Модульная платформа коммутации и управления OSP

AT A GLANCE

The modular R&S®OSP open switch and control platform can be used to perform RF switch and control tasks quickly and easily. The latest R&S®OSP generation comes with an extended range of modules, allowing an even wider variety of RF wiring configurations to be implemented.

The latest R&S®OSP product family comprises three models (R&S®OSP220, R&S®OSP230 and R&S®OSP320) plus a satellite box (R&S®OSP-B200S2) to meet the requirements of diverse test scenarios – ranging from desktop configurations for laboratory measurements to complex, rack-integrated test systems.

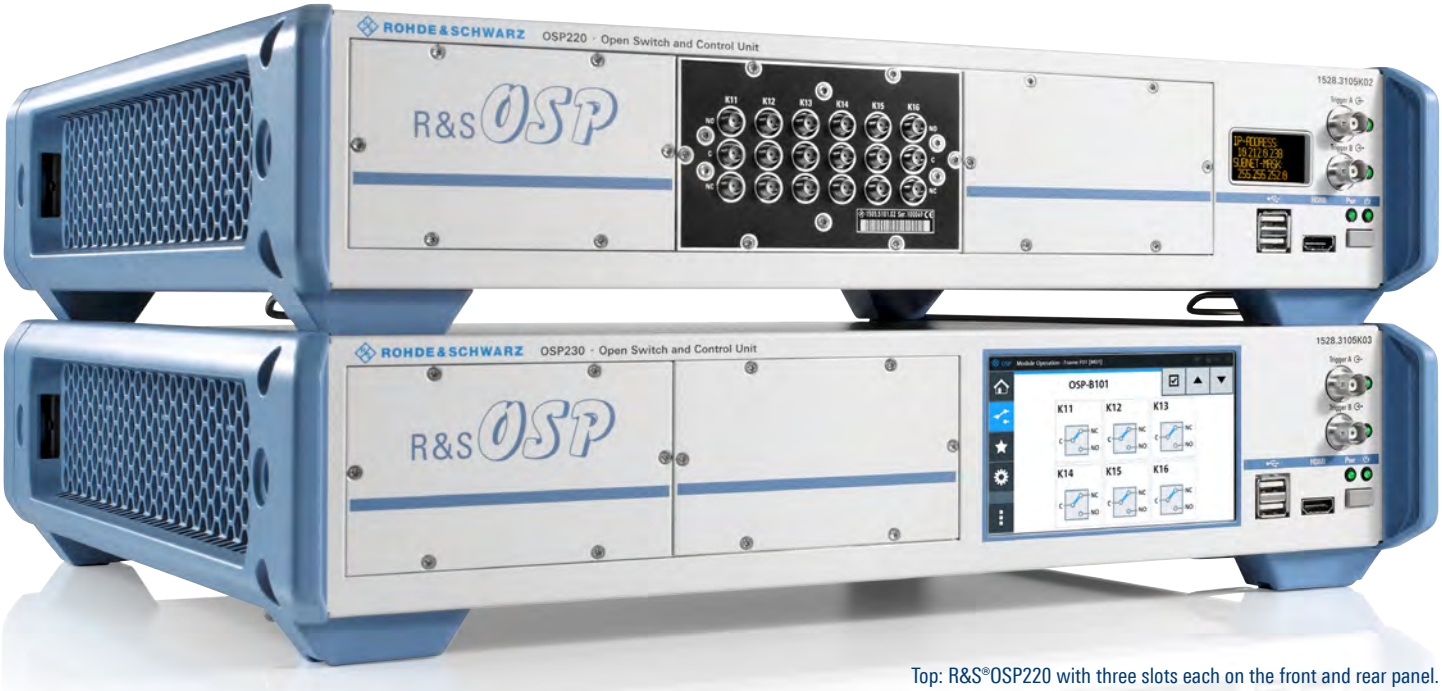
The R&S®OSP switch and control units can be controlled via Ethernet. Multiple units can be combined into a primary/secondary system setup via LAN. Manual control via a touchscreen or an external monitor and a keyboard and mouse is also possible.

The units have module slots on their front and rear panels, allowing users to implement application-specific configurations, from simple RF switch functions to automatic path switchover in complex RF test systems. Typical applications include mobile and wireless communications as well as broadcast and EMC applications.

The R&S®OSP-B200S2 satellite box, in combination with up to two R&S®OSP modules, enables split operation, i.e. it shifts RF switch and control tasks close to the DUT or the antennas.

