: See "AWGN" on page 103

CALCulate<Measurement>:STATistics:SAMPles[:MINimum] <value>

Effective for statistics measurements.

Sets the minimum number of samples.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 1 to 2147483647 *RST: 1000000

Manual operation: See "Minimum Samples" on page 103

CALCulate<Measurement>:STATistics:TGATe:SELection <value>

Effective for statistics measurements.

Configures the sampling window.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> **0**
Continuous

1 - 4
Gate number

Range: 0 to 4
*RST: 1

Manual operation: See "Evaluate" on page 106

13.5.11.2 Combining Statistics Commands

Parameter list

For the calculation functions of the statistics measurement, the following parameters are used.

- <statistics_size>
  Mandatory. Number of test points on the time axis.
  Corresponds to `[SENSe<Sensor>:]STATistics:SCALe:X:POINts` on page 438.
- <capture_time>
  Mandatory. Time interval during which the power for the statistical evaluation is measured.
  Corresponds to `[SENSe<Sensor>:]STATistics:TIME` on page 439
- <source_list>
  Mandatory. Defines the primary and secondary sensor. The number for each sensor is preceded by the character @. The entire expression is enclosed in parentheses.
  Example: (@3),(@2)
  Sensor C is the primary sensor, and sensor B is the secondary sensor.

CONFigure<Measurement>:STATistics:CCDF? <statistics_size>, <capture_time>, <source_list>
FETCh<Measurement>:STATistics:CCDF? <statistics_size>, <capture_time>, <source_list>
READ<Measurement>:STATistics:CCDF? <statistics_size>, <capture_time>, <source_list>
MEASure<Measurement>:STATistics:CCDF? <statistics_size>, <capture_time>, <source_list>

Measures the power in the defined time interval and performs a statistic evaluation (probability density function, PDF).

The used parameters are described in "Parameter list" on page 271.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<statistics_size>	<expr>
<capture_time>	Default unit: s
<source_list>	<expr>
Usage:	Query only

CONFigure<Measurement>:STATistics:PDF? <statistics_size>, <capture_time>, <source_list>
FETCh<Measurement>:STATistics:PDF? <statistics_size>, <capture_time>, <source_list>
READ<Measurement>:STATistics:PDF? <statistics_size>, <capture_time>, <source_list>
MEASure<Measurement>:STATistics:PDF? <statistics_size>, <capture_time>, <source_list>

Measures the power in the defined time interval and performs a statistic evaluation (complementary cumulative distribution function, CCDF).

The used parameters are described in "Parameter list" on page 271.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<statistics_size>	<expr>
<capture_time>	Default unit: s
<source_list>	<expr>
Usage:	Query only

13.5.11.3 Scaling

[SENSe<Sensor>:]STATistics:SCALe:X:MPWidth?

Queries the greatest level resolution that can be attained. If the value is exceeded, a settings conflict occurs, due to the following reasons:

- Number of pixels that has been selected is too great, see `CALCulate<Measurement>:STATistics[:SCALe]:X:POINts` on page 275.
- Width chosen for the level range is too small, see `CALCulate<Measurement>:STATistics[:SCALe]:X:RANGe` on page 275.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

CALCulate<Measurement>:STATistics:PDF[:SCALe]:Y:PDIVision <value>

Effective if `CALCulate<Measurement>:STATistics[:SCALe]:Y:SPACing LIN` is set.

Sets the scaling of the y-axis for PDF statistics measurements.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.01 to 1000.0 *RST: 0.2 Default unit: -

Manual operation: See "Y / div" on page 104

CALCulate<Measurement>:STATistics:PDF[:SCALe]:Y:TOP <value>

Effective if `CALCulate<Measurement>:STATistics[:SCALe]:Y:SPACing LIN` is set.

Sets the maximum value of the y-axis for PDF statistics measurements.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.0 to 10000.0 *RST: 1.0 Default unit: -

Manual operation: See "Y Maximum" on page 104

CALCulate<Measurement>:STATistics[:CDF][:SCALe]:Y[:LINear]:PDIVision <value>

Effective if `CALCulate<Measurement>:STATistics[:SCALe]:Y:SPACing` `LIN` is set.

Sets the scaling of the y-axis for CDF statistics measurements.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.001 to 20.0 *RST: 20.0 Default unit: pct

Manual operation: See "Y / div" on page 104

CALCulate<Measurement>:STATistics[:CDF][:SCALe]:Y[:LINear]:TOP <value>

Effective if `CALCulate<Measurement>:STATistics[:SCALe]:Y:SPACing` `LIN` is set.

Sets the maximum value of the y-axis for CDF statistics measurements.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	Range: 0.0 to 100.0 *RST: 100.0 Default unit: pct

Manual operation: See "Y Maximum" on page 104

CALCulate<Measurement>:STATistics[:SCALe]:X:MODE <value>

Effective for statistics measurements.

Sets relative or absolute scaling for the x-axis.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	ABSolute | RELative *RST: ABSolute

Manual operation: See "Scaling of Power Axis" on page 104

CALCulate<Measurement>:STATistics[:SCALe]:X:POINts <value>

Effective for statistics measurements.

Sets the measurement result resolution. It specifies the number of pixels that are assigned to the logarithmic level range for measured value output. The width of the level range divided by N–1, where N is the number of pixels, must not be less than the smallest level resolution.

- Level range: `CALCulate<Measurement>:STATistics[:SCALe]:X:RANGe` on page 275
- Smallest level resolution: `[SENSe<Sensor>:]STATistics:SCALe:X:MPWidth?` on page 273

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 3 to 8191
*RST: 600

Manual operation: See "Power / div" on page 104

CALCulate<Measurement>:STATistics[:SCALe]:X:RANGe <value>

Effective for statistics measurements.

Sets the width of the level range for the analysis result.

Lower limit of the level range:

- `CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel:RELative` on page 275
- `CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel[:ABSolute]` on page 276

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 0.01 to 100.0
*RST: 50.0
Default unit: dB

Manual operation: See "Power / div" on page 104

CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel:RELative <value>

Effective for statistics measurements with relative power display.

Sets the lower limit of the level range for the analysis result. This level is assigned to the first pixel. The level assigned to the last pixel is equal to the level of the first pixel plus the level range.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -400.0 to 400.0
*RST: -25.0
Default unit: dB

Manual operation: See "Minimum Power" on page 104

CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel[:ABSolute] <value>

Effective for statistics measurements with absolute power display.

Sets the lower limit of the level range for the analysis result. This level is assigned to the first pixel. The level assigned to the last pixel is equal to the level of the first pixel plus the level range.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> Range: -400.0 to 400.0
*RST: -30.0
Default unit: dBm

Manual operation: See "Minimum Power" on page 104

CALCulate<Measurement>:STATistics[:SCALe]:Y:SPACing <value>

Effective for statistics measurements.

Sets linear or logarithmic scaling for the y-axis.

Suffix:
<Measurement> 1 to 8
Measurement

Parameters:
<value> LINear | LOGarithmic
*RST: LOGarithmic

Manual operation: See "Scaling of Y Axis" on page 104

13.5.11.4 Using Markers

CALCulate<Measurement>:STATistics[:CDF]:MARKer:Y:POSition <value>

Positions the y-marker to a measurement value of the CDF statistics measurement.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 0.0 to 100.0
*RST: 50.0
Default unit: pct

Manual operation: See "[%] marker" on page 101

CALCulate<Measurement>:STATistics:MARKer:HORizontal:DATA?

Effective for statistics measurements.

Queries the measurement result at the x-marker position.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:STATistics:MARKer:VERTical:DATA[:POWer]?

Effective for statistics measurements.

Queries the power value at the y-marker position.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:STATistics:MARKer:X:POSition[:ABSolute] <value>

Effective for statistics measurements.

Sets the absolute position of the x-marker.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dBm

Manual operation: See "[dBm] / [dB] marker" on page 101

CALCulate<Measurement>:STATistics:MARKer:X:POSition:RELative <value>

Effective for statistics measurements.

Sets the x-marker relative to a power value.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dB

Manual operation: See "[dBm] / [dB] marker" on page 101

CALCulate<Measurement>:STATistics:PDF:MARKer:Y:POSition <value>

Positions the y-marker to a measurement value of the PDF statistics measurement.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:

<value> Range: 0.0 to 10000.0
*RST: 0.0
Default unit: -

Manual operation: See "[%] marker" on page 101

13.5.12 NRT

Further information:

- Chapter 7.8, "NRT", on page 106

CALCulate<Measurement>:RELative<DirectionalChannel>:STATe on page 234

CALCulate<Measurement>:RELative<DirectionalChannel>:CCDF <value>

Sets the reference value for the cumulative distribution function (CCDF).

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: 0.0 to 100.0 *RST: 50.0 Default unit: pct

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>:POWer[:MAGNitude] <value>

Sets the reference value for relative ratio measurements.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement>	1 to 8 Measurement	
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)	

Parameters:

<value>	Range:	-120.0 to +150.0
	*RST:	+0.0
	Default unit:	dBm

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RCOefficient <value>

Sets the reference value for the reflection coefficient.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range:	0.0 to 1.0
	*RST:	0.5
	Default unit:	-

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RFRatio <value>

Sets the reference value for the ratio of forward/reverse power.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 100.0
*RST: 50.0
Default unit: pct

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RLOSs <value>

Sets the reference value for the return loss.

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dB

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:SWR <value>

Sets the reference value for the standing wave ratio (SWR).

Suffix:

<Measurement> 1 to 8
Measurement

<DirectionalChannel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 1.0
*RST: 0.5
Default unit: -

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio[:MAGNitude] <value>

Sets the reference value for relative ratio measurements.

Suffix:

<Measurement>	1 to 8 Measurement
<DirectionalChannel>	1 to 2 1 to 2

Parameters:

<value>	Default unit: pct

Manual operation: See "Forward Reference Value, Reflection Reference Value" on page 55
See "Reference Value" on page 71

[SENSe<Sensor>:]FUNCtion:CONCurrent <concurrent>

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

Enables or disables the usage of several measurement functions simultaneously.

Suffix:

<Sensor>	101 R&S NRT directional power sensor

Parameters:

<concurrent>

ON
Two measurement functions can be enabled simultaneously.

OFF
Only a single function can be enabled. If a new measurement function is enabled, the previously active function is disabled automatically.

*RST: ON

[SENSe<Sensor>:]FUNCtion:OFF:ALL<Channel>

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

Disables all measurement functions for the specified channel.

Suffix:

<Sensor>	101 R&S NRT directional power sensor

<Channel>	1 to 2 1 = forward, 2 = reflection (reverse)
Usage:	Event

[SENSe<Sensor>:]FUNCtion:OFF[:FUNC] <function>

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

Disables the specified measurement function.

The query returns all disabled measurement functions.

Suffix:

<Sensor>	101 R&S NRT directional power sensor

Setting parameters:

<function>	See `CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>` on page 229.
Usage:	Setting only

[SENSe<Sensor>:]FUNCtion:STATe? <function>

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

Queries whether the measurement function is enabled or disabled.

Suffix:

<Sensor>	101 R&S NRT directional power sensor

Query parameters:

<function>	See `CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>` on page 229.
Usage:	Query only

[SENSe<Sensor>:]POWer:REFLection:RANGe:AUTO <state>
[SENSe<Sensor>:]POWer[:POWer]:RANGe:AUTO <state>

If enabled, adapts the scaling of the graphical display once.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	ON | OFF *RST: ON
Manual operation:	See "Autoscale" on page 111

[SENSe<Sensor>:]POWer:REFLection:RANGe:LIMit:DETect <value>
[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit:DETect <value>

Effective if the Out 1 / Trig Out connector is configured as monitoring output for the power indication, for example using `[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit[:STATe] ON`.

Defines when a logic high level (> 2.7 V) is output at the Out 1 / Trig Out connector.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	INBound | OUTBound | HIGH **INBound** Measured power is within the range specified. **OUTBound** Measured power is out of the range defined. **HIGH** Measured power exceeds the upper scale limit. *RST: HIGH

Manual operation: See "Fail Voltage" on page 148

[SENSe<Sensor>:]POWer:REFLection:RANGe:LIMit[:STATe] <state>
[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit[:STATe] <state>

Enables or disables the Out 1 / Trig Out connector as a monitoring output for the power indication.

If enabled, you cannot use the connector for any other purpose.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	*RST: OFF

Manual operation: See "Mode" on page 146

[SENSe<Sensor>:]POWer:REFLection:RANGe:LOWer <lower>
[SENSe<Sensor>:]POWer[:POWer]:RANGe:LOWer <lower>

Effective if `[SENSe<Sensor>:]POWer:REFLection:RANGe:AUTO` is disabled.

Sets the lower scale limit for the power indication.

The entry has no unit. The unit corresponds to the output unit selected by `UNIT<Measurement>:POWer[:VALue]` or `UNIT<Measurement>:POWer:RATio`. If you change the unit, the entered value remains the same.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<lower>	Range: -1999.0 to 1999.0 *RST: 0.0

Manual operation: See "Measurement for Limit Output" on page 148

[SENSe<Sensor>:]POWer:REFLection:RANGe[:UPPer] <upper>
[SENSe<Sensor>:]POWer[:POWer]:RANGe[:UPPer] <upper>

Effective if `[SENSe<Sensor>:]POWer:REFLection:RANGe:AUTO` is disabled.

Sets the lower scale limit for the power indication. For further details, see `[SENSe<Sensor>:]POWer[:POWer]:RANGe:LOWer` on page 284.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<upper>	Range: -1999.0 to 1999.0 *RST: 1.0

Manual operation: See "Measurement for Limit Output" on page 148

[SENSe<Sensor>:]RRESolution <rres>

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

Configures the resolution of the measurement.

Suffix:

<Sensor>	101 R&S NRT directional power sensor

Parameters:

<rres>	LOW | HIGH **HIGH** Equals `CALCulate<Measurement>:RESolution` `OOOI`. **LOW** All other settings. *RST: LOW

Manual operation: See "Resolution" on page 50

13.5.13 Querying Measurement Results

CALCulate<Measurement>:COUNt:DATA?

Queries the number of measured values that are included for the calculation of the mean value and standard deviation.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:DATA?

Queries the measurement result.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:MAXimum:DATA?
CALCulate<Measurement>:MINimum:DATA?

Queries the maximum/minimum of all measured values.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:MEAN:DATA?

Queries the mean value of all measured values. The mean value is reset if the auxiliary values are reset.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:PTPeak:DATA?

Queries the peak-to-peak distance (maximum to minimum) of the measured values.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

CALCulate<Measurement>:SDEViation:DATA?

Queries the standard deviation of all measured values. The standard deviation is calculated and reset together with the mean value, `CALCulate<Measurement>:MEAN:DATA?`.

Suffix:
<Measurement> 1 to 8
Measurement

Usage: Query only

13.6 Calculation Functions

Further information:

- "Channel Calculation Function" on page 67
- Chapter 13.3, "Addressing Measurements and Sensors", on page 182

13.6.1 Selecting a Calculation Function

CALCulate<Measurement>:MATH[:EXPRession] [<expression>]

Selects a channel calculation function that processes the results of one or two power sensors. The result of this calculation is made available as a measured value.

`SENSn` is assigned as primary sensor, `SENSm` as secondary sensor.

Table 13-3: <expression> parameters for absolute power measurements

Channel calculation function	<expression>	Description
Single measurement	`"(SENSn)"`	Measured value of sensor A, B, C or D
Sum	`"(SENSn+SENSm)"`	Sum of the values measured by sensor n and sensor m
Difference	`"(SENSn-SENSm)"`	Difference between the measured values of sensor n and sensor m
With n and m= 1, 2, 3, 4 or A, B, C, D		

Table 13-4: <expression> parameters for relative power measurements

Channel calculation function	<expression>	Description
Ratio	`"(SENSn/SENSm)"`	Quotient of the values measured by sensor n and sensor m
Standing wave ratio	`"SWR(SENSn,SENSm)"`	Standing wave ratio. No output unit. $\frac{1+\sqrt{SENSm/SENSn}}{1-\sqrt{SENSm/SENSn}}$ Sensor n measures the forward power of a wave. Sensor m measures the reflected power.
Reflection coefficient	`"RCO(SENSn,SENSm)"`	Reflection coefficient of a DUT. No output unit. $\sqrt{SENSm/SENSn}$ Sensor n measures the forward power of a wave. Sensor m measures the reflected power.
Return loss	`"RLOS(SENSn,SENSm)"`	Return loss of a DUT. The output unit is dB. $10 \times \log \frac{SENSm/SENSn}{SENSm/SENSn}$ Sensor n measures the forward power of a wave. Sensor m measures the reflected power.
Reflection ratio	`"REFL(SENSn,SENSm)"`	Reflection ratio of a DUT. The output unit is percent. $100 \frac{SENSm}{SENSn}$ Sensor n measures the forward power of a wave. Sensor m measures the reflected power.
With n and m = 1, 2, 3, 4 or A, B, C, D		

Table 13-5: Additional <expression> parameters for queries

<expression>	Description
`OFF`	No channel calculation function is selected.
–	For `SENSn` or `SENSm`, if no primary or secondary sensor is selected.

Suffix:

<Measurement> 1 to 8
Measurement

Parameters:
<expression> See Table 13-3 and Table 13-4. The unit is set by `UNIT<Measurement>:POWer[:VALue]` or `UNIT<Measurement>:POWer:RATio`.
The query returns two additional expressions, see Table 13-5.

*RST: Depends on the selected channel.
Default unit: Depends on <expression> and the set unit.

Manual operation: See "Channel Calculation Function" on page 67

CALCulate<Measurement>:MATH[:EXPRession]:CATalog? [<expressions>]

Queries all channel calculation functions supported by `CALCulate<Measurement>:MATH[:EXPRession]`.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<expressions>

Usage: Query only

Manual operation: See "Channel Calculation Function" on page 67

13.6.2 Using a Calculation Function

The following commands combine several setting commands and thus simplify programming of the R&S NRX. They use parameter lists that differ for each measurement type.

- `CONFigure`
  Configures according to the parameter list, but does not start a measurement.
  The query without parameters, for example `CONF?`, returns the parameters transfered the last time. Since the instrument settings can be changed after sensing a `CONFigure` command, the query does not return the current instrument setup.
- `READ`
  Compares the parameter list to the current settings, starts a measurement and returns the result. If the parameter list does not match, a SCPI error is returned, and the command is aborted.
- `MEASure`
  Configures according to the parameter list, starts a measurement and returns the result. Thus, this command combines the `CONFigure` and `READ` commands.
  The query without parameters, for example `MEAS?`, returns the parameters transfered the last time.
- `FETCh`
  Returns the last valid measurement result.

13.6.2.1 Continuous Average Calculation Functions

Parameter list

For the calculation functions of the continuous average measurement, the following parameters are used.

- <expected_value>
  Optional. Value that is expected for the measurement.
- <resolution>
  Optional. Limit up to which the measurement result should be free of noise.
  Corresponds to `[SENSe<Sensor>:]AVERage:COUNt:AUTO:RESolution`.
- <source_list>
  Optional. Primary and secondary sensor. The number for each sensor is preceded by the character @. The entire expression is enclosed in parentheses.
  Example: (@3),(@2)
  Sensor C is the primary sensor, and sensor B is the secondary sensor.

CONFigure<Measurement>[:SCALar][:POWer][:AVG]?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer][:AVG]?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENS1)"` to `"(SENS4)"`.

Measured average power measured by one power sensor. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list>	<expr>
Usage:	Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer][:AVG]:RELative? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:RELative? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative power measured by one power sensor. The used parameters are described in "Parameter list" on page 290.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn-SENSm)"`.

Difference measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence:RELative? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence:RELative? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:DIFFerence:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative difference measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:SUM?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:SUM?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer][:AVG]:SUM?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:SUM?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn+SENSm)"`.

Sum of the values measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:SUM:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:SUM:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer][:AVG]:SUM:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:SUM:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative sum measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:RATio?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:RATio?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer][:AVG]:RATio?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:RATio?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENSn /SENSm)"`.

Ratio measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:RATio:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:RATio:RELative?
[<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer][:AVG]:RATio:RELative? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:RATio:RELative? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative ratio measured by two power sensor. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:SWR? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:SWR? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer][:AVG]:SWR? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:SWR? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"SWR(SENSn,SENSm)"`.

Standing wave ratio measurement of two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:REFLection? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:REFLection? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer][:AVG]:REFLection? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:REFLection? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"REFL(SENSn,SENSm)"`.

Reflection coefficient/transmission factor of a DUT, measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer][:AVG]:RLOSs? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer][:AVG]:RLOSs? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer][:AVG]:RLOSs? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer][:AVG]:RLOSs? [<expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"RLOS(SENSn,SENSm)"`.

Return loss/transmission loss of a DUT, measured by two power sensors. The used parameters are described in "Parameter list" on page 290.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

13.6.2.2 Continuous Average Calculation Functions with Buffering

Parameter list

The following parameters are used.

- <buffered_size>
  Mandatory. Number of requested measured values.
  Corresponds to `[SENSe<Sensor>:][POWer:][AVG:]BUFFer:SIZE`.
- <expected_value>
  Optional. Value that is expected for the measurement.
- <resolution>
  Optional. Limit up to which the measurement result should be free of noise.
  Corresponds to `[SENSe<Sensor>:]AVERage:COUNt:AUTO:RESolution`.
- <source_list>
  Mandatory. Primary and secondary sensor. The number for each sensor is preceded by the character @. The entire expression is enclosed in parentheses.
  Example: (@3),(@2)
  Sensor C is the primary sensor, and sensor B is the secondary sensor.

CONFigure<Measurement>:ARRay[:POWer][:AVG]? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENS1)"` to `"(SENS4)"`.

Measured average power measured by one power sensor with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<buffered_size>	<expr>
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:DIFFerence? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:DIFFerence? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:DIFFerence? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:DIFFerence? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENSn-SENSm)"`.

Difference measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:DIFFerence:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:DIFFerence:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:DIFFerence:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:DIFFerence:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative difference measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:RATio? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:RATio? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:RATio? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:RATio? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENSn /SENSm)"`.

Ratio measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:RATio:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:RATio:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:RATio:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:RATio:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative ratio measured by two power sensor with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:

<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:REFLection? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:REFLection? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:REFLection? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:REFLection? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"REFL(SENSn,SENSm)"`.

Reflection coefficient/transmission factor of a DUT, measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative power measured by one power sensor with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:RLOSs? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:RLOSs? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:RLOSs? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:RLOSs? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"RLOS(SENSn,SENSm)"`.

Return loss/transmission loss of a DUT, measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:SUM? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:SUM? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:SUM? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:SUM? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENSn+SENSm)"`.

Sum of the values measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:SUM:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:SUM:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>:ARRay[:POWer][:AVG]:SUM:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:SUM:RELative? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative sum measured by two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>:ARRay[:POWer][:AVG]:SWR? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>:ARRay[:POWer][:AVG]:SWR? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>:ARRay[:POWer][:AVG]:SWR? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>:ARRay[:POWer][:AVG]:SWR? <buffered_size>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"SWR(SENSn,SENSm)"`.

Standing wave ratio measurement of two power sensors with buffering. The used parameters are described in "Parameter list" on page 296.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<buffered_size> <expr>

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

13.6.2.3 Burst Average Calculation Functions

Parameter list

For the calculation functions of the burst average measurement, the following parameters are used.

- <dtolerance>
  Mandatory. Length of a time interval during that the power level can drop below the trigger level without being interpreted as end of the power pulse.
  Corresponds to `[SENSe<Sensor>:][POWer:]BURSt:DTOLerance`.
- <start_exclude>
  Mandatory. Amount of time at the beginning of a timeslot or integration period that is not evaluated.
  Corresponds to `[SENSe<Sensor>:]TIMing:EXCLude:STARt`.
- <end_exclude>
  Mandatory. Amount of time at the end of a timeslot or integration period that is not evaluated.
  Corresponds to `[SENSe<Sensor>:]TIMing:EXCLude:STOP`.
- <expected_value>
  Optional. Value that is expected for the measurement.
- <resolution>
  Optional. Limit up to which the measurement result should be free of noise.
  Corresponds to `[SENSe<Sensor>:]AVERage:COUNt:AUTO:RESolution`.
- <source_list>

Optional. Primary and secondary sensor. The number for each sensor is preceded by the character @. The entire expression is enclosed in parentheses.
Example: (@3),(@2)
Sensor C is the primary sensor, and sensor B is the secondary sensor.

CONFigure<Measurement>[:SCALar][:POWer]:BURSt? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENS1)"` to `"(SENS4)"`.

Power measured by one power sensor. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<dtolerance>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer]:BURSt:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative power measured by one power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<dtolerance>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn-SENSm)"`.

Difference measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<dtolerance>	Default unit: s
<start_exclude>	Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:DIFFerence:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative difference measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<dtolerance> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:SUM? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:SUM? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer]:BURSt:SUM? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:SUM? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"(SENSn+SENSm)"`.

Sum measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<dtolerance> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:SUM:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:SUM:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:SUM:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:SUM:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Sum measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<dtolerance> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:RATio? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:RATio? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:RATio? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:RATio? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn /SENSm)"`.

Ratio measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<dtolerance> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:RATio:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:RATio:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer]:BURSt:RATio:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:RATio:RELative? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative ratio measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<dtolerance>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:SWR? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:SWR? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:SWR? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:SWR? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"SWR(SENSn,SENSm)"`.

Standing wave ratio, measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<dtolerance>	Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:REFLection? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:REFLection? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:REFLection? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:REFLection? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"REFL(SENSn,SENSm)"`.

Reflection coefficient/transmission factor of a DUT, measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<dtolerance> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:BURSt:RLOSs? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:BURSt:RLOSs? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:BURSt:RLOSs? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:BURSt:RLOSs? <dtolerance>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"RLOS(SENSn,SENSm)"`.

