

## Product Datasheet - Technical Specifications



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# R&S® NGL200

## Power Supply Series

### High precision source and sink

3 year warranty



# R&S®NGL200 Power Supply Series At a glance

Thanks to their high accuracy and fast load recovery time, the R&S®NGL200 power supplies are perfect for challenging applications. Their two-quadrant architecture allows them to function both as a source and a sink to simulate batteries and loads. Their short recovery times enable them to handle fast load changes that occur for example when mobile communications devices switch from sleep mode to transmit mode.

The single-channel R&S®NGL201 and the two-channel R&S®NGL202 deliver up to 60 W of output power per channel. The output channels are floating, galvanically isolated and protected against overload and short circuits.

Thanks to their fast recovery time of  $< 30 \mu\text{s}$  and minimum overshoot even during a demanding load change, the R&S®NGL200 power supplies are ideal for powering IoT devices and other battery-operated devices.

With a resolution of up to  $6\frac{1}{2}$  digits when measuring voltage, current and power, the R&S®NGL200 power supplies are perfect for characterizing devices that have low power consumption in standby mode and high current in full load operation. In many cases, an additional digital multimeter is no longer necessary.

The linear two-quadrant design of the output stages allows the R&S®NGL200 power supply series to operate as a source and sink with minimum residual ripple and noise, ideally supporting the development of power amplifiers and MMICs.

Key facts	R&S®NGL201	R&S®NGL202
Number of output channels	1	2
Total output power	60 W	120 W
Max. output power per channel	60 W	
Output voltage per channel	0 V to 20 V	
Max. output current per channel	$\leq 6 \text{ V}$ : 6 A, $> 6 \text{ V}$ : 3 A	
Load recovery time	$< 30 \mu\text{s}$	
Max. power and current per channel when used as a load	60 W, 3 A	



# R&S®NGL200 Power Supply Series

## Benefits and key features

### Technology for challenging tasks

- ▮ Fast load regulation
- ▮ Minimum residual ripple and low noise
- ▮ Readings with up to 6 ½ digit resolution
- ▮ Galvanically isolated, floating channels
- ▮ Output stage isolated with relays
- ▮ Two quadrants: operates as source and sink
- ▮ Constant voltage, constant current and constant resistance modes

- ▮ Variable internal impedance
- ▮ Protection functions to safeguard instrument and DUT
- ▮ Safety limits to safeguard the DUT

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### Easy operation

- ▮ High-resolution touchscreen
- ▮ Color coding of operating modes
- ▮ QuickArb function
- ▮ EasyRamp function
- ▮ Save and recall instrument settings

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### Ideal for use in labs and test systems

- ▮ Tailored for use in labs and system racks
- ▮ Sense function for lead resistance compensation
- ▮ Front and rear connectors
- ▮ Full remote capabilities
- ▮ Fast on the bus and on the bench
- ▮ Advanced instrument design: compact form factor, quiet operation

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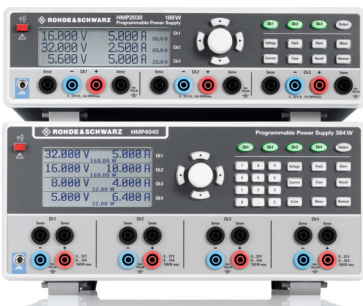
### Different classes of power supplies



R&S®NGE100B three-channel power supply

#### Basic power supplies

- ▮ Economical, 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®NGL202 two-channel 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



# Technology for challenging tasks

## Fast load regulation

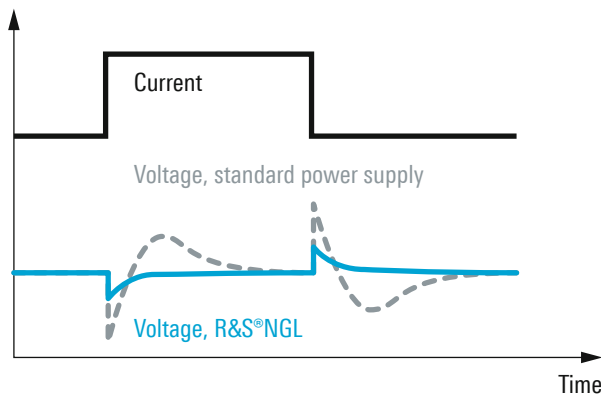
Consumer electronics such as mobile phones and IoT devices require very little power in sleep mode. However, the current increases abruptly as soon as the device switches to transmit mode. A power supply used to power such DUTs must be capable of handling load changes from a few  $\mu\text{A}$  to the ampere range without creating voltage drops or overshoots.

