

R&S[®] NGE100 Power Supply Getting Started



5601.1308.02 – 05

This manual describes the following R&S®NGE100 models and options:

- R&S®NGE102 2-Channel PSU (5601.1414.02)
- R&S®NGE103 3-Channel PSU (5601.1414.03)
- R&S®NGE-K101 Ethernet Remote Control (5601.2204.03)
- R&S®NGE-K102 Wireless LAN Remote Control (5601.2210.03)
- R&S®NGE-K103 Digital Trigger I/O (5601.2227.03)

The contents of this manual correspond to firmware version 1.00 or higher.

The software contained in this product uses several valuable open source software packages. For information, see the "Open Source Acknowledgment" document, which is available for download from the R&S NGE100 product page at www.rohde-schwarz.com/product/nge100 > "Downloads" > "Firmware". Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

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Mühlhofstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Fax: +49 89 41 29 12 164

Email: info@rohde-schwarz.com

Internet: www.rohde-schwarz.com

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Safety Instructions

Instrucciones de seguridad

Sicherheitshinweise

Consignes de sécurité

WARNING

Risk of injury and instrument damage

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

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

ADVERTENCIA

Riesgo de lesiones y daños en el instrumento

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

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

⚠️ WARNUNG**Gefahr von Verletzungen und Schäden am Gerät**

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

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

⚠️ AVERTISSEMENT**Risque de blessures et d'endommagement de l'appareil**

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

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

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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.

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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.

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Europe, Africa, Middle East

Phone +49 89 4129 12345
customersupport@rohde-schwarz.com

North America

Phone 1-888-TEST-RSA (1-888-837-8772)
customer.support@rsa.rohde-schwarz.com

Latin America

Phone +1-410-910-7988
customersupport.la@rohde-schwarz.com

Asia/Pacific

Phone +65 65 13 04 88
customersupport.asia@rohde-schwarz.com

China

Phone +86-800-810-8228 /
+86-400-650-5896
customersupport.china@rohde-schwarz.com



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1 Preface

1.1 Documentation Overview

This section provides an overview of the R&S NGE100 user documentation. You find it on the product page at:

<http://www.rohde-schwarz.com/product/nge100> > "Downloads"

Getting started manual

Introduces the R&S NGE100 and describes how to set up and start working with the product. A printed version is included in the delivery.

User manual

The 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.

Basic safety instructions

Contains safety instructions, operating conditions and further important information. The printed document is included in the delivery.

Brochure

The brochure provides an overview of the R&S NGE100 and shows its specific characteristics. The technical specifications of the R&S NGE100 are included in the brochure. It also lists the options and their order numbers as well as optional accessories.

Release notes and open source acknowledgment (OSA)

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

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

See <http://www.rohde-schwarz.com/product/nge100> > "Downloads" > "Firmware".

Application notes, application cards, white papers, etc.

These documents contain information about possible applications and background information on various topics, see www.rohde-schwarz.com/appnotes.

1.2 Conventions Used in the Documentation

The following conventions are used throughout the R&S NGE100 manual.

1.2.1 Typographical Conventions

Convention	Description
Keys	Name of key is bolded.
<u>Links</u>	Links are displayed as underlined.
"References"	References to other parts of the documentation are enclosed by quotation marks.

2 Welcome to R&S NGE100

The two or three-channel power supply series are based on a classical transformer concept with high efficiency electronic pre-regulators and secondary linear regulators. This concept allows the instrument to achieve the high output power within a minimum space, high efficiency and lowest residual ripple.

The R&S NGE100 power supply series feature galvanically isolated, floating over-load and short-circuit proof outputs with adjustable power ratings. The outputs can be connected in series or in parallel, thus making high currents and voltages available.