New technologies such as 5G, radar and other applications call for very fast and often precisely defined switching times between measuring instruments and antennas and between the DUT ports in development and production.

The R&S®OSP-K100 hardware trigger option makes switching of solid-state relay and digital I/O modules up to 1000 times faster and enables precise, reproducible path switching irrespective of whether the paths involved contain electromechanical, solid-state RF relay or digital I/O modules.



Top: R&S®OSP220 with three slots each on the front and rear panel.
Bottom: R&S®OSP230 with built-in touchscreen, two slots on the front panel and three slots on the rear panel.

BENEFITS AND KEY FEATURES

Modular, reliable, cost-efficient

Thanks to the modular design of the R&S®OSP family, users can quickly and easily set up test and measurement configurations for applications in production, test labs and development. The ability to implement complex wiring configurations with a single switch and control platform is an essential prerequisite for reliable and reproducible measurements that can be automated to enable cost-efficient test sequences.

Compact and flexible

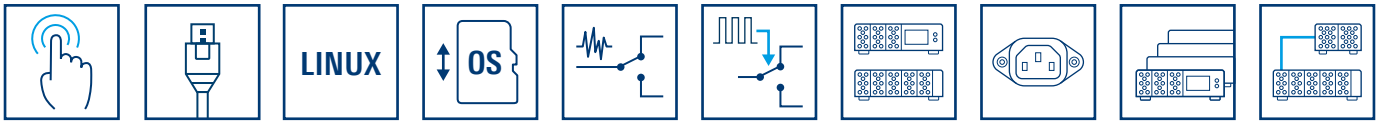
The R&S®OSP units come with a powerful CPU that provides maximum flexibility in controlling switch and control modules. It enables the use of internal and external interfaces and supports a convenient web interface. The web GUI provides a compact menu display on the built-in touchscreen (R&S®OSP230 and optionally on the R&S®OSP320) and an extended view on a connected monitor or PC.

The units of the latest R&S®OSP series come in a compact 2 RU 19" cabinet (R&S®OSP220 and R&S®OSP230) with up to six module slots and a 3 RU version (R&S®OSP320) with up to ten module slots.

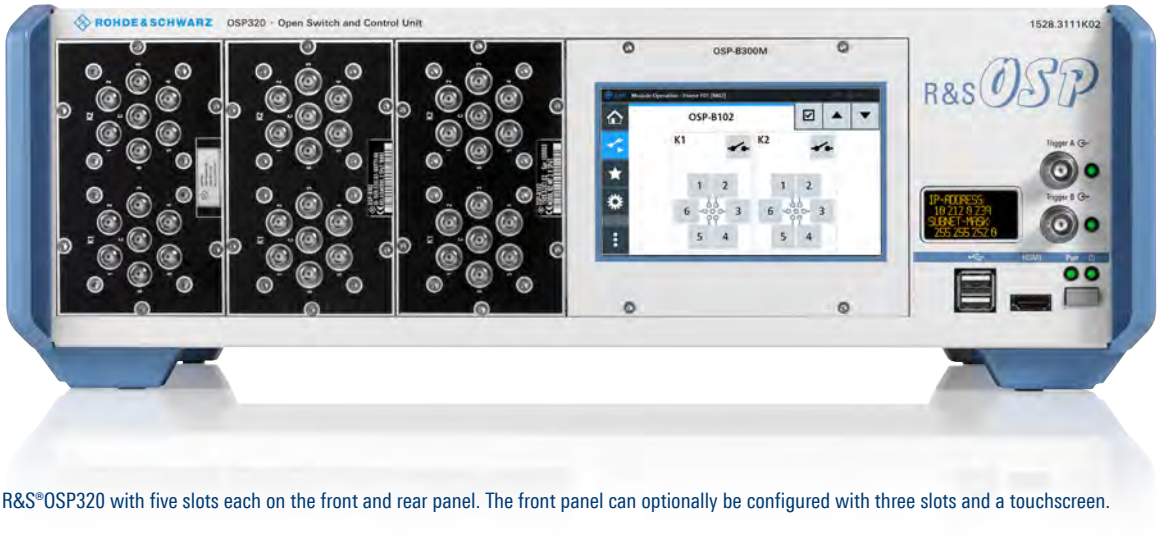
The module slots on the front and rear panels can be combined into wider slots to accept larger modules that provide an extended range of functions.

