

Version 04.00

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Digital VLF-HF Receivers R&S® EK895/R&S® EK896

For all shortwave applications from 10 kHz to 30 MHz

- Compact DSP-based receivers for the following applications:
- Radiomonitoring and radio detection
- Radiocommunications
- Search operation, DF systems
- Frontend for HF intelligence tasks
- Digital signal processing (DSP) for convenient and versatile operation
- Two models:
- Half-rack receiver R&S EK895
- Search receiver R&S EK896
- Realtime remote control or master-slave mode

- Tried and tested system concept
- Excellent price/performance ratio
- Extremely reliable operation under harsh environmental and EMC conditions





VLF-HF Receiver R&S EK895 with control panel

Digital VLF-HF Receivers R&S® EK895/R&S® EK896

Special features

- Excellent large-signal behaviour, very good intercept points
- High resolution of tuning frequency down to 1 Hz
- Fast and low-noise synthesizer
- Demodulators for AM, CW, LSB, USB, ISB, FM, FSK, AFSK and FAX included in basic configuration
- 13 bandwidths from 150 Hz to 8 kHz (quasi-continuous on request)
- RF preamplifier, switchable (noise figure 8kT₀)
- Double notch filter
- Noise blanker
- DATA LINK reception (option)
- Passband tuning
- Syllabic squelch
- Special RTTY (FSK/AFSK) mark and space filters, matched to the selected shift

- Digital data output
- Maximum input voltage protection up to 100 V EMF
- Control interface fully complying with international standards
- Low power consumption <25 VA (basic model R&S EK895), therefore little self-heating
- Powerful microprocessor for bus interfacing, menus and user programs
- Dual receiver as 19" desktop or rack models
- Free slots for retrofitting of options
- Integrated self-test down to module level with plain-text result display
- Available with operator front panel or remote-control-only front panel
- Highly compact; width ½19" (R&S EK895) or 19" (R&S EK896)

Operational features

- Easy to operate via terminal, computer or front panel
- High rejection of strong interfering signals
- 1000 programmable channel memory locations
- Scan mode for programmable frequency ranges and any desired channel sequences
- Remote control of all settings over any distance when using modems
- Ideal handoff receivers in stationary, mobile and remote receiving systems
- High availability owing to long MTBF and short MTTR
- Easy to adapt to special requirements by means of optional plug-in modules and standardized interfaces

Overview

General characteristics of the R&S EK 895

With the R&S EK890 family, Rohde& Schwarz is presenting a powerful generation of VLF-HF receivers which are topend products benefiting from many years of experience in this field. All members of this family are based on the R&S EK890 basic model. Due to the advantages of digital signal processing, embedded in the improved receiver versions R&S EK895/R&SEK 896 a number of additional features and operational convenience have been added. Straightforward, menu-guided selection and programming of the receiving settings ensure excellent processing and handling of the received signal content. The compact design is due to the use of largescale-integration SMDs. Featuring full system compatibility, the receivers provide the basis for extremely economical customer-specific solutions.

With its excellent RF characteristics and clearcut, full remote-control capability via standardized data interfaces, the R&S EK 890 family is suitable for all civil, administrative and military shortwave

applications. These receivers are an ideal choice for receiving systems that have to fulfill extremely high reliability requirements, in particular under harsh environmental and EMC conditions.

Operation is possible via an ASCII terminal, a computer (PC) or via the front panel. Using line drivers, a master receiver can control up to 99 remote receivers in master-slave operation. On the R&S EK895/R&S EK896, two wired and bus-integrated slots for plug-in modules are provided for extensions, e.g. BCD interface or input filters.

Uses

The comprehensive sequence control can be used for all demanding shortwave reception tasks. Due to flexible programming of the processor, the following operating modes are possible:

- Manual operation
- Remote control or master-slave operation
- Channel scanning, sequential and programmable
- Frequency scan
- Channel reception
- Password-protected channel reception

The R&S EK 890 family thus fulfills the requirements for versatile use in voice receiving and any kind of data communication system as well as for all radiomonitoring, radio detection and radio intelligence (COMINT) applications. For application in DF systems, an R&S EK 895 is used as the master (controlling synthesizer), its LOs being brought out for external amplification, distribution and phaselocked application to all other receivers.

