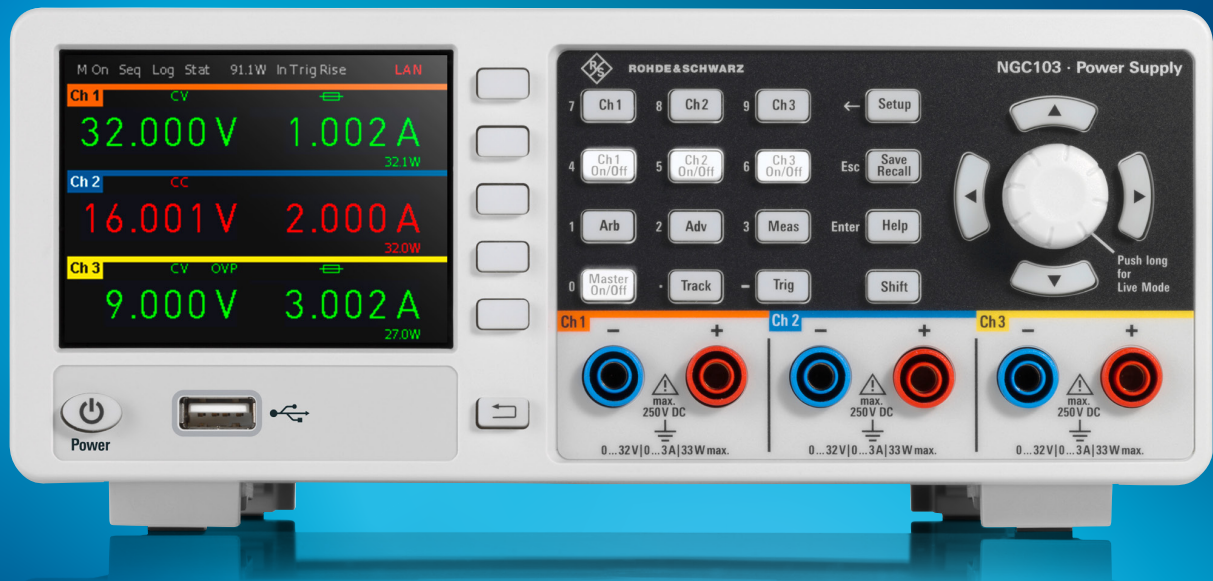


R&S® ESSENTIALS

R&S® NGC100

POWER SUPPLY SERIES

Up to three channels in a universal instrument



Data Sheet
Version 01.00

ROHDE & SCHWARZ

Make ideas real



AT A GLANCE

One, two or three channels – the R&S®NGC100 power supplies' specifications and wide range of functions make them ideal for use in development labs and industrial environments. Thanks to their high energy efficiency, the power supplies remain cool and quiet, even at maximum load. Practical interfaces and connectors allow users to work quickly and conveniently with the R&S®NGC100 series – even in 19" racks.

The R&S®NGC100 family consists of three models, all with a maximum total power of up to 100 W and a continuous voltage range from 0 V to 32 V. The single-channel R&S®NGC101 delivers a maximum of 10 A, the two-channel R&S®NGC102 a maximum of 5 A and the three-channel R&S®NGC103 a maximum of 3 A per channel. The two-channel and three-channel models enable users to connect multiple outputs in parallel or in series to increase the voltage or current.

The outputs are galvanically isolated, floating and protected against overloading and short circuits.

Voltage, current and power values are output on a brilliant QVGA display.

Developers and industrial users benefit from useful functions such as the sequenced start of channels, EasyArb and EasyRamp functions that are directly programmable on the device, an analog input for external control of voltage values, an external trigger input for controlling channels and arb steps, a wide range of logging functions and an integrated energy meter.

The R&S®NGC100 power supplies offer a variety of protective functions to prevent damage to the instrument and the DUT. You can set the maximum current (electronic

fuse, overcurrent protection/OCP), the maximum voltage (overvoltage protection/OVP) or the maximum power (overpower protection/OPP) separately for each channel. The output channels switch off when any of their set limits are reached. Overtemperature protection (OTP) prevents the instrument from overheating.

Switching technology ensures high efficiency, with minimum heat dissipation even at full load.

In industrial applications, power supplies are often installed in 19" racks. The R&S®HZC95 rack adapter is available for this purpose and can even hold two instruments of this class side by side.

Additional connections for all channels, including sense lines, are provided on the rear panel to simplify use in system cabinets.

