

# R&S®NGP800

## Power Supply Series

### Getting Started



5601560302

This manual describes the following R&S®NGP800 models:

- R&S®NGP802 Two-channel 32V/20A Power Supply 400 W (5601.4007.05)
- R&S®NGP822 Two-channel 64V/10A Power Supply 400 W (5601.4007.06)
- R&S®NGP804 Four-channel 32V/20A Power Supply 800 W (5601.4007.02)
- R&S®NGP824 Four-channel 64V/10A Power Supply 800 W (5601.4007.03)
- R&S®NGP814 Four-channel 32V/20A & 64V/10A Power Supply 800 W (5601.4007.04)

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5601.5603.02 | Version 05 | R&S®NGP800

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# Safety Instructions

## Instrucciones de seguridad

## Sicherheitshinweise

## Consignes de sécurité

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### **WARNING**

#### **Risk of injury and instrument damage**

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

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

### **ADVERTENCIA**

#### **Riesgo de lesiones y daños en el instrumento**

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

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



## **WARNUNG**

### **Gefahr von Verletzungen und Schäden am Gerät**

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

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



## **AVERTISSEMENT**

### **Risque de blessures et d'endommagement de l'appareil**

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

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

# Customer Support

## Technical support – where and when you need it

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

## Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish.

We will take care that you will get the right information.

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Phone +49 89 4129 12345  
[customersupport@rohde-schwarz.com](mailto:customersupport@rohde-schwarz.com)

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# 1 Documentation Overview

This section provides an overview of the R&S NGP800 user documentation. You can find it on the product page at:

[www.rohde-schwarz.com/product/ngp800](http://www.rohde-schwarz.com/product/ngp800)

## Getting Started

Introduces the R&S NGP800 power supply series and describes how to set up and start working with the instrument. The printed document is delivered with the instrument.

## User manual

Describes all instrument modes and functions in detail. It also provides an introduction to remote control and a complete description of the remote control commands with programming examples, instrument interfaces, error messages and information on maintenance.

The online version (html format) of the user manual provides the complete contents for immediate display on the internet.

## Basic safety instructions

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

## Service manual

Describes the performance test for checking the rated specifications, module replacement and repair, firmware update, troubleshooting and fault elimination, and contains mechanical drawings and spare part lists. The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS, <https://gloris.rohde-schwarz.com>).

## Datasheet

The datasheet contains the technical specifications of the R&S NGP800 power supply series. It also lists all options with their order numbers and accessories.

See [www.rohde-schwarz.com/brochure-datasheet/ngp800](http://www.rohde-schwarz.com/brochure-datasheet/ngp800)



### **Calibration certificate**

The document is available on <https://gloris.rohde-schwarz.com/calcert>. You need the device ID of your instrument, which you can find on a label on the rear panel.

### **Release notes and open source acknowledgment**

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation. The open source acknowledgment document provides verbatim license texts of the used open source software.

See [www.rohde-schwarz.com/firmware/ngp800](http://www.rohde-schwarz.com/firmware/ngp800).

## 2 Welcome to R&S NGP800

The two or four-channel power supply series are based on a primary switched-mode regulator with power factor correction. This concept allows the instrument to achieve highest accuracy and lowest residual ripple.

The R&S NGP800 power supply series feature galvanically isolated, overload and short-circuit proof outputs. The outputs can be connected in parallel and serial to achieve higher currents or voltages.

Multi-purpose protection functions, such as overcurrent protection (OCP), over-voltage protection (OVP) and overpower protection (OPP) can be set separately for each channel. If the set limit is reached, the affected output channel is automatically turned off and an indicator icon (Ⓢ, Ⓡ, Ⓟ) flashes on the display. The overcurrent protection can also be linked to the other channels. If the current exceeds the limit on the affected channel, all linked channels will be switched off.

The R&S NGP800 power supply series are also protected from overheating. Each channel is equipped with a temperature sensor that monitors the channel operating temperature for controlling the fan speed and overtemperature protection. If the safe limit is exceeded, the output of the affected channel is switched off. The channel must cool down to a defined threshold before the output can be switched on again. Operations of the other channels are not affected. Also, the actual operating speed of the fans is monitored. If a fan is not running, e.g. rotor locked condition, all the outputs will be switched off to prevent overheating.

