

R&S[®]OSP

Open Switch and Control Platform

Getting Started



1178711702

The R&S®OSP is a high-performance switch platform from Rohde & Schwarz. It facilitates RF tests by eliminating the need to rearrange coaxial cable connections repeatedly during measurements. Instead, the application-specific modules in the base unit automatically switch the required signal paths.

This document describes the following R&S®OSP base units:

- **R&S®OSP220** Base Unit 2HU without Touchscreen (order no. 1528.3105.02)
- **R&S®OSP230** Base Unit 2HU with Touchscreen (order no. 1528.3105.03)
- **R&S®OSP320** Base Unit 3HU without Touchscreen (order no. 1528.3111.02)
- **R&S®OSP-B200S2** Satellite 2HU for Base Units (order no. 1528.3134.02/.04)

For all optionally available standard switch modules, refer to the user manual, which is available for download at <https://www.rohde-schwarz.com/product/osp-n> > Manuals

The software contained in this product uses several valuable open source software packages. For information, see the "Open Source Acknowledgment" document, which is available for download from the R&S OSP product page at <https://www.rohde-schwarz.com/product/osp-n> > Firmware. Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

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In this manual, products from Rohde & Schwarz are indicated without the ® symbol, e.g. R&S®OSP is indicated as R&S OSP.

Contents

1 Operational Safety	5
1.1 Safety Considerations for SSRs.....	9
2 Key Features	11
3 Documentation Overview	12
3.1 Getting Started Manual.....	12
3.2 User Manual.....	12
3.3 Data Sheets and Brochures.....	12
3.4 Service Manual.....	13
3.5 Basic Safety Instructions.....	13
3.6 Release Notes, Open Source Acknowledgment.....	13
3.7 Application Notes & Cards, White Papers, etc.....	13
3.8 Tutorials.....	13
4 Preparing for Use	14
4.1 Unpacking and Checking the Switch Unit.....	14
4.2 Accessory List.....	15
4.3 Placing or Mounting the Instrument.....	16
4.4 Connecting AC Power.....	18
4.5 Switching the Instrument On and Off.....	18
4.6 Checking the Installed Modules.....	20
4.7 Configuring the Initial Instrument Settings.....	20
5 Instrument Tour	21
5.1 Front Panel View.....	21
5.1.1 Front Panel of the R&S OSP220.....	21
5.1.2 Front Panel of the R&S OSP230.....	21

5.1.3	Front Panel of the R&S OSP320.....	22
5.1.4	Front Panel of the R&S OSP-B200S2 Satellite Unit.....	23
5.1.5	Touchscreen.....	24
5.2	Rear Panel View.....	25
5.2.1	Rear Panel of the R&S OSP220.....	25
5.2.2	Rear Panel of the R&S OSP230.....	26
5.2.3	Rear Panel of the R&S OSP320.....	26
5.2.4	Rear Panel of the R&S OSP-B200S2 Satellite Unit.....	27
6	Trying Out the Switch Unit.....	29
6.1	Manual and Remote Modes of Operation.....	29
6.1.1	Direct Manual Operation.....	29
6.1.2	Manual Remote Operation.....	30
6.1.3	Remote Operation by SCPI Commands.....	30
6.2	User Interface and Functional Elements.....	31
6.3	Main Action Buttons.....	34
6.4	Elements of the Status Bar.....	35
6.5	Manual Module Operation: Switching / Selecting.....	35
6.5.1	Switching Mode.....	36
6.5.2	Selection Mode.....	37
6.6	Contacting Customer Support.....	38

1 Operational Safety

The product documentation helps you to use the R&S OSP safely and efficiently. Keep the product documentation in a safe place and pass it on to the subsequent users.

Intended use

The R&S OSP is designated for use in industrial, administrative, and laboratory environments. Use the R&S OSP only for its designated purpose. Observe the safety and usage instructions documented in the user manual, as well as operating conditions and performance limits stated in the data sheet.

Safety information is part of the product documentation. It warns you about the potential dangers and gives instructions how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In the "Basic Safety Instructions", safety issues are grouped according to subjects. For example, one subject is electrical safety. The "Basic Safety Instructions" are delivered with the R&S OSP in different languages in print.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation. Always read the safety instructions carefully. Make sure to comply fully with them. Do not take risks and do not underestimate the potential danger of small details such as a damaged power cable.

WARNING

Restrictions on opening a switch unit

Opening an R&S OSP switch unit can lead to personal injury and instrument damage.

To avoid these risks, do not open your switch unit.

If opening is required for mounting a module, let Rohde & Schwarz service personnel mount this module.

If opening is not required for mounting a module, follow the mounting instruction in the user manual.

⚠ WARNING**Risk of injury due to disregarding safety information**

Observe the information on appropriate operating conditions provided in the data sheet to prevent personal injury or damage to the instrument. Read and observe the basic safety instructions provided with the instrument, in addition to the safety instructions in the following sections.

Do not open the instrument casing, except for removing a blank panel or an existing hardware option module for exchanging it, as described in the user manual.

⚠ CAUTION**Risk of injury due to stacking**

A stack of instruments can fall over and cause injury.

Never stack more than three instruments on top of each other. Instead, mount the instruments in a rack. Ensure that the rack has sufficient load capacity and stability. Observe the specifications of the rack manufacturer. Always install the instruments from bottom to top shelf so that the rack stands securely. Secure the instrument against falling out of the rack.

⚠ CAUTION**Risk of injury due to collapsing foldable feet**

Foldable feet can collapse, which can lead to personal injury and damage of your equipment.

To prevent this risk, always fold the instrument's foldable feet completely in or out to ensure stability. The feet can collapse, if they are not folded out completely or if the instrument is moved without lifting it. The foldable feet are designed to carry the weight of the instrument, but not an extra load.

Always place the instrument on a stable, flat and level surface with the bottom of the instrument facing down.

NOTICE**Risk of instrument damage due to inappropriate operating conditions**

Specific operating conditions are required to ensure accurate measurements and to avoid damage to the instrument. Observe the information on appropriate operating conditions provided in the basic safety instructions and the instrument's data sheet.

NOTICE**Risk of electrostatic discharge (ESD)**

Electrostatic discharge (ESD) can damage the electronic components of the instrument and the device under test (DUT).

A risk of damage due to ESD is typically limited to switch units that are equipped with hardware options with one or more of the following features:

- Digital input or output ports (I/O ports)
- Solid-state relays (SSR)
- Integrated amplifiers in special modules that are delivered as part of a test system

ESD is most likely to occur when you connect or disconnect a cable to one of the switch unit's connectors. To prevent ESD, use a wrist strap and cord and connect yourself to the ground, or use a conductive floor mat and heel strap combination.

For details, refer to the basic safety instructions delivered as a printed brochure with the instrument.

NOTICE**Risk of instrument damage during operation**

An unsuitable operating site or test setup can damage the switch unit and connected devices. Ensure the following operating conditions before you switch on the switch unit:

- All fan openings are unobstructed and the airflow perforations are unimpeded. The minimum distance from the wall is 10 cm.
- The instrument is dry and shows no sign of condensation.
- The instrument is positioned as described in the following sections.
- The ambient temperature does not exceed the range specified in the data sheet.

NOTICE**Risk of instrument damage due to insufficient airflow in a rack**

If you mount several instruments in a rack, you need an efficient ventilation concept to ensure that the instruments do not overheat. Insufficient airflow for a longer period can disturb the operation and even cause damage.