Multi-purpose protection functions are available for each channel which you can set separately, such as overcurrent protection (FUSE), overvoltage protection (OVP), overpower protection (OPP) and overtemperature protection (OTP). If such a limit is reached, the affected output channel is automatically turned off and an indicator message (FUSE, OVP, OPP or OTP) is displayed. The overcurrent protection can be linked to other channel (FuseLink function). In this case, all linked channels are turned off when the set channel reaches its limit.

The EasyArb function allows channel 1 (Ch 1) to have a freely definable voltage and current sequences with a timeframe as short as 10 ms. It allows you to vary the voltage or current limit during a test sequence, for example to simulate different charging conditions of a battery. With EasyRamp function, the R&S NGE100 provides the operating condition to simulate the continuous rise of the supply voltage within a defined timeframe of 10 ms to 10 s.

Four data lines of the digital I/O interface are mutually independent and can be used as trigger input or trigger output separately. Various trigger conditions (e.g. fuse tripped, voltage, current, indicator messages) can be used to turn off, on or invert the output state when the trigger condition is met.

All R&S NGE100 power supply series are equipped with a color LCD display (320 x 240 pixels). The R&S NGE100 comes with a USB interface and optional LAN (LXI) and wireless LAN (WLAN) interface.

For models with WLAN, network connection can also be established wirelessly.

This user manual contains a 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/nge100>).

3 Putting into Operation

This chapter describes the steps to set up the R&S NGE100 for the first time.

⚠ 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.

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 13
 - 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

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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 cord must be plugged in before signal circuits may be connected.

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

⚠ DANGER**Risk of electric shock**

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

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 as follows:

- 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.

For the series connection of all output voltages, it is possible to exceed the low voltage protection of 42 V. Please note that in this case any contact with live components is life-threatening. It is assumed that only qualified and trained personnel service the power supplies and the connected loads.

Prior to switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If it is necessary to set a different voltage, the power fuse of the product must be changed accordingly.

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 safety socket outlets. Separating the ground is prohibited.

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



Use only the power cord included in the delivery package. See "[Delivery package](#)" on page 13.

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 product 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, the low-heat device socket on the back panel has to be unplugged.

See [Table 3-1](#) for the general data on the instrument specification. For more information, see the instrument product brochure (PN: 5214.8748.12).

Table 3-1: General data on instrument specification

General data		
Mains nominal voltage	AC	115 / 230 V (±10 %) 50 / 60 Hz
Power consumption	Maximum input power	180 W
Mains fuses	115 V AC	IEC 60127-2 / 5 T 5 A 250 V
	230 V AC	IEC 60127-2 / 5 T 2.5 A 250 V
Temperature	Operating temperature range	0 °C to + 40 °C

General data		
	Storage temperature range	- 20 °C to + 70 °C
Humidity	Non-condensing	5 % to 80 %
Display		3.5" (QVGA)
Rack mount capability	½ 19 "	R&S HZC95 option
Dimensions	W x H x D	222 mm x 88 mm x 280 mm (8.74 in x 3.46 in x 11.02 in)
Weight	R&S NGE102	4.4 kg (9.70 lb)
	R&S NGE103	4.5 kg (9.92 lb)

3.3 Unpacking and Checking the Instrument

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 at a later date, 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 protection 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 NGE100 power supply preloaded with two 230 V fuses
- Four power cables
- Two 115 V fuses (replace the preloaded fuses with these fuses depending on the mains voltage, see [Chapter 4.2, "Switching On the Instrument"](#), on page 18 for more information)
- One Getting Started manual
- One document folder containing safety instructions and calibration certificate

3.4 Setting Up the Instrument

The R&S NGE100 is designed for benchtop and rackmount.

3.4.1 Bench Operation

On a benchtop, the R&S NGE100 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.