The "Arbitrary" function allows freely definable voltage and current sequences with a timeframe as short as 1 ms, e.g. to simulate different charging conditions of a battery. The voltage and current points can also be grouped in different blocks which can be sequenced and repeated independently to achieve a flexible "Arbitrary" function generation.

With the "Ramp" function, the R&S NGP800 power supply provides the operating condition to ramp up the supply voltage within a defined timeframe up to 10 s with 1 ms step size and it can be set independently for each channel. Furthermore, the channels can be sequenced to ramp up the voltage output applied at different times. With different slew rates and delays between channel outputs, it is easy to test multi-voltage systems reliability. For the four-channel power supplies, the outputs can also be arranged into two independent sub-groups.

The analog input and digital I/O interfaces at the rear panel can be activated with an option key. The analog input allows you to control the output directly using

voltage signals (0 V to 5 V analog input corresponds to 0 to  $V_{max}$  or  $I_{max}$ ) and can be set independently for each channel. The analog inputs are galvanically isolated from the channel outputs, making the connection simpler. The digital I/O provides an 8-bit control port for various control functions. Each pin can be configured as input or output port, to control any output channel, trigger an event, e.g. start arbitrary or to indicate various conditions, e.g. over current protections.

The R&S NGP800 power supplies are equipped with a color 800 x 480 5 " TFT LCD touch screen and a USB and LAN interfaces to control the instrument remotely. With wireless LAN (WLAN) option, network connection can also be established wirelessly. The R&S NGP800 power supplies can also be remote controlled using the GPIB option.

The user manual describes all instrument functionalities. The latest version is available for download from the product homepage (<http://www.rohde-schwarz.com/product/ngp800>).

## 3 Putting into Operation

This chapter describes how to set up the R&S NGP800 power supply series for the first time.

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### **WARNING**

#### **Risk of injury and instrument damage**

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

- Do not open the instrument casing
- Read and observe the "Basic Safety Instructions" delivered as a printed brochure with the instrument. Note that the basic safety instructions also contain information on operating conditions that prevent damage to the instrument

In addition, read and observe the safety instructions in the following sections.

Notice that the data sheet may specify additional operating conditions.

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### **WARNING**

#### **Risk of radio interference**

This instrument is compliant with Class A of CISPR 32. In a residential environment, this instrument may cause radio interference.

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**NOTICE****Risk of instrument damage during operation**

An unsuitable operating site or test setup can cause damage to the instrument and the connected devices. Ensure the following operating conditions before you switch on the instrument:

- The instrument is dry and shows no sign of condensation
- The instrument is positioned as described in [Chapter 3.4.1, "Bench Operation"](#), on page 15
- 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 correctly connected and not overloaded

**EMI impact on measurement results**

Electromagnetic interference (EMI) may affect the measurement results. To suppress the generated EMI:

- Use suitable shielded cables of high quality, for example, LAN cables
- Note the EMC classification in the data sheet

## 3.1 Safety

This instrument was built in compliance with DIN EN 61010-1 (VDE 0411 part 1), safety regulations for electrical instruments, control units and laboratory equipment.

It has been tested and shipped from the plant in safe condition. It is also in compliance with the regulations of the European standard EN 61010-1 and the international standard IEC 61010-1.

To maintain this condition and ensure safe operation, you must observe all instructions and warnings given in this user manual. Casing, chassis and all measuring ports are connected to a protective earth conductor. The instrument is designed in compliance with the regulations of protection class I.

For safety reasons, the instrument may only be operated with authorized safety sockets. The power cable must be plugged in before signal circuits may be connected.

Never use the product if the power cable is damaged. Check regularly if the power cables are in perfect condition. Choose suitable protective measures and installation types to ensure that the power cable cannot be damaged and that no harm is caused by tripping hazards or from electric shock, for instance.

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**⚠ DANGER****Risk of electric shock**

It is prohibited to disconnect the earthed protective connection inside or outside of the instrument!

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If it is assumed that a safe operation is no longer possible, the instrument must be shut down and secured against any unintended operation.