Return loss/transmission loss of a DUT, measured by two power sensors. The used parameters are described in "Parameter list" on page 302.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<dtolerance>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>

Usage: Query only

13.6.2.4 Timeslot Calculation Functions

Parameter list

For the calculation functions of the timeslot measurement, the following parameters are used.

- <tslot_width>
  Mandatory. Width of a timeslot.
  Corresponds to `[SENSe<Sensor>:][POWer:]TSLot[:AVG]:WIDTh` on page 433.
- <no_slots>
  Mandatory. Number of timeslots to be measured.
  Corresponds to `[SENSe<Sensor>:][POWer:]TSLot[:AVG]:COUNt` on page 432.
- <start_exclude>

Mandatory. Amount of time at the beginning of a timeslot or integration period that is not evaluated.
Corresponds to `[SENSe<Sensor>:]TIMing:EXCLude:STARt`.

- <end_exclude>
Mandatory. Amount of time at the end of a timeslot or integration period that is not evaluated.
Corresponds to `[SENSe<Sensor>:]TIMing:EXCLude:STOP`.
- <expected_value>
Optional. Value that is expected for the measurement.
- <resolution>
Optional. Limit up to which the measurement result should be free of noise.
Corresponds to `[SENSe<Sensor>:]AVERage:COUNt:AUTO:RESolution`.
- <source_list>
Optional. Primary and secondary sensor. The number for each sensor is preceded by the character @. The entire expression is enclosed in parentheses.
Example: (@3),(@2)
Sensor C is the primary sensor, and sensor B is the secondary sensor.

CONFigure<Measurement>[:SCALar][:POWer]:TSLot? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENS1)"` to `"(SENS4)"`.

Power measured by one power sensor. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<tslot_width>	Default unit: s
<no_slots>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative power measured by one power sensor. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<tslot_width> Default unit: s

<no_slots> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn-SENSm)"`.

Power measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<tslot_width>	Default unit: s
<no_slots>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:DIFFerence:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative difference measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<tslot_width>	Default unit: s

<no_slots> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:SUM? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:SUM? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:SUM? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:SUM? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn+SENSm)"`.

Sum measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<tslot_width> Default unit: s

<no_slots> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:SUM:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:SUM:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:SUM:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:SUM:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative sum measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<tslot_width>	Default unit: s
<no_slots>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>
Usage:	Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:RATio? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:RATio? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:RATio? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:RATio? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]"(SENSn /SENSm)"`.

Ratio measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<tslot_width> Default unit: s

<no_slots> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:RATio:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:RATio:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:RATio:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:RATio:RELative? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]`.

Relative ratio measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:
<Measurement> 1 to 8
Measurement

Query parameters:
<tslot_width> Default unit: s

<no_slots> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:SWR? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:SWR? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:SWR? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:SWR? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"SWR(SENSn,SENSm)"`.

Standing wave ratio measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement> 1 to 8
Measurement

Query parameters:

<tslot_width> Default unit: s

<no_slots> Default unit: s

<start_exclude> Default unit: s

<end_exclude> Default unit: s

<expected_value_or_source_list>

<resolution_or_source_list>

<source_list> <expr>

Usage: Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:REFLection? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:REFLection? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

READ<Measurement>[:SCALar][:POWer]:TSLot:REFLection? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:REFLection? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"REFL(SENSn,SENSm)"`.

Reflection coefficient/transmission factor of a DUT, measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<tslot_width>	Default unit: s
<no_slots>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>
Usage:	Query only

CONFigure<Measurement>[:SCALar][:POWer]:TSLot:RLOSs? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
FETCh<Measurement>[:SCALar][:POWer]:TSLot:RLOSs? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
READ<Measurement>[:SCALar][:POWer]:TSLot:RLOSs? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]
MEASure<Measurement>[:SCALar][:POWer]:TSLot:RLOSs? <tslot_width>, <no_slots>, <start_exclude>, <end_exclude>[, <expected_value_or_source_list>, <resolution_or_source_list>, <source_list>...]

Used for `CALCulate<Measurement>:MATH[:EXPRession]` `"RLOS(SENSn,SENSm)"`.

Return loss/transmission loss of a DUT, measured by two power sensors. The used parameters are described in "Parameter list" on page 310.

Suffix:

<Measurement>	1 to 8 Measurement

Query parameters:

<tslot_width>	Default unit: s
<no_slots>	Default unit: s
<start_exclude>	Default unit: s
<end_exclude>	Default unit: s
<expected_value_or_source_list>	
<resolution_or_source_list>	
<source_list>	<expr>
Usage:	Query only

13.7 Configuring Sensors

13.7.1 Setting the Frequency

[SENSe<Sensor>:]FREQuency:FIXed <frequency>
[SENSe<Sensor>:]FREQuency[:CW] <frequency>

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

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<frequency>	Range: 0.0 to 110.0e9 *RST: 1.0e9 Default unit: Hz

Manual operation: See "Freq [Freq]" on page 26

[SENSe<Sensor>:]FREQuency:TRACk <state>

Enables or disables the frequency tracker of the power sensor, if available.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	OFF | ON *RST: OFF

13.7.2 Sensor Modes

Further information:

- Chapter 8.1, "Mode Settings", on page 113
- Chapter 13.7.8.1, "NRT Mode Settings", on page 355

CALCulate<Measurement>[:CHANnel<Channel>]:BURSt:TIMing:EXCLude:STARt <value>

Effective for burst average measurements.

Sets the time interval at the beginning of bursts that is excluded from the measurement. Thus, signal overshoots are omitted.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	Range: 0.0 to 15.0 *RST: 0.0 Default unit: s

Manual operation: See "Exclude from Start, Exclude from End" on page 116

CALCulate<Measurement>[:CHANnel<Channel>]:BURSt:TIMing:EXCLude:STOP <value>

Effective for burst average measurements.

Sets the time interval at the end of bursts that is excluded from the measurement. Thus, signal overshoots are omitted.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	Range: 0.0 to 15.0 *RST: 0.0 Default unit: s

Manual operation: See "Exclude from Start, Exclude from End" on page 116

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe <state>

Effective for continuous average measurements.

Enables or disables the duty cycle correction.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<state>	*RST: OFF

Manual operation: See "Duty Cycle State" on page 114

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue] <duty_cycle>

Effective for continuous average measurements.

Sets the duty cycle for measuring pulse-modulated signals. The duty cycle defines the percentage of one period during which the signal is active. If the duty cycle is enabled, the R&S NRX takes this percentage into account when calculating the signal pulse power from the average power.

For thermal power sensors or multipath power sensors, the duty cycle correction is the only way to determine the power of pulsed signals.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<duty_cycle>	Range: 0.001 to 100.0 *RST: 50.0 Default unit: pct

Manual operation: See "Duty Cycle" on page 114

CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:ESAMpling <value>

Effective for trace measurements.

Enables or disables the automatic equivalent sampling that allows for high resolution measurements.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	*RST: ON

Manual operation: See "Equivalent Time Sampling" on page 115

CALCulate<Measurement>[:CHANnel<Channel>]:SAMPling <value>

Effective for continuous average measurements.

Sets the sampling rate.

If the sampling frequency is located within the video bandwidth, aliasing can occur, that is when spectral components near the sampling frequency cause beating effects. If you change the sampling rate, the beating effects usually disappear.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	FREQ1 | FREQ2 **FREQ1** Normal sampling rate

FREQ2
Lower sampling rate
Recommended to avoid measurement errors caused due to aliasing effects. However, this setting extends the measurement time.

*RST: FREQ1

Manual operation: See "Sampling Rate" on page 115

CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance <value>

Effective for burst average measurements.

Detects the falling edge of a burst. If the power keeps low for at least the set time, the end of the burst is assumed. Modulation-specific power drops that are shorter than the set value are ignored.

See also Chapter 7.2, "Burst Average", on page 72.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: 0.0 to 0.3
*RST: 0.0
Default unit: s

Manual operation: See "Dropout Tolerance" on page 116

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue] <value>

Effective for continuous average measurements.

Sets the width of the sampling window.

When measuring modulated signals, the measurement can show fluctuation due to the modulation. If that is the case, adapt the size of the sampling window exactly to the modulation period to get an optimally stable display. If the modulation period varies or is not precisely known, you can also set `CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]` ON.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	Range: 8.3e-9 to 30.0 *RST: 0.01 Default unit: s

Manual operation: See "Aperture" on page 115

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe] <value>

Effective for continuous average measurements.

Enables or disables the smoothing filter, a steep-edge digital lowpass filter. The filter reduces result fluctuations caused by modulation.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	See "Smoothing" on page 116. *RST: OFF

Manual operation: See "Smoothing" on page 116

CALCulate<Measurement>:TRACe:MEASurement:TRANsition:ESAMpling:AUTO[:STATe] <value>

Effective for pulse analysis measurements.

Enables or disables the automatic equivalent sampling that allows for high-resolution measurements.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:

<value>	*RST: ON

Manual operation: See "Equivalent Time Sampling" on page 115

13.7.3 Sensor Corrections

Further information:

- Chapter 8.2, "Correction Settings", on page 117
- Chapter 13.12, "Managing Setups and Correction Tables", on page 380
- Chapter 13.7.8.2, "NRT Correction Settings", on page 359

[SENSe<Sensor>:]CORRection:SPDevice:LIST?

Queries the list of the S-parameter data sets that have been loaded to the power sensor. The result of the query indicates the consecutive number and mnemonic of each data set.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

Manual operation: See "S-Parameter List" on page 118

[SENSe<Sensor>:]CORRection:SPDevice:SELect <num>

Selects a data set for S-parameter correction that has been loaded to the power sensor.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<num> Range: 1 to 1999
*RST: 1

Manual operation: See "S-Parameter List" on page 118

[SENSe<Sensor>:]CORRection:SPDevice:STATe <state>

Enables or disables the S-parameter correction. If enabled, the power sensor uses the S-parameter data set selected by `[SENSe<Sensor>:]CORRection:SPDevice:SELect`.

For some power sensors, the S-parameter correction is always activated. If you try to deactivate the S-parameter correction for such a power sensor, a SCPI error is generated.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<state> ON | OFF
*RST: OFF

Manual operation: See "S-Parameter List" on page 118

[SENSe<Sensor>:]RGAMma[:MAGNitude] <magnitude>

Sets the magnitude of the complex reflection coefficient of the source , Γ_{source}.

A value of 0.0 corresponds to an ideal matched source. A value of 1.0 corresponds to total reflection.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<magnitude> **0.0**
Disables the compensation.
Range: -200.0 to 200.0
*RST: 0.0
Default unit: -

[SENSe<Sensor>:]RGAMma:PHASe <phase_angle>

Sets the phase angle of the complex reflection coefficient of the source, Γ_{source}.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<phase_angle> Range: 0.0 to 360.0
*RST: 0.0
Default unit: deg

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:STATe <state>

Enables or disables the offset correction.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<state>	ON | OFF *RST: OFF

Manual operation: See "Offset State" on page 118
See "Offset" on page 129

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe:INDex <value>

Selects one of the available offset tables.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Setting parameters:

<value>	Range: 1 to 10 *RST: 1

Usage: Setting only

Manual operation: See "Frequency dependent offset table" on page 119

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe[:STATe] <state>

Enables or disables the selected table.

If enabled, the measurement results are corrected using the specified offset. If the exact frequency value is not available in the table, the values of the table are interpolated. If the selected frequency is outside the specified frequency range, the first or last offset value of the table is used.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Setting parameters:

<state>	*RST: OFF

Usage: Setting only

Manual operation: See "Frequency dependent offset active" on page 119

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet[:MAGNitude] <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:STATe` `ON` is set.

Considers the transmission loss in a cable that connects the desired measurement point, set by `INPut<Sensor>:PORT:POSition`, and the power sensor.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: -200.0 to 200.0
*RST: 0.0
Default unit: dB

Manual operation: See "Offset" on page 118
See "Offset" on page 129

CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:CORRection:STATe <value>

Enables or disables gamma correction. See also "Gamma Correction" on page 119.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> *RST: OFF

Manual operation: See "Gamma Correction" on page 119

CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:PHASe <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:CORRection:STATe` `ON` is set.

Sets the phase angle of the complex reflection coefficient of the source.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: -360.0 to 360.0
*RST: 0.0
Default unit: deg

Manual operation: See "Gamma Phase" on page 120

CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma[:MAGNitude] <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:CORRection:STATe` `ON` is set.

Sets the magnitude of the complex reflection coefficient of the source.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: 0.0 to 1.0
*RST: 0.0
Default unit: -

Manual operation: See "Gamma Magnitude" on page 120

13.7.4 Sensor Filters

Further information:

- Chapter 8.3, "Filter Settings", on page 120
- Chapter 13.7.8.3, "NRT Filter Settings", on page 362

[SENSe<Sensor>:]AVERage:COUNt:AUTO:RESolution <resolution>

Defines the number of significant places for linear units and the number of decimal places for logarithmic units which should be free of noise in the measurement result.

The setting is only taken into account, if:

- `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:TYPE RES`
- `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe] ON`

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<resolution> Range: 1 to 4
*RST: 3

[SENSe<Sensor>:]AVERage:RESet

Effective for continuous average, burst average, time gate measurements.

Clears the filter buffer.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Event

Manual operation: See "Clear Filter Buffer" on page 122

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:MTIMe <value>

Effective for continuous average, burst average measurements, if `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:TYPE RES` is set.

Sets an upper limit for the settling time of the auto-averaging filter that is never exceeded, thus limiting the length of the filter.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: 0.01 to 1000.0
*RST: 1.0
Default unit: s

Manual operation: See "Maximum Settling Time" on page 122

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:NSRatio <value>

Effective for continuous average, burst average measurements, if `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:TYPE` `NSR` is set.

Sets the averaging number so that the intrinsic noise of the power sensor does not exceed the specified value.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: 100e-6 to 1.0
*RST: 1.0
Default unit: dB

Manual operation: See "Noise Content" on page 122

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:SLOT <value>

Effective for continuous average, burst average measurements.

Sets a timeslot from which the measured value is used to determine the filter length automatically. The timeslot number must not exceed the number of the currently set timeslots.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: 1 to 128
*RST: 1

Manual operation: See "Timeslot" on page 123

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:TYPE <value>

Effective for continuous average, burst average measurements.

Sets the autofilter.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> RESolution | NSRatio

RESolution
Sets the averaging number so that the intrinsic noise of the power sensor does not exceed the value specified by `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:NSRatio`.

NSRatio
Limits the averaging number as specified by `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:MTIMe`.

*RST: RESolution

Manual operation: See "Fixed Noise Mode" on page 122

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol:AUTO <state>

Effective for continuous average, burst average, pulse analysis, timeslot, statistics measurements.

Enables or disables the automatic termination control. See also `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol[:ENUM]` on page 333.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<state> *RST: ON

Manual operation: See "Moving Average State" on page 123

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol[:ENUM] <mode>

Effective for continuous average, burst average, pulse analysis, timeslot, statistics measurements.

Defines how the measurement results are output. This is called termination control.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<mode> MOVing | REPeat

If you use `SYSTem:PRESet` instead of `*RST`, the RST value differs. See Table 13-16.

MOVing
Outputs intermediate values to facilitate early detection of changes in the measured quantity. In the settled state, that means when the number of measurements specified by the average count has been performed, a moving average is output.

REPeat
Specifies that a measurement result is not output until the entire measurement has been completed. This means that the number of measurement cycle repetitions is equal to the set average count. If the average count is large, the measurement time can be very long.
The average count is set using `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]` on page 363.

*RST: MOVing

Manual operation: See "Moving Average" on page 123

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TYPE <type>

Requires an R&S frequency selective power sensor.

Sets the averaging method. See also the user manual of the power sensor.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<type> POWer | VIDeo | LINear
*RST: POWer

Manual operation: See "Averaging Domain" on page 123

CALCulate<Measurement>[:CHANNel<Channel>]:AVERage[:STATe] <value>

Enables or disables the averaging filter. If enabled, the number of measured values is averaged. Averaging reduces the effect of noise so that more reliable results are obtained.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<value> *RST: ON

Manual operation: See "Filter State" on page 121

CALCulate<Measurement>[:CHANNel<Channel>]:TRACe:AVERage:COUNt[:VALue] <value>

Effective for trace measurements.

Sets the number of readings that are averaged for one measured value. The higher the count, the lower the noise, and the longer it takes to obtain a measured value.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<value> If the entered filter length is not a 2^n value, the value is rounded to the next 2^n value without an error message.
Range: 1 to 65536
*RST: 4

Manual operation: See "Filter Length" on page 121

CALCulate<Measurement>[:CHANNel<Channel>]:TRACe:AVERage:TCONtrol: AUTO <state>

Effective for trace measurements.

Enables or disables the automatic termination control. See also `CALCulate<Measurement>[:CHANNel<Channel>]:TRACe:AVERage:TCONtrol[:ENUM]` on page 335.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<state> *RST: ON

Manual operation: See "Moving Average State" on page 123

CALCulate<Measurement>[:CHANNel<Channel>]:TRACe:AVERage:TCONtrol[: ENUM] <mode>

Effective for trace measurements.

Defines how the measurement results are output. This is called termination control.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<mode> MOVing | REPeat

If you use `SYSTem:PRESet` instead of `*RST`, the RST value differs. See Table 13-16.

MOVing
Outputs intermediate values to facilitate early detection of changes in the measured quantity. In the settled state, that means when the number of measurements specified by the average count has been performed, a moving average is output.

REPeat
Specifies that a measurement result is not output until the entire measurement has been completed. This means that the number of measurement cycle repetitions is equal to the set average count. If the average count is large, the measurement time can be very long.
The average count is set using `CALCulate<Measurement>[:CHANNel<Channel>]:TRACe:AVERage:COUNt[:VALue]`.

*RST: MOVing

Manual operation: See "Moving Average" on page 123

CALCulate<Measurement>[:CHANNel<Channel>]:TRACe:AVERage[:STATe] <value>

Effective for trace measurements.

Enables or disables the averaging filter. If enabled, the number of measured values is averaged. Averaging reduces the effect of noise so that more reliable results are obtained.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> *RST: ON

Manual operation: See "Filter State" on page 121

CALCulate<Measurement>[:CHANNel<Channel>][:POWer]:NCORrection[:STATe] <state>

Effective for R&S frequency selective power sensors.

Enables or disables the noise cancellation.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<state> *RST: OFF

CALCulate<Measurement>[:CHANNel<Channel>][:POWer]:VBWidth:ENUM <value>

Requires a wideband power sensor.

Sets the video filter bandwidth. Reducing the video bandwidth also increases the trigger sensitivity.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = forward, 2 = reflection (reverse)

Parameters:
<value> EFULI | E5M | E1M5 | E0M3

EFULI
Full

E5M
5 MHz

E1M5
1.5 MHz

E0M3
300 kHz

*RST: EFULI

Manual operation: See "Video Bandwidth" on page 124

13.7.5 Sensor Ranges

Further information:

- Chapter 8.4, "Range Settings", on page 124

CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation:AUTO <auto>

Requires an R&S frequency selective power sensor.

Enables or disables the automatic setting of the input attenuation.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<auto> OFF | ON | ONCE

ONCE
Adjusts the input attenuation one time, then disables the automatic setting.

*RST: OFF

Manual operation: See "Attenuator Mode" on page 126

CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation[:VALue] <value>

Requires an R&S frequency selective power sensor.

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation:AUTO` `OFF` is set.

Sets the input attenuation.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Only two values are possible, 0.0 dB and 30.0 dB. The entered value is rounded to the next value.

Range: 0.0 to 30.0
*RST: 30.0
Default unit: dB

Manual operation: See "Attenuation" on page 126

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:AUTO <value>

Enables or disables the automatic measurement path selection.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value> *RST: ON

Manual operation: See "Range State" on page 125

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:CLEVel:STATe <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:AUTO` `ON` is set.

Enables or disables the reduction of the transition range between the measurement paths, set by `CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:CLEVel[:VALue]`.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> *RST: OFF

Manual operation: See "User Defined Transition" on page 125

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe: CLEVel[:VALue] <value>

Reduces the transition range between the measurement paths, 0 -> 1 and 1 -> 2, by the set value, the so-called cross-over level. Thus, you can improve the measurement accuracy for signals with a high peak-to-average ratio, since the headroom for modulation peaks becomes larger. However, the S/N ratio is reduced at the lower limits of the transition ranges.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: -20.0 to 0.0
*RST: 0.0
Default unit: dB

Manual operation: See "Offset" on page 126

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe[:VALue] <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:AUTO OFF` is set.

Sets the active measurement path in which the power sensor is measuring.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> LOW | MID | HIGH
*RST: MID

Manual operation: See "Range" on page 125

13.7.6 Standardized Signals

For a set of standards, you can preconfigure settings.

13.7.6.1 Commands

SYSTem:STANdard:CATalog?

Queries the supported standards. Use the returned strings for `SYSTem:STANdard:PRESet`.

Usage: Query only

SYSTem:STANdard:PRESet <string>

Configures the power sensor and trigger settings for the selected standard. Query the supported standards using `SYSTem:STANdard:CATalog?`.

If `SYSTem:STANdard:PWSettings OFF` is set, also configures the R&S NRX display settings.

Use `SYSTem:STANdard:TRIGger:SOURce` to set the trigger source.

Setting parameters:

<string> "<standard name>"

Available standards. For the corresponding power sensor configuration, follow the link.

GSM/EDGE
Table 13-6

DECT
Table 13-7

WCDMA/3GPP FDD
Table 13-8

WCDMA/3GPP TDD DL
Table 13-9

WCDMA/3GPP TDD UL
Table 13-10

TD-SCDMA
Table 13-11

Bluetooth DH1
Table 13-12

Bluetooth DH3
Table 13-13

Bluetooth DH5
Table 13-14

CDMA2000
Table 13-15

Usage: Setting only

Manual operation: See "Parameter Set" on page 68
See "Recall Parameter Set" on page 69

SYSTem:STANdard:PWSettings <state>

Specifies whether the display settings are kept unchanged when using SYSTem:STANdard:PRESet.

Parameters:

<state>

ON
Only configures the power sensor.

OFF
Configures the power sensor and the display settings of the R&S NRX. See Chapter 13.7.6.3, "Display Configuration", on page 351.

*RST: OFF

Manual operation: See "Preserve Window Settings" on page 68

SYSTem:STANdard:TRIGger:SOURce <source>

Sets the trigger source for SYSTem:STANdard:PRESet.

Parameters:

<source> INTernal | EXTernal

INTernal
Internal triggering

EXTernal
External triggering

*RST: INTernal

13.7.6.2 Preconfigured Settings

For the following standards, you can preconfigure the power sensor using:

- Parameter Set
- SYSTem:STANdard:PRESet

Table 13-6: GSM/EDGE

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	4.615 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	11.762 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	577 µs
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	20 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	30 µs
Timeslot count	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt	8
Timeslot fence	CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe]	OFF
Timeslot width	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh	577 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 20 µs 2: 2.328 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 527 µs 2: 527 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-50 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	5 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-20 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS

Sensor parameter	Remote control command	Value
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	27 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-7: DECT

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	10 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	3.7 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	416.7 µs
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	15 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	25 µs
Timeslot count	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt	24
Timeslot fence	CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe]	OFF
Timeslot width	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh	416.667 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 15 µs 2: 5.015 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 348.055 µs 2: 348.0 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-200 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	10.250 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF

Sensor parameter	Remote control command	Value
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	39.9 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-8: WCDMA/3GPP FDD

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	CONTav
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	10 ms
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	OFF
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Filter auto	CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe]	OFF
Filter length	CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]	16
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	EXT

Table 13-9: WCDMA/3GPP TDD DL

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	10 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	6.667 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF

Sensor parameter	Remote control command	Value
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	666.667 µs
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	25 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	40 µs
Timeslot count	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt	15
Timeslot fence	CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe]	OFF
Timeslot width	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh	666.667 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 25 µs 2: 5.358 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 601.667 µs 2: 602 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-200 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	10.250 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	19.9 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-10: WCDMA/3GPP TDD UL

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	10 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	6.420 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	666.667 µs
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	15 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	40 µs
Timeslot count	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt	15
Timeslot fence	CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe]	OFF
Timeslot width	CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh	666.667 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 15 µs 2: 5.348 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 611.667 µs 2: 612 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-200 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	10.250 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS

Sensor parameter	Remote control command	Value
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	19.9 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-11: TD-SCDMA

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	5 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	13.250 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	366 µs
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	10 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	15 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 20 µs 2: 710 µs 3: 835 µs 4: 5.970 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 620 µs 2: 30 µs 3: 85 µs 4: 620 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-200 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	10.250 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s

Sensor parameter	Remote control command	Value
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	19.9 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-12: Bluetooth DH1

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	1.25 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	29.28 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	366 µs
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	10 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	15 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 10 µs 2: 660 µs
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 341 µs 2: 341 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-30 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	1.28 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF

Sensor parameter	Remote control command	Value
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	2.480 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-13: Bluetooth DH3

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	2.50 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	64.88 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	1.622 ms
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	10 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	15 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 10 µs 2: 1.885 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 1.597 ms 2: 351 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-30 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	2.530 ms
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261

Sensor parameter	Remote control command	Value
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	4.980 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-14: Bluetooth DH5

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	TRACe
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	3.75 ms
Duty cycle	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]	76.533 %
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	ON
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Dropout tolerance	CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance	2.870 ms
Exclude time start	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt	10 µs
Exclude time end	CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP	15 µs
Timegate offset	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]	1: 10 µs 2: 3.135 ms
Timegate length	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME	1: 2.845 ms 2: 351 µs
Timegate fence	CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]	OFF
Trace offset time	CALCulate<Measurement>:TRACe:X[:SCALe]:LEFT	-30 µs
Trace capture time	CALCulate<Measurement>:TRACe:X[:SCALe]:LENGth	3.780 ms

Sensor parameter	Remote control command	Value
Trace number of points	CALCulate<Measurement>:TRACe:X:POINts	261
Trace realtime	[SENSe<Sensor>:]TRACe:REALtime	OFF
Trigger delay	TRIGger<Measurement>[:CHANnel<Channel>]:DELay[:VALue]	0 s
Trigger level	TRIGger<Measurement>[:CHANnel<Channel>]:LEVel	-30 dBm
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	INT
Trigger slope	TRIGger<Measurement>[:CHANnel<Channel>]:SLOPe	POS
Trigger holdoff	TRIGger<Measurement>[:CHANnel<Channel>]:HOLDoff	7.480 ms
Trigger dropout time	TRIGger<Measurement>[:CHANnel<Channel>]:DTIMe	0 s
Trigger hysteresis	TRIGger<Measurement>[:CHANnel<Channel>]:HYSTeresis	3 dB

Table 13-15: CDMA2000

Sensor parameter	Remote control command	Value
Sensor mode	CALCulate<Measurement>:TYPE	CONTav
Aperture time	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]	80 ms
Duty cycle correction	CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe	OFF
Smoothing	CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]	OFF
Filter auto	CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe]	OFF
Filter length	CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]	16
Trigger source	TRIGger<Measurement>[:CHANnel<Channel>]:SOURce	EXT

13.7.6.3 Display Configuration

You can choose whether you want to preserve the display settings when loading the parameter set using:

- Preserve Window Settings
- SYSTem:STANdard:PWSettings

If you do not preserve the display settings, they are changed as follows for all standards.

