

Product Datasheet - Technical Specifications



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Your contact

Technical and commercial sales, price information,
quotations, demo/test equipment, consulting:

Tel.: **+49 - (0)81 41 - 52 71-0**

FAX: **+49 - (0)81 41 - 52 71-129**

E-Mail: sales@meilhaus.com

Meilhaus Electronic GmbH
Am Sonnenlicht 2
82239 Alling/Germany

Tel. **+49 - (0)81 41 - 52 71-0**
Fax **+49 - (0)81 41 - 52 71-129**
E-Mail sales@meilhaus.com

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R&S® NGE100B

Power Supply Series

Reduced to the max



R&S®NGE100B Power Supply Series 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 comfort 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 earth-free 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 via direct 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) or the maximum power (overpower protection, OPP). If such a limit is reached, the affected output channel will be switched off. Overtemperature protection (OTP) prevents overheating of the instrument.

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, including in combination with R&S®HMC test instruments. The R&S®NGE100B power supplies can be remotely controlled via USB or optionally via Ethernet or even via wireless LAN.

Key facts

- R&S®NGE102B with two or R&S®NGE103B with three channels
- Max. output power of 66 W with R&S®NGE102B, 100 W with R&S®NGE103B (33.6 W per channel)
- Max. output voltage of 32 V per channel (up to 64 V/96 V in serial operation)
- Max. 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 wireless LAN
- Optional digital I/O (4 bit)

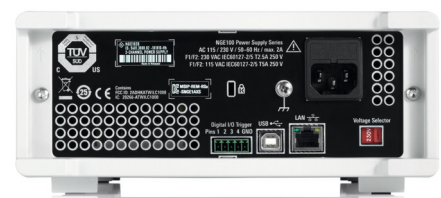
Model overview	R&S®NGE102B	R&S®NGE103B
Number of output channels	2	3
Max. output power	66 W	100 W
Output power per channel	max. 33.6 W	max. 33.6 W
Output voltage per channel	0 V to 32 V	0 V to 32 V
Output current per channel	0 A to 3 A	0 A to 3 A



Front view of the R&S®NGE102B



Front view of the R&S®NGE103B



Rear view of the R&S®NGE100B series

R&S® NGE100B

Power Supply Series

Benefits and key features

Meets your daily needs

- ▮ All channels galvanically isolated and earth-free
- ▮ All channels electrically equivalent with the same voltage, current and power
- ▮ Parallel and serial operation
- ▮ Short-circuit-proof outputs
- ▮ Protection functions to safeguard instrument and DUT
- ▮ Modern architecture; small, compact and quiet
- ▮ Tailored to be used in education, labs and system racks

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Easy operation

- ▮ Straightforward operation
- ▮ Color-coding of operating conditions
- ▮ Comfort features for special applications
- ▮ Tracking and link functions
- ▮ Five memory keys to save/recall instrument settings

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Connectivity – everything you need

- ▮ Front connectors with 4 mm safety binding posts
- ▮ USB interface (virtual COM port and TMC class)
- ▮ LAN interface (LXI) with integrated web server (R&S®NGE-K101 option)
- ▮ Wireless LAN, unique in this class (R&S®NGE-K102 option)
- ▮ Digital trigger in/out (4 bit) on the rear (R&S®NGE-K103 option)

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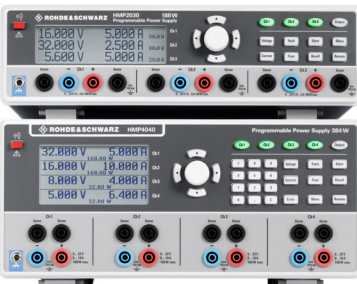
Different classes of power supplies



R&S®NGE103B three-channel power supply

Basic power supplies

- ▮ Affordable, quiet and stable instruments
- ▮ For manual and simple computer-controlled operation
- ▮ In applications where speed and accuracy are a low consideration
- ▮ Used in education, on the bench and in system racks



R&S®HMP2030 three-channel and R&S®HMP4040 four-channel power supply

Performance power supplies

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



R&S®HM8143 three-channel arbitrary power supply

Specialty power supplies

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

Basic class

Performance class

Specialty class

Meets your daily needs

All channels galvanically isolated and earth-free

The R&S®NGE102B and R&S®NGE103B power supplies offer the choice between two or three channels. The circuitry of each single channel is completely separated 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 any 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. Every single channel can be seen 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, 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 are 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 power supplies in the basic class. Here again, the R&S®NGE100B power supply series raises the bar. 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.