Safe operation can no longer be assumed when:

- Instrument shows visible damage
- Instrument includes loose parts
- Instrument no longer functions properly
  - After an extended period of storage under unfavorable conditions (e.g. outdoors or in damp rooms)
  - After rough handling during transport (e.g. packaging that does not meet the minimum requirements by post office, railway or forwarding agency)

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**⚠ DANGER****Exceeding the low voltage protection**

Use insulated wires and not bare wires for the terminal connection.

It is assumed that only qualified and trained personnel service the power supplies and the connected loads.

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The universal AC input at the rear of the instrument accepts nominal line voltages in the range of 100 VAC to 250 VAC. Line frequency can be either 50 Hz or 60 Hz.

## Fuses

The instrument contains internal fuses, which are not user accessible.

## 3.2 Intended Operation

The instrument is intended only for use by personnel familiar with the potential risks of measuring electrical quantities.

For safety reasons, the instrument may only be connected to properly installed wall outlets. Separating the ground is prohibited.

The power cable must be inserted before signal circuits may be connected.



Use only the power cable included in the delivery package. See "[Delivery package](#)" on page 14.

Before each measurement, measuring cables must be inspected for damage and replaced if necessary. Damaged or worn components can damage the instrument or cause injury.

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The instrument may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury, and in some cases, death.

### Provide adequate airflow

Do not block the air intake at the front and side of the instrument or the exhaust at the rear. Install the instrument on a location that allows sufficient space for air circulation at the air intake and exhaust. Recommended spacing to non-heat producing surface is at least 2.5 inches (63.5 mm) from the ventilation holes.

Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

The instrument is designed for use in the following sectors: Industrial, residential, business and commercial areas and small businesses.

The instrument is designed for indoor use only. Before each measurement, you need to verify at a known source if the instrument functions properly.



To disconnect from the mains, unplug the IEC socket on the back panel.

See [Table 3-1](#) for the general data on the instrument specification. For more information, see the instrument datasheet (P/N: 3609.1927.32).

**Table 3-1: General data on instrument specification**

General data		
Mains nominal voltage	100 VAC to 250 VAC 50 Hz / 60 Hz	
Maximum input power	650 W for 2 channels 1125 W for 4 channels	
Mains fuses	Internal 16 A 250 V IEC 60127-2/7 fast-acting Not user accessible	
Operating temperature range	+5 °C to +40 °C	
Storage temperature range	-20 °C to +70 °C	
Humidity noncondensing	5 % to 95 %	
Display	TFT 5" 800 pixels x 480 pixels WVGA Touch	
Rack installation	R&S ZZA-GE23 rack adapter 2U (P/N: 5601.4059.00)	
Dimensions (W x H x D)	362 mm x 100 mm x 451 mm (14.25" x 3.94" x 17.76")	
Weight	R&S NGP802/822 (2-channel)	7.5 kg (16.5 lb)
	R&S NGP804/814/824 (4-channel)	8.0 kg (17.6 lb)

### 3.3 Unpacking and Checking the Instrument

Unpack the R&S NGP800 power supply carefully and check the content of the package.

- Check the equipment for completeness using the delivery note and package contents list for the various items.
- Check the instrument for any damage and loose parts. If there is any damage, immediately contact the carrier who delivered the instrument.



**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.

**NOTICE****Risk of damage during transportation and shipment**

Insufficient protection against mechanical and electrostatic effects during transportation and shipment can damage the instrument.

- Always ensure that sufficient mechanical and electrostatic protections are provided
- When shipping an instrument, the original packaging should be used. If you do not have the original packaging, use sufficient padding to prevent the instrument from moving around inside the box. Pack the instrument in antistatic wrap to protect it from electrostatic charging
- Secure the instrument to prevent any movement and other mechanical effects during transportation

**Delivery package**

The package contents contain the following items:

- R&S NGP800 power supply
- Four power cables
- Two 8-pin terminal block plug for output connections
- Two 8-pin plug for analog Input and digital I/O port connections
- One printed Getting Started manual
- One document folder containing a Basic Safety Instructions guide, calibration certificate, KC and CE certificate

## 3.4 Setting Up the Instrument

The R&S NGP800 power supply series are designed for benchtop and rackmount operation.

**NOTICE****Risk of instrument damage due to high temperature**

Operate R&S NGP800 power supply in an area where the ambient temperature is within +5 °C to +40 °C.