NOTICE**Risk of overloading internal terminations**

Overloading an electromechanical RF relay with internal port termination can damage or destroy the relay.

The maximum load that the internal termination of one port can handle is approximately 1 W. However, if the relay has several terminated ports, their cumulative maximum load is less than the sum. For example, an SP6T relay with 6 internally terminated ports cannot handle 6 W, but typically 3 W, only.

To avoid the risk of damage due to overloading internal terminations, limit the load to the "Max. termination power per relay" that is specified in the [data sheet](#).



EMI impact on measurement results

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated electromagnetic interference (EMI):

- Use suitable shielded cables of high quality. For example, use double-shielded RF, LAN and HDMI cables.

Note: USB cables are of varying and often poor quality. Therefore, consider the quality of each individual USB cable.

- Always terminate open cable ends.
- Note the EMC classification in the data sheet.

1.1 Safety Considerations for SSRs

CAUTION

Risk of injury and damage due to inappropriate SSR usage

Solid-state relays (SSRs) have no defined switching state at power loss. Hence, other than an electromechanical monostable relay, if there is a malfunction (for example, missing supply voltage), typically the SSR ports go to a high-impedance state. But the relay does not actively switch off a connected load. This failure can lead to a risk of personal injury and damage of equipment.

To prevent this risk, you must implement a dedicated concept for failsafe operation of your system in a competent manner.

NOTICE

Risk of damage due to inappropriate SSR usage

Solid-state relays (SSRs) are intended for high-frequency and high-speed switching, but their semiconductor elements are damaged easily by excess current, voltage peaks or a short circuit. Hence, inappropriate conditions or usage can damage SSRs or connected components and lead to associated problems.

To prevent this risk, avoid excess current, voltage peaks and short circuits.

NOTICE**Risk of SSR damage due to inappropriate operating conditions**

Solid-state relays (SSRs) for RF applications are intended for switching low powers. To avoid damage due to overload, refer to the operating conditions according to the data sheet.

**Monostable vs. failsafe**

Without power, a solid-state relay (SSR) quits operating as a switch:

- It is in a high-impedance state
- It does not have any defined and stable switching state

Sometimes, SSRs are considered as behaving like a monostable relay. And the term "monostable relay" is often considered to be equivalent with the term "failsafe relay". However, this interpretation is misleading.

For more information, refer to the user manual.

2 Key Features

The R&S OSP is a highly flexible, modular switch and control platform. Each switch unit can be equipped with several application-specific switch modules.

The platform meets the requirements of diverse test scenarios in production, labs and development environments. Scenarios range from desktop configurations for laboratory measurements to complex, rack-integrated test systems.

The R&S OSP220/230/320 described in this manual are the second generation of switch units from Rohde & Schwarz, replacing the R&S OSP120/130/150.

Outstanding key features are:

- 5 to 10 module slots and up to 16 module buses provide maximum flexibility
- Fast setup of test and measurement configurations
- Replace complex wirings by a single switch and control platform
- Easy master/slave configuration
- Optional installation of several remotely controlled satellite units ([see p. 23](#))
- Reliable measurements and reproducible tests
- Automation for cost-efficient test sequences
- Electromechanical relay modules up to 67 GHz
- Solid-state relay modules with switching and settling times down to the μs range
- Backward compatible to all standard modules of the previous switch unit generation R&S OSP120/130/150, as described in the user manual

The available switch modules are described in the user manual.

For a detailed specification of the R&S OSP, refer to the data sheet, available for download at www.rohde-schwarz.com/brochure-datasheet/osp.



Note that switch units are no measurement instruments. They support efficient working with test and measurement setups, but switch units do not display measurement results or power levels.

3 Documentation Overview

This section provides an overview of the R&S OSP user documentation. Unless specified otherwise, you find the documents on the R&S OSP product page at:

www.rohde-schwarz.com/product/osp-n

3.1 Getting Started Manual

Introduces the R&S OSP and describes how to set up and start working with the product. Includes, e.g., basic operations and safety instructions. A printed version is delivered with the switch unit.

3.2 User Manual

Contains the description of all switch unit modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, interfaces and error messages. Includes the contents of the getting started manual.

A separate R&S OSP-B200R/B200S2 Satellite System user manual is also available for download at www.rohde-schwarz.com/manual/osp-n.

3.3 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S OSP. It also lists the firmware applications and their order numbers, and optional accessories.

If there is a data mismatch between the data sheet and other documentation, the information given in the data sheet is valid.

The brochure provides an overview of the instrument and deals with the specific characteristics. See www.rohde-schwarz.com/brochure-datasheet/osp-n

3.4 Service Manual

Describes handling failed modules, module replacement, troubleshooting and special remote control commands for service purposes. The document also contains spare part lists and mechanical drawings. The service manual ("Classified Service Document") is available for Rohde & Schwarz personnel, only.

3.5 Basic Safety Instructions

Contains safety instructions, operating conditions and further important information. The printed document is delivered with the switch unit.

3.6 Release Notes, Open Source Acknowledgment

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation. The open-source acknowledgment document (OSA) provides verbatim license texts of the used open-source software. See www.rohde-schwarz.com/firmware/osp-n

3.7 Application Notes & Cards, White Papers, etc.

These documents deal with special applications or background information on particular topics. See www.rohde-schwarz.com/application/osp

3.8 Tutorials

Tutorials offer guided examples and demonstrations on operating the R&S OSP. They are provided on the product page of the internet.

4 Preparing for Use

This section describes the basic steps to be taken when setting up the R&S OSP for the first time and putting it into operation.

4.1 Unpacking and Checking the Switch Unit.....	14
4.2 Accessory List.....	15
4.3 Placing or Mounting the Instrument.....	16
4.4 Connecting AC Power.....	18
4.5 Switching the Instrument On and Off.....	18
4.6 Checking the Installed Modules.....	20
4.7 Configuring the Initial Instrument Settings.....	20

4.1 Unpacking and Checking the Switch Unit

Check the equipment for completeness using the delivery note and the accessory lists for the various items. Check the equipment for any damage. If parts of the equipment are missing or if there is damage, immediately contact the carrier who delivered the equipment.



Packing material

Retain the original packing material. If the instrument needs to be transported or shipped later, you can use the material to protect the control elements and connectors.

NOTICE**Risk of damage during transportation and shipment**

Insufficient protection against mechanical and electrostatic effects during transportation and shipment can damage the instrument.

- Always make sure that sufficient mechanical and electrostatic protection is provided.
- When shipping an instrument, we recommend using the original packaging. If you do not have the original packaging, use sufficient padding to prevent the instrument from moving around inside the box. Pack the instrument in antistatic wrap to protect it from electrostatic charging.
- Secure the instrument to prevent any movement and other mechanical effects during transportation.

4.2 Accessory List

The R&S OSP base unit comes with the following accessories:

- Printed "Getting Started" manual, English (order no. 1178.7117.02)
- Ethernet (LAN) cable, 2 m, RJ45 (1:1), category 6 (order no. 0041.9748.00)
- Power supply cable, delivered country-specific to fit your local wall outlet format, see [Table 4-1](#)

Table 4-1: Power cords

Power supply cables according to country-specific standards	Order no.
European standard	0025.2365.00
Angular adapter for European standard	0086.4400.44
British standard	0006.7013.00
Swiss standard	0006.7020.00
US American standard	0006.7036.00
Australian standard	0006.7107.00
Chinese standard	0041.4752.00
Japanese standard	0041.6232.00
Brazilian standard	3587.8102.00

4.3 Placing or Mounting the Instrument

The R&S OSP is designed for use either on a bench top or in a standard 19" rack.