R&S NRX parameter	Remote control command	Value
Result resolution	CALCulate<Measurement>:RESolution	OOI
Lower power limit	CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWer]	-90 dBm
Upper power limit	CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer]	30 dBm
Lower power ratio limit	CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue]	-120 dB
Upper power ratio limit	CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue]	60 dB
Relative measurement status	CALCulate<Measurement>:RELative<DirectionalChannel>:STATe	OFF
NRT measurement reference value	CALCulate<Measurement>:RELative<DirectionalChannel>:POWer[:MAGNitude]	1.0 dBm
NRT measurement reference value (ratio)	CALCulate<Measurement>:RELative<DirectionalChannel>:RATio[:MAGNitude]	1.0 dBm
Measurement function	CALCulate<Measurement>:MATH[:EXPRession]	Depends on suffix: 1: "(SENS1)" 2: "(SENS2)" ...
Measurement type	CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>	"POWer:AVERage"
Output unit	UNIT<Measurement>:POWer[:VALue]	DBM
Output unit (ratio)	UNIT<Measurement>:POWer:RATio	DB
Upper limit check	CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer:STATe	OFF
Lower limit check	CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer:STATe	OFF
Upper power limit	CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:POWer	0 dBm
Lower power limit	CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:POWer	0 dBm

R&S NRX parameter	Remote control command	Value
Upper power ratio limit	CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue]	1.0 dB
Lower power ratio limit	CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue]	1.0 dB

13.7.7 Frequency Selective Power Sensors

CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:REFio:FREQuency <freq>

Effective for:

- R&S frequency selective power sensors
- CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:SOURce on page 354 REFio is set.

Sets the frequency of the reference clock signal that is supplied at the REF connector of the power sensor.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<freq>	Range:	1.0e+7 to 1.2e+8
	*RST:	1.0e+7

CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:REFio:OUTPut[:STATe] <state>

Effective for R&S frequency selective power sensors.

If the REF connector of the power sensor is used as an output, enables or disables the output signal.

Suffix:

<Measurement>	1 to 8 Measurement

<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<state>	*RST:	OFF

CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:SOURce <source>

Effective for R&S NRP series power sensors and R&S frequency selective power sensors.

Sets the source of the reference oscillator.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<source>	HOST | INTernal | REFio *RST: INTernal

[SENSe<Sensor>:]BANDwidth[:RESolution]:TYPE:AUTO[:STATe] <state>

Effective for R&S frequency selective power sensors.

If enabled, sets the filter type suitable for the currently chosen measurement mode and bandwidth.

You can query the selected filter type using `[SENSe<Sensor>:]BANDwidth[:RESolution]:TYPE[:VALue]`.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	*RST:	ON

[SENSe<Sensor>:]BANDwidth[:RESolution]:TYPE[:VALue] <value>

Effective for R&S frequency selective power sensors.

Sets the filter type for resolution bandwidth filter. The filter bandwidth is not affected.

If you want to set the filter type automatically, use `[SENSe<Sensor>:]BANDwidth[:RESolution]:TYPE:AUTO[:STATe]`.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> FLAT | NORMal | LTE | W3GPp
*RST: FLAT

[SENSe<Sensor>:]BANDwidth[:RESolution][:VALue] <value>

Effective for R&S frequency selective power sensors.

Sets the resolution bandwidth.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> Range: 10.0 to 400.0e6
*RST: 25.0e6
Default unit: Hz

13.7.8 NRT Measurement Type

13.7.8.1 NRT Mode Settings

Further information:

- Chapter 8.5.1, "NRT Mode Settings", on page 127

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:MODE <mode>

Defines how the average burst power is determined.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:
<mode> AUTO | USER

AUTO
Not supported by all power sensors.
The power sensor automatically recognizes the duty cycle of the burst series and calculates the average burst power from this duty cycle and the average power. Set an appropriate video bandwidth using `CALCulate<Measurement>[:CHANnel<Channel>]:NRT:VBWidth[:VALue]`.

USER
Define the duty cycle by:
`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:PERiod`
`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:WIDTh`
The R&S NRX calculates the average burst power from these values.

*RST: AUTO

Manual operation: See "Burst Mode" on page 127

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:PERiod <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:MODE USER` is set.

Sets the burst period.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:
<value> Range: 0.0 to 1.0
*RST: 0.1
Default unit: s

Manual operation: See "Burst Period" on page 127

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:WIDTh <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:MODE` `USER` is set.

Sets the burst width.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: 0.0 to 1.0 *RST: 0.01 Default unit: s

Manual operation: See "Burst Width" on page 128

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:CCDF:THReshold <value>

Sets the threshold for the complementary cumulative distribution function (CCDF).

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>	Range: -290.0 to +110.0 *RST: +0.0 Default unit: dBm

Manual operation: See "CCDF Threshold" on page 128

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DIRection <direction>

Defines how the forward power is determined.

Suffix:

<Measurement>	1 to 8 Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:
<direction> AUTO | FORWard | REVerse

AUTO
Determines the power flow direction automatically. The greater value of two measured values is automatically assigned as forward power.

FORWard | REVerse
Sets a fixed direction of the forward power, either from port 1 to port 2 (`FORWard`), or from port 2 to port 1(`REVerse`).

*RST: AUTO

Manual operation: See "Direction" on page 128

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:PEP:HOLD:TIME <value>

Sets the hold time of the peak hold circuit of the power sensor.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:
<value> Range: 1e-3 to 1e-1
*RST: 0.01
Default unit: s

Manual operation: See "PEP Hold Time" on page 128

INPut<Sensor>:PORT:SOURce:AUTO <auto>

Enables or disables the automatic assignment of the forward direction.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<auto> **ON**
The direction in which the greater power flows is taken as the forward direction.

OFF
The forward direction is defined by `INPut<Sensor>:PORT:SOURce[:VALue]`.

*RST: 0

Manual operation: See "Direction" on page 128

INPut<Sensor>:PORT:SOURce[:VALue] <val>

Effective if `INPut<Sensor>:PORT:SOURce:AUTO OFF` is set.

Sets a fixed direction of the forward power.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<val> **1**
Port 1 to port 2

2
Port 2 to port 1

Range: 1 to 2
*RST: 1

Manual operation: See "Direction" on page 128

13.7.8.2 NRT Correction Settings

Further information:

- Chapter 8.5.2, "NRT Correction Settings", on page 128

[SENSe<Sensor>:]DM:STATe <state>

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

Enables or disables the modulation correction. Set the communication standard using `[SENSe<Sensor>:]DM:STANdard`.

Suffix:

<Sensor> 101
R&S NRT directional power sensor

Parameters:

<state> OFF | ON

*RST: 0

Manual operation: See "Modulation" on page 129

[SENSe<Sensor>:]DM:STANdard <standard>

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

Sets a communication standard for the modulation correction to reduce systematic deviations occurring in power measurements.

Suffix:

<Sensor> 101
R&S NRT directional power sensor

Parameters:

<standard> IS95 | WCDMa | DVBT | DAB
*RST: IS95

Manual operation: See "Modulation" on page 129

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:RPLane <plane>

Selects the power sensor port to which the measurement results are referred to.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<plane> SOURce | LOAD
*RST: SOURce

Manual operation: See "Offset Reference Plane" on page 129

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation[:VALue] <modulation>

Sets a communication standard for the modulation correction to reduce systematic deviations occurring in power measurements.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<modulation> OFF | IS95 | WCDMa | DVBT | DAB

*RST: OFF

Manual operation: See "Modulation" on page 129

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation:WCDMa:CRATe <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation[:VALue] WCDMa` is set.

Sets the chip rate for the WCDMA communication standard.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value> Range: 0.0 to 8.2e6
*RST: 1.0e6
Default unit: Hz

Manual operation: See "WCDMA Chip Rate" on page 130

INPut<Sensor>:PORT:OFFSet <offs>

Considers the transmission loss in a cable that connects the desired measurement point, set by `INPut<Sensor>:PORT:POSition`, and the power sensor.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<offs> Range: 0.0 to 100.0
*RST: 0.0
Default unit: dB

Manual operation: See "Offset" on page 129

INPut<Sensor>:PORT:POSition <pos>

Selects the power sensor port to which the measurement results are referred to.

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<pos> SOURce | LOAD
*RST: SOURce

Manual operation: See "Offset Reference Plane" on page 129

13.7.8.3 NRT Filter Settings

Further information:

- Chapter 8.5.3, "NRT Filter Settings", on page 130

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe] <state>

Sets the averaging mode.

Suffix:
<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:
<state>
OFF
Uses the value set by `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]`

ON
Determines the average count automatically from the level of the input signal.

ONCE
Automatically adapts the average count once.

*RST: ON

Manual operation: See "Recalc Filter Length" on page 122
See "Averaging Mode" on page 131

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue] <value>

Effective if `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe]` `OFF` is set.

Sets the number of readings that are averaged for one measured value. The higher the count, the lower the noise, and the longer it takes to obtain a measured value.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	Range: 1 to 1048576 *RST: 4

Manual operation: See "Filter Length" on page 121
See "Averaging Count" on page 131

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:ENUM <value>

See `CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]` on page 363.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor

Parameters:

<value>	E1 | E2 | E4 | E8 | E16 | E32 | E64 | E128 | E256 *RST: E4

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture:MODE <mode>

Specifies which integration time is used for a single measurement.

Suffix:

<Measurement>	1 to 8 Measurement
<Channel>	1 to 2 1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<mode>	DEFault | USER

DEFault
Default setting

USER
Value defined by CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture[:VALue].

*RST: USER

Manual operation: See "Integration Time Mode" on page 131

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture[:VALue] <value>

Effective if CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture:MODE USER is set.

Defines the integration time for a single measurement.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor

Parameters:

<value> Range: 0.005 to 0.111
*RST: 0.037
Default unit: s

Manual operation: See "Integration Time" on page 131

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:VBWidth[:VALue] <value>

For measuring the peak envelope power, specify the video bandwidth that thepower sensor uses for measuring the detected RF signal.

Suffix:

<Measurement> 1 to 8
Measurement

<Channel> 1 to 2
1 = primary sensor, 2 = secondary sensor or 1 = forward, 2 = reflection (reverse)

Parameters:

<value>

0
4 kHz

1
200 kHz

2
Maximum bandwidth of the power sensor

Range: 0 to 2
*RST: 2

Manual operation: See "Video Bandwidth" on page 131

[SENSe<Sensor>:]BWIDth:VIDeo:FNUMber <fnum>
[SENSe<Sensor>:]BANDwidth:VIDeo:FNUMber <fnum>

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

For measuring the peak envelope power, specify the video bandwidth that is used for measuring the detected RF signal.

Suffix:

<Sensor> 101
R&S NRT directional power sensor

Parameters:

<fnum> Sets the bandwidth of the power sensor as follows:
0 = 4 kHz, 1 = 200 kHz, 2 = maximum bandwidth

Range: 0 to 2
*RST: 0

Manual operation: See "Video Bandwidth" on page 131

13.8 Configuring the Test Generator

If the sensor check source (R&S NRX-B1) is installed, you can use it as a power reference for testing the connected power sensors.

Further Information:

- Chapter 3.2.1.2, "Module Bay", on page 24
- "Sensor Check Source tab" on page 144

OUTPut:SOURce:STATe <state>
SOURce:OUTPut:STATe <state>

Requires the sensor check source (R&S NRX-B1)

Enables or disables the signal output.

Parameters:

<state> *RST: 0

Manual operation: See "Signal Output" on page 144

SOURce:POWer[:VALue] <value>

Requires the sensor check source (R&S NRX-B1)

Sets the power level for the output signal.

If you enter a value without unit, the unit is defined by `SOURce:UNIT:POWer`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Parameters:

<value>	Range:	-40.0 to +20.0
	*RST:	+0.0
	Default unit:	dBm

Manual operation: See "Power Level" on page 145

SOURce:PULM:STATe <state>

Requires the sensor check source (R&S NRX-B1)

Effective if the output signal is enabled, using `SOURce:OUTPut:STATe` or `OUTPut:SOURce:STATe`.

Sets the signal type of the output signal.

Parameters:

<state> OFF | ON

OFF
Continuous wave

ON
Pulse modulation

*RST: 0

Manual operation: See "Signal Output" on page 144

SOURce[:RF]:FREQuency[:VALue] <freq>

Requires the sensor check source (R&S NRX-B1)

Sets the frequency of the output signal.

Parameters:

<freq>	Range:	50.0e6 to 1.0e9
	*RST:	50.0e6
	Default unit:	Hz

Manual operation: See "Frequency" on page 144

13.9 Configuring the Analog Signal Ouput and the Trigger Input/Output

Configures the two multifunctional BNC connectors at the rear of the R&S NRX.

Further Information:

- Chapter 3.2.2.1, "Trig In / Out 2 and Out 1 / Trig Out Connectors", on page 28
- "I/O 1, I/O 2 tabs" on page 145

INPut<undef>:TRIGger:IMPedance <impedance>

Effective if `OUTPut:MODE<output> TIN` is set.

Sets the termination resistance of the external trigger signal that is supplied at the Trig In / Out 2 connector. Choose a setting that fits the impedance of the trigger source to minimize reflections on the trigger signals.

Suffix:

<undef>	1 to n No suffix required.

Parameters:

<impedance>	HIGH | LOW *RST: HIGH

Manual operation: See "Impedance for Trigger Input" on page 148

OUTPut:LIMit:FAIL <mode>

Effective if `OUTPut:MODE<output>` is set to:

`LIM`, `FLIMit` or `RLIMit`

Sets the fail voltage that is output if a measured value causes a limit violation.

Parameters:

<mode> LOW | HIGH

HIGH
Output voltage of 5 V.

LOW
Output voltage of 0 V.

*RST: LOW

Manual operation: See "Fail Voltage" on page 148

OUTPut:LIMit:FEED:INDex <index>

Effective if `OUTPut:MODE<output>` `LIM` or `FLIM` or `RLIM` is set.

Sets the measurement that is monitored.

Parameters:

<index>

Manual operation: See "Measurement for Limit Output" on page 148

OUTPut:MODE<output> <mode>

Sets the functionality of the Out 1 / Trig Out and Trig In / Out 2 connectors.

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<mode> OFF | RECorder | FRECorder | RRECorder | LIMit | FLIMit | RLIMit | TOUT | TIN | OFF | RECorder | FRECorder | RRECorder | LIMit | FLIMit | RLIMit | TOUT | TIN

OFF
Disabled

RECorder
Analog output

FRECorder
Forward analog output

RRECorder
Reflection analog output

LIMit
Limit violation

FLIMit
Forward limit violation

RLIMit
Reflection limit violation

TOUT
Trigger output

TIN
Trigger input

*RST: OFF

Manual operation: See "Mode" on page 146

OUTPut:RECorder<output>:FEED:INDex <index>

Effective if `OUTPut:MODE<output>` `REC` or `FREC` or `RREC` is set.

Sets the measurement of which the results are output.

Suffix:
<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:
<index>

Manual operation: See "Measurement for Recorder Output" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:CCDF <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the CCDF measurement value that corresponds to 0 V output voltage.

Suffix:
<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:
<value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: pct

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer[:VALue] <value>

Effective if OUTPut:MODE<output> is set to REC, FREC or RREC.

Sets the measurement value that corresponds to 0 V output voltage.

If you enter a value without unit, the unit is defined by UNIT<Measurement>:POWer[:VALue]. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<output>	1 to 2 BNC connectors at the rear; 1 = Out 1 / Trig Out, 2 = Trig In / Out 2

Parameters:

<value>	The range depends on the measurement.

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:POWer <value>

Effective if OUTPut:MODE<output> is set to:

REC, FREC or RREC

Sets the power measurement value that corresponds to 0 V output voltage.

If you enter a value without unit, the unit is defined by UNIT<Measurement>:POWer[:VALue]. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<output>	1 to 2 BNC connectors at the rear; 1 = Out 1 / Trig Out, 2 = Trig In / Out 2

Parameters:

<value>	Range: -180.0 to +210.0 *RST: -30.0 Default unit: dBm

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:RATio:RCOefficient <value>

Effective if OUTPut:MODE<output> is set to:

REC, FREC or RREC

Sets the reflection coefficient measurement value that corresponds to 0 V output voltage.

Suffix:

<output>	1 to 2 BNC connectors at the rear; 1 = Out 1 / Trig Out, 2 = Trig In / Out 2

Parameters:

<value> Range: -1e18 to 1e18
*RST: 0.0
Default unit: -

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:RATio:RFRatio <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the ratio of forward/reverse power that corresponds to 0 V output voltage.

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> Range: 0.0 to 100.0
*RST: 0.0
Default unit: pct

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:RATio:RLOSs <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the return loss measurement value that corresponds to 0 V output voltage.

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> Range: -180.0 to 180.0
*RST: 0.0
Default unit: dB

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:RATio:SWR <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the standing wave ration (SWR) measurement value that corresponds to 0 V output voltage.

Suffix:

<output> — 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> — Range: -1e18 to 1e18
*RST: 1.0
Default unit: -

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:LOWer:RATio[:VALue] <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the power ratio measurement value that corresponds to 0 V output voltage.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer:RATio`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<output> — 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> — Range: -180.0 to +180.0
*RST: +0.0
Default unit: dB

Manual operation: See "0 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:CCDF <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the CCDF measurement value that corresponds to 2.5 V output voltage.

Suffix:

<output> — 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> — Range: 0.0 to 100.0
*RST: 1.0
Default unit: pct

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer[:VALue] <value>

Effective if `OUTPut:MODE<output>` is set to `REC`, `FREC` or `RREC`.

Sets the measurement value that corresponds to 2.5 V output voltage.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> The range depends on the measurement.

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:POWer <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the power measurement value that corresponds to 2.5 V output voltage.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<value> Range: -180.0 to +210.0
*RST: +30.0
Default unit: dBm

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:RATio:RCOefficient <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the reflection coefficient measurement value that corresponds to 2.5 V output voltage.

Suffix:

<output>	1 to 2 BNC connectors at the rear; 1 = Out 1 / Trig Out, 2 = Trig In / Out 2

Parameters:

<value>	Range: -1e18 to 1e18 *RST: 1.0 Default unit: -

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:RATio:RFRatio <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the ratio of forward/reverse power that corresponds to 2.5 V output voltage.

Suffix:

<output>	1 to 2 BNC connectors at the rear; 1 = Out 1 / Trig Out, 2 = Trig In / Out 2

Parameters:

<value>	Range: 0.0 to 100.0 *RST: 100.0 Default unit: pct

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:RATio:RLOSs <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the return loss measurement value that corresponds to 2.5 V output voltage.

Suffix:

<output>	1 to 2 BNC connectors at the rear; 1 = Out 1 / Trig Out, 2 = Trig In / Out 2

Parameters:

<value>	Range: -180.0 to 180.0 *RST: 10.0 Default unit: dB

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:RATio:SWR <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the standing wave ratio (SWR) measurement value that corresponds to 2.5 V output voltage.

Suffix:
<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:
<value> Range: -1e18 to 1e18
*RST: 10.0
Default unit: -

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:RECorder<output>:LIMit:UPPer:RATio[:VALue] <value>

Effective if `OUTPut:MODE<output>` is set to:

`REC`, `FREC` or `RREC`

Sets the power ratio measurement value that corresponds to 2.5 V output voltage.

If you enter a value without unit, the unit is defined by `UNIT<Measurement>:POWer:RATio`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:
<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:
<value> Range: -180.0 to +180.0
*RST: +10.0
Default unit: dB

Manual operation: See "2.5 V Equivalent" on page 147

OUTPut:TRIGger:SOURce <source>

Effective if `OUTPut:MODE<output>` `TOUT` is set.

Sets the trigger source.

Parameters:
<source> SENS1 | SENS2 | SENS3 | SENS4 | EXTernal | CHKSource
*RST: EXTernal

Manual operation: See "Trigger Source for Trigger Output" on page 148

13.10 Zeroing

Further Information:

- Chapter 10, "Zeroing Sensors", on page 134

CALibration<Sensor>:ZERO [<auto>]

Performs zeroing for the power sensor connected to selected port.

Turn off all test signals before zeroing. An active test signal during zeroing causes an error.

While zero calibration is in progress, no queries or other setting commands are allowed, since the command is synchronous. Any communication attempt can run into a timeout. Use `*WAI` to recognize the end of a zeroing procedure.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<auto> ON | OFF | ONCE | LFR | UFR

ON
Return value if a calibration is in progress.

OFF
Return value if no calibration is in progress.

ONCE
Starts zeroing.

LFR | UFR
Starts zeroing in a lower frequency range (LRF) or upper frequency range (UFR), thus reducing the required time by half. Not accepted by all power sensors. Consult the manual of the power sensor concerned.

CALibration<Sensor>:ZERO:AUTO [<auto>]

Performs zeroing using the signal at the power sensor input.

Turn off all test signals before zeroing. An active test signal during zeroing causes an error.

While zero calibration is in progress, no queries or other setting commands are allowed, since the command is synchronous. Any communication attempt can run into a timeout. Use `*WAI` to recognize the end of a zeroing procedure.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using SYSTem:LANGuage "NRP2".

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<auto> ON | OFF | ONCE | LFR | UFR

See CALibration<Sensor>:ZERO on page 376.

CALibration<undef>:ALL:ZERO:AUTO [<auto>]

Applies to all connected power sensors. See CALibration<Sensor>:ZERO:AUTO on page 376.

Suffix:

<undef> 1 to n
No suffix required.

Parameters:

<auto> ON | OFF | ONCE | LFR | UFR

CALibration<Sensor>:ZERO:FAST:AUTO [<auto>]

Effective for trace measurements.

Performs fast zeroing. Since the commands are processed very quickly, they are not overlapping.

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using SYSTem:LANGuage "NRP2".

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<auto> ON | OFF | ONCE | LFR | UFR

See CALibration<Sensor>:ZERO on page 376.

CALibration<undef>:ALL:ZERO:FAST:AUTO [<auto>]

Applies to all connected power sensors. See CALibration<Sensor>:ZERO:FAST:AUTO on page 377.

Suffix:

<undef>	1 to n No suffix required.

Parameters:

<auto>	ON | OFF | ONCE | LFR | UFR

13.11 Running Selftests

Used for testing the connected power sensors and the R&S NRX.

Further information:

- Chapter 11.4, "Test", on page 163

CALibration<Sensor>:TEST?

Requires a thermal power sensor, equipped with an additional test heater.

Queries the power difference in W when measuring with the external heater enabled and disabled.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100
Usage:	Query only

CALibration<Sensor>:TEST:DEViation?

Requires a thermal power sensor, equipped with an additional test heater.

Queries the relative deviation of the current power difference from the reference value stored in the calibration data set. The relative deviation is calculated as follows:

<relative deviation> = (<current power difference> / <reference value>) - 1

with

<current power difference>: `CALibration<Sensor>:TEST?`

<reference value>: `CALibration<Sensor>:TEST:REFerence?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

CALibration<Sensor>:TEST:REFerence?

Requires a thermal power sensor, equipped with an additional test heater.

Queries the reference value of the power difference in W when measuring with the external heater enabled and disabled. The reference value is determined during the calibration process and stored in the calibration data set.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

DIAGnostic:INFO:OTIMe?

Queries the count of the built-in elapsed-time meter. The count is always output in hours [h] and cannot be changed.

Usage: Query only

TEST:DEVice:RESult?

Queries the test results of `TEST:DEVice[:ALL]`.

Usage: Query only

TEST:DEVice[:ALL] [<argument>]

Performs tests for the keyboard, display and touch panel.

Parameters:

<argument> The tests can be performed as single tests or as combined test.

"SubSystemGui:KeyboardTest"
Keyboard test

"SubSystemGui:DisplayTest"
Display test

"SubSystemGui:TouchTest"
Touch test

Example:

```
TEST:DEV "SubSystemGui:
KeyboardTest;DisplayTest;TouchTest";*OPC
```

Performs a combined test.

TEST:USB:STORage? [<argument>]

Checks the connected memory stick.

Query parameters:

<argument>
: **0**
Test passed
1
Test failed; no memory stick connected or memory stick does not respond.

Usage: Query only

TEST:SENSor<Sensor>?