The R&S NGP800 power supply is fan-cooled and must be installed with sufficient space on the sides to allow proper air circulation. Ensure that fan openings are unobstructed and airflow vents are unimpeded.

Operating the instrument with insufficient airflow or outside the allowable ambient temperature can disrupt the operation and even cause damage.

### 3.4.1 Bench Operation

On a benchtop, the R&S NGP800 power supply can either lie flat or stand on its feet. As shown in [Figure 3-1](#), feet on the bottom can be folded out to set the instrument in an inclined position.



*Figure 3-1: Inclined position*

**NOTICE****Positioning of instrument**

The instrument must be positioned in a manner that allows you to disconnect the unit from the mains at any time and without restrictions.

**⚠ WARNING****Risk of injury if feet are folded out**

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

- Fold the feet completely in or out to ensure stability of the instrument. Never shift the instrument when the feet are folded out.
- When the feet are folded out, do not work under the instrument or place anything underneath.
- The feet can break if they are overloaded. The overall load on the folded-out feet must not exceed 250 N.

### 3.4.2 Rack Mounting

The instrument can be installed in 19" rack using the rack adapter R&S ZZA-GE23 (P/N 5601.4059.00). Proceed according to the installation instructions supplied with the rack adapter.

## 4 Instrument Tour

This chapter provides an overview of all the controls available in the R&S NGP800 power supply series and steps to switch on the instrument for the first time.

- [Overview of Controls](#)..... 17
- [Switching On the Instrument](#)..... 22

### 4.1 Overview of Controls

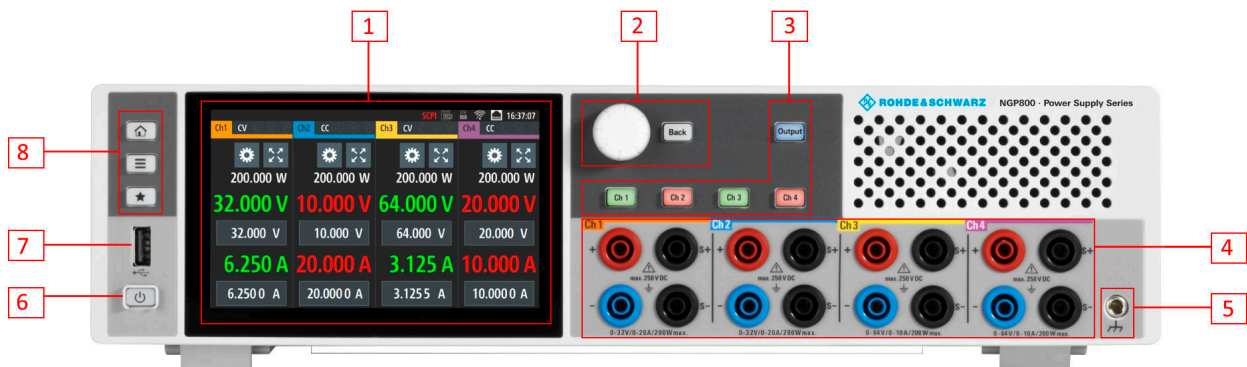
#### 4.1.1 Front Panel

The front panel of the R&S NGP800 power supply is shown in [Figure 4-1](#). The function keys and navigation controls are located beside the display. The various connectors are located at the right of the display.

The following power supply models are available:

**Table 4-1: Power supply models**

Models	Number of output channels
NGP802, NGP822	2
NGP804, NGP814, NGP824	4



**Figure 4-1: Front panel of R&S NGP800 power supply**

- 1 = Display with touch screen
- 2 = Rotary knob and back key
- 3 = Output and channel keys
- 4 = Output terminals (see [Table 4-1](#))
- 5 = Chassis ground terminal (4mm socket)
- 6 = Standby button
- 7 = USB connector
- 8 = Menu control keys

### Display (1)

The display is a color TFT touch screen. Depending on the instrument models, up to four channels are shown on the display. The respective measurement settings and menu settings are displayed in the individual channel display area.

Two information status bars, providing the overall device operating mode and channel settings of the instrument are located respectively at the device level (top-right hand corner of the display area) and channel level (on top of individual channel display area) of the instrument.