Bench-top positioning

If the R&S OSP is operated on a bench top, the surface must be flat.

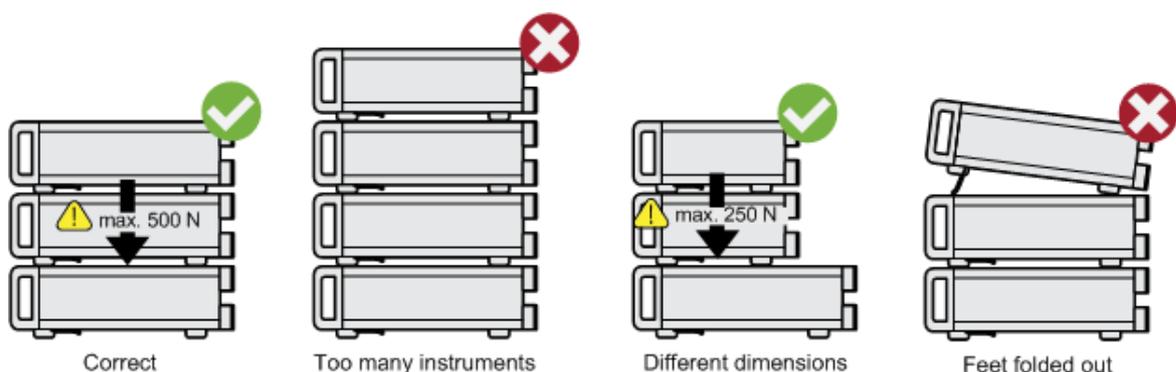
⚠ WARNING

Risk of injury when stacking instruments

A stack of instruments can tilt over and cause injury if not stacked correctly. Furthermore, the instruments at the bottom of the stack can be damaged due to the load imposed by the instruments on top.

Observe the following instructions when stacking instruments:

- Never stack more than three instruments. If you need to stack more than three instruments, install them in a rack.
- The overall load imposed on the lowest instrument must not exceed 500 N.
- It is best if all instruments have the same dimensions (width and length). If you need to stack smaller instruments on the top, the overall load imposed on the lowest instrument must not exceed 250 N.
- If the instruments have foldable feet, fold them in completely.

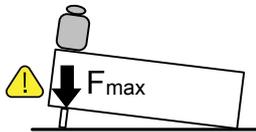


You can use the instrument in horizontal position, standing on its feet, or with the support feet folded out from underneath.

⚠ CAUTION**Risk of injury if feet are folded out**

The feet can fold in if they are not folded out completely or if the instrument is shifted, which can cause damage or injury.

- Fold the feet completely in or out to ensure stability of the instrument. Never shift the instrument when the feet are folded out.
- When the feet are folded out, do not work under the instrument or place anything underneath.
- The feet can break if they are overloaded. The overall load on the folded-out feet must not exceed 500 N.

**Rack mounting**

You can install the R&S OSP in a 19" rack, using one of the following optional rack adapter kits:

- For 2 HU (R&S OSP220 and R&S OSP230), use R&S ZZA-211 (order no. 1096.3260.00)
- For 3 HU (R&S OSP320), use R&S ZZA-311 (order no. 1096.3277.00)

The installation instructions for the adapter kit are included in its delivery.

The satellite unit R&S OSP-B200S2 is not designed for rack-mounting.

NOTICE**Risk of instrument damage due to insufficient airflow in a rack**

If you mount several instruments in a rack, you need an efficient ventilation concept to ensure that the instruments do not overheat. Insufficient airflow for a longer period can disturb the operation and even cause damage.

4.4 Connecting AC Power

The switch unit is equipped with an AC power supply connector and can be used with different AC voltages. The R&S OSP adapts itself automatically to the voltage. Refer to the data sheet for the voltage and frequency requirements. The AC power connector is on the rear panel of the instrument.

- ▶ Connect the R&S OSP to an AC power supply using the supplied power cable.
As the instrument's assembly is in line with the specifications for safety class EN61010, you must connect it only to an outlet that has a ground contact.

For replacing the fuses, refer to the maintenance chapter in the user manual.

4.5 Switching the Instrument On and Off

Switching on

- ▶ Set the AC power switch on the rear panel to position "I".
The instrument is supplied with AC power. After booting, the instrument is ready for operation. A green LED above the [Pwr] key on the front panel indicates the operating mode.

Switching off

1. If the LED above the [Pwr] key on the front panel emits green light, set the R&S OSP to **standby mode** by pressing the [Pwr] key.
The LED changes from green to orange light, indicating sleep mode. The switch unit is now unavailable via LAN, even if connected.
Otherwise, if the R&S OSP is already in standby mode, do not press the [Pwr] key.
2. Set the AC power switch on the rear panel to position "O".
The R&S OSP changes into **off mode**.



Display timeout

The **OLED status display** of a switch unit R&S OSP220 or R&S OSP320 serves for showing you the network connection. The LAN connection is set typically at power-up.

The status display switches off automatically after setting the LAN connection with a timeout specified by the "Status Display Period" parameter in the "General" configuration tab (see user manual). Without a network connection, the status display switches off with the same timeout after power-up. This feature helps to prevent burn-in effects often seen in OLED displays.

When the switch unit is connected via a new network address, the status display is switched on again for the next 30 minutes. (Your server can assign a new address, for example, when you change the switch unit's network settings from static IP to DHCP, as described in the user manual.)

The RGB-LED **touchscreen display** in the R&S OSP230 and in the module R&S OSP-B300M needs no burn-in protection. Thus, it has no timeout.

NOTICE

Risk of losing settings

While the R&S OSP is in operating mode, if you switch it off using the rear panel switch or by disconnecting the power cord, the instrument loses its current settings. (Operating mode is indicated by a green LED above the [Pwr] key.)

For example, if you have selected signal paths previously, you must select and enable these paths again, when you restart the switch unit.

To avoid a loss of settings, press the [Pwr] key first to set the switch unit into standby mode. Then shut it down properly by setting the rear AC power switch to position "O".

- If "Configuration" > "General" > "Switch-On Reset" is activated, the R&S OSP resets all internal latching switches during the startup procedure.
- If "Configuration" > "General" > "Switch-On Action" is set to "Switch Path", the R&S OSP loads the previously set path while booting. The switch unit activates this path when the startup procedure is completed.

Configuring a master-slave setup of switch units is described in the user manual.

4.6 Checking the Installed Modules

The instrument is typically equipped with one or more optional switch modules. You can visually check whether the modules listed on your delivery note correspond with the installed modules. Each module's name is printed on its panel.