The R&S®NGL200 power supplies have a new circuit design that allows the user to determine how the power supply regulates load changes. The "Fast" default setting is optimized for speed, achieving recovery times of  $< 30 \mu\text{s}$ . Deactivating "Fast" slightly increases the recovery time, focusing on preventing overshoots.

## Minimum residual ripple and low noise

Advanced electronic circuitry is often very complex and sensitive to interference on the supply lines. In order to supply interference-free voltage to such sensitive DUTs, the power supplies must provide extremely stable output voltages and currents. All types of ripple and noise need to be avoided. The R&S®NGL200 power supplies have linear regulation and are ideal for sensitive DUTs.

Power supplies usually respond to abrupt load changes with overshoot and slow recovery times. Thanks to specially optimized control circuits, the R&S®NGL200 series achieves recovery times of  $< 30 \mu\text{s}$ .



The measured currents and voltages are displayed with  $6\frac{1}{2}$  digit resolution. The power supply automatically switches from source to sink mode. In the example, channel 2 is operating as a load. This is indicated by a negative current reading.



### Readings with up to 6½ digit resolution

With a resolution of up to 6½ digits when measuring voltage, current and power, the R&S®NGL200 power supplies are perfect for characterizing devices that have low power consumption in standby mode and high current in full load operation. The entire measuring range is covered without having to switch ranges. This results in faster measurements. In many cases, an additional digital multimeter is no longer necessary.

### Galvanically isolated, floating channels

Both channels of the R&S®NGL202 are completely isolated from each other and are not connected to chassis ground. They can be used as independent power supplies or be cascaded. The channels can be connected in parallel to achieve higher currents or in series to achieve higher voltages. Connecting the two channels makes it easy to power bipolar circuits that might need +12 V/-12 V, for example.

### Output stage isolated with relays

Switching off an output channel of a standard power supply usually simply switches off the output voltage – the output stage of the supply remains connected to the output terminals. The R&S®NGL200 uses relays to isolate the power supply circuits from the connector sockets.

### Two quadrants: operates as source and sink

The two-quadrant architecture of the power supplies allows them to function both as a source and a sink and simulate batteries or loads. The power supply automatically switches from source mode to sink mode. As soon as the externally applied voltage exceeds the set nominal voltage, current flows into the power supply. This is indicated by a negative current reading.

### Constant voltage, constant current and constant resistance modes

Configuring and regulating the output voltage (constant voltage mode) is the standard application for power supplies. However, the R&S®NGL200 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.

When operating as an electronic load, constant resistance mode is also available. In this mode, the power supply behaves like an adjustable resistance over the entire load range. This makes it possible to simulate battery discharge with a constant load resistance, for example.

### Variable internal impedance

A power supply should have an internal impedance as low as possible to suppress loading effects on the DUT. However, there are applications where certain battery types need to be simulated in a controlled manner or where it is necessary to simulate the increase in internal impedance as the battery discharges. The R&S®NGL200 power supplies support these applications due to their adjustable internal impedance range.

Two channels can be connected together to supply bipolar circuits with, for example, +12 V/-12 V.



## Protection functions to safeguard instrument and DUT

The R&S®NGL200 power supplies provide protection functions to make sure the DUT and the power supply are not damaged in the event of a fault. The output channels are protected against overload and short circuits. The maximum voltage, current and power can be set separately for each channel. When a channel reaches the set limit, it is automatically switched off and a message is displayed.

### Overvoltage protection (OVP)

If the voltage exceeds the configured maximum value, the channel is switched off and the corresponding symbol flashes on the display.

### Overcurrent protection (electronic fuse, OCP)

To better protect sensitive loads, the channels of R&S®NGL200 power supplies provide electronic fuses that can be set individually. If the channel current exceeds the set current, the channel is automatically switched off and the overcurrent symbol flashes.