Compatible with legacy products

The second generation R&S®OSP product family is largely backward compatible. In particular, all available universal switch and control modules can be used with the latest units. A dedicated compatibility mode reduces the effort required when using existing control software.



Touchscreen | LAN | Linux | microSD card | RF switches up to 67 GHz | Trigger (optional) | Front and rear module slots | 110 V to 240 V (AC) supply | Cascadable | Optional satellite box



R&S®OSP320 with five slots each on the front and rear panel. The front panel can optionally be configured with three slots and a touchscreen.

SWITCH AND CONTROL MODULES

The units of the R&S®OSP family come with powerful switch and control modules that can be inserted into the front and rear module slots. Different types of modules can be combined in an R&S®OSP unit – from simple RF switch modules to more complex, application-specific modules – allowing users to tailor their R&S®OSP platform cost-efficiently as required for the application at hand.

The following module types are available:

- Universal electromechanical RF relay modules up to 67 GHz in different versions, i.e. with terminated and non-terminated, failsafe and latching relays
- Solid-state relay (SSR) modules (up to 10 GHz)
- Digital I/O modules and multiplexer module

Special modules such as the R&S®OSP-B104, R&S®OSP-B114 and R&S®OSP-PM-I are available to simplify the implementation of EMS test systems.

The R&S®OSP detects each module automatically. No installation routine is required after a module change; new modules are immediately ready for operation.

R&S®OSP modules containing different – including mixed – relay types such as SPDT, DPDT and SPnT and an integrated power sensor.

R&S®OSP modules with type N connectors containing different relay types such as SPDT, DPDT and SP6T.

Modules with terminated and non-terminated relays from DC to 40 GHz.

Modules with SPDT, DPDT and SP6T relays up to 50 GHz.

Overview of universal R&S®OSP modules with RF coaxial relays [1),2)]

Frequency range		0 Hz	9 kHz	to	6 GHz	8 GHz	10 GHz	12.4 GHz	18 GHz	26.5 GHz [3)]	40 GHz	50 GHz	67 GHz
Relay types		**R&S®OSP-Bxxx RF relay modules**											
RF solid-state relays (SSR)	SPDT		**B107:** reflective, 1 W										
			B127: absorptive [4)], 1 W										
	DP3T		**B142:** absorptive [4)], 10 W										
	SP6T		**B128:** absorptive [4)], 1 W										
Electromechanical RF relays	SPDT	**B106:** 3 × BNC (900 MHz) and 3 × N											
		B131/B132: failsafe											
	DPDT	**B136:** failsafe											
	SP6T	**B133:** failsafe											
	SPDT	**B101:** failsafe								**B111E**	**B111H**	**B111U**	**B111V**
		B101L: latching										**B111UL** [5)]	**B111VL** [5)]
		B121: terminated, failsafe								**B121E**	**B121H**	**B121U**	**B121VL** [5)]
	DPDT	**B116:** failsafe								**B116E**	**B116H**	**B116U**	
	SP6T	**B102:** failsafe								**B112E**	**B112H**	**B112U**	
		B102L: latching										**B112UL** [5)]	
		B122: terminated								**B122E**	**B122H**	**B122U**	
	SP6T, SPDT	**BM6x:** 1 × SPDT, 1 × SP6T, failsafe								**BM6xE**	**BM6xH**	**BM6xU**	
		B123/B124/B125: terminated, failsafe								**B125E**	**B125H**		
	SP8T, SPDT	**B119:** failsafe								**B119E**			
		B129: 1 × terminated SP8T, 2 × non-terminated SPDT, failsafe								**B129E**			

Color code for coaxial connectors in line with IEEE 287-2007: N type SMA 2.92 mm 2.4 mm 1.85 mm

1) For digital I/O and application-specific modules and their specifications, see ordering information and R&S®OSP data sheet (PD 5216.1340.22).
2) Relays are non-terminated unless otherwise specified.
3) SMA female connectors are also commonly used in this frequency range.
4) With 50 Ω termination.
5) Latching.

Selection of R&S®OSP modules of different size and configuration, depending on function.