The built-in memory has capacity for non-volatile storage of 1000 complete channel settings so that channel management and control by an external computer are not required but are nevertheless additionally possible. Due to their excellent characteristics regarding dynamic range, low synthesizer noise and gain control range, the receivers are ideal high-performance frontends for subsequent signal processing.

Two independent Receivers R&S EK895 with remote-control panel in a 19" rackmount adapter



Search Receiver R&S EK896

The R&S EK896 has especially been designed for complex tasks of radio detection and search reception, its operating principle and configuration perfectly matching the relevant requirements. Basically it is fitted with panel controls and LCD displays for local and remote-control operation.

High-speed and reliable radiomonitoring is supported by temporary storage of a complete receiver setup and its transfer to or readout from the connected slave. The R&S EK 896 is the optimal operator's position in modern radiomonitoring systems. In the usual master-slave mode, a master receiver can control up to 99 slave receivers via additional line drivers to handle simultaneous radiomonitoring or specific radio detection tasks. Due to its outstanding characteristics, the R&S EK 896 is ideal for use as a standalone receiver. All R&S EK 895 options can be fitted.

Design

RF unit

The antenna signal is routed via a low-pass filter, which is provided for rejecting image frequencies and suppressing oscillator reradiation, and applied to the input mixer where it is converted to the first IF of 41.44 MHz by means of an oscillator variable in 1 Hz steps. The crystal filter that follows determines the maximum receiving bandwidth of 10 kHz and rejects the second image frequency. A fixed frequency of 40 MHz is used for conversion to the second IF of 1.44 MHz.

The high-performance mixer at the receiver input ensures excellent large-signal behaviour. The intercept points are typically $+70~\mathrm{dBm}~(\mathrm{IP_2})$ and $+35~\mathrm{dBm}~(\mathrm{IP_3})$; the crossmodulation transfer is 10% for an interfering signal of $+21~\mathrm{dBm}$. In most cases, additional filters such as sub-octave filters are therefore not required.



Search Receiver R&S EK896 with front panel for local/remote control

IF/AF processor (DSP)

The second IF is converted to the third IF of 25 kHz using a 5.66 MHz fixed frequency. After digitization of the third IF in a 16-bit A/D converter, the processor assumes all signal generation and processing tasks (DSP) including the following:

- Automatic, remote or manual control (AGC, DGC, MGC)
- Measurement of received levels
- Filtering with 13 fixed or quasi-continuously adjustable bandwidths
- Demodulation, passband tuning, double notch filter
- Noise blanker, syllabic squelch
- Generation of BFO frequency as analog IF from 0 to 40 kHz, digital IF as serial data and I/Q data stream

Synthesizer

The synthesizer supplies all the conversion frequencies required for the RF and the IF demodulator units. Due to direct digital frequency synthesis, the first conversion oscillator can be varied in 1 Hz steps. The settling time of the oscillator is 5 ms for any frequency variation. Two phase-locked loops (PLLs) produce the 40 MHz and 5.66 MHz fixed frequencies. The operation of the total of four PLLs in the synthesizer is continuously monitored.

In the basic version, all the frequencies are derived from a temperature-compensated crystal oscillator. Higher accuracy requirements can be fulfilled by including a heated crystal oscillator (optional OCXO) or using an external frequency standard (1 MHz, 5 MHz or 10 MHz).

Control functions

Processor and software

The 16-bit microprocessor using power-saving CMOS technology is what makes the high-performance, compact, reliable and user-friendly concept of the R&S EK895 possible. The microprocessor is not only responsible for setting and managing the module functions, it also communicates with the outside world via the panel controls and the data interface, executes the internal programs and ensures the high operational reliability through various routines:

- Nonvolatile storage of all settings
- Continuous testing of CPU, RAM and PROM functions
- Continuous monitoring (CM) of synthesizer
- BIT (built-in test) for module testing

The simple and logical ASCII command syntax for controlling the receiver via the serial interface includes control commands for the following:

Basic settings

- Frequency
- BF0
- Bandwidth
- Demodulation modes
- Gain control mode
- Digital threshold
- Passband tuning

Search operations

- Frequency scanning
- Channel scanning
- Hold time
- Dwell time
- Stop criterion