In the two-channel R&S®NGL202, the electronic fuse can be linked to the other channel (FuseLink function). Then both channels are switched off as soon as the selected channel reaches the maximum current value.

There are two settings to define the response behavior of the electronic fuses. The "Fuse delay at output-on" specifies how long the fuse remains inactive after the channel is activated. The sensitivity of the fuse is specified using the "Fuse delay time". This allows users to modify the behavior of the power supply to prevent a channel from being switched off due to a short current spike during operation.

### Overpower protection (OPP)

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

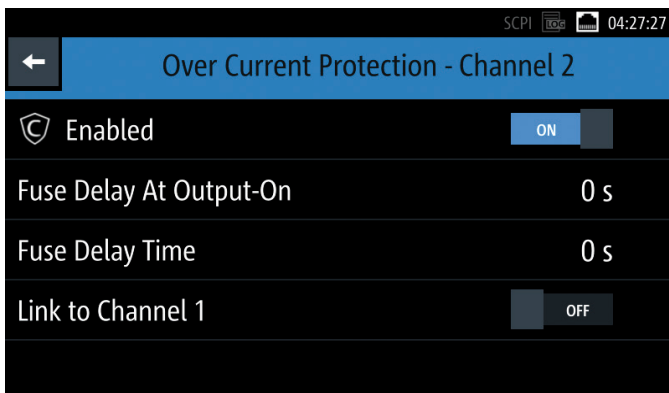
### Overtemperature protection (OTP)

The R&S®NGL200 power supplies have internal overtemperature protection that switches the power supply off if a thermal overload is imminent.

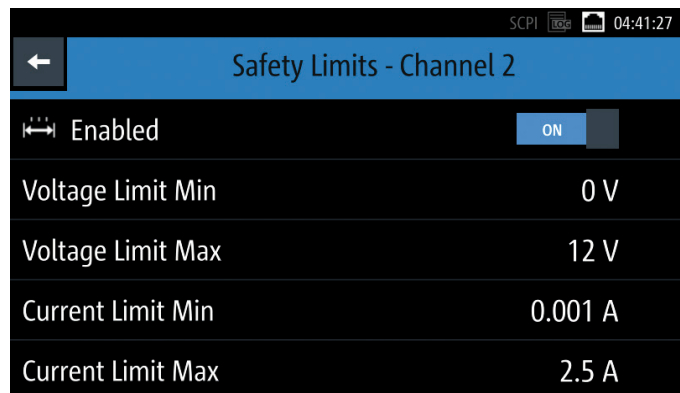
## Safety limits to safeguard the DUT

To prevent a DUT from being destroyed by a too high voltage, safety limits can be set on the R&S®NGL200 power supplies. Before starting the actual measuring task, the user can limit the power supply to values that are not dangerous for the DUT.

Electronic fuse with additional functions: "Fuse delay at output-on" specifies how long the fuse remains inactive after the channel is activated. The sensitivity of the fuse is specified using the "Fuse delay time".



The user can set safety limits to limit the adjustment range of the power supply and prevent a DUT from being damaged due to accidentally using the wrong setting.



# Easy operation

## High-resolution touchscreen

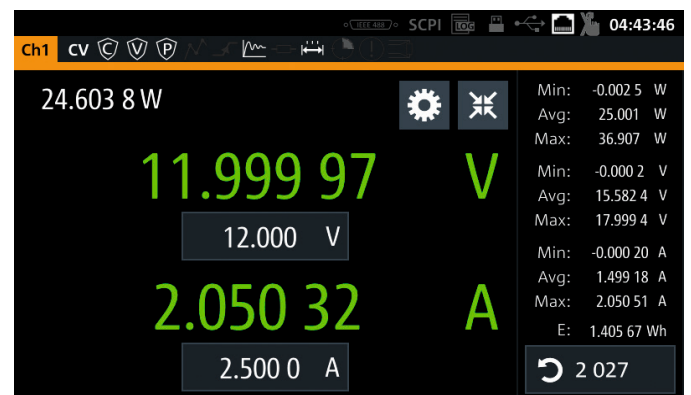
The large capacitive touchscreen is the central operating element for R&S®NGL200 power supplies. Lightly tapping a numerical value brings up a virtual keyboard to enter the desired value. Alternatively, the voltage, current and limits for the various protection functions can be set using the rotary knob. Functions that are used less frequently can be accessed and operated via menus.

