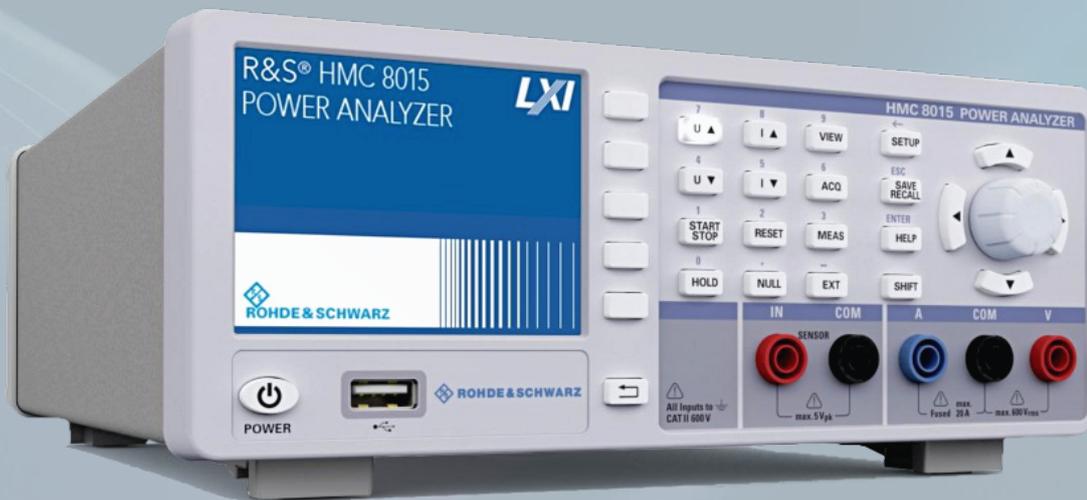


# R&S® HMC8015

Power Analyzer and OneBox Tester



# Benefits

- | Multifunctional power analyzer for wired measurements up to 100kHz
- | Developed in Germany and manufactured in Europe according to highest quality and production standards
- | 6 + 1 analyzer with state of the art functionality and highest in class resolution
- | Covering a large application area from electronics design and development to service and production environments
- | Compact footprint bench-top combining features of seven different instruments at a best in class performance
- | Brilliant QVGA TFT display for excellent readability combined with a freely configurable graphical user interface
  
- | Lowest basic accuracy in its class 0.05% of reading
- | Automatic AC/DC detection and switching
- | Excellent scalability through options and accessories
- | Well-balanced sampling rate and bandwidth ratio to never miss any waveform details
- | Fanless design for silent operation
- | Very fast boot time less than 8s
- | Huge variety of interfaces
- | Future-proof investment: long-term support and new functions via firmware upgrades



# Applications

- | Consumption analysis of on-grid devices
- | Power analysis for embedded systems
- | Power electronics: R&D, engine test stands, switched PSU, power inverter
- | Quality control in manufacturing
- | Standards testing in R&D and production
- | Battery and solar industries: charge and discharge cycles
- | Embedded and analog hardware design: power consumption of FPGAs,  $\mu$ Cs, LED panels 5V, mW
- | Service and maintenance| Education customers

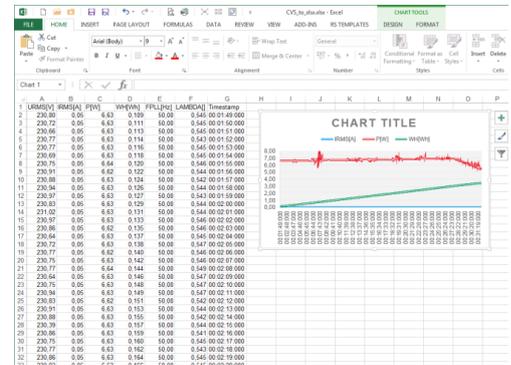
# At a Glance



Key Facts	
Bandwidth	DC to 100 kHz
Sampling Rate	500 kSample/s
Resolution	2x 16-bit simultaneous sampling (voltage and current)
Voltage Input	up to 600V <sub>rms</sub>
Current Input	up to 20A <sub>rms</sub>
Basic Accuracy	0.05% of reading
Display	Brilliant color TFT
1+1 Datalogging	CSV to USB stick or remotely via interface
2+1 Oscilloscope	Oscillographic waveform chart (opt.)
3+1 Spectrum Analyzer	Harmonics as bar chart or table view (opt.)
4+1 Energy Meter	Real-time integrator
5+1 Production Tester	Limit testing with PASS-FAIL (opt.)
6+1 Policy Tester	Energy Star, EN50160, EN50564, EN61000-3-2, IEC62301 (opt.)