Test operations

- Read CM status
- BIT start
- BIT readout

System operations

Readout of

- Software version
- Options
- Error messages
- Signal level
- Deviation

Channel operations

- Channel manipulations
- Store channel
- Erase channel
- Select channel
- Readout channel

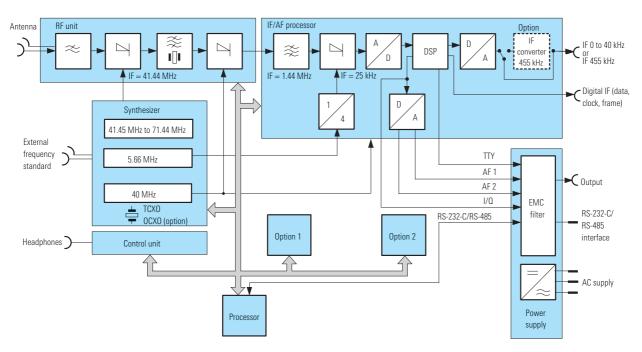
Special operations

- Master-slave operation
- Complete erasure of channel memory

In addition, the following functions can be selected on the front panel:

- Display of interface configuration
- Fast channel storage
- Channel buffer storage
- Default settings on/off
- Password for channel service
- Local/remote mode
- Knob increments

Block diagram of the Digital VLF-HF Receivers R&S EK895/R&S EK896



Various configurations

Receivers with control panel

In the standard version, the R&S EK895 receiver is available with an operator front panel, which can also be retrofitted. This front panel also permits manual control and display of all functions while full remote-control capability is maintained. This version is particularly suitable for use as a master receiver in receiving systems or as a standalone unit (standard with R&S EK896).

The operator interface allows for a combination of hardkey and softkey entries. Parameters that are frequently handled, i.e. receive frequency, channel, BFO frequency and passband tuning (PBT), can be entered directly via a separate keypad. All current receiver settings are continuously displayed in large high-contrast characters on a backlit LCD. An additional bargraph indicator allows display of either the receive level (0 to 120 dB μ V, in 5 dB steps), the DGC or MGC settings or the frequency offset (as a tuning aid and deviation indication).

Receivers with remote-control panel

Optionally, the receivers are remote-controlled by ASCII command sequences via a multistandard interface (RS-232-C, RS-485, RS-422/423, 2-/4-wire). In the simplest case, a terminal can be used as the control unit. For more convenience, a computer can be used to handle complex tasks and to create special user interfaces. A demo program for generating a virtual front panel is available if desired.

The features newly incorporated into the R&S EK895/R&SEK 896, such as preamplifier (PREAMP), noise blanker (NB), squelch (SQ), notch filter (NOTCH) and passband tuning (PBT), are selected in submenus using softkeys. If one of these features is active, a bargraph appears on the display above the relevant inscription (PREAMP, NB, SQ, NOTCH, PBT).

Remote Control Unit R&S GB899 (model 03)

This option is an R&S EK895 reduced to control functions plus a Control Panel R&S GB890. It is used for realtime remote control of handoff receiving equipment, over long distances preferably via additional modems.

IF bandwidth configuration

The R&S EK895/R&S EK896 features 13 bandwidths from 150 Hz to 8 kHz. Quasicontinuous tuning in 128 steps is available as an option.

Input Filter Unit R&S FK890H1 (option)

The input filter module comprises a lowpass filter, a bandpass filter and eight suboctave filters which are automatically selected with the receive frequency.

BCD Interface R&S GC890 (option)

A plug-in BCD interface is available for controlling frequency-dependent add-on units with parallel interfaces, e.g. a selective antenna.

TTY Line Current Source R&S GH890 (option)

For the operation of older teletype units that require line current (single/double current), a TTY line current source requiring no extra slot can be accommodated.

IF Converter R&S UX895 (option)

The IF Converter R&S UX895 can be supplied as a submodule for incorporation into the IF/AF processor. Instead of the analog IF output signal of 0 to 40 kHz, it linearly converts the set receive parameters to the IF of 455 kHz.