The power supplies can be controlled via LAN, USB or even via a GPIB interface when using the R&S®NGC100-G models.

The R&S®NGC100 power supplies offer top quality and intelligent, practical functions at an extremely attractive price.

KEY FACTS

- ▶ Three versions with one, two or three output channels
- ▶ 100 W maximum total output power for all R&S®NGC models
- ▶ Maximum output voltage of 32 V per channel; higher voltages possible in serial operation
- ▶ High output currents up to 3 A/5 A/10 A – depending on the number of output channels; higher currents possible in parallel operation
- ▶ Linear postregulation for low residual ripple and noise
- ▶ Electronic fuse (OCP), adjustable maximum voltage (OVP), adjustable maximum power (OPP) and overtemperature protection (OTP)
- ▶ Standard USB/LAN, special models with additional IEEE-488 (GPIB) interface
- ▶ Rear panel connections, including sense lines, for all channels

DIFFERENT POWER SUPPLY CLASSES



R&S®NGC103 and R&S®NGE103B
three-channel power supplies

Basic power supplies

- ▶ Affordable, quiet and stable
- ▶ For manual operation and simple computer-controlled operation
- ▶ Used in education, on the bench and in system racks



R&S®HMP4040 and R&S®NGP804
four-channel power supplies

Performance power supplies

- ▶ When speed, accuracy and advanced programming features are vital to test performance
- ▶ Features such as DUT protection, fast programming times and downloadable V and I sequences
- ▶ Used in labs and ATE applications



R&S®NGU401 single-channel SMU
and R&S®NGM202 two-channel
power supply

High precision power supplies

- ▶ Tailored to specific applications
- ▶ Unique features such as
 - Emulation of unique battery characteristics
 - Electronic loads to accurately sink current and dissipate power in a controlled manner
- ▶ Used in labs and ATE environments

BENEFITS

More than meets your daily needs

▶ page 4

Easy operation

▶ page 6

Ideal for labs and test systems

▶ page 7

Model overview			
Parameter	R&S®NGC101	R&S®NGC102	R&S®NGC103
Number of output channels	1	2	3
Maximum output current per channel	10 A	5 A	3 A
Maximum output power per channel	100 W	50 W	33 W
Maximum total output power	100 W	100 W	100 W
Output voltage per channel	0 V to 32 V	0 V to 32 V	0 V to 32 V

MORE THAN MEETS YOUR DAILY NEEDS

All channels galvanically isolated and floating

The R&S®NGC100 power supply series consists of instruments with one, two or three channels. The circuitry of each channel is completely isolated from the others; there is no connection to chassis ground. This makes it easy to combine the channels to drive balanced circuitries that might need +12 V/-12 V, for example, and avoids ground problems in complex DUTs.

All channels have the same voltage range

In contrast to other power supplies on the market, the R&S®NGC100 power supplies offer the same voltage range on all channels. You can select any channel for a specific application. Each channel can be regarded as a separate power supply.

All channels have overload and short-circuit protection

Even the most experienced user is occasionally distracted – so it is good to know that since the outputs are protected against overloads and short circuits, the R&S®NGC100 power supplies will not be damaged.

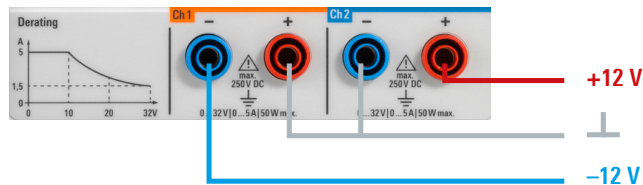
Parallel and serial operation

Because all channels are electrically equivalent, they can be combined in serial mode to achieve higher voltages. Up to 96 V can be achieved with the R&S®NGC103.

In parallel mode, the channels can be bundled for higher current. Up to 10 A can be achieved when two channels of the R&S®NGC102 are combined.

Supplying balanced circuits

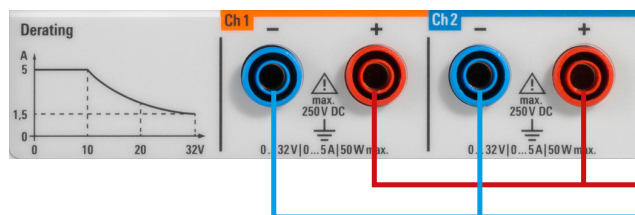
Two channels can be connected together to supply balanced circuits with e.g. +12 V/-12 V.



