R&S®ESSENTIALS

R&S®NGE100B POWER SUPPLY SERIES

Reduced to the max

Data Sheet
Version 02.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

The R&S®NGE100B power supply series consists of robust, high-performance, affordable instruments. They offer high efficiency combined with low ripple plus a variety of convenience functions that are not usually found in this class of power supplies.

The R&S®NGE100B power supply series consists of the R&S®NGE102B two-channel power supply and the R&S®NGE103B three-channel power supply. Both instruments provide up to 33.6 W output power per channel.

Unlike most power supplies in this class, the R&S®NGE100B power supplies feature 100 % electrically equivalent output channels. All outputs are floating and short-circuit proof. The output channels can be combined in serial or in parallel to achieve higher voltages or higher currents (up to 96 V or up to 9 A using all three channels of the R&S®NGE103B).

All basic functions of the R&S®NGE100B power supplies can be operated directly via keys on the front panel. The rotary knob plays the central role in adjusting the voltage and current and setting the limits for the multipurpose protection functions. The operating conditions of all channels are displayed on the screen simultaneously. Active channels are indicated by the illuminated channel key. Active outputs are shown in green when working in constant voltage mode and in red when working in constant current mode. Inactive outputs are displayed in white.

To safeguard the instrument and the device under test (DUT), the R&S®NGE100B power supplies provide a variety of protection functions. For each channel, users can separately set the maximum current (electronic fuse, overcurrent protection/OCP), the maximum voltage (overvoltage protection/OVP) and the maximum power (overpower protection/OPP). If such a limit is reached, the affected output channel will be switched off. Overtemperature protection (OTP) prevents the instrument from overheating.

In industrial applications, power supplies are often installed in 19" racks. The R&S®HZC95 rack adapter allows the power supplies to be mounted in racks. The R&S®NGE100B power supplies can be remotely controlled via USB or optionally via Ethernet.

Key facts

- R&S®NGE102B with two channels or R&S®NGE103B with three channels
- Maximum output power of 66 W with R&S®NGE102B, 100 W with R&S®NGE103B (33.6 W per channel)
- Maximum output voltage of 32 V per channel (up to 64 V/96 V in serial operation)
- Maximum output current of 3 A per channel (up to 6 A/9 A in parallel operation)
- Electronic fuse (OCP), overvoltage protection (OVP), overpower protection (OPP), overtemperature protection (OTP)
- USB interface (CDC/TMC), optional LAN (LXI)
- Optional digital I/O (4 bit)

BENEFITS

Meets your daily needs
▶ page 5

Easy operation
▶ page 6

Connectivity: everything you need
▶ page 7

Model overview		
Parameter	**R&S®NGE102B**	**R&S®NGE103B**
Number of output channels	2	3
Total output power	66 W	100 W
Maximum output power per channel	33.6 W	
Output voltage per channel	0 V to 32 V	
Maximum output current per channel	3 A	

Front view of the R&S®NGE102B

Front view of the R&S®NGE103B

Rear view of the R&S®NGE103B

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

MEETS YOUR DAILY NEEDS

All channels galvanically isolated and floating

The R&S®NGE102B and R&S®NGE103B power supplies offer the choice between 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 bipolar circuitries that might need +12 V/–12 V, for example, and avoids ground problems in complex DUTs.

All channels electrically equivalent with the same voltage, current and power

In contrast to other power supplies on the market, the R&S®NGE100B power supplies feature electrically identical channels. Offering the same voltage, current and power, there is no limitation in selecting a channel for a specific application. Each channel can be regarded as a separate power supply.

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®NGE103B and up to 64 V with the R&S®NGE102B. In parallel mode, the channels can be bundled for higher current. Up to 6 A can be achieved when combining two channels. Using all three channels of the R&S®NGE103B, even 9 A is possible.

Short-circuit-proof outputs

Whatever might happen when unskilled students gain their first experience in practical work with electronics, all outputs of the R&S®NGE100B power supply series are short-circuit proof and will therefore not be damaged.