With its very high resolution of 800 × 480 pixels, the display sets new standards for power supplies. The large high-resolution display makes it easy to read the voltage and current fields, even at great distances. A wide variety of additional information, such as power values or statistics, can also be displayed. Icons clearly show the status of the set protection or special functions.

Numerical values can be entered using the virtual touchscreen keyboard or the rotary knob.



The large high-resolution display makes it easy to read the voltage and current values (even at great distances) and provides a lot of additional information.





## Color coding of operating modes

Colors are used to indicate the different modes. For example, active channels in constant voltage mode light up green, while red is used for constant current mode. When the power supply is in constant resistance mode, the numbers are displayed in cyan.

The Output key is used to switch the channels on or off. When the channels are switched on, the key lights up blue. Each of the R&S®NGL202 channels can be selected individually using the channel keys.

## QuickArb function

Some applications require the voltage or the current to be varied during a test sequence, for example when simulating different charging conditions of a battery. The Arb function allows manual configuration of time/voltage or time/current sequences via the user interface or program them via external interfaces.

Other power supplies also offer an Arb function, but the QuickArb function of the R&S®NGL200 power supplies sets new standards. More points (4096 points) are supported per cycle. It is also possible to interpolate between the discrete points and select whether the sequence of voltage values 1 V – 2 V – 3 V is to be run as steps, or whether the voltage values are to be increased using linear interpolation.

Arb sequences can be programmed to run much faster with the R&S®NGL200 than with other power supplies.

The dwell time for a single voltage or current value can be set with a resolution of up to 1 ms. This makes it possible to program very short drops in voltage to test the power-up behavior of a DUT. The dwell times can also be set in the range of hours to implement test sequences extending over days or weeks for long-term testing.

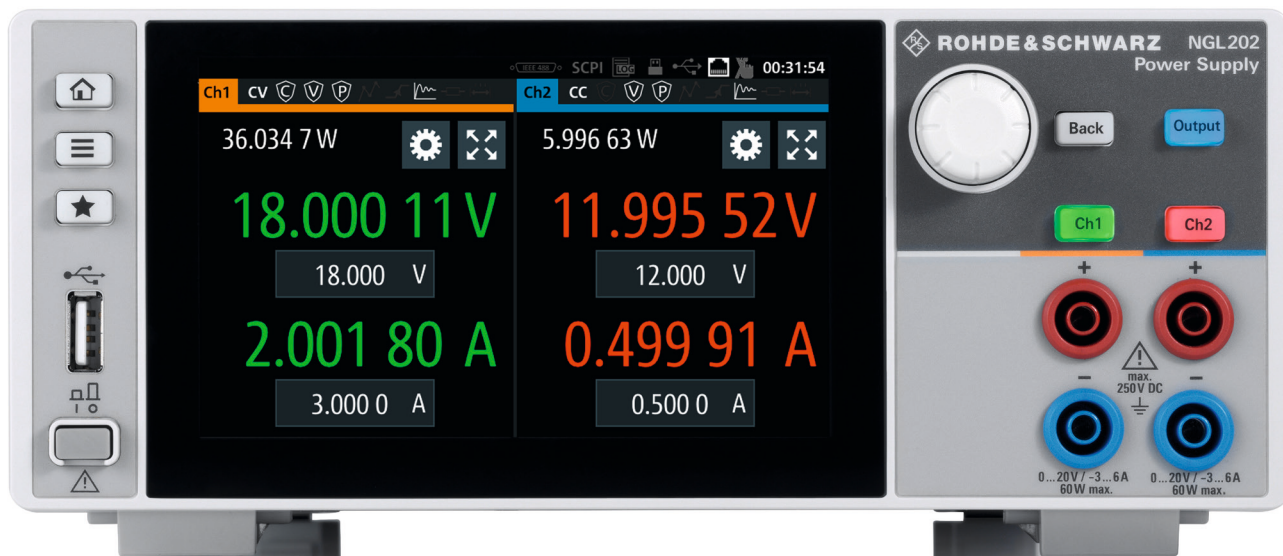
## EasyRamp function

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®NGL200 power supplies provides the solution. The output voltage can be increased continuously within a time frame of 10 ms to 10 s. The EasyRamp function can be operated both manually and remotely.

