

R&S®NH8300/ R&S®NV8300 Family of UHF Transmitters

Air-cooled transmitters for analog and digital TV



R&S®NH8300/ R&S®NV8300 Family of UHF Transmitters At a glance

Standardized design for analog and digital TV

The new air-cooled R&S®NH8300/R&S®NV8300 family of transmitters has been designed for analog TV standards (B/G, K, M/N, I), color coding standards (SECAM, PAL, NTSC) and sound coding standards (FM mono, dual-sound/stereo IRT and NICAM) as well as for digital TV standards (DVB-T, DVB-T2, DVB-H, ISDB-T, ISDB-T_B, MediaFLO™, ATSC, ATSC Mobile DTV). LDMOS transistor-based amplifiers ensure high output power while requiring only minimum space.

All components are fully broadband from 470 MHz to 862 MHz (UHF bands IV/V) for both the analog and digital standards. The available output power ranges from 750 W to 2.8 kW for analog TV (combined) and from 300 W to 1.8 kW (DVB-T, DVB-T2, DVB-H, ISDB-T, ISDB-T_B, MediaFLO™) as well as from 450 W to 1.8 kW (ATSC, ATSC Mobile DTV) for digital TV.

The transmitters include the following components:

- Exciter
- Power amplifier(s)
- Transmitter control unit
- Transmitter rack with cooling system

The R&S®NH8300/R&S®NV8300 family of UHF transmitters is based on a design concept that is common to all Rohde&Schwarz sound and TV transmitters of the R&S®Nx8000 family. This means that the transmitter control unit and the bus system for internal and external communications are identical throughout.

Key facts

- 750 W to 2.8 kW output power for analog TV
- 300 W to 1.8 kW output power for DVB-T, DVB-T2, DVB-H, ISDB-T, ISDB-T_B, MediaFLO™
- 450 W to 1.8 kW output power for ATSC, ATSC Mobile DTV
- Frequency range 470 MHz to 862 MHz



R&S®NH8300/ R&S®NV8300 Family of UHF Transmitters

Benefits and key features

R&S®Sx800 multistandard TV exciter for digital or analog signal processing

- ▮ The exciter can be converted from analog to digital at any time
- ▮ Various standby configurations
- ▮ Easy servicing due to modular design and plug-ins
- ▮ For operation in single-frequency networks, a MIP decoder enables automatic delay compensation
- ▮ Digital signal processing provides maximum stability and easy precorrection

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Air-cooled broadband R&S®VH8300A1 power amplifier

- ▮ For analog and digital signals without requiring any adjustment
- ▮ With innovative amplifier controller, which is used for all sound and TV transmitters of the R&S®Nx8000 family
- ▮ Output power control makes for long life for the individual transistors
- ▮ Each amplifier module is self-monitoring and self-protecting
- ▮ Based on LDMOS technology
- ▮ All amplifier modules can easily be replaced during operation

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Innovative R&S®NetCCU®800 transmitter control unit

- ▮ The R&S®NetCCU®800 clearly shows the current status of the transmitter system on a color display
- ▮ Transmitter remote control and monitoring via SNMP and/or HTTP interface
- ▮ All parameters required for diagnostics can be retrieved locally as well as remotely
- ▮ In-depth diagnostics through new bus system
- ▮ Only two height units

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Transmitter rack with integrated cooling

- ▮ Same 19" rack (depth 800 mm) used for all power classes
- ▮ One rack accommodates up to six amplifier modules
- ▮ Contains two built-in fans that operate in active standby
- ▮ Various air ducting configurations
- ▮ Effective cooling with a minimum amount of air considerably reduces the cooling system's power consumption and noise generation

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R&S®Sx800 multi-standard TV exciter for digital or analog signal processing

Using state-of-the-art technology, the R&S®Sx800 multistandard TV exciter can be accommodated in a housing of only one height unit. It performs full signal processing from the video/audio input signal (analog TV) or the transport stream (digital TV) to the standard-conforming RF output signal. Its flexible concept provides high safety of investment.

