

R&S®OSP

Open Switch and Control Unit

Quick Start Guide



1505.3896.62 – 14

The Quick Start Guide describes the following R&S®OSP models and options:

- R&S®OSP120, stock no. 1505.3009.02/.12
- R&S®OSP130, stock no. 1505.3009.03
- R&S®OSP150, stock no. 1505.3009.05/.15
- Option Module R&S®OSP-B011, stock no. 1505.4763.02
- Option Module R&S®OSP-B012, stock no. 1505.4770.02
- Option Module R&S®OSP-B101, stock no. 1505.5101.02
- Option Module R&S®OSP-B101L, stock no. 1505.5101.52
- Option Module R&S®OSP-B102, stock no. 1505.5201.02
- Option Module R&S®OSP-B102L, stock no. 1505.5201.52
- Option Module R&S®OSP-B103, stock no. 1505.5301.02
- Option Module R&S®OSP-B104, stock no. 1505.5401.02
- Option Module R&S®OSP-B106, stock no. 1505.5601.02
- Option Module R&S®OSP-B107, stock no. 1505.5901.02
- Option Module R&S®OSP-B108, stock no. 1505.5718.02
- Option Module R&S®OSP-B111, stock no. 1505.4605.02
- Option Module R&S®OSP-B111UL, stock no. 1528.1531.13/.16
- Option Module R&S®OSP-B111VL, stock no. 1515.5991.13/.16
- Option Module R&S®OSP-B112, stock no. 1505.4611.02
- Option Module R&S®OSP-B114, stock no. 1505.4711.02
- Option Module R&S®OSP-B116, stock no. 1515.5827.02
- Option Module R&S®OSP-B119, stock no. 1515.5856.02
- Option Module R&S®OSP-B121, stock no. 1515.5504.02
- Option Module R&S®OSP-B121H, stock no. 1515.5504.40
- Option Module R&S®OSP-B122, stock no. 1515.5510.02
- Option Module R&S®OSP-B122H, stock no. 1528.1525.02
- Option Module R&S®OSP-B123, stock no. 1515.5527.02
- Option Module R&S®OSP-B124, stock no. 1515.5533.02
- Option Module R&S®OSP-B125, stock no. 1515.5540.02
- Option Module R&S®OSP-B126, stock no. 1515.5556.02
- Option Module R&S®OSP-B127, stock no. 1505.4728.02
- Option Module R&S®OSP-B128, stock no. 1505.4734.02
- Option Module R&S®OSP-B129, stock no. 1517.7004.02
- Option Module R&S®OSP-B131, stock no. 1505.4740.02
- Option Module R&S®OSP-B132, stock no. 1505.4757.02
- Option Module R&S®OSP-B133, stock no. 1528.3157.02
- Option Module R&S®OSP-B136, stock no. 1522.4500.02
- Option Module R&S®OSP-B142, stock no. 1528.1048.03/.11/.12/.13
- Option Module R&S®OSP-B158, stock no. 4094.7300.02

The firmware of the instrument makes use of the operating system LINUX® and other valuable open source software packages. For information, see the "Open Source Acknowledgement" on the user documentation CD-ROM (included in delivery) or at

<https://www.rohde-schwarz.com/en/firmware/osp>.

Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

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The following abbreviations are used throughout this manual:

R&S®OSP is abbreviated as R&S OSP

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1 Documentation Overview

The Quick Start Guide describes the following R&S®OSP models and options:

R&S OSP120, stock no. 1505.3009.02/.12

R&S OSP130, stock no. 1505.3009.03

R&S OSP150, stock no. 1505.3009.05/.15

Option Module R&S OSP-B011, stock no. 1505.4763.02

Option Module R&S OSP-B012, stock no. 1505.4770.02

Option Module R&S OSP-B101, stock no. 1505.5101.02

Option Module R&S OSP-B101L, stock no. 1505.5101.52

Option Module R&S OSP-B102, stock no. 1505.5201.02

Option Module R&S OSP-B102L, stock no. 1505.5201.52

Option Module R&S OSP-B103, stock no. 1505.5301.02

Option Module R&S OSP-B104, stock no. 1505.5401.02

Option Module R&S OSP-B106, stock no. 1505.5601.02

Option Module R&S OSP-B107, stock no. 1505.5901.02

Option Module R&S OSP-B108, stock no. 1505.5718.02

Option Module R&S OSP-B111, stock no. 1505.4605.02

Option Module R&S OSP-B111UL, stock no. 1528.1531.13/.16

Option Module R&S OSP-B111VL, stock no. 1515.5991.13/.16

Option Module R&S OSP-B112, stock no. 1505.4611.02

Option Module R&S OSP-B114, stock no. 1505.4711.02

Option Module R&S OSP-B116, stock no. 1515.5827.02

Option Module R&S OSP-B119, stock no. 1515.5856.02

Option Module R&S OSP-B121, stock no. 1515.5504.02

Option Module R&S OSP-B121H, stock no. 1515.5504.40

Option Module R&S OSP-B122, stock no. 1515.5510.02

Option Module R&S OSP-B122H, stock no. 1528.1525.02

Option Module R&S OSP-B123, stock no. 1515.5527.02

Option Module R&S OSP-B124, stock no. 1515.5533.02

Option Module R&S OSP-B125, stock no. 1515.5540.02

Option Module R&S OSP-B126, stock no. 1515.5556.02

Option Module R&S OSP-B127, stock no. 1505.4728.02

Option Module R&S OSP-B128, stock no. 1505.4734.02

Option Module R&S OSP-B129, stock no. 1517.7004.02

Option Module R&S OSP-B131, stock no. 1505.4740.02

Option Module R&S OSP-B132, stock no. 1505.4757.02

Option Module R&S OSP-B133, stock no. 1528.3157.02

Option Module R&S OSP-B136, stock no. 1522.4500.02

Option Module R&S OSP-B142, stock no. 1528.1048.03/.11/.12/.13

Option Module R&S OSP-B158, stock no. 4094.7300.02

2 Preparing for Use

The following topics will help you to get familiar with the instrument and perform the first steps:

- Front Panel Tour R&S OSP120 [or](#) Front Panel Tour R&S OSP130 [or](#) Front Panel Tour R&S OSP150
- Rear Panel Tour
- Putting the Instrument into Operation

NOTICE

General Safety Instructions

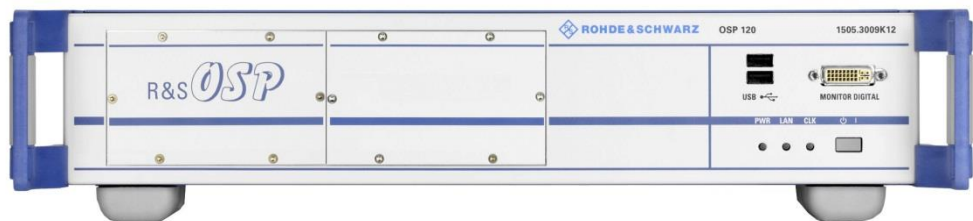
Please make sure to observe the instructions of the following sections so that you cannot cause damage to the instrument or endanger people. This is of particular importance when you use the instrument for the first time. Also observe the general safety instructions at the beginning of this manual.