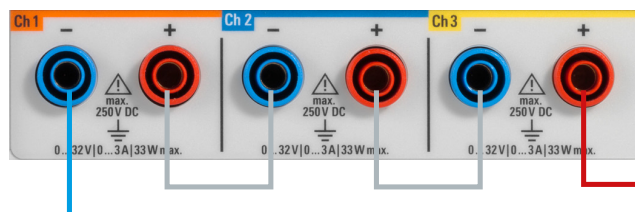
Parallel and serial operation

The output channels can be configured in parallel to achieve higher output current, or in series for higher output voltage.

Parallel operation: max. 10 A



Serial operation: max. 96 V



R&S®NGC101 single-channel instrument



R&S®NGC102 two-channel instrument

Constant voltage and constant current modes

Configuring and regulating the output voltage (constant voltage mode) is the standard application for power supplies. However, the R&S®NGC100 power supplies can also be used in constant current mode, with each channel separately configurable. If the configured current level is exceeded, current limiting ensures that only the configured current can flow. The output voltage is accordingly reduced below the configured value. This prevents damage to the test circuit in the event of a fault.

Tracking function

The separate output channels can be used as independent power sources, but their true versatility becomes evident when combined. The channels can be connected in parallel to achieve higher currents or in series for higher voltages. The convenient tracking function lets you vary the voltage on all channels in parallel.

Protection functions to safeguard the instrument and DUT

Multipurpose protection functions are not standard in basic class power supplies. Here, the R&S®NGC100 power supply series raises the bar once again. For example, the limit values for all protection functions can be configured separately for each channel.

Overvoltage protection (OVP)

If the voltage rises above the configured maximum value, the output is switched off and the "OVP" indicator on the display blinks. Depending on the setting, the voltage configured on the instrument or the voltage measured by the instrument is used as the switching threshold for OVP.

Overpower protection (OPP)

Alternatively, instead of the maximum voltage, the maximum power can be set and used as the switch-off parameter.

Overcurrent protection (electronic fuse, OCP)

To provide even better protection for sensitive loads, each channel of the R&S®NGC100 power supplies is equipped with an electronic fuse that can be set separately. If a configured current level is exceeded, the affected output channel will be automatically switched off and the fuse symbol on the display blinks red.

The electronic fuse can be linked to other channels (FuseLink function). If a channel exceeds the maximum current level, then this channel and all linked channels will be switched off.

Even the delay time of the electronic fuses can be set. With this functionality, you can adjust the behavior of the power supply so that the electronic fuse is not tripped by short current spikes that occur when a channel is switched on.

Overtemperature protection (OTP)

The R&S®NGC100 power supplies have internal overtemperature protection that switches off the output channel if there is an imminent risk of thermal overload.

Modern instrument concept: small, compact and quiet

Universal power supplies need to fulfill many demands:

- ▶ They have to work reliably even with unstable electricity.
- ▶ They should be small and compact. The switching regulator makes the R&S®NGC100 highly efficient. It reduces weight and size and requires a lower fan speed, which results in low noise.
- ▶ They should provide stable output voltages/currents with low ripple and noise. This is implemented by using linear control circuitry for stabilization.



R&S®NGC103 three-channel instrument



R&S®NGC103-G rear view

IDEAL FOR LABS AND TEST SYSTEMS

Tailored for use in labs and system racks

There is never enough space on the bench or in the rack. The R&S®NGC100 power supplies take up very little space thanks to their compact design. Since the built-in fan is temperature-controlled, it often runs at a low speed or powers down completely, resulting in very low operating noise.

Remote control functions and rack adapters are essential in system applications. Access to rear panel connections and compact design are key factors for use in test systems.

The R&S®NGC100 power supplies fulfill all these requirements – particularly the R&S®NGC103, which combines three electronically equivalent channels in a compact package.

The instruments can be installed in 19" racks using the R&S®HZC95 rack adapter.

Two R&S®NGC103 models side by side provide six channels on two rack units. For adequate cooling, ensure a minimum of one rack unit of space above a R&S®NGC100.

Remote sensing for more stringent accuracy requirements

There is often a significant voltage drop over the connection leads, especially in applications with high current consumption. Since power supplies usually maintain a constant output voltage, the voltage on the DUT will be lower than the voltage displayed on the instrument. The remote sensing function compensates for this voltage drop over the supply leads. The voltage actually present at the load is measured by an additional pair of sense lines, and this value is used to regulate the voltage directly at the load. The R&S®NGC100 power supplies provide separate sense lines for each output channel.

Connections on front and rear panels

The safety sockets on the front panel of the R&S®NGC100 power supplies are designed for 4 mm banana plugs. Additional connections for all channels, including sense lines, are provided on the rear panel to simplify use in rack systems.

Remote control of instrument functions

All instruments in the R&S®NGC100 series can be remotely controlled for use in test systems. The standard commands for programmable instruments (SCPI) scripting language is used. The following interfaces are available:

USB/LAN dual interface

All models of the R&S®NGC100 power supplies have a standard dual interface with USB and LAN ports.



IEEE-488 (GPIB) interface

The R&S®NGC100-G power supplies are special versions with an IEEE-488 (GPIB) port in addition to the USB and LAN interfaces.

Note: the IEEE-488 (GPIB) port cannot be retrofitted to the standard versions.



SPECIFICATIONS

Definitions

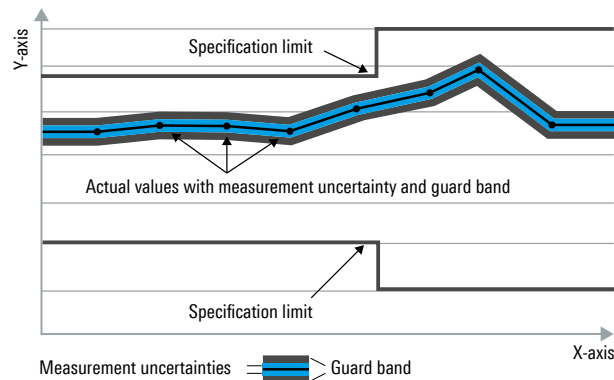
General

Product data applies under the following conditions:

- ▶ Three hours of storage at ambient temperature followed by 30 minutes of warm-up operation
- ▶ All data is valid at +23°C (-3°C/+7°C) after 30 minutes of warm-up time
- ▶ Specified environmental conditions met
- ▶ Recommended calibration interval adhered to
- ▶ All internal automatic adjustments performed, if applicable

Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as $<$, \leq , $>$, \geq , \pm or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value, e.g. dimensions or resolution of a setting parameter. Compliance is ensured by design.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with $<$, $>$ or as a range, it represents the performance met by approximately 80% of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter, e.g. nominal impedance. In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bit per second (Gbps), million bit per second (Mbps), thousand bit per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

Electrical specifications

Outputs	All channel outputs are galvanically isolated and not connected to ground.	
Number of output channels	R&S®NGC101	1
	R&S®NGC102	2
	R&S®NGC103	3
Maximum total output power	all models	100 W
Maximum output power per channel	R&S®NGC101	100 W
	R&S®NGC102	50 W
	R&S®NGC103	33 W
Output voltage per channel	all models	0 V to 32 V
Maximum output current per channel	R&S®NGC101	10 A
	R&S®NGC102	5 A
	R&S®NGC103	3 A
Maximum voltage in serial operation	R&S®NGC102	64 V
	R&S®NGC103	96 V
Maximum current in parallel operation	R&S®NGC102	10 A
	R&S®NGC103	9 A
Voltage ripple and noise	20 Hz to 20 MHz	
	R&S®NGC101	< 1 mV (RMS) (meas.); < 5 mV (peak-to-peak) (meas.)
	R&S®NGC102/R&S®NGC103	< 450 µV (RMS) (meas.); < 4 mV (peak-to-peak) (meas.)
Current ripple and noise	R&S®NGC101	< 1.5 mA (RMS) (meas.)
	R&S®NGC102/R&S®NGC103	< 1 mA (RMS) (meas.)
Load regulation	load change from 10% to 90%	
Voltage	±(% of output + offset)	
	R&S®NGC101/R&S®NGC102	< 0.03% + 5 mV (meas.)
	R&S®NGC103	< 0.02% + 3 mV (meas.)
Current	±(% of output + offset)	
	R&S®NGC101/R&S®NGC102	< 0.03% + 300 µA (meas.)
	R&S®NGC103	< 0.03% + 200 µA (meas.)
Load recovery time	to within ±20 mV of the set nominal voltage	< 1 ms (meas.)
Line regulation	±10% change in mains voltage	
Voltage	±(% of output + offset)	
	R&S®NGC101/R&S®NGC102	< 0.03% + 5 mV (meas.)
	R&S®NGC103	< 0.02% + 3 mV (meas.)
Current	±(% of output + offset)	
	R&S®NGC101/R&S®NGC102	< 0.03% + 300 µA (meas.)
	R&S®NGC103	< 0.03% + 200 µA (meas.)
Output voltage overshoot at turn-off of mains power and active channel output	all models	< 100 mV (meas.)
Rise time	10% to 90% of rated output voltage, resistive load (full load)	R&S®NGC101: < 1 ms (meas.); R&S®NGC102: < 1.2 ms (meas.); R&S®NGC103: < 0.8 ms (meas.)
Fall time	90% to 10% of rated output voltage, resistive load (full load)	R&S®NGC101: < 1.5 ms (meas.); R&S®NGC102: < 3.6 ms (meas.); R&S®NGC103: < 3.6 ms (meas.)
Programming resolution		
Voltage	1 mV	
Current	R&S®NGC101	I < 1 A: 0.5 mA; I ≥ 1 A: 1 mA
	R&S®NGC102/R&S®NGC103	I < 1 A: 0.1 mA; I ≥ 1 A: 1 mA
Programming accuracy		
Voltage	±(% of output + offset)	
Current	±(% of output + offset)	
	R&S®NGC101	< 0.2% + 10 mA
	R&S®NGC102	< 0.1% + 5 mA
R&S®NGC103	< 0.05% + 2 mA	

Output measurements		
Measurement functions		voltage, current, power, energy
Readback resolution		
Voltage		1 mV
Current	R&S®NGC101	I < 1 A: 0.5 mA; I ≥ 1 A: 1 mA
	R&S®NGC102/R&S®NGC103	I < 1 A: 0.1 mA; I ≥ 1 A: 1 mA
Readback accuracy		
Voltage	±(% of output + offset)	< 0.05% + 2 mV
Current	±(% of output + offset)	
	R&S®NGC101	< 0.15% + 10 mA
	R&S®NGC102	< 0.05% + 4 mA
	R&S®NGC103	< 0.05% + 2 mA
Temperature coefficient (per °C)		
	+5°C to +20°C and +30°C to +40°C	
Voltage	±(% of output + offset)	0.02% + 3 mV
Current	±(% of output + offset)	0.02% + 3 mA
Remote sensing		
		yes, for each channel
Ratings		
Maximum voltage to earth		250 V DC
Maximum counter voltage	voltage with same polarity connected to the outputs	33 V
Maximum reverse voltage	voltage with opposite polarity connected to the outputs	0.4 V
Maximum reverse current		3 A
Remote control mode		
Command processing time		< 30 ms (nom.)
Protection functions		
Overvoltage protection		
Programming resolution		adjustable for each channel 1 mV
Overpower protection		
		adjustable for each channel
Overcurrent protection (electronic fuse)		
Programming resolution		adjustable for each channel same as programming resolution current
Response time		< 10 ms (meas.)
Fuse linking (FuseLink function)	R&S®NGC102/R&S®NGC103	yes
Response time of linked channels	R&S®NGC102/R&S®NGC103	< 100 µs (meas.) + response time of linked channel
Fuse delay at output-on	adjustable for each channel	10 ms to 10 s (10 ms increments)
Overtemperature protection		
		independent for each channel
Special functions		
Output ramp function (EasyRamp)		
	all models	EasyRamp
EasyRamp time		10 ms to 10 s (10 ms increments)
Output delay		
	R&S®NGC102/R&S®NGC103	
Synchronicity		< 100 µs (meas.)
Delay per channel		1 ms to 60 s (1 ms increments)
Arbitrary function (EasyArb)		
	all models	
Parameters		voltage, current, time
Maximum number of points		512
Dwell time		10 ms to 600 ms (10 ms increments)
Repetition		continuous or burst mode with 1 to 255 repetitions
Trigger		manually, remote control or via trigger input
Statistics (sampling time)		
	all models	
	voltage	minimum, maximum, mean (10 ms)
	current	minimum, maximum, mean (10 ms)
	power	minimum, maximum, mean (10 ms)
	energy	10 ms

Special functions		
Digital trigger and control interfaces	all models	digital trigger input
Minimum trigger interval		10 ms
Trigger response time		< 1 ms (meas.)
Edge direction		rising, falling
Input level		TTL
Analog control interface	all models	
Control parameter		voltage or current
Input voltage		0 V to 10 V
Minimum input resistance		10 kΩ
Input current		4 mA to 20 mA
Shunt resistance		250 Ω
Acquisition rate V/I interface		10 sample/s
Maximum response time		150 ms
Resolution		14 bit
Data logging	all models	
Maximum acquisition rate		1000 sample/s
Memory depth	internal	512 kbyte
	external	USB flash drive (max. 4 Gbyte)
Voltage resolution	≤ 100 sample/s	1 mV
	1000 sample/s	10 mV
Current resolution	≤ 100 sample/s	R&S®NGC101/NGC102: 1 mA, R&S®NGC103: 0.1 mA
	1000 sample/s	R&S®NGC101/NGC102: 10 mA, R&S®NGC103: 1 mA
Display and interfaces		
Display		3.5", QVGA
Front panel connections	channel outputs	4 mm safety sockets
Rear panel connections		16-pin connector block
Remote control interfaces	all models	USB-TMC, USB-CDC (virtual COM), LAN
	additionally on R&S®NGC100-G models	IEEE-488 (GPIB)
General data		
Environmental conditions		
Temperature	operating temperature range	+5°C to +40°C
	storage temperature range	-20°C to +70°C
Humidity	noncondensing	5% to 80%
Altitude	operating altitude	max. 2000 m above sea level
Power rating		
Mains nominal voltage		100 V to 240 V (± 10%)
Mains frequency		50 Hz to 60 Hz
Maximum power consumption		200 W (meas.)
Mains fuses		T3.15H 250 V
Rated current		max. 2.5 A (meas.)
Product conformity		
Electromagnetic compatibility	EU: in line with Radio Equipment Directive 2014/30/EU UK: in line with Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091) Korea	applied harmonized standards: ► EN 61326-1 ► EN 55011 (Class A) KC mark
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU UK: in line with Electrical Equipment (Safety) Regulations 2016 USA, Canada	applied harmonized standard: EN 61010-1 CSA C22.2 No. 61010-1
RoHS	EU: in line with EU Directive 2011/65/EU UK: in line with Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012/3032)	applied harmonized standard: EN IEC 63000

General data**Mechanical resistance**

Vibration	sinusoidal	5 Hz to 55 Hz, 0.3 mm (peak-to-peak) amplitude const., 55 Hz to 150 Hz, 0.5 g const., in line with EN60068-2-6
	random	8 Hz to 500 Hz, 1.2 g (RMS), in all three axes, in line with EN60068-2-64
Shock		10 Hz to 45 Hz, ramp 6 dB/octave, 45 Hz to 2 MHz: max. 40 g in line with MIL-STD-810E

Mechanical data

Dimensions (W × H × D)	all models	222 mm × 97 mm × 291 mm (8.74 in × 3.82 in × 11.46 in)
Weight	R&S®NGC100 models	2.6 kg (5.73 lb)
	R&S®NGC100-G models	2.7 kg (5.95 lb)
Rack installation		R&S®HZC95 option (½ 19", 2 HU)
Recommended calibration interval	40 h/week operation over entire range of specified environmental conditions	1 year

ORDERING INFORMATION

Designation	Type	Order No.
Base unit		
Single-channel power supply	R&S®NGC101	3657.2288.02
Single-channel power supply, GPIB	R&S®NGC101-G	3657.2288.03
Two-channel power supply	R&S®NGC102	3657.2359.02
Two-channel power supply, GPIB	R&S®NGC102-G	3657.2359.03
Three-channel power supply	R&S®NGC103	3657.2413.02
Three-channel power supply, GPIB	R&S®NGC103-G	3657.2413.03
Included accessories		
Set of power cables, quick start guide		
System components		
19" rack adapter, 2 HU, for one or two R&S®NGC100 power supplies	R&S®HZC95	5800.2054.02

Warranty		
Base unit		3 years
All other items ¹⁾		1 year
Service options		
Extended warranty, one year	R&S®WE1	
Extended warranty, two years	R&S®WE2	Contact your local Rohde & Schwarz sales office.
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	

¹⁾ For options installed, the remaining base unit warranty applies if longer than one year. Exception: all batteries have a one-year warranty.

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- ▶ Worldwide
- ▶ Local and personalized
- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

Rohde & Schwarz

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Sustainable product design

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- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management
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Rohde & Schwarz training

www.training.rohde-schwarz.com

Rohde & Schwarz customer support

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