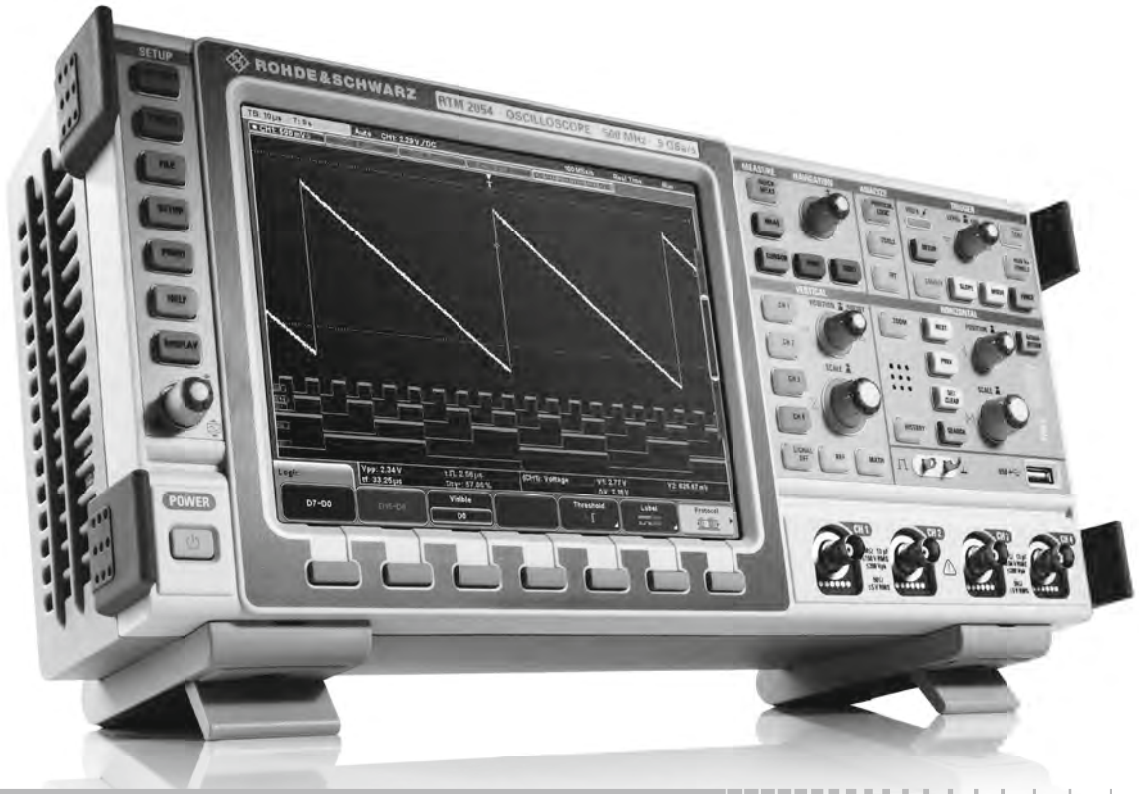
R&S®RTM
Digital Oscilloscope
Specifications



ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 06.00

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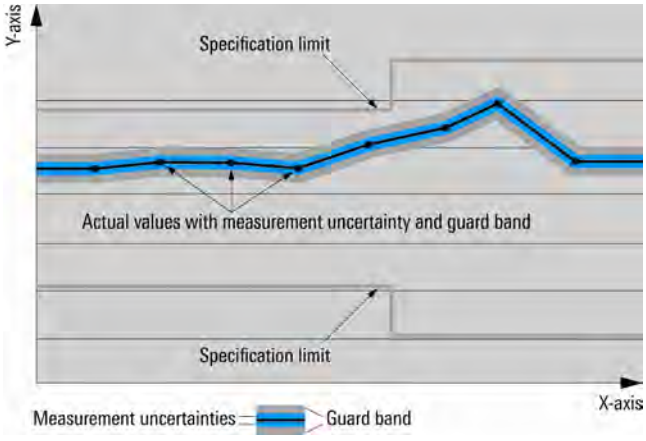
Definitions

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 <, ≤, >, ≥, ±, 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 (e.g. 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 (e.g. 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.