You can also view the installed modules in the "Module Operation" dialog (touchscreen display or "WebGUI", see [Chapter 6.2, "User Interface and Functional Elements"](#), on page 31):

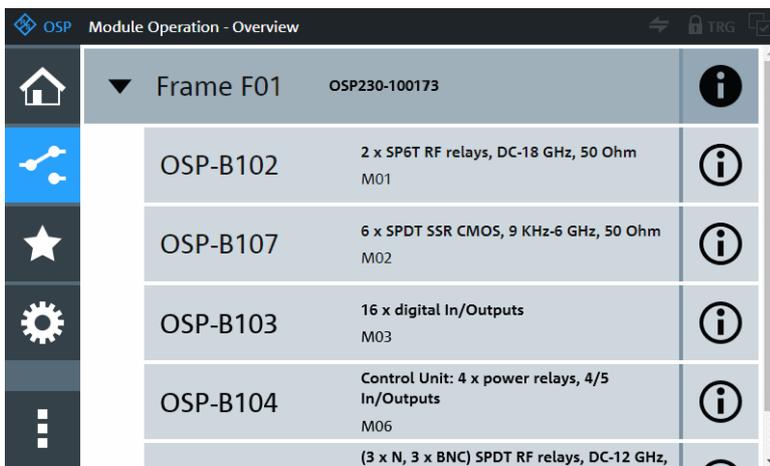


Figure 4-1: The module operation dialog, here with a single switch unit and 5 modules

The information in this dialog is updated during the booting process, when the R&S OSP automatically detects the installed modules.

4.7 Configuring the Initial Instrument Settings

After startup, the switch unit is fully configured automatically, and ready for use.

However, you have many options to change the configuration, for example:

- Edit the network settings
- Define or modify a master-slave setup
- Restore a previous setting
- Define switching paths and output channels

These configuration settings and many more are described in the user manual.

5 Instrument Tour

- [Front Panel View](#).....21
- [Rear Panel View](#).....25

5.1 Front Panel View

The following chapters describe the front panels of all models of the R&S OSP switch unit family. For the functional elements, refer to [Chapter 6.2](#).

5.1.1 Front Panel of the R&S OSP220

The front panel of the R&S OSP220 features 3 module slots, a monochrome non-touch status display, a power switch and various connectors.

The R&S OSP220 occupies 2 height units (2HU) in a standard 19" rack. You can insert 1-slot, 2-slot or 3-slot modules into the 3 front slots:



Figure 5-1: Front view of the R&S OSP220 (2HU)

FS01 = Front slot 01, here with a blind plate

FS02 = Front slot 02, here with a 1-slot switch module

FS03 = Front slot 03, here with a blind plate

F Int = Front interfaces and status display (OLED, 128 x 64 pixels), see [Figure 6-4](#)

5.1.2 Front Panel of the R&S OSP230

The front panel of the R&S OSP230 features 2 module slots, an integrated touch-screen display, a power switch and various connectors.

The R&S OSP230 occupies 2 height units (2HU) in a standard 19" rack. You can insert two 1-slot modules or one 2-slot module into the 2 front slots:

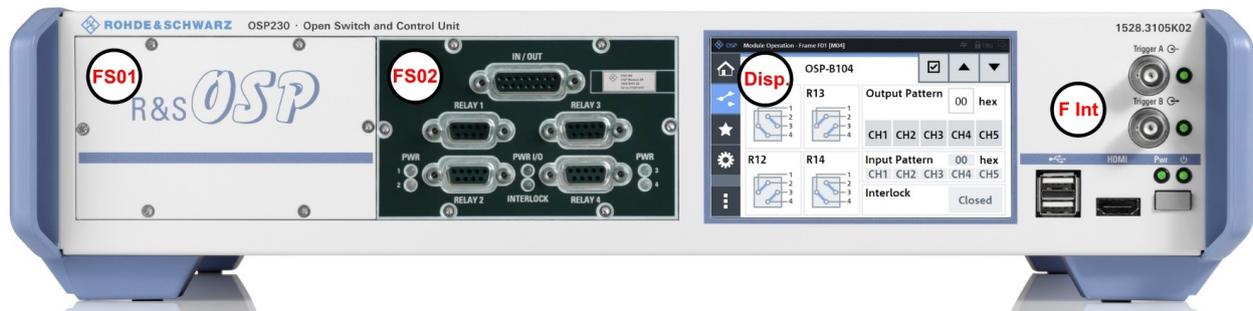


Figure 5-2: Front view of the R&S OSP230 (2HU)

FS01 = Front slot 01, here with a blind plate

FS02 = Front slot 02, here with a 1-slot switch module

Disp. = Integrated touchscreen display (and no front slot 03)

F Int = Front interfaces, see [Figure 6-4](#)

5.1.3 Front Panel of the R&S OSP320

The R&S OSP320 is higher than all other switch units from Rohde & Schwarz. With its 3 height units (3HU), it enables a more dense fitting of 1-slot switch modules within the same instrument width. Hence, its front panel features 5 module slots, along with a power switch, a status display and various connectors.

2 of the 5 front slots (labeled FS04 and FS05 in [Figure 5-3](#)) can hold the factory-mounted optional touchscreen display module R&S OSP-B300M:

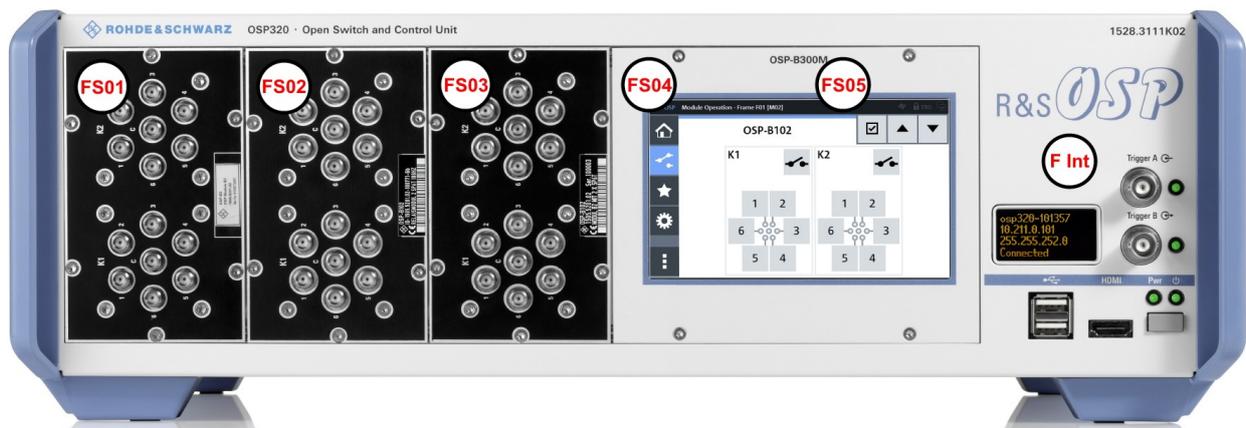


Figure 5-3: Front view of the R&S OSP320 (3HU)

FS01 to FS03 = Front slots 01 to 03, here each with a 1-slot switch module
 FS04 + FS05 = Front slot 04 and 05, here with mounted touchscreen display module
 F Int = Front interfaces and status display (OLED, 128 x 64 pixels), see [Figure 6-4](#)

The dedicated touchscreen display module R&S OSP-B300M shown in [Figure 5-3](#) is optional (see p. 24). It can only be factory-mounted in the R&S OSP320 with 3 height units (3HU) in position FS04 + FS05.

You cannot insert any modules into the R&S OSP320 that are designed as 2-slot or 3-slot modules for a switch unit with 2 height units (2HU, see above).