Naturally the R&S®NGE100B power supplies come with internal overtemperature protection to switch off the instrument in the case of pending 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
- Power supplies should be small and compact. The switching regulator makes the R&S®NGE100B work very effectively. It reduces weight and size and requires a lower fan speed, which results in low noise
- Power supplies 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

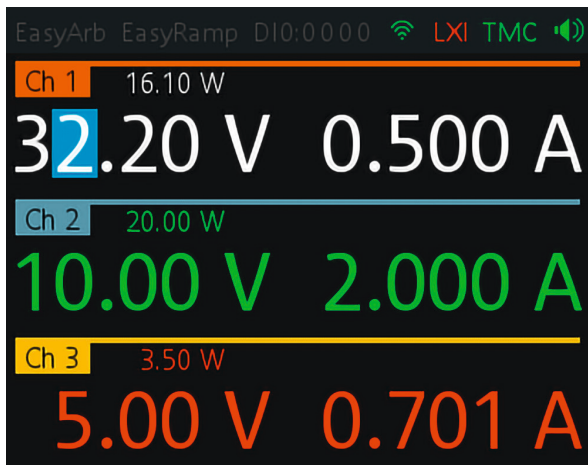
Power supplies in the basic class offer the functionality you need in daily work – and with the R&S®NGE100B power supply series – even a bit more. Students should find all the functions they need for training, but should not be confused by exotic functions. Used in standard applications on the bench, power supplies 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

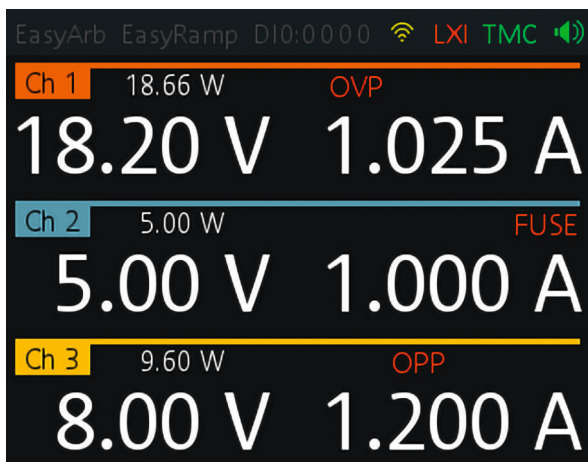
Straightforward operation

All basic R&S®NGE100B power supply functions can be operated via direct 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 the arrow keys to adjust the desired voltage in steps down to 10 mV. A constant output current can be similarly set in steps down to 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, select the two channels for positive and negative voltage and adjust the two voltages. The rotary knob will adjust the two voltages symmetrically. Activating or deactivating the electronic fuses is just as easy – by simply pressing one key on the front panel.



The different operating conditions are marked by colors: constant voltage operation is indicated in green, constant current operation in red, inactive channels are shown in white, a number marked by a blue background indicates that the channel is in setting mode



Executed protection functions are always displayed on the screen

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 protective functions. Colors indicate the different operating conditions:

- 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. Whenever a channel is in the setting mode, the number to be set is marked by a blue background

Comfort features for special applications

Some applications require that the user vary the voltage or the current 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. EasyArb allows the user to program time/voltage or time/current sequences, either manually via the user interface, or via the external interfaces.

Sometimes test sequences have to simulate operating conditions where the abrupt rise of 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 function as individual power supplies, but demonstrate their versatility when combined. Running in parallel, higher currents can be achieved; serial connected channels yield higher voltages. The tracking function allows the user to vary the voltage on all channels in parallel for very convenient operation.

The link function of the electronic fuse makes the instrument even more versatile. Users can set up the power supply so that all channels are switched off if one channel hits its limit. Or it can be set 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 easily be stored/recalled via five memory keys on the front panel.

Connectivity – everything you need

Ethernet	
MAC Address	00:90:b8:1f:0c:2c
Status	Disconnected
IP Mode	DHCP & Auto-IP
IP Address	169 . 254 . 4 . 106
Subnet Mask	255 . 255 . 0 . 0
Default Gateway	169 . 254 . 4 . 106
Reset LXI	Reset

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

WLAN	
MAC Address	f8:f0:05:f1:56:e3
Module	Enabled
Status	Connected
SSID	:S@DAS_SPEKTRUM
Password	●●●●●●●●●●
Connect	Disconnect
IP Address	192 . 168 . 50 . 13
Subnet Mask	255 . 255 . 252 . 0
Gateway	192 . 168 . 48 . 1

Wireless LAN, unique in this class (R&S®NGE-K102 option)

Digital IO			
DIO 1	DIO 2	DIO 3	DIO 4
Direction	Trigger In		
Channel	Ch 1		
Response	Start EasyArb		
Trigger	Pulse		
Logic	Active High		
Status	Enabled		

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

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 or they can clamp stripped cables as very often seen in educational applications. The design of the connectors is robust enough to survive generations of students.