Tailored to be used in education, labs and system racks

Protection functions to safeguard instrument and DUT

Multipurpose protection functions are not standard in basic class power supplies. Here, the R&S®NGE100B power supply series raises the bar once again.
For each channel, users can separately set the:

- Maximum current (electronic fuse, overcurrent protection/OCP)
- Maximum voltage (overvoltage protection/OVP)
- Maximum power (overpower protection/OPP)

If such a limit is reached, the affected output channel will be automatically switched off and a message (FUSE, OVP or OPP) will be displayed. The overcurrent protection can be linked to other channels (FuseLink function). In this case, the channel exceeding the maximum current level and all linked channels will be switched off.

Even the delay time of the electronic fuses can be set. With this functionality, users can define the behavior of the power supply to prevent too early switch-off due to a short current spike.

The R&S®NGE100B power supplies have internal overtemperature protection that switches off the channel if there is an imminent risk of thermal overload.

Modern architecture, small, compact and quiet

Universal power supplies need to fulfill many demands:

- They have to work reliably even in countries with unstable electricity.
- They should be small and compact. The switching regulator makes the R&S®NGE100B 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. This is implemented by using linear control circuitry for stabilization.

Tailored to be used in education, labs and system racks

Basic class power supplies offer the functionality you need in daily work – and the R&S®NGE100B power supply series even offers a bit more. Students should find all the functions they need for training, but will not be confused by exotic functions. Power supplies used in standard applications on the bench should be affordable and robust, offering the necessary accuracy and speed. If the instrument is to be installed in a rack, remote control and rack integration are recommended. The R&S®NGE100B power supply series fulfills all these requirements.

EASY OPERATION

Straightforward operation

All basic R&S®NGE100B power supply functions can be operated directly via keys on the front panel – no need to maneuver through a jungle of menus. Just press the "Voltage" key, select an output channel and use the rotary knob or arrow keys to adjust the desired voltage in steps as small as 10 mV. You can similarly set a constant output current with a resolution as fine as 1 mA.

If channels need to be operated simultaneously, for example to increase the voltage of a device from ±12 V to ±15 V, press the "Track" key and select the two channels for the positive and negative voltages. Now you can use the rotary knob to symmetrically adjust the two voltages. Activating and deactivating the electronic fuses is just as easy – simply press one key on the front panel.

Color coding of operating conditions

All operating conditions are shown clearly on the 3.5" QVGA display (320 × 240 pixel), including the output power and the status of any protection functions. Colors indicate the different operating conditions:

- Active outputs are displayed in green when working in constant voltage mode and in red when working in constant current mode.
- Inactive outputs are displayed in white. Whenever a channel is in the setting mode, the digit being adjusted is indicated by a blue background.

Convenience functions for special applications

Some applications require the voltage or current to be varied during a test sequence, for example to simulate different charging conditions of a battery. Here, the EasyArb function is a convenient solution that is not usually found in basic class power supplies. It lets you program time/voltage and time/current sequences, either manually via the user interface or via the external interfaces.

Sometimes test sequences have to simulate operating conditions where an abrupt increase in the supply voltage has to be avoided. The EasyRamp function of the R&S®NGE100B power supply series offers the solution. The output voltage can be increased continuously within a 10 ms to 10 s timeframe. Of course, the EasyArb and EasyRamp functions can both be controlled manually or remotely.

Tracking and link functions

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 let you vary the voltage on all channels in parallel.