The R&S®Sx800 TV exciter contains the following main modules:

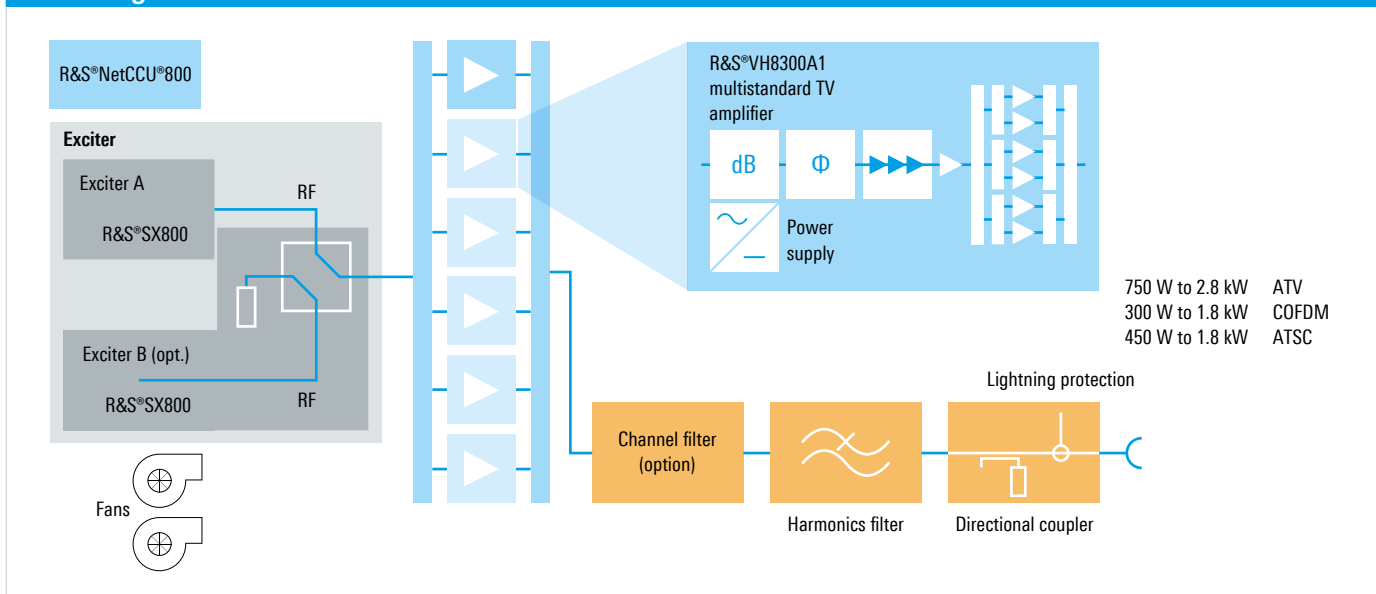
- Input interface
- Mainboard
- RF interface

Input interface

For the analog TV standards, the input interface converts the analog video and audio input signals to digital signals for further processing. Optionally, the input interface encodes and modulates the NICAM subcarrier. NICAM signal processing supports the analog sound input, NICAM 728 data input and NICAM sound subcarrier operating modes. The input interface also monitors the input sync pulse.

For the digital TV standards, the input interface is equipped with four ASI inputs (DVB-T, DVB-H, ISDB-T, ISDB-T_B) or two SMPTE 310M and two ASI inputs (ATSC). This makes it a universal input stage – capable of handling all operating modes of the DVB-T, DVB-H, ISDB-T, ISDB-T_B, and ATSC standards. Two ASI/T2-MI inputs are available for DVB-T2 on the R&S®TSE800 extension box; alternatively two IP inputs can be used.

Block diagram of an R&S®Nx8300 TV transmitter



For digital applications, the input interface monitors the packet synchronization and the data rate of the input signals. Input data buffers eliminate line-side jitter and wander effects.

For operation in single-frequency networks (SFN), a MIP decoder in line with TS 101191 is included in signal processing. The decoder enables automatic delay compensation and automatic operating mode detection. Seamless, automatic input signal switching ensures redundant signal feed.

The exciter can be converted from analog to digital at any time, involving only a minimum of effort.

Mainboard

The mainboard digitally processes and modulates the signals from the input interface in line with the corresponding TV standard. Digital signal processing provides maximum stability and easy precorrection.

The signals are modulated by applying the appropriate algorithm for analog or digital TV. The resulting digital in-phase and quadrature (I and Q) signals are taken to a precorrector. Linear precorrection compensates for group delay and frequency response, which occur in power filters in the RF path, for example. Nonlinear precorrection corrects distortion products generated in the amplifiers. The digital precorrection implemented here makes for 100% reproducibility. For the digital standards, automatic/adaptive precorrection is available as an option.

RF interface

The RF interface first converts the digital I and Q signals to analog baseband signals. These signals are double-converted in a subsequent modulator section to yield the final modulated signal.

A synthesizer supplies the frequencies required for up-conversion. It can, of course, be locked to an external reference frequency. The high-quality reference oscillator ensures that the required frequency accuracy for SFNs is maintained even if the external reference fails.