USB interface (virtual COM port and TMC class)

Via the USB interface, the instrument can be controlled from external PCs.

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 can be activated by the customer using a keycode that has to be ordered separately. This option allows the user to remotely control all instrument parameters. A fixed IP address can be used, or, alternatively, the DHCP function might be used to allocate dynamic IP addresses. The Ethernet function offers a web server that can be used by standard web browsers (i.e. Internet Explorer).

The R&S®NGE100B power supply series is LXI certified in line with version 1.4 (LXI Core 2011).

Wireless LAN, unique in this class¹⁾

An alternative to remotely controlling the R&S®NGE100B power supply series is to use the optional wireless LAN interface (R&S®NGE-K102), which has to be ordered separately. Activated by a keycode, the wireless LAN module supports the client mode, meaning the instruments automatically connect to a network. Other power supplies or other test instruments can also be connected. Using a browser, all connected instruments can be operated via the web. In a typical classroom setting, this enables the teacher to control all of the students' instruments or to set them to defined start conditions.

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 the functionality is activated with a keycode that has to be ordered separately.

¹⁾ Note: The wireless LAN functionality is not available in all regions due to country-specific regulations (see page 10).

Specifications

Definitions

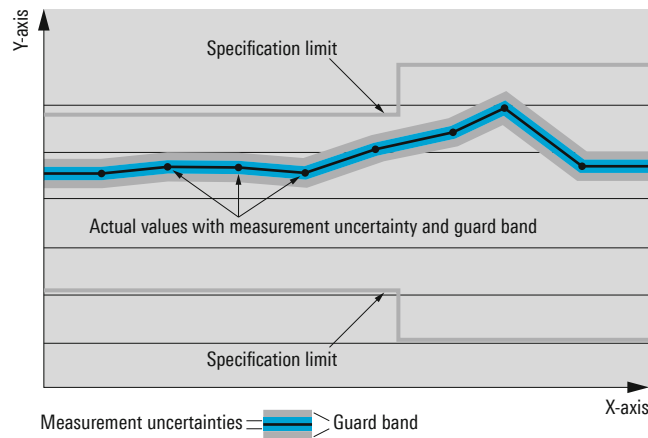
General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- 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/3GPP2 standard, chip rates are specified in Mcps (million chips per second), whereas bit rates and symbol rates are specified in Mbps (million bits per second), kbps (thousand bits per second), Msps (million symbols per second) or ksps (thousand symbols per second), and sample rates are specified in Msample/s (million samples per second). Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

All data is valid at +23°C (-3°C/+ 7°C) after 30 minutes warm-up time.

Electrical specifications		
Outputs		
All channel outputs are galvanically isolated and not connected to ground.		
Number of output channels	R&S®NGE102B	2
	R&S®NGE103B	3
Total output power	R&S®NGE102B	max. 66 W
	R&S®NGE103B	max. 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	typ. < 1.5 mV (RMS) < 20 mV (peak-to-peak) (meas.)
Current ripple and noise	20 Hz to 20 MHz	< 2 mA (RMS) (meas.)
Load regulation		
load change from 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.)
Line regulation		
±10% change in mains voltage		
Voltage	± (% of output + offset)	< 0.1% + 20 mV
Current	± (% of output + offset)	< 0.1% + 5 mA
Output voltage overshoot at turn-off of mains power and active channel output		< 100 mV
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		
+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		3 A

Remote control		
Command processing time		≤ 30 ms
Programming settling time	within 1% of final value	
Positive voltage change	no load	10 ms + command processing time
	full load (resistive)	10 ms + command processing time
Negative voltage change	no load	500 ms + command processing time
	full load (resistive)	10 ms + command processing time

Protection functions		
Overvoltage protection		configurable for each channel
Overpower protection		configurable for each channel
Overcurrent protection (electronic fuse)		configurable for each channel
Response time	$(I_{load} > I_{resp} \times 2)$	< 10 ms
Fuse linking (FuseLink function)		yes
Response time of linked channels		< 100 μs + response time of linked channel
Fuse delay	configurable for each channel	10 ms to 10 s (10 ms increments)
Overtemperature protection		yes