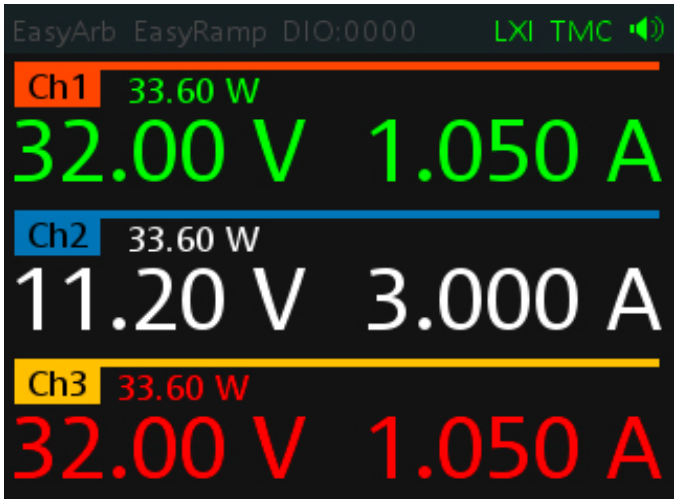
The link function of the electronic fuse makes the instrument even more versatile. You can set up the power supply so that all channels are switched off if one channel reaches its limit. Or you can set it up to leave one channel working, for example to keep the fan powered to cool down the DUT. The status of fuses and all other protection functions is always shown on the display.

Five memory keys to save/recall instrument settings

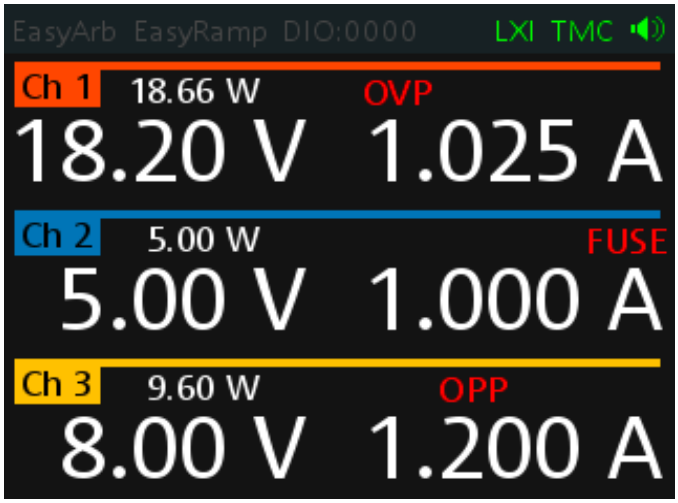
Frequently used instrument settings can be easily stored/recalled via five memory keys on the front panel.

The different operating conditions are color coded:

- Green: constant voltage operation
- Red: constant current operation
- White: inactive channels



Activated protection functions are always displayed on the screen



CONNECTIVITY: EVERYTHING YOU NEED

Front connectors with 4 mm safety binding posts

The output connectors on the front of the R&S®NGE100B power supplies can hold 4 mm safety banana plugs and can clamp stripped cables – a common occurrence in educational applications. The connectors are robust enough to survive generations of students.

USB interface (virtual COM port and TMC class)

External PCs can control the instrument via the USB interface.

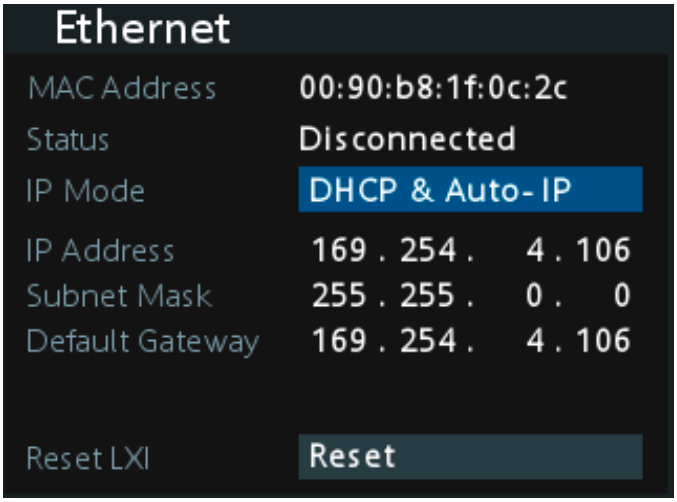
LAN interface (LXI) with integrated web server

In addition to the standard USB connector, the R&S®NGE100B power supply series offers an optional Ethernet interface (R&S®NGE-K101), which you can activate with a keycode that has to be ordered separately. This option allows you to remotely control all instrument parameters. You can use a fixed IP address or the DHCP function, which allocates dynamic IP addresses. The Ethernet function offers a web server that can be used by standard web browsers.