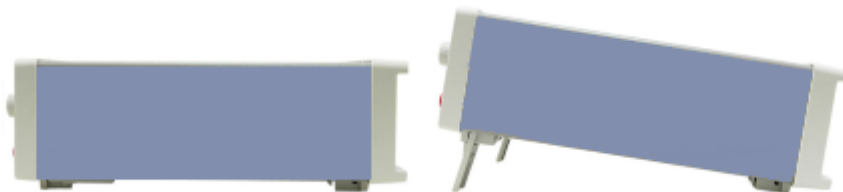


Figure 3-1: Operating positions

NOTICE**Positioning of instrument**

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

3.4.2 Rack Mounting

The instrument can be installed in a 19" rack-mount using a rack adapter kit.

NOTICE**Ambient temperature**

Place the R&S NGE100 in an area where the ambient temperature is within +0 °C to +40 °C. The R&S NGE100 is fan-cooled and must be installed with sufficient space on the top to ensure a free flow of air. Required minimum distance: 1 rack unit (RU).



Figure 3-2: Rack mounting

4 Instrument Tour

This chapter provides an overview of all the controls available in the R&S NGE100 models and steps to switch on the instrument for the first time.

- [Overview of Controls](#)..... 15
- [Switching On the Instrument](#)..... 18

4.1 Overview of Controls

4.1.1 Front Panel

The front panel of the R&S NGE100 is as shown in [Figure 4-1](#). The function keys and navigation controls are located beside the display. The various connectors are located below the display and function keys.

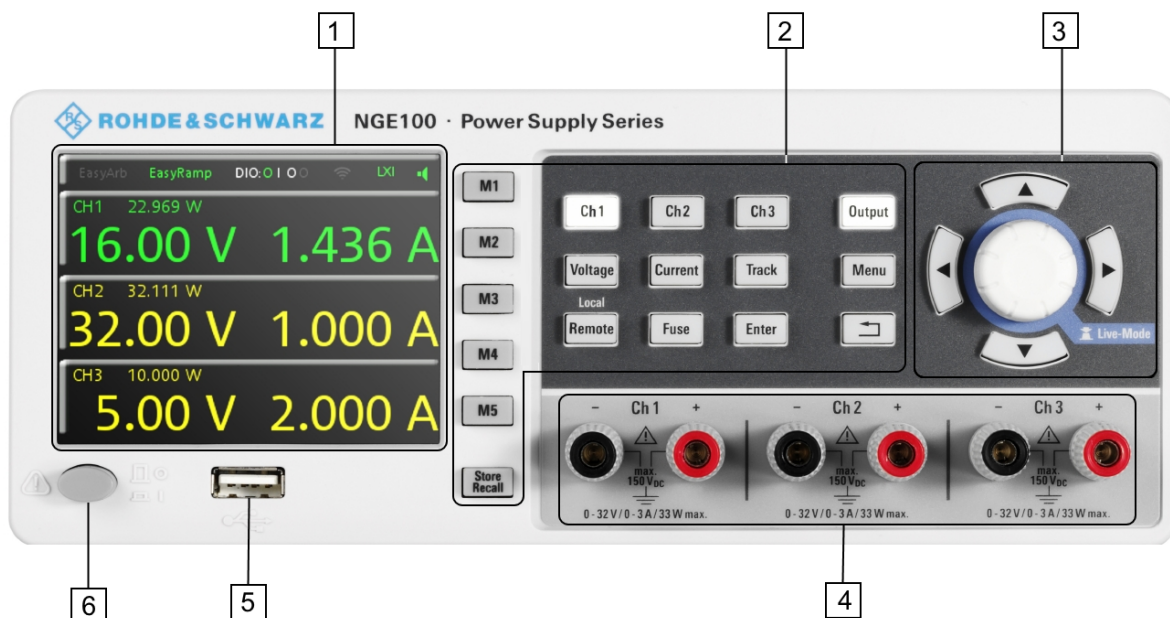


Figure 4-1: Front panel of R&S NGE100

- 1 = Display
- 2 = Function keys
- 3 = Rotary knob and arrow keys

4 = Output channels (three for NGE103 and two for NGE102)

5 = USB connector

6 = Power key

Display

The display is a color LCD screen. Depending on the instrument type, up to three channels are shown on the screen. The respective measurement settings and functions are displayed in the individual channel section. There is a status bar above the channels to show whether a certain function is enabled, disabled or operating in a certain mode.