The RF interface can optionally be equipped with a demodulator path that processes the amplified and/or filtered RF signal so that it can be analyzed for automatic/adaptive precorrection. For this purpose, the exciter is equipped with two inputs that allow the signal to be tapped ahead of and after the power filter without external switches being required.

Overview of the special characteristics of the R&S®Sx800 TV exciter

General

- ▮ Integrated digital linear and nonlinear precorrection
- ▮ Digital signal processing for analog and digital TV

Digital TV

- ▮ DVB-T, DVB-T2, DVB-H, ISDB-T, ISDB-T_B, MediaFLO™, ATSC, ATSC Mobile DTV
- ▮ ASI mode
- ▮ SMPTE 310M
- ▮ Suitable for single-frequency networks (SFN) and multifrequency networks (MFN)
- ▮ Hierarchical modulation (DVB-T, DVB-T2, DVB-H)
- ▮ Seamless input switching
- ▮ MIP monitoring
- ▮ Automatic/adaptive precorrection (optional)

Analog TV

- ▮ Standards B/G, K, M/N, I
- ▮ PAL, SECAM and NTSC
- ▮ FM mono, dual-sound/stereo IRT or, optionally, NICAM

Air-cooled broadband R&S®VH8300A1 power amplifier

The air-cooled broadband R&S®VH8300A1 amplifier operates in the range from 470 MHz to 862 MHz (UHF bands IV/V). It can be used both for analog and digital signals without requiring any adjustments, which means a smaller inventory of spare parts for operators of mixed transmitter networks.

The output power of each amplifier plug-in depends on the modulation mode: 300 W for COFDM standards, 450 W for ATSC and 750 W for analog TV (combined). Due to the use of advanced LDMOS technology, the power amplifiers offer very high linearity, excellent efficiency and compact design. Each amplifier plug-in contains a predriver and a driver stage, six power transistors and a separate power supply.

The amplifier is available with either single- or three-phase mains. Correspondingly, the transmitters are available with either single- or three-phase mains distribution.

An innovative amplifier controller is used, which is identical for all sound and TV transmitters of the R&S®Nx8000 family. This controller not only monitors and evaluates protective functions (e.g. overtemperature switchoff, VSWR reduction, transistor failure detection), but also provides phase correction and control of the RF output power. Output power control prevents, for example, the amplifier from being overdriven in the event a transistor fails, thus ensuring a long life of the individual transistors. Each amplifier module is, therefore, self-monitoring and self-protecting.

All relevant operating parameters and fault messages are transferred to the transmitter control unit via the CAN bus interface, which is likewise an innovative feature. The amplifier modules can easily be replaced during operation.



Innovative R&S®NetCCU®800 transmitter control unit

The innovative R&S®NetCCU®800 transmitter control unit handles both internal and external communications and provides all control functions. Only two height units suffice to implement the functions of a transmitter control unit plus an IP interface. The R&S®NetCCU®800 clearly shows the current status of the transmitter system on a color display.

All transmitter and/or amplifier parameters required for diagnostics can be retrieved locally as well as remotely from anywhere in the world via a standard (IP) protocol and standard software (web browser, SNMP). This allows the transmitter status of unattended stations to be accurately evaluated, and any servicing that may be needed to be optimally prepared. Locally, this data can be retrieved via the IP interface of the R&S®NetCCU®800. All transmitter-specific settings can be easily downloaded in a file via PC.



The R&S®NetCCU®800 transmitter control unit.

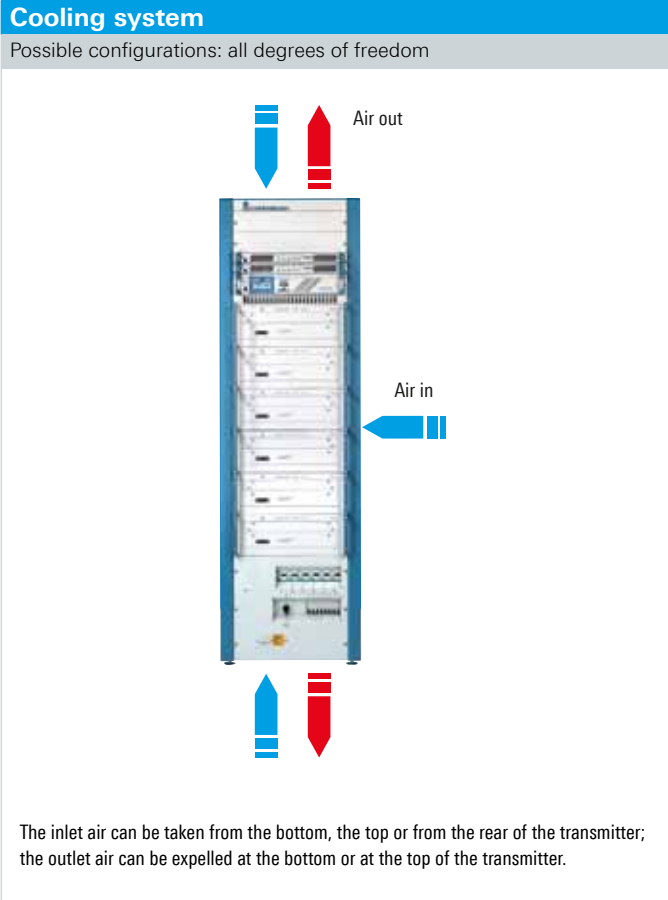
Transmitter rack with integrated cooling