2.1 Front Panel Tour R&S OSP120

This chapter gives an overview of the front panel controls and connectors of the R&S OSP120 and gives all information that is necessary to put the instrument into operation and connect external devices. Notes on reinstallation of the instrument software appear at the end of the chapter.

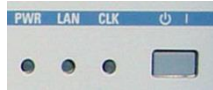
[Chapter 3.3](#), R&S OSP Panel Functions, of this manual provides an introduction to the operation of the instrument by means of the control program OSP Panel. For a description of the operating concept and an overview of the instrument's capabilities refer to the Instrument Functions ([chapter 5](#)).

The front panel of the R&S OSP120 consists of STANDBY switch, Status LEDs and connectors. Brief explanations on the function of these items and the rear panel can be found on the next pages.



2.1.1 Status LEDs and Standby Key

The status LEDs and the standby toggle switch are located in the bottom right corner of the front panel. See also [chapter 2.5.9](#).



The status LEDs light to indicate the following instrument states:

PWR: shows standby (yellow LED) and ready state (green LED).

LAN: shows if data are received via LAN network.

CLK: is flashing if data are transferred via CAN bus.

On an R&S OSP150, the logic is inverted: the CLK indicator goes off shortly during CAN bus activity.

The STANDBY key serves the following purpose:

Toggle between standby and ready state (indicated by the yellow and green PWR LED, respectively).

2.1.2 Front Panel Connectors

2.1.2.1 USB Connectors



Single Universal Serial Bus connectors of type A (master USB), used to connect a keyboard or flash drive. All front panel USB connectors comply with standard USB 2.0; refer to the "Specifications".



USB Connection

The length of passive connecting USB cables should not exceed 1 m. The maximum current per USB port is 500 mA. It is recommended to use double-shielded USB cables.

2.1.2.2 Monitor Connector



An external monitor with a digital interface can be connected to the MONITOR DIGITAL connector on the front panel of the R&S OSP120. An external monitor, together with a keyboard, is a prerequisite for manual intervention in order to define the LAN configuration or in case of service to have access to the Linux Operating system.

Monitor connection:



Before the external monitor is connected, the instrument must be switched off (standby mode) to prevent damage to the monitor and the R&S OSP120. After connection, the external monitor is detected when the instrument is started. The Linux Operating system menu of the R&S OSP is then displayed on the external monitor. Further settings are not required.

It is recommended to use a double-shielded monitor cable equipped with ferrites at each end.

2.2 Front Panel Tour R&S OSP130

This chapter gives an overview of the front panel controls and connectors of the R&S OSP130 and gives all information that is necessary to put the instrument into operation and connect external devices. Notes on reinstallation of the instrument software appear at the end of the chapter.

The chapter Getting Started of this manual provides an introduction to the operation of the instrument by means of the control program OSP Panel. For a description of the operating concept and an overview of the instrument's capabilities refer to the Instrument Functions ([chapter 5](#)). The graphical user interface on the instrument is explained in [chapter 5.3](#).

The front panel of the R&S OSP130 has the same STANDBY key and Status LEDs as the R&S OSP120. See the corresponding sections in [chapter 2.1.1](#) for details. There is no connector for an external monitor.



2.2.1 Navigation Keys

The navigation keys allow access to the various functions of the graphical user interface. They can be subdivided into three groups.



In the top row next to the screen there are three keys to quickly access different hierarchy levels in the menus.

pressing the key **MENU** activates the top level menu.

pressing the key **BACK** moves up in hierarchy by one menu level.

pressing the key **HOME** leaves the menu and displays the Main menu screen



In the top row next to the screen there are three keys to quickly access different hierarchy levels in the menus.

With the cursor keys the focus is moved within the screen elements; see a detailed description in [chapter 5.3](#).



In the top row next to the screen there are three keys to quickly access different hierarchy levels in the menus.

pressing the key **FUNCTION** executes a switching action, if applicable.

pressing the key **OK** confirms a selection, for example for going to the next menu level.

pressing the key **STATUS** displays status information for the chosen item (device or module) or changes the selection of a switch for path configuration.

2.2.2 Status Keys

The status keys serve the following purposes:



The **OFF** key is not used at the moment.



The **ON** key is not used at the moment.



Pressing the **RESET** key leaves the menu and displays the Main menu screen.



The **LOCAL** key is not used at the moment.

2.2.3 Status Indicators

The status indicators have the following meaning:



Error in supply voltage, please contact service.



General error condition. Please note any additional information what could have led to this condition and contact R&S if the error is reproducible.



General warning condition. Not used at the moment.



Indicates communication via the CAN interface.



Indicates communication via the CAN interface as well.

2.2.4 Front Panel USB Connectors



Single Universal Serial Bus connectors of type A (master USB), used to connect a keyboard or flash drive. All front panel USB connectors comply with standard USB 2.0; refer to the "Specifications".



USB Connection

The length of passive connecting USB cables should not exceed 1 m. The maximum current per USB port is 500 mA. It is recommended to use double-shielded USB cables.

2.3 Front Panel Tour R&S OSP150

This chapter gives an overview of the front panel controls of the R&S OSP150. The front panel of the R&S OSP150 is similar to the front panel of the R&S OSP120 having the Standby key and the three status LEDs but does not have any connector. See [chapter 2.1.1](#) for the description of the front panel elements.

Please notice that the operation of the CLK LED is different to OSP120 and OSP130.

2.4 Rear Panel Tour

This section gives an overview of the rear panel connectors of the R&S OSP120. The rear panels of the R&S OSP130 and of the R&S OSP150 are almost identical to it.



The rear connectors and interfaces are described in detail in the complete operating manual. The following connectors are available on the instruments:

LAN connector (RJ-45) is used to integrate the instrument to a Local Area Network, primarily for remote control purposes. This connector is not available on the R&S OSP150.

CAN bus connector (D-Sub, 9 pin) is a control port to connect one or several extension units R&S OSP150.

The R&S OSP owns three slots which can be configured with the options available for the R&S OSP. The above configuration shows the following options:

Option R&S OSP-B101: Relay module consisting of six coaxial relays of SPDT type; the RF coaxial connectors are SMA type

Option R&S OSP-B102: Relay module consisting of two coaxial relays of SP6T type; the RF coaxial connectors are SMA type

Option R&S OSP-B103: I/O module with 16 Bit input / output ports; the connectors are D-Sub types, 25 pin, female for output and male for input

In case of the options which can be installed in the R&S OSP, the connectors related to each option are described in detail in the operating manual.

2.4.1 LAN Connector



8-pin LAN connector RJ-45 used to connect the R&S OSP120 or OSP130 to a Local Area Network (LAN). Refer to Remote Operation in a LAN.

LAN Connection



Depending on the connection (a non-dedicated network connection or dedicated connection to a single controller) a standard RJ-45 cable or cross-over RJ-45 cable is required. See [chapter 2.9.1](#) for further information.