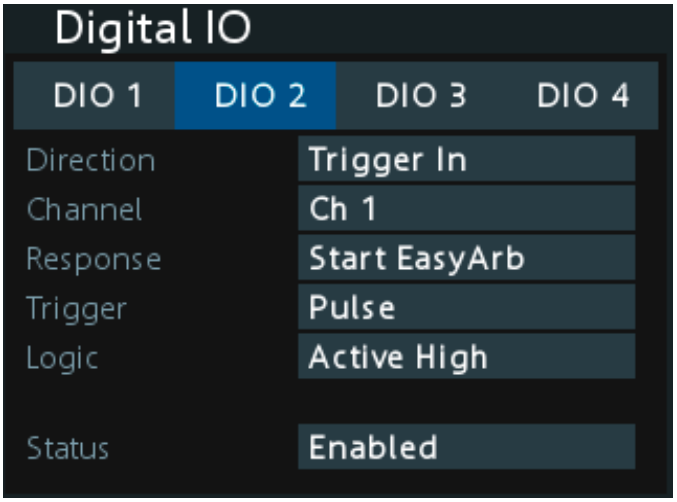
Digital trigger in/out (4 bit) on the rear

Another option for the R&S®NGE100B power supply series is a set of 4-bit digital in/out interfaces that can be individually used as trigger inputs or outputs. Similar to the other options, the hardware of the R&S®NGE-K103 option is already installed and you can activate the functionality with a keycode that has to be ordered separately.

LAN interface with integrated web server (R&S®NGE-K101 option)



Example: channel 1 of the optional digital I/O interface (R&S®NGE-K103) is used as a trigger input



SPECIFICATIONS

Definitions

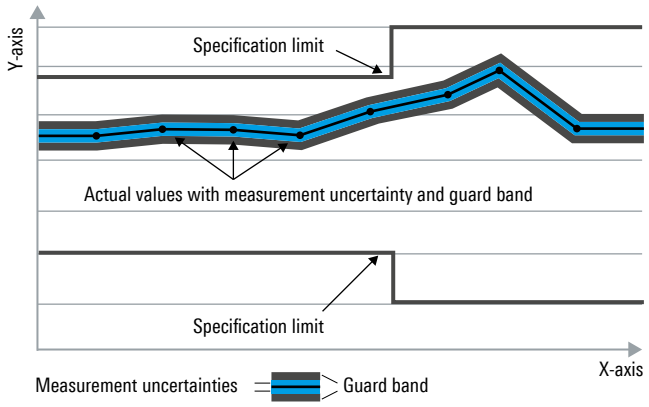
General

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 <, ≤, >, ≥, ± 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	The channel outputs are galvanically isolated and not connected to ground.	
Number of output channels	R&S®NGE102B	2
	R&S®NGE103B	3
Maximum total output power	R&S®NGE102B	66 W
	R&S®NGE103B	100 W
Maximum output power per channel		33.6 W
Output voltage per channel		0 V to 32 V
Maximum output current per channel		3 A
Maximum voltage in serial operation	R&S®NGE102B	64 V
	R&S®NGE103B	96 V
Maximum current in parallel operation	R&S®NGE102B	6 A
	R&S®NGE103B	9 A
Voltage ripple and noise	20 Hz to 20 MHz	< 1.5 mV (RMS) (typ.), < 20 mV (peak-to-peak) (meas.)
Current ripple and noise	20 Hz to 20 MHz	< 2 mA (RMS) (meas.)
Load regulation	load change: 10% to 90%	
Voltage	± (% of output + offset)	< 0.1% + 20 mV
Current	± (% of output + offset)	< 0.1% + 5 mA
Load recovery time	10% to 90% load change within a band of ± 30 mV of set voltage	< 200 µs (meas.)
Rise time	10% to 90% of rated output voltage, resistive load	< 1 ms
Fall time	90% to 10% of rated output voltage, resistive load	full load: < 5 ms, no load: < 10 ms
Programming resolution		
Voltage		10 mV
Current		1 mA
Programming accuracy		
Voltage	± (% of output + offset)	< 0.1% + 30 mV
Current	± (% of output + offset)	< 0.1% + 5 mA