INTUITIVE OPERATION

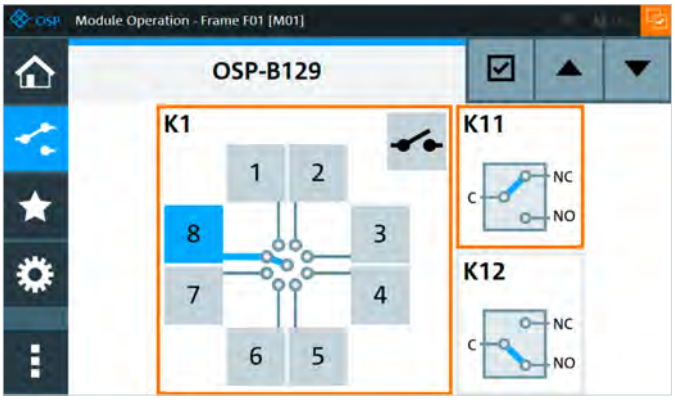
All R&S®OSP units can be controlled using an external keyboard and mouse and monitor with HDMI™ interface. The models with a touchscreen can be manually operated without external accessories.

The R&S®OSP units come with a built-in web interface for operation via the touchscreen or control from a PC or laptop via a browser. With browser based control, the resolution of the displayed content is automatically adapted to the size of the monitor used. The intuitive user interface makes it easy to configure and control the switch and control modules; no specific software knowledge is required.

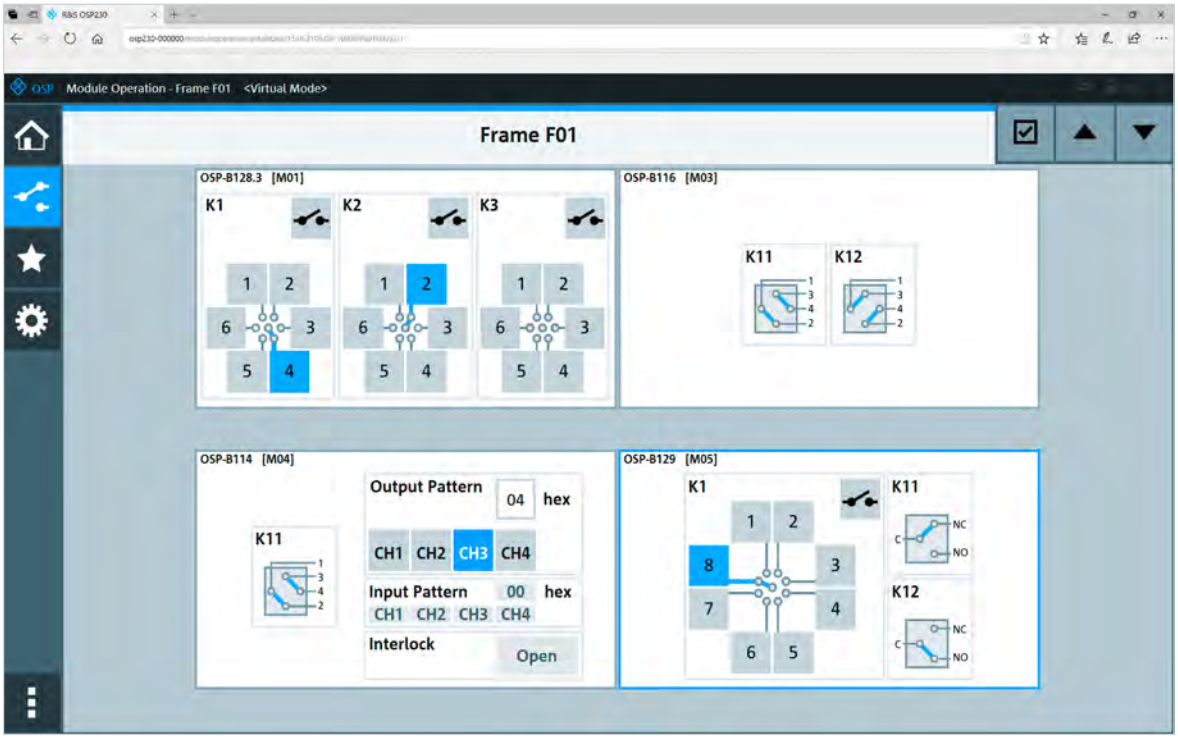
Path control

Relay switching states are combined into defined paths, simplifying the control and programming of complex wiring configurations.

The ability to copy and paste the syntax of manually defined paths to SCPI commands makes SCPI programming very efficient.



Example of path definition via R&S®OSP touchscreen for the R&S®OSP-B129 RF switch module (relays K1 and K11).



The larger monitor of a PC/laptop provides an extended view, allowing multiple RF modules to be displayed.