It is recommended to use double-shielded LAN cables of category 6 (SSTP).

2.4.2 CAN Bus Connector



9-pin connector D-Sub male used to connect the R&S OSP120 or R&S OSP130 to extension units R&S OSP150. Refer to Instrument Functions in [chapter 5](#).

NOTICE

Maximum input levels

The maximum input levels and voltages of the input connectors at the front and rear panel must not be exceeded.

CAUTION

Supply Voltage over CAN bus

In some CAN bus applications the R&S OSP120, OSP130 or OSP150 is required to deliver the supply voltage to an external device. An example for this is the connection of the fiber-optic extender R&S OSP-Z104. Using the cable OSP-Z106 is recommended for this case.

However, when connecting an R&S OSP150 to an OSP120 or OSP130, this supply voltage line must not be present. Using the connecting cables R&S OSP-Z101 or R&S OSP-Z102 is recommended. Not observing these precautions may damage the power supplies in the R&S OSP.

See also in the operating manual for the pinout of the CAN bus connector.

2.4.3 Mains Switch and Connector



The mains connector is located at the bottom left corner of the rear panel.

Next to the connector is a mains fuse, and above the fuse the mains switch. With the positions "0" the instrument is disconnected from mains, and in position "1" it is connected. See [chapters 2.5.6](#) and [2.5.7](#) for more information.

2.5 Putting the Instrument into Operation

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

NOTICE

Instrument setup

Before turning on the instrument, please make sure that the following conditions are fulfilled:

Instrument covers are in place and all fasteners are tightened.

Fan openings are unobstructed.

Signal levels at the input connectors are all within the specified ranges.

Signal outputs are correctly connected and not overloaded.

The instrument is dry and shows no condensation.

Non-observance may cause damage to the instrument or other devices in the test setup.

2.5.1 Unpacking the Instrument and Checking the Shipment

Remove the instrument from its packaging and check the equipment for completeness using the delivery note and the accessory lists for the various items.

First, pull off the polyethylene protection pads from the instrument's rear feet and then carefully remove the pads from the instrument handles at the front.

Pull off the corrugated cardboard cover that protects the rear of the instrument.

Carefully unthread the corrugated cardboard cover at the front that protects the instrument handles and remove it.

Check the instrument for any damage. If there is damage, immediately contact the carrier who delivered the instrument. In this case, make sure not to discard the box and packing material.

It is advisable to keep the original packing material in order to prevent control elements and connectors from being damaged in case the instrument is to be transported or shipped at a later date.

2.5.2 Instrument Setup

The R&S OSP is designed for use under laboratory conditions, either on a bench top or in a rack. The general ambient conditions required at the operating site are as follows:

The ambient temperature must be in the ranges specified for operation and for compliance with specifications (see "Specifications").

All fan openings including the rear panel perforations must be unobstructed. The distance to the wall should be at least 10 cm.

2.5.3 Bench Top Operation

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

The instrument is used in horizontal position, standing on its feet.

2.5.4 Mounting in a 19" Rack

The instrument can be mounted in 19" racks using a ZZA-211 adapter (order number 1096.3260.00). Please note the mounting instructions supplied with the rack adapter.

NOTICE

Allow for sufficient air supply in the rack.

Make sure that there is sufficient space between the ventilation holes and the rack casing.

2.5.5 EMI Protective Measures

In order to avoid electromagnetic interference (EMI), the instrument may only be operated when it is closed and with all shielding covers fitted. Only appropriate shielded signal and control cables may be used.

2.5.6 Connecting the Instrument to the AC Supply

The R&S OSP is automatically adapted to the AC supply voltage supplied. The supply voltage must be between 100 V and 240 V with frequencies ranging from 50 Hz to 60 Hz (see also the tolerances quoted in the "Specifications"). The mains connector is located in the lower left corner of the rear panel.

- Connect the instrument to the AC power source using the AC power cable delivered with the instrument.

The maximum power consumption of the instrument depends on the installed options. The typical power consumption is also listed in the "Specifications".

The R&S OSP is protected by two fuses located in the fuse holder below the AC power switch; see Replacing Fuses.

2.5.7 Power on and off

The mains connector is located at the bottom left corner of the rear panel.

To turn the power on or off, press the AC power switch to position I (On) or 0 (Off).

See also Replacing Fuses.

After power-on, the R&S OSP instrument is in ready state after about 30 seconds.

The STANDBY key at the front panel of the instrument is used to toggle between standby and ready state. The AC power switch can be permanently on.

Switching off is required only if the instrument must be completely removed from the AC power supply but may be used in order to reduce power consumption when not in use.



Extension units



If communication between OSP120 or OSP130 and any extension unit OSP150 connected via CAN bus cannot be established properly, try to turn on the extension unit(s) first before turning on the OSP120 or OSP130.

2.5.8 Replacing Fuses

The instrument is protected by two fuses (IEC 127- T4.0H/250V, stock no. 0020.7600.00) located in the fuse holder below the AC power switch on the rear panel.

WARNING

Shock hazard

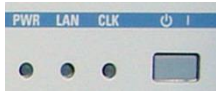
For fuse replacement, ensure that the instrument is switched off and disconnected from the power supply by removing the plug from the AC power connector.

To replace the fuses

1. Open the lid of the AC power connector.
2. Lift the fuse holder out of its slot.
3. Exchange the fuses.
4. Put the fuse holder back in its slot and close the lid.

2.5.9 Standby and Ready State

The STANDBY toggle switch is located in the bottom right corner of the front panel.



After switching on the AC power, the R&S OSP is in ready mode after about 30 seconds.

Press the STANDBY key on the front panel briefly to switch the R&S OSP from the standby to ready state or vice versa.

In standby state, the left PWR LED is yellow. The standby power only supplies the power switch circuits. In this state it is safe to switch off the AC power and disconnect the instrument from the power supply.

After Power On or when changing from Standby to Ready state, the left PWR LED is immediately switched to green and all modules are power-supplied. Please note that the Linux operating system of R&S OSP takes about 30 seconds to start up. After this time the R&S OSP is ready for operation.

CAUTION

Shock hazard

The instrument is still power-supplied while it is in standby mode.

2.6 Maintenance

The R&S OSP does not require any special maintenance. Make sure that the air vents are not obstructed. The outside of the instrument is suitably cleaned using a soft, non-fluffy dust cloth.

NOTICE

Instrument damage caused by cleaning agents

Cleaning agents contain substances that may damage the instrument, e.g. solvent-containing cleaning agents may damage the front panel labeling or plastic parts. Never use cleaning agents such as solvents (thinners, acetone, etc), acids, bases, or other substances.

For our support center address and a list of useful R&S contact addresses refer to the pages at the beginning of this manual.

2.6.1 Storing and Packing

The R&S OSP can be stored at the temperature range quoted in the data sheet. When it is stored for a longer period of time the instrument should be protected against dust.