Starts a selftest of the selected power sensor and returns the result. In contrast to `*TST?`, this command returns detailed information that you can use for troubleshooting.

The response is sensor-dependent. It always contains an identification string for the power sensor with the type name and the firmware version number. If an error has occurred, the response also contains the error message in plain text.

Suffix:

<Sensor>
: 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

Manual operation: See "Sensor Test" on page 151

SYSTem:SENSor<Sensor>:TEST?

See `TEST:SENSor<Sensor>?` on page 380.

Suffix:

<Sensor>
: 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

Manual operation: See "Sensor Test" on page 151

13.12 Managing Setups and Correction Tables

Manages setups and frequency-dependent correction tables.

Further information:

- Chapter 9, "Saving and Recalling Settings", on page 132

- "Frequency Dependent Offset" on page 118

MEMory:CATalog:STATe?

Queries information on the available setups stored on the R&S NRX.

The response consists of:

<used disk space>, <remaining disk space>, "<setup 1>", "<setup 2>", "<setup 3>", ...

Each <setup> consists of:

<name>,<data type>,<required disk space in bytes>

Example: `"Setup 1,STAT,1212479"`

Usage: Query only

MEMory:CATalog:TABLe?

Queries information on the available frequency-dependent correction tables stored on the R&S NRX.

The response consists of:

<used disk space>, <remaining disk space>, "<table 1>", "<table 2>", "<table 3>", ...

Each <table> consists of:

<name>,<data type>,<required disk space in bytes>

Example: `"Table 2,TABL,84"`

Usage: Query only

MEMory:CATalog[:ALL]?

Queries information on the available setups and frequency-dependent correction tables stored on the R&S NRX. Combines the information queried by.

- `MEMory:CATalog:STATe?`
- `MEMory:CATalog:TABLe?`

The response consists of:

<used disk space>, <remaining disk space>, "<setup 1>", "<setup 2>", "<setup 3>", ..., "<table 1>", "<table 2>", "<table 3>", ...

Each <setup> and <table> consists of:

<name>,<data type>,<required disk space in bytes>

Example for <setup>: `"Setup 1,STAT,1212479"`

Example for <table>: `"Table 2,TABL,84"`

Usage: Query only

MEMory:CLEar:TABLe

Deletes the content of the selected correction table.

Use `MEMory:TABLe:SELect` to select the table.

Notice: Once send, you cannot cancel this command. Cleared values are irretrievably lost.

Alternatively, you can use `MEMory:CLEar[:NAME]`.

Example: `MEM:CLE:TABL`

Usage: Event

MEMory:CLEar[:NAME] <name>>

Deletes the content of the correction table or setup carrying the specified name.

Notice: Once send, you cannot cancel this command. Cleared values are irretrievably lost.

Setting parameters:
<<name>> Name of the correction table or setup

Example: `MEM:CLE "Setup 9"`

Usage: Setting only

MEMory:FREE:STATe?

Queries the used and remaining disk space for setups.

Example: `MEM:FREE:STAT?`
Query
`1358442496,8337127`
Response

Usage: Query only

MEMory:FREE:TABLe?

Queries the used and remaining disk space for frequency-dependent correction tables.

Example: `MEM:FREE:TABL?`
Query
`1358442496,267`
Response

Usage: Query only

MEMory:FREE[:ALL]?

Queries the used and remaining disk space for setups and frequency-dependent correction tables. Combines the information queried by:

- `MEMory:FREE:STATe?`
- `MEMory:FREE:TABLe?`

Example: `MEM:FREE?`
Query
`1358442496,8337394`
Response

Usage: Query only

MEMory:NSTates?

Queries the number of available setups.

Example: `MEM:NST?`
Query
`20`
Response

Usage: Query only

MEMory:STATe:CATalog?

Queries the names of the available setups stored on the R&S NRX.

Usage: Query only

MEMory:STATe:DEFine <register_name>[, <register_number>]
MEMory:STATe:MAP <register_name>[, <register_number>]

Assigns a name to the setup stored in the memory location.

Take care to use recognizable names. The R&S NRX does not check whether a name is unique. If you want to reset the factory default, use `MEMory:STATe:RESet`.

The query returns the memory location that is assigned to the setup name.

Parameters:

<register_name> Setup name; allowed are alphanumeric characters and special characters.

<register_number> Memory location of the setup

0
Factory-set setup, cannot be changed

1 to 19
Available memory locations

Example: `MEM:STAT:MAP "test",5`

Example: `MEM:STAT:MAP? "test"`

Manual operation: See "Save / Recall Setup" on page 133
See "Setup Name" on page 133

MEMory:STATe:RESet

Resets the setup names to factory default, "Setup 1", "Setup 2" and so on.

Usage: Event

MEMory:TABLe:DATA?

Queries the content of the selected table.

Use `MEMory:TABLe:SELect` to select the table.

The response consists of data pairs (frequency - offset):

<frequency 1>,<offset 1>,<frequency 2>,<offset 2>,<frequency 3>,<offset 3>, ...

Frequency in Hz, offset in dB.

Example: `MEM:TABL:DATA?`
Query
`1.000000E+02,0.000000E+00,2.000000E+03,`
`0.000000E+00,3.000000E+04,0.000000E+00`
Response

Usage: Query only

MEMory:TABLe:DATA:POINts?

Queries the number of data pairs (frequency - offset) in the selected table.

Use `MEMory:TABLe:SELect` to select the table.

Usage: Query only

MEMory:TABLe:FREQuency <value>...

Defines the frequency values in the selected correction table. Existing data is overwritten. Take care that the number of frequency values matches the number of offset values, defined by `MEMory:TABLe:GAIN[:MAGNitude]`. If the numbers differ, excess values are ignored.

Use `MEMory:TABLe:SELect` to select the table.

Setting parameters:

<value> Numeric values with a maximum of 2 digits after the decimal point, separated by commas. Values with more than 2 decimal places are rounded.

Default unit: Hz

Example: `MEM:TABL:FREQ 50.00,60,70.3456`
Sets 3 frequency values; 50.00 Hz, 60.00 Hz, 70.35 Hz.

Usage: Setting only

Manual operation: See "Edit table "<table name>"" on page 119

MEMory:TABLe:FREQuency:POINts?

Queries the number of frequency values in the selected correction table.

Use `MEMory:TABLe:SELect` to select the table.

Usage: Query only

Manual operation: See "Edit table "<table name>"" on page 119

MEMory:TABLe:GAIN:POINts?

Queries the number of offset values in the selected correction table.

Use `MEMory:TABLe:SELect` to select the table.

Usage: Query only

Manual operation: See "Edit table "<table name>"" on page 119

MEMory:TABLe:GAIN[:MAGNitude] <value>...

Defines the offset values in the selected correction table. Existing data is overwritten. Take care that the number of frequency values matches the number of offset values, defined by `MEMory:TABLe:FREQuency`. If the numbers differ, excess values are ignored.

Use `MEMory:TABLe:SELect` to select the table.

Setting parameters:

<value>	Numeric values with a maximum of 3 digits after the decimal point, separated by commas. Values with more than 3 decimal places are rounded. Default unit: dB
Example:	`MEM:TABL:GAIN 0,0.0033,0.04` Sets 3 offset values; 0.000 dB, 0.003 dB, 0.040 dB.
Usage:	Setting only
Manual operation:	See "Edit table "<table name>"" on page 119

MEMory:TABLe:MAP <register_name>[, <register_number>]

Assigns a name to the correction table stored in the memory location.

Take care to use recognizable names. The R&S NRX does not check whether a name is unique. If you want to reset the factory default, use `MEMory:STATe:RESet`.

The query returns the memory location that is assigned to the setup name.

Parameters:

<register_name>	Name of the correction table; allowed are alphanumeric characters and special characters.
<register_number>	Memory location of the correction table **0** Factory-set correction table, cannot be changed **1 to 9** Available memory locations
Example:	`MEM:TABL:MAP "test5",5`
Example:	`MEM:TABL:MAP? "test5"`
Manual operation:	See "Edit table name" on page 119

MEMory:TABLe:MOVE <string>...

Renames of the selected correction table.

Use `MEMory:TABLe:SELect` to select the table.

Setting parameters:

<string> "<old name>","<new name>"
If the old name is incorrect, an error occurs.

Example: `MEM:TABL:MOVE "Test 1","test_5#"`

Usage: Setting only

MEMory:TABLe:RESet

Deletes the content of all frequency-dependent correction tables and resets the names to factory default, "Table 1", "Table 2" and so on.

To delete the content of a specific table, use `MEMory:CLEar:TABLe`.

Usage: Event

MEMory:TABLe:SELect <name>>

Selects one of the available offset tables for the following commands:

- `MEMory:TABLe:GAIN[:MAGNitude]`
- `MEMory:TABLe:GAIN:POINts?`
- `MEMory:TABLe:FREQuency:POINts?`
- `MEMory:TABLe:FREQuency`
- `MEMory:TABLe:DATA?`
- `MEMory:TABLe:DATA:POINts?`

Alternatively, you can use `CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe:INDex`.

Setting parameters:

<<name>> "<table name>"
You can query the table names using `MEMory:CATalog:TABLe?`.

Example: `MEM:TABL:SEL "Table 1"`

Usage: Setting only

Manual operation: See "Frequency dependent offset table" on page 119

13.13 System Information and Configuration

The SYSTem subsystem contains a series of commands for general functions that do not directly affect the measurement.

Further information:

- Chapter 11, "System Settings", on page 136

13.13.1 Presetting

SYSTem:PRESet

Sets the R&S NRX to a defined initial state. The default settings are indicated in the description of commands as *RST value.

With the exceptions listed in Table 13-16, this command corresponds to `*RST`.

*Table 13-16: Differences between *RST and SYSTem:PRESet*

Command	*RST	SYSTem:PRESet
[SENSe<Sensor>:]AVERage:TCONtrol	REPeat	MOVing
CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol[:ENUM]	REPeat	MOVing
CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage:TCONtrol[:ENUM]	REPeat	MOVing
INITiate<Measurement>:CONTinuous	OFF	ON

Usage: Event

Manual operation: See "Preset" on page 133

SYSTem:SENSor<Sensor>:RESet

Sets the selected power sensor to a defined initial state.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Event

13.13.2 Shutdown and Reboot

SYSTem:REBoot

Reboots the R&S NRX.

Usage: Event

SYSTem:SENSor<Sensor>:REBoot

Reboots the selected power sensor.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Event

SYSTem:SHUTdown

Shuts down the R&S NRX.

Usage: Event

13.13.3 Firmware Update

If you want to integrate a firmware update function in an application, use SYSTem:FWUPdate.

Example

You want to update your R&S NRX with the NRX_18.01.22.02.rsu file. This file has a size of 10242884 bytes.

To send the file to the R&S NRX for updating the firmware, your application has to assemble a memory block containing:

```
SYST:FWUP <block_data>
```

The <block_data> are definite length arbitrary block data as described in SYSTem:FWUPdate on page 390.

The size of the file is 10242884. This number has 8 digits. Thus, the <block_data> consist of the following:

- #
- 8
  How many digits follow to specify the file size.
- 10242884
  Number that specifies the file size.
- <file_contents>
  Contents of the *.rsu file, byte-by-byte
- 0x0a
  Delimiter

In this example, you write exactly 10242905 bytes to the R&S NRX, for example by using a 'viWrite()' function.

The 10242905 bytes result from the values of the list above:

9 + 1 + 1 + 1 + 8 + 10242884 + 1

In a (pseudo) string notation, the memory block looks as follows:

`SYST:FWUP #810242884<file_contents>0x0a,`

SYSTem:FWUPdate <fwudata>>

Loads new operating firmware into the R&S NRX. Rohde & Schwarz provides the update file. For further details, see Chapter 12, "Firmware Update", on page 166.

If you want to integrate a firmware update function in an application, see the example given in Chapter 13.13.3, "Firmware Update", on page 389.

Setting parameters:

<<fwudata>> <block_data>

Definite length arbitrary block data containing the direct copy of the binary `*.rsu` file in the following format:
#
Single digit indicating how many digits follow to specify the size of the binary file.
Number that specifies the size of the binary file.
Binary data
0x0a as appended delimiter for line feed

Usage: Setting only

SYSTem:FWUPdate:STATus?

Queries the result of the firmware update, returned as a readable string.

Further information.

- `SYSTem:FWUPdate` on page 390
- Chapter 12, "Firmware Update", on page 166

Example: `SYST:FWUP:STAT?`
Query
`"Success"`
Response

Usage: Query only

13.13.4 Network Settings

SYSTem:COMMunicate:INET[:SELF]:ADDRess <address>
SYSTem:COMMunicate:NETWork[:IPADdress][:ADDRess] <IPaddress>

Effective if `SYSTem:COMMunicate:NETWork[:IPADdress]:MODE` `STATic` is set.

Sets the IP address of the R&S NRX

Parameters:

<IPaddress> Consists of four blocks separated by dots, consisting of up to 3 digits. Example: 108.0.0.255

Range: 0 to 255 for each block

Manual operation: See "IPv4 Address" on page 139

SYSTem:COMMunicate:INET[:SELF]:DNS:ADDRess <server>
SYSTem:COMMunicate:NETWork[:IPADdress]:DNS <DNS>

Effective if `SYSTem:COMMunicate:NETWork[:IPADdress]:MODE` `STATic` is set.

Sets the DNS server address of your local subnet.

Parameters:

<DNS> Consists of four blocks separated by dots, consisting of up to 3 digits. Example: 123.456.0.1

Range: 0 to 255 for each block

Manual operation: See "DNS Server" on page 140

SYSTem:COMMunicate:INET[:SELF]:DNS:SUFFix <suffix>
SYSTem:COMMunicate:NETWork[:COMMon]:DOMain <Domain>

Sets the primary DNS suffix, that means the domain name. DNS uses the suffix for registration and name resolution to identify the R&S NRX uniquely in the entire network.

Parameters:

<Domain>

Manual operation: See "DNS Suffix" on page 139

SYSTem:COMMunicate:INET[:SELF]:GATeway:ADDRess <gateway>
SYSTem:COMMunicate:NETWork[:IPADdress]:GATeway <Gateway>

Effective if `SYSTem:COMMunicate:NETWork[:IPADdress]:MODE` `STATic` is set.

Sets the IP address of the default gateway.

Parameters:

<Gateway> Consists of four blocks separated by dots, consisting of up to 3 digits. Example: 192.168.10.254

Range: 0 to 255 for each block

Manual operation: See "Default Gateway" on page 140

SYSTem:COMMunicate:INET[:SELF]:MODE <state>
SYSTem:COMMunicate:NETWork[:IPADdress]:MODE <mode>

Sets how the IP address is assigned.

Parameters:

<mode> AUTO | STATic

AUTO
Assigns the IP address automatically, provided the network supports the dynamic host configuration protocol (DHCP).

STATic
Enables assigning the IP address manually.

*RST: AUTO

Manual operation: See "Address Mode" on page 139

SYSTem:COMMunicate:INET[:SELF]:SUBNetmask:ADDRess <netmask>
SYSTem:COMMunicate:NETWork[:IPADdress]:SUBNet:MASK <Mask>

Effective if `SYSTem:COMMunicate:NETWork[:IPADdress]:MODE` `STATic` is set.

Sets the subnet mask of your local subnet.

Parameters:

<Mask> Consists of four blocks separated by dots, consisting of up to 3 digits. Example: 255.255.255.0

Range: 0 to 255 for each block

Manual operation: See "Subnet Mask" on page 140

SYSTem:COMMunicate:NETWork[:COMMon]:HOSTname <Hostname>

Sets the individual hostname of the R&S NRX.

It is recommended that you do not change the default hostname to avoid problems with the network connection. However, if you change the hostname, be sure to use a unique name.

Parameters:
<Hostname>

Manual operation: See "Host Name" on page 138

SYSTem:COMMunicate:NETWork[:COMMon]:WORKgroup <Workgroup>

Sets an individual workgroup name for the R&S NRX.

Parameters:
<Workgroup>

SYSTem:COMMunicate:NETWork:MACaddress?

Queries the MAC address of the network adapter.

Usage: Query only

SYSTem:COMMunicate:NETWork:RESTart

Restarts the network connection to the R&S NRX, i.e. terminates the connection and sets it up again.

Usage: Event

SYSTem:COMMunicate:NETWork:STATus?

Queries the network configuration state.

Usage: Query only

13.13.5 Remote Settings

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess <address>

Sets the GPIB address.

Parameters:

<address>	Range:	1 to 30
	*RST:	20

Manual operation: See "GPIB Address" on page 142

SYSTem:HELP:HEADers? [<Parser>]

Returns a list of all SCPI commands supported by the R&S NRX.

Query parameters:

<Parser>

Return values:

<Headers> <dblock>

Usage: Query only

SYSTem:HELP:SYNTax? <Header>

Returns the relevant parameter information for the specified SCPI command.

Query parameters:

<Header> Long or short form of the SCPI command. See also Chapter 14.2.2, "Syntax for Device-Specific Commands", on page 454.

Return values:

<Syntax> <dblock>

Example:

```
SYST:HELP:SYNT? "SYST:KLOC"
```

Query

```
"SYSTem:KLOCk[?] <boolean>"
```

Response

Usage: Query only

SYSTem:HELP:SYNTax:ALL?

Queries the implemented SCPI commands and their parameters. Returns the result as a block data.

Return values:

<Syntax> <dblock>

Usage: Query only

SYSTem:IDN:ANSWer <string>

Effective if `SYSTem:IDN:MODE` `USER` is set.

Sets the customized instrument identification string so that you can identify each R&S NRX individually.

You can query the defined string using *IDN?.

Parameters:
<string> Identification string. Maximum string length is 128 characters.

Manual operation: See "Custom IDN String" on page 143

SYSTem:IDN:AUTO <status>

Enables or disables the automatic instrument identification for *IDN?.

Parameters:
<status> ON | OFF

*RST: 1

Manual operation: See "Customization of *IDN?" on page 142

SYSTem:IDN:MODE <mode>

Sets which identification string is used.

Parameters:
<mode> AUTO | USER

AUTO
Automatic instrument identification.

USER
Customized identification string. Define the string using SYSTem:IDN:ANSWer.

*RST: AUTO

Manual operation: See "Customization of *IDN?" on page 142

SYSTem:LANGuage <language>

Sets the native remote command set or an emulation of a predecessor.

Setting parameters:
<language> String

SCPI
Native remote command set of the R&S NRX.

NRP2
Emulation of the R&S NRP2.

NRP
Emulation of the R&S NRP.

Query parameters:
<language> String

SCPI | NRP2 | NRP

Manual operation: See "Language" on page 142

SYSTem:OPT:ANSWer <string>

Effective if `SYSTem:OPT:MODE USER` is set.

Sets the customized option identification string.

You can query the defined string using `*OPT?`.

Parameters:

<string> Option string. Maximum string length is 128 characters.

Manual operation: See "Custom OPT String" on page 143

SYSTem:OPT:AUTO <status>

Enables or disables the automatic instrument identification for `*OPT?`.

Parameters:

<status> ON | OFF

*RST: 1

Manual operation: See "Customization of *OPT?" on page 143

SYSTem:OPT:MODE <mode>

Sets which option string is used.

Parameters:

<mode> AUTO | USER

AUTO
Automatic option identification string.

USER
Customized option string. Define the string using `SYSTem:OPT:ANSWer`.

*RST: AUTO

Manual operation: See "Customization of *OPT?" on page 143

SYSTem:VERSion?

Queries the SCPI version that the command set of the R&S NRX complies with.

Return values:

<version>

Usage: Query only

13.13.6 Managing Sensors

[SENSe<Sensor>:]ADD <sensor>

Adds a LAN power sensor. See "To add a LAN power sensor" on page 149.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Setting parameters:

<sensor>	Hostname of the power sensor.

Example: `ADD "NRQ6-101435"`

Usage: Setting only

Manual operation: See "Add Sensor" on page 150

SYSTem:SENSor<Sensor>:INFO? [<argument>]

Queries information about the selected power sensor, including calibration data.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Query parameters:

<argument>

Example:

```
SYST:SENS2:INFO?
```

Query

```
"Cal. Abs.:2015-07-08 ","Cal. Due Date:
2017-07 ","Cal. Lin.:
not applicable ","Cal. Misc.:
2015-07-08 ","Cal. Refl.:
2015-07-08 ","Cal. S-Para.:
not applicable ","Cal. S-Para. (User):
not applicable ","Cal. Temp.:
not applicable ","Coupling:AC ","Function:
Power Terminating ","Hostname:
nrp33sn-900444 ","IP Address:
0.0.0.0 ","Impedance:
50 ","Manufacturer:Rohde & Schwarz ","MaxFreq:
3.3e+10 ","MaxPower:0.2 ","MinFreq:
1e+07 ","MinPower:1e-10 ","Resolution:
5e-07 ","SPD Mnemonic: ","SW Build:
18.06.14.01 ","Sensor Name:
NRP33SN-900004 ","Serial:
900444 ","Stock Number:
1419.7777K02 ","Technology:
3-Path Diode ","TestLimit:
0.160 dB ","TestLimit pd:
0.160 dB ","Type:NRP33SN ","Uptime:904 "
```

Response

Usage: Query only

Manual operation: See "Sensor Info" on page 150
See "Hide Sensor Overload Message" on page 165

13.13.7 Instrument Information

SYSTem:DID?
SYSTem:DEVice:ID?

Queries the Rohde & Schwarz instrument ID.

Return values:
<DeviceID>

Usage: Query only

Manual operation: See "System Info" on page 153

SYSTem:DFPRint [<Path>]

Generates the device footprint.

Setting parameters:
<Path>

Return values:
<XMLDeviceFootprint><dblock>

SYSTem:DFPRint:HISTory:COUNt?

Queries the number of device footprints in the history.

Return values:
<Count>

Usage: Query only

SYSTem:DFPRint:HISTory:ENTRy? <index>

Queries a device footprint from the history.

Query parameters:
<index> **0**
Most recent device footprint

Return values:
<XmlDeviceFootprint><dblock>

Usage: Query only

SYSTem:INFO:TERMchar <termination>

Selects the termination characters for information returned by `SYSTem:INFO[:INFO]?`.

Parameters:
<termination> CR | LF | CRLF | STRS
*RST: STRS

SYSTem:INFO[:INFO]? [<argument>]

Queries information on the R&S NRX. See "System Info" on page 153.

If queried without parameters, the command returns all available information in the form of a list of strings separated by commas.

If you want to query specific information, add the query parameter:

```
SYST:INFO? "<string>"
```

Query parameters:

<argument> 'Manufacturer', 'Type', 'Stock Number', 'Serial', 'SW Build', 'MAC Address', 'Hostname', 'IP Address', 'Domain', 'Subnetmask', 'Gateway', 'Mode', 'Status', 'Sensor Name', 'Technology', 'Function', 'MinPower', 'MaxPower', 'MinFreq', 'MaxFreq', 'Impedance', 'Coupling', 'Uptime', 'Cal. Misc.', 'Cal. Abs.', 'Cal. Refl.', 'Cal. Temp.', ' Cal. Lin.', 'Cal. S-Para.', 'Cal. S-Para. (User)', 'SPD Mnemonic', 'Cal. Due Date', 'Certificate No', 'Limit', 'TestLimit', 'TestLimit pd'

Usage: Query only

Manual operation: See "System Info" on page 153

13.13.8 Date and Time Settings

SYSTem:DATE <year>, <month>, <day>
SYSTem:DATE:UTC <year>, <month>, <day>

Sets the date in coordinated universal time (UTC).

`SYSTem:DATE:LOCal` is changed accordingly.

Parameters:

<year>	YYYY	
<month>	Range:	1 to 12
<day>	Range:	1 to 31

Manual operation: See "Date" on page 154

SYSTem:DATE:LOCal <year>, <month>, <day>

Sets the local date.

`SYSTem:DATE:UTC` is changed accordingly.

Parameters:

<year>	YYYY	
<month>	Range:	1 to 12

<day> Range: 1 to 31

Manual operation: See "Date" on page 154

SYSTem:TIME <hour>, <min>, <sec>
SYSTem:TIME:UTC <hour>, <minute>, <second>

Sets the time in the coordinated universal time (UTC).

`SYSTem:TIME:LOCal` is changed accordingly.

Parameters:

<hour>	hh
<minute>	mm
<second>	ss

Manual operation: See "Time" on page 154

SYSTem:TIME:LOCal <hour>, <minute>, <second>

Sets the local time.

`SYSTem:TIME:UTC` is changed accordingly.

Parameters:

<hour>	hh
<minute>	mm
<second>	ss

Manual operation: See "Time" on page 154

SYSTem:TIME:DSTime:MODE <dst>

Enables or disables the automatic clock adjustment for daylight saving time (DST). The automatic clock adjustment depends on configured time zone, see `SYSTem:TIME:DSTime:RULE` on page 401.

If disabled, the local time is calculated as:

Local time = UTC + time zone offset

Parameters:

<dst> OFF | ON

SYSTem:TIME:DSTime:RULE <rule>

Sets the time zone. You can query the list of the available time zones with `SYSTem:TIME:DSTime:RULE:CATalog?`.

Parameters:

<rule>

Manual operation: See "Time Zone Region" on page 154
See "Time Zone" on page 155

SYSTem:TIME:DSTime:RULE:CATalog?

Querys the list of available time zones.

Return values:
<cat>

Usage: Query only

Manual operation: See "Time Zone Region" on page 154
See "Time Zone" on page 155

SYSTem:TIME:HRTimer:ABSolute:SET

Sets the start time for an absolute timer.

Return values:

<year>	YYYY
<month>	MM
<day>	DD
<hour>	hh
<min>	mm
<sec>	ss
<msec>	

SYSTem:TZONe <hour>, <minute>

Sets the offset of the local time to the UTC time, due to the time zone. There can be an additional offset due to daylight saving time (DST).