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

Function keys

Function keys are means of input for manual operation of the instrument functions. When a function key is pressed, all the related keys are also illuminated.

For detailed description on function keys, see section "Function Keys" in the User Manual.

Rotary knob and arrow keys

Rotary knob and arrow keys are means of navigation and adjustment. When pressed or rotated, they perform tasks like navigation around the screen, adjustment of parameter values or confirmation of entries.

For detailed description on rotary knob and arrow keys, see section "Navigation Controls" in the User Manual.

Output channels

Depending on the instrument type, up to three output channels are available for output of power to the connected load. They are Ch 1, Ch 3 and Ch 3 (0 V to 32 V / 0 A to 3 A).

USB connector

The USB connector is a Type-A connector. You can connect a USB flash drive to this connector to perform a firmware update. See section "Firmware Update" in the release notes for the update procedure.

For screenshot and firmware update, USB flash drive file system supports FAT32 only.

Power key

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 NGE100 with its connectors.

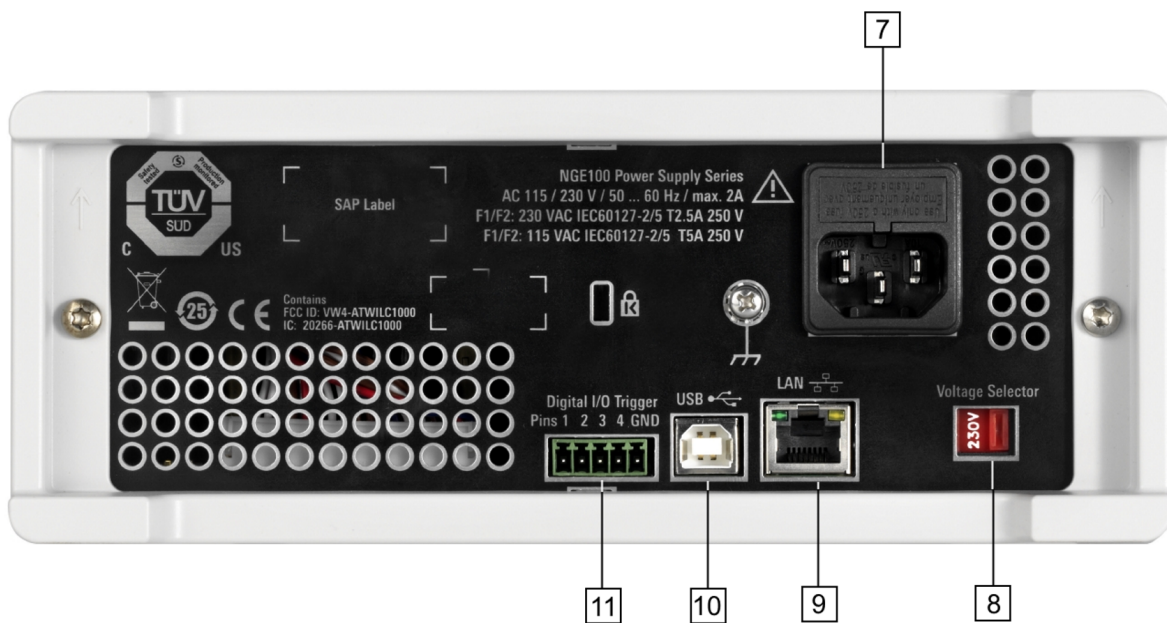


Figure 4-2: Rear panel of R&S NGE100

- 7 = AC inlet with fuse holder
- 8 = Voltage selector
- 9 = Ethernet (LAN) connector
- 10 = USB connector
- 11 = Digital I/O connector

AC inlet with fuse holder



Main supply cord

Do not use detachable mains supply cord with inadequate rating.