# Datalogging

- Logging of up to 10 measurement parameters
- Recording 10 readings per second
- Absolute time stamps with 100ms resolution
- Directly to USB flash drives (FAT32)
- Logging data saved in CSV format
- Directly utilizable in Excel spreadsheets



# Oscilloscope

- Waveform auto-scaling
- Automatic hardware-based triggering
- Simultaneous display of voltage, current and power for one period
- Auto-measurement for Urms, Irms, F PLL, P,  $\Phi$

**Inrush mode:** single shot with user-defined time base to analyze fast switching-on operations

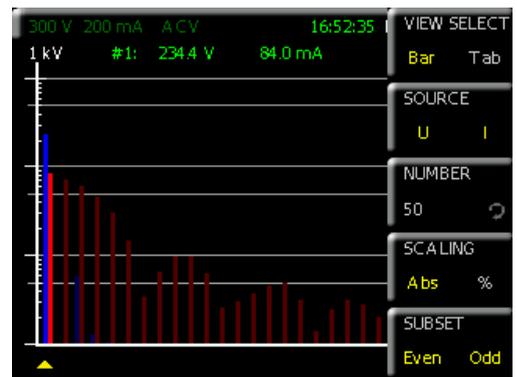
Note: for full operation **HVC151** option is required



# Spectrum Analyzer

- Harmonics visualized as bar chart or table view
- Calculation covering 50 harmonics
- Scaling with absolute V/A values or as percentage of basic wave
- Logarithmic display to never miss any details
- Export function for easier report generation

Note: for full operation **HVC151** option is required



# Energy Meter

- High precision and gapless acquisition
- Hardware-based, real-time integration
- Distinguishing positive and negative Wh, Ah
- Acquisition modes: manually, time-based, event-based (ext. trigger)
- Logging functionality as standard

Note: for full operation **HVC152** option is required



# Production Tester

## Limit testing

- Numerical display with limit bar
- Up to 6 limits freely configurable
- PASS-FAIL for one limit via rear connectors
  - Analog output representing limit bar
  - Digital output showing limit violations

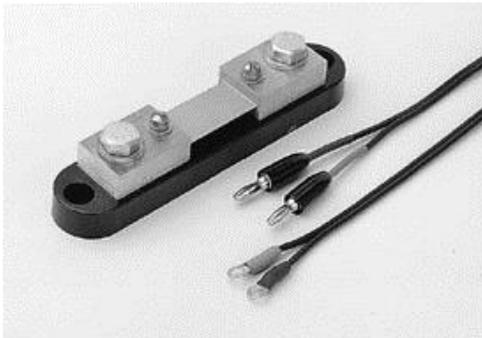
## Production environment

- Huge variety of interfaces for remote control
- SCPI command set
- Rackmount kit capability

Note: for full operation **HVC152** option is required

# Input Ranges

- | 600V rms and 20A rms
- | Short-term peaks up to 1,800V and 60A
- | Two selectable crest factors: CF3, CF6
- | Automatic internal current range switching
- | 3-times overload capability
- | Increase current input range by external shunts or current probes
- | Graphical range and limit bars



Power Analyzer R&S®HMC8015			
Range configuration			
	CF3	CF6	Peak
voltage	6V	2.5V	±15V
	15V	7.5V	±45V
	30V	15V	±90V
	60V	30V	±180V
	150V	75V	±450V
	300V	150V	±900V
	600V	300V	±1800V
current (600mΩ)	5 mA	2.5 mA	±15 mA
	10 mA	5 mA	±30 mA
	20 mA	10 mA	±60 mA
	60 mA	25 mA	±150 mA
	100 mA	60 mA	±300 mA
	200 mA	100 mA	±600 mA
current (10mΩ)	0.6 A	0.26 A	±1.5 A
	1 A	0.5 A	±3 A
	2 A	1 A	±6 A
	6 A	2.5 A	±15 A
	10 A	6 A	±30 A
	20 A	10 A	±60 A

# Measurement Parameters

- Simultaneous sampling of voltage and current
- Real-time integrator
- 26 different measurement parameters

## R&S® HMC8015 basic unit

$P, S, Q, U_{rms}, U_{avg}, U_{THD}, I_{rms}, I_{avg}, I_{THD}, F_U, F_I, F_{PLL}, \lambda, \Phi, Wh+, Wh-, Wh, Ah+, Ah-, Ah$