DIVERSE INTERFACES

The models of the R&S®OSP family come with diverse interfaces. PC interfaces such as USB 3.0, USB 2.0, Ethernet and HDMI™ are provided as standard. They can be used for manual operation and remote control of the R&S®OSP as well as for updates and data backup.

In addition to internal bus interfaces for module control, the R&S®OSP offers internal USB, LAN and PCI interfaces for controlling application-specific modules.

The operating system, together with any system and user information that may be included, is stored on an externally accessible microSD card that can be removed in security-critical applications.

HARDWARE BASED TRIGGER

New technologies such as 5G and radar applications call for considerably faster and often precisely defined path switching intervals. The R&S®OSP-K100 hardware trigger option delivers precise, reproducible and accelerated path switching.

The two BNC connectors on the R&S®OSP front panel are used as trigger inputs, with LEDs indicating the trigger status. The R&S®OSP320 additionally comes with a D-Sub connector on its rear panel to accept an addressed trigger.

Up to 16 paths can be controlled, depending on the trigger type. A path can consist of just one switching relay or a number of switchable elements distributed among different modules or even among different R&S®OSP units of a primary/secondary system and any optional R&S®OSP satellite boxes that may be connected. This opens up a virtually unlimited variety of applications.

The trigger function can be configured in a convenient trigger menu or programmed using SCPI commands. Since calculating trigger intervals for paths containing multiple switching elements is a tedious task, the R&S®OSP offers a very useful feature. It displays the minimum trigger interval for a given path based on the data sheet values of all switching elements involved and taking into account the internal delays.

Trigger types

Trigger type	Number of paths	Interfaces	Function
Single	1	BNC A	The trigger activates only one path only once; then the trigger mode is deactivated.
Toggle	2	BNC A	The trigger switches back and forth between two paths.
Sequenced	3 to 16	BNC A, B	The trigger is switched sequentially from path 0 to path n (n = 2 to 15). A reset restarts the sequence with path 0.
Addressed (R&S®OSP320 only)	up to 16	D-Sub	The R&S®OSP320 has four additional address lines for direct control of paths 0 to 15.

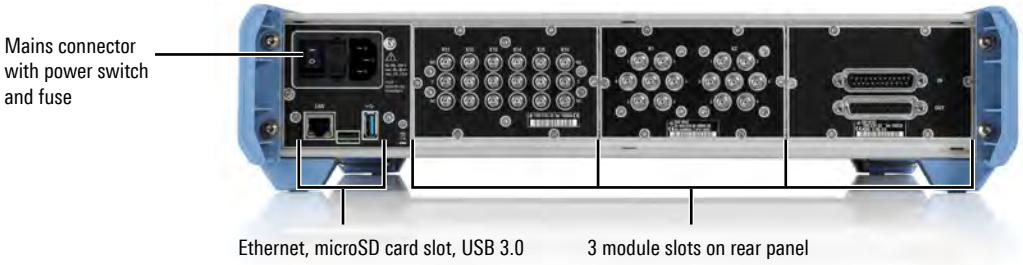
Trigger menu and trigger connectors

Display of minimum trigger interval and the paths to which the trigger signal is to be applied.

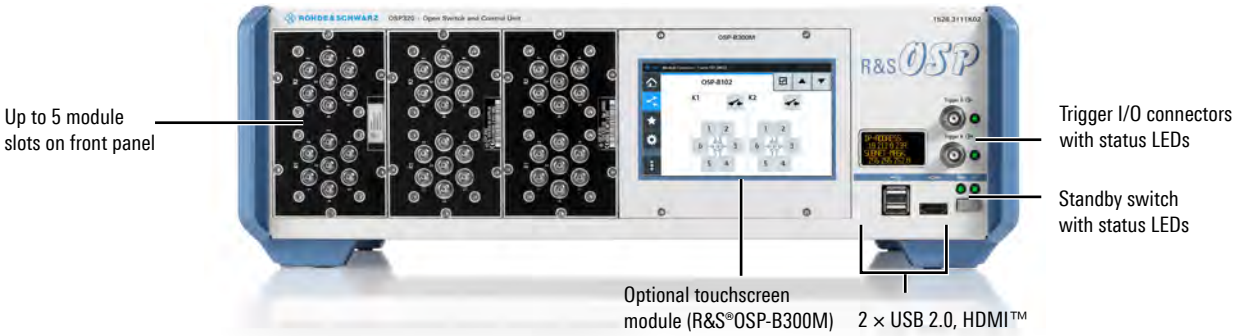
Front view of 2 RU R&S®OSP220 switch and control unit