The original packing should be used, particularly the protective caps at the front and rear, when the instrument is to be transported or dispatched. If the original packing is no longer available, use a sturdy cardboard box of suitable size and carefully wrap the instrument to protect it against mechanical damage.

2.7 Connecting External Accessories

The LAN interface at the rear panel of the R&S OSP120 or OSP130 is used for remote control of the instrument:

- A LAN connection can be established in order to remotely control the instrument from an external PC (see Connecting a LAN Cable).

In addition the R&S OSP120 provides interfaces for monitor connection and USB connection:

- An external monitor shows the menus of the Linux Operating System, if any access or setup within the Linux Operating System should be necessary.
- A keyboard simplifies the entry of data (see Connecting a Keyboard).
- A flash drive supports the firmware update (see Connecting a USB Flash Drive).

2.7.1 Connecting a USB Flash Drive



A USB flash drive can be connected to one of the USB Connectors on the front panel of the R&S OSP120 or OSP130.

The flash drive is detected automatically when it is connected.

2.7.2 Connecting a Keyboard



A keyboard can be connected to one of the USB Connectors on the front panel of the R&S OSP120.

The keyboard is detected automatically when it is connected. The default input language is English – US. Refer to [chapter 2.10.1](#) for changing the keyboard properties.

Keyboard configuration



The keyboard configuration already is pre-configured.

Operating the R&S OSP120 does not require a keyboard. Usually all essential functions can be controlled via LAN interface.

2.7.3 Connecting a Monitor



A standard monitor can be connected to the DVI-D connector on the front panel of the R&S OSP120.

Monitor configuration



There is no particular configuration of the monitor required.

Operating the R&S OSP120 does not require a monitor. Usually all essential functions can be control via LAN interface.

NOTICE

Monitor connection

The monitor must be connected while the instrument is switched off (in standby mode). Otherwise correct operation can not be guaranteed.

The monitor displays the menus of the Linux Operating System which is integral part of the R&S OSP120. The monitor together with keyboard is required if any setups / changes have to be done in the Linux operating system.

2.7.4 Connecting a LAN Cable



A LAN cable can be connected to the LAN connector on the rear panel of the R&S OSP120 or OSP130. To establish a LAN connection proceed as follows:

Refer to chapter Assigning an IP Address and learn how to avoid connection errors.

Connect an appropriate LAN cable to the LAN port. Use a commercial RJ-45 cable to establish a non-dedicated network connection, or a cross-over RJ-45 cable to establish a dedicated connection between the instrument and a single PC.

Dedicated vs. non-dedicated network connections

There are two methods to establish a LAN connection of the R&S OSP:

- A non-dedicated network (Ethernet) connection from the instrument to an existing network made with an ordinary RJ-45 network cable. The instrument is assigned an IP address and can coexist with a computer and with other hosts on the same network.
- A dedicated network connection between the instrument and a single computer made with a cross-over RJ-45 network cable. The computer must be equipped with a network adapter and is directly connected to the instrument. The use of hubs, switches, or gateways is not needed, however, data transfer is still made using the TCP/IP protocol.

2.8 Starting the R&S OSP and Shutting Down

To start the R&S OSP, proceed as follows:

- Make sure that the instrument is connected to the AC power supply and switch the power switch (see [chapter 2.5.7](#)) on the rear panel to position I (On). All modules of the R&S OSP are powered (the left PWR LED is green) and after about 30 seconds the instrument is in ready state.
- If necessary, press the STANDBY toggle switch (see [chapter 2.5.9](#)) on the front panel to switch the instrument to ready state (the left PWR LED is green).
- In ready state, the instrument already has booted the Linux Operating System (see [chapter 2.10](#)) and started the R&S OSP application. Independent of the last setup, the R&S OSP always starts with the default conditions, i.e. all relays in reset condition.

To shut down the R&S OSP, proceed as follows:

- Press the STANDBY key, which will shut down the Linux operating system and set the instrument to standby state.
- If desired, set the AC power switch to position 0 (Off).

NOTICE

Standby state

It is recommended to switch the R&S OSP to standby state before disconnecting it from the AC supply.

2.9 Remote Operation in a LAN

A LAN connection is used to integrate the R&S OSP (not the OSP150) into a home/company network. The LAN connection is required for:

- Remote control operation of the R&S OSP120 or OSP130.
- Manual control of the R&S OSP from a remote computer using the "OSP Panel" application.

To establish the connection proceed as follows:

- Assign an IP address to the R&S OSP following the directions below and connect the instrument to the network as described in [chapter 2.7.4](#), Connecting a LAN Cable.

2.9.1 Assigning an IP Address

There are two different modes for the OSP LAN configuration. The OSP as it is delivered works in the LAN configuration as described in [chapter 2.9.1.1](#).

With OSP firmware version 2.51 onwards, the OSP LAN configuration can be setup as described in [chapter 2.9.1.2](#).

The actual LAN configuration can be read out from the OSP by the following SCPI command:

SYSTem:NETWork:MODE?

2.9.1.1 Default mode of LAN Configuration

The actual LAN configuration is set to mode -> DHCP_AUTO

Depending on the network capacities, the IP address information for the R&S OSP120 or R&S OSP130 can be obtained in different ways.

- If the network supports dynamic TCP/IP configuration using the Dynamic Host Configuration Protocol (DHCP), all address information can be assigned automatically.
- If the network does not support DHCP, or if the instrument is set to use alternate TCP/IP configuration, a static IP address is used.

By default, the R&S OSP is configured either to use:

- A dynamic TCP/IP configuration and obtain all address information automatically. This means that it is safe to establish a physical connection to the LAN without any previous R&S OSP configuration.
(Priority 1)
- A user defined static IP address. This address can be defined (but must not) in addition to the default address. See [chapter 3.3.3](#) for information how to configure the user defined IP address via the OSP Panel application.
(Priority 2)
- A static default IP address. Per default, the R&S OSP is set to the IP address 192.168.48.147. See also [chapter 3.1](#).
(Priority 3)

Please note the priorities shown above which is related to IP address handling done by the OSP.

NOTICE

Valid IP addresses

If your network does not support DHCP, or if you choose to disable dynamic TCP/IP configuration, you must assign valid address information before connecting the R&S OSP to the LAN. Contact your network administrator to obtain a valid IP address, because connection errors can affect the entire network.

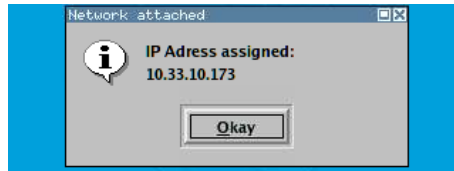
Reading the IP address

When using the dynamic TCP/IP configuration, the actual IP address information will be displayed when booting the R&S OSP. Proceed as follows:

Connect the R&S OSP via a commercial RJ-45 cable to your network supporting DHCP

Switch on the R&S OSP120 with Monitor and Keyboard connected (not applicable to the OSP130)

At the end of the booting process, the IP address will be displayed as shown below for the OSP120 and the OSP130. The values of the IP address shown are only examples.