For safety reasons, the instrument can only be operated with authorized safety sockets.

The power cable must be plugged in before signal circuits can be connected. Never use the product if the power cable is damaged. See [Chapter 4.2, "Switching On the Instrument"](#), on page 18 for more information.

Voltage selector

The voltage selector selects the mains voltage between 115 V and 230 V.

Ethernet connector

This connector is used for establishing remote control via SCPI or LXI. See section "Ethernet Setup" in the user manual for more information on the connection setup.

The Ethernet option NGE-K101 must be installed for this function to be available in the instrument.

USB connector

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

Digital I/O connector

The Digital I/O connector is a terminal block for external trigger input or output.

Measurement control can be achieved by means of an external input signal or using an external output signal to trigger other instruments for some measurements.

The Digital Trigger I/O option (NGE-K103) must be installed for this function to be available in the instrument.

4.2 Switching On the Instrument

Prior to switching on the instrument, check if the value on the voltage selector corresponds to the mains voltage (115 V or 230 V). Switch it, if necessary, and change the power fuse of the instrument accordingly.

To change the power fuse:

1. Peel off the yellow label sticker on the AC inlet.
2. Pull out the fuse holder which is located directly on top of the socket.

3. Remove the preloaded fuses from the fuse holder.
4. Check the caps of both fuses that you want to change to for their ratings. There should be written either T5A250V for 115 V or T2.5A250V for 230 V. The fuse size is 5 x 20 mm.
5. Once verified, insert the fuses into each groove of the fuse holder.
6. Return the fuse holder to its position in the panel.

To switch on the instrument:

1. Connect the power cable to the AC inlet and switch on the mains power.
2. Press **Power** key on the front panel.
The instrument performs a system check, boots the operating system, and starts the R&S NGE100 firmware.
By default, all output channels are off when the instrument is switched on to prevent connected loads from being damaged unintentionally.
Instrument settings from memory location M1 and auto saved parameters are loaded during the instrument startup.
For more information on the store/recall instrument settings, see the "Store and Recall" chapter in the user manual.

To switch off the instrument, press **Power** key again.

5 Trying Out the Instrument

This chapter describes some basic functions that you can perform with the R&S NGE100.

5.1 Selecting the Channels

To select a channel, press the corresponding channel key. The key illuminates.

5.2 Setting the Output Voltage and Current Limit

To set the output voltage and current limit via Live-Mode:

1. Long press the rotary knob to enter into the setting mode. The font color of channel 1 voltage setting changes to blue.
2. Move to the desired parameter via the arrow keys.
3. On the desired parameter, rotate the knob to adjust its value.

Alternatively:

1. Press **Voltage** or **Current** key on the front panel.
2. Press the desired channel key to activate the respective voltage or current limit setting for that channel. The value on the respective channel becomes editable (in blue) and the digit for adjustment is indicated by a cursor.
3. Press the right or left arrow key to move the cursor.
4. Press the up / down arrow key or turn the rotary knob to change the value of the digit indicated by the cursor. The new value registers immediately.

5.3 Activating the Channels Output

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

To activate the channel output, press **Output** key on the front panel followed by the desired channel key or vice versa. The font color of that channel section changes to green or red depending on the operating mode the instrument is in.

5.4 Storing / Recalling of Instrument Settings

The instrument settings can be stored in the instrument memory by long pressing **Store Recall** key and selecting the memory location (**M1** to **M5**) key. The previous setting is overwritten.

To retrieve the desired saved settings, press **Store Recall** key and select the memory location (**M1** to **M5**) key.

6 Maintenance

Before cleaning the instrument, ensure that it has been switched off and 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**

Cleaning agents contain substances that may damage the instrument. For example, cleaning agents that contain a solvent may damage the front panel labeling, plastic parts, or the display.

Never use cleaning agents such as solvents (thinners, acetone, etc.), acids, bases, or other substances.

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

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