Digital Selection R&S FK896D (option for R&S EK896 only)

This option considerably improves the input selectivity of the receiver. Two versions are available for 20 dB or 40 dB stopband attenuation. The automatically tracking selection circuit includes the following functions:

- 7-circuit lowpass (0 to 30 MHz)
- 5-circuit lowpass (0 to 1.5 MHz) for rejection of strong shortwave interfering signals
- Tracking single-circuit filter (1.5 MHz to 30 MHz) with a stopband attenuation of >20 dB (40 dB) at 10% spacing from the center frequency
- Switch on/off by remote control
- Input voltage protection of ≥200 V EMF

The Digital Selection R&S FK896D is recommended for use in environments with strong RF interference (collocation problems). It improves input selection by automatically tracking the receive frequency and, at the same time, considerably increases input-voltage protection (overload protection).

Rear view of the R&S EK895



Main mo	enu: MOD GAIN BW SCA MORE	Second menu level
MOD	Demodulation modes MORE: for further modes	AM CW LSB USB MORE
GAIN	Control modes Auto, manual, auto+manual, auto+digital MORE: fast or slow control	AGC MGC A+M A+D MORE
BW	Bandwidth	BW ↓ BW ↑
SCA	Scan mode Frequency sweep, channel sweep (any sequence), channel sweep (incremental), stop or continue sweep, program sweep	FRQ CHP CHS S/C PRO
MORE:	M/S SYS SPEC CHM MEM	
M/S	Master-slave operation Address slave (indicate slave address, e.g. 62), read out or vary slave settings	ADR62 GET PUT
SYS	System status Read out firmware version, built-in options, error messages; start self-test; MORE: total reset	VERS OPT CM BIT MORE
SPEC	Special functions Rotary knob: step size on/off; level setting for threshold-controlled external switching signal; show serial interface setting; switch to remote control; default settings on/off	KNOB LEV SER REM DEF
CHM	Channel memory parameters Channel memory indication and channel-specific parameter variation without interrupting reception	MOD GAIN BW THLD
MEM	Channel memory operations Clear all memory, clear certain memory, store to certain memory, use next free memory	CLA CLCH STCH STO

Broadband IF Output R&S GM 893 (option)

The optional broadband output (plug-in module) supplies a 1 MHz output signal at the first IF of 41.44 MHz (relative to a receive frequency of ± 500 kHz). To prevent impairment of the receiver sensitivity of the main channel (message channel), the path to the broadband channel is decoupled by approx. 10 dB. For broadband spectrum analysis, a spectrum display can be connected to this broadband output.

Digital data output (option)

For further digital signal processing of the received signal, a separate digital IF interface (connector X 69 at rear) is available,

delivering the digital DATA, CLOCK FRAME outputs (0 to 40 kHz, sampling rate 100 ksps).

DATA LINK option

If DATA LINK operation (MIL-STD-188-203-1A) is required, special receiver versions are available.

1.44 MHz IF output, unregulated (option)

For connecting and operating an external IF spectrum display, e.g. the **Digital Spectrum Display R&S EP090**, an unregulated IF output at 1.44 MHz is available. This option uses the HF unit (model 03) and has to be ordered along with the basic receiver.

Operating concept

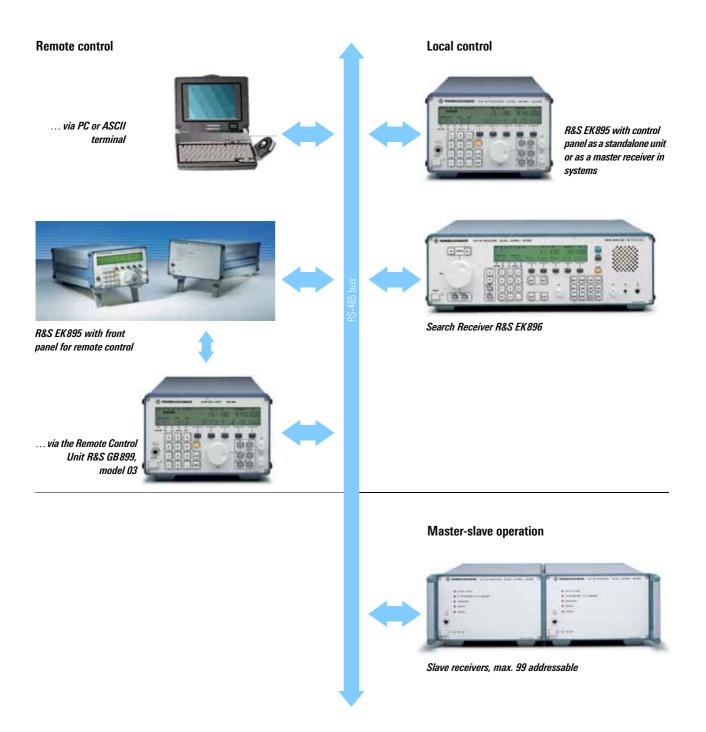
The R&S EK890 family has a suitable operating mode for every application (see also page 8). The remote-control interface is configured to the RS-485 standard and is bus-compatible for system operation. Users who want to control their radiomonitoring system from the receiver front panel rather than from a computer can use the receivers of the R&S EK890 family as a master receiver or install the Remote Control Unit R&S GB899.

The softkey-menu operator interface provides the ergonomical advantage of clean front panel layout as well as access to a large number of setting parameters. When you insert extension modules, they are automatically detected and incorporated in the software BIT and the menu system. The clearcut operating concept of the R&S EK890 family has five menu levels which allow 50 logically structured operating routines to be called up by softkeys. In spite of the multitude of functions, operation is higly convenient, e.g. each type of modulation is assigned a default setting with all relevant parameters, which can also be individually programmed.

The table to the left shows all possible settings down to the second menu level.

For fast access to the setting parameters, the R&S EK896 has 12 additional hard-keys, e.g. for standard types of modulation, bandwidth variation, etc.

Control concepts of the Digital VLF-HF Receivers R&S EK895/R&S EK896



Specifications

Frequency range	10 kHz to 30 MHz		
Resolution	1 Hz		
Frequency drift Frequency standard Oven-controlled frequency standard	-10 to +45°C aging/year 5 x 10 ⁻⁷ 1 x 10 ⁻⁶ 1 x 10 ⁻⁷ 1 x 10 ⁻⁷		
External frequency standard	1/5/10 MHz, 0.2 V to 1 V rms		
Antenna input	BNC connector, 50 Ω		
VSWR	<1.5 typ. with preamp on for f >250 kH <3 typ. w/o preamp for f >5MHz otherwise <4 typ.		
Max. input voltage (≤30 MHz)	100 V EMF		
Oscillator reradiation into 50 Ω termination	≤10 µV		
Demodulation modes	CW/MCW (A1A, A1B, A2A, A2B) FAX1 (F1C) AM/AME (A3E, H2A, H2B, H2E) USB/ LSB (R2A, R3E, J2A, J3E) ISB (B8E) FSK/AFSK (F1A, F1B), F6 (F7B) FAX2 (F3C), FM (F3E) DATA LINK acc. to MIL-STD-188-203-1A (on request)		
IF bandwidth	3 dB 60 dB		
(standard values)	±75 Hz ±150 Hz ±150 Hz ±225 Hz ±300 Hz ±430 Hz ±500 Hz ±770 Hz ±750 Hz ±990 Hz ±1050 Hz ±1600 Hz ±1200 Hz ±1760 Hz ±1350 Hz ±1900 Hz ±1550 Hz ±2100 Hz ±2000 Hz ±3400 Hz ±2400 Hz ±3700 Hz ±3000 Hz ±4200 Hz ±4000 Hz ±5200 Hz		
Quasi-continuous bandwidth (option for R&S EK895)	128 steps, 100 Hz to 9 kHz		
Sensitivity For S/N = 10 dB, f = 0.1 MHz to 30 MHz A1A (CW) J3E (SSB), J7B H3E (AME), 1 kHz, m = 60%	0.4 μV EMF (–121 dBm), BW=3 1.0 μV EMF (–113 dBm), BW=2 2.7 μV EMF (–104 dBm), BW=	.7 kHz	
With preamplifier, f=0.2 MHz to 30 MHz A1A (CW) J3E (SSB), J7B H3E (AME), 1 kHz, m=60%	0.2 μV EMF (–127 dBm), BW=3 0.4 μV EMF (–121 dBm), BW= 1.0 μV EMF (–113 dBm), BW=	2.7 kHz	
Immunity to interference, non-linarities			
Intermodulation (1.5 MHz to 30 MHz; $\Delta f \ge 30$ kHz; interfering signal 0 dBm) IP_2 IP_3	>60 dBm (70 dBm typ.) >30 dBm (35 dBm typ.)		
Crossmodulation (0.1 MHz to 30 MHz, interfering signal 5 V EMF (+21 dBm); $\Delta f \geq \!\! 30 \text{ kHz; } m\!=\!0.3; f\!=\!1 \text{ kHz; signal level } 10 \text{ mV EMF } (-33 \text{ dBm}))$	≤10% modulation transfer		

Blocking (0.1 MHz to 30 MHz; interfering signal 6.3 V EMF (+23 dBm); $\Delta f \ge 30$ kHz; signal level 1 mV EMF (-53 dBm); m=0.3; f=1 kHz)	≤1 dB signal attenuation	
Desensitization (interfering signal 300 mV EMF; ∆f ≥30 kHz; signal level 30 µV EMF; bandwidth 3.1 kHz)	≥20 dB SINAD	
Inherent spurious signals (f >100 kHz)	<-113 dBm (nominal -124 dBm)	
Image frequency rejection	>90 dB	
IF rejection	>90 dB	
Weighted S/N ratio for 1 mV EMF	>46 dB SINAD	
Gain control	automatic (AGC), manual (MGC) or remote (DGC)	
AGC error	$\leq\!3$ dB typ. (1 μV to 1 V EMF)	
Time response constants Attack time Decay time	<15 ms 25/150/500 ms, 1 s, 3 s	
DGC range	0 to 120 dBµV EMF in 1 dB steps	
BF0	-5.00 kHz to +5.00 kHz	
Resolution	10 Hz	
AFSK/FSK demodulator	transfer rate (50 baud to 600 baud) and deviation range (±42.5 Hz to ±425 Hz) adjustable; V.28 interface and audible tone circuit	
Diplex telegraphy demodulator (F7B)	2 x V.28 interface	
Channel memory	for 1000 channels, nonvolatile, storage of complete receiver setup for each channel	
Data interface	RS-232-C, RS-485 (bus-compatible)	
Transfer rate	50 baud to 38400 baud	
Outputs		
AF output 1, AF (I) Settling range	0.3 kHz to 3.4 kHz; floating; $Z_{out}{=}600~\Omega$ $-10~\text{dBm}$ to +10 dBm	
AF (Q) FAX1 (F1C) FAX2 (F3C)	480 mV rms, $Z_{\rm out}\approx 100~\Omega$ 1.9 kHz \pm 150 Hz in VLF range (f<500 kHz) 1.9 kHz \pm 400 Hz in HF range (f \geq 500 kHz) 1.9 kHz modulated	
FM (F3E)	NBFM (3 dB bandwidth: ±4 kHz)	
AF output 2 (LSB in ISB mode) Settling range	0.3 kHz to 3.4 kHz, floating, $Z_{out}{=}600~\Omega$ $-10~\text{dBm}$ to $+10~\text{dBm}$	
Monitoring output	$=$ 10 dBill to \pm 10 dBill $=$ 500 mV, $Z_{out} = 332 \Omega$	
FM video output	1 V/kHz, Z_{out} = 1 k Ω	
IF (1.44 MHz) output (unregulated)	BW (–3 dB): ≥10 kHz;	
ii (1.11 ivii iz) oatpat (ainogalatoa)	gain: (18 ± 2) dB, 50Ω	
IF output (analog)	0 to 40 kHz in 100 Hz steps, 0 dBm into 600 Ω or 455 kHz, 0 dBm into 50 Ω (optional)	
IF output (digital)	serial data (clock, data, frame),	
	100 ksps	

Options

Control Panel R&S GB 890 (model 03)	with controls and indicators for complete receiver setup; connector for loudspeaker or headphones (max. 1 W into 8 Ω)	
Remote Control Unit R&S GB899 (model 03, on request)	Control Panel R&S GB890 plus R&S EK895 reduced to control functions, using RS-232-C with a transfer rate of 50 baud to 19200 baud; modem oper- ation is recommended for distances beyond about 100 m	
Input Filter Unit R&S FK890H1	lowpass filter 0 to 0.5 MHz bandpass filter 0.5 MHz to 1.5 MHz 8 suboctave filters 1.5 MHz to 30 MHz	
BCD Interface R&S GC890	frequency information, 22 bit parallel (CMOS, 5 V)	
TTY Line Current Source R&S GH 890	single current: 40 mA/60 V double current: ±20 mA/±30 V	
IF Converter R&S UX895 (on request)	455 kHz, 0 dBm into 50 Ω , BNC female	
Digital Selection R&S FK896D (R&S EK896 only)		
Frequency range	0 to 30 MHz, at f <1.5 MHz as LPF	
Stopband attenuation	\geq 20 dB (>40 dB: R&S FK896D, model 04) at 10% spacing from center frequency (f = 1.5 MHz to 30 MHz)	
Gain	0 to +2 dB	
Tuning time	<10 ms	
Inband IP ₃	\geq 34 dBm (\geq 30 dBm: R&S FK896D, model 04)	
Noise figure	13 dB typ.	
RF input voltage protection	\geq 200 V EMF (Z_{in} =50 Ω) >10 V EMF or >4 A	

Broadband IF Output R&S GM 893 (model 03)		
Output frequency	41.44 MHz	
3 dB bandwidth	>1 MHz	
Attenuation	<10 dB relative to antenna input	
Impedance	50 Ω	
Oven-controlled frequency standard	aging/day $\le 1 \times 10^{-9} (OCXO)$	

General data

Environmental conditions Operating temperature range Permissible temperature range Storage temperature range Humidity (non-condensing)	to MIL-STD-810 D -10°C to +45°C -25°C to +55°C -40°C to +80°C max. 95% at +40°C	
Vibration test	10 to 55 Hz; 0.4 mm double amplitude	
Shock test	30 g, 11 ms	
EMC	to MIL-STD-461/462	
MTBF	>14 000 h	
Power supply	100/120/220/240 V -15/+10%, 47 Hz to 420 Hz (approx. 25 VA to 75 VA, depending on model)	
Dimensions (W x H x D), weight R&S EK895	211 mm x 132 mm x 460 mm, approx. 8 kg 426 mm x 132 mm x 460 mm, approx. 11 kg	





Ordering information

Digital VLF-HF Receiver	R&S EK895	
Remote control via serial interface		6057.8996.02
With control panel; for local and remote control		6057.8996.12
With control panel; for local and remote control; with built-in OCXO		6057.8996.14
With control panel; for local and remote control; with built-in OCXO; LINK11 reception		6057.8996.17
With control panel; for local and remote control; with built-in OCXO; LINK11 reception; for use with external frequency standard		6057.8996.37
With control panel; for local and remote control; with 1.44 MHz IF output		6057.8996.63
Digital VLF-HF Search Receiver	R&S EK896	
Control panel with speaker; for local and remote control		6038.2509.12
Control panel with speaker; for local and remote control; with built-in $\ensuremath{\text{OCX0}}$		6038.2509.14
With control panel; for local and remote control; with built-in OCXO; LINK11 reception		6038.2509.17
With control panel; for local and remote control; with built-in OCXO; LINK11 reception; for use with external frequency standard		6038.2509.37
Plug-in modules (R&S EK895, R&S EK896)		
Preselection Unit	R&S FK890H1	6007.7750.02
Digitally Tuned RF Selection Stopband attenuation 20 dB; for R&S EK896 only	R&S FK896D	6077.3019.02
Digitally Tuned RF Selection Stopband attenuation 40 dB; for R&S EK896 only	R&S FK896D	6077.3019.04
BCD Interface	R&S GC890	6007.7809.02
Broadband IF Output	R&S GM893	6051.8494.03
Recommended extras (R&S EK895, R&S EK896)		
Transfer Software Package	R&S EK890S3	6015.4492.02
Quasi-Continuous IF Bandwidth Control	R&S EK895S7	6077.0510.02
Loudspeaker Unit	R&S GA890L1	6041.6199.02
Remote Control Unit	R&S GB899	6037.3501.03
TTY Line Current Source	R&S GH890	6007.6054.02
Service Kit	R&S KA890C1	6030.9004.02
19" Assembling Kit for two R&S EK895 Desktop model	R&S KA890L1	6041.6699.02
19" Assembling Kit for two R&S EK895 For rack installation	R&S KA890L1	6041.6699.03
High-precision Oven-controlled Master Quartz Oscillator		6007.3255.03
IF Conversion to 455 kHz	R&S UX 895	6077.0261.02
19" Adapter Kit For one R&S EK895 and one blank panel	R&S ZZA-98	0827.4533.00