5.1.4 Front Panel of the R&S OSP-B200S2 Satellite Unit



For a comprehensive description of this unit, also refer to the **R&S OSP-B200R/B200S2 Satellite System user manual**, available for download at www.rohde-schwarz.com/manual/osp.

The R&S OSP-B200S2 is a standalone device, only, not to be mounted into a 19" rack. The front panel of satellite unit the features 2 module slots, into which you can insert 1-slot or 2-slot modules:



Figure 5-4: Front view of the R&S OSP-B200S2 (2HU)

SlotA = Front slot A, here with a 1-slot switch module
 SlotB = Front slot B, here with a 1-slot switch module

This unit is designed to serve as a satellite with up to 2 switch modules, controlled from a base switch unit with remote control module R&S OSP-B200R.

For example, you can use the satellite unit inside a shielded chamber for EMC tests that do not tolerate electrical wiring. In this scenario, use the satellite with local battery power supply, and control the switch modules fitted in the unit via a fiber-optic link. See also [Chapter 5.2.4.1, "Wired Link versus Fiber-Optic Link"](#), on page 28.

5.1.5 Touchscreen

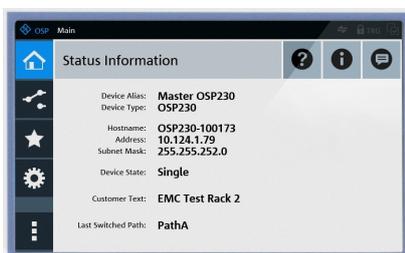


Figure 5-5: Touchscreen display, here showing the Main menu

- The R&S OSP230 is equipped with an **integrated** touchscreen display on the front panel.
- The R&S OSP320 can be equipped with the touchscreen display **module** R&S OSP-B300M.

Both the *integrated display* and the *display module* are based on a touch-sensitive RGB LCD with a resolution of 800 x 480 pixels.

The touchscreen display offers one out of several means of user interaction for easily handling the switch unit. It shows the relay and switch-path settings, provides status information and allows configuring and controlling your measurement tasks.



The touchscreen reacts in a defined way when you tap a particular element on the screen with a finger or with a pointing device, for example an external USB mouse. Any user interface element that reacts to a click by a mouse pointer also reacts to a tap on the screen, and vice versa. Using the touchscreen, you can perform all tasks by the tap of your finger.

For the remainder of this manual, all interactions are described for a "click" action. These descriptions also mean the equivalent "tap" action using the touchscreen.

On-screen keyboard

The on-screen keyboard is an additional means of direct interaction with the switch unit R&S OSP230 or R&S OSP320, the latter if equipped with touchscreen module R&S OSP-B300M.



Figure 5-6: Different versions of the on-screen keyboard

Left = Numbers and characters allowed

Center = Decimal numbers, only

Right = Hexadecimal numbers

The touchscreen automatically opens an on-screen keyboard, if your current action requires entering numbers or characters. The cancel button or the OK button closes the on-screen keyboard.

Instead of using the on-screen keyboard, you can enter data with a connected external keyboard (Figure 6-1) or via the user interface in a browser (Figure 6-2).

5.2 Rear Panel View

The following chapters describe the rear panels of all models of the R&S OSP switch unit family. For the functional elements, refer to [Chapter 6.2](#).

5.2.1 Rear Panel of the R&S OSP220

The rear panel of the R&S OSP220 features 3 module slots, an on/off switch, fuses, power supply connector, LAN and USB connectors and a micro SD card slot. You can insert 1-slot, 2-slot or 3-slot modules into the 3 rear slots:



Figure 5-7: Rear view of the R&S OSP220 (2HU)

R Int = Rear interfaces, see [Figure 6-4](#)
 RS01 to RS03 = Rear slots 01 to 03, here each with a blind plate

5.2.2 Rear Panel of the R&S OSP230

The rear panel of the R&S OSP230 features 3 module slots, an on/off switch, fuses, power supply connector, LAN and USB connectors and a micro SD card slot. You can insert 1-slot, 2-slot or 3-slot modules into the 3 rear slots:



Figure 5-8: Rear view of the R&S OSP230 (2HU)

R Int = Rear interfaces, see [Figure 6-4](#)
 RS01 to RS03 = Rear slots 01 to 03, here each with a 1-slot switch module

5.2.3 Rear Panel of the R&S OSP320

The rear panel of the R&S OSP320 features 5 module slots, an on/off switch, fuses, power supply connector, LAN and USB connectors and a micro SD card slot:

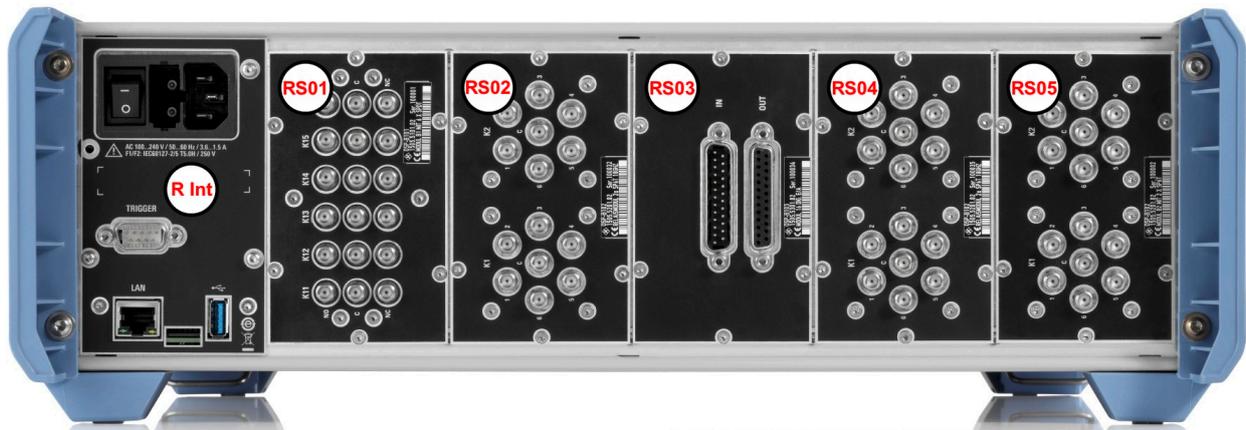


Figure 5-9: Rear view of the R&S OSP320 (3HU)

R Int = Rear interfaces, see [Figure 6-4](#), with an additional D-Sub 9 trigger connector
 RS01 to RS05 = Rear slots 01 to 05, here each with a 1-slot switch module

You cannot insert any modules into the R&S OSP320 that are designed as 2-slot or 3-slot modules for a switch unit with 2 height units (2HU, see above).



The D-Sub 9 trigger connector (next to the label "R Int" in [Figure 5-9](#)) is only available in the rear interface panel of the R&S OSP320, not in any other switch unit. This connector enables the addressed hardware trigger.

5.2.4 Rear Panel of the R&S OSP-B200S2 Satellite Unit



For a comprehensive description of this unit, also refer to the **R&S OSP-B200R/B200S2 Satellite System user manual**, available for download at www.rohde-schwarz.com/manual/osp-n.

The rear panel of the R&S OSP-B200S2 features various connectors and LEDs. You cannot insert any modules into the rear panel of the R&S OSP-B200S2.