Front view of 2 RU R&S®OSP230 switch and control unit

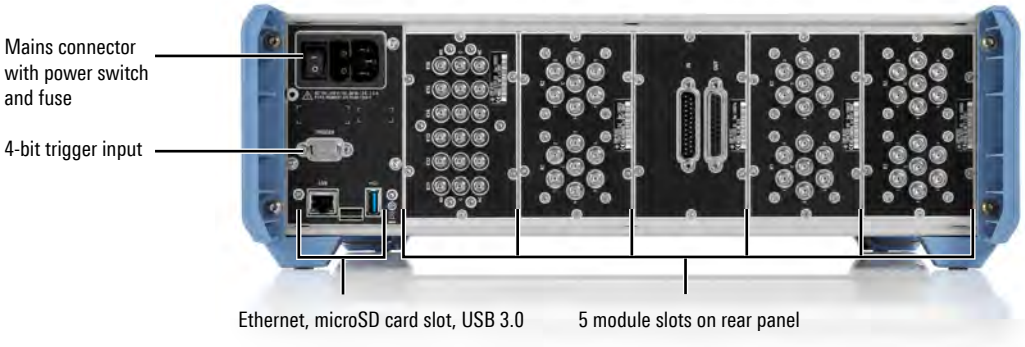
Rear view of 2 RU R&S®OSP220 and R&S®OSP230 switch and control units



Front view of 3 RU R&S®OSP320 switch and control unit



Rear view of 3 RU R&S®OSP320 switch and control unit



SYSTEM INTEGRATION

Easy system integration

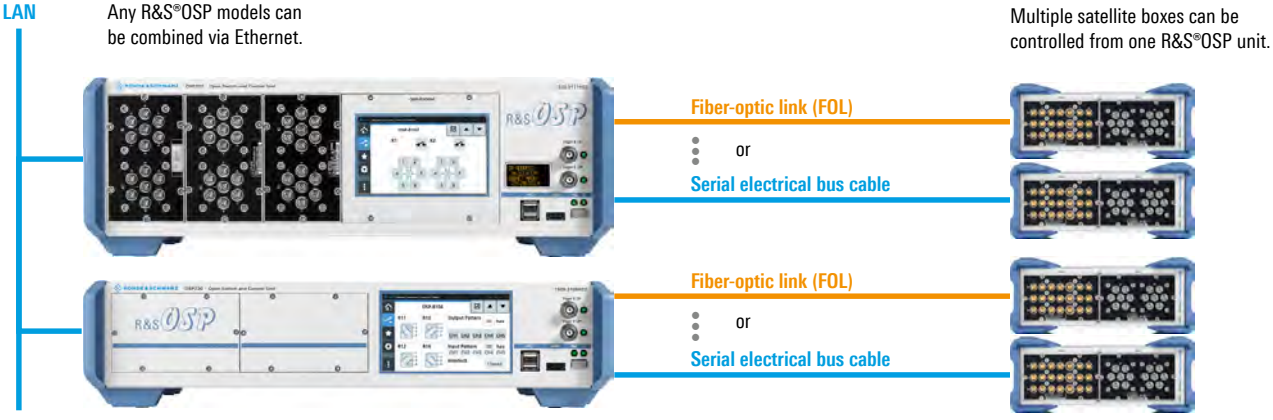
Since all R&S®OSP models can be controlled via Ethernet, R&S®OSP units can be connected to a PC or laptop, integrated into a test system, or remotely operated over a corporate network or the internet.

Remote control is via SCPI commands using programs such as LabVIEW, LabWindows/CVI, Keysight VEE, C++, C#, Visual Basic .NET, Visual Basic and others.

Virtually unlimited expandability

All R&S®OSP models can be combined via Ethernet into a primary/secondary system in a local network or a corporate or global network. This substantially enhances the functionality of the R&S®OSP configuration, including path control, plus it provides an easy way to expand existing R&S®OSP systems to meet future requirements.

Possible combinations of R&S®OSP base units and satellite boxes



Split operation

In addition to networking multiple R&S®OSP units, split operation is also possible using the compact R&S®OSP-B200S2 satellite box. The satellite box shifts RF switch and control tasks close to the DUT or the antennas. This reduces the number of long RF cables required, improving RF performance of the setup and saving cost. The satellite box is controlled via a serial electrical bus cable (wired link) or a fiber-optic link (FOL), as required for a given application.

