R&S® HMO Compact Series
Mixed Signal Oscilloscopes
70/100/150/200 MHz Bandwidth
Intelligent user interface
To optimize the screen display, the instrument shows and hides menus

FFT
Superb FFT functionality

Quick view
At the push of a button the 16 most important values of the measured signal are permanently updated and displayed

Setup
Intuitive, multi-lingual user menu

Help
Context-sensitive help

Math
Wide range of programmable math functions

Zoom
Memory zoom up to 50,000 : 1

Analog channels
Vertical sensitivity of up to 1mV/div.

Fan
Maximum noise reduction by temperature-controlled fan

Precise signal analysis
2 Gsamples/s sampling rate
2 Msamples memory

Serial bus analysis
Hardware-based triggering and decoding (optional)

Standard MSO functionality
Analyze analog channels plus up to an additional 8 digital channels

Component tester
Display of characteristic curves for testing of components

Bus signal source
To create SPI, PC, UART and counter test-signals

**Rohde & Schwarz**
R&S®HMO Compact Series

"**R&S®HMO2024, R&S®HMO1524 only**"
At a glance

The increasing complexity of systems brings with it an increase in the challenges facing T&M systems. The digital mixed signal oscilloscopes in the R&S®HMO compact series unify high sensitivity and multifunctionality with an attractive price. The wide range of applications and measurement functions address a broad group of users – from embedded developers to service technicians to educators. Advanced, powerful technology in a compact design meets the high requirements of today’s customers.

The 2- and 4-channel instruments offer bandwidths of 70 MHz, 100 MHz, 150 MHz and 200 MHz, a sampling rate of 2 Gsample/s and a memory depth of 2 Msample. Featuring MSO functionality as standard and a variety of options for serial bus analysis, the instruments meet the demands of modern design development.

Rohde & Schwarz offers the R&S®HMO compact series exclusively as mixed signal oscilloscopes. Unlike other manufacturers’ instruments, the mixed signal functions are not activated via software options. The only optional extra is the R&S®HO3508 low-capacitance logic probe that analyzes signals with a sampling rate of 1 Gsample/s on up to 8 logic channels. The probe is not tied to the instrument serial number and can be used with any of the R&S®HMO oscilloscopes.

For communications between embedded systems and the environment, hardware-based signal triggering and decoding for all common protocols (I2C, SPI, UART, CAN and LIN) has been integrated. It can be activated with an upgrade voucher at any time.

Thanks to the integrated 64k point FFT analysis function, the R&S®HMO compact series competes with significantly larger oscilloscopes in the frequency domain. The time domain signal, measurement window and FFT results are displayed on a single screen, which makes it easier to analyze the input signal waveform.

The R&S®HMO compact series offers time domain, logic, protocol and frequency analysis plus an advanced component tester in a single, compact instrument. It is a member of the Rohde & Schwarz scope-of-the-art family.
Key facts

Superior hardware-based acquisition for precise measurement results
- 2 Gsa/s sampling rate, 2 Msa memory depth
- High vertical sensitivity down to 1 mV/div
- Low-noise measurement due to state-of-the-art A/D converter
- High acquisition rate to identify signal faults

Versatile measurement functions and fast results
- Wide selection of automatic measurement functions
- QuickView: key results at the push of a button
- Advanced math functions with realtime calculations
- Mask test: a new mask can be easily created with just a few keystrokes
- FFT: the easy way to analyze the signal spectrum

Logic analysis with the MSO option
- Mixed signal function as standard
- Precise triggering on signal events
- Straightforward display of digital signals
- Low test point loading due to active probe solution

Serial bus analysis: hardware-based triggering and decoding
- Versatile trigger options for isolating specific data packets
- Color-coded display of decoded bus signals
- Direct export of analyzed data to USB memory drive
- Simultaneous decoding of two buses in realtime

Future-ready investment and scalability
- Free firmware updates
- Serial bus analysis via optional software licenses