## Save and recall instrument settings

The Save and Recall functions make it easy to save and recall frequently used settings.

All settings and operating modes are easy to read. When the power supply is in constant voltage mode, the numbers and the keys light up green. Red is used for constant current mode. The Output key lights up blue to indicate that the channels are switched on (active).



# Ideal for use in labs and test systems

## Tailored for use in labs and system racks

The R&S®NGL200 power supplies are the right choice for challenging applications. They are used in R&D labs and integrated into production test systems.

The power supplies can be installed in 19" racks using the R&S®HZN96 rack adapter. Connectors on the rear panel and a compact design are important criteria for use in test systems.

## Sense function for lead resistance compensation

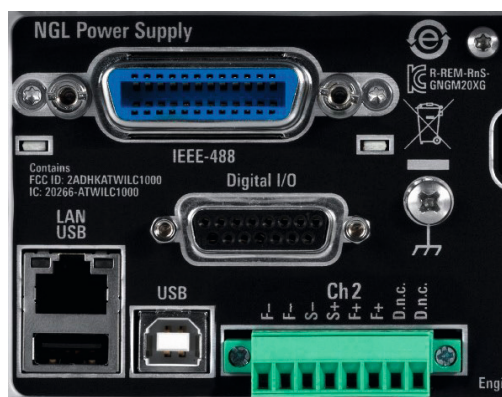
There is often a significant voltage drop over the supply leads, especially in applications with high current consumption. Since power supplies usually maintain a constant output voltage, the voltage on the DUT will be lower than the voltage displayed on the power supply. The sense function compensates 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 connectors for the sense lines are located on the rear panel. The R&S®NGL201 also has sense line connectors on the front panel.

## Front and rear connectors

The safety sockets on the front panel of the R&S®NGL200 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.

All connections are also provided on the rear panel (shown here: R&S®NGL202).



Digital inputs and outputs are optionally available. They can be used as trigger, inhibit and fault functions. One more connection is configurable. The hardware of the R&S®NGL-K103 option is preinstalled. The function can be activated using a keycode (to be ordered separately).

## Full remote capabilities

For use in test systems, the R&S®NGL200 power supply series can be remotely controlled. The following interfaces are available.

## USB and LAN

USB and LAN (Ethernet) interfaces are installed as standard. All supply parameters can be remotely controlled via these interfaces.

## Wireless LAN (R&S®NGL-K102 option)

As an alternative, the R&S®NGL200 power supplies can be remotely controlled via the WLAN interface. The WLAN module, which is activated by keycode (to be ordered separately), supports CLIENT mode, which means that the power supplies automatically connect to a network. The power supplies are operated via a web browser.

**Note:** The WLAN function is not available in all regions due to country-specific regulations.

## GPIB interface (R&S®NGL-B105 option)

The R&S®NGL-B105 interface with a GPIB (IEEE-488) port is also available as an option.

## Fast on the bus and on the bench

Complicated measurement sequences require ever faster setting, measuring and command processing times. The R&S®NGL200 power supplies meet these needs. Thanks to a state-of-the-art multicore architecture, they not only process control commands much faster than conventional power supplies, they process them internally in parallel. Users benefit from this in ATE systems. There are also advantages in manual operation, such as faster sequences in Arb mode.

## Advanced instrument design: compact form factor, quiet operation

There is never enough space on the bench or in the rack. The R&S®NGL200 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.