Parameters:

<hour>	Range:	-12 to 15
<minute>	Range:	-59 to 59

13.13.9 Error Messages

The severity of the error is distinguished:

- Normal error
  Results from, for example, unknown commands or syntax errors and generally affect a single parameter or setting.
- Static error
  More severe than a normal error. Prevents the execution of normal measurements.

For example, a static error is reported as long as the R&S NRX detects over-temperature conditions or a faulty fan.

In the following, the expressions error code and error number are used synonymously.

Further information:

- Chapter 15.2.1, "Interpreting the Errors and Error Codes", on page 484

SYSTem:ERRor:ALL?

Queries all unread entries in the error/event queue and removes them from the queue. The response is a comma-separated list of error numbers and a short error description in the first-in first-out order.

Return values:

<ErrorNumber> Positive error numbers are instrument-dependent. Negative error numbers are reserved by the SCPI standard.

<ErrorText> Short error description

Usage: Query only

SYSTem:ERRor:CODE:ALL?

Queries all unread entries in the error/event queue and removes them from the queue. Only the error numbers are returned and not the entire error text.

Return values:

<ErrorCode> Error number

0
No errors have occurred since the error queue was last read out.

Usage: Query only

SYSTem:ERRor:CODE[:NEXT]?

Queries the oldest entry in the error queue and then deletes it. Only the error number is returned and not the entire error text.

Return values:

<Error>

Example: `SYSTem:ERRor:CODE`
Queries the oldest entry in the error queue.
`Response: 0`
No errors have occurred since the error queue was last read out.

Usage: Query only

SYSTem:ERRor:COUNt?

Queries the number of entries in the error queue.

Return values:
<ErrorCount>

Example: `SYSTem:ERRor:COUNt`
Queries the number of entries in the error queue.
`Response: 1`
One error has occurred since the error queue was last read out.

Usage: Query only

SYSTem:ERRor:EXTended[:STATe] <state>

Enables or disables the extended error messages that provide more information than `SYSTem:ERRor[:NEXT]?`. The location of errors in the parsed command strings is also shown.

Parameters:
<state> *RST: ON

SYSTem:ERRor[:NEXT]?

Queries the error/event queue for the oldest item and removes it from the queue. The response consists of an error number and a short error description.

Return values:
<ErrorCode> Positive error numbers are instrument-dependent. Negative error numbers are reserved by the SCPI standard.

0
No errors have occurred since the error queue was last read out.

<ErrorDescription> Short error description

Usage: Query only

SYSTem:SERRor[:ALL]?

Queries all errors from the list of static errors.

Usage: Query only

SYSTem:SERRor:LIST:ALL?

Queries the list of all static errors that have occurred so far. The list is persistent. You can remove entries using `SYSTem:SERRor:REMove`.

Usage: Query only

SYSTem:SERRor:LIST:NEXT?

Queries the list of all static errors that have occurred but have already been resolved for the oldest entry and removes it from the queue. The response consists of an error number and a short description of the error.

Usage: Query only

SYSTem:SERRor:REMove <num>

Removes an entry from the list of static errors. The entry is identified by its error number.

Setting parameters:

<num> Unique sequence number

*RST: 0

Usage: Setting only

13.13.10 Locking

SYSTem:KLOCk <klock>

Disables or enables the front panel keyboard of the instrument including the [LOCAL] key.

Parameters:

<klock> OFF | ON

SYSTem:LOCK:SHARed:STRing?

Queries the lock string assigned to the locking group if shared locking is enabled.

Writes an error in the error queue if shared locking is not enabled.

Return values:

<result>

Usage: Query only

SYSTem:LOCK:TIMeout <timeout>

Sets the maximum time in milliseconds to wait when processing a command if the device is locked and the sender of the command is not the owner of the lock before the command is discarded and an error is written to the error queue.

Setting parameters:
<timeout>

Return values:
<result>

13.14 Using the Status Register

Further information:

- Chapter 14.4.2, "Structure of a SCPI Status Register", on page 462

13.14.1 General Status Register Commands

STATus:PRESet

Resets the edge detectors and `ENABle` parts of all registers to a defined value.

Usage: Event

STATus:QUEue[:NEXT]?

Queries the most recent error queue entry and deletes it.

Return values:

<ErrorCode> Numeric value

<positive error number>
Sensor-specific error

<negative error number>
SCPI error message

0
Error queue is empty.

<ErrorDescription> String describing the error, example:

"No error"
Error queue is empty.

Usage: Query only

13.14.2 Reading Out the CONDition Part

Further information:

- "CONDition status register part" on page 463

STATus:DEVice:CONDition?
STATus:OPERation:BIT<bitno>:CONDition?
STATus:OPERation:CALibrating:CONDition?
STATus:OPERation:CONDition?
STATus:OPERation:LLFail<RegisterIndex>:CONDition?
STATus:OPERation:MEASuring:CONDition?
STATus:OPERation:MEASuring:EXTension<RegisterIndex>:CONDition?
STATus:OPERation:SENSe:CONDition?
STATus:OPERation:TRIGger:CONDition?
STATus:OPERation:TRIGger:EXTension<RegisterIndex>:CONDition?
STATus:OPERation:ULFail<RegisterIndex>:CONDition?
STATus:QUEStionable:BIT<bitno>:CONDition?
STATus:QUEStionable:CALibration:CONDition?
STATus:QUEStionable:CONDition?
STATus:QUEStionable:MEASure<RegisterIndex>:CONDition?
STATus:QUEStionable:POWer:CONDition?
STATus:QUEStionable:WINDow<RegisterIndex>:CONDition?

Suffix:

<RegisterIndex> 1 to 8
Register

Usage: Query only

13.14.3 Reading Out the EVENt Part

Further information:

- "EVENt status register part" on page 463

STATus:DEVice[:EVENt]?
STATus:OPERation[:EVENt]?
STATus:OPERation:BIT<bitno>[:EVENt]?
STATus:OPERation:CALibrating[:SUMMary][:EVENt]?
STATus:OPERation:LLFail<RegisterIndex>[:SUMMary][:EVENt]?
STATus:OPERation:MEASuring[:SUMMary][:EVENt]?
STATus:OPERation:MEASuring:EXTension<RegisterIndex>[:SUMMary][:EVENt]?
STATus:OPERation:SENSe[:SUMMary][:EVENt]?
STATus:OPERation:TRIGger[:SUMMary][:EVENt]?

STATus:OPERation:TRIGger:EXTension<RegisterIndex>[:SUMMary][:EVENt]?
STATus:OPERation:ULFail<RegisterIndex>[:SUMMary][:EVENt]?
STATus:QUEStionable[:EVENt]?
STATus:QUEStionable:BIT<bitno>[:EVENt]?
STATus:QUEStionable:CALibration[:SUMMary][:EVENt]?
STATus:QUEStionable:MEASure<RegisterIndex>[:SUMMary][:EVENt]?
STATus:QUEStionable:POWer[:SUMMary][:EVENt]?
STATus:QUEStionable:WINDow<RegisterIndex>[:SUMMary][:EVENt]?

Suffix:

<RegisterIndex> 1 to 8
Register

Usage: Query only

13.14.4 Controlling the ENABle Part

Further information:

- "ENABle status register part" on page 463

STATus:DEVice:ENABle <value>
STATus:OPERation:BIT<bitno>:ENABle <RegisterBit>
STATus:OPERation:CALibrating:ENABle <value>
STATus:OPERation:ENABle <RegisterValue>
STATus:OPERation:LLFail<RegisterIndex>:ENABle <value>
STATus:OPERation:MEASuring:ENABle <value>
STATus:OPERation:MEASuring:EXTension<RegisterIndex>:ENABle <value>
STATus:OPERation:SENSe:ENABle <value>
STATus:OPERation:TRIGger:ENABle <value>
STATus:OPERation:TRIGger:EXTension<RegisterIndex>:ENABle <value>
STATus:OPERation:ULFail<RegisterIndex>:ENABle <value>
STATus:QUEStionable:BIT<bitno>:ENABle <RegisterBit>
STATus:QUEStionable:CALibration:ENABle <value>
STATus:QUEStionable:ENABle <RegisterValue>
STATus:QUEStionable:MEASure<RegisterIndex>:ENABle <value>
STATus:QUEStionable:POWer:ENABle <value>
STATus:QUEStionable:WINDow<RegisterIndex>:ENABle <value>

Suffix:

<RegisterIndex> 1 to 8
Register

Parameters:

<value> *RST: 0

13.14.5 Controlling the Negative Transition Part

Further information:

- "PTRansition / NTRansition status register part" on page 463

STATus:DEVice:NTRansition <value>
STATus:OPERation:BIT<bitno>:NTRansition <RegisterBit>
STATus:OPERation:CALibrating:NTRansition <value>
STATus:OPERation:LLFail<RegisterIndex>:NTRansition <value>
STATus:OPERation:MEASuring:NTRansition <value>
STATus:OPERation:MEASuring:EXTension<RegisterIndex>:NTRansition <value>
STATus:OPERation:NTRansition <RegisterValue>
STATus:OPERation:SENSe:NTRansition <value>
STATus:OPERation:TRIGger:NTRansition <value>
STATus:OPERation:TRIGger:EXTension<RegisterIndex>:NTRansition <value>
STATus:OPERation:ULFail<RegisterIndex>:NTRansition <value>
STATus:QUEStionable:BIT<bitno>:NTRansition <RegisterBit>
STATus:QUEStionable:CALibration:NTRansition <value>
STATus:QUEStionable:NTRansition <RegisterValue>
STATus:QUEStionable:MEASure<RegisterIndex>:NTRansition <value>
STATus:QUEStionable:POWer:NTRansition <value>
STATus:QUEStionable:WINDow<RegisterIndex>:NTRansition <value>

Suffix:

<RegisterIndex> 1 to 8
Register

Parameters:

<value> *RST: 0

13.14.6 Controlling the Positive Transition Part

Further information:

- "PTRansition / NTRansition status register part" on page 463

STATus:DEVice:PTRansition <value>
STATus:OPERation:BIT<bitno>:PTRansition <RegisterBit>
STATus:OPERation:CALibrating:PTRansition <value>
STATus:OPERation:LLFail<RegisterIndex>:PTRansition <value>
STATus:OPERation:MEASuring:PTRansition <value>
STATus:OPERation:PTRansition <RegisterValue>
STATus:OPERation:MEASuring:EXTension<RegisterIndex>:PTRansition <value>
STATus:OPERation:SENSe:PTRansition <value>
STATus:OPERation:TRIGger:PTRansition <value>
STATus:OPERation:TRIGger:EXTension<RegisterIndex>:PTRansition <value>
STATus:OPERation:ULFail<RegisterIndex>:PTRansition <value>
STATus:QUEStionable:BIT<bitno>:PTRansition <RegisterBit>
STATus:QUEStionable:CALibration:PTRansition <value>
STATus:QUEStionable:MEASure<RegisterIndex>:PTRansition <value>
STATus:QUEStionable:POWer:PTRansition <value>
STATus:QUEStionable:PTRansition <RegisterValue>
STATus:QUEStionable:WINDow<RegisterIndex>:PTRansition <value>

Suffix:

<RegisterIndex> 1 to 8
Register

Parameters:

<value>	*RST:	65535

13.15 R&S NRP2 Compatibility

This chapter describes all R&S NRP2 remote commands that are still functional but not recommended to use if you start afresh. If you want to reuse programming from the R&S NRP2, you can use these commands. But if you start with the R&S NRX without inherited liabilities, only use the commands recommended for the R&S NRX.

13.15.1 CALCulate Commands

CALCulate<Measurement>:STATistics:MARKer:HORizontal:POSition[:X][:POWer] <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:STATistics:MARKer:X:POSition[:ABSolute]`

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:
<value>

CALCulate<Measurement>:STATistics:MARKer:VERTical:POSition[:Y] <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:STATistics[:CDF]:MARKer:Y:POSition`

`CALCulate<Measurement>:STATistics:PDF:MARKer:Y:POSition`

The command is not fully R&S NRP2 compatible. If port 1 is assigned to measurement 1 and so on, the command works. If port 1 is assigned to measurement 2, for example, enable the R&S NRP2 emulation using `SYSTem:LANGuage "NRP2"`.

Suffix:

<Measurement>	1 to 8 Measurement

Parameters:
<value>

CALCulate<Measurement>:TRACe:MARKer<Marker>:XPOSition <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`DISPlay[:WINDow<Window>]:TRACe:MARKer<Marker>:POSition:TIME`

Suffix:

<Measurement>	1 to 8 Measurement
<Marker>	1 to 4 Marker (M1 to M4)

Parameters:

<value>	Default unit: s

13.15.2 DISPlay Commands

DISPlay:ILLumination <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`DISPlay:BRIGthness`

Parameters:

<state>	*RST:	ON

DISPlay[:WINDow<Undef>]:SELect <window>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

None. The commands of the DISPlay system conform to the R&S NRX concept.

Suffix:
<Undef> 1 to n
No suffix required.

Parameters:
<window> Range: 1 to 4
*RST: 1

DISPlay[:WINDow<Undef>]:SIZE <size>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

None. The commands of the DISPlay system conform to the R&S NRX concept.

Suffix:
<Undef> 1 to n
No suffix required.

Parameters:
<size> NORMal | ZOOMed
*RST: NORMal

DISPlay[:WINDow<Window>]:ANALog:LOWer:POWer <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWer] on page 197

Suffix:
<Window> 1 to 8
Measurement

Parameters:
<value>

DISPlay[:WINDow<Window>]:ANALog:LOWer:RATio <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] on page 197

Suffix:
<Window> 1 to 8
Measurement

Parameters:
<value>

DISPlay[:WINDow<Window>]:ANALog:UPPer:POWer <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer]` on page 200

Suffix:

<Window>	1 to 8 Measurement

Parameters:

<value>	<block_data>

DISPlay[:WINDow<Window>]:ANALog:UPPer:RATio <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue]` on page 200

Suffix:

<Window>	1 to 8 Measurement

Parameters:

<value>	<block_data>

DISPlay[:WINDow<Window>]:AVALue <auxiliaries>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:AVALue`

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<auxiliaries>	NONE | NORMal | EXTRemes | STATistics *RST: NONE

DISPlay[:WINDow<Window>]:FORMat <format>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:DMODe`

The command is only fully R&S NRP2 compatible, if `SYSTem:LANGuage NRP2` is set.

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<format> DIGital | ANALog | GRAPhical

*RST: DIGital

DISPlay[:WINDow<Window>]:METer:LOWer:POWer <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWer]` on page 197

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value>

DISPlay[:WINDow<Window>]:METer:LOWer:RATio <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue]` on page 197

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value>

DISPlay[:WINDow<Window>]:METer:UPPer:POWer <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer]` on page 200

Suffix:

<Window> 1 to 4
Measurement pane

Parameters:

<value>

DISPlay[:WINDow<Window>]:METer:UPPer:RATio <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue]` on page 200

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>

DISPlay[:WINDow<Window>]:RESolution <resolution>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:RESolution`

Suffix:

<Window>	1 to 8 Measurement

Parameters:

<resolution>	Range:	0.001 to 1
	*RST:	0.01

DISPlay[:WINDow<Window>]:TRACe:LOWer <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DB`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBM`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBUV`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DPCT`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:ONE`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:WATT`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DB`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBM`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBUV`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DPCT`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:ONE`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:WATT`

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>

DISPlay[:WINDow<Window>]:TRACe:UPPer <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DB`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBM`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DBUV`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:DPCT`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:ONE`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:SPAN:WATT`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DB`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBM`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DBUV`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:DPCT`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:ONE`

`CALCulate<Measurement>:TRACe:Y[:SCALe]:TOP:WATT`

Suffix:

<Window>	1 to 4 Measurement pane

Parameters:

<value>

DISPlay[:WINDow<Window>]:TSLot <slot>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG]:SELection`

Suffix:

<Window>	1 to 8 Measurement

Parameters:

<slot>	Range:	1 to 4
	*RST:	1

13.15.3 OUTPut Commands

OUTPut:RECorder<output>[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:MODE<output>`

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<state>

OUTPut:RECorder<output>:FEED[:VALue] <string>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:RECorder<output>:FEED:INDex`

Suffix:

<output> 1 to 2
BNC connectors at the rear; 1 = Out 1 / Trig Out,
2 = Trig In / Out 2

Parameters:

<string>

OUTPut:ROSCillator[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:SOURce:STATe`

Parameters:

<state>

OUTPut:TRIGger[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:MODE<output>`

Parameters:

<state>

OUTPut:TTL:ACTive <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:LIMit:FAIL`

Parameters:
<mode> LOW | HIGH

OUTPut:TTL:FAIL <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:LIMit:FAIL`

Parameters:
<mode> LOW | HIGH

OUTPut:TTL:FEED <feed>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:LIMit:FEED:INDex`

Parameters:
<feed>

OUTPut:TTL[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`OUTPut:MODE<output>`

Parameters:
<state>

13.15.4 SENSe Commands

[SENSe<Sensor>:]AVERage:COUNt:AUTO:MTIMe <maximum_time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:MTIMe`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<maximum_time>	Range: 0.01 to 1000.0 *RST: 4.00 Default unit: s

[SENSe<Sensor>:]AVERage:COUNt:AUTO:NSRatio <nsr>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:NSRatio

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<nsr>	Range: 100e-6 to 1.0 *RST: 0.01 Default unit: dB

[SENSe<Sensor>:]AVERage:COUNt:AUTO:SLOT <slot>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:SLOT

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<slot>	Range: 1 to 128 *RST: 1

[SENSe<Sensor>:]AVERage:COUNt:AUTO:TYPE <type>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO:TYPE

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<type>	RESolution | NSRatio *RST: RESolution

[SENSe<Sensor>:]AVERage:COUNt:AUTO[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:AUTO[:STATe]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	| OFF | ON | ONCE

[SENSe<Sensor>:]AVERage:COUNt:ENUM <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt:ENUM`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	E1 | E2 | E4 | E8 | E16 | E32 | E64 | E128 | E256 *RST: E4

[SENSe<Sensor>:]AVERage:COUNt[:VALue] <count>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNt[:VALue]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<count>	Range: 1 to 1048576 *RST: 4

[SENSe<Sensor>:]AVERage:TCONtrol <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TCONtrol[:ENUM]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<mode>	MOVing | REPeat If you use SYSTem:PRESet instead of *RST, the RST value differs. See Table 13-16. *RST: REPeat

[SENSe<Sensor>:]AVERage:TYPE <type>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:TYPE

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<type>	POWer | VIDeo | LINear *RST: POWer

[SENSe<Sensor>:]AVERage[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage[:STATe]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	ON | OFF *RST: ON

[SENSe<Sensor>:]BANDwidth:VIDeo <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:VBWidth:ENUM

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:VBWidth[:VALue]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<mode>

[SENSe<Sensor>:]BURSt:MODE <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:MODE

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<mode> AUTO | USER
*RST: AUTO

[SENSe<Sensor>:]BURSt:PERiod <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:PERiod

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> Range: 0.0 to 1.0
*RST: 0.1
Default unit: s

[SENSe<Sensor>:]BURSt:WIDTh <width>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:WIDTh

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<width> Range: 0.0 to 1.0
*RST: 0.01
Default unit: s

[SENSe<Sensor>:]BWIDth:VIDeo <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:VBWidth:ENUM

`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:VBWidth[:VALue]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<mode>

[SENSe<Sensor>:]CORRection:DCYCle:STATe <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle:STATe`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state> ON | OFF
*RST: OFF

[SENSe<Sensor>:]CORRection:DCYCle[:INPut][:MAGNitude] <duty_cycle>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<duty_cycle>

[SENSe<Sensor>:]CORRection:DCYCle[:VALue] <duty_cycle>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:DCYCle[:VALue]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<duty_cycle>	Range:	0.001 to 100.00
	*RST:	50.0
	Default unit:	pct

[SENSe<Sensor>:]CORRection:FDOFfset[:INPut][:MAGNitude]?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet[:MAGNitude]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]CORRection:FDOTable:STATe <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe[:STATe]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>

[SENSe<Sensor>:]CORRection:FDOTable[:SELect] <table_name>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:TABLe:INDex`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<table_name>

[SENSe<Sensor>:]CORRection:OFFSet:STATe <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:STATe

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100	

Parameters:

<state>	*RST:	OFF

[SENSe<Sensor>:]CORRection:OFFSet[:VALue] <offset>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet[:MAGNitude]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<offset>	Range:	-200.00 to 200.00
	*RST:	0.0
	Default unit:	dB

[SENSe<Sensor>:]DATA? [<function>]

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:DATA?

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Query parameters:

<function>

Usage: Query only

[SENSe<Sensor>:]DM:WCDMa:CRATe <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation:WCDMa:CRATe

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	Range: 0.0 to 8.2e6 *RST: 1.0e6 Default unit: Hz

[SENSe<Sensor>:]FUNCtion[:ON] <function>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:FEED<Channel>`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<function>	*RST: POWer:AVG

[SENSe<Sensor>:]INFormation? [<argument>]

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`SYSTem:SENSor<Sensor>:INFO?`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Query parameters:

<argument>

Usage: Query only

[SENSe<Sensor>:]INPut:ATTenuation:AUTO <auto>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation:AUTO`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<auto>	OFF | ON | ONCE *RST: OFF

[SENSe<Sensor>:]INPut:ATTenuation[:VALue] <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:INPut:ATTenuation[:VALue]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> Range: 0.0 to 30.0
*RST: 30.0
Default unit: dB

[SENSe<Sensor>:]INTernal:TRIGger:JITTer:METHod <method>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`TRIGger<Measurement>[:CHANnel<Channel>]:JITTer:METHod`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<method> COMPensate | MEASure | NONE
*RST: COMPensate

[SENSe<Sensor>:][POWer:][AVG:]APERture[:VALue] <integration_time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:APERture[:VALue]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<integration_time> Range: 8.3e-9 to 30.0
*RST: 0.005
Default unit: s

[SENSe<Sensor>:][POWer:][AVG:]SMOothing:STATe <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:SMOothing[:STATe]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100	

Parameters:

<state>	ON | OFF	
	*RST:	OFF

[SENSe<Sensor>:][POWer:]BURSt:DTOLerance <tolerance>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:BURSt:DTOLerance

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<tolerance>	Range:	0.00 to 0.30
	*RST:	1.000e-6
	Default unit:	s

[SENSe<Sensor>:][POWer:]NCORrection[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:CHANnel<Channel>][:POWer]:NCORrection[:STATe]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	*RST:	OFF

[SENSe<Sensor>:][POWer:]TGATe:SELect <gate>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>[:POWer]:TGATe<Undef>[:AVG]:SELection

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<gate>

[SENSe<Sensor>:][POWer:]TGATe<Gate>:OFFSet:TIME <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:OFFSet[:TIME]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

<Gate> 1 to 4
Time gate

Parameters:

<time> Default unit: s

[SENSe<Sensor>:][POWer:]TGATe<Gate>:TIME <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

<Gate> 1 to 4
Time gate

Parameters:

<time> Default unit: s

[SENSe<Sensor>:][POWer:]TGATe<Gate>[:EXCLude]:MID:OFFSet[:TIME] <time_interval>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:OFFSet[:TIME]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

<Gate> 1 to 4
Time gate

Parameters:
<time_interval> Default unit: s

[SENSe<Sensor>:][POWer:]TGATe<Gate>[:EXCLude]:MID:TIME <time_interval>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:TIME`

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

<Gate> 1 to 4
Time gate

Parameters:
<time_interval> Default unit: s

[SENSe<Sensor>:][POWer:]TGATe[:EXCLude]:MID[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID[:STATe]`

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<state>

[SENSe<Sensor>:][POWer:]TSLot[:AVG]:COUNt <count>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG]:COUNt`

Suffix:
<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:
<count> Range: 1 to 128
*RST: 8

[SENSe<Sensor>:][POWer:]TSLot[:AVG]:WIDTh <width>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG]:WIDTh`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<width>	Range: 50.0e-9 to 0.10 *RST: 1.000e-3 Default unit: s

[SENSe<Sensor>:][POWer:]TSLot[:AVG][:EXCLude]:MID:OFFSet[:TIME] <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID:OFFSet[:TIME]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>	Range: 0.00 to 0.10 *RST: 0.00 Default unit: s

[SENSe<Sensor>:][POWer:]TSLot[:AVG][:EXCLude]:MID:TIME <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID:TIME`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>	Range: 0.00 to 0.10 *RST: 0.00 Default unit: s

[SENSe<Sensor>:][POWer:]TSLot[:AVG][:EXCLude]:MID[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TSLot[:AVG][:EXCLude]:MID[:STATe]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	*RST: OFF

[SENSe<Sensor>:]POWer:CCDFunction:REFerence <ref>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:CCDF:THReshold` on page 357

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<ref>	Range: -290.0 to +110.0 *RST: +0.0 Default unit: dBm

[SENSe<Sensor>:]POWer:PEP:HOLD <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:NRT:PEP:HOLD:TIME`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>	Range: 1.0e-3 to 1.0e-1 *RST: 6.0e-2 Default unit: s

[SENSe<Sensor>:]RANGe:AUTO <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:AUTO`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	*RST: ON

[SENSe<Sensor>:]RANGe:CLEVel <level>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe:CLEVel[:VALue]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<level>	Range: -20.00 to 0.00 *RST: 0.00 Default unit: dB

[SENSe<Sensor>:]RANGe[:VALue] <range>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>][:POWer][:AVG]:RANGe[:VALue]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<range>	Range: 0 to 2 *RST: 1

[SENSe<Sensor>:]ROSCillator:REFio:FREQuency <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:REFio:FREQuency`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	Range:	1.0e+7 to 1.2e+8
	*RST:	1.0e+7
	Default unit:	Hz

[SENSe<Sensor>:]ROSCillator:REFio:OUTPut[:STATe] <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:REFio:OUTPut[:STATe]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> *RST: OFF

[SENSe<Sensor>:]ROSCillator:SOURce <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:ROSCillator:SOURce`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> HOST | INTernal | REFio
*RST: INTernal

[SENSe<Sensor>:]SAMPling <sampling_rate>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:SAMPling`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<sampling_rate> FREQ1 | FREQ2
*RST: FREQ1

[SENSe<Sensor>:]SGAMma:CORRection:STATe <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:CORRection:STATe`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state> ON | OFF
*RST: OFF

[SENSe<Sensor>:]SGAMma:PHASe <phase>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma:PHASe`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<phase> Range: -360.0 to 360.0
*RST: 0.0
Default unit: degree

[SENSe<Sensor>:]SGAMma[:MAGNitude] <magnitude>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:SGAMma[:MAGNitude]`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<magnitude> Range: 0.0 to 1.0
*RST: 0.0

[SENSe<Sensor>:]STATistics:SAMPles[:MINimum] <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:STATistics:SAMPles[:MINimum]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>

[SENSe<Sensor>:]STATistics:SCALe:X:POINts <points>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:STATistics[:SCALe]:X:POINts

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<points>	Range: 3 to 8191 *RST: 200

[SENSe<Sensor>:]STATistics:SCALe:X:RANGe <range>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:STATistics[:SCALe]:X:RANGe

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<range>	Range: 0.01 to 100.0 *RST: 50.0 Default unit: dB

[SENSe<Sensor>:]STATistics:SCALe:X:RLEVel <rlev>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel:RELative

CALCulate<Measurement>:STATistics[:SCALe]:X:RLEVel[:ABSolute]

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<rlev>	Range: -280.0 to 220.0 *RST: -30.0 Default unit: dBm

[SENSe<Sensor>:]STATistics:TIME <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG]:TIME` if a gate is set.