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<th>Application</th>
<th>How the R&amp;S®HMO meets your needs</th>
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<td>Engineering lab</td>
<td>Advanced math functions available as standard, chained calculations possible</td>
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<tr>
<td></td>
<td>Automeasurement for six user-defined parameters</td>
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<tr>
<td></td>
<td>Memory zoom function up to 50,000:1</td>
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<td></td>
<td>Digital bus signal source</td>
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<tr>
<td>Analog circuit design</td>
<td>Low-noise amplifier and A/D converter</td>
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<tr>
<td></td>
<td>1 mV/div sensitivity</td>
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<td></td>
<td>50 Ω/1 MΩ input impedance, switchable (R&amp;S®HMO15024, R&amp;S®HMO2024)</td>
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<td>Component tester</td>
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<td>Embedded debugging</td>
<td>Mixed signal function with 8 logic channels</td>
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<td>Serial bus trigger and hardware-accelerated decode (R&amp;S®HMO010/11/12, R&amp;S®HV110/111/112)</td>
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<td></td>
<td>6-digit hardware counter</td>
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<td>FFT with 64kPoints</td>
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<td>Production environment</td>
<td>Remote control for automated data acquisition</td>
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<td>Pass/fail tests based on user-defined masks with error signal output</td>
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<td></td>
<td>Automatic signal measurement at the push of a button</td>
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<td></td>
<td>USB/RS-232, Ethernet/USB or GPIB (IEEE 488) interfaces</td>
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<td>General purpose and education</td>
<td>Fast boot time and lightweight design</td>
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<td>Low-noise, intelligent temperature management</td>
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<td>Extended display size through VirtualScreen technology</td>
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<td>DVI-D output for external display</td>
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</table>

Model overview

<table>
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<tr>
<th>Frequency</th>
<th>200 MHz</th>
<th>150 MHz</th>
<th>100 MHz</th>
<th>70 MHz</th>
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</thead>
<tbody>
<tr>
<td>4 channel</td>
<td>R&amp;S®HMO2024</td>
<td>R&amp;S®HMO1524</td>
<td>R&amp;S®HMO1024</td>
<td>R&amp;S®HMO724</td>
</tr>
</tbody>
</table>
Functions for everyday use

The intelligent screen design hides menus when these are not in use. This allows a maximum display area for measurement data, despite the extremely compact instrument dimensions.

QuickView you will also receive a comfort feature that allows to get a quick overview of the measured waveform. By pressing a single button to activate the automatic analysis the results are displayed directly at the signal and on the bottom of the screen.

Pattern Generator
The HMO Compact Series includes a 4 bit wide bus signal source. Thereby predefined I²C, SPI, UART signal patterns as well as pseudo random patterns and counter signals are provided.

Component Tester
Our time proven component tester will also be at your side. Two measuring frequencies with 50Hz or 200Hz are provided to support your potentially tedious search for faulty components. And since a picture truly does say more than a thousand words, you will be able to tell at a glance if your error analysis is on track.
Always a MSO

The mixed signal functionality is always included in the R&S®HMO Compact Series with no software option being necessary to unlock it.
Rohde & Schwarz is offering the R&S®HMO Compact Series exclusively as mixed-signal oscilloscopes. The great advantages of these instruments are best illustrated by taking a look at how ADCs (Analog Digital Converter) or DACs (Digital Analog Converter) are integrated.

These transformer modules include an analog signal on the one side and a digital signal on the other side. As shown in the image below the latency time of a DAC can be determined with one simple cursor measurement. Therefore a MSO allows developers to devote their full attention to the circuit without having to waste energy on the measurement setup.

The active logic probe R&S®HO3508 is available separately and is not linked to a specific serial number of an instrument. It can be used with any R&S®HMO oscilloscope.