For a detailed description on-screen layout, see section "Display Overview" in the User Manual.

### Rotary knob and back key (2)

The rotary knob and back key are used for menu navigation and value adjustment in the instrument.

For a detailed description on navigation, see section "Rotary Knob and Back Key" in the User Manual.

### Output and channel keys (3)

Depending on the instrument models, up to four channels and one output key are provided to select individual channel and enable/disable the output(s).

### Output terminals (4)

Two-channel instruments: NGP802 and NGP822 are equipped with 8 terminals for outputs and remote sense connections. Four-channel instruments: NGP804, NGP814 and NGP824 are equipped with 16 terminals for outputs and remote sense connections.

For 32 V models, each output is capable to source 200 W of power at 0 V to 32 V and maximum current of 20 A.

For 64 V models, each output is capable to source 200 W of power at 0 V to 64 V and maximum current of 10A.

### **Chassis ground terminal (5)**

A 4 mm socket is provided for the user to connect to earth ground through the instrument ground/chassis.

### **Standby button (6)**

The [Power] key toggles the instrument between standby state and normal state. In standby state, the key is illuminated in red and the instrument internal circuits are operated in powered down state. In normal state, all the internal modules are powered up and the instrument will startup to operate normally. The LED illumination is turned off in this state.

### **USB connector (7)**

USB Type-A connector is provided for connecting a USB flash drive to perform software update, store logging data or screen captures. It can also be used for an external USB mouse connector.

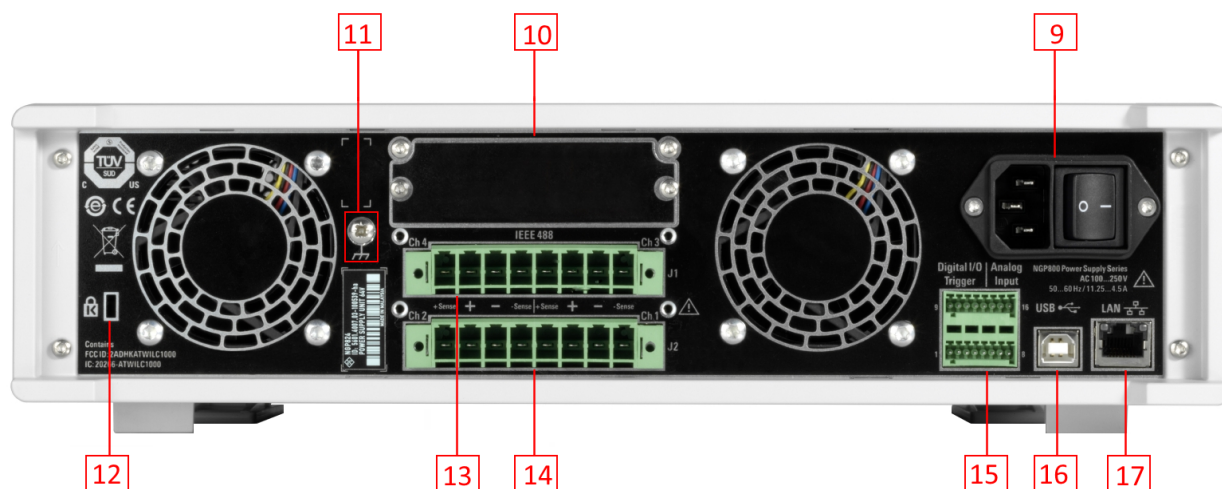
### **Menu control keys (8)**

The menu control keys allow you to access the home window, main menu window and user button key in the instrument.

For a detailed description on menu control keys, see section "Menu Controls" in the User Manual.

## **4.1.2 Rear Panel**

[Figure 4-2](#) shows the rear panel of the R&S NGP800 power supply with its connectors.



**Figure 4-2: Rear panel of R&S NGP800 power supply**

- 9 = AC inlet with integrated 2-pole rocker switch
- 10 = Optional IEEE-488 (GPIB) interface
- 11 = Ground terminal
- 12 = Kensington lock
- 13 = Channel 3 and 4 rear panel connector (for NGP804, NGP814 and NGP824 models only)
- 14 = Channel 1 and 2 rear panel connector
- 15 = Analog input and digital I/O connector
- 16 = USB-B connector (device)
- 17 = Ethernet (LAN) connector

## AC inlet with integrated 2-pole rocker switch (9)



### Main supply cable

Use only the power cable that was supplied with the instrument. Using other types, which might have inadequate rating can cause overheating of the power cable, resulting in fire.