`CALCulate<Measurement>:STATistics:APERture` if no gate is set.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>	Range: 10.0e-6 to 0.3 *RST: 0.01 Default unit: s

[SENSe<Sensor>:]STATistics[:EXCLude]:MID:OFFSet[:TIME] <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:OFFSet[:TIME]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>	Range: 0.0 to 0.3 *RST: 0.0 Default unit: s

[SENSe<Sensor>:]STATistics[:EXCLude]:MID:TIME <time>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:POWer]:TGATe<Gate>[:AVG][:EXCLude]:MID:TIME`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<time>
Range: 0.0 to 0.3
*RST: 0.0
Default unit: s

[SENSe<Sensor>:]TIMing:EXCLude:STARt <exclude_start>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TSLot:TIMing:EXCLude:STARt`

Suffix:

<Sensor>
1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<exclude_start>
Range: 0.0 to 15.0
*RST: 0.0
Default unit: s

[SENSe<Sensor>:]TIMing:EXCLude:STOP <exclude_stop>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TSLot:TIMing:EXCLude:STOP`

Suffix:

<Sensor>
1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<exclude_stop>
Range: 0.0 to 15.0
*RST: 0.0
Default unit: s

[SENSe<Sensor>:]TRACe:AVERage:COUNt <filter length>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage:COUNt[:VALue]`

Suffix:

<Sensor>
1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<count>
Range: 1 to 65536
*RST: 4

[SENSe<Sensor>:]TRACe:AVERage:TCONtrol <mode>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage:TCONtrol[:ENUM]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<mode>	MOVing | REPeat *RST: REPeat

[SENSe<Sensor>:]TRACe:AVERage[:STATe] <state>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:AVERage[:STATe]`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<state>	ON | OFF *RST: ON

[SENSe<Sensor>:]TRACe:ESAMpling:AUTO <auto>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>[:CHANnel<Channel>]:TRACe:ESAMpling`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<auto>	*RST: ON

[SENSe<Sensor>:]TRACe:MEASurement:ALGorithm <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:ALGorithm`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	HISTogram | INTegration | PEAK *RST: HISTogram

[SENSe<Sensor>:]TRACe:MEASurement:DEFine:DURation:REFerence <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:TRACe:MEASurement:DEFine:DURation:REFerence

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	Range: Depends on sensor. *RST: Depends on sensor. Default unit: pct

[SENSe<Sensor>:]TRACe:MEASurement:DEFine:TRANsition:HREFerence <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:HREFerence

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value>	Range: Depends on the sensor. *RST: Depends on the sensor. Default unit: pct

[SENSe<Sensor>:]TRACe:MEASurement:DEFine:TRANsition:LREFerence <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

CALCulate<Measurement>:TRACe:MEASurement:DEFine:TRANsition:LREFerence

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> float_value

Range: depending on the sensor
*RST: depending on the sensor
Default unit: PCT

[SENSe<Sensor>:]TRACe:MEASurement:POWer:AVG?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:AVG?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:HREFerence?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:HREFerence?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:LREFerence?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:LREFerence?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:MAX?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:MAX?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:MIN?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:MIN?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:PULSe:BASE?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:BASE?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:PULSe:TOP?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:PULSe:TOP?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:POWer:REFerence?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:POWer:REFerence?`

If you enter a value without unit, the unit is defined by `[SENSe<Sensor>:]UNIT:POWer[:VALue]`. For further information, see Chapter 13.5.1.3, "Units", on page 207.

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:PULSe:DCYCle?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:PULSe:DCYCle?`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:PULSe:DURation?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:PULSe:DURation?`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:PULSe:PERiod?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:PULSe:PERiod?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:PULSe:SEParation?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:PULSe:SEParation?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:ESAMpling:AUTO[:STATe] <value>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:ESAMpling:AUTO[:STATe]` on page 324

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<value> *RST: ON

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:NEGative:DURation?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:DURation?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:NEGative:OCCurrence?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OCCurrence?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:NEGative:OVERshoot?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:NEGative:OVERshoot?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:POSitive:DURation?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:DURation?`

Suffix:

<Sensor> 1 to 128
Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:POSitive:OCCurrence?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:OCCurrence?`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:POSitive:OVERshoot?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:POSitive:OVERshoot?`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:MEASurement:TRANsition:SPERiod?

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:MEASurement:TRANsition:SPERiod?`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Usage: Query only

[SENSe<Sensor>:]TRACe:POINts <points>

Available for R&S NRP2 compatibility. Recommended R&S NRX command:

`CALCulate<Measurement>:TRACe:X:POINts`

Suffix:

<Sensor>	1 to 128 Configured sensor connected at: port A = 1, ... , port D = 4, R&S NRX-B9 = 101, USB and LAN port = 5 to 100

Parameters:

<points>	Range:	1 to 8192
	*RST:	260

14 Remote Control Basics

14.1 Remote Control Interfaces and Protocols

For remote control, communication between the R&S NRX and the controlling host is established based on the following interfaces and protocols.

Table 14-1: Supported interfaces and protocols

Interface	Protocol	VISA*) address string	Library	Further information
USB	USBTMC	USB::<vendor ID>::<product ID>::<serial number>[::INSTR]	VISA	Chapter 14.1.1, "USB Interface", on page 449
Ethernet	VXI-11	TCPIP::host address[::LAN device name][::INSTR]	VISA	Chapter 14.1.2.2, "VXI-11 Protocol", on page 452
	HiSLIP High-speed LAN instrument protocol (IVI-6.1)	TCPIP::host address::hislip0[::INSTR]	VISA	Chapter 14.1.2.3, "HiSLIP Protocol", on page 452
	Socket communication (SCPI raw)	TCPIP::host address[::LAN device name]::<port>::SOCKET		Chapter 14.1.2.4, "Socket Communication", on page 453
GPIB/ IEEE488 interface (R&S NRX-B8)	GPIB/IEEE 488	GPIB::<primary address>::INSTR		Chapter 14.1.3, "GPIB Interface", on page 453
	*) VISA is a standardized software interface library providing input and output functions to communicate with instruments. A VISA installation on the controller is a prerequisite for remote control over LAN (when using VXI-11 or HiSLIP protocol) and USBTMC interfaces. See also Chapter 14.1.2.1, "VISA Resource Strings", on page 451.			

14.1.1 USB Interface

Computer requirements

- VISA library
  A USB connection requires the VISA library to be installed. VISA detects and configures the R&S NRX automatically when the USB connection is established.
- USBTMC driver

Apart from the USBTMC driver, which comes with the installation of the R&S NRP Toolkit, you do not have to install a separate driver.

Setup

► Connect the host interface of the R&S NRX and the USB interface of the computer.

USBTMC protocol

USBTMC is a protocol that is built on top of USB for communication with USB devices from the test & measurement category. It defines a dedicated class code that identifies a device's functionality. R&S NRX also uses this class code to identify itself as a member of the test & measurement class. Using a VISA library, such devices support service request, trigger and other operations that are commonly found in GPIB devices.

USB resource string

The VISA resource string for USBTMC device communication represents an addressing scheme that is used to establish a communication session with the sensor. It is based on the sensor address and some instrument- and vendor-specific information. The syntax of the used USB resource string is:

USB::<vendor ID>::<product ID>::<serial number>[::INSTR]

- *<vendor ID>* is the vendor ID for Rohde & Schwarz.
- *<product ID>* is the product ID for the R&S NRX.
- *<serial number>* is the individual serial number of the R&S NRX, printed on the casing.

Example:

`USB::0x0AAD::0x015B::100001`

0x0AAD is the vendor ID for Rohde & Schwarz.

0x015B is the product ID for the R&S NRX.

100001 is the serial number of the particular R&S NRX.

14.1.2 Ethernet Interface

The Ethernet interface of the R&S NRX allows you to integrate it in a local area network (LAN).

Requirements

- TCP/IP network protocol
  The local area network must support the TCP/IP network protocol.
  The TCP/IP network protocol and the associated network services are preconfigured on the R&S NRX.
- VISA library
  Installed on the computer.
- Software for device control
  Installed on the computer.

Setup

► Using the Ethernet interface, connect the computer and the R&S NRX to a local area network.

14.1.2.1 VISA Resource Strings

The VISA resource string for network device communication is required to establish a communication session between the controller and the power sensor in a LAN. The resource string is a unique identifier, composed of the specific IP address of the sensor and some network and VISA-specific keywords.

TCPIP::<IP address or hostname>[::<LAN device name>][::INSTR]

- *TCPIP* designates the network protocol used
- *<IP address or hostname>* is the IP address or hostname of the device
- *[::<LAN device name>]* defines the protocol and the instance number of a subinstrument:
- *[::INSTR]* indicates the power sensors resource class (optional)

The IP address or hostname is used by the programs to identify and control the sensor. While the hostname is determined by settings in the sensor, the IP address is assigned by a DHCP server when the sensor requests one. Alternatively the IP address is determined with a procedure called Zeroconf.

You can also assign a *LAN device name* which defines the protocol characteristics of the connection. See the description of the VISA resource string below for the corresponding interface protocols. The string of the *LAN device name* is emphasized in italics.

VXI-11

TCPIP::<IP address or hostname>*[::inst0]*[::INSTR]

- *inst0* is the LAN device name, indicating that the VXI-11 protocol is used (optional)

inst0 currently selects the VXI-11 protocol by default and can be omitted.

For further details, see Chapter 14.1.2.2, "VXI-11 Protocol", on page 452.

HiSLIP

TCPIP::<IP address or hostname>*::hislip0*[::INSTR]

- *hislip0* is the HiSLIP device name, designates that the interface protocol HiSLIP is used (mandatory)

hislip0 is composed of [::HiSLIP device name[,HiSLIP port]] and must be assigned.

For further details, see Chapter 14.1.2.3, "HiSLIP Protocol", on page 452.

Socket communication

TCPIP::<IP address or hostname>*::port::SOCKET*

- *port* determines the used port number

- *SOCKET* indicates the raw network socket resource class

Socket communication requires the specification of the port (commonly referred to as port number) and of "SOCKET" to complete the VISA resource string with the associated protocol used.

The default port for socket communication is port 5025.

For further details, see Chapter 14.1.2.4, "Socket Communication", on page 453.

Example:

A power sensor has the IP address *10.111.11.20*; the valid resource string using VXI-11 protocol is:

TCPIP::10.111.11.20::INSTR

The DNS hostname is *nrx-100001*; the valid resource string is:

TCPIP::nrx-100001::hislip0 (HiSLIP)

TCPIP::nrx-100001::inst0 (VXI-11)

A raw socket connection can be established using:

TCPIP::10.111.11.20::5025::SOCKET

TCPIP::nrx-100001::5025::SOCKET

14.1.2.2 VXI-11 Protocol

The VXI-11 standard is based on the ONC RPC (Open Network Computing Remote Procedure Call) protocol which in turn relies on TCP/IP as the network/transport layer. The TCP/IP network protocol and the associated network services are preconfigured. TCP/IP ensures connection-oriented communication, where the order of the exchanged messages is adhered to and interrupted links are identified. With this protocol, messages cannot be lost.

14.1.2.3 HiSLIP Protocol

The HiSLIP (high-speed LAN instrument protocol) is the successor protocol for VXI-11 for TCP-based instruments specified by the IVI foundation. The protocol uses two TCP sockets for a single connection - the first for fast data transfer, the second one for non-sequential control commands (e.g. `Device Clear` or `SRQ`).

HiSLIP has the following characteristics:

- High performance as with raw socket network connections
- Compatible IEEE 488.2 support for Message Exchange Protocol, Device Clear, Serial Poll, Remote/Local, Trigger, and Service Request.
- Uses a single IANA registered port (4880), which simplifies the configuration of firewalls.
- Supports simultaneous access of multiple users by providing versatile locking mechanisms.
- Usable for IPv6 or IPv4 networks.

The HiSLIP data is sent to the device using the "fire and forget" method with immediate return. Opposed to VXI-11, where each operation is blocked until a VXI-11 device handshake returns. Thus, a successful return of a VISA operation such as `viWrite()` does not guarantee that the sensor has finished (or even started) executing the requested command. It just indicates that the command has been delivered to the TCP/IP buffers.

For more information see also the application note at:

http://www.rohde-schwarz.com/appnote/1MA208.

14.1.2.4 Socket Communication

An alternative way for remote control of the software is to establish a simple TCP/IP connection to the device using the standard network drivers of your operating system. The so-called "socket" on Linux, "winsock" on Windows. The socket communication, also referred to as "raw Ethernet communication", does not necessarily require a VISA installation on the remote controller side.

Socket connections are established on a specially defined port. The socket address is a combination of the IP address or hostname of the sensor and the number of the port configured for remote control. The power sensors use port number 5025 for this purpose.

14.1.3 GPIB Interface

Connect the R&S NRX and the controller using a GPIB bus cable. Address the R&S NRX by its GPIB address.

Controller prerequisites

- GPIB bus card
- Card drivers
- Program libraries for the programming language

14.2 SCPI Command Structure

SCPI commands - messages - are used for remote control. Commands that are not taken from the SCPI standard follow the SCPI syntax rules. The power sensor supports the SCPI version 1999. The SCPI standard is based on standard IEEE 488.2 and aims at the standardization of device-specific commands, error handling and the status registers.

SCPI commands consist of a so-called header and, usually, one or more parameters. The header and the parameters are separated by a "white space" (ASCII code 0 to 9, 11 to 32 decimal, e.g. blank). The headers can consist of several mnemonics (keywords). Queries are formed by appending a question mark directly to the header.

The commands can be either device-specific or device-independent (common commands). Common and device-specific commands differ in their syntax.

14.2.1 Syntax for Common Commands

Common (=device-independent) commands consist of a header preceded by an asterisk (*) and possibly one or more parameters.

Examples:

*RST	RESET	Resets the instrument.
*ESE	EVENT STATUS ENABLE	Sets the bits of the event status enable registers.
*ESR?	EVENT STATUS QUERY	Queries the contents of the event status register.
*IDN?	IDENTIFICATION QUERY	Queries the instrument identification string.

14.2.2 Syntax for Device-Specific Commands

Long and short form

The mnemonics feature a long form and a short form. The short form is marked by upper case letters here, to distinguish it from the long form, which constitutes the complete word. Either the short form or the long form can be entered; other abbreviations are not permitted.

Example:

`INITiate:CONTinuous` is equivalent to `INIT:CONT` or `init:cont`.

Case-insensitivity

Upper case and lower case notation only serves to distinguish the two forms in the manual, the instrument itself is case-insensitive.

Numeric suffixes

If a command can be applied to multiple instances of an object, e.g. specific channels or sources, the required instances can be specified by a suffix added to the command. Numeric suffixes are indicated by angular brackets (<1...4>, <n>, <i>) and are replaced by a single value in the command. Entries without a suffix are interpreted as having the suffix 1.

Different numbering in remote control

For remote control, the suffix can differ from the number of the corresponding selection used in manual operation. SCPI prescribes that suffix counting starts with 1. Suffix 1 is the default state and used when no specific suffix is specified.

Some standards define a fixed numbering, starting with 0. If the numbering differs in manual operation and remote control, it is indicated for the corresponding command.

Optional mnemonics

Some command systems permit certain mnemonics to be inserted into the header or omitted. These mnemonics are marked by square brackets in the description. The instrument must recognize the long command to comply with the SCPI standard. Some commands are considerably shortened by these optional mnemonics.

Example:

Definition: `INITiate[:IMMediate]`

Command: `INIT:IMM` is equivalent to `INIT`

Parameters

Parameters must be separated from the header by a "white space". If several parameters are specified in a command, they are separated by a comma.

For a description of the parameter types, refer to Chapter 14.2.3, "SCPI Parameters", on page 455.

Special characters

|	**Parameters** A vertical stroke in parameter definitions indicates alternative possibilities in the sense of "or". The effect of the command differs, depending on which parameter is used.
[ ]	Mnemonics in square brackets are optional and can be inserted into the header or omitted. **Example**: `INITiate[:IMMediate]` `INIT:IMM` is equivalent to `INIT`
{ }	Parameters in curly brackets are optional and can be inserted once or several times, or omitted.

14.2.3 SCPI Parameters

Many commands are supplemented by a parameter or a list of parameters. The parameters must be separated from the header by a "white space" (ASCII code 0 to 9, 11 to 32 decimal, e.g. blank). Allowed parameters are:

- Numeric values
- Special numeric values
- Boolean parameters
- Text

- Character strings
- Block data

The parameters required for each command and the allowed range of values are specified in the command description.

Numeric values

Numeric values can be entered in any form, i.e. with sign, decimal point and exponent. Values exceeding the resolution of the instrument are rounded up or down. The mantissa can comprise up to 255 characters, the exponent must lie inside the value range -32000 to 32000. The exponent is introduced by an "E" or "e". Entry of the exponent alone is not allowed.

Units

For physical quantities, you can enter the unit. Units and prefixes, as defined by the international system of units (SI), are allowed and recognized. If you omit the unit, the default or set unit is used. See also Chapter 13.5.1.3, "Units", on page 207.

If you need decimal multiples and submultiples of a unit, you can use SCPI prefixes, see Table 14-2. Because SCPI uses only capital letters, it cannot distinguish between upper and lower case characters. Therefore, if SI prefixes use the same letter in upper and lower case, SCPI defines the meaning. An example is milli (m) and mega (M). In SCPI, M means milli for all units except Hz and Ohm - `MHZ` means mega Hz, 10^6 Hz.

Table 14-2: SCPI prefixes

Factor	SI name	SI symbol	SCPI prefix
10^3	kilo	k	K
10^6	mega	M	MA; also allowed are MOHM and MHZ
10^9	giga	G	G
10^{12}	tera	T	T
10^{-3}	milli	m	M Exception: Hz and Ohm
10^{-6}	micro	µ	U
10^{-9}	nano	n	N
10^{-12}	pico	p	P

Special numeric values

The texts listed below are interpreted as special numeric values. For a query, the numeric value is provided.

- **MIN/MAX**
  `MINimum` and `MAXimum` denote the minimum and maximum value.
- **DEF**

`DEFault` denotes a preset value which has been stored in the non-variable memory. This value conforms to the default setting, as it is called by the *RST command.

- **UP/DOWN**
  `UP`, `DOWN` increases or reduces the numeric value by one step. The step width can be specified via an allocated step command for each parameter which can be set via UP, DOWN.
- **INF/NINF**
  `INFinity`, `Negative INFinity (NINF)` represent the numeric values 9.9E37 or -9.9E37, respectively. `INF` and `NINF` are only sent as instrument responses.
- **NAN**
  Not a number (NAN) represents the value 9.91E37. NAN is only sent as an instrument response. This value is not defined. Possible causes are the division by zero, the subtraction of infinite from infinite and the representation of missing values.

Boolean parameters

Boolean parameters represent two states. The "ON" state (logically true) is represented by "ON" or a numeric value 1. The "OFF" state (logically untrue) is represented by "OFF" or the numeric value 0. The numeric values are provided as the response for a query.

Example:

Setting command: `SENSe:AVERage:COUNt:AUTO ON`

Query: `SENSe:AVERage:COUNt:AUTO?`

Response: `1`

Text parameters

Text parameters observe the syntactic rules for mnemonics, i.e. they can be entered using a short or long form. Like any parameter, they have to be separated from the header by a white space. For a query, the short form of the text is provided.

Example:

Setting command: `TRIGger:SLOPe POSitive`

Query: `TRIG:SLOP?`

Response: `POS`

Character strings

Enter strings always in quotation marks (' or ").

Example:

Setting command: `SENSe:FUNCtion "POWer:AVG"`

Query: `SENS:FUNC?`

Response: `"POWer:AVG"`

Block data

Block data is a format which is suitable for the transmission of large amounts of data. A command using a block data parameter has the following structure:

Example:

`SYSTem:HELP:SYNTax:ALL?`

`Response: #45168xxxxxxxx`

The ASCII character # introduces the data block. The next number indicates how many of the following digits describe the length of the data block. In the example, the 4 following digits indicate the length to be 5168 bytes. The data bytes follow. During the transmission of these data bytes all end or other control signs are ignored until all bytes are transmitted.

#0 specifies a data block of indefinite length. The use of the indefinite format requires a `NL^END` message to terminate the data block. This format is useful when the length of the transmission is not known or if speed or other considerations prevent segmentation of the data into blocks of definite length.

14.2.4 Overview of Syntax Elements

The following table provides an overview of the syntax elements:

:	The colon separates the mnemonics of a command. In a command line, the separating semicolon marks the uppermost command level.
;	The semicolon separates two commands of a command line. It does not alter the path.
,	The comma separates several parameters of a command.
?	The question mark forms a query.
*	The asterisk marks a common command.
' "	Quotation marks introduce a string and terminate it (both single and double quotation marks are possible).
#	The hash symbol introduces binary, octal, hexadecimal and block data. • Binary: #B10110 • Octal: #O7612 • Hex: #HF3A7 • Block: #21312
	A "white space" (ASCII-Code 0 to 9, 11 to 32 decimal, e.g. blank) separates the header from the parameters.

14.2.5 Structure of a Command Line

A command line can consist of one or several commands. It is terminated by one of the following:

- a <New Line>
- a <New Line> with EOI

- an EOI together with the last data byte

Several commands in a command line must be separated by a semicolon ";". If the next command belongs to a different command system, the semicolon is followed by a colon.

If the successive commands belong to the same system, having one or several levels in common, the command line can be abbreviated. To this end, the second command after the semicolon starts with the level that lies below the common levels. The colon following the semicolon must be omitted in this case.

Example:

`TRIG:LEV 0.1mW;TRIG:DEL 3E-3`

This command line contains two commands. Both commands are part of the `TRIG` command system, i.e. they have one level in common.

When abbreviating the command line, the second command begins with the level below `TRIG`. The colon after the semicolon is omitted. The abbreviated form of the command line reads as follows:

`TRIG:LEV 0.1E-3;DEL 3E-3`

A new command line always begins with the complete path.

Example:

`TRIG:LEV 0.1E-3`

`TRIG:DEL 3E-3`

14.2.6 Responses to Queries

A query is defined for each setting command unless explicitly specified otherwise. It is formed by adding a question mark to the associated setting command. According to SCPI, the responses to queries are partly subject to stricter rules than in standard IEEE 488.2.

- The requested parameter is transmitted without a header.
  Example: `TRIG:SOUR?`, response: `INT`
- Maximum values, minimum values and all other quantities that are requested via a special text parameter are returned as numeric values.
- Numeric values are output without a unit. Physical quantities are referred to the basic units or to the units set using the `Unit` command. The response `3.5E9` for example stands for 3.5 GHz.
- Truth values (Boolean values) are returned as `0` (for `OFF`) and `1` (for `ON`).
  Example:
  Setting command: `SENS:AVER:COUN:AUTO ON`
  Query: `SENS:AVER:COUN:AUTO?`
  Response: `1`
- Text (character data) is returned in a short form.
  Example:

Setting command: `TRIGger:SOURce INTernal`
Query: `TRIG:SOUR?`
Response: `INT`

14.3 Command Sequence and Synchronization

A sequential command finishes the execution before the next command is starting. To make sure that commands are carried out in a certain order, each command must be sent in a separate command line.

As a rule, send commands and queries in different program messages.

14.3.1 Preventing Overlapping Execution

To prevent an overlapping execution of commands, you can use one of the commands `*OPC`, `*OPC?` or `*WAI`. All three commands cause a certain action only to be carried out after the hardware has been set. The controller can be forced to wait for the corresponding action to occur.

Table 14-3: Synchronization using *OPC, *OPC?, *WAI

Command	Action	Programming the controller
*OPC	Sets the Operation Complete bit in the ESR after all previous commands have been executed.	• Setting bit 0 in the ESE • Setting bit 5 in the SRE • Waiting for service request (SRQ)
*OPC?	Stops command processing until 1 is returned. Occurs when all pending operations are completed.	Send *OPC? directly after the command whose processing must be terminated before other commands can be executed.
*WAI	Stops further command processing until all commands sent before *WAI have been executed.	Send *WAI directly after the command whose processing must be terminated before other commands are executed.