R&S®OSP-B200R remote control module with R&S®OSP-B200S2 satellite box and fiber-optic cable.

ORDERING INFORMATION

Designation	Type	Order No.
R&S®OSP switch and control units and satellite boxes [1)]		
Switch and control unit (2 RU) with 3 + 3 module slots and monitor interface	R&S®OSP220	1528.3105K02
Switch and control unit (2 RU) with 3 + 2 module slots, touchscreen and monitor interface	R&S®OSP230	1528.3105K03
Switch and control unit (3 RU) with 5 + 5 module slots and monitor interface	R&S®OSP320	1528.3111K02
Satellite box, with electrical interface (wired link)	R&S®OSP-B200S2	1528.3134.02
Satellite box, with fiber-optic link (FOL) interface and electrical interface (wired link)	R&S®OSP-B200S2	1528.3134.04
Hardware trigger functionality (license key)	R&S®OSP-K100	1528.3486.02
R&S®OSP RF switch modules		
RF switch modules with electromechanical RF coaxial relays		
DC to 12.4 GHz		
3 × SPDT (N), 3 × SPDT (BNC), DC to 900 MHz, non-terminated	R&S®OSP-B106	1505.5601.02
2 × SPDT (N), non-terminated	R&S®OSP-B131	1505.4740.02
6 × SPDT (N), non-terminated	R&S®OSP-B132	1505.4757.02
1 × SP6T (N), non-terminated	R&S®OSP-B133	1528.3157.02
2 × DPDT (N), non-terminated	R&S®OSP-B136	1522.4500.02
DC to 18 GHz		
6 × SPDT (SMA), non-terminated	R&S®OSP-B101	1505.5101.02
6 × SPDT (SMA), non-terminated, latching	R&S®OSP-B101L	1505.5101.52
2 × SP6T (SMA), non-terminated	R&S®OSP-B102	1505.5201.02
2 × SP6T (SMA), non-terminated, latching	R&S®OSP-B102L	1505.5201.52
1 × SP6T (SMA), n × SPDT (SMA), non-terminated, n = 1 to 3	R&S®OSP-BM6n	1528.1625.1n
2 × DPDT (SMA), non-terminated	R&S®OSP-B116	1515.5827.02
1 × SP8T (SMA), 2 × SPDT (SMA), non-terminated	R&S®OSP-B119	1515.5856.02
3 × SPDT (SMA), terminated	R&S®OSP-B121	1515.5504.02
1 × SP6T (SMA), terminated	R&S®OSP-B122	1515.5510.02
6 × SPDT (SMA), 1 × SP6T (SMA), terminated	R&S®OSP-B123	1515.5527.02
3 × SPDT (SMA), 2 × SP6T (SMA), terminated	R&S®OSP-B124	1515.5533.02
6 × SPDT (SMA), 3 × SP6T (SMA), terminated	R&S®OSP-B125	1515.5540.02
1 × SP8T (SMA), terminated, 2 × SPDT (SMA), non-terminated	R&S®OSP-B129	1517.7004.02
DC to 26.5 GHz		
6 × SPDT (SMA), non-terminated	R&S®OSP-B111E	1505.4605.26
n × SP6T (SMA), non-terminated, n = 1 or 2	R&S®OSP-B112E	1528.1560.1n
1 × SP6T (SMA), n × SPDT (SMA), non-terminated, n = 1 to 3	R&S®OSP-BM6nE	1528.1625.2n
2 × DPDT (SMA), non-terminated	R&S®OSP-B116E	1515.5827.26
1 × SP8T (SMA), 2 × SPDT (SMA), non-terminated	R&S®OSP-B119E	1515.5856.26
3 × SPDT (SMA), terminated	R&S®OSP-B121E	1515.5504.26
1 × SP6T (SMA), terminated	R&S®OSP-B122E	1528.1525.26
6 × SPDT (SMA), 3 × SP6T (SMA), terminated	R&S®OSP-B125E	1515.5540.26
1 × SP8T (SMA), terminated, 2 × SPDT (SMA), non-terminated	R&S®OSP-B129E	1517.7004.26
DC to 40 GHz		
n × SPDT (2.92 mm), non-terminated, n = 3 or 6	R&S®OSP-B111H	1505.4605.4n
n × SP6T (2.92 mm), non-terminated, n = 1 or 2	R&S®OSP-B112H	1528.1560.4n
1 × SP6T (2.92 mm), n × SPDT (2.92 mm), non-terminated, n = 1 to 3	R&S®OSP-BM6nH	1528.1625.4n
2 × DPDT (2.92 mm), non-terminated	R&S®OSP-B116H	1515.5827.40
3 × SPDT (2.92 mm), terminated	R&S®OSP-B121H	1515.5504.40
1 × SP6T (2.92 mm), terminated	R&S®OSP-B122H	1528.1525.02
6 × SPDT (2.92 mm), 3 × SP6T (2.92 mm), terminated	R&S®OSP-B125H	1515.5540.40
DC to 50 GHz		
n × SPDT (2.4 mm), non-terminated, n = 3 or 6	R&S®OSP-B111U	1505.4605.5n
n × SPDT (2.4 mm), non-terminated, latching, n = 3 or 6	R&S®OSP-B111UL	1528.1531.1n
n × SP6T (2.4 mm), non-terminated, n = 1 or 2	R&S®OSP-B112U	1528.1560.5n
1 × SP6T (2.4 mm), non-terminated, latching	R&S®OSP-B112UL	1528.1548.11
1 × SP6T (2.4 mm), n × SPDT (2.4 mm), non-terminated, n = 1 to 3	R&S®OSP-BM6nU	1528.1625.5n