Output measurements

Measurement functions		voltage, current, power
Readback resolution		
Voltage		10 mV
Current		1 mA
Readback accuracy		
Voltage	± (% of output + offset)	< 0.1% + 20 mV
Current	± (% of output + offset)	< 0.1% + 5 mA
Temperature coefficient (per °C)	+5°C to +20°C and +30°C to +40°C	
Voltage	± (% of output + offset)	< 0.02% + 5 mV per K
Current	± (% of output + offset)	< 0.02% + 3 mA per K

Ratings

Maximum voltage to earth		150 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	for 5 min max.	3 A

Remote control

Command processing time		≤ 30 ms (nom.)

Protection functions		
Overvoltage protection		adjustable for each channel
Programming resolution		10 mV
Overpower protection		adjustable for each channel
Overcurrent protection (electronic fuse)		adjustable for each channel
Programming resolution		1 mA
Response time	(I_{load} > I_{resp} × 2)	< 3 ms
Fuse linking (FuseLink function)		yes
Fuse delay time	adjustable for each channel	10 ms to 10 s (10 ms increments)
Response time for linked channels		< 40 ms (typ.)
Overtemperature protection	independent for each channel	yes

Special functions		
Output ramp function		EasyRamp
EasyRamp time		10 ms to 10 s (10 ms increments)
Arbitrary function	channel 1 only	EasyArb
Parameters		voltage, current, time
Maximum number of points		128
Dwell time		10 ms to 600 s (10 ms increments)
Repetition		continuous or burst mode with 1 to 255 repetitions
Trigger	optional (R&S®NGE-K103)	manually, remote control or via optional trigger input
Trigger and control interface	optional (R&S®NGE-K103)	digital I/O
Trigger response time		< 150 ms
Maximum voltage (IN/OUT)		5 V
Input level		TTL
Maximum drain current (OUT)		10 mA

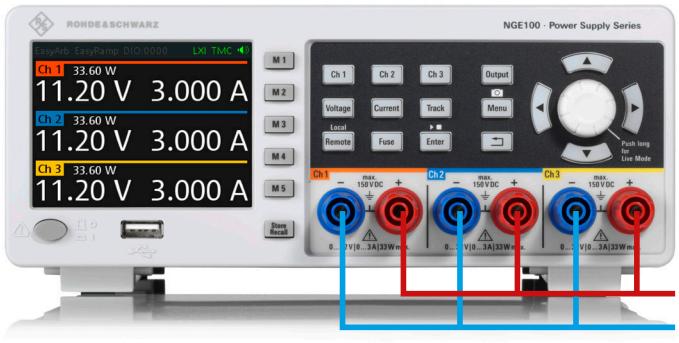
Display and interfaces		
Display		3.5"/QVGA
Front panel connections	channel outputs	4 mm safety binding posts
Remote control interfaces	standard	USB-TMC, USB-CDC (virtual COM)
	optional (R&S®NGE-K101)	LAN (LXI)
Trigger and control interface	optional (R&S®NGE-K103)	digital I/O

General data		
Environmental conditions		
Temperature	operating temperature range	0 °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		115 V/230 V (± 10 %)
Mains frequency		50 Hz to 60 Hz
Maximum power consumption		180 W (meas.)
Rated current		max. 2 A (meas.)
Mains fuses	115 V AC power source	IEC 60127-2/5 T 5 A 250 V
	230 V AC power source	IEC 60127-2/5 T 2.5 A 250 V