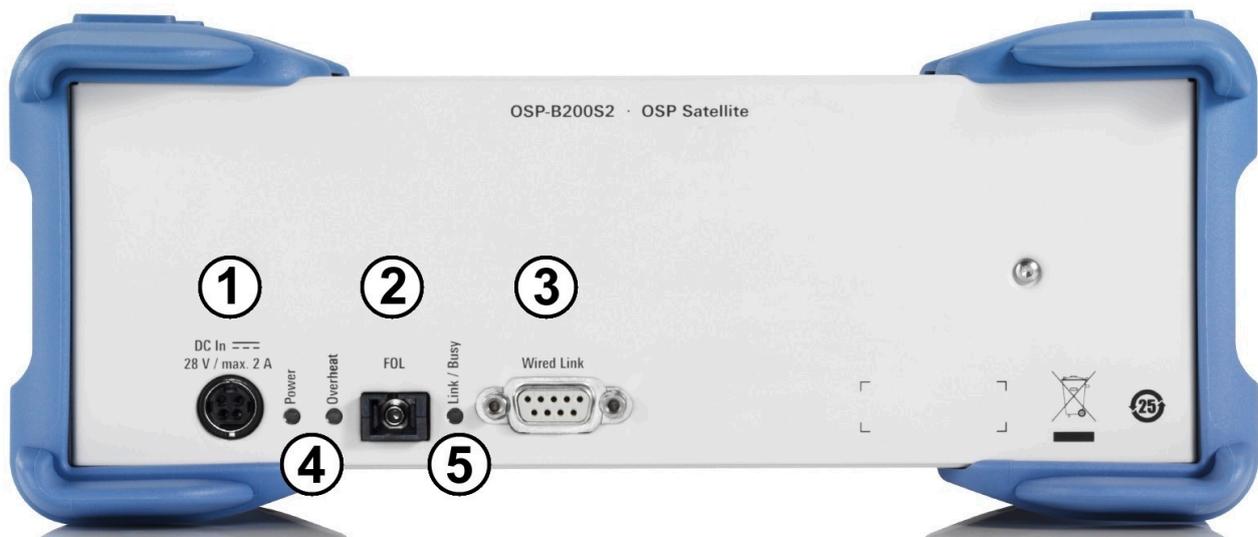


Figure 5-10: Rear view of the R&S OSP-B200S2 (2HU)

- 1 = DC power supply connector
- 2 = Fiber-optic link (FOL) connector for optical remote control
- 3 = Wired link connector for electrical remote control
- 4 = Status LEDs for indicating [Power] and [Overheat]
- 5 = Status LED for indicating [Link / Busy]

5.2.4.1 Wired Link versus Fiber-Optic Link

The link connectors (labeled (2) and (3) in [Figure 5-10](#)) allow choosing either an electrical or an optical control connection.

- **Wired link**

For remote operation of the satellite unit R&S OSP-B200S2 across distances up to 10 m, use the D-Sub cable R&S OSP-Z200x.

Connect this cable **exclusively** to the remote control interface module R&S OSP-B200R in your base switch unit. Connecting it to any other device or module can harm your equipment.

The wired link cable supplies power from the base switch unit to the satellite.

- **Fiber-optic link**

For remote operation of the satellite unit R&S OSP-B200S2 across larger distances up to 20 m, or inside a shielded room, use the fiber-optic cable R&S OSP-Z201x or R&S OSP-Z202x.

As the fiber-optic link cable does not supply power to the satellite unit, you must also use the 28 V DC power supply R&S OSP-B200P.

6 Trying Out the Switch Unit

This chapter introduces the most important basic operations and settings of the R&S OSP step by step. For a complete overview, see the user manual (p. 12).

Prerequisite: the instrument is set up, connected to mains power supply and started up, as described in [Chapter 4 on page 14](#). The next sections describe:

- [Manual and Remote Modes of Operation](#)..... 29
- [User Interface and Functional Elements](#)..... 31
- [Main Action Buttons](#)..... 34
- [Elements of the Status Bar](#)..... 35
- [Manual Module Operation: Switching / Selecting](#)..... 35
- [Contacting Customer Support](#)..... 38

6.1 Manual and Remote Modes of Operation

You can operate the switch unit by any of the following modes:

- [Direct Manual Operation](#)..... 29
- [Manual Remote Operation](#)..... 30
- [Remote Operation by SCPI Commands](#)..... 30

6.1.1 Direct Manual Operation

If you use an R&S OSP230 or an R&S OSP320 with display module R&S OSP-B300M, you can control your switch unit by the user interface on the integrated touchscreen display.

Alternatively, with any of the R&S OSP models, you can control your switch unit via an external mouse and keyboard, connected to the USB interfaces (see (4) in [Figure 6-4](#)). Optionally (especially without integrated touchscreen), you can connect an external monitor to the switch unit's HDMI interface (see (5)).

Manual and Remote Modes of Operation



Figure 6-1: Operation by integrated touchscreen (1) or by external USB / HDMI devices (2)



For scrolling the touchscreen, swipe it with your finger. With an external monitor, click and use the mouse wheel or the keyboard's up/down keys.

For connecting external devices, see [Figure 6-4](#).

6.1.2 Manual Remote Operation

You can control one or more switch units by working with the user interface in a web browser ("WebGUI") on a remote computer that is connected via LAN.



Figure 6-2: Manual remote operation via "WebGUI" and LAN

RJ45 = Ethernet (LAN) connector on the rear panel of each switch unit

Refer to the user manual for more information, also regarding the combination of several switch units in a master-slave setup.



Note that the legacy software R&S OSP Panel is not compatible with the switch units R&S OSP220, R&S OSP230 and R&S OSP320.

6.1.3 Remote Operation by SCPI Commands

You can control the R&S OSP by SCPI commands sent from a remote computer that is connected via LAN. Refer to the user manual.

User Interface and Functional Elements



Figure 6-3: Remote operation by SCPI commands

RJ45 = Ethernet (LAN) connector on the rear panel of each switch unit
 Far left = Two switch units integrated in a test system like R&S CEMS

To do so, you have the following options:

- For SCPI command communication, use a terminal program like R&S Forum or similar programming interface (for example with R&S VISA driver). Remote operation and RC commands are described in the user manual.
- Use your own application to communicate with the R&S OSP via a VISA interface or directly via a TCP/IP raw socket connection.
- Let a test system software like R&S EMC32 or R&S ELEKTRA send the required commands. Refer to www.rohde-schwarz.com/product/emc32 and www.rohde-schwarz.com/product/elektra.

The R&S OSP can handle up to 5 open SCPI command connections simultaneously.

6.2 User Interface and Functional Elements



The switch unit R&S OSP230 and the display module R&S OSP-B300M have a **touchscreen display**.

Its functions are described in the user manual.



The switch units R&S OSP220 and R&S OSP320 have a **status display**.

After booting, it displays the hostname, IP address, subnet mask and device status information. For details, refer to the user manual.

See also "[Display timeout](#)" on page 19.

You cannot operate the switch units R&S OSP220 – and the R&S OSP320 without display module R&S OSP-B300M – by their status displays. To operate these

switch units without the graphical user interface of a built-in full touchscreen display, use one of the following alternatives:

- As on the right-hand side in [Figure 6-1](#), connect an external monitor to the HDMI connector on the unit's front panel (labeled (5) in [Figure 6-4](#)). Also connect a mouse and keyboard to the USB connectors, labeled (4).
- Use the switch unit as a slave device in a master-slave setup, as described in the user manual.
- Connect the switch unit to a local area network (LAN) by the RJ45 connector on the unit's rear panel. The connector is labeled (1) in [Figure 6-4](#). Read the unit's IP address from the status display and proceed as described in [Chapter 6.1.2, "Manual Remote Operation"](#), on page 30, or [Chapter 6.1.3, "Remote Operation by SCPI Commands"](#), on page 30.