Designation	Type	Order No.
n × DPDT (2.4 mm), non-terminated, n = 1 or 2	R&S®OSP-B116U	1515.5827.5n
n × SPDT (2.4 mm), terminated, n = 1 to 3	R&S®OSP-B121U	1515.5504.5n
1 × SP6T (2.4 mm), terminated	R&S®OSP-B122U	1528.1525.51
DC to 67 GHz		
n × SPDT (1.85 mm), non-terminated, n = 1 to 6	R&S®OSP-B111V	1505.4605.6n
n × SPDT (1.85 mm), non-terminated, latching, n = 3 or 6	R&S®OSP-B111VL	1515.5991.1n
n × SPDT (1.85 mm), terminated, latching, n = 1 to 3	R&S®OSP-B121VL	1528.1654.6n
RF switch modules with RF coaxial solid-state relays (SSR)		
6 × SPDT (SMA), SSR, 9 kHz to 6 GHz, reflective	R&S®OSP-B107	1505.5901.02
6 × SPDT (SMA), SSR, 9 kHz to 10 GHz, absorptive	R&S®OSP-B127	1505.4728.02
n × SP6T (SMA), SSR, 9 kHz to 10 GHz, absorptive, n = 1 to 3	R&S®OSP-B128	1505.4734.1n
3 × DP3T (SMA), 10 W power SSR, 9 kHz to 8 GHz, reflective	R&S®OSP-B142	1505.4792.03
n × SPDT (SMA), 10 W power SSR, 9 kHz to 8 GHz, absorptive[2], n = 1 to 3	R&S®OSP-B142	1505.4792.1n
Control modules for RF test systems		
Passive module, for integration of one R&S®NRP-Zxx power sensor (with USB interface)	R&S®OSP-PM-I	1515.5985.02
EMS module, with drivers for four external power relays, additional digital inputs/outputs, interlock	R&S®OSP-B104	1505.5401.02
EMS module, for small systems with 1 × DPDT (N), digital inputs/outputs, interlock with SPDT	R&S®OSP-B114	1505.4711.02
Digital I/O module, 16 × digital inputs, 16 × digital outputs	R&S®OSP-B103	1505.5301.02
Multiplexer module, 6-channel, 4-wire multiplexer	R&S®OSP-B108	1505.5718.02
Remote control module for one R&S®OSP-B200S2 satellite box, with electrical interface (wired link)	R&S®OSP-B200R	1528.3140.02
Remote control module for one R&S®OSP-B200S2 satellite box, with fiber-optic link (FOL) interface and electrical interface	R&S®OSP-B200R	1528.3140.04
AC power supply for R&S®OSP-B200S2 satellite box (required for FOL interface)	R&S®OSP-B200P	1528.3205.02

Service options		
Extended warranty, one year	R&S®WE1	Please contact your local sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty, three years	R&S®WE3	
Extended warranty, four years	R&S®WE4	

[1] For options and accessories, see data sheet PD 5216.1340.22.
[2] Reflective DP3T relays with external termination (1 W).