Command synchronization using `*WAI` or `*OPC?` is a good choice if the overlapped command takes only little time to process. The two synchronization commands simply block overlapped execution of the command. Append the synchronization command to the overlapping command.

Measurements, for example, run concurrent. The order, in which the power sensors trigger, has not to correspond to the order of the remote commands.

14.4 Status Reporting System

The status reporting system stores all information on the current operating state of the instrument, and on errors which have occurred. This information is stored in the status registers and in the error queue. You can query both with the commands of the `STATus` subsystem.

14.4.1 Hierarchy of the Status Registers

Figure 14-1 shows the hierarchical structure of information in the status registers.

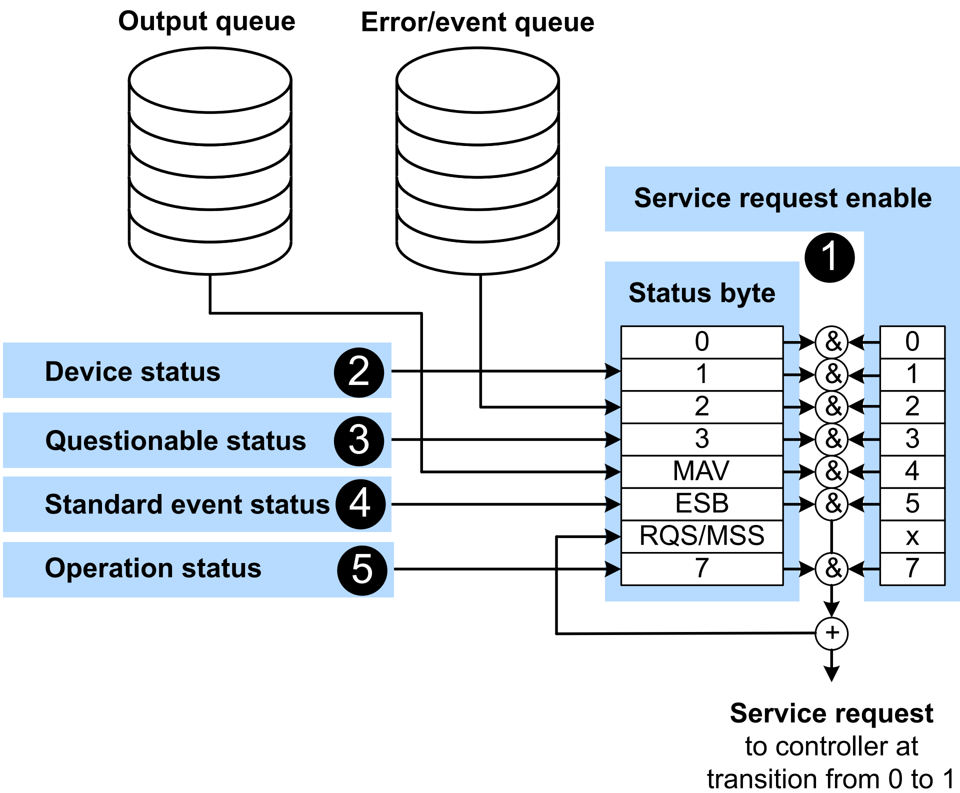


Figure 14-1: Status registers overview

1 = Chapter 14.4.3, "Status Byte (STB) and Service Request Enable Register (SRE)", on page 464
2 = Chapter 14.4.5, "Device Status Register", on page 465
3 = Chapter 14.4.6, "Questionable Status Register", on page 467
4 = Chapter 14.4.7, "Standard Event Status and Enable Register (ESR, ESE)", on page 471
5 = Chapter 14.4.8, "Operation Status Register", on page 472

The highest level is formed by the status byte register (STB) and the associated service request enable (SRE) register.

The status byte register (STB) receives its information from:

- Standard event status register (ESR)

- Associated standard event status enable register (ESE)
- SCPI-defined operation status register
- Questionable status register, which contains detailed information on the device.

The R&S NRX works with several status register levels to support a high number of measurements. 8 measurements are grouped on one status register. The first status register groups the measurements 1 to 8. The next lower status register groups the measurements 9 to 16, and so on. Thus, the suffixes (m+1), (m+2), ... read as follows:

Status register	SCPI suffix	Value of suffix m	Measurement covered (m+1) to (m+8)
First hierarchy	1	0	1 to 8
Second hierarchy	2	8	9 to 16
Third hierarchy	3	16	17 to 24
...	...	...	...
8th hierarchy	8	56	57 to 64

The SCPI suffix of the status register is always (m+1). The suffix of the `CALC` command corresponds to the measurement channel, (m+x). Bit 0 summarizes the status of the next lower status register.

14.4.2 Structure of a SCPI Status Register

Each SCPI register consists of five 16-bit registers that have different functions, see Figure 14-2. The individual bits are independent of each other, i.e. each hardware status is assigned a bit number which is the same for all five registers. Bit 15, the most-significant bit, is set to 0 in all registers, thus preventing problems some controllers have with the processing of unsigned integers.

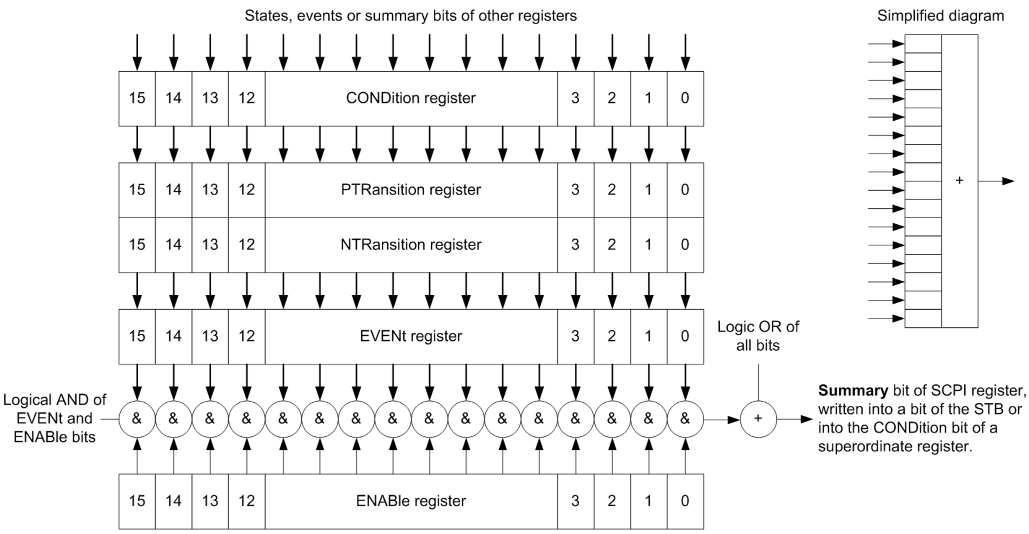


Figure 14-2: Standard SCPI status register

CONDition status register part

The five parts of a SCPI register have different properties and functions:

The `CONDition` part is written into directly by the hardware or the sum bit of the next lower register. Its contents reflect the current instrument status. This register part can only be read, but not written into or cleared. Its contents are not affected by reading.

PTRansition / NTRansition status register part

The two transition register parts define which state transition of the `CONDition` part (none, 0 to 1, 1 to 0 or both) is stored in the `EVENt` part.

The *Positive TRansition* part acts as a transition filter. When a bit of the `CONDition` part is changed from 0 to 1, the associated `PTR` bit decides whether the `EVENt` bit is set to 1.

- `PTR` bit = 1: The `EVENt` bit is set.
- `PTR` bit = 0: The `EVENt` bit is not set.

This part can be written into and read as required. Its contents are not affected by reading.

The *Negative TRansition* part also acts as a transition filter. When a bit of the `CONDition` part is changed from 1 to 0, the associated `NTR` bit decides whether the `EVENt` bit is set to 1.

- `NTR` bit = 1: The `EVENt` bit is set.
- `NTR` bit = 0: The `EVENt` bit is not set.

This part can be written into and read as required. Its contents are not affected by reading.

EVENt status register part

The `EVENt` part indicates whether an event has occurred since the last reading, it is the "memory" of the condition part. It only indicates events passed on by the transition filters. It is permanently updated by the instrument.

You can only read this part. Reading the register clears it. This part is often equated with the entire register.

ENABle status register part

The `ENABle` part determines whether the associated `EVENt` bit contributes to the sum bit (see below). Each bit of the `EVENt` part is "ANDed" with the associated `ENABle` bit (symbol '&'). The results of all logical operations of this part are passed on to the sum bit via an "OR" function (symbol '+').

`ENABle` bit = 0: The associated `EVENt` bit does not contribute to the sum bit.

`ENABle` bit = 1: If the associated `EVENt` bit is 1, the sum bit is set to 1 as well.

You can read and write as required. Its contents are not affected by reading.

Sum bit

The sum bit is obtained from the `EVENt` and `ENABle` part for each register. The result is then entered into a bit of the `CONDition` part of the higher-order register.

The instrument automatically generates the sum bit for each register. Thus an event can lead to a service request throughout all levels of the hierarchy.

14.4.3 Status Byte (STB) and Service Request Enable Register (SRE)

The status byte register is already defined in IEEE 488.2. It gives a rough overview of the instrument status, collecting information from the lower-level registers. It is comparable with the `CONDition` register of a SCPI defined register and is at the highest level of the SCPI hierarchy. Its special feature is that bit 6 acts as the summary bit of all other bits of the status byte register.

The status byte register is read by `*STB?` or a serial poll. The service request enable register is associated with the status byte register. The function of the service request enable register corresponds to that of the `ENABle` register of the SCPI registers. Each bit of the status byte register is assigned a bit in the service request enable register. Bit 6 of the service request enable register is ignored. If a bit is set in the service request enable register and the associated bit in the status byte register changes from 0 to 1, a service request (SRQ) is generated on the IEC/IEEE bus. This service request triggers an interrupt in the controller configured for this purpose, and can be further processed by the controller.

Set and read the service request enable register using `*SRE`.

See Figure 14-1.

Table 14-4: Used status byte bits and their meaning

Bit no.	Short description	Bit is set if
1	Device status register summary	A instrument is connected or disconnected or when an error has occurred in a instrument, depending on the configuration of the instrument status register. Chapter 14.4.5, "Device Status Register", on page 465
2	Error queue not empty	The error queue has an entry. If this bit is enabled by the service request enable register, each entry of the error queue generates a service request. An error can thus be recognized and specified in detail by querying the error queue. The query yields a conclusive error message. This procedure is recommended since it considerably reduces the problems of IEC/IEEE-bus control.
3	Questionable status register summary	An `EVENt` bit is set in the `QUEStionable` status register and the associated `ENABle` bit is set to 1. A set bit denotes a questionable device status which can be specified in greater detail by querying the questionable status register. Chapter 14.4.6, "Questionable Status Register", on page 467
4	MAV Message available	A readable message is in the output queue. This bit can be used to automate reading of data from the instrument into the controller.

Bit no.	Short description	Bit is set if
5	ESB Standard event status register summary	One of the bits in the standard event status register is set and enabled in the event status enable register. Setting this bit denotes a serious error which can be specified in greater detail by querying the standard event status register. Chapter 14.4.7, "Standard Event Status and Enable Register (ESR, ESE)", on page 471.
6	MSS Master status summary	The instrument triggers a service request, which happens if one of the other bits of this register is set together with its enable bit in the service request enable register (SRE).
7	Operation status register summary	An `EVENt` bit is set in the operation status register and the associated `ENABLe` bit is set to 1. A set bit denotes that an action is being performed by the instrument. Information on the type of action can be obtained by querying the operation status register. Chapter 14.4.8, "Operation Status Register", on page 472

14.4.4 IST Flag and Parallel Poll Enable Register (PPE)

Similar to the service request (SRQ), the IST flag combines the complete status information in a single bit. It can be queried by a parallel poll or by `*IST?`.

The parallel poll enable register (PPE) determines which bits of the STB affect the IST flag. The bits of the STB are ANDed with the corresponding bits of the PPE; bit 6 is also used, in contrast to the service request enable register. The IST flag is obtained by `ORing` all results together.

Set and read the parallel poll enable register using `*PRE`.

14.4.5 Device Status Register

Contains information on current instrument states, `CONDition` register, or states that occurred since the last query, `EVENt` register.

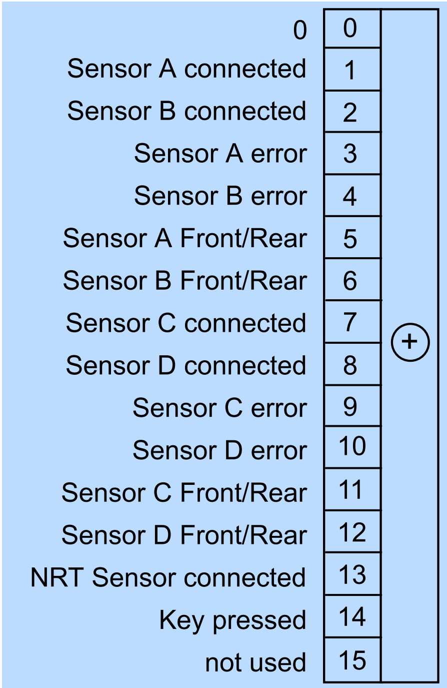


Figure 14-3: Device status register

Querying the register:

- `STATus:DEVice:CONDition?`
- `STATus:DEVice[:EVENt]?`

Table 14-5: Used device status bits and their meaning

Bit no.	Short description	Bit is set if
1	Sensor A connected	
2	Sensor B connected	
3	Sensor A error	
4	Sensor B error	
5	Sensor A front/rear	Sensor A connected at the rear.
6	Sensor B front/rear	Sensor B connected at the rear.
7	Sensor C connected	
8	Sensor D connected	
9	Sensor C error	
10	Sensor D error	
11	Sensor C front/rear	Sensor C connected at the rear.
12	Sensor D front/rear	Sensor D connected at the rear.

Bit no.	Short description	Bit is set if
13	NRT sensor connected	
14	Key pressed	Front panel key pressed.

14.4.6 Questionable Status Register

Contains information on questionable instrument states that occur if the instrument is not operated in compliance with its specifications.

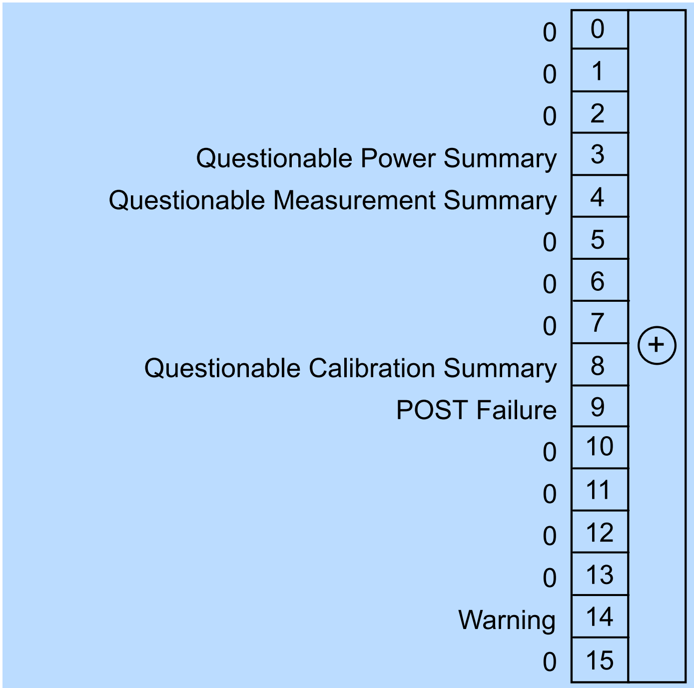


Figure 14-4: Questionable status register

Querying the register:

- STATus:QUEStionable:CONDition?
- STATus:QUEStionable[:EVENt]?

Table 14-6: Used questionable status bits and their meaning

Bit no.	Short description	Bit is set if
3	Questionable power summary	Summary of Questionable Power Status Register exists.
4	Questionable measurement summary	Summary of Questionable Measurement Status Registers exists.
8	Questionable calibration summary	Summary of Questionable Calibration Status Register exists.

Bit no.	Short description	Bit is set if
9	POST failure	Built-in test of the R&S NRX that is carried out automatically upon power-up has generated an error.
14	Warning	

14.4.6.1 Questionable Power Status Register

Contains information whether the measured power values are questionable.

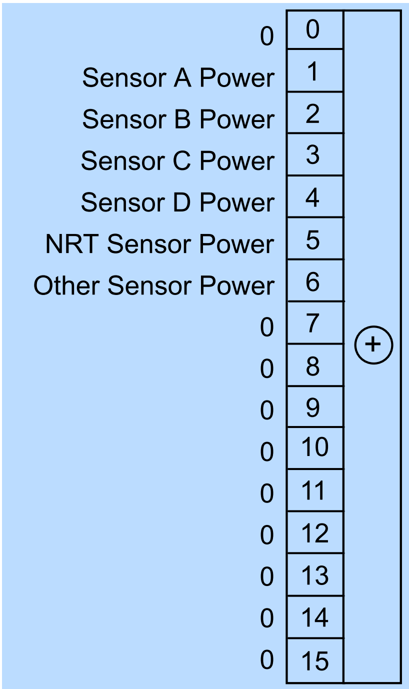


Figure 14-5: Questionable power status register

Querying the register:

- `STATus:QUEStionable:POWer:CONDition?`
- `STATus:QUEStionable:POWer[:SUMMary][:EVENt]?`

Table 14-7: Used questionable power status bits and their meaning

Bit no.	Short description	Bit is set if measurement data of a sensor are corrupt.
1	Sensor A power	Sensor A
2	Sensor B power	Sensor B
3	Sensor C power	Sensor C
4	Sensor D power	Sensor D
5	NRT sensor power	R&S NRT-Zxx power sensor
6	Other sensor power	USB or LAN power sensor

14.4.6.2 Questionable Measurement Status Registers

Contain information whether the displayed data or the calculated power is questionable.

For information on index m, see Chapter 14.4.1, "Hierarchy of the Status Registers", on page 461.

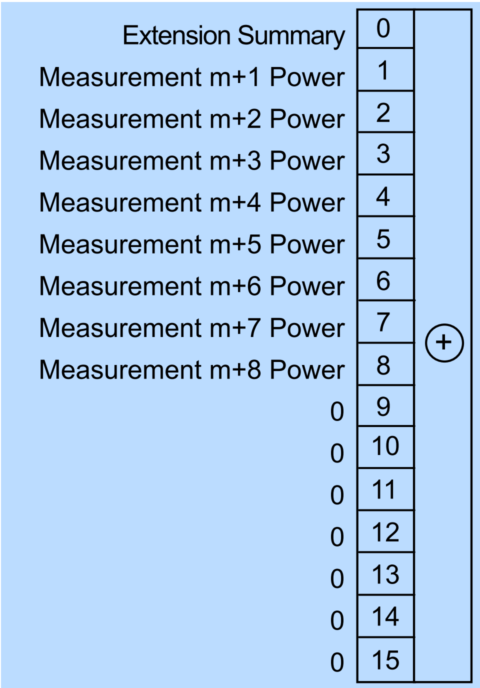


Figure 14-6: Questionable measurement status registers

Querying the register:

- STATus:QUEStionable:MEASure<RegisterIndex>:CONDition?
- STATus:QUEStionable:MEASure<RegisterIndex>[:SUMMary][:EVENt]?
- STATus:QUEStionable:WINDow<RegisterIndex>:CONDition?
- STATus:QUEStionable:WINDow<RegisterIndex>[:SUMMary][:EVENt]?

Table 14-8: Used questionable measurement status bits and their meaning

Bit no.	Short description	Bit is set if measured values of a measurement channel are corrupt or for the extension summary.
0	Extension summary	Sum bit of the next lower status register.
1	Measurement m+1 power	Channel 1
2	Measurement m+2 power	Channel 2
3	Measurement m+3 power	Channel 3
4	Measurement m+4 power	Channel 4
5	Measurement m+5 power	Channel 5

Bit no.	Short description	Bit is set if measured values of a measurement channel are corrupt or for the extension summary.
6	Measurement m+6 power	Channel 6
7	Measurement m+7 power	Channel 7
8	Measurement m+8 power	Channel 8

14.4.6.3 Questionable Calibration Status Register

Contains information whether the zeroing of a power sensor was successful.

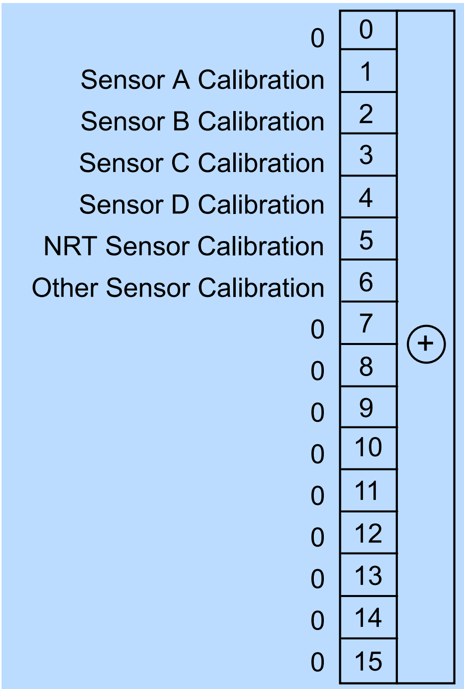


Figure 14-7: Questionable calibration status register

Querying the register:

- STATus:QUEStionable:CALibration:CONDition?
- STATus:QUEStionable:CALibration[:SUMMary][:EVENt]?

Table 14-9: Used questionable calibration status bits and their meaning

Bit no.	Short description	Bit is set if zeroing of a sensor is not successful.
1	Sensor A calibration	Sensor A
2	Sensor B calibration	Sensor B
3	Sensor C calibration	Sensor C
4	Sensor D calibration	Sensor D

Bit no.	Short description	Bit is set if zeroing of a sensor is not successful.
5	NRT sensor calibration	R&S NRT-Zxx power sensor
6	Other sensor calibration	USB or LAN power sensor

14.4.7 Standard Event Status and Enable Register (ESR, ESE)

The `ESR` is already defined in the IEEE 488.2 standard. It is comparable to the `EVENt` register of a SCPI register. The standard event status register can be read out by `*ESR?`.

The `ESE` forms the associated `ENABle` register. It can be set and read by `*ESE`.

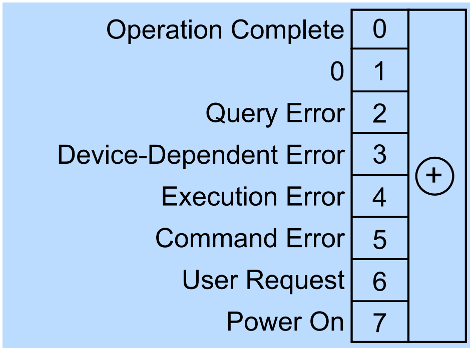


Figure 14-8: Standard event status register (ESR)

Table 14-10: Used standard event status bits and their meaning

Bit no.	Short description	Bit is set if
0	Operation complete	All previous commands have been executed and `*OPC` is received.
2	Query error	The controller wants to read data from the instrument but has not sent a query, or it sends new commands to the instrument before it retrieves existing requested data. A frequent cause is a faulty query which cannot be executed.
3	Device-dependent error	A instrument-dependent error occurs. An error message with a number between -300 and -399 or a positive error number denoting the error in greater detail is entered in the error queue.
4	Execution error	The syntax of a received command is correct but the command cannot be executed due to various marginal conditions. An error message with a number between -200 and -300 denoting the error in greater detail is entered in the error queue.
5	Command error	An undefined command or a command with incorrect syntax is received. An error message with a number between -100 and -200 denoting the error in greater detail is entered in the error queue.
6	User request	The instrument is switched over to manual control.
7	Power on	The instrument is switched on.

14.4.8 Operation Status Register

Contains information on current operations, `CONDition` register, or operations performed since the last query, `EVENt` register.

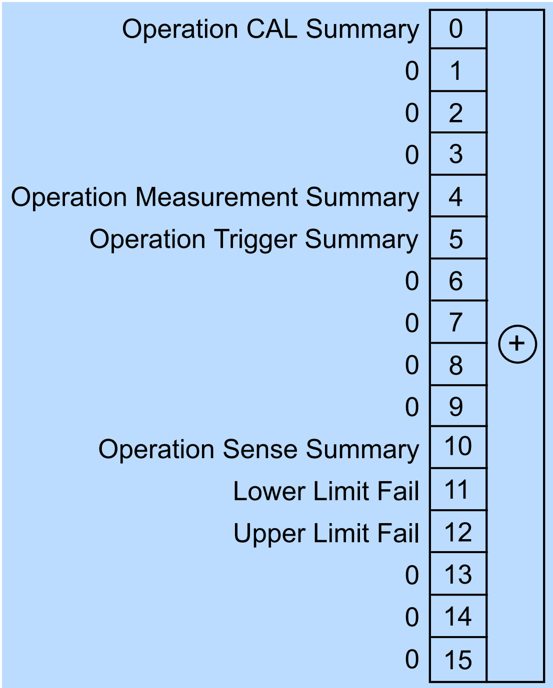


Figure 14-9: Operation status register

Querying the register:

- `STATus:OPERation:CONDition?`
- `STATus:OPERation[:EVENt]?`

Table 14-11: Used operation status bits and their meaning

Bit no.	Short description	Bit is set if
0	Operation CAL summary	Summary of Operation Calibrating Status Register exists.
4	Operation measurement summary	Summary of Operation Measuring Status Register exists.
5	Operation trigger summary	Summary of Operation Trigger Status Register exists.
10	Operation sense summary	Summary of Operation Sense Status Register exists.
11	Lower limit fail	Summary of Operation Lower Limit Fail Status Registers exists.
12	Upper limit fail	Summary of Operation Upper Limit Fail Status Registers exists.