The power cable provides the earth ground connection through the third ground conductor. Operate the instrument only on authorized safety sockets which provide earth connection.

The power cable must be plugged in before signal circuits can be connected. Never use the product if the power cable is damaged.

The built-in 2-pole rocker switch is the main power switch of the instrument which connects/disconnects it from the AC supply.

### Option IEEE-488 (GPIB) interface (10)

Option R&S NG-B105 provides an IEEE-488 (GPIB) bus interface.

### Ground terminal (11)

M4 screw provides connection to earth ground through the instrument ground/chassis.

### Kensington security slot (12)

A Kensington lock can be anchored to the R&S NGP800 power supply housing to secure it to a workstation mechanically.

### Channel connectors (13, 14)

#### NOTICE

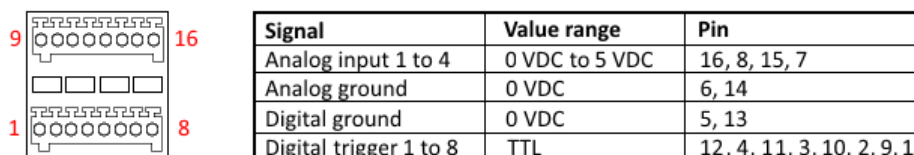
#### Output terminals

Either the channel output terminals at the front panel or rear panel can be used. Using both terminals at the same time can cause instrument malfunction.

The channel terminal blocks contain connections to both outputs (“+”, “-”) and remote sense (“+Sense”, “-Sense”). Terminal block for channel 3 and channel 4 are only available for a 4-channel instrument.

### Digital I/O & analog input connector (15)

A 16-pin terminal block provides connection to both digital I/O (option NGP-K103) and analog input (option NGP-K107). See [Figure 4-3](#) for pin assignment of the terminal block.





**USB connector (16)**

USB Type-B connector provides remote control operation via USB.

**Ethernet connector (17)**

10/100 Ethernet port for remote control operation via the local area network.

## 4.2 Switching On the Instrument

Before switching on the instrument, check that all the instructions in the “Basic Safety Instruction” brochure and safety measures in previous sections are observed.

**To switch on instrument:**

1. Connect the power cable to the AC power connector at the rear panel of the R&S NGP800 power supply.
2. Connect the power cable to the socket outlet.
3. Toggle the power rocker switch at the rear panel to turn on the instrument. The instrument performs a system check, boots the operating system, and starts the R&S NGP800 power supply firmware.

It takes a few seconds for the power supply to complete the initialization before it is ready for use. If the instrument does not turn on, verify that the power cord is securely plugged-in and power is available at the outlet. Check if the standby power is lit at the [Power] key on the front panel. If the standby power is lit, press the [Power] key to initiate the start-up sequence.

**To switch off instrument:**

1. Press the [Power] key. The R&S NGP800 power supply initializes the power down sequence and enters into standby mode. The R&S NGP800 operates at low power.
2. Toggle the rocker switch at the rear panel to turn off the instrument completely.
3. Disconnect the AC power cable from the socket outlet.