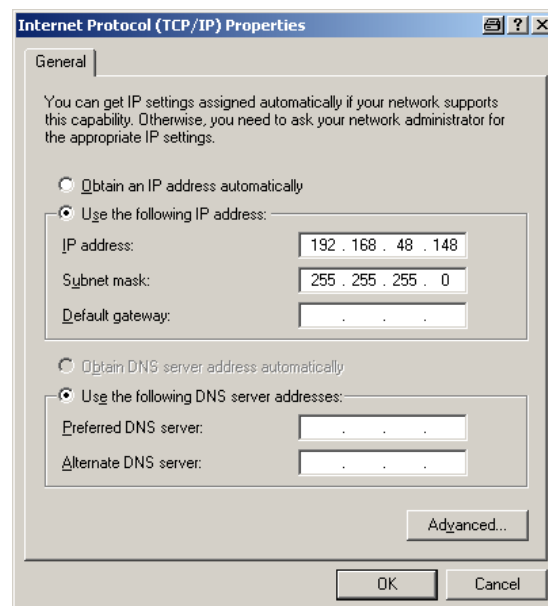


Press Okay button or the ENTER key on the keyboard (OK key for the R&S OSP130) for confirmation and to continue the operation.

Manual TCP/IP configuration

If your network does not support DHCP, proceed as follows:

1. Connect the R&S OSP120 or OSP130 via a cross-over RJ-45 cable to your computer (or network not supporting DHCP).
2. Set the network configuration of your computer to work with a static IP address. The following setup is recommended:



3. Switch on the R&S OSP and wait until boot-up is finished.

The R&S OSP now can be accessed under its default IP address from your computer.

2.9.1.2 Specific mode of LAN Configuration

The R&S OSP120 can be configured to enable gateway routing.

The actual LAN configuration is set to mode -> DHCP-STATIC

The LAN configuration can be setup using the OSP Panel application. See [chapter 3.3.3](#).

The change over to DHCP-STATIC mode is achieved by the following SCPI command:

SYSTem:NETWork:STATic "<IpAddr>","<Netmask>","<Gateway>".

2.9.2 R&S OSP Panel

The R&S OSP120 has no elements for front panel operating. A "manual" operation is achieved via the R&S application OSP Panel.

"OSP Panel" is a Windows application which can be used to access and control the R&S OSP120 or the OSP130 from a remote computer through a LAN connection. The OSP Panel allows full access to all R&S OSP functions.

To start the OSP Panel connection

4. Connect the R&S OSP to a LAN and determine its IP address; see Remote Operation in a LAN. It is necessary to have a VISA library installed on your computer.
5. Install the OSP Panel application on your computer (connected to the LAN). The VISA libraries which are necessary for running the OSP Panel are available on a separate disc (NI-VISA I/O Library)..
6. Start the OSP Panel, specify the correct IP address in the OSP Panel, and the R&S OSP can be manually controlled.

For detailed information about OSP Panel refer to the [chapter 3.3 R&S OSP Panel Functions](#).

2.10 Linux Operating System

The R&S OSP is equipped with a Linux operating system which has been configured according to the instrument's features and needs. Changes in the system configuration can be necessary in order to

- Establish a LAN connection.
- Customize the properties of the keyboard connected to the R&S OSP120.
- Call up additional software tools.

NOTICE

Configuration of the operating system, updates

The operating system is adapted to the R&S OSP. To avoid impairment of instrument functions, only change the settings described in this manual. Existing software must be modified only with update software released by Rohde & Schwarz. Likewise, only programs authorized by Rohde & Schwarz for use on the instrument must be executed.

2.10.1 Keyboard Properties

The keyboard properties can be changed via the console of the Linux Operating System. To customize the keyboard properties, perform the following steps:

7. Switch off the R&S OSP.
8. R&S OSP120: Connect the external monitor and keyboard to the R&S OSP120 and switch on the instrument. The messages of the Linux boot process are displayed on the monitor. Wait until the boot process is finished (takes about 30 seconds) and press the <ENTER> key.
9. R&S OSP130: Connect the external keyboard to the R&S OSP120 and switch on the instrument. Wait until booting is complete. Change from regular display to Linux system login by pressing the keys CTRL + ALT + F3.
10. When asked for the login, use the login name **root** and the password **root**.

To change the keyboard properties to German, type <de> and conform with the <ENTER> key. The keyboard properties will be kept until the instrument is switched off. After booting of the instrument, the default keyboard configuration (English US) is set up again.

2.11 Firmware Update

This chapter contains information on firmware update and Linux operating system update to the R&S OSP120 or OSP130.

NOTICE**Possible impairment of the functioning of the instrument**

The instrument is equipped with the Linux operating system. It is thus possible to install COTS software in the instrument. The use and installation of commercial off-the-shelf (COTS) software may impair the instrument function. For this reason, we recommend that you only execute programs tested by Rohde & Schwarz with regard to their compatibility with the instrument software. In certain cases, the use of these programs can impair the performance of the instrument.

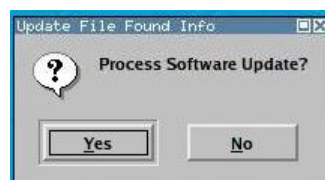
The drivers and programs used in the instrument under Linux have been adapted to the test instrument. Existing instrument software must only be modified with update software released by Rohde & Schwarz.

The firmware update packages for the R&S OSP120 and OSP130 are integrated in a single setup file "OSP<xxx>.rsu" (<xxx> denotes the version of the firmware update). Firmware updates as well as the Release Notes describing the improvements and modifications are provided on the Internet at the download site of the R&S OSP homepage.

The installation of a new firmware version is performed via the USB interface. A de-installation of the old firmware is not necessary. The firmware update is performed while the instrument is running. The new firmware will be loaded right after the update process.

To perform a firmware update, perform the following steps.

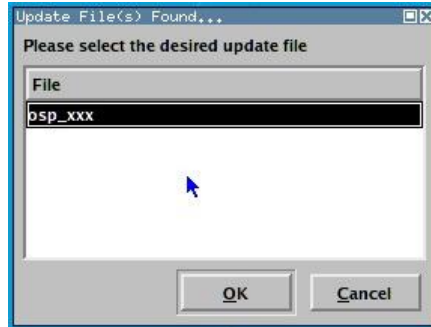
11. The update file has to be downloaded from the Internet to a PC. From there the file should be transferred to a USB flash drive which will later be plugged into the USB interface of the R&S OSP.
12. Connect the external monitor and keyboard to the R&S OSP120 and switch on the instrument. Wait until booting is complete.
13. Connect the USB flash drive to one of the two USB interfaces on the R&S OSP front panel. If the instrument recognizes a flash drive at its USB interface, and finds valid update versions, the Software Update Process is started. Press the Yes button (OK key on OSP130) to continue



All update versions (files with extension .rsu) stored on the flash drive now are offered for selection. Thus, an upgrade or downgrade of the firmware is possible at any time. Select the required firmware update version and press the OK button.

NOTICE

It is recommended not to switch off the instrument or to remove the USB flash drive while the firmware update is running.