## Advanced Analysis (HOC151/HVC151)

Same as basic unit plus  $U_{p+}, U_{p-}, I_{p+}, I_{p-}, P_{p+}, P_{p-}$ , waveform, trendchart, inrush, harmonics view



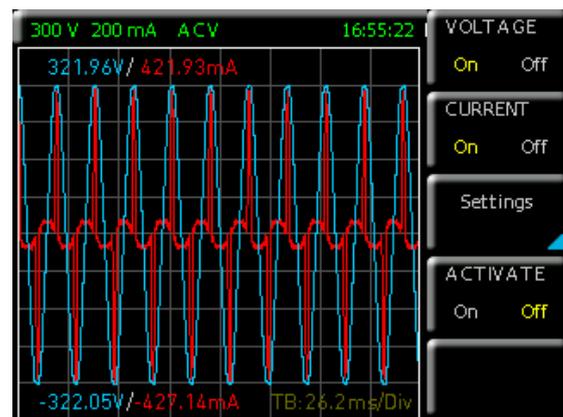
Note: for full operation **HVC151** option is required

## 6 different display and operation modes

- Numeric
- Waveform
- Trendchart
- Inrush
- Harmonics
- Policy Testing

Harmonics					VIEW SELECT	
Order	U[%]	Phi(U)[°]	I[%]	Phi(I)[°]	Bar	Tab
1	100.00	-83.6	100.00	80.9		
2	0.22	-84.6	0.63	39.1		
3	0.28	16.6	88.22	-63.7		
4	0.08	-63.3	0.54	88.3		
5	2.50	-64.6	74.83	-42.9		
6	0.04	41.6	0.65	-26.1		
7	0.57	-31.3	55.38	-26.2		
8	0.05	69.0	0.54	2.1		
9	0.45	-72.4	36.52	-6.9		
10	0.03	57.7	0.57	68.2		
11	0.10	-21.7	17.66	16.6		
12	0.03	-76.4	0.58	-64.0		

Additional controls on the right: SOURCE (U, I), NUMBER (50), SCALING (Abs, %), SUBSET (Even, Odd).



Note: for full operation **HVC151, HVC153** options are required

# Connectivity

┆ R&S@HCZ815 mains adapter

- EU, GB, USA
- 250V AC, 10 A max
- CAT-II

┆ Analog and digital I/Os + SENSOR input for external sensors, triggering and monitoring

┆ Remote control interfaces:

USB (VCP, TMC), Ethernet (LXI + Webserver), IEEE-488 (GPIB, R&S@HMC8015-G)

┆ Driver packages:

LabVIEW, LabWindows/CVI, VXI, IVI.NET

Note: for full operation **HVC152** option is required



# Display

┆ Freely configurable graphical user interface

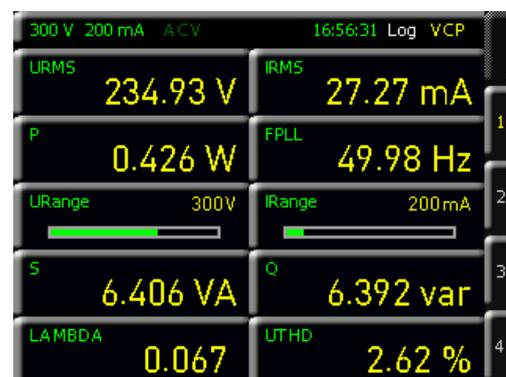
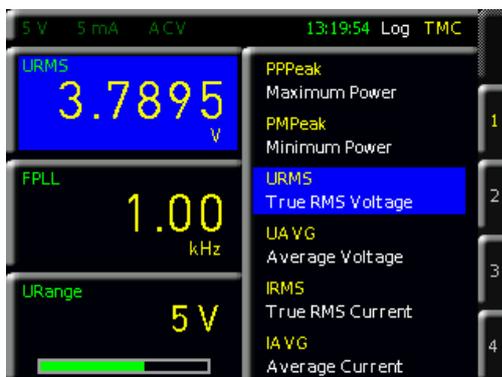
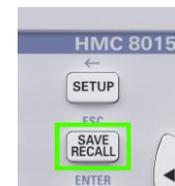
┆ Numerical and chart display modes