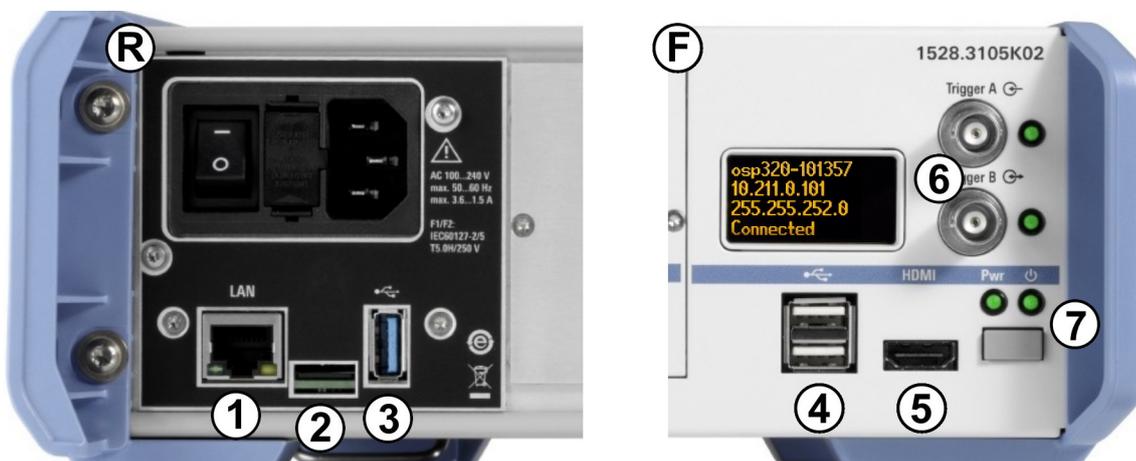


Figure 6-4: Connectors and functional elements on the switch unit's rear and front panel

R = Rear interfaces (where the R&S OSP320 has an additional trigger port, see [Figure 5-9](#))

F = Front interfaces (where the R&S OSP230 has no [OLED status display](#))

I/O = Main power switch with fuse holder and power connector

1 = LAN connector (RJ45)

2 = Slot for the micro SD card that holds the switch unit's operating system

3 = USB 3.1 connector

4 = Two USB 2.0 connectors (for external mouse and keyboard)

5 = HDMI connector (for an external monitor)

6 = Two BNC trigger input connectors (A and B, with two trigger status LEDs), see below

7 = Front power switch with [Pwr] and LAN status LEDs



If you connect an external monitor to the **HDMI** connector (5), use a monitor that is compatible with this port's DVI signal. This signal is configured for the touchscreen's resolution of 800 x 480 pixels. Incompatible monitors cannot display the graphical user interface.

 With the **trigger** connectors (6), the R&S OSP is prepared for external triggering, which requires the hardware trigger option **R&S OSP-K100**. Firmware versions below version 2.00 do not support this trigger option.

Note that the rear interface panel of the R&S OSP320 has an additional D-Sub 9 trigger connector, shown in [Rear view of the R&S OSP320 \(3HU\) on page 27](#).

In any of these configurations, you can operate a switch unit by its user interface: either on an external monitor or in a web browser (we recommend using **Chrome** as browser). The same holds true for the R&S OSP230 and R&S OSP320 with integrated display module R&S OSP-B300M, which allow touchscreen operation.

Using any of these options, you get access to the graphical user interface (GUI):



Figure 6-5: Main menu of the graphical user interface ("WebGUI"), here in the recommended Chrome browser



In the "Main" menu of the user interface, clicking the "Help" icon  in the top right area opens an overview of the available functions:

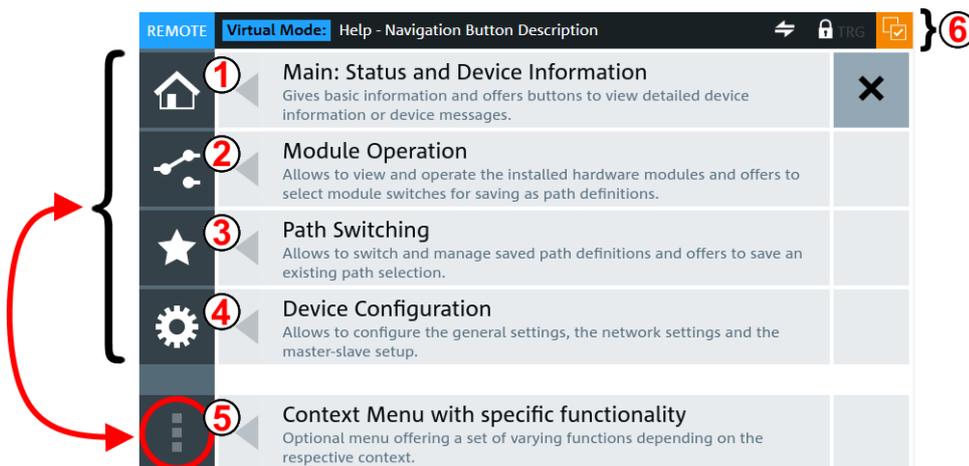


Figure 6-6: Main elements of the graphical user interface (GUI)

- 1 = Main menu
- 2 = Module operation
- 3 = Path switching
- 4 = Device configuration
- 5 = Context menu, always used together with one of the menu buttons above
- 6 = Status bar with varying elements, see [Chapter 6.4](#)

The main GUI elements listed above are briefly described in [Chapter 6.3, "Main Action Buttons"](#), on page 34, and [Chapter 6.4, "Elements of the Status Bar"](#), on page 35. For more information, refer to the user manual.

6.3 Main Action Buttons

The user interface includes the following main action buttons:



The **"Main"** menu provides status and network information. Its context menu (1)+(5) gives additional device info and messages.



The **"Module Operation"** dialog allows immediate interaction with the relays. For a brief overview, see [Chapter 6.5](#).



The **"Path Switching"** dialog allows defining, editing and activating paths. You can also export and import paths.



The **"Configuration"** dialog provides general settings, trigger operation (optional), settings for network connectivity and for master/slave operation.

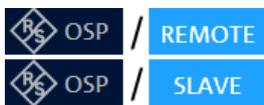
Context Menu



The "**Context Menu**" button calls specific functionality for any of the menu items shown above and listed as (1) to (4) in [Figure 6-6](#). Hence, this button is always used **together** with one of the other buttons.

For more information, refer to the user manual.

6.4 Elements of the Status Bar



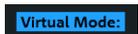
The status bar is shown on top in [Figure 6-5](#) and [Figure 6-6](#).

The various indicator icons have the following meanings:



Left: the R&S OSP is controlled by its graphical user interface (locally or via LAN). Right: the R&S OSP is controlled

remotely by SCPI commands or a master. See [Chapter 6.1, "Manual and Remote Modes of Operation"](#), on page 29.



If this label is displayed in the status bar, the R&S OSP is in virtual mode (see user manual).



If the lock icon is highlighted (right), it indicates the locked mode (see user manual).