If the software update is complete, the USB flash drive has to be removed. A message box is coming up to confirm the removal of the flash drive. After confirmation the instrument starts rebooting.

The R&S OSP is now ready to operate with the new firmware version.

Before using the R&S OSP, repeat the registration process. See [chapter 3.3.2](#) for details.

CAUTION

Firmware Update:

The firmware update is not allowed to be performed running the GUI via Web-Browser and VNC. Doing this will abort the firmware installation procedure!

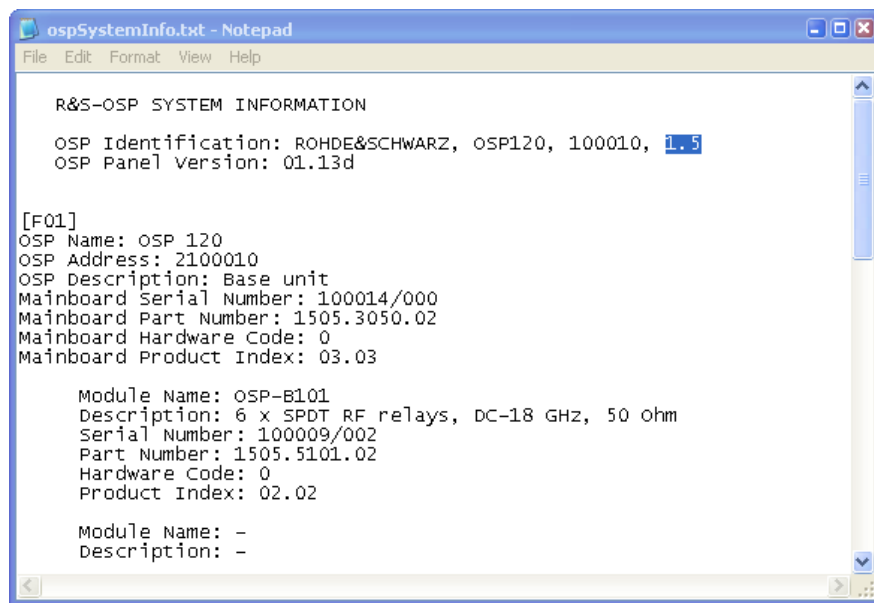
2.12 Read the actual the Firmware Version

The currently installed firmware version of the different R&S OSP units can be read in several ways as described in the following chapters.

2.12.1 Get Firmware Version using R&S OSP Panel

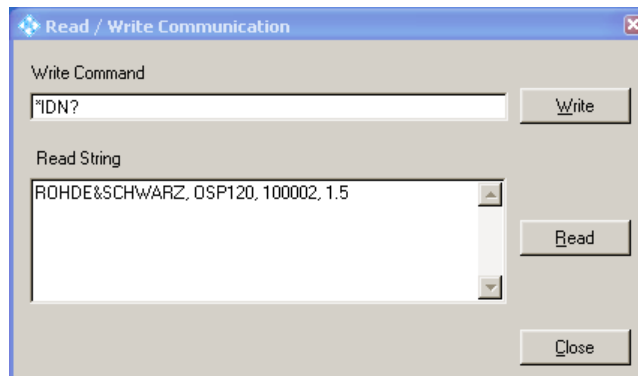
The firmware versions of all OSP models can be read using the application OSP Panel. Start the OSP Panel and select the function >File >System Info.

This function displays the OSP System information together with the actual Firmware version. The Firmware version is shown in the OSP Identification string as highlighted in the following example (Version 1.5).



2.12.2 Get Firmware Version via SCPI Command

In remote mode the current OSP Firmware Version can be read via the “*IDN?” command. When sending the Identification command, the OSP prompts back the following answer (example for OSP120) after pressing the Read button (see below example).



The last part of the string shows the actual firmware version (1.5 for the above example).

With Firmware version 2.51 onwards, the actual version of the OSP is read-out in the configuration string, too.

See below example for OSP120 with Ser. No. 100008 and Var 02:

*Rohde&Schwarz, OSP120, 100008, **Var02**, 2.51*

With Firmware version 2.57 onwards, the firmware version of the OSP is read-out with additional date label.

See below example for OSP120 with Ser. No. 100008, Var 02 and date 2016, June 14th:

*Rohde&Schwarz, OSP120, 100008, **V02**, 2.57.160614*

3 Getting Started

This chapter helps you to get familiar with the R&S OSP and explains how to solve basic tasks that you will frequently encounter when working with the instrument.

You can control the basic switching tasks and define paths with the graphical user interface (GUI). A more comfortable approach is using the separate OSP Panel software. It allows to configure the R&S OSP and to get more information about the device, its modules and relays.

R&S®OSP model	Manual operation ...	Figure / Chapter
R&S OSP120 without display	... with monitor and keyboard (GUI)	Figure 3-1 / Chapter 4 and Chapter 5.3.1
R&S OSP130 with display	... direct control via front display and panel keypad (GUI)	Figure 3-2 / Chapter 4 and Chapter 5.3.1
R&S OSP120 and R&S OSP130	... via Ethernet connection between OSP and laptop/PC (Web-GUI via VNC or OSP Panel)	Figure 3-3 / Chapters 3.1, 3.7.1, 5.3.1 (Web-GUI), 3.2 to 3.3 (OSP Panel)

Since the R&S OSP120 only has remote control capability, the manual operation of the instrument is achieved either via a connected keyboard, mouse and monitor or via the application OSP Panel, which runs on an external computer connected to the same LAN network as the R&S OSP120.

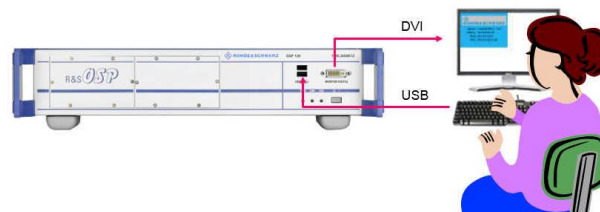


Figure 3-1: Manual operation of R&S OSP120 using GUI

For manual control of the R&S OSP130, you can use the internal display and keypads. As an alternative, you can use a keyboard and mouse, see [Figure 3-2](#).



Figure 3-2: Manual operation of R&S OSP130 using the GUI

Both base units R&S OSP120 and R&S OSP130 can be controlled via LAN interface by Web-GUI (VNC required) or by the application software OSP Panel, [Figure 3-3](#).