# Specifications

## Definitions

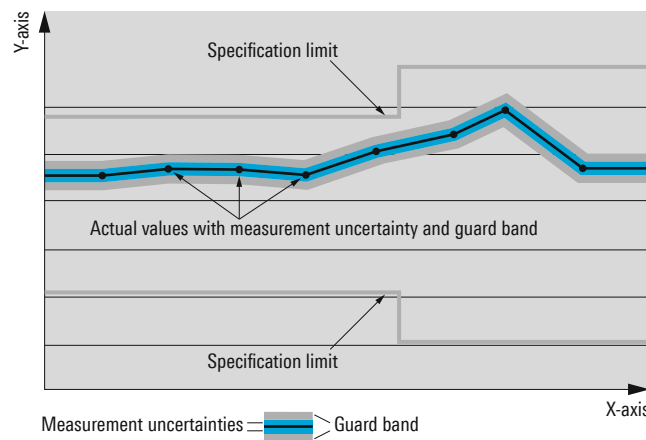
### General

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 (for example, 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 (for example, 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 ksp/s (thousand symbols per second), and sample rates are specified in Msample/s (million samples per second). Mcps, Mbps, Msps, kbps, ksp/s 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		
<b>Outputs</b>	The channel outputs are galvanically isolated and not connected to ground.	
Number of output channels	R&S®NGL201	1
	R&S®NGL202	2
Total output power	R&S®NGL201	max. 60 W
	R&S®NGL202	max. 120 W
Maximum output power per channel		60 W
Output voltage per channel		0 V to 20 V
Maximum output current per channel	≤ 6 V output voltage	6 A
	> 6 V output voltage	3 A
Maximum voltage in serial operation	R&S®NGL202	40 V
Maximum current in parallel operation	R&S®NGL202, ≤ 6 V output voltage	12 A
	R&S®NGL202, > 6 V output voltage	6 A
Adjustable output impedance		-50 mΩ to 100 Ω
	Increments	1 mΩ
Voltage ripple and noise	20 Hz to 20 MHz	< 500 μV (RMS), < 2 mV (peak-to-peak) (meas.)
Current ripple and noise	20 Hz to 20 MHz	< 1 mA (RMS) (meas.)
<b>Electronic load</b>		yes, R&S®NGL202: both channels
Maximum sink power	R&S®NGL201	60 W
	R&S®NGL202	120 W (60 W per channel) <sup>1)</sup>
Maximum sink current per channel		3 A
Sink modes		constant voltage, constant current, constant resistance
<b>Load regulation</b>	load change: 10% to 90%	
Voltage	±(% of output + offset)	< 0.01% + 0.5 mV
Current	±(% of output + offset)	< 0.01% + 0.1 mA
Load recovery time	regulation to within ±20 mV of the set voltage	< 30 μs (meas.)
<b>Programming resolution</b>		
Voltage		1 mV
Current		0.1 mA
<b>Programming accuracy</b>		
Voltage	±(% of the output + offset)	< 0.02% + 3 mV
Current	±(% of the output + offset)	< 0.05% + 2 mA

<sup>1)</sup> Time limited at an operating temperature of > 30°C and total power > 90 W.

Output measurements		
Measurement functions		voltage, current, power, energy
<b>Readback resolution</b>		
Voltage		10 μV
Current		10 μA
<b>Readback accuracy</b>		
Voltage	±(% of output + offset)	< 0.02% + 2 mV
Current	±(% of output + offset)	< 0.05% + 250 μA
<b>Temperature coefficient (per °C)</b>	+23°C (-3°C/+7°C)	
Voltage	±(% of output + offset)	0.15 × specification/°C
Current	±(% of output + offset)	0.15 × specification/°C
<b>Sense function</b>		yes, R&S®NGL202: both channels
Maximum sense compensation		2 V

Ratings		
Maximum voltage to ground		250 V DC
Maximum counter voltage	voltage with the same polarity connected to the outputs	22 V
Maximum reverse voltage	voltage with opposite polarity connected to the outputs	0.5 V
Maximum reverse current	for 5 minutes max.	1 A

Remote control		
Command processing time		typ. < 6 ms

Protection functions		
Overvoltage protection		adjustable, R&S®NGL202: both channels
Programming resolution		1 mV
Overpower protection		adjustable, R&S®NGL202: both channels
Overcurrent protection (electronic fuse)		adjustable, R&S®NGL202: both channels
Programming resolution		0.1 mA
Response time	$(I_{load} > I_{resp} \times 2)$ at $I_{load} \geq 2$ A	< 1.5 ms
Fuse linking (FuseLink function)	R&S®NGL202	yes
Fuse delay at output-on	for R&S®NGL202: both channels	0 ms to 10 s (1 ms increments)
Fuse delay time	for R&S®NGL202: both channels	0 ms to 10 s (1 ms increments)
Overtemperature protection		yes