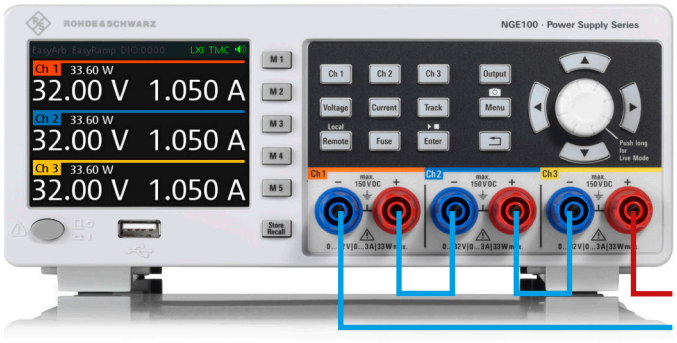
General data		
Product conformity		
Electromagnetic compatibility	EU: in line with EU EMC Directive 2014/30/EU; UK: in line with Electromagnetic Compatibility Regulations 2016 (S.I.2016/1091); for serial numbers ≥ 110000	applied standards: ► EN 61326-1 ► EN 55011 (Class A) ► EN 61326-2-1
	Korea	KC mark
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU; UK: in line with Electrical Equipment (Safety) Regulations 2016 (S.I.2016/1101)	applied harmonized standard: EN 61010-1
	USA	UL 61010-1
	Canada	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)	EN IEC 63000
International safety approvals	cTUVus mark	certificate no. U8 087787 0030
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.30 mm (peak-to-peak) amplitude const., 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6
	random	8 Hz to 500 Hz, 1.2 g (RMS), in all three axes, in line with EN 60068-2-64
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	222 mm × 97 mm × 310 mm (8.74 in × 3.82 in × 12.21 in)
Weight	R&S®NGE102B	4.9 kg (10.80 lb)
	R&S®NGE103B	5.0 kg (11.00 lb)
Rack installation	R&S®HZC95	½ 19", 2 HU
Recommended calibration interval	40 h/week over entire range of the specified environmental conditions	1 year

Parallel and serial operation

Parallel operation: max. 9 A



Serial operation: max. 96 V



ORDERING INFORMATION

Designation	Type	Order No.
Base unit		
Two-channel power supply	R&S®NGE102B	5601.3800.02
Three-channel power supply	R&S®NGE103B	5601.3800.03
Accessories supplied		
Set of power cables, quick start guide		
Software options		
Ethernet remote control	R&S®NGE-K101	5601.2204.03
Digital trigger I/O	R&S®NGE-K103	5601.2227.03
System components		
19" rack adapter, 2 HU	R&S®HZC95	5800.2054.02

Warranty		
Base unit		3 years
All other items [1]		1 year
Options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde&Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	

Extended warranty with a term of one and two years (WE1 and WE2)
Repairs carried out during the contract term are free of charge[2]. Necessary calibration and adjustments carried out during repairs are also covered.

Extended warranty with calibration coverage (CW1 and CW2)
Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde&Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs[2] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

Extended warranty with accredited calibration (AW1 and AW2)
Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde&Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs[2] and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

[1] For options installed, the remaining base unit warranty applies if longer than one year. Exception: all batteries have a one-year warranty.
[2] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

FROM PRESALES TO SERVICE. AT YOUR DOORSTEP.

The Rohde&Schwarz network in over 70 countries ensures optimum on-site support by highly qualified experts.

User risks are reduced to a minimum at all project stages:

- Solution finding/purchase
- Technical startup/application development/integration
- Training
- Operation/calibration/repair

Service at Rohde&Schwarz
You're in great hands

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

Rohde&Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

Rohde&Schwarz training
www.training.rohde-schwarz.com

Rohde&Schwarz customer support
www.rohde-schwarz.com/support

PD 5216.1370.32 | Version 02.00 | January 2024 (sk)
R&S®NGE100B Power Supply Series

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