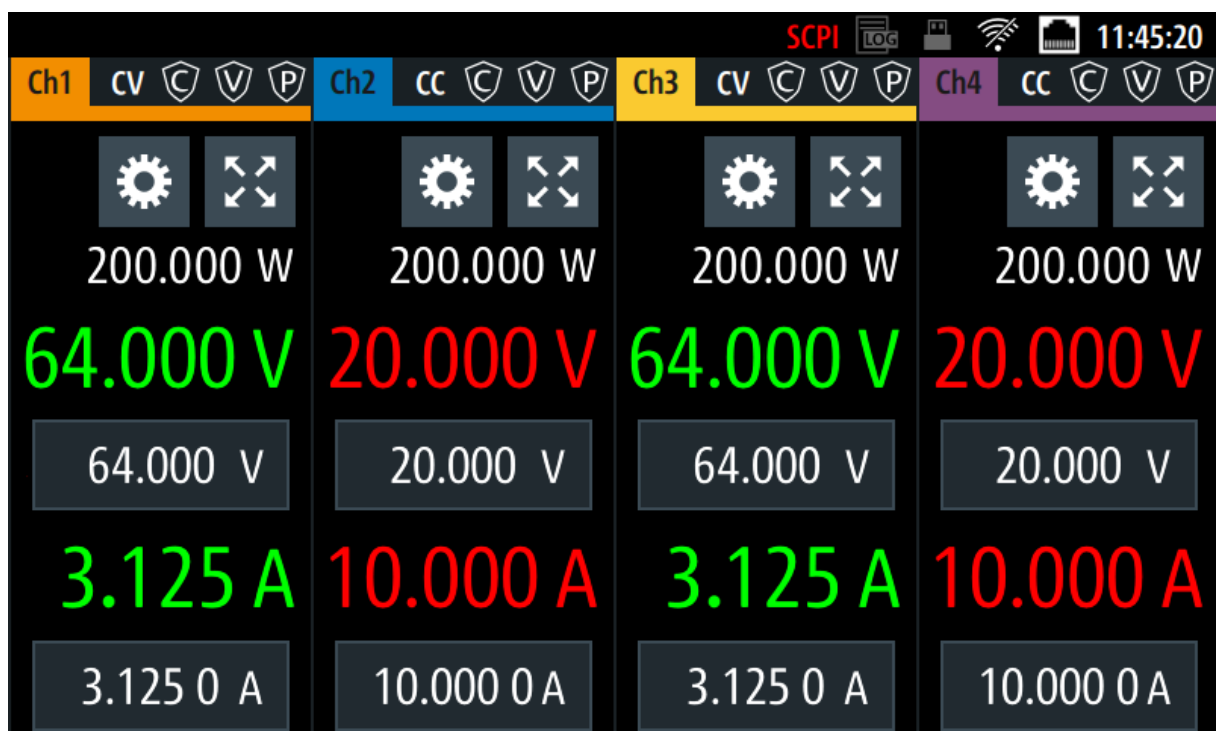
## 5 Trying Out the Instrument

This chapter describes some basic functions that you can perform with the R&S NGP800 power supply series.

### 5.1 Setting the Output Voltage and Current Limit

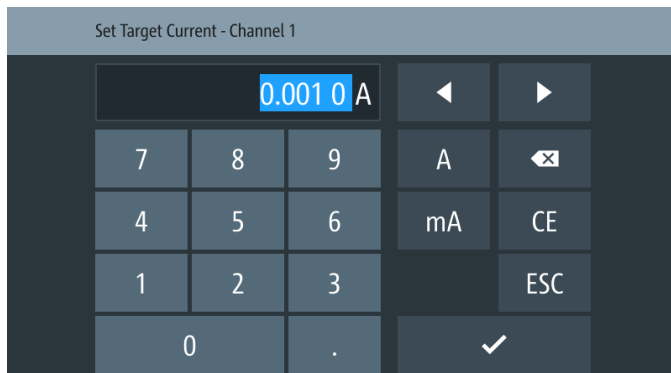
1. Press [Home]  key.

The R&S NGP800 power supply displays the home window.