Base unit

Vertical system

Input channels	R&S®RTM2022	2 channels
	R&S®RTM2024	4 channels
	R&S®RTM2032	2 channels
	R&S®RTM2034	4 channels
	R&S®RTM2052	2 channels
	R&S®RTM2054	4 channels
Input impedance		50 Ω ± 1.5 % or 1 MΩ ± 1 % with 12 pF ± 1 pF (meas.)
Analog bandwidth (–3 dB)	at 50 Ω input impedance	
	R&S®RTM2022 and R&S®RTM2024	> 200 MHz
	R&S®RTM2032 and R&S®RTM2034	> 350 MHz
	R&S®RTM2052 and R&S®RTM2054	> 500 MHz
	at 1 MΩ input impedance	
	R&S®RTM2022 and R&S®RTM2024	> 200 MHz (meas.)
	R&S®RTM2032 and R&S®RTM2034	> 350 MHz (meas.)
	R&S®RTM2052 and R&S®RTM2054	> 500 MHz (meas.)
Lower frequency limit (–3 dB) at AC coupling		< 5 Hz (meas.)
Analog bandwidth limits (max. –1.8 dB, min. –3.5 dB)	R&S®RTM2022 and R&S®RTM2024	20 MHz
	R&S®RTM2032 and R&S®RTM2034	200 MHz, 20 MHz
	R&S®RTM2052 and R&S®RTM2054	400 MHz, 200 MHz, 20 MHz
Rise time (calculated)	R&S®RTM2022 and R&S®RTM2024	< 1.75 ns
	R&S®RTM2032 and R&S®RTM2034	< 1 ns
	R&S®RTM2052 and R&S®RTM2054	< 700 ps
Vertical resolution		8 bit, up to 16 bit with high resolution decimation mode
DC gain accuracy	offset and position = 0 maximum operating temperature change of ±5 °C after self-alignment	
	input sensitivity > 5 mV/div	±1.5 %
	input sensitivity ≤ 5 mV/div	±2 %
Input coupling		DC, AC, GND
Input sensitivity	at 50 Ω	1 mV/div to 1 V/div
	at 1 MΩ	1 mV/div to 10 V/div
Maximum input voltage	at 50 Ω	5 V (RMS), max. 30 V (V_p)
	at 1 MΩ	150 V (RMS), 200 V (V_p), derates at 20 dB/decade to 5 V (RMS) above 250 kHz
Position range		±5 div
Offset range	input sensitivity	
	500 mV/div to ≤ 10 V/div	±(100 V – input sensitivity × 5 div) max. ±5 V at 50 Ω
	50 mV/div to < 498 mV/div	±(10 V – input sensitivity × 5 div) max. ±5 V at 50 Ω
	1 mV/div to < 49.8 mV/div	±(1 V – input sensitivity × 5 div)
Offset accuracy		±(0.5% × |net offset| + + 0.15 div × input sensitivity) (net offset = offset – (position × input sensitivity))
DC measurement accuracy	after adequate suppression of measurement noise by using either high-resolution sampling mode or waveform averaging, or a combination of both	±(DC gain accuracy × |reading – net offset| + offset accuracy)
Channel-to-channel isolation (each channel at same input sensitivity)	input frequency < analog bandwidth	> 50 dB

Horizontal system

Timebase range		selectable between 1 ns/div and 500 s/div
Channel deskew		±100 ns
Trigger offset range	min.	memory depth/actual sampling rate
	max.	4 × memory depth/actual sampling rate
Modes		normal, roll
Channel-to-channel skew		< 200 ps (meas.)
Timebase accuracy	after delivery/calibration, at +23 °C	±2.5 ppm
	during calibration interval	±3.5 ppm

Acquisition system

Maximum realtime sampling rate	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	2 channels with 2.5 Gsample/s
		1 channel with 5 Gsample/s
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	4 channels with 2.5 Gsample/s
		2 channels with 5 Gsample/s
Maximum equivalent time sampling rate		100 Gsample/s
Memory depth per channel	at sampling rate of 2.5 Gsample/s	10 Msample for each channel
	at sampling rate of 5 Gsample/s	20 Msample for each channel
Decimation modes	sample	first sample in decimation interval
	peak detect	largest and smallest sample in decimation interval
	high resolution	average value of samples in decimation interval
Waveform arithmetic	off	no arithmetic
	envelope	envelope of acquired waveforms
	smooth	graphical smoothing of acquired waveform
	average	average over a series of acquired waveforms
	filter	digital lowpass on the acquired waveform, limit frequency selectable
Number of averaged waveforms		2, 4, 8, 16, 32, 64, 128, 256, 512, 1024
Waveform acquisition rate		up to 12500 waveforms/s

Trigger system

Trigger level	range	±10 div from center of screen
Trigger modes		auto, normal, single, n single
Hold-off range	time	inactive or 50 ns to 13.7 s
Trigger types		edge, width, video, pattern, rise time, fall time, serial bus
Edge trigger	trigger events	rising edge, falling edge, both edges
	sources for A trigger	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2, logic channels from D0 to D15 (with R&S®RTM-B1 option), external trigger input, line
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15 (with R&S®RTM-B1 option), external trigger input, line
	trigger coupling of A trigger	DC, AC, HF reject (attenuates > 5 kHz (meas.)), LF reject (attenuates < 2 kHz (meas.)), lowpass (attenuates > 100 MHz (meas.))
	sources for B trigger	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4
	trigger coupling of B trigger	DC
	selectable trigger hysteresis for A and B trigger	automatic, small, medium, large

Width trigger	trigger events	pulse width is smaller, greater, equal, unequal, inside interval, outside interval
	minimum pulse width	3.2 ns
	maximum pulse width	1.7 s
	polarity	positive, negative
	sources	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2, logic channels from D0 to D15 (with R&S®RTM-B1 option), external trigger input
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15 (with R&S®RTM-B1 option), external trigger input
	selectable trigger hysteresis	automatic, small, medium, large
Video trigger	trigger events	selectable line, all lines, even frame, odd frame, all frames
	supported standards	PAL, NTSC, SECAM, PAL-M, SDTV 576i, HDTV 720p, HDTV 1080i, HDTV 1080p
	sources	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2, ext. trigger input
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4, ext. trigger input
	sync pulse polarity	positive, negative
Pattern trigger	trigger events	logic condition between active channels
	sources	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2, logic channels from D0 to D15 (with R&S®RTM-B1 option)
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15 (with R&S®RTM-B1 option)
	state of channels	high, low, don't care
	logic between channels	and/or
	condition	true, false
Rise time, fall time	trigger events	time between the crossing of two selectable levels is smaller, greater, equal, unequal, inside interval, outside interval
	minimum slew rate	3.2 ns
	maximum slew rate	1.7 s
	polarity	rising edge, falling edge, both edges
	sources	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4
Serial bus trigger	supported standards	
	R&S®RTM-K1 option	I^2C/SPI (two- and three-wire)
	R&S®RTM-K2 option	UART/RS-232/RS-422/RS-485
	R&S®RTM-K3 option	CAN/LIN
	R&S®RTM-K5 option	audio (I^2S, LJ, RJ, TDM)
	R&S®RTM-K6 option	MIL-STD-1553
	R&S®RTM-K7 option	ARINC 429
Trigger sensitivity	with DC, AC, LF reject, lowpass	
	input sensitivity > 5 mV/div	< 0.8 div
	2 mV/div ≤ input sensitivity < 5 mV/div	< 1.5 div (meas.)
	input sensitivity < 2 mV/div	< 2 div (meas.)
	with HF reject	
	all input sensitivities	< 1 div (meas.)
External trigger input	input impedance	1 MΩ ± 1 % with 12 pF ± 2 pF (meas.)
	maximum input voltage	150 V (V_p) derates at 20 dB/decade to 5 V (RMS) above 250 kHz
	trigger level	±5 V
	sensitivity	< 300 mV (V_{pp})
	input coupling	DC, AC

Trigger output	functionality	a pulse is generated for every acquisition trigger event
	output voltage	0 V to 5 V at high impedance, 0 V to 2.5 V at 50 Ω
	pulse width	selectable between 50 ns and 60 ms
	pulse polarity	low active or high active
	output delay	depends on trigger settings

Waveform measurements

Automatic measurements	measurements on channels, math waveforms, reference waveforms	mean, mean cycle, RMS, RMS cycle, amplitude, top level, base level, peak-to-peak, max. peak, min. peak, period, frequency, positive pulse count, negative pulse count, rising edge count, falling edge count, positive pulse width, negative pulse width, positive duty cycle, negative duty cycle, rise time, fall time, standard deviation, standard deviation cycle, delay, phase, burst width
	measurements on trigger signal	trigger period, trigger frequency implemented by means of six-digit hardware counter
		DC voltmeter (requires Rohde & Schwarz active probe with R&S®ProbeMeter functionality)
	reference levels	lower, middle and upper level in percentage
	statistics	maximum, minimum, mean, standard deviation and measurement count for each automatic measurement
	number of active measurements	4
Cursor measurements	measurements on channels, math waveforms, reference waveforms	voltage, time, voltage and time, ratio x, ratio y, pulse count, peak values, RMS/mean/standard deviation, duty ratio, burst width, rise/fall time, vertical marker
	additional actions for cursor	timebase tracking, coupling of cursors, autoset, set to screen
Quick measurements	function	fast overview of measurements from one channel, some measurements displayed with result lines in diagram
	sources	
	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4
	measurements displayed in diagram	mean, max. peak, min. peak, rise time, fall time
	numerically displayed measurements	RMS, peak-to-peak, period, frequency

Mask testing

Sources	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4
Mask definition		acquired waveform with user-defined tolerance, can be stored and restored
Result statistics		completed acquisitions, passed and failed acquisitions (absolute and in percent), test duration
Actions on mask violation		beep, acquisition stop, print, screenshot, save waveform, send pulse

Waveform maths

Number of math waveforms		up to 5
Functions		addition, subtraction, multiplication, division, maximum, minimum, square, square root, absolute value, positive wave, negative wave, reciprocal, inverse, log10, ln, derivation, integration, lowpass filter, highpass filter, period, frequency, positive duty cycle, negative duty cycle, positive pulse width, negative pulse width
Sources	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2, math waveforms 1 to 4
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4, math waveforms 1 to 4
Spectral analysis	sources	channel 1, channel 2 (R&S®RTM20x2) channel 1, channel 2, channel 3, channel 4 (R&S®RTM20x4)
	setup parameters	center frequency, frequency span, vertical scale, vertical position
	FFT lengths	2048, 4096, 8192, 16384, 32768, 65536
	windows	Hann, Hamming, Blackman, rectangular
	waveform arithmetic	none, envelope, average (selectable 2, 4, 8, 16, 32, 64, 128, 256, 512)
	cursors	two horizontal cursors, previous peak, next peak, timebase tracking, coupling of cursors, set to screen

Search function

Functions	search types	edge, width, peak, rise/fall time, runt, data2clock, pattern, protocol (available with R&S®RTM-K3, R&S®RTM-K6 and R&S®RTM-K7 options)
	configuration	manual level setting on screen, level with selectable hysteresis
	gate	all recorded data (only in stop mode), displayed data or selectable time frame with start and stop time
	display of search events	in diagram and in result table
	markers on search events	up to 32 markers
	navigation in search events (stop modus)	fast navigation with keys (marked events) or knob (if result table is active)
Sources	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2, math waveforms from 1 to 5
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4, math waveforms from 1 to 5

Display characteristics

Diagram types		Yt, XY, XYZ, zoom, FFT
XY/XYZ mode		parallel display of XY/XYZ diagram and Yt diagrams of input signals for X, Y_1, Y_2 and Z
Zoom		horizontal zoom with fast navigation, split screen with overview signal and zoomed signal
Interpolation		sin(x)/x, linear, sample&hold
FFT mode		split screen with overview signal and dedicated frequency display
Waveform display		lines, dots
Persistence		50 ms to 9.6 s; infinite
Special display mode		inverse brightness, temperature colors
Diagram grid		lines, reticle, none
Marker		up to 32 time markers, fast navigation with dedicated keys
Reference signals		up to 4 reference signals
Virtual screen	function	logic, protocol, math and reference signals can be positioned on a larger virtual screen; displayed section can be easily moved using a dedicated knob
	size of virtual screen	±10 div
	available for the following diagram types	Yt, zoom

Protocol and logic

Bus decode	number of bus signals	4 [1]
	bus types	parallel, parallel clocked SSPI, SPI, I^2C (R&S®RTM-K1 option) UART/RS-232/RS-422/RS-485 (R&S®RTM-K2 option) CAN, LIN (R&S®RTM-K3 option) I^2S, LJ, RJ, TDM (R&S®RTM-K5 option) MIL-STD-1553 (R&S®RTM-K6 option) ARINC 429 (R&S®RTM-K7 option)
	display types	decoded bus, logical signal, frame table (depends on decoded bus)
	position and size	size and position on screen selectable
	data format of decoded bus	hex, decimal, binary

[1] If a bidirectional bus is used (e.g. UART RX/TX or SPI MOSI/MISO), two bus decoders are occupied.

Miscellaneous

Save/recall	device settings	save and recall on internal file system or USB memory stick or on a PC via webinterface
	reference waveforms	save and recall on internal file system or USB memory stick or on a PC via webinterface
	math equation sets	save and recall on internal file system or USB memory stick or on a PC via webinterface
	waveforms	save on USB memory stick or download and save on a PC via webinterface available file formats: BIN, CSV, TXT, TRF
	screenshots	save on USB memory stick or download and save on a PC via webinterface, available file formats: BMP, PNG
Print		configurable print button, actions on press: • save device settings • save traces • save screenshot • save screenshot and device settings • print screenshot on USB printer
Instrument security		secure erasure of internal file system and all settings
Menu languages		available menu languages: • English • German • French • Russian • Simplified Chinese • Traditional Chinese • Japanese • Spanish • Korean
Help		online help, available languages: • English
Undo/Redo		deep Undo/Redo function

Input and outputs

Front		
Channel inputs		BNC, for details see “Vertical system”
	probe interface	auto detection of passive probes, Rohde & Schwarz active probe interface
Probe compensation output	signal shape	rectangle V_{low} = 0 V, V_{high} = 1 V (meas.)
	frequency	1 kHz/1 MHz, selected during setup or depending on timebase setting
Ground jack		connected to ground
USB host interface		1 port, type A plug, version 2.0, memory sticks only
Rear		
External trigger input		BNC, for details see “Trigger system”
Trigger output		BNC, for details see “Trigger system”
USB host interface		1 port, type A plug, version 2.0, printer
Interface slot	slot for interface boards	LAN/USB interface (standard) GPIB interface
	LAN/USB interface	
	LAN	RJ-45 connector, supports 10/100BaseT
	USB	USB device port
	GPIB interface	see R&S®RTM-B10 option
External monitor interface		DVI-D connector, output of scope display
Security slot		for standard Kensington style lock

General data

Display		
Type		8.4" LC TFT color display
Resolution		1024 × 768 pixel (XGA)

Temperature		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	–40 °C to +70 °C
Climatic loading		+25° C/+40 °C at 95 % rel. humidity cyclic, in line with IEC 60068-2-30

Altitude		
Operating		up to 3000 m above sea level
Nonoperating		up to 4600 m above sea level

Mechanical resistance		
Vibration	sinusoidal	5 Hz to 150 Hz, max. 1.8 g at 55 Hz; 0.5 g from 55 Hz to 150 Hz, in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64, MIL-PRF-28800F, 4.5.5.3.1 random vibration, class 3 and 4
Shock		40 g shock spectrum, in line with MIL-STD-810E, method no. 516.4, procedure I, MIL-PRF-28800F, functional shock, 30 g, 11 ms, halfsine

EMC		
RF emission	in line with EN 55011 class A, operation in residential, commercial and business areas or in small-size companies is not covered; therefore the instrument may not be operated in residential, commercial and business areas or in small-size companies unless additional measures are taken to ensure that EN 55011 class B is complied with	in line with CISPR 11/EN 55011 group 1 class A (for a shielded test setup); the instrument complies with the emission requirements stipulated by EN 55011, EN 61326-1 and EN 61326-2-1 class A, making the instrument suitable for use in industrial environments
Immunity		in line with IEC/EN 61326-1 table 2, immunity test requirements for industrial environments [2]

Certifications		VDE-GS, $_{C}$CSA$_{US}$

Calibration interval		1 year

Power supply		
AC supply		100 V to 240 V at 50 Hz to 60 Hz max. 160 VA
Power consumption		max. 145 W
Safety		in line with IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 61010-1-04, UL 61010-1

[2] Test criterion is displayed noise level within ±1 div for input sensitivity of 10 mV/div.

Mechanical data		
Dimensions	W × H × D	403 mm × 189 mm × 142 mm (15.87 in × 7.44 in × 5.59 in)
Weight	without options (nom.)	4.1 kg (10.04 lb)

Options

R&S®RTM-B1

Mixed signal option, additional 16 logic channels

Vertical system

Input channels		16 logic channels (from D0 to D15)
Arrangement of input channels		arranged in two logic probes with 8 channels each, assignment of the logic probes to the channels (from D0 to D7 or D8 to D15) is displayed on the probe
Input impedance		100 kΩ ± 2 % || ~4 pF (meas.) at probe tips
Maximum input frequency	signal with minimum input voltage swing and hysteresis setting: normal	400 MHz (meas.)
Maximum input voltage		±40 V (V_p)
Minimum input voltage swing		500 mV (V_{pp}) (meas.)
Threshold groups		from D0 to D3, D4 to D7, D8 to D11 and D12 to D15
Threshold level	range	±8 V in 25 mV steps
	predefined	CMOS 5.0 V, CMOS 3.3 V, CMOS 2.5 V, TTL, ECL, PECL, LVPECL
Threshold accuracy		±(100 mV + 3 % of threshold setting)
Comparator hysteresis		normal, robust, maximum

Horizontal system

Channel deskew	range for each channel	±200 ns
Channel-to-channel skew		< 500 ps (meas.)

Acquisition system

Sampling rate	two logic probes	2.5 Gsample/s on each channel
	one logic probe	5 Gsample/s on each channel
Memory depth	two logic probes	10 Msample for every channel
	one logic probe	20 Msample for every channel

Trigger system

See chapter “Trigger system” of the base unit

Waveform measurements

Measurement sources		all channels from D0 to D15
Automatic measurements		positive pulse width, negative pulse width, period, frequency, burst width, delay, phase, positive duty cycle, negative duty cycle, positive pulse count, negative pulse count, rising edge count, falling edge count
Additional cursor function		display of decoded bus value at the cursor position

Display characteristics

Channel activity display		independent of the scope acquisition, the state (stays low, stays high or toggles) of the channels from D0 to D15 is displayed

R&S®RTM-B10

GPIB additional interface		
Function		interface in line with IEC 625-2 (IEEE 488.2)
Command set		SCPI 1999.0
Connector		24-pin Amphenol female
Interface functions		SH1, AH1, T6, L4, SR1, RL0, PP1, DC1, DT0, C0

R&S®RTM-K1

I^2C triggering and decoding		
Bus configuration	sources for SCL and SDA	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	bit rate	up to 10 Mbps
	size of address	7 bit or 10 bit
	size of data	8 bit
	label list	associate frame identifier with symbolic ID
Trigger	trigger events	start, stop, restart, missing acknowledge, address (7 bit or 10 bit), data, address and data
	offset for trigger on data	0 data byte to 4095 data byte
	data pattern width	up to 3 sequential data byte
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	address, data, start, stop, ACK, NACK; error and trigger event are displayed in different colors
	displayed format of address	hex
	displayed format of data	ASCII, binary, decimal or hex
SPI triggering and decoding		
Bus configuration	sources for CS, CLK, MOSI and MISO	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	bit rate	up to 25 Mbps
	chip select (CS)	active low, active high or missing (two-wire SPI)
	clock (CLK) slope	rise or fall
	data symbol size	1 bit to 32 bit
	idle time for two-wire SPI	< 1 ms
Trigger	trigger events	start of frame, end of frame, bit number, data pattern
	selectable bit number	0 to 4095
	offset for trigger on data pattern	0 bit to 4095 bit
	data pattern size	1 bit to 32 bit
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	data, start, stop; error and trigger event are displayed in different colors
	displayed format of data	ASCII, binary, decimal or hex
	data decoding	MSB or LSB first

R&S®RTM-K2

UART/RS-232/RS-422/RS-485 triggering and decoding		
Bus configuration	source for RX and TX	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	bit rate	300/600/1200/2400/4800/9600/19200/ 38400/57600/115200 bps or user-selectable up to 12 Mbps
	end of frame	timeout, none
	signal polarity	idle low, idle high
	data symbol size	5 bit to 9 bit
	parity	none, even or odd
	stop bits	1, 1.5 or 2
Trigger	trigger events	start bit, start of frame, symbol number, any symbol, pattern of symbols, parity error, frame error, break
	offset for trigger on data symbol	0 to 4095 symbols
	data symbol pattern width	1 to floor (32/symbol size) symbols
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	data, start, stop; error and trigger event are displayed in different colors
	displayed format of data	ASCII, binary, decimal or hex

R&S®RTM-K3

CAN triggering and decoding		
Bus configuration	signal type	CAN_H, CAN_L
	bit rate	10/20/33.3/50/83.3/100/125/250/500/ 1000 kbps or user-selectable in range from 100 bps to 5 Mbps
	sampling point	10 % to 90 % within bit period
	label list	associate frame identifier with symbolic ID
Trigger	trigger events	start of frame, frame type, identifier, identifier + data, error condition (any combination of CRC error, bit stuffing error, form error and ACK error)
	identifier setup	frame type (data, remote or both), identifier type (11 bit or 29 bit); condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	start of frame, identifier, DLC, data payload, CRC, ACK, end of frame, error frame, overload frame, CRC error, bit stuffing error, ACK error
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; three table positions (top, bottom, full screen); frame navigation; data export as CSV file
Search	search events	frame, error, identifier, identifier + data, identifier + error
	frame event setup	start of frame, end of frame, overload frame, error frame, data ID 11 bit, data ID 29 bit, remote ID 11 bit, remote ID 29 bit
	error event setup	any combination of CRC error, bit stuffing error, form error and ACK error
	identifier setup	frame type (data, remote or both), identifier type (11 bit or 29 bit); condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
	event table	search results displayed as tabulated list; event navigation

LIN triggering and decoding		
Bus configuration	version	1.3, 2.x or SAE J602; mixed traffic is supported
	bit rate	1.2/2.4/4.8/9.6/10.417/19.2 kbps or user-selectable in range from 1 kbps to 5 Mbps
	polarity	active high or active low
	label list	associate frame identifier with symbolic ID
Trigger	source	any input channel
	trigger events	start of frame (sync break), identifier, identifier + data, wakeup frame, error condition (any combination of checksum error, parity error and sync field error)
	identifier setup	range from 0d to 63d; condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
Decode	displayed signals	bus signal, logic signal or both
	color coding of bus signal	frame, frame identifier, parity, data payload, checksum, error condition
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; three table positions (top, bottom, full screen); frame navigation; data export as CSV file
Search	search events	frame, error, identifier, identifier + data, identifier + error
	frame event setup	start of frame, wake up
	error event setup	any combination of checksum error, parity error and sync field error
	identifier setup	range from 0d to 63d; condition =, ≠, >, <; identifier selectable from label list
	data setup	data pattern up to 8 byte (hex or binary); condition =, ≠, >, <
	event table	search results displayed as tabulated list; event navigation

R&S®RTM-K5

Audio (I^2S, LJ, RJ, TDM) triggering and decoding		
Bus configuration	source (data, clock, word/sync)	channel 1, channel 2, channel 3, channel 4, logic channels from D0 to D15
	thresholds	per-channel threshold (analog channels), per-group threshold (logic channels), assisted threshold configuration (find level)
	bit rate	up to 30 Mbps, autodetected
	signal type	I^2S standard, left justified, right justified, TDM
	polarity	data: active high, active low; clock: rising edge, falling edge; word/sync: normal, inverted
	word length	2 to 32 bit
	bit order	most significant bit first (MSBF), least significant bit first (LSBF)
	I^2S-specific setup	
	first channel	left, right
	LJ/RJ-specific setup	
	first channel	left, right
	channel offset	0 to 31 bit
	TDM-specific setup	
	number of channels	1 to 8
	channel length	2 to 32 bit
	channel offset	0 to (channel length – word length) bits
	channel delay	0 to 31 bit
Trigger	trigger events	data, window, word/sync, error condition
	data setup	define individual value and condition for each audio channel; condition =, ≠, >, <, inside range, outside range, don't care; trigger when "all" or "any" audio channel conditions are met in single audio frame
	window setup	audio channel setup same as data setup; user-defined window length up to 4 000 000 000 frames
	word/sync setup	rising edge, falling edge
Decode	displayed signals	bus signal, stacked bus signal, logic signal
	color coding of bus signal	color-coded audio channels
	displayed format of data	hex, signed decimal, binary, ASCII
	frame table	decode results displayed as tabulated list with timestamp; three table positions (top, bottom, full screen); frame navigation; data export as CSV file
	track of audio waveform	displays audio channel content as a waveform that is time-correlated to the source signals; user can activate, scale and position each audio channel individually

R&S®RTM-K6

MIL-STD-1553 triggering and decoding		
Protocol configuration	source	channel 1 to channel 4
	bit rate	standard bit rate (1 Mbit/s)
	polarity	normal, inverted
	label list	associate frame identifier with symbolic ID
	auto threshold setup	assisted threshold configuration
	timing	max response (4 µs to 200 µs)
Trigger	trigger event setup	sync, word, command word, status word, command and data word, error condition
	sync setup	all words, command/status word, data word
	word setup	all words, command word, status word, data word
	command word setup (type: address/word)	RT address (condition =, ≠, ≥, ≤, in range, out of range); direction (T/R); subaddress (condition =, ≠, ≥, ≤, in range, out of range); data word count (condition =, ≠, ≥, ≤, in range, out of range)
	command word setup (type: mode code)	RT address (condition =, ≠, ≥, ≤, in range, out of range); subaddress (0, 31 or either); mode code from labeled dropdown list
	status word setup	RT address; status flags (message error, instrumentation, service request, broadcast command, busy, subsystem flag, dynamic bus control, terminal flag) individually configurable (1, 0, don't care)
	command and data word setup	transmission type (BC-RT, RT-BC, BC-BC, mode code); RT address (condition =, ≠, ≥, ≤, in range, out of range); subaddress (condition =, ≠, ≥, ≤, in range, out of range); data word count (condition =, ≠, ≥, ≤, in range, out of range); data pattern up to 4 words long (condition =, ≠, ≥, ≤, in range, out of range); payload data index (condition =)
	error condition setup	any combination of sync error, Manchester error, parity error, timing error (see protocol configuration)
Decode	display signals	bus signal; symbolic ID in bus signal when label list in use
	color coding	sync, RT address, subaddress, mode code, status bit field, data, error condition
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; three table positions (top, bottom, full screen); frame navigation; data export as CSV file; column with symbolic ID when label list in use
Search	search events	word, command word, mode code, status word, command and data word, error
	word setup	command, status, data
	command word setup	see trigger settings for "command word setup (type: address/word)"
	mode code setup	see trigger settings for "command word setup (type: mode code)"
	status word setup	see trigger settings for "status word setup"
	command and data word setup	see trigger settings for "command and data word setup"
	error condition setup	all, sync, parity, manchester, timing

R&S®RTM-K7

ARINC 429 triggering and decoding		
Protocol configuration	source	channel 1 to channel 4
	bit rate	high (100 kbit/s), low (12.5 kbit/s), or user-defined in range 10 kbit/s to 1 Mbit/s
	polarity	A leg, B leg, normal, inverted
	label list	associate numeric label with symbolic ID; optional definition of ARINC word format in terms of availability of label-specific SDI and SSM fields
	auto threshold setup	assisted threshold configuration
Trigger	trigger event setup	word, label, label and data, error condition, transmission interval
	word setup	word start, word stop
	label setup	label (condition =, ≠, ≥, ≤, in range, out of range)
	data setup	data pattern up to 23 bit long (condition =, ≠, ≥, ≤, in range, out of range); data bit offset; SDI (00,01,10,11); SSM (00,01,10,11); label list can be used to determine availability of trigger properties SSM and SDI for given label value
	error condition setup	any combination of coding error, parity error, gap error
	transmission interval setup	label (condition =); SDI (optional); time interval (condition >, <, in range, out of range)
Decode	display signals	bus signal, logic signal or both; symbolic ID in bus signal when label list in use
	color coding	word begin, word end, label, SDI, data, SSM, parity, error
	displayed format of data	hex, decimal, binary, ASCII
	frame table	decode results displayed as tabulated list, errors highlighted in red; three table positions (top, bottom, full screen); frame navigation; data export as CSV file; column with symbolic ID when label list in use
Search	search events	word, label, label and data, error condition
	word setup	word start, word stop
	label setup	see trigger settings for “label setup”
	data setup	see trigger settings for “data setup”
	error condition setup	coding error, parity error, gap error, any

R&S®RTM-K15

History and segmented memory				
Memory segmentation	function	additional memory segments for the acquisition		
	number of segments	record length	segments	total memory (per channel)
		10 ksample	45 000	450 Msample
		20 ksample	22 500	450 Msample
		50 ksample	9 183	459 Msample
		100 ksample	4 591	459 Msample
		200 ksample	2 301	460 Msample
		500 ksample	921	460 Msample
		1 Msample	460	460 Msample
		2 Msample	230	460 Msample
		5 Msample	92	460 Msample
		10 Msample	46	460 Msample
		20 Msample [3]	23	460 Msample
		Segmentation is active on all analog and logic channels and protocol decoding.		
Ultra segmented mode		continuous recording of waveforms in acquisition memory without interruption due to visualization; blind time between consecutive acquisitions less than 5 µs (up to 200 000 waveforms/s)		
History mode	function	The history mode always provides access to past acquisitions in the segmented memory.		
	timestamp resolution	3.2 ns		
	history player	replays the recorded waveforms; start and stop waveform could be set; repetition possible		

[3] At 5 Gsample/s sampling rate.

R&S®RTM-K31

Power analysis		
General description	The R&S®RTM-K31 power analysis option extends the R&S®RTM firmware with measurement functionality focused on switched mode power supplies (SMPS) and DC/DC converters.	
Input	quality	evaluation of power quality at an AC input; measures real power, apparent power, reactive power, power factor and phase angle of power, frequency, crest factor, RMS of voltage and current
	harmonics	measures up to the 40th harmonic of the incoming line frequency; precompliance checking for IEC 61000-3-2 (A, B, C, D), RTCA DO 160, MIL-STD-1399, max. limit checks
	inrush current	measures peak inrush current and electrical charge within up to 3 configurable measurement zones to analyze the inrush and post-inrush behavior
	consumption	long term measurement of consumed power and energy to analyze nonperiodical signals of e.g. standby devices
Switching/control loop	slew rate	The minimum and maximum slew rate of current or voltage is measured at start and end of the switching cycle.
	modulation	measures modulation of switching frequency, duty cycle (±) and pulse width
	dynamic on-resistance	measures resistance of the switching transistor(s) in active state
Power path	efficiency	measures input and output power to calculate the efficiency of a power device
	switching loss	measures switching loss and conduction loss of a power device
	safe operating area (SOA)	checks violation of voltage and current limits in which a power device can operate without damage; current versus voltage view (linear or log); violation mask is user-defined and editable in linear and log-log views; save/load of masks; export of mask violation data
	turn on/off time	measures relationship between AC and DC current, when turning SMPS off and on
Output	ripple	measures AC components of output voltage or current, AC RMS, mean, period, frequency, duty cycles, min./max./peak-to-peak amplitude
	spectrum	FFT analysis of output, measurement of frequency peaks
	transient response	This measurement captures the device behavior between the event of load changes and stabilization; includes peak (voltage, time), settling time, rise time, overshoot and delay
Deskew	automated	By using the R&S®RT-ZF20 probe deskew and calibration test fixture and Rohde & Schwarz voltage and current probes, the skew between the signals is compensated automatically.
Zero offset	automated	automatic compensation of input offset
Reporting	Report data can be saved for every measurement. Report generation using user-selected test results from historical and current tests. Put repeated and/or different measurements in one report. R&S®Oscilloscope Report Creator can be downloaded from Rohde & Schwarz website free-of-charge.	

R&S®RTM-K32

Digital voltmeter (DVM)		
General description	The R&S®RTM-K32 option extends R&S®RTM firmware with digital voltmeter and counter functionalities.	
Sources for digital voltmeter	R&S®RTM2022, R&S®RTM2032 and R&S®RTM2052	channel 1, channel 2
	R&S®RTM2024, R&S®RTM2034 and R&S®RTM2054	channel 1, channel 2, channel 3, channel 4
Digital voltmeter measurements		DC, AC RMS, AC+DC RMS, crest factor, peak-to-peak, max. peak, min. peak
	number of active measurements	4
	resolution	3 digits
Counter	source for counter	A or B trigger signal
	measurements on trigger signal	trigger period, trigger frequency
	resolution	7 digits

Ordering information

Designation	Type	Order No.
Base unit (including standard accessories: per channel: 500 MHz passive probe (10:1), compact manual, CD-ROM (with operating and service manual), power cord)		
Digital Oscilloscope		
Digital Oscilloscope, 200 MHz, 2 channels	R&S®RTM2022	5710.0999.22
Digital Oscilloscope, 200 MHz, 4 channels	R&S®RTM2024	5710.0999.24
Digital Oscilloscope, 350 MHz, 2 channels	R&S®RTM2032	5710.0999.32
Digital Oscilloscope, 350 MHz, 4 channels	R&S®RTM2034	5710.0999.34
Digital Oscilloscope, 500 MHz, 2 channels	R&S®RTM2052	5710.0999.52
Digital Oscilloscope, 500 MHz, 4 channels	R&S®RTM2054	5710.0999.54
Hardware options		
Mixed Signal Option, 400 MHz	R&S®RTM-B1	5710.0901.02
GPIB Interface	R&S®RTM-B10	1305.0014.02
Bandwidth upgrades [4]		
Upgrade of R&S®RTM2032/4 oscilloscopes to 500 MHz bandwidth, incl. calibration	R&S®RTM-B200	5710.0918.02
Upgrade of R&S®RTM2022/4 oscilloscopes to 350 MHz bandwidth, incl. calibration	R&S®RTM-B201	1326.0665.02
Upgrade of R&S®RTM2022/4 oscilloscopes to 500 MHz bandwidth, incl. calibration	R&S®RTM-B202	1326.0671.02
Software options		
I^2C/SPI Triggering and Decoding	R&S®RTM-K1	5710.1443.02
UART/RS-232/RS-422/RS-485 Triggering and Decoding	R&S®RTM-K2	5710.1450.02
CAN/LIN Triggering and Decoding	R&S®RTM-K3	5710.1466.02
Audio (I^2S, LJ, RJ, TDM) Triggering and Decoding	R&S®RTM-K5	5710.0882.02
MIL-STD-1553 Triggering and Decoding	R&S®RTM-K6	1317.6835.02
ARINC 429 Triggering and Decoding	R&S®RTM-K7	1317.6841.02
History and Segmented Memory	R&S®RTM-K15	5710.0899.02
Power Analysis	R&S®RTM-K31	1317.5745.02
Digital Voltmeter (DVM)	R&S®RTM-K32	1326.0907.02
Probes		
500 MHz, passive, 10:1, 10 MΩ || 9.5 pF, max. 400 V	R&S®RTM-ZP10	1409.7708.02
400 MHz, passive, high-voltage, 100:1, 50 MΩ || 7.5 pF, 1 kV (RMS)	R&S®RT-ZH10	1409.7720.02
400 MHz, passive, high-voltage, 1000:1, 50 MΩ || 7.5 pF, 1 kV (RMS)	R&S®RT-ZH11	1409.7737.02
1.0 GHz, active, 1 MΩ || 0.8 pF, R&S®ProbeMeter, micro button	R&S®RT-ZS10	1410.4080.02
1.0 GHz, active, 1 MΩ || 0.8 pF	R&S®RT-ZS10E	1418.7007.02
100 MHz, active, high-voltage, differential, 8 MΩ || 3.5 pF, 1 kV (RMS) (CAT III)	R&S®RT-ZD01	1422.0703.02
1.0 GHz, active, differential, 1 MΩ || 0.6 pF, R&S®ProbeMeter, micro button, incl. 10:1 external attenuator, 1.3 pF, 70 V DC, 46 V AC (peak)	R&S®RT-ZD10	1410.4715.02
1.5 GHz, active, differential, 1 MΩ || 0.6 pF, R&S®ProbeMeter, micro button	R&S®RT-ZD20	1410.4409.02
10 MHz, current, AC/DC, 0.01 V/A, 150 A (RMS)	R&S®RT-ZC10	1409.7750.02
100 MHz, current, AC/DC, 0.1 V/A, 30 A (RMS)	R&S®RT-ZC20	1409.7766.02
Probe accessories		
Accessory Set for R&S®RTM-ZP10	R&S®RT-ZA1	1409.7566.02
Spare Accessory Set for R&S®RT-ZS10/R&S®RT-ZS10E	R&S®RT-ZA2	1416.0405.02
Pin Set for R&S®RT-ZS10/R&S®RT-ZS10E	R&S®RT-ZA3	1416.0411.02
Mini Clips	R&S®RT-ZA4	1416.0428.02
Micro Clips	R&S®RT-ZA5	1416.0434.02
Lead Set	R&S®RT-ZA6	1416.0440.02
Pin Set for R&S®RT-ZD20	R&S®RT-ZA7	1417.0609.02
Probe Power Supply	R&S®RT-ZA13	1409.7789.02
External Attenuator, 10:1, 2.0 GHz, 70 V DC, 46 V AC (peak)	R&S®RT-ZA15	1410.4744.02
Deskew Fixture for Power Measurements	R&S®RT-ZF20	1800.0004.02
Accessories		
Front Cover	R&S®RTM-Z1	1305.0272.02
Soft Case, for R&S®RTM digital oscilloscopes and accessories	R&S®RTM-Z3	1305.0289.02
Transit Case	R&S®RTM-Z4	1317.4210.02
Rackmount Kit	R&S®ZZA-RTM	1304.8292.02

[4] The bandwidth upgrade is performed at a Rohde & Schwarz service center, where the oscilloscope will also be calibrated.

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, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	
Extended Warranty with Calibration Coverage, one year	R&S®CW1	
Extended Warranty with Calibration Coverage, two years	R&S®CW2	
Extended Warranty with Calibration Coverage, three years	R&S®CW3	
Extended Warranty with Calibration Coverage, four years	R&S®CW4	

Extended warranty with a term of one to four years (WE1 to WE4)
Repairs carried out during the contract term are free of charge [5]. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

Extended warranty with calibration (CW1 to CW4)
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 [5] and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

For product brochure, see PD 3606.8066.12 and www.rohde-schwarz.com

[5] Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.

Service that adds value

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About Rohde&Schwarz

The Rohde&Schwarz electronics group is a leading supplier of solutions in the fields of test and measurement, broadcasting, secure communications, and radiomonitoring and radiolocation. Founded more than 80 years ago, this independent global company has an extensive sales network and is present in more than 70 countries.
The company is headquartered in Munich, Germany.

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- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

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ISO 9001

Certified Environmental Management
ISO 14001

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