┆ Easy to operate, easy to configure measurements

┆ Flat menu design for fast navigation

┆ 10 display updates per second

┆ Easy screenshot export push&hold



# Technical Data

Basic Specifications	
Measurement method	simultaneous voltage and current sampling
Analog bandwidth	DC to 100 kHz
Frequency accuracy	0.1% of reading
A/D converter resolution	16 bit (voltage), 16 bit (current)
Basic accuracy	0.05% of reading
Display resolution	5 digits
Sampling frequency	500 kHz
Filters	
Analog signal filter	1 kHz
Digital filter	automatic adaptiv filter
Frequency filter	500 Hz (independent from signal filters)
Additional rear panel inputs / outputs (BNC)	
Analog input	$\pm 10V_p$
Analog input accuracy	0.5% of reading
Analog output	$\pm 5V_p$
Digital input	
Low level	0V to 2V
High level	3V to 24V
Digital output	5V TTL (up to 100 mA source/sink)
Voltage input impedance	2 M $\Omega$
PLL synchronisation sources	U, I, external

General Specifications	
Display	
Type	8.9cm (3.5") TFT (Farbe)
Resolution	320 x 240 Pixel (QVGA)
Power supply	100V <sub>ac</sub> to 115V <sub>ac</sub> / 230V <sub>ac</sub> $\pm 10\%$ @ 50-60 Hz
Power consumption	30W max, 15W typ.
Operating temperature	5°C to 40°C
Storage temperature	-25°C to 60°C
Standards	CSA, DIN EN 61010-1, DIN EN 61326-1, DIN EN 55011
Common mode voltage	CAT II, 600V <sub>rms</sub>
Dimensions	222 x 88 x 280 mm
Weight	ca 3.250 kg
Warm-up time	60 minutes

Specifications apply to sine wave as input, PF = 1, voltage to earth = 0V, analog signal filter deactivated, digital filter activated

Power Analyzer R&S®HMC8015			
Range configuration			
	CF3	CF6	Peak
voltage	5V 15V 30V 60V 150V 300V 600V	2.5V 7.5V 15V 30V 75V 150V 300V	$\pm 15V$ $\pm 45V$ $\pm 90V$ $\pm 180V$ $\pm 450V$ $\pm 900V$ $\pm 1800V$
current (500m $\Omega$ )	5mA 10mA 20mA 50mA 100mA 200mA	2.5mA 5mA 10mA 25mA 50mA 100mA	$\pm 15mA$ $\pm 30mA$ $\pm 60mA$ $\pm 150mA$ $\pm 300mA$ $\pm 600mA$
current (10m $\Omega$ )	0.5A 1A 2A 5A 10A 20A	0.25A 0.5A 1A 2.5A 5A 10A	$\pm 1.5A$ $\pm 3A$ $\pm 6A$ $\pm 15A$ $\pm 30A$ $\pm 60A$
sensor	0.033V 0.33V 1.33V	0.066V 0.66V 2.66V	$\pm 0.1V$ $\pm 1V$ $\pm 4V$
Measurement accuracy ( $\pm$ reading in % $\pm$ peak range in %)			
Frequency	Voltage	Current / Sensor	Active Power
DC	0.05 + 0.05	0.05 + 0.05	0.05 + 0.05
f < 45 Hz	0.05 + 0.05	0.05 + 0.05	0.075 + 0.075
45 Hz < f < 66 Hz	0.05 + 0.05	0.05 + 0.05	0.05 + 0.05
66 Hz < f < 1 kHz	0.05 + 0.1	0.05 + 0.1	0.075 + 0.075
1 kHz < f < 10 kHz	(0.1 + 0.02 *F) + 0.1	(0.1 + 0.02 *F) + 0.1	(0.1 + 0.07 *F) + 0.1
10 kHz < f < 100 kHz	(0.1 + 0.04 *F) + 0.1	(0.1 + 0.04 *F) + 0.2	(0.1 + 0.07 *F) + 0.1
voltage, current: F = frequency in kHz sensor input: F = frequency in kHz *2			
Additional errors			
Power factor < 1	$\pm(0.2 + 0.2 *F)\%$ , only for active power		
Common mode error	$\pm 0.01\%$ of peak range		

All specifications valid for a temperature range between 20°C and 30°C at 80% relative humidity after 60 minutes warm-up

# Models & options

- R&S® HMC8015 basic unit
- R&S® HMC8015-G basic unit with GPIB



- **Advanced Analysis** option license key/voucher: HOC151/HVC151
- **Advanced I/O** option license key/voucher: HOC152/HVC152
- **OneBox Tester** option license key/voucher: HOC153/HVC153



# Recommended Accessories

- R&S® HZC815-EU mains adapter
- R&S® HZC815-GB mains adapter
- R&S® HZC815-USA mains adapter



- R&S® HZC50 AC/DC current probe (30A)
- R&S® HZC51 AC/DC current probe (1kA)



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