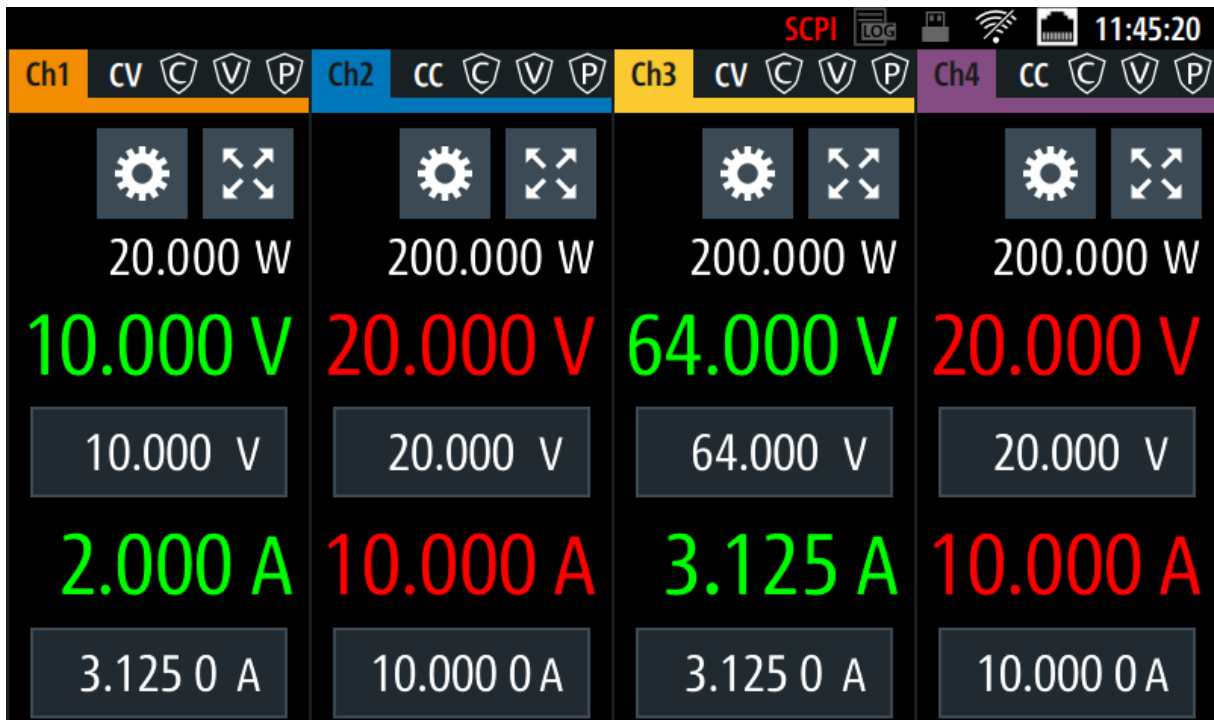


2. Select voltage or current parameter of the desired channel.  
The R&S NGP800 power supply displays an on-screen keypad to set the value.

## Activating the Channels Output



3. Enter the required value.
4. Confirm value with either a unit key or enter key .  
The home window shows the updated voltage and current settings (See changes of voltage and current values in channel 1).



5. Repeat for other channel if desired.

## 5.2 Activating the Channels Output

The output voltages can be switched on or off regardless of the instrument's operating mode.

## Activating the Channels Output

To activate the channel output, press the [Output] key on the front panel followed by the desired channel key or vice versa.

The R&S NGP800 power supply displays the actual voltage on the output channel and the actual current drawn by the load connected to the output. The display font color of the selected channel changes depending on the operating mode of the instrument.

- Constant voltage (CV)
  - Voltage regulated, actual current is lesser than setpoint.
  - Font color of measured voltage and current is green.
- Constant current (CC)
  - Current regulated, current drawn by the circuit is limited to setpoint.
  - Font color of measured voltage and current is red.

When output is turned off, the display font color changes to white and the operating mode is not displayed.

See the highlighted areas in [Figure 5-1](#).



**Figure 5-1:** Font color in highlighted areas changes to green or red depending on the different operating modes of the instrument

## 6 Maintenance

Regular maintenance improves the life span of the instrument, the following chapter provides information on instrument maintenance.

### Cleaning

Before cleaning the instrument, ensure that it has been switched off and the power cable is disconnected.

Clean the outer case of the instrument at regular intervals, using a soft, lint-free dust cloth.

---

#### **NOTICE**

##### **Instrument damage caused by cleaning agents**

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use any liquids for cleaning.

Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

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The display may only be cleaned with an appropriate glass cleaner. Rub the display with a dry, clean and lint-free cloth. Do not allow cleaning fluid to enter the instrument.

### Internal battery replacement

An internal CR2032 coin cell battery powers the real-time clock circuit which provides continuous time stamp for the instrument. If the battery fails, the system clock and time stamp for the logging function are not available but other instrument functions are not affected.

Under normal usage at room temperature, the battery is expected to last up to 10 years. However, the battery life expectancy is reduced if the device is stored at temperature above 40°C for an extended period of time.



If the instrument cannot retain the date and time settings after turning off the AC input, the battery is discharged.

Contact your local service partner for battery replacement.

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