A 19" rack (depth 800 mm) is used for all power classes. One rack accommodates up to six amplifier modules. The rack contains two built-in fans that operate in active standby.

Various air ducting configurations can be implemented, with cooling air intake from the top, bottom or rear of the transmitter rack, and exhaust air discharge toward the top or bottom. Each amplifier module contains an optimized, highly efficient heat sink. This feature plus the elaborate cooling concept ensure effective cooling with a minimum amount of air. This in turn considerably reduces the cooling system's power consumption and noise generation.

An innovative, nearly wireless power distribution system eliminates wiring errors during assembly. The transmitters are available with single- and three-phase mains distribution.

A channel filter integrated in the transmitter (for analog operation), a frequency-response-compensated directional coupler and built-in lightning protection round out the R&S®NH8300/R&S®NV8300 family of transmitters.



Specifications in brief

Specifications common to the R&S®NH8300/R&S®NV8300

Frequency range	470 MHz to 862 MHz
Power supply	3 × 400 V AC ± 15%; three-phase operation; 47 Hz to 63 Hz 230 V AC ± 15%, 50/60 Hz, L1-N; single-phase operation; 47 Hz to 63 Hz 240 V AC + 10%/–15%, 50/60 Hz, L1-L2; single-phase operation; 47 Hz to 63 Hz
Max. installation altitude	2000 m above sea level (> 2000 m on request)
Operating temperature range	+1 °C to +45 °C
Permissible relative humidity	95%, without condensation
Dimensions (W × H × D)	600 mm × 2000 mm × 800 mm (23.6 in × 78.7 in × 31.5 in)
RF connector	1 5/8 EIA
Immunity ¹⁾	
To fast transients and burst in line with IEC61000-4-4	< 4 kV (AC supply), < 1 kV (signal inputs)
To surges in line with IEC61000-4-5	balanced < 2 kV (e.g. L1-L2), unbalanced < 4 kV (e.g. L1-N)
Synchronization	
Reference frequency	10 MHz, 0.1 V to 5 V (V _{pp}) or TTL, BNC
Reference pulse	1 Hz, TTL, BNC
Local and remote control	
Local control	
Color display and keys	front-panel operation via graphical user interface (GUI)
RJ-45	PC operation via standard web browser
Remote control	
RJ-45	network management interface (web server and/or SNMP agent), optional
Parallel interface	floating contacts for messages and commands, optional
Bit bus	bus interface, in line with IEC864-2, optional

¹⁾ With integrated AC supply overvoltage protection; more stringent requirements must be covered by additional on-site measures.

Specifications of the R&S®NH8300 for analog TV

	R&S®NH8301	R&S®NH8302	R&S®NH8303	R&S®NH8304
Number of amplifiers	1	2	3	4
RF output power (dual sound)	750 W	1500 W	2250 W	2800 W
Rate of air flow	8.5 m ³ /min	11 m ³ /min	15 m ³ /min	17 m ³ /min
Reference frequency	10 MHz, 0.1 V to 5 V (V _{pp}) or TTL, BNC			
TV standards	B, G, K, M, N, I			
Color transmission	PAL, NTSC, SECAM			
Inputs (video)	2 × video			
Inputs (audio)	without NICAM: 2 × AF, with NICAM: 2 × AF + 1 × AF for third language, standard M/N: 1 × AF + 1 × BTSC (BNC)			
Sound transmission	dual-sound coding in line with IRT, FM single-sound and NICAM 728 (–13 dB/–20 dB) (optional); FM single-sound (–10 dB), BTSC input			

Specifications in brief

Specifications of the R&S®NV8300 for DVB-T, DVB-H, ISDB-T, ISDB-T_B

	R&S®NV8301	R&S®NV8302	R&S®NV8303	R&S®NV8304	R&S®NV8305	R&S®NV8306
Number of amplifiers	1	2	3	4	5	6
RF output power ¹⁾	300 W	600 W	900 W	1200 W	1500 W	1800 W
Rate of air flow	8.5 m ³ /min	11 m ³ /min	15 m ³ /min	17 m ³ /min	17 m ³ /min	17 m ³ /min
Inputs	4 × ASI					
Coding and modulation	for DVB-T, DVB-H: in line with EN300744, EN302304 (optional) for ISDB-T, ISDB-T _B : in line with ARIB STD-B31 Version 1.6					
Modulation	QPSK, 16QAM or 64QAM					
Guard interval	1/4, 1/8, 1/16 or 1/32 of useful symbol duration					
IFFT mode	2k and 8k, 4k (optional for DVB-H)					
Inner code rate	1/2, 2/3, 3/4, 5/6 or 7/8					

Specifications of the R&S®NV8300 for DVB-T2

	R&S®NV8301	R&S®NV8302	R&S®NV8303	R&S®NV8304	R&S®NV8305	R&S®NV8306
Number of amplifiers	1	2	3	4	5	6
RF output power ¹⁾	300 W	600 W	900 W	1200 W	1500 W	1800 W
Rate of air flow	8.5 m ³ /min	11 m ³ /min	15 m ³ /min	17 m ³ /min	17 m ³ /min	17 m ³ /min
Inputs (DVB-T2)	2 × ASI or T2-MI, BNC, 75 Ω and 2 × Gigabit Ethernet, RJ-45 (optional)					
Coding and modulation	in line with EN302755 V.1.1.1, SFN in line with TS102773 (T2-MI)					
Channel parameters						
Channel bandwidth	1.7 MHz, 5 MHz, 6 MHz, 7 MHz, 8 MHz					
FFT mode	1k, 2k, 4k, 8k, 16k, and 32k COFDM					
Guard interval	1/32, 1/16, 1/8, 1/4, 1/128, 19/128, 19/256					
L1 parameters						
Mode	single PLP, multiple PLP					
Modulation	BPSK, QPSK, 16QAM or 64QAM					
PLP configuration						
Modulation	QPSK, 16QAM, 64QAM or 256QAM					
Inner code rate	1/2, 3/5, 2/3, 3/4, 4/5, 5/6					

Specifications of the R&S®NV8300 for ATSC

	R&S®NV8301	R&S®NV8302	R&S®NV8303	R&S®NV8304
Number of amplifiers	1	2	3	4
RF output power ²⁾	450 W	900 W	1350 W	1800 W
Rate of air flow	8.5 m ³ /min	11 m ³ /min	15 m ³ /min	17 m ³ /min
Inputs (ATSC)	2 × SMPTE + 2 × ASI			
Coding and modulation	in line with Doc. 53/1995			
Modulation	8VSB			
Symbol rate	10.76 MHz			
Data rate	19.39 Mbit/s			
Trellis coding	2/3			
Reed-Solomon encoding	207/187/10			

¹⁾ Average power specification: at < 510 MHz approx. 10% lower power, at > 662 MHz approx. 5% higher power.

²⁾ Average power specification: at < 510 MHz approx. 5% lower power, at > 662 MHz approx. 6% higher power.

To comply with the applicable standards and limit values for the suppression of out-of-band emissions (and in the case of digital standards, also for maintaining the required shoulder distance), the transmitter may only be operated with suitable filters at the RF output.

Ordering information

Designation	Type	Order No.
Typical configuration of a DVB-T transmitter with 1.8 kW and dual drive		
DVB-T transmitter, configured as an R&S®NV8306V, UHF bands IV/V, 470 MHz to 862 MHz, 1.8 kW output power, with dual drive		
DTV Transmitter (base unit)	R&S®NV8306X	2098.0259.50
Basic Rack	R&S®KG830M1	2096.2002.02
Power Kit	R&S®ZR800C1	2098.5009.46
6 × UHF Power Amplifier	R&S®VH8300A1	2095.6004.02
2 × R&S®Sx800 Exciter, configured as DVB-T exciter	R&S®Sx800	2095.1502K50
Installation Kit, for R&S®Sx800 exciter	R&S®ZR800T1	2099.1007.03
Installation Kit, for R&S®Sx800 dual drive	R&S®ZR800V1	2099.1507.04
Transmitter Control Unit	R&S®NetCCU®800	2095.8007K02

Your local Rohde&Schwarz expert will help you determine the optimum solution for your requirements. To find your nearest Rohde&Schwarz representative, visit www.sales.rohde-schwarz.com

Service you can rely on

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

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Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- | Energy-efficient products
- | Continuous improvement in environmental sustainability
- | ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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