14.4.8.1 Operation Calibrating Status Register

The CONDition register contains information whether a power sensor is being calibrated. The EVENt register contains information whether a calibration was started or completed since the last query.

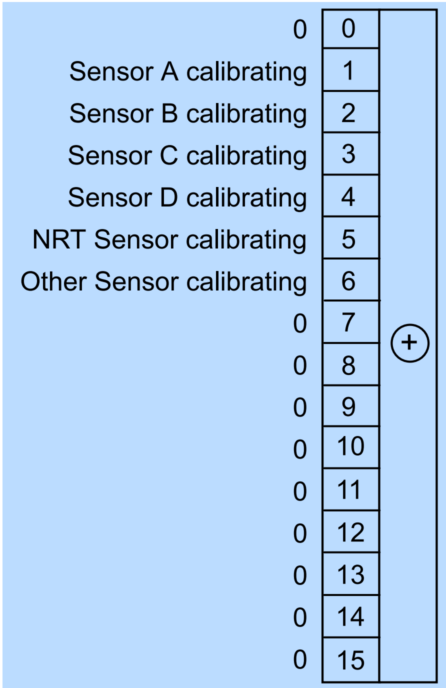


Figure 14-10: Operation calibrating status register

Querying the register:

- STATus:OPERation:CALibrating:CONDition?
- STATus:OPERation:CALibrating[:SUMMary][:EVENt]?

Table 14-12: Used operation calibrating status bits and their meaning

Bit no.	Short description	Bit is set if a sensor is zeroing.
1	Sensor A calibrating	Sensor A
2	Sensor B calibrating	Sensor B
3	Sensor C calibrating	Sensor C
4	Sensor D calibrating	Sensor D
5	NRT sensor calibrating	R&S NRT-Zxx power sensor
6	Other sensor calibrating	USB or LAN power sensor

14.4.8.2 Operation Measuring Status Register

The `CONDition` register contains information whether a power sensor is measuring. The `EVENt` register contains information whether a measurement was started or completed since the last query.

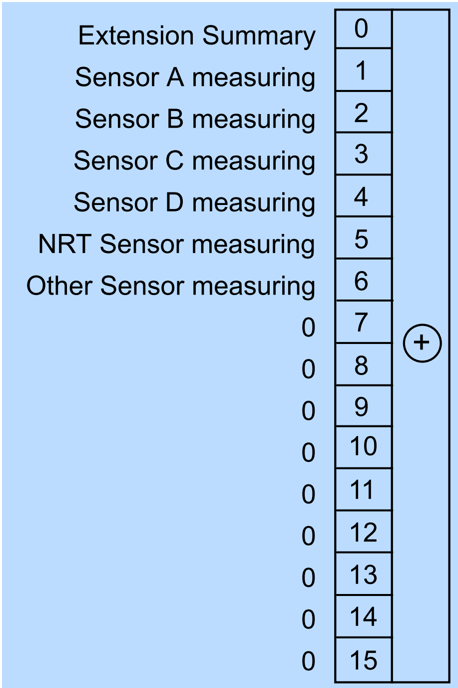


Figure 14-11: Operation measuring status register

Querying the register:

- `STATus:OPERation:MEASuring:CONDition?`
- `STATus:OPERation:MEASuring[:SUMMary][:EVENt]?`

Table 14-13: Used operation measuring status bits and their meaning

Bit no.	Short description	Bit is set if a sensor is measuring or for the extension summary.
0	Extension summary	Summary of Operation Measuring Extended Status Registers exists.
1	Sensor A measuring	Sensor A
2	Sensor B measuring	Sensor B
3	Sensor C measuring	Sensor C
4	Sensor D measuring	Sensor D
5	NRT sensor measuring	R&S NRT-Zxx power sensor
6	Other sensor measuring	USB or LAN power sensor

14.4.8.3 Operation Measuring Extended Status Registers

The `CONDition` registers contain information whether a measurement channel is used. The `EVENt` registers contain information whether a measurement channel was used since the last query.

For information on index m, see Chapter 14.4.1, "Hierarchy of the Status Registers", on page 461.

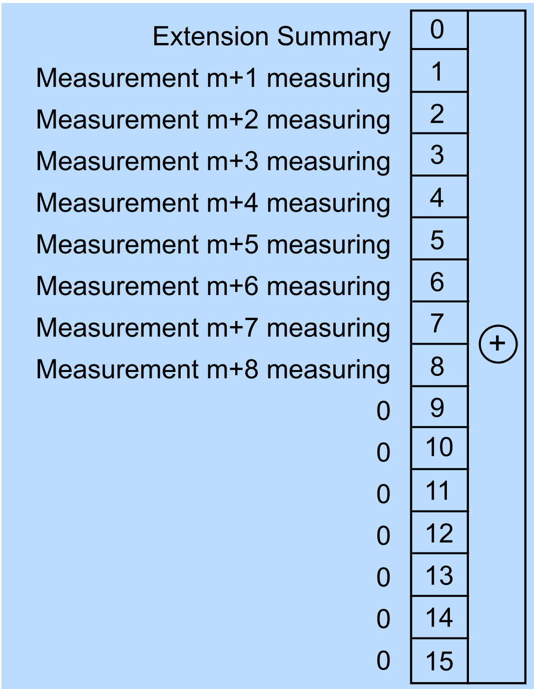


Figure 14-12: Operation measuring extended status registers

Querying the register:

- STATus:OPERation:MEASuring:EXTension<RegisterIndex>:CONDition?
- STATus:OPERation:MEASuring:EXTension<RegisterIndex>[:SUMMary][:EVENt]?

Table 14-14: Used operation measuring extended status bits and their meaning

Bit no.	Short description	Bit is set if a measurement channel is active or for the extension summary.
0	Extension summary	Sum bit of the next lower status register.
1	Measurement m+1 measuring	Channel 1
2	Measurement m+2 measuring	Channel 2
3	Measurement m+3 measuring	Channel 3
4	Measurement m+4 measuring	Channel 4
5	Measurement m+5 measuring	Channel 5

Bit no.	Short description	Bit is set if a measurement channel is active or for the extension summary.
6	Measurement m+6 measuring	Channel 6
7	Measurement m+7 measuring	Channel 7
8	Measurement m+8 measuring	Channel 8

14.4.8.4 Operation Trigger Status Register

The `CONDition` register contains information whether a power sensor is waiting for a trigger event. The `EVENt` register contains information whether the power sensor has been waiting for a trigger event since the last query.

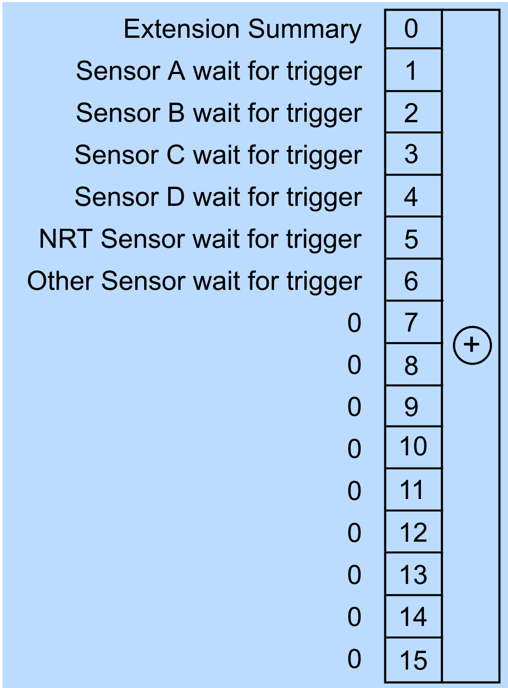


Figure 14-13: Operation trigger status register

Querying the register:

- `STATus:OPERation:TRIGger:CONDition?`
- `STATus:OPERation:TRIGger[:SUMMary][:EVENt]?`

Table 14-15: Used operation trigger status bits and their meaning

Bit no.	Short description	Bit is set if a sensor is waiting for trigger event or for the extension summary.
0	Extension summary	Summary of Operation Trigger Extended Status Registers exists.
1	Sensor A wait for trigger	Sensor A
2	Sensor B wait for trigger	Sensor B

Bit no.	Short description	Bit is set if a sensor is waiting for trigger event or for the extension summary.
3	Sensor C wait for trigger	Sensor C
4	Sensor D wait for trigger	Sensor D
5	NRT sensor wait for trigger	R&S NRT-Zxx power sensor
6	Other sensor wait for trigger	USB or LAN power sensor

14.4.8.5 Operation Trigger Extended Status Registers

The `CONDition` registers contain information whether a measurement channel is waiting for a trigger event. The `EVENt` registers contain information whether a measurement channel has been waiting for a trigger event since the last query.

For information on index m, see Chapter 14.4.1, "Hierarchy of the Status Registers", on page 461.

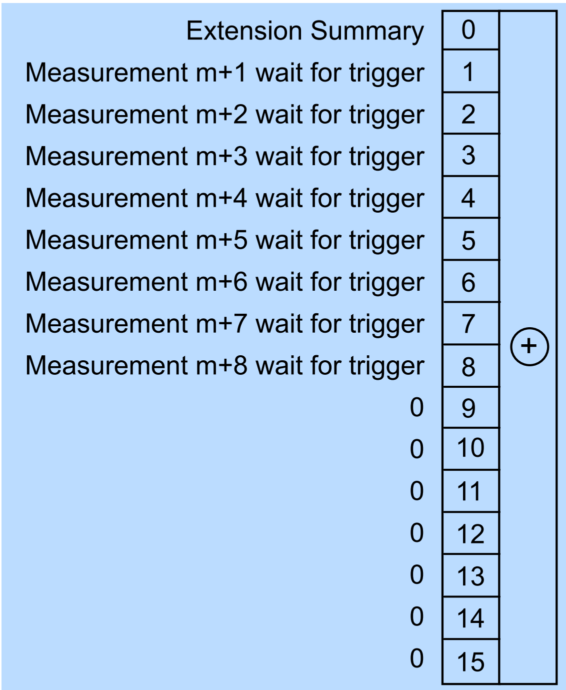


Figure 14-14: Operation trigger extended status registers

Querying the register:

- STATus:OPERation:TRIGger:EXTension<RegisterIndex>:CONDition?
- STATus:OPERation:TRIGger:EXTension<RegisterIndex>[:SUMMary][:EVENt]?

Table 14-16: Used operation trigger extended status bits and their meaning

Bit no.	Short description	Bit is set if a measurement channel is waiting for trigger event or for the extension summary.
0	Extension summary	Sum bit of the next lower status register.
1	Measurement m+1 wait for trigger	Channel 1
2	Measurement m+2 wait for trigger	Channel 2
3	Measurement m+3 wait for trigger	Channel 3
4	Measurement m+4 wait for trigger	Channel 4
5	Measurement m+5 wait for trigger	Channel 5
6	Measurement m+6 wait for trigger	Channel 6
7	Measurement m+7 wait for trigger	Channel 7
8	Measurement m+8 wait for trigger	Channel 8

14.4.8.6 Operation Sense Status Register

The `CONDition` register contains information whether a power sensor is being initialized. The `EVENt` register contains information whether an initialization was started or completed since the last query.

A power sensor is initialized if:

- Supply voltage is switched on (power-up).
- Sensor was connected.
- Reset was performed, `*RST` or `SYSTem:PRESet`.

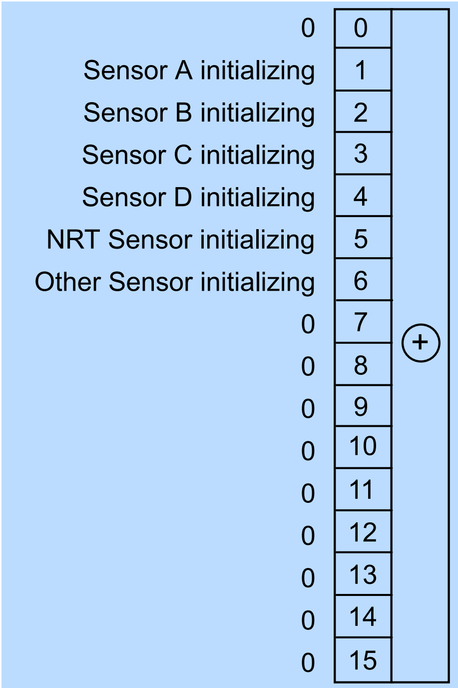


Figure 14-15: Operation sense status register

Querying the register:

- `STATus:OPERation:SENSe:CONDition?`
- `STATus:OPERation:SENSe[:SUMMary][:EVENt]?`

Table 14-17: Used operation sense status bits and their meaning

Bit no.	Short description	Bit is set if a sensor is initializing.
1	Sensor A initializing	Sensor A
2	Sensor B initializing	Sensor B
3	Sensor C initializing	Sensor C
4	Sensor D initializing	Sensor D
5	NRT sensor initializing	R&S NRT-Zxx power sensor
6	Other sensor initializing	USB or LAN power sensor

14.4.8.7 Operation Lower Limit Fail Status Registers

The `CONDition` registers contain information whether a measured value is below a configured lower limit. The `EVENt` registers contain information whether a measured value dropped below a limit value since the last query.

For information on index m, see Chapter 14.4.1, "Hierarchy of the Status Registers", on page 461.

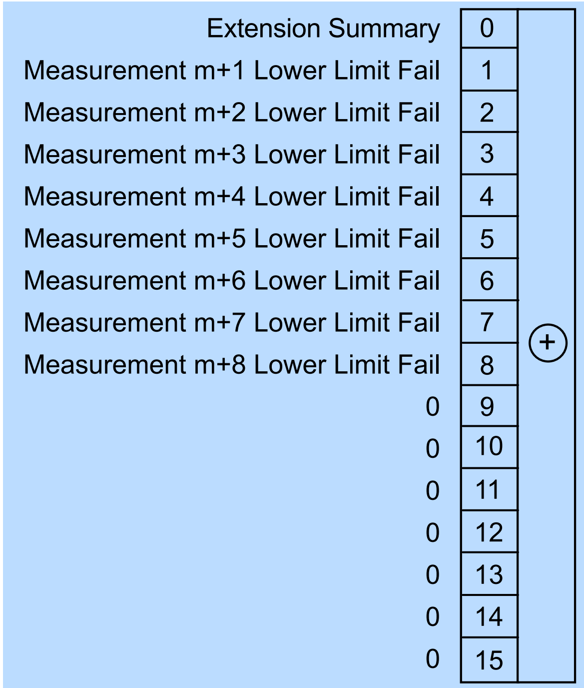


Figure 14-16: Operation lower limit fail status registers

Querying the register:

- STATus:OPERation:LLFail<RegisterIndex>:CONDition?
- STATus:OPERation:LLFail<RegisterIndex>[:SUMMary][:EVENt]?

Table 14-18: Used operation lower limit fail status bits and their meaning

Bit no.	Short description	Bit is set if measured values of a measurement channel are below the lower limit value or for the summary.
0	Extension summary	Sum bit of the next lower status register.
1	Measurement m+1 lower limit fail	Channel 1
2	Measurement m+2 lower limit fail	Channel 2
3	Measurement m+3 lower limit fail	Channel 3
4	Measurement m+4 lower limit fail	Channel 4
5	Measurement m+5 lower limit fail	Channel 5
6	Measurement m+6 lower limit fail	Channel 6
7	Measurement m+7 lower limit fail	Channel 7
8	Measurement m+8 lower limit fail	Channel 8

14.4.8.8 Operation Upper Limit Fail Status Registers

The CONDition registers contain information whether a measured value currently exceeds a configured upper limit. The EVENt registers contain information whether a measured value exceeded an upper limit value since the last query.

For information on index m, see Chapter 14.4.1, "Hierarchy of the Status Registers", on page 461.

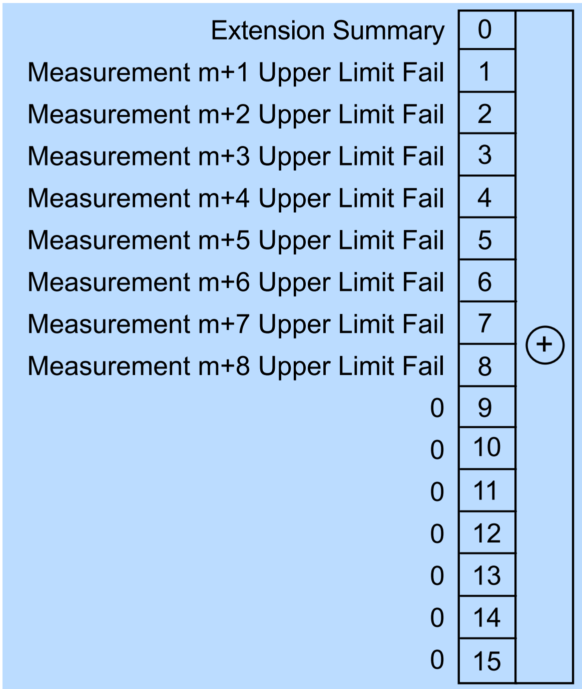


Figure 14-17: Operation upper limit fail status registers

Querying the register:

- STATus:OPERation:ULFail<RegisterIndex>:CONDition?
- STATus:OPERation:ULFail<RegisterIndex>[:SUMMary][:EVENt]?

Table 14-19: Used operation upper limit fail status bits and their meaning

Bit no.	Short description	Bit is set if measured values of a measurement channel exceed the upper limit value or for the summary.
0	Extension summary	Sum bit of the next lower status register.
1	Measurement m+1 upper limit fail	Channel 1
2	Measurement m+2 upper limit fail	Channel 2
3	Measurement m+3 upper limit fail	Channel 3
4	Measurement m+4 upper limit fail	Channel 4
5	Measurement m+5 upper limit fail	Channel 5
6	Measurement m+6 upper limit fail	Channel 6

Bit no.	Short description	Bit is set if measured values of a measurement channel exceed the upper limit value or for the summary.
7	Measurement m+7 upper limit fail	Channel 7
8	Measurement m+8 upper limit fail	Channel 8

15 Troubleshooting

15.1 Displaying Information

Status information

Status information is displayed in the title bar of the graphical user interface. See Chapter 4, "Operating Concepts", on page 31.

In remote control, the status reporting system stores all information on the current operating state and occurred errors. See:

- Chapter 13.14, "Using the Status Register", on page 406
- Chapter 14.4, "Status Reporting System", on page 461

Instrument information

Instrument information, including the installed hardware and software options, is available under Chapter 11.2, "Instrument Info", on page 152.

The hardware configuration is provided separately under Chapter 11.3, "Hardware Configuration", on page 162.

In remote control, use the commands described in Chapter 13.13.7, "Instrument Information", on page 398.

Sensor information

You can display information about one of the connected power sensors. See "Sensor Info" on page 150.

In remote control, use the commands described in Chapter 13.13.7, "Instrument Information", on page 398.

15.2 Error Messages

The graphical user interface has a notification center where all information, warning and error messages are collected. See Chapter 4, "Operating Concepts", on page 31.

In remote control, use the commands described in Chapter 13.13, "System Information and Configuration", on page 387.

15.2.1 Interpreting the Errors and Error Codes

In the following, important error messages and their meaning are explained. For all other errors, perform tests to find out whether it is a hardware or software problem, and report the problem to the R&S customer support. See Chapter 15.3, "Performing Tests", on page 487.

In remote control, errors are associated with error codes. Positive error codes are instrument-dependent. Negative error codes are reserved by the SCPI standard. The error types are grouped in number ranges. In the following description, both the error code used in remote control and an error description is given to help identify the error.

15.2.1.1 System Errors

Number range of error codes: 1000 to 1999. Described errors:

1004 - firmware update error
Firmware update failed.

Possible reasons:
- You have used an `*.rsu` file that is not designated for the R&S NRX. The name of a suitable `*.rsu` file starts with "NRX".
- The firmware update was interrupted or otherwise faulty.

Solution: Perform the firmware update again. See Chapter 12, "Firmware Update", on page 166.

1005 - settings conflict
Settings conflict of the R&S NRX occurred.

Reason: Contradictory settings are allowed so that you are not hampered in your workflow.

Solution: See Chapter 5.5, "Settings Conflict", on page 47.

1007 - target descriptor error
Servicing required. You cannot resolve the problem yourself.

Solution: Contact customer support. See Chapter 15.5, "Contacting Customer Support", on page 488.

1008 - temperature alert
R&S NRX is overheated. Overheating can damage the R&S NRX.

Possible reasons:
- Insufficient airflow. Follow the instructions in "To place the R&S NRX on a bench top" on page 18 or Chapter 3.1.5, "Mounting in a Rack", on page 19.

- The environmental temperature exceeds the suitable temperature range given in the data sheet under environmental conditions.
- The fan does not work properly. See Chapter 15.5, "Contacting Customer Support", on page 488.

1009 - fan failure alert

The fan does not work. Overheating can damage the R&S NRX.

Solution: Switch off the R&S NRX, and contact customer support. See Chapter 15.5, "Contacting Customer Support", on page 488.

15.2.1.2 Power Sensor Errors

Number range of error codes: 2000 to 2999.

The power sensors report their error states to the R&S NRX. The error states depend on the power sensor type. Described errors:

2001 - sensor maximum allowed count

The maximum number of power sensors that you can use simultaneously is reached.

Solution: Install the second measurement channel (R&S NRX-K2) or the 3rd and 4th measurement channel (R&S NRX-K4). See also Chapter 5.1, "Parallel Measurements", on page 43.

2003 - sensor settings conflict

The current settings of the R&S NRX do not comply with the operating range of the connected power sensor.

Solution: Change the settings of the R&S NRX or use another power sensor that is suitable for the selected settings.

2005 - sensor underrange

Possible reasons:

- The detected signal is below the minimum value that the power sensor can correctly measure.
- The current settings of the R&S NRX undercut the specified operating range of the connected power sensor.

Solution: Change the settings of the R&S NRX or use another power sensor that is suitable for the selected settings.

2006 - sensor overrange
Possible reasons:
- The detected signal is above the maximum value that the power sensor can correctly measure.
- The current settings of the R&S NRX exceed the specified operating range of the connected power sensor.

Solution: Change the settings of the R&S NRX or use another power sensor that is suitable for the selected settings.

2007 - sensor overload
The RF input power exceeds the measurement range by far.

Solution: Immediately disconnect the power sensor from the RF source to avoid damage. Use an attenuator or another power sensor that is suitable for the input level.

2008 - sensor protocol minor mismatch
The firmware version of the connected power sensor is out-of-date.

Solution: An update of the power sensor firmware is recommended.

2009 - sensor protocol major mismatch
The firmware version of the connected power sensor is not supported any more.

Solution: Update the firmware of the connected power sensor.

15.2.1.3 Sensor Check Source (R&S NRX-B1) Errors

Number range of error codes: 3000 to 3999. Described errors:

3002 - setting not supported
The sensor check source (R&S NRX-B1) does not support the set frequency or power level.

Solution: Change the frequency or power level setting. See "Sensor Check Source tab" on page 144.

3003 - missing calibration data
The calibration data of the sensor check source (R&S NRX-B1) are missing for the set power level.

Solution:
- Change the frequency or power level setting. See "Sensor Check Source tab" on page 144.
- If you cannot work with another power level, servicing is required. Contact customer support. See Chapter 15.5, "Contacting Customer Support", on page 488.

3004 - version <no.> available for sensor check source (R&S NRX-B1)
A newer version of the sensor check source (R&S NRX-B1) is available.

Solution: Update the sensor check source (R&S NRX-B1) as described in "Sensor Check Source Info" on page 145.

15.2.1.4 License Key Errors

Number range of error codes: 4000 to 4999.

4001 - license key management warning

Usually caused by:

- Problems with the system time. See "Date and Time Settings" on page 154.
- Wrong license key for a software option. See "SW Options tab" on page 159.

For all other errors, collect information for technical support. See Chapter 15.4, "Collecting Information for Technical Support", on page 487.

15.2.1.5 Error Handling Errors

Number range of error codes starts from 9000.

9001 - static error queue overflow
The static error queue has reached its maximum number of 1000 errors and warnings. No more entries are created.

Solution: Solve the static errors before continuing.

15.3 Performing Tests

Using the graphical user interface, you can test the following:

- User interface of the R&S NRX, see Chapter 11.4, "Test", on page 163.
- Connected power sensors, see "Sensor Test" on page 151.

In remote control, use the commands described in Chapter 13.11, "Running Selftests", on page 378.

15.4 Collecting Information for Technical Support

If you encounter problems that you cannot solve yourself, contact your Rohde & Schwarz support center, see Chapter 15.5, "Contacting Customer Support", on page 488. Our support center staff is optimally trained to assist you in solving problems.

The support center finds solutions more quickly and efficiently if you provide them with information on the instrument and an error description.

Obtaining information from the R&S NRX firmware

1. Select [System] > "Test".
2. Create and save the information for troubleshooting. See "Creating information for troubleshooting" on page 164.

Attach the archive file to an email in which you describe the problem.

15.5 Contacting Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:

Figure 15-1: QR code to the Rohde & Schwarz support page

Glossary: List of Abbreviations

A

AVG: Average

C

CCDF: Complementary cumulative distribution function

CDMA: Code division multiple access

D

DHCP: Dynamic host control protocol

DNS: Domain name system

E

EMC: Electromagnetic compatibility

EMI: Electromagnetic interference

G

GPIB: General purpose interface bus

H

HiSLIP: High-speed LAN instrument protocol

I

IDN: Instrument identification string

IP: Internet protocol

L

LAN: Local area network

O

OPT: Option identification string

OSA: Open source acknowledgement

P

PEP: Peak envelope power

S

SCPI: Standard commands for programmable instruments

SSH: Secure shell

SWR: Standing wave ratio

U

USB: Universal serial bus

V

VISA: Virtual instrument software architecture

VNC: Virtual network computing

W

WCDMA: Wideband code division multiple access

List of Commands

Index

V

Z