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**Optional: Logic probe R&S®HO3508**

- Logic probe R&S®HO3508 fits to all R&S®HMO series oscilloscopes
- No hardware lock to a specific device
- 8 logic channels available on each logic probe
- Signal threshold adjustable for each logic pod

**Specifications R&S®HO3508**

<table>
<thead>
<tr>
<th>Channels</th>
<th>8</th>
</tr>
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<tbody>
<tr>
<td>Memory depth per channel</td>
<td>1 MPts (R&amp;S®HMO Compact Series)</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Max. input frequency</td>
<td>350 MHz</td>
</tr>
<tr>
<td>Max. input voltage</td>
<td>40 V (DC + AC)</td>
</tr>
<tr>
<td>Thresholds</td>
<td>TTL, CMOS, ECL, user-defined (-2 V to +8 V)</td>
</tr>
<tr>
<td>Measuring category</td>
<td>CAT I</td>
</tr>
<tr>
<td>Cable length</td>
<td>approx. 1 m</td>
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</tbody>
</table>

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8 bit DAC signal change

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8 bit DAC signal change
Frequency Analysis

Due to the outstanding FFT functionality of the R&S®HMO series oscilloscopes, signals can also be analysed in the frequency domain with up to 65,536 points. Additional practical tools such as cursor measurement as well as peak-detect-functions are also available. They allow engineers to complete their analysis significantly faster, also in the frequency domain.

Figure 1: A sinusoid signal that at first sight appears undistorted
Figure 2: The frequency spectrum exposes the signal distortion
Figure 3: Sine burst signal in time domain

Easy analysis in frequency domain

Quite often the distortion of input signals cannot be detected with the naked eye. For instance, the sine wave signal displayed in figure 1 appears to be undistorted. Only the frequency spectrum (figure 2) - available with just one touch of a button - clearly displays additional harmonics that occur as harmonic oscillations for multiples of the basic frequency.

For non-periodic input signals most instruments offer the option to trigger the spectrum at just the right moment to then check it in “STOP” mode at a later time. However, at that point, many oscilloscopes with FFT functionality calculate the spectrum only once and store the result in the memory. The base time signal will no longer be used for the calculation. Consequently, an investigation of all parts of the signal will no longer be possible.

R&S®HMO series oscilloscopes work differently: Since FFT is also active for previously stored signals, it is possible to subsequently analyze any sections of those signals captured in single shot mode or stop mode with an adjustable window width. Figure 3 shows a sine burst signal in the time domain. Pushing the FFT button will switch the oscilloscope into the frequency domain. Users can choose between various measurement...
windows like the „rectangular“ type that has been used in figure 4. Although this window type captures frequencies at a high degree of accuracy, it is also accompanied by more noise. In order to suppress this disturbing interference users can for instance choose the Hanning window. The impact on the spectrum is visible in figure 5 (see device screen).
Serial Bus Analysis

I²C, SPI, CAN or LIN – in terms of interaction with the outside world for embedded systems, it is safe to say that these are the most commonly used communication protocols. The R&S® HMO Compact Series by Rohde & Schwarz offers you hardware-accelerated signal triggering and decoding for all of these protocols. You can upgrade your instrument via software licence keys with those functions required to develop your application:

- R&S®HOO10 / R&S®HV110: Analysis of I²C, SPI and UART/RS-232 signals on analog and logic channels
- R&S®HOO11 / R&S®HV111: Analysis of I²C, SPI and UART/RS-232 signals on all analog channels
- R&S®HOO12 / R&S®HV112: Analysis of CAN and LIN signals on analog and logic channels

**Serial bus trigger types:**
- I²C: Start, Stop, ACK, nACK, Address/Data
- SPI: Start, End, Serial Pattern (32Bit)
- UART/RS-232: Startbit, Frame Start, Symbol, Pattern
- LIN: Frame Start, Wake Up, Identifier, Data, Error
- CAN: Frame Start, Frame End, Identifier, Data, Error
Vouchers and Options

You can easily upgrade all available serial bus analysis options for your R&S®HMO oscilloscope at any point in time. Should your requirements change, then so does the R&S®HMO Compact Series, as all models can be extended to serial bus analysis functionality via software upgrades whenever required. This is done with upgrade vouchers available at your dealer.

The individual voucher number and the serial number of the instrument to be upgraded is entered at http://voucher.rohde-schwarz.com

The customer immediately receives the respective licence key which can be loaded via USB memory drive into the instrument.

### Options for all R&S®HMO oscilloscopes

<table>
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<th>Voucher-Code</th>
<th>Option-Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>R&amp;S®HV110</td>
<td>R&amp;S®HOO10</td>
<td>PC, SPI, UART/RS-232 on analog and digital channels</td>
</tr>
<tr>
<td>R&amp;S®HV111</td>
<td>R&amp;S®HOO11</td>
<td>PC, SPI, UART/RS-232 on all analog channels</td>
</tr>
<tr>
<td>R&amp;S®HV112</td>
<td>R&amp;S®HOO12</td>
<td>CAN, LIN on analog and digital channels</td>
</tr>
</tbody>
</table>

1) Available at your dealer at any time
2) Only when purchasing an R&S®HMO oscilloscope
R&S®HMO Compact Series
(4-channel mixed signal oscilloscopes)

R&S®HMO724: 70 MHz
R&S®HMO1024: 100 MHz
R&S®HMO1524: 150 MHz
R&S®HMO2024: 200 MHz

from firmware version 4.527

### Display
- **Screen size / type**: 16.5 cm (6.5") VGA Color Display
- **Resolution (L x W)**: 640 x 480 Pixel
- **Backlight**: 400 cd/m² (LED)
- **Display range in horizontal direction**
  - without menu bar: 12 Div (600 Pixel)
  - with menu bar: 10 Div (500 Pixel)
- **Display range in vertical direction**
  - with Virtual Screen usage: 200 Div
- **Color depth**: 256 colors
- **Trace display**: pseudo-color, inverse brightness
- **Levels of trace brightness**: 32
- **Button brightness**: light, dark

### Vertical System
- **DSO Mode**: CH1, CH2, CH3, CH4
- **MSO Mode**: CH1, CH2, CH3, CH4|POD, CH4

### Analog Channels
- **Y-bandwidth (-3 dB)**
  - (1 mV, 2 mV/Div): 200 MHz (R&S®HMO724, R&S®HMO1024)
  - (5 mV to 10 V/Div): 70 MHz (R&S®HMO724)
  - Lower AC bandwidth: 2 Hz
- **Bandwidth limitation (switchable)**: about 20 MHz

### Input sensitivity range
- **all analog channels**: 1 mV/Div to 10 V/Div
- **coarse stepping**: 13 calibrated steps, 1-2-5 sequence
- **variable stepping**: freely between calibrated steps

### Impedance
- **1 MD || 14 pF ±2 pF**
  - (50Ω switchable: R&S®HMO1524, R&S®HMO2024)

### Coupling
- **Max. input voltage**: 200 Vₚ, (derates at 20 db/decade to 5 Vᵥ above 100 kHz)
- **50Ω (R&S®HMO1524, R&S®HMO2024)**: 5 Vᵥ

### Display range in horizontal direction
- **Position range**: ±10 Div (from center of screen)
- **Offset control (R&S®HMO1524, R&S®HMO2024 only)**: up to 5 mV/Div, 1.5 Div
  - from 5 mV/Div: 0.8 Div

### Logic Channels (with logic probe R&S®H03508)
- **Thresholds**: TTL, CMOS, ECL, user-defined [-2 V to +8 V]
- **Impedance**: 100 kΩ || 4 pF
- **Max. input voltage**: 40 Vᵥ

### Trigger System
- **Trigger Mode**
  - **Auto**: Triggers automatically also without any specific trigger event
  - **Normal**: Triggers only on specific trigger events
  - **Single**: Triggers once on a trigger event
  - **Trigger indicator**: Screen and panel (LED)
  - **Trigger sensitivity**: up to 5 mV/Div: 1.5 Div
  - from 5 mV/Div: 0.8 Div

### DC gain accuracy
- **2% of full scale

### Trigger level setting
- **with auto level**: Linking peak value and trigger level, adjustable between peak values of a signal
- **without auto level**: ±10 Div (from center of screen)

### Trigger coupling
- **AC**: 5 Hz to 100 MHz (HMO724)
  - 5 Hz to 150 MHz (HMO1024)
  - 5 Hz to 200 MHz (HMO1524)
  - 5 Hz to 250 MHz (HMO2024)
- **DC**: DC to 100 MHz (HMO724)
  - DC to 150 MHz (HMO1024)
  - DC to 200 MHz (HMO1524)
  - DC to 250 MHz (HMO2024)
- **HF**: 30 kHz to 100 MHz (HMO724)
  - 30 kHz to 150 MHz (HMO1024)
  - 30 kHz to 200 MHz (HMO1524)
  - 30 kHz to 250 MHz (HMO2024)

### Selectable filters
- **LF**: DC to 5 kHz, selectable in DC and auto level mode
- **Low-pass (noise rejection)**: min. level: 1.5 Div (> 5 mV/Div) selectable with AC, DC

### External Trigger Input (BNC)
- **Impedance**: 1 MD || 14 pF ±2 pF
- **Trigger level**: 0.3 Vpp to 10 Vpp
- **Max. input voltage**: 100 Vᵥ
- **Coupling**: DC, AC

### Trigger Types
- **Edge**: rising, falling, both
- **Switchable filters**: LF, noise rejection
- **Sources**: all analog and digital channels, AC line, external (AC, DC)

### Edge A/B
- **Direction**: rising, falling, both
- **Frequency range**: DC to 70/100/150/200 MHz
- **Min. signal amplitude**: 0.8 Div
- **Trigger level range (separately adjustable with different sources)**: ±10 Div (from center of screen)
- **Trigger settings for state B**
  - **time based**: 32 ns to 17 s, resolution min. 8 ns
  - **event based**: 1 to 2ⁿ events
Pulse width
Polarity positive, negative
Functions equal, not equal, lower, higher, within/without a range
Pulse duration 32ns to 17s, resolution min. 8ns
Sources all analog channels

Logic
Functions boolean operators AND, OR, TRUE, FALSE
time based operators equal, not equal, lower, higher, within/without a range, timeout
Duration 8ns to 2s, resolution min. 1ns
States H, L, X
Sources all logic and analog channels

Video
Sync. pulse polarity positive, negative
supported standards NTSC, SECAM, PAL, PAL-M, SDTV 576p, HDTV 720p, HDTV 1080p
Field even/odd, either
Line line number selectable, all
Sources all analog channels, external (AC, DC)

Serial Busses (R&S®HOO10/11/12)
Bus representation Up to two busses can be analyzed at the same time. Color-coded display of decoded data in ASCII, binary, decimal and hexadecimal format.
Option / Voucher code
R&S®HOO10/R&S®HV110 Analysis of IC, SPI, UART/RS-232 signals on analog and logic channels
R&S®HOO11/R&S®HV111 Analysis of IC, SPI, UART/RS-232 signals on all analog channels
R&S®HOO12/R&S®HV112 Analysis of CAN and LIN signals on analog and logic channels
Trigger types by protocols
I2C Start, Stop, ACK, NACK, Address/Data
SPI Start, End, Serial Pattern (32 Bit)
UART/RS-232 Startbit, Frame Start, Symbol, Pattern
LIN Frame Start, Wake Up, Identifier, Data, Error
CAN Frame Start, Frame End, Identifier, Data, Error

Horizontal System
Time domain (Yt) main screen, time domain and zoom window
Frequency domain (FFT) time domain and frequency domain window (FFT)
XY/XYZ mode virtual display of 20 Div for all math, logic, bus, reference signals
VirtualScreen voltage (XY), intensity (Z)
Component tester voltage (X), current (Y)
Reference signals up to 4 references
Channel deskew -15ns to +16ns, step size 1ns
Memory Zoom up to 50,000:1
Time base Accuracy 50.0 x 10^-4
Aging 10.0 x 10^-4 per year
Operation Modes REFRESH 2ns/Div to 50s/Div
ROLL 50ms/Div to 50s/Div

Acquisition System
Realtime Sampling Rate
Analog channels 4 x 1 GSa/s or 2 x 2 GSa/s
Logic channels 8 x 1 GSa/s
Memory depth 4 x 1 MPs or 2 x 2 MPs
Resolution 8 Bit, (HiRes up to 10Bit)
Waveform arithmetics refresh, roll (base/triggered), average (up to 1024), envelope, peak detect (1 ns), filter (low-pass, adjustable), high resolution (up to 10 Bit)
Record modes automatic, max. sampling rate, max. waveform rate
Interpolation all analog channels sin(x)/x, linear, sample-hold
logic channels pulse
Delay pre-trigger 0 to 8 x 10^6 Sa x (1/sample rate)
post-trigger 0 to 2 x 10^6 Sa x (1/sample rate)
Waveform update rate up to 2,000 Wfm/s
Waveform display dots, vectors, persistence afterglow
Persistence afterglow min. 50 ms

Waveform measurements and Operation
Operation menu-driven (multilingual), auto-set, help functions (multilingual)
Automatic measurements voltage (Vpp, Vp+, Vp-, Vrms, Vmean, Vmin, Vmax), amplitude, phase, frequency, period, rise/ fall time (80%, 90%), pulse width (pos/ neg), duty cycle (pos/neg), standard deviation, delay, crest factor, edgel pulse count (pos/neg), trigger period, trigger frequency
Automatic search functions Edge, pulse, peak, rise/fall time, runt
Cursor measurements voltage (V1, V2, ΔV), time (t1, t2, Δt), ratio X, ratio Y, pulse and edge count (pos/neg), peak values (Vpp, Vp+, Vp-), mean/RMS/standard deviation, duty cycle (pos/neg), rise/fall time (80%, 90%), ratio marker
Quick measurements (QUICKVIEW) voltage (Vpp, Vp+, Vp-, Vrms, Vmean, Vmin, Vmax), rise/fall time, frequency, period plus 8 additional measurement functions (see automatic measurement functions, freely selectable)
Marker up to 8 freely positionable markers for easy navigation, automatic marker positioning based on search specification

Frequency counter (hardware based)
Resolution 6 digit
Frequency range 0.5 Hz to 70/100/150/200 MHz
Accuracy 50.0 x 10^-6
Aging ±10.0 x 10^-6 per year

Mask Testing
Functions Pass/Fail comparison with an user-defined mask performed on waveforms
Sources all analog channels
Mask definition Mask enclosing acquired waveform with user-defined tolerance
Actions on mask violations beep, acquisition stop, screenshot, trigger pulse, automatically saving trace data
during acquisition Statistics: number of completed tests (max. 4 x 10^9 events), number of passes / failed acquisitions (absolute and in percent), test duration
**Waveform maths**

**Quickmath**
- Functions: addition, subtraction, multiplication, division
- Sources: 2 analog channels

**Mathematics**
- Functions: addition, subtraction, multiplication, division, minimum / maximum, square, square root, absolute value, pos/neg wave, reciprocal, inverse, log10/in, derivation, integration, filter (lowpass/highpass)
- Editing: formula editor, menu-driven
- Sources: all analog channels, user-defined constants
- Storage location: math. memory
- Number of formula sets: 5 formula sets
- Number of equations: 5 equations per formula set
- Simultaneous display of math. functions: 1 formula set with max. 4 equations

**Frequency Analysis (FFT)**
- Parameters: frequency span, center frequency, vertical scale, vertical position
- FFT length: 2 Kpts, 4 Kpts, 8 Kpts, 16 Kpts, 32 Kpts, 64 Kpts
- Window: Hanning, Hamming, Rectangular, Blackman
- Scale: dBm, dBV, Vrms
- Waveform arithmetic: refresh, envelope, average (up to 512)
- Cursor measurement: 2 horizontal cursors, previous/next peak search
- Sources: all analog channels

**Pattern Generator**
- Functions: square wave / probe adjust, bus signal source, counter, pseudo-random pattern
- Square wave: frequencies: 1 kHz, 1 MHz level: 1 Vpp (t <4 ns)
- Bus Signal Source (4 Bit): IC (100kBit/s, 400kBit/s, 1 MBit/s), SPI (100kBit/s, 250kBit/s, 1 MBit/s), UART (9600Bit/s, 115,2kBit/s, 1 MBit/s)
- Counter (4 Bit): frequencies: 1 kHz, 1 MHz direction: decrementing
- Random pattern (4 Bit): frequencies: 1 kHz, 1 MHz

**Component Tester**
- Parameters: voltage (X), current (Y)
- Testing frequency: 50 Hz, 200 Hz
- Voltage: 10 V, (open)
- Current: 10 mA (short)
- Reference potential: Ground (PE)

**Interfaces**
- Connectors and ports:
  - for mass storage (FAT16/32): 2 x USB-Host (Typ A), max. 500mA
  - for remote control: USB Device (Typ B), RS-232
- Optional interfaces:
  - HO730 dual interface: USB Device (Typ B), Ethernet (RJ45)
  - HO740 interface: IEEE-488 (GPIB)
- External monitor interface: DVI-D (480p, 60Hz) HDMI compatible

**General Data**
- Application memory: 4MB for references, formulas, device settings, language and help functions
- Save/Recall:
  - device settings: on internal file system or external USB memory, available file format: HDS
  - reference waveforms: on internal file system or external USB memory, available file formats: BIN, CSV, TXT, HRT
  - traces: on external USB memory, available file formats: BIN, CSV, TXT, HRT
  - data display or acquisition data
  - sources: single or all analog channels
  - screenshots: on external USB memory, available file formats: BMP, GIF, PNG (color, inverted, grey-scale)
  - Math equation sets: on internal file system or external USB memory
  - Realtime Clock (RTC): date and time
  - Power supply:
    - AC supply: 100V to 240V, 50 Hz to 60 Hz, CAT-II
    - Power consumption: 2-channel models: max. 45W, 4-channel models: max. 55W

**Safety**
- in line with IEC 61010-1 (ed. 3), IEC 61010-2-30 (ed. 1), EN 61010-1, EN 61010-2-030, CAN/CSA-C22.2 No. 61010-1-12, CAN/CSA-C22.2 No. 61010-2-030-12, UL Std. No. 61010-1 (3rd Edition), UL61010-2-030

**Temperature**
- Operating temperature range: +5°C to +40°C
- Storage temperature range: -20°C to +70°C
- Rel. humidity: 5% to 80% (without condensation)

**Mechanical Data**
- Dimensions (W x H x D): 285 x 175 x 140 mm
- Net weight: 2.5 kg
- All specifications at 23°C after 30 minutes warm-up.

**Options and Vouchers**

**Options**
- Description | Optionen-Code | Voucher-Code
- I2C, SPI, UART/RS-232 on analog and digital channels | R&S®HO10 | R&S®HV110
- I2C, SPI, UART/RS-232 on all analog channels | R&S®HO11 | R&S®HV111
- CAN und LIN on analog and digital channels | R&S®HO12 | R&S®HV112

**Service 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 |
Recommended Accessories

**R&S®HO732**
Ethernet/USB-device dual-interface card

**R&S®HO740**
IEEE-488 (GPIB) interface card, galvanically isolated

**HZO20**
High voltage probe 1000:1 (400 MHz, 1000 V rms)

**HZO30**
1 GHz active probe (0.9 pF, 1 MΩ)

**HZ100**
Differential Probe 20:1 / 200:1

**R&S®HO3508**
8 channel logic probe

**HZO40**
Active differential probe 200 MHz (10:1, 3.5 pF, 1 MΩ)

**HZO50 / HZO51**
AC/DC current probes 30 A, DC to 100 kHz / 100/1000 A, DC to 20 kHz

**R&S®HO740**
IEEE-488 (GPIB) interface card, galvanically isolated

**R&S®RT-ZP03**
Passive probe 1:1 (10 MHz), 10:1 (300 MHz)

**R&S®RT-ZH10**
Passive probe, 400 MHz, high-voltage, 100:1, 50 MΩ, 7.5 pF, 1 kV (RMS)

**HZO90**
Carrying case for protection and transport

**HZO91**
4 RU 19” rackmount kit

**HZ020**
High voltage probe 1000:1 (400 MHz, 1000 V rms)

**HZO30**
1 GHz active probe (0.9 pF, 1 MΩ)

**HZ100**
Differential Probe 20:1 / 200:1