Special functions		
<b>Output ramp function</b>		EasyRamp
EasyRamp time		10 ms to 10 s (10 ms increments)
<b>Output sequencing</b>		
Synchronicity		typ. < 25 $\mu$ s
Delay per channel		1 ms to 10 s (1 ms increments)
<b>Arbitrary function</b>		QuickArb
Parameters		voltage, current, time
Maximum number of points		4096
Dwell time		1 ms to 20 h (1 ms increments)
Repetition		continuous or burst mode with 1 to 65535 repetitions
Trigger		manually via the keyboard, via remote control or via optional interface
<b>Trigger and control interfaces</b>		digital I/O, R&S®NGL-K103

Display and interfaces		
Display		TFT 5" 800 × 480 pixels WVGA Touch
Front panel connections	R&S®NGL201	4 mm safety sockets (channels, sense)
	R&S®NGL202	4 mm safety sockets (channels)
Rear panel connections		8-pin connector block per channel
Remote control interfaces	standard	USB-TMC, USB-CDC (virtual COM port), LAN WLAN
	R&S®NGL-K102	WLAN
	R&S®NGL-B105	IEEE-488 (GPIB)



General data		
<b>Environmental conditions</b>		
Temperature	operating temperature range	+5°C to +40°C
	storage temperature range	-20°C to +70°C
Humidity	noncondensing	5% to 95%
<b>Power rating</b>		
Mains nominal voltage		100 V/115 V/230 V (±10%)
Mains frequency		50 Hz to 60 Hz
Maximum power consumption		400 W
Mains fuses		2 × T4.0H/250 V
<b>Product conformity</b>		
Electromagnetic compatibility	EU: in line with Radio Equipment Directive 2014/53/EU	applied standards: ETSI EN300 328 V2.1.1 EN 61326-1 EN 55011 (Class A) EN 55032 (Class A) ETSI EN301 489-1 V2.2.0 ETSI EN301 489-17 V3.2.0
	Korea	KC mark
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EU	applied harmonized standards: EN 61010-1
	USA, Canada	CSA-C22.2 No. 61010-1
WLAN approvals	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	CE0682
	Singapore	iMDA standards DB102020
	USA, Canada	FCC, IC
RoHS	in line with EU Directive 2011/65/EU	EN50581
<b>Mechanical resistance</b>		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.3 mm (peak-to-peak) 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6
	wideband noise	8 Hz to 500 Hz, acceleration: 1.2 g (RMS) in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method 516.4, procedure I
<b>Mechanical data</b>		
Dimensions	W × H × D	222 mm × 97 mm × 436 mm (8.74 in × 3.82 in × 17.17 in)
Weight	R&S°NGL201	7.1 kg (15.6 lb)
	R&S°NGL202	7.3 kg (16.1 lb)
Rack installation		R&S°HZN96 option
<b>Recommended calibration interval</b>	operation 40 h/week over entire range of specified environmental conditions	1 year

R&S°NGL201, front view



R&S°NGL202, front view



R&S°NGL202, rear view



# Ordering information

Designation	Type	Order No.
<b>Base unit</b>		
Single-channel power supply	R&S®NGL201	3638.3376.02
Two-channel power supply	R&S®NGL202	3638.3376.03
<b>Accessories supplied</b>		
Set of power cables, quick start guide		
<b>Interface options</b>		
Wireless LAN remote control	R&S®NGL-K102	3652.6362.02
Digital trigger I/O	R&S®NGL-K103	3652.6385.02
IEEE-488 (GPIB) interface	R&S®NGL-B105	3652.6356.02
<b>System components</b>		
19" rack adapter, 2 HU	R&S®HZN96	3638.7813.02

<b>Warranty</b>		
Base unit		3 years
All other items <sup>1)</sup>		1 year
<b>Options</b>		
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 charge <sup>2)</sup> 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 <sup>2)</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

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

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