If the trigger icon is highlighted (right), the software option **R&S OSP-K100** is enabled and the trigger is activated (see user manual).



If the selection indicator icon is highlighted (right), at least one relay or output channel is selected (see [Chapter 6.5.2](#)).

6.5 Manual Module Operation: Switching / Selecting



This chapter outlines only the most basic features of the dialogs for manual "Module Operation" that allow immediate interaction with the relays.

Click the "Module Operation" button  to see a **list** of all installed switch modules or  to open the **interaction dialog** of one switch module:

Table 6-1: List of modules (left, virtual), interaction dialog of one module (right, physical)



If you see the interaction dialog of one switch module (as in the right picture above), click the "Module Operation" button  to see the list of installed modules (as in the left picture above, here a screenshot in virtual mode). In the icon of the "Module Operation" button, the "back" arrow (available with firmware versions from 1.40) indicates that it brings you back to the list. To see the interaction dialog of any module, click its name in the list.

6.5.1 Switching Mode

Allows switching relays and output channels.

The switching mode is active, as long as the selection mode (see [Chapter 6.5.2](#)) is deactivated. In switching mode, clicking the icon of a switchable item changes its state:

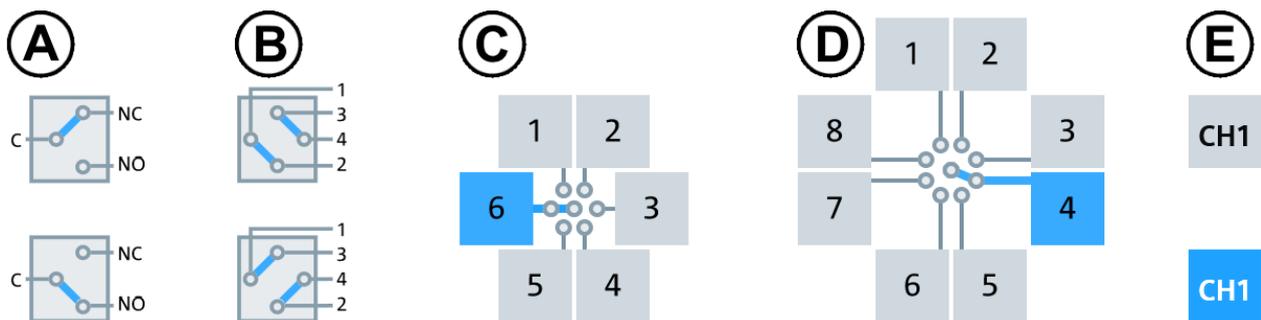


Figure 6-7: Various relay types and the effect of clicking them

- (A) SPDT relays, and (B) DPDT relays: Clicking toggles the state
- (C) SP6T relays, and (D) SP8T relays: Clicking a terminal port selects it to be connected to the common port
- (E) Output channels: Clicking toggles the state

 For switching relays, output channels or other switchable items, the "Toggle select mode" button (orange, described below) must **not** be active.

6.5.2 Selection Mode

Allows selecting relays and output channels.

The "Toggle select mode" button switches the "Selection Mode" on or off. This button (marked by a red circle in [Figure 6-8](#)) is only available in a view that shows at least one module and its details.

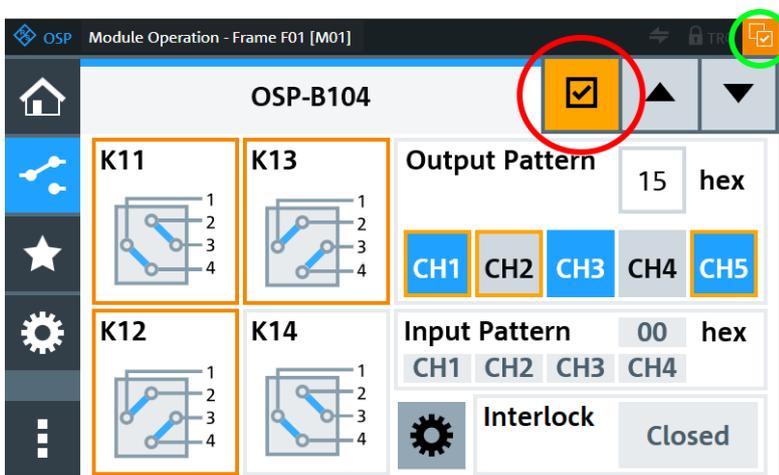


Figure 6-8: Relay or channel selection dialog

- Red circle = "Toggle select mode" button. If the button is orange, the "Selection Mode" is activated.
- Green circle = "Items selected" indicator. The icon is highlighted, if at least one relay or output channel in any module is selected.
- Orange frames = Selected relays and output channels are highlighted in the module's interaction dialog

While the "Selection Mode" is active, tapping or clicking the icon of a relay, output channel or other Switchable items **does not change** its state, but only **selects or deselects** it. This selection is indicated by the icon's frame color changing from gray to orange.

 Use the selection mode for defining paths and output patterns.
To select or deselect all relays and output channels, go to "Module Operation" (or "Path Switching") > "Context Menu" > "Path Selection" > "Select All" or "Deselect All".



In a full-screen window of your web browser, the module interaction dialog can display several modules at the same time:

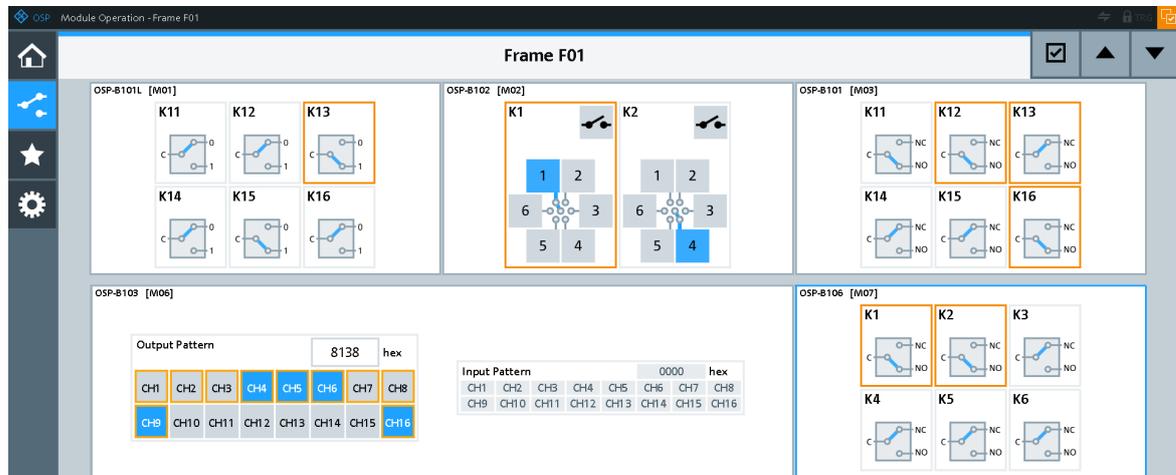


Figure 6-9: Full-screen representation of several modules in a browser window

On the contrary, to reproduce the original size of the touchscreen display, set your browser window to 800 × 480 pixels. Optionally, hit [F12] to enter this setting.

For a comprehensive description of module operation and all other functions, including the definition and switching of paths, refer to the user manual.

6.6 Contacting Customer Support

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products. Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:

