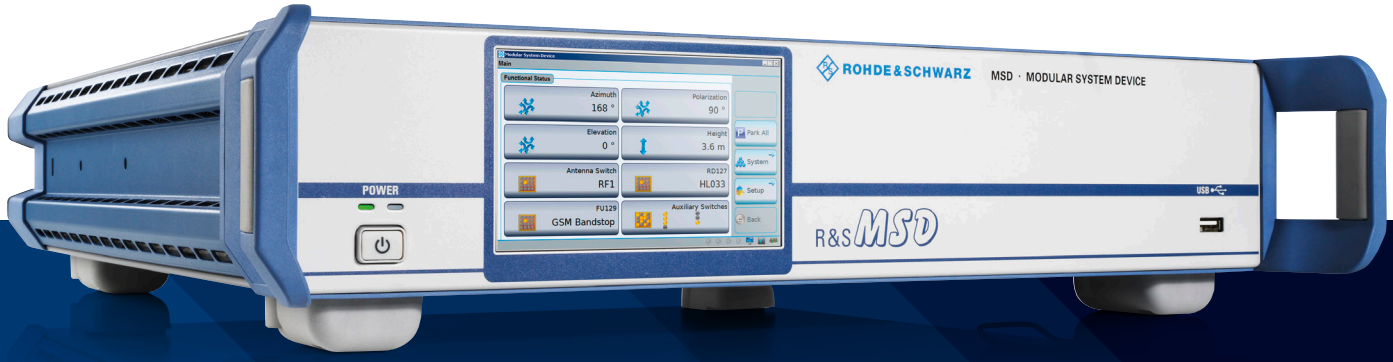
R&S®MSD
MODULAR SYSTEM DEVICE

Flexible antenna switching and rotator control



Product Brochure
Version 10.00

ROHDE&SCHWARZ
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AT A GLANCE

The R&S®MSD modular system device combines flexible antenna switching and rotator control in one compact device.

In order to match project-specific requirements, various modules for antenna switching and/or positioning can be inserted into the two rear slots of the 19" 2 HU rack-mount case. The R&S®MSD can be operated with AC or DC power for maximum flexibility and easy integration into a mobile monitoring vehicle. Additional options, such as DC feeds and splitters, round off the functionality.

The R&S®MSD can be operated locally (via the touch-screen on the front panel) or remotely controlled (via a LAN/WAN connection).

KEY FACTS

- Antenna switching and/or rotator control in one powerful device
- Frequency range from DC to 26.5 GHz
- Compact design (19", 2 HU)
- Variable power supply (AC or DC)

BENEFITS

Flexible switching of up to twelve antennas

Several options are available to provide a high degree of flexibility for antenna switching, e.g. to facilitate antennas covering different frequency ranges or polarizations. The R&S®MSD is ideal for microwave monitoring. The R&S®MSD-SM8 RF switch module provides a single-pole six-throw (SP6T) antenna switch for the frequency range from DC to 8 GHz and the R&S®MSD-SM26 RF switch module provides an SP6T antenna switch for the frequency range from DC to 26.5 GHz.

The open collector outputs can also be used to control other external equipment, e.g. the R&S®ZS129Z1 or suitable third-party equipment with open collector control.

Monitoring equipment such as the R&S®ESMD wideband monitoring receiver or the R&S®EB500 monitoring receiver provides TTL outputs. When connected to the TTL inputs of the R&S®MSD, the receiver can directly initiate the R&S®MSD switching.

Any combination of the R&S®MSD-SM8 and R&S®MSD-SM26 RF switch modules can be integrated, with a maximum of two per device.

Additional system capabilities

Further flexibility is provided by a single-pole double-throw (SPDT) antenna switch (DC to 8 GHz).

The optional splitter can be used to distribute an input signal to two outputs (DC to 8 GHz).

8 kHz to 8 GHz active antennas can be directly powered by DC feeds that supply DC voltage to an antenna input. Use the R&S®DCF-S to switch the DC feeds on and off.

The SPDT antenna switch, the splitter and the DC feeds are options that can be used in conjunction with the R&S®MSD-SM8 and the R&S®MSD-SM26 RF switch modules. They are integrated into the RF switch modules so that no further module slot is occupied. Per RF switch module, up to two SPDT antenna switches or splitters, up to four DC feeds and one DC feed switch can be assembled.

The R&S®MSD-SM8 RF switch module and the SPDT switch are also available as terminated versions, where the unused outputs are terminated with 50 Ω.

Powerful control of up to four axis

The rotator control options can be used to control up to four axes: azimuth, elevation, polarization and antenna height.

The rotator control basic modules control up to two rotators, either one AC-powered and one DC-powered rotator or two DC-powered rotators. This constellation is typically used to control movement in the azimuth and elevation or polarization range.

The rotator control extension modules allow control of one additional AC-powered or DC-powered rotator (e.g. for elevation or polarization) and the antenna height. The height of the antenna is managed via the R&S®GB127MU mast control unit.

The rotator module can be used to directly control various rotators. Rotators currently supported by the R&S®MSD include the Yaesu G2800 azimuth rotator, the Yaesu G550 elevation/polarization rotator, the Winter AR/AE 1003 and the Winter AR/AE 1049. For basic rotator control the R&S®MSD-RCB option is required. Additionally, for Winter rotators, the R&S®MSD-RCL option is required.

The R&S®MSD also supports the Pro.Sis.Tel PST2051DPRO azimuth rotator and the Pro.Sis.Tel PST2051EL polarization rotator. These devices have an extended lower temperature range. To control them, the R&S®MSD-RCB-P option is required.

Please note that the extension module requires the basic module. The extension hardware will be integrated into the basic module so that only one module slot is occupied.

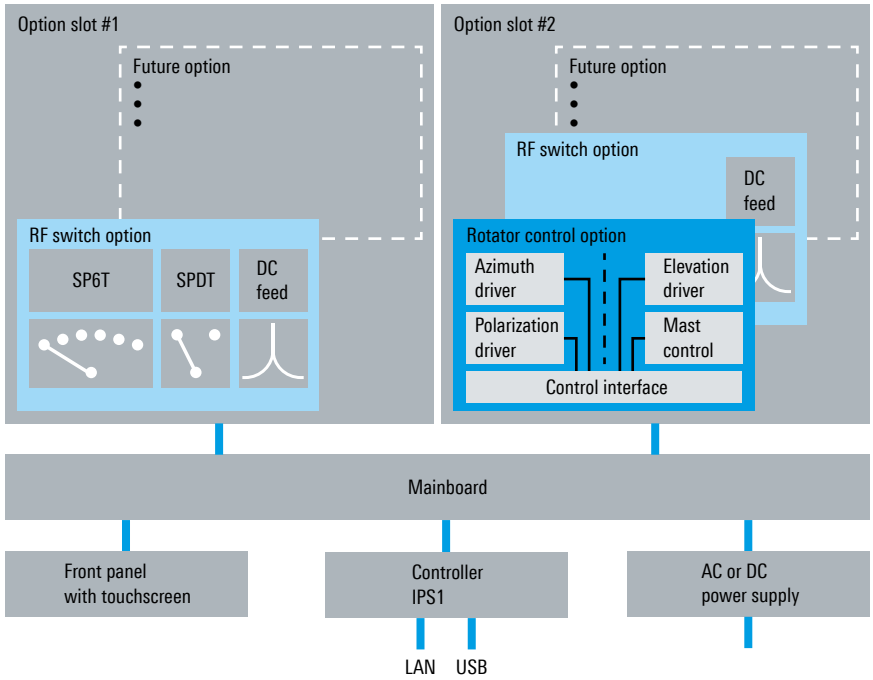
One rotator control module (either the basic module or the basic module plus integrated extension module) per device is supported.

Modular structure for easy adaptation to customer-specific requirements

The R&S®MSD has been designed to allow easy adaptation and configuration to individual tasks and requirements. The figure below shows the main components of the R&S®MSD. While mainboard, process controller and touchscreen are always integrated into the 19" 2 HU case, the two slots can be flexibly equipped with R&S®MSD options to perfectly match individual customer's requests. The customer can choose between AC or DC operation.

If requirements change during operation, it is possible to upgrade the R&S®MSD, e.g. an additional module can be inserted in an empty slot, or the basic rotator control module can be upgraded with the extension module. These modifications will be done in a Rohde&Schwarz factory.

Main components



SYSTEM CONFIGURATION

The R&S®MSD provides two slots for switching and/or rotator control. While only one rotator module (for up to three rotators and one mast) can be installed, it is possible to have two RF switch modules. Any combination of rotator and RF switch modules is possible, with a maximum of two modules per R&S®MSD. The modules can only be installed in a Rohde&Schwarz factory.

While some configuration (e.g. IP address) can be done via the touchscreen, the entire setup is performed on a PC using the integrated configuration tool. Simply connect to the R&S®MSD via the LAN interface and use a standard browser to set all necessary information for operating the R&S®MSD. After defining which module is inserted in which slot, the details of the module(s) can be specified.

For a RF switch module, the user configures individual conditions for the elements, including the TTL ports. For a rotator module, the user sets parameters such as axis type (e.g. azimuth, polarization), motor type (e.g. AC or DC) and maximum and minimum positions.

The user also defines general data such as device name and options for file.

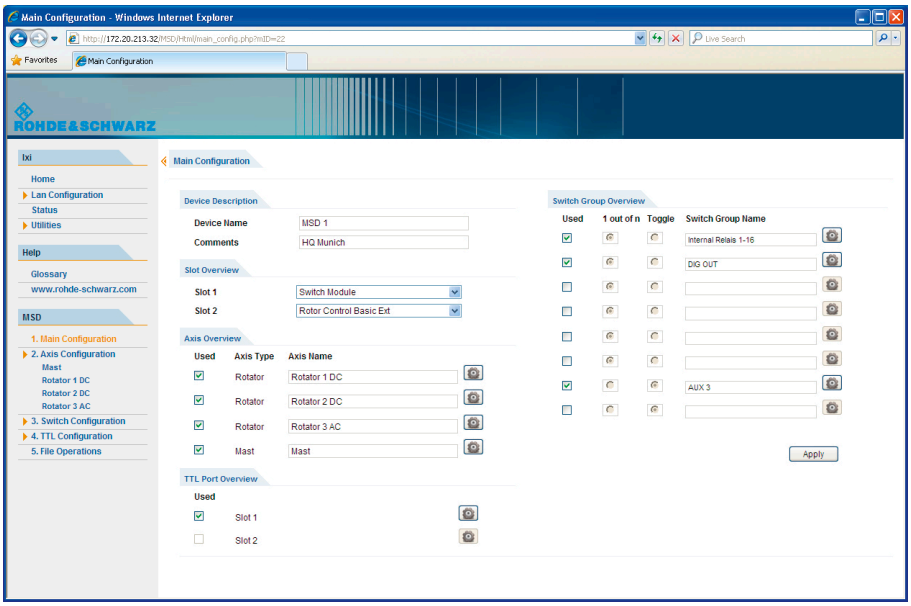
The configuration file can be saved internally and on the control computer or on an external device (e.g. USB flash drive). This file can be used to restore the configuration of this device if necessary. A configuration can also be read in to allow multiple devices with similar setups to be easily and efficiently configured.

Reliable operation of rotators with high starting current

The R&S®MSD-RCL option enables the R&S®MSD to operate antenna rotators that require a very high starting current. To prevent the R&S®MSD control unit from detect this as a short circuit, the R&S®MSD-RCL is installed between the controller and the antenna rotator.

Two cables are needed to connect the R&S®MSD-RCL rotator current limiter. The first, which connects the R&S®MSD modular system device to the R&S®MSD-RCL, is included. The second cable, connecting the R&S®MSD-RCL to the antenna rotator must be matched to the specific antenna rotator and is ordered seperately.

R&S®MSD-RCL rotator current limiter

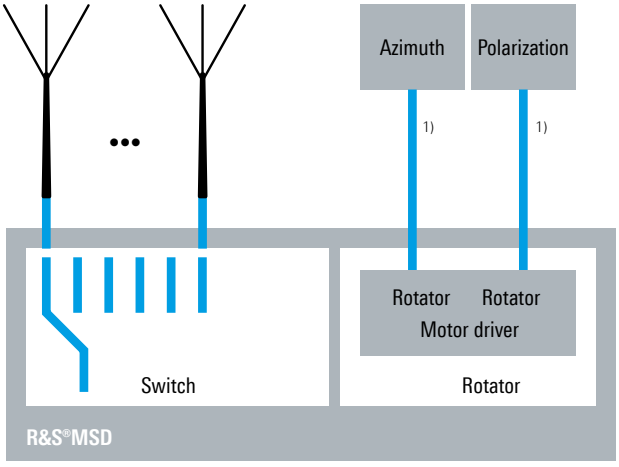


Configuration dialog of R&S®MSD opened in browser

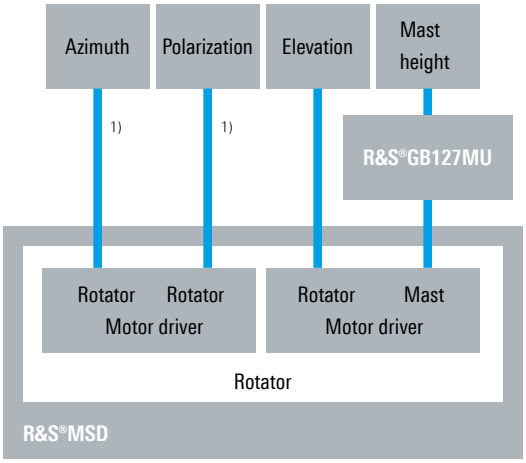
CONFIGURATION EXAMPLES

The following examples illustrate how the R&S®MSD can be configured for switching and/or rotator control.

SP6T switch, rotator for azimuth and polarization



Rotator and mast control for azimuth, polarization, elevation and mast height



1) For Winter rotators, the R&S®MSD-RCL option is required.

SPECIFICATIONS

Specifications		
Base unit	front panel	5" touchscreen display
		standby/on switch
		1 × USB 2.0 interface
	rear panel	see Interfaces
8 GHz RF switch module		
Frequency range		DC to 8 GHz
Interfaces		8 × RF connectors (N female, DC to 8 GHz), 1 × 16 bit TTL control input
Insertion loss	DC to 3 GHz	< 1.0 dB
	3 GHz to 8 GHz	< 1.6 dB
VSWR	DC to 3 GHz	< 1.4
	3 GHz to 8 GHz	< 1.8
Customer-specific extensions		up to 2 SPDT RF switches and/or RF splitters and up to 4 DC feeds can be integrated
		insertion loss and VSWR depend on specific configuration
26.5 GHz RF switch module		
Frequency range		DC to 26.5 GHz
Interfaces		8 × RF connectors (Rohde&Schwarz RF test port adapter, DC to 26.5 GHz), 1 × 16 bit TTL control input
Insertion loss	DC to 3 GHz	< 1.0 dB
	3 GHz to 8 GHz	< 1.6 dB
	8 GHz to 12 GHz	< 2.0 dB
	12 GHz to 26.5 GHz	< 3.0 dB
VSWR	DC to 3 GHz	< 1.4
	3 GHz to 8 GHz	< 1.8
	8 GHz to 12 GHz	< 2.0
	12 GHz to 26.5 GHz	< 2.5
Customer-specific extensions		up to 2 SPDT RF switches and/or RF splitters and up to 4 DC feeds can be integrated
		insertion loss and VSWR depend on specific configuration
RF switch 1 and 2		
Frequency range		DC to 8 GHz
Interfaces		integrated into 8 GHz RF switch module or 26.5 GHz RF switch module
Rotator control basic		
Rotator types	axis number 1	▶ Yaesu G2800 ▶ Winter AR/AE 1049 (azimuth or polarization) ▶ Winter AR/AE 1003
	axis number 2	▶ Yaesu G2800 ▶ Yaesu G550 ▶ Winter AR/AE 1049 (azimuth or polarization) ▶ Winter AR/AE 1003
Interfaces		2 × rotator control
Rotator control basic, Pro.Sis.Tel		
Rotator types	axis number 1	Pro.Sis.Tel PST2051D-PRO
	axis number 2	Pro.Sis.Tel PST2051E
Interfaces		2 × rotator control

Specifications

Rotator control extension		
Rotator types	axis number 3	▶ Yaesu G2800 (no CE) ▶ Yaesu G550 (no CE) ▶ Winter AR/AE 1049 (azimuth and polarization) ▶ Winter AR/AE 1003 ▶ Pro.Sis.Tel PST2051D (azimuth or polarization) ▶ Pro.Sis.Tel PST641 (azimuth or polarization) ▶ Pro.Sis.Tel PST61 (azimuth or polarization)
Mast types	axis number 4	Geroh KVRxx or KVLxx
		with electric motor drive and BAAA030 attachment, resolver with RS-232 interface for position feedback
		R&S®GB127MU is required as interface
Interfaces		1 × rotator control, 1 × mast control
Rotator current limiter		
Control input	X1	ODU MINI-SNAP 8
Rotator output	X2	ODU MINI-SNAP 8
DC feed		
Frequency range		8 kHz to 8 GHz
Output voltage, current		26 V DC, max. 500 mA
	optional	12 V to 24 V DC, max. 500 mA
		short circuit protected
Insertion loss	8 kHz to 20 kHz	< 1.5 dB
	20 kHz to 8 GHz	< 1.0 dB
VSWR	8 kHz to 20 kHz	< 2.5
	20 kHz to 8 GHz	< 1.5
Interfaces		integrated into 8 GHz RF switch module or 26.5 GHz RF switch module
RF splitter		
Frequency range		DC to 8 GHz
Interfaces		integrated into 8 GHz RF switch module or 26.5 GHz RF switch module
AC power supply		
Input rating		100 V to 240 V AC, 50 Hz to 60 Hz, max. 4 A
Output voltage		+26 V DC
Interfaces		main connector with on/off switch and fuses
		1 × remote control output (+24 V DC and 16 open collector outputs)
		LAN (10/100/1000BASE-T), RJ-45
DC power supply		
Input rating		12 V to 30 V DC, max. 30 A
Output voltage		+26 V DC
Interfaces		DC connector, on/off switch and fuse
		1 × remote control output (+24 V DC and 16 open collector outputs)
		LAN (10/100/1000BASE-T), RJ-45
General data		
Operating temperature range		0 °C to +50 °C
Storage temperature range		–30 °C to +70 °C
Relative humidity		95 % cyclic test, +25 °C/+40 °C
Vibration	sinusoidal	5 Hz to 150 Hz
	random	10 Hz to 500 Hz
Shock		40 g shock spectrum
Power supply		optional AC or DC supply
Dimensions (W × H × D)	without feet or handles	444.6 mm × 88.1 mm × 456.0 mm (17.50 in × 3.47 in × 17.95 in), 19", 2 HU
Weight	depends on configuration	6 kg to 10 kg (13.23 lb to 22.05 lb)

ORDERING INFORMATION

Designation	Type	Order No.
Modular system device	R&S®MSD	3046.4008.02
Options		
RF switch module, SP6T switch, DC to 8 GHz	R&S®MSD-SM8	3046.4508.02
RF switch module, SP6T switch, DC to 8 GHz, terminated	R&S®MSD-SM8T	3046.4508.03
RF switch module, SP6T switch, DC to 26.5 GHz	R&S®MSD-SM26	3046.4608.02
SPDT switch, DC to 26.5 GHz [1]	R&S®MSD-SW	3046.4714.02
SPDT switch, DC to 18 GHz [1], terminated	R&S®MSD-SW2T	3046.6500.02
Splitter, DC to 8 GHz [1]	R&S®MSD-SP	3046.5104.02
DC feed, powers one external 8 kHz to 8 GHz antenna [1]	R&S®MSD-DCF	3046.5004.02
DC feed switch [1]	R&S®MSD-DCF-S	3046.4666.02
Rotator control basic, controls 2 rotators/axes	R&S®MSD-RCB	3046.4808.02
Rotator control basic, controls 2 rotators/axes, for Pro.Sis.Tel rotators	R&S®MSD-RCB-P	3059.1002.02
Rotator control extension, controls 1 rotator/axis plus one mast [2]	R&S®MSD-RCE	3046.4908.02
Rotator current limiter, external	R&S®MSD-RCL	3046.6200.02
AC power supply	R&S®MSD-AC	3046.5204.02
DC power supply	R&S®MSD-DC	3046.5304.02

[1] Requires R&S®MSD-SM8/26 option.
[2] Requires R&S®MSD-RCB option.

Service options		
Extended warranty, one year	R&S®WE1	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	

This document also applies to the following product configurations: 4128.6816.xx.

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- Uncompromising quality
- Long-term dependability

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