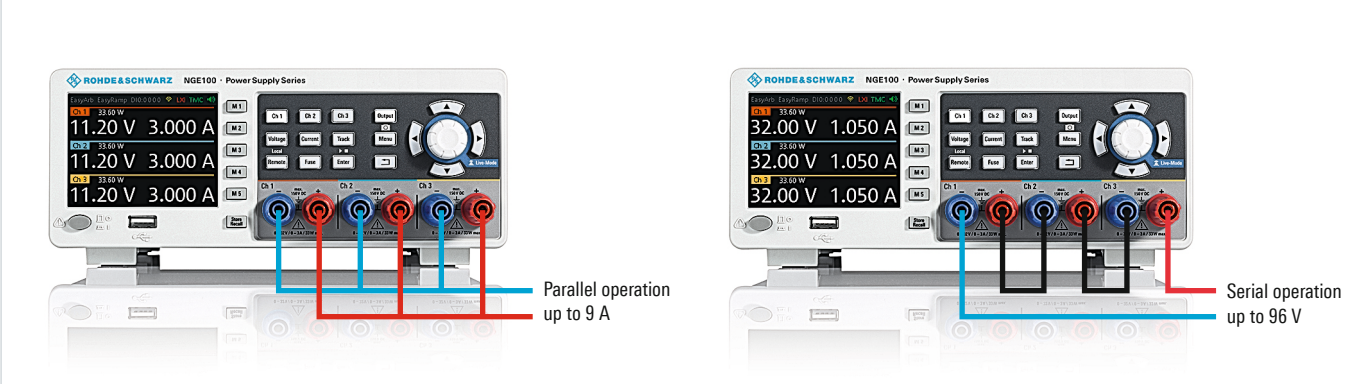
Special functions		
Output ramp function		EasyRamp
EasyRamp time		10 ms to 10 s (10 ms increments)
Arbitrary function		EasyArb
Parameter		voltage, current, time
Maximum number of points		128
Dwell time		10 ms to 600 s (10 ms increments)
Repetition		continuous or burst mode with 1 to 255 repetitions
Trigger	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
Minimum trigger interval		10 ms
Trigger response time		< 150 ms
Trigger level		TTL, max. 5 V
Edge direction		rising, falling

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)
	optional (R&S®NGE-K102)	wireless LAN 802.11 b/g/n, 2.4 GHz; operating mode: client
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%
Power rating		
Mains nominal voltage		115 V/230 V (± 10%)
Mains frequency		50 Hz/60 Hz
Maximum power consumption		180 W

General data		
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
Product conformity		
Electromagnetic compatibility	EU, in line with EU RE Directive 2014/53/EU (notified body: CTC advanced GmbH)	applied standards: EN 61326-1, EN 61326-2-1, DRAFT EN 301 489-1 V 2.2.0, DRAFT EN 301 489-17 V 3.2.0, EN 300 328 V 2.1.1, 47 CFR FCC part 15B (class A), and ICES-003 issue 6
Electrical safety	Korea	KC mark
	EU, in line with Low Voltage Directive 2014/35/EU	EN 61010-1
	USA	UL 61010-1
Wireless LAN certifications	Canada	CSA C22.2 No. 61010-1
	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom	CE
	Singapore	iMDA standards DB102020
	United States, Canada	FCC, IC
RoHS		EN 50581, in line with EU directive 2011/65/EU
International safety approvals	cTUVus mark	certificate no. U8 18 04 87787 008
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.30 mm (peak-to-peak) amplitude const., 55 Hz to 155 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 2000 Hz: max. 40 g in line with MIL-STD-810E
Mechanical data		
Dimensions	W x H x D	222 mm x 97 mm x 310 mm (8.74 in x 3.82 in x 12.21 in)
Weight	R&S®NGE102B	4.9 kg (10.80 lb)
	R&S®NGE103B	5.0 kg (11.00 lb)
Rack installation	optional (R&S®HZC95)	½ 19"
Recommended calibration interval	operation 40 h/week in the full range of the specified environmental conditions	1 year

Parallel and serial operation



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
Wireless LAN remote control	R&S®NGE-K102	5601.2210.03
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	Please 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 a term of one and two years (WE1 and WE2)

Repairs carried out during the contract term are free of charge²⁾. 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 repairs²⁾ and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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

²⁾ Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.