

# R&S<sup>®</sup> NGL200/NGM200 Power Supply Series Getting Started



1178872002



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Getting Started

Version 04

# Contents

<b>1 Documentation Overview.....</b>	<b>5</b>
<b>2 Welcome to R&amp;S NGL/NGM.....</b>	<b>7</b>
<b>3 Putting into Operation.....</b>	<b>9</b>
3.1 Safety.....	10
3.2 Intended Operation.....	12
3.3 Unpacking and Checking the Instrument.....	13
3.4 Setting Up the Instrument.....	14
3.4.1 Bench Operation.....	14
3.4.2 Rack Mounting.....	15
<b>4 Instrument Tour.....</b>	<b>16</b>
4.1 Overview of Controls.....	16
4.1.1 Front Panel.....	16
4.1.2 Rear Panel.....	18
4.2 Switching On the Instrument.....	21
<b>5 Trying Out the Instrument.....</b>	<b>23</b>
5.1 Setting the Output Voltage and Current.....	23
5.2 Activating the Channels Output.....	23
<b>6 Maintenance.....</b>	<b>25</b>
<b>Index.....</b>	<b>26</b>

# 1 Documentation Overview

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

[www.rohde-schwarz.com/product/ngl200](http://www.rohde-schwarz.com/product/ngl200)

[www.rohde-schwarz.com/product/ngm200](http://www.rohde-schwarz.com/product/ngm200)

## Getting Started

Introduces the R&S NGL/NGM 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 NGL/NGM power supply series. It also lists all options with their order numbers and accessories.

See [www.rohde-schwarz.com/brochure-datasheet/ngl200](http://www.rohde-schwarz.com/brochure-datasheet/ngl200)

See [www.rohde-schwarz.com/brochure-datasheet/ngm200](http://www.rohde-schwarz.com/brochure-datasheet/ngm200)

### **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/ngl200](http://www.rohde-schwarz.com/firmware/ngl200). The open source acknowledgment document can also be read directly on the instrument.

See [www.rohde-schwarz.com/firmware/ngm200](http://www.rohde-schwarz.com/firmware/ngm200). The open source acknowledgment document can also be read directly on the instrument.

## 2 Welcome to R&S NGL/NGM

The one or two-channel power supply series are based on a classical transformer concept with linear regulators. This concept allows the instrument to achieve highest accuracy and lowest residual ripple.

The R&S NGL/NGM power supply series feature galvanically isolated, floating overload and short-circuit proof outputs. When multiple channels are connected in parallel, higher currents can be achieved. When connected in serial, higher voltages are achievable.

Multi-purpose protection functions are available for each channel which you can set separately, such as overcurrent protection (OCP), overvoltage protection (OVP) and overpower protection (OPP). If such a limit is reached, the affected output channel is automatically turned off and an indicator icon (🔴, 🟡, 🟢) blinks on the display. In the case of two-channel power supply (NGL202, NGM202), the overcurrent protection can be linked to the other channel. In this case, the linked channel is turned off when the other channel reaches a limit.

Additionally, the R&S NGL/NGM is protected with overtemperature protection (OTP). This safety feature protects the R&S NGL/NGM from overheating. When the temperature in the power supply exceeds the OTP limit, the channel outputs are automatically cut off.

The Arbitrary function allows a freely definable voltage and current sequences with a timeframe as short as 1 ms. It allows varying the voltage or current during a test sequence, for example to simulate different charging conditions of a battery. With "Ramp" function, the R&S NGL/NGM provides the operating condition to ramp up the supply voltage within a defined timeframe of 10 ms to 10 s.

All R&S NGL/NGM power supplies are equipped with a color TFT display (800 pixels x 480 pixels) and enhanced with touch input capability. The R&S NGL/NGM comes with a USB and LAN (LXI) interface. Equipped with a wireless LAN (WLAN) option, you can establish a network connection wirelessly.

The digital I/O interface installed at the rear panel is activated with an option, it allows a single trigger-in signal to control multi trigger-out signals on the power supply, providing many possibilities to control outputs and associated devices in the event when a trigger occurs.

The user manual contains description of the functionalities that the instrument provides. The latest version is available for download at the product homepage

(<http://www.rohde-schwarz.com/product/ngl200> for R&S NGL and <http://www.rohde-schwarz.com/product/ngm200> for R&S NGM) .

## 3 Putting into Operation

This chapter describes how to set up the R&S NGL/NGM 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 14
- 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, 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)

---

**⚠ 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.

---

Before switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network.

## 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.

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.

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: 5216.1057.32).

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

General data	
Mains nominal voltage	AC 100 V / 115 V / 230 V ( $\pm 10\%$ ) 50 Hz to 60 Hz
Maximum power consumption	400 W

General data		
Mains fuses	2 x IEC T4.0H 250 V	
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 HZN96 rack adapter 2U (P/N: 3638.7813.02)	
Dimensions (W x H x D)	222 mm x 97 mm x 436 mm (8.74" x 3.82" x 17.17")	
Weight	R&S NGL201	7.1 kg (15.65 lb)
	R&S NGM201	7.2 kg (15.87 lb)
	R&S NGL202	7.3 kg (16.09 lb)
	R&S NGM202	7.4 kg (16.31 lb)

### 3.3 Unpacking and Checking the Instrument

Unpack the R&S NGL/NGM 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 NGL power supply or R&S NGM power supply
- Four power cables
- One printed Getting Started manual
- One document folder containing a printed Basic Safety Instructions guide

## 3.4 Setting Up the Instrument

The R&S NGL/NGM is designed for benchtop and rackmount operation.

### 3.4.1 Bench Operation

On a benchtop, the R&S NGL/NGM 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.

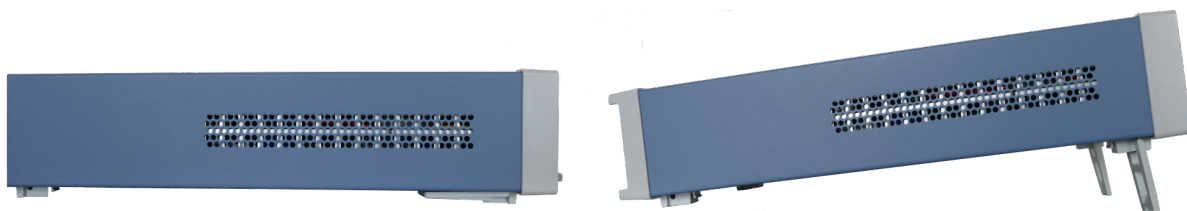


Figure 3-1: Operating positions

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**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.

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### 3.4.2 Rack Mounting

The instrument can be installed in a 19" rack using the rack adapter R&S HZN96 (P/N 3638.7813.02). Proceed according to the installation instructions supplied with the rack adapter.

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**NOTICE****Ambient temperature**

Place the R&S NGL/NGM power supply in an area where the ambient temperature is within +5 °C to +40 °C. The R&S NGL/NGM power supply is fan-cooled and must be installed with sufficient space along the sides to ensure free flow of air.

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## 4 Instrument Tour

This chapter provides an overview of all the controls available in the R&S NGL/NGM models and steps to switch on the instrument for the first time.

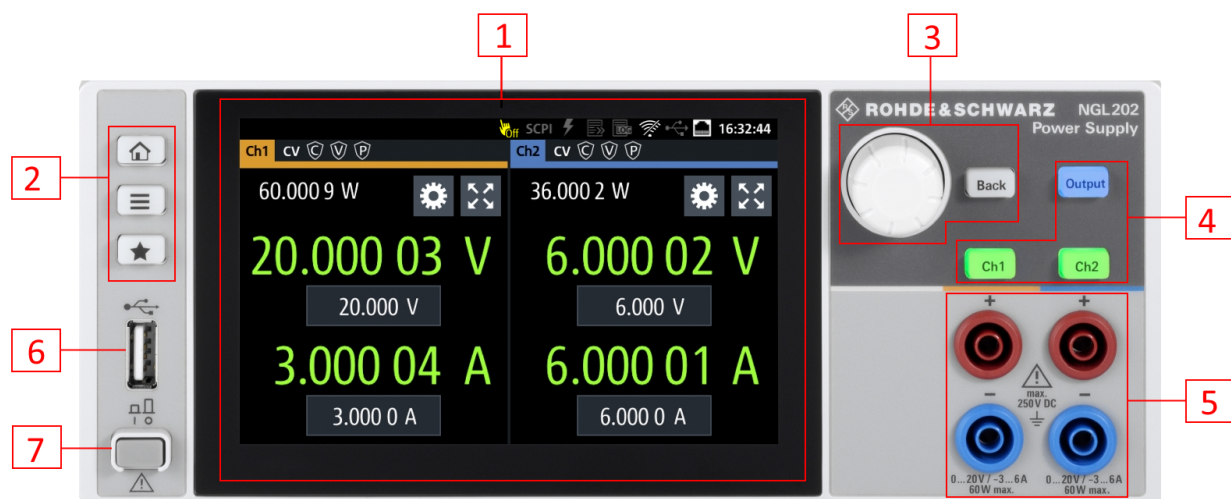
- [Overview of Controls](#)..... 16
- [Switching On the Instrument](#)..... 21

### 4.1 Overview of Controls

#### 4.1.1 Front Panel

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

The R&S NGL/NGM has one output channel for NGL201, NGM201 models and two output channels for NGL202, NGM202 models.



**Figure 4-1: Front panel of R&S NGL/NGM with 2 channels**

- 1 = Display with touch screen
- 2 = Menu control keys
- 3 = Rotary knob and back key
- 4 = Output and channel keys

5 = Output terminals (one channel with sense for NGL201, NGM201; two channels for NGL202, NGM202)

6 = USB connector

7 = Power key

### Display (1)

The display is a color TFT touch screen. Depending on the instrument model, up to two channels are shown on the display. The respective measurement settings and functions are displayed in the individual channel display area. There is a status bar in the device level and channel level, showing the device operating mode and respective channel settings of the instrument.

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

### Menu control keys (2)

The menu control keys allow you to access the home window, device/channel menu window and user key in the instrument.

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

### Rotary knob and back key (3)

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

For a detailed description on rotary knob and back key, see section "Navigation Controls" in the User Manual.

### Output and channel keys (4)

The channel key allows you to select the power supply channel to source or sink power. The output key allows you to enable or disable the output power on the channel key.

Refer to datasheet for the channel voltage/current limits in the source and sink mode.

### Output terminals (5)

Depending on the instrument type, one or two output channels are available to source or sink power.

Both instrument models are equipped with 4 terminals. The NGL201, NGM201 models provide both the output plus the sense connectors at the front panel while the NGL202, NGM202 models provide only output terminals for both channels.

### USB connector (6)

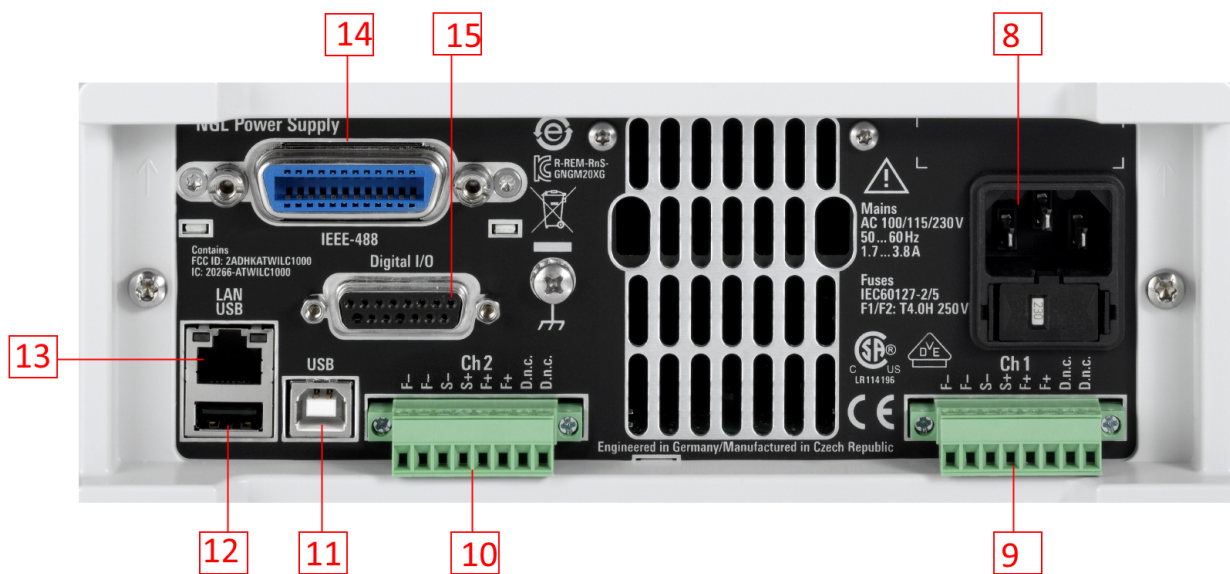
The USB connector is a Type-A connector. You can connect a USB flash drive to this connector to perform a firmware update, store logging data or screen shots.

### Power key (7)

The [Power] key switches the instrument on and off.

## 4.1.2 Rear Panel

Figure 4-2 shows the rear panel of the R&S NGL/NGM with its connectors.



**Figure 4-2: Rear panel of R&S NGL/NGM with 2 channels**

- 8 = AC inlet with fuse holder and voltage selector
- 9 = Channel 1 rear panel connector for NGL202, NGM202 models. The two D.n.c. labels for NGM201 are labeled as DVM+ and DVM-
- 10 = Channel 2 rear panel connector for NGL202, NGM202 models. The two D.n.c. labels for NGM202 are labeled as DVM+ and DVM-
- 11 = USB connector (device)
- 12 = USB connector (host)
- 13 = Ethernet (LAN) connector
- 14 = Optional IEEE-488 (GPIB) interface
- 15 = Digital I/O connector



## AC inlet with fuse holder and voltage selector (8)



### Main supply cord

Do not use detachable mains supply cord with inadequate rating.

The power cable must be plugged in before signal circuits can be connected. Do not use the product if the power cable is damaged. See [Chapter 4.2, "Switching On the Instrument"](#), on page 21 for more information.

The built-in voltage selector selects the mains voltage between 100 V, 115 V and 230 V. All voltage settings are using the same fuse rating.

## Channel connectors (9, 10)

### NOTICE

#### Output terminals

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



### Digital voltmeter (DVM)

The DVM+ and DVM- pins on the channel connector are available only with R&S NGM power supply series equipped with option R&S NGM-K104 (P/N: 3643.9927.02).

The channel connectors contain both output ("F+", "F-") and sense ("S+", "S-") connections. Connector for "Ch 2" is only available in the NGL202, NGM202 models.

## USB connectors (11, 12)

The USB host connector (Type-A) can be used for mass storage devices or an external mouse like the USB connector at the front panel.

The USB device connector is a Type-B connector for remote control operation.

### Ethernet connector (13)

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

For a detailed description on the connection setup, see section "LAN Connection" in the User Manual.

### Option IEEE-488 (GPIB) interface (14)

An IEEE-488 (GPIB) interface can be ordered (NGL-B105 or NGM-B105). This interface is not user installable.

### Digital I/O connector (15)

The Digital I/O option (R&S NGL-K103 or R&S NGM-K103) must be installed for this function to be available in the instrument.

The specified voltages are 0 V to 24 V for all output pins and 0 V to 15 V for all input pins.

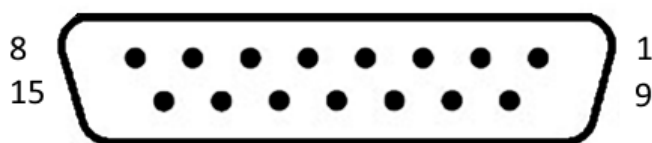


Figure 4-3: Digital I/O connector (female socket front view)

Table 4-1: Digital I/O pin layout

Pin	Signal	Direction	Pin	Signal	Direction
1	*Inhibit Ch1	IN	9	*Inhibit Ch2	IN
2	Trigger Ch1	IN	10	Trigger Ch2	IN
3	In	IN	11	Output Fault	OUT
4	Out1	OUT	12	Out2	OUT
5 - 8	Gnd	-	13 - 15	Gnd	-

\* The [inhibit signals](#) can be used to turn off the outputs by a digital hardware signal.

**Table 4-2: Inhibit signals**

Signal name	Pin	Descriptions
Inhibit Ch1	Pin 1 of <a href="#">Digital I/O connector</a>	If the inhibit signal goes active, channel 1 output is turned off. The inhibit signal is low active (inverted logic).
Inhibit Ch2	Pin 9 of <a href="#">Digital I/O connector</a>	If the inhibit signal goes active, channel 2 output is turned off The inhibit signal is low active (inverted logic).

## 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. Also, check if the value on the voltage selector corresponds to the mains voltage (100 V, 115 V or 230 V).



### Fuse rating

The R&S NGL/NGM uses the same fuse ratings for all mains voltages.

### To change power fuse:

1. Peel off the yellow label sticker on the AC inlet.
2. Release the latch of the fuse holder which is located at both side of the socket and pull it out.
3. Pull out the removable part of the fuse holder.
4. Turn this removable part until the correct voltage label (100, 115 or 230) is displayed in the window of the holder.
5. Return the fuse holder to its position in the panel.

### To switch on instrument:

1. Connect the power cable to the AC power connector on the rear panel of the R&S NGL/NGM.

2. Connect the power cable to the socket outlet.
3. Press [Power] key on the front panel.  
The instrument performs a system check, boots the operating system, and starts the R&S NGL/NGM firmware.

By default, all output channels are turned off when the instrument is switched on to prevent connected loads from being damaged unintentionally.

During startup, the R&S NGL/NGM is loaded with the last saved instrument settings from internal memory. See "Store and Recall" in the User Manual.

**To switch off instrument:**

1. Press [Power] key.  
All current settings are saved to internal memory and the firmware shuts down.
2. Disconnect the AC power cable from the instrument.

## 5 Trying Out the Instrument

This chapter describes some basic functions that you can perform with the R&S NGL/NGM.



### Source and sink current

The R&S NGL/NGM power supply series are 2 quadrant power supplies which may both source and sink current. When the voltage across the output terminal exceeds the set voltage, current flows into the instrument. The default behavior "Auto" can be configured in output menu, see section "Output mode" in the User Manual.

On the display, sink mode is shown as negative current.

### 5.1 Setting the Output Voltage and Current

1. Press [Home] key.  
The R&S NGL/NGM displays the home window.
2. Select voltage or current parameter in the home window.  
The R&S NGL/NGM displays an on-screen keypad to set the value.
3. Enter the required value.
4. Confirm value with the unit key (V/mV or A/mA).

### 5.2 Activating the Channels Output

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

To switch on or off channel output.

1. Select desired channel key ([Ch1] or [Ch2]) on the front panel.
2. Press [Output] key.

The R&S NGL/NGM outputs the set voltage level on the selected output channel terminal.




Depending on the mode which the channels are operated in, the followings are observed:



### CR mode

CR mode is a special case of sink mode in which the instrument behaves like a constant resistor. Only in this mode, the respective channel keys and display font color in the home window turns cyan.

In "normal" sink mode, the colors are the same as in source mode: green if the current flowing into the R&S NGL/NGM is below the set current and red if the current is limited to the set value. The only visible indication of sink mode is the change of the sign of the current readout change to "Minus".

Color illuminated on front panel keys and display font color of voltage and current in home window	Operating mode
 Green	Constant voltage mode (CV)
 Red	Constant current mode (CC)
 Cyan	Constant resistance mode (CR) Note: Instrument is operated in sink mode and "Constant Resistance" is activated.

Also, the operating symbol mode (CV, CC or CR) is displayed at the channel status bar of the respective channel.

## 6 Maintenance

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.

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.



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# Index

## A

Activating the channels output ..... 23

## B

Basic safety instructions ..... 5

## D

Delivery package contents ..... 14

Documentation overview ..... 5

## F

Front panel

  Display ..... 17

  Menu control keys ..... 17

  Output and channel keys ..... 17

  Output terminals ..... 17

  Power key ..... 18

  Rotary knob and back keys ..... 17

  USB connector ..... 18

## G

Getting Started ..... 5

## I

Instrument tour ..... 16

  Overview of controls ..... 16

  switching on NGL/NGM ..... 21

Intended operation ..... 12

## M

Maintenance

  Cleaning ..... 25

## O

Open source acknowledgment ..... 6

Overview of controls

  Front panel ..... 16

  Rear panel ..... 18

## P

Putting into operation ..... 9

  Intended operation ..... 12

  Safety ..... 10

  Unpacking and checking the instrument  
  ..... 13

## R

Rear panel

  AC inlet with fuse holder ..... 19

  Channel connectors ..... 19

  Digital I/O connector ..... 20

  Ethernet connector ..... 20

  IEEE-488 (GPIB) interface ..... 20

  USB connectors ..... 19

  Voltage selector ..... 19

Release notes ..... 6

## S

Safety ..... 10

Safety instructions ..... 5

Service manual ..... 5

Setting the output voltage and current limit  
  ..... 23

Setting up the instrument ..... 14

  Bench operation ..... 14

  Rack mounting ..... 15

## T

Trying out the instrument

  Activating the channels output ..... 23

  Setting the output voltage and current  
  limit ..... 23

## U

Unpacking and checking the instrument . 13

User manual ..... 5

## W

Welcome to R&S NGL/NGM ..... 7