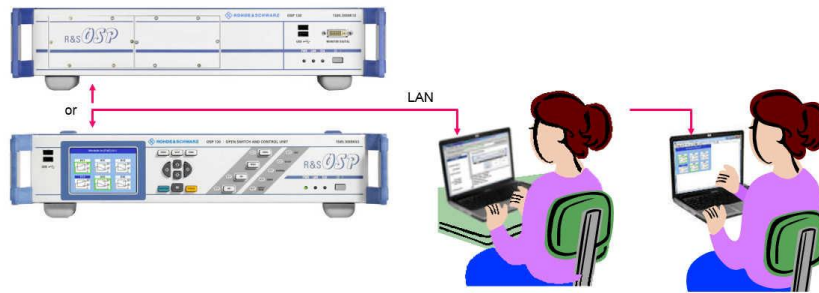


Figure 3-3: Operation of R&S OSP120/130 by OSP Panel software or Web-GUI

Chapter 3.2 gives a short overview on the OSP Panel operation via LAN:

- Installing the R&S OSP Panel
- R&S OSP Panel Functions
- Sample Session

CAUTION

Risk of shock hazard and instrument damage

Before starting any measurement on your R&S OSP, please note the instructions given in chapter 2 Preparing for Use.

In chapter 4, Manual Operation, you find information on customizing the instrument according to your personal preferences.

The operating manual also provides information on typical applications of the R&S OSP platform.

In the following, we assume that you are familiar with standard Windows dialogs and mouse operation.

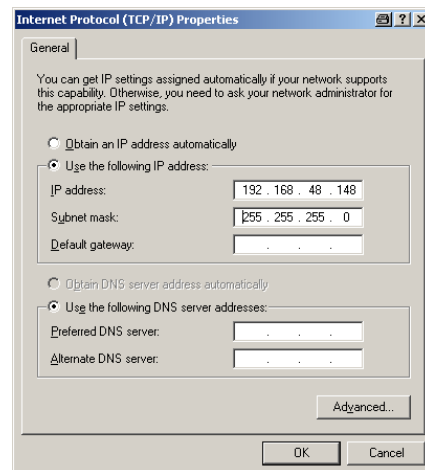
3.1 Connecting R&S OSP and PC

Please read chapter 2.9.1 for understanding the possibilities of IP address assignments. The following setup describes the connection of the R&S OSP120 or R&S OSP130 within a dedicated network; i.e. the connection to a single computer, in case you are not using the dynamic TCP/IP configuration (DHCP).

When using the dynamic TCP/IP configuration (DHCP), these steps are not required.

To set up a LAN connection, proceed as follows:

- Connect the R&S OSP to the computer using a cross-over RJ-45 cable: Ensure that the network configuration of the computer is set to the required protocol. Select >Settings >Control Panel >Network Connections. Select the properties of the active interface, then the properties of the TCP/IP protocol, and set the following IP address:



- The R&S OSP is configured by default to IP address **192.168.48.147**. This address is to be entered in the OSP Panel application when using the examples described in the following chapters.

When a static IP address other than the default address is required, it can be changed using the OSP Panel. See [chapter 3.3.3](#) for detailed information.

3.2 Installing the R&S OSP Panel

The OSP Panel installation setup is available on CD which is part of the R&S OSP delivery.

The installation setup includes the VISA libraries which are necessary for running the OSP Panel.

To install the application, proceed as follows:

- Insert the documentation CD on the disk drive of your computer.
- Select the directory "OSP Panel" on the CD, select the file setup.exe and press the <ENTER> button to start the installation.
- If the installation is complete, confirm and exit the installation program.

3.3 R&S OSP Panel Functions

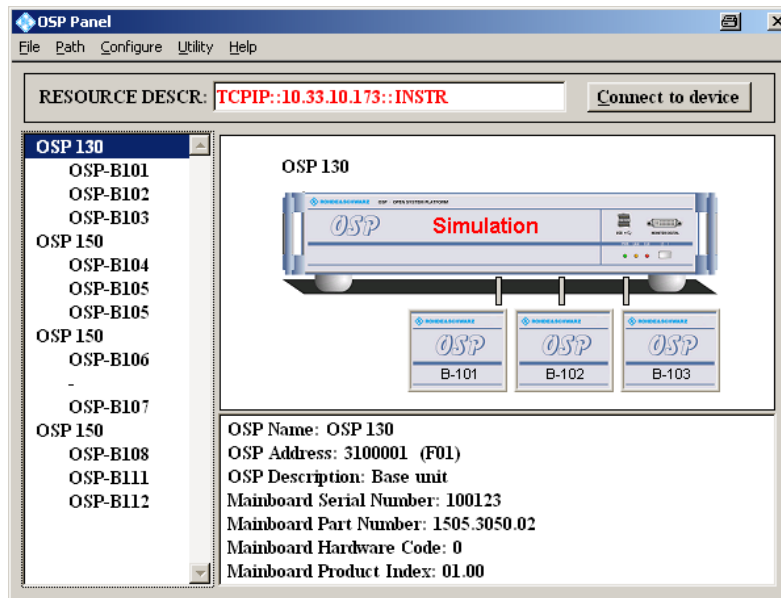
The following sections can help you to make efficient use of the OSP Panel, which is the application for manual control of the R&S OSP120 and may also be used in connection with the R&S OSP130. The OSP Panel offers the following features:

- Configuration of the IP address
- Dialogs to control the different options configured in the R&S OSP
- Definition of path configurations
- Direct access to SCPI commands

The following examples are based on the assumption that the IP address has been obtained dynamically to be 10.33.10.173.

3.3.1 Configuring/Connecting R&S OSP Panel

When starting the OSP Panel, no instrument is connected via LAN network. The OSP Panel is in simulation mode and the following dialog appears:



The R&S OSP remains in simulation mode as long as no connection to an instrument via LAN is performed.

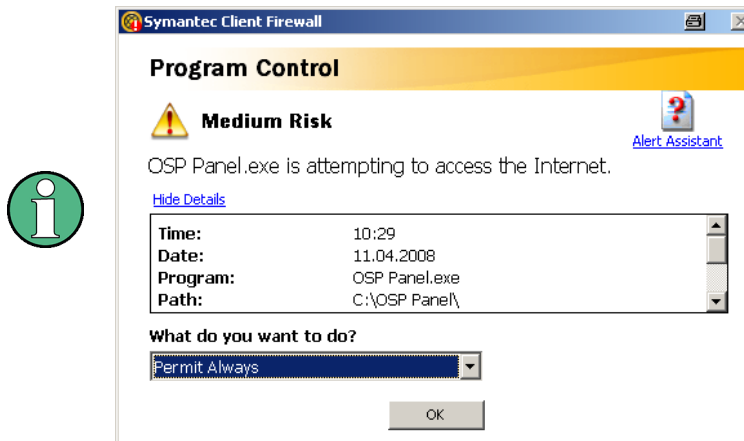
To connect an R&S OSP via LAN, perform the following steps:

14. Get the actual IP address as described in [chapter 3.1](#) and enter the address in the input field RESOURCE DESCR.

Connect to device

15. Press the "Connect to device" button at the upper right corner of the OSP Panel dialog to connect the instrument.

If your computer is equipped with a firewall function, it may be necessary to allow the firewall to unlock the OSP Panel. Here is an example of such a firewall message:

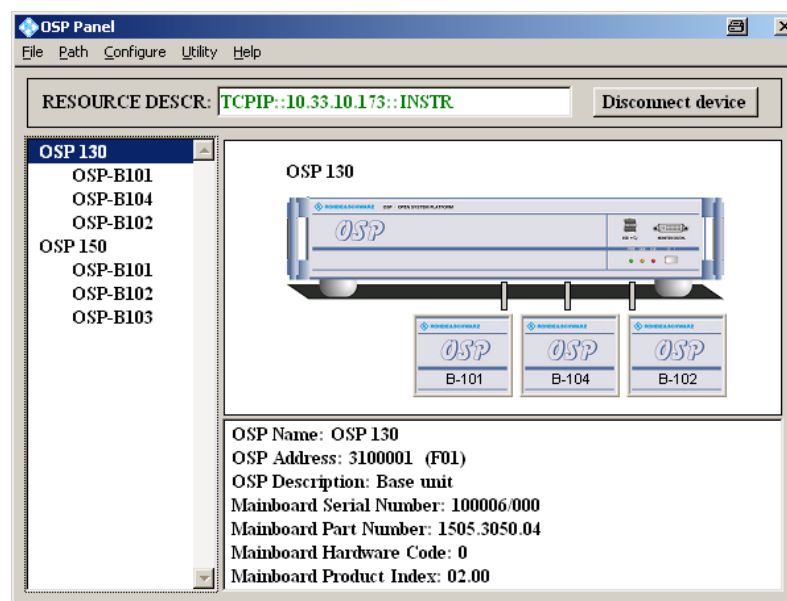


It is recommended to allow free access to Internet for the OSP Panel.

If the LAN connection is established, the R&S OSP device found on the LAN network is displayed in the left field together with the installed options.

Note that it is necessary to register the R&S OSP once, if the instrument is switched on for the first time or if the configuration has changed or if a firmware update has been made. See [chapter 3.3.3](#) for further information. See also in the operating manual for actions related to extensions with an OSP150.

In the below example, an R&S OSP130 Device is found on the network which is equipped with three modules R&S OSP-B101, R&S OSP-B104 and R&S OSP-B102. Furthermore, to this device an R&S OSP150 is connected which is equipped with three modules R&S OSP-B101, R&S OSP-B102 and R&S OSP-B103.



3.3.2 Addressing R&S OSP Device

Select the R&S OSP device in the left field of the OSP Panel dialog.

In the lower right field of the OSP Panel dialog additional information on the R&S OSP is displayed as follows:

OSP Name: OSP 130
 OSP Address: 3100001 (F01)
 OSP Description: Base unit
 Mainboard Serial Number: 100006/000
 Mainboard Part Number: 1505.3050.04
 Mainboard Hardware Code: 0
 Mainboard Product Index: 02.00

OSP Name	Shows the model of the OSP; i.e. OSP130
OSP address	<p>The device address is read back from the OSP flash memory. The first OSP device (the device which can be addressed via LAN interface) in a system is preferably defined as Device F01.</p> <p>The R&S OSP address is composed out of the R&S OSP version (last digit of the R&S OSP Ident Number) and the R&S OSP serial number (6 digit number):</p> <p>Version: xxxx.xxxxK03</p> <p>Serial Number: 100001</p> <p>The above example results in R&S OSP address → 3100001</p>
OSP Description	Base unit (OSP120, OSP130) or Extension unit (OSP150)
Mainboard Serial Number:	The serial number read back from the R&S OSP Mainboard is displayed.
Mainboard Part Number	The part number read back from the R&S OSP Mainboard is displayed.
Mainboard Hardware Code	The hardware code read back from the R&S OSP Mainboard is displayed.
Mainboard Product Index	The product index read back from the R&S OSP Mainboard is displayed.

OSP device

Note that no functions can be set selecting the R&S OSP Device. For the R&S OSP Device only the additional information as listed above can be read.



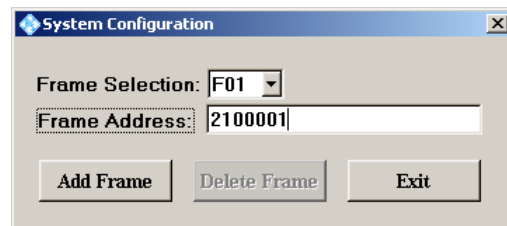
OSP address

If an R&S OSP is set up for the first time, it is necessary to register the R&S OSP address once. Otherwise it may happen that the R&S OSP is correctly detected but no modules are indicated.

To register the R&S OSP proceed as follows:

16. Connect the instrument via LAN with the computer, where the OSP Panel is running (see [chapter 3.3.1](#))
17. Start the OSP Panel, set the correct IP address, and select Connect to device.
18. Select **>Configure >System** in the OSP Panel.

The following dialog allows to register the R&S OSP:



The OSP device which is connected to the LAN network is recommended to be defined as device F01 indicating the first OSP device connected with this IP address. Up to 9 instruments can be connected to the same IP address. They are distinguished by different frame numbers from F01 to F09.

Frame Selection: F01

19. Use the drop-down list to set the device number to F01.

Frame Address: 2100001

20. Type in the device address

The OSP address is composed out of the OSP version (last digit of the OSP part number) and the OSP serial number (6 digit number): The information of the OSP version and the serial number can be found on the serial number label above the mains switch on the OSP's rear side:

Frame Selection: F01

Use the drop-down list to set the device number to F01.



Version (OSP120): xxxx.xxxxK02

Serial Number: 100001

The above example results in OSP address → 2100001

Add Frame

21. Pressing the Add Frame button sends a corresponding command to the R&S OSP and the information is stored on the OSP flash memory.

The next time the OSP Panel is started and connected to the R&S OSP, the correct device information is read back from the OSP flash memory and all available R&S OSP modules are listed correctly.

Configuration changes



Whenever the configuration has changed by adding or removing OSP150 extension units, you must repeat registration. For this purpose, remove all frames except the first one (F01), and insert them if required as new ones.

See also in the operating manual for extensions with an OSP150.

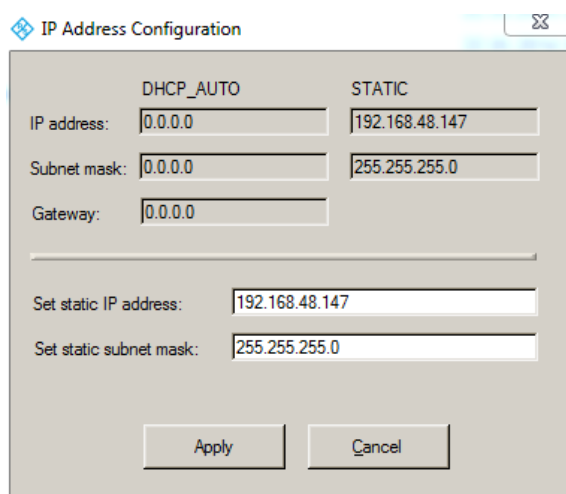
3.3.3 Changing the IP address with R&S OSP Panel

The OSP Panel supports the setting of the user defineable static IP address. Please note that this function is supported in OSP Panel version 2.00 onwards. Depending on the two possibilities of the LAN configuration mode with the OSP, the following menus are offered .

3.3.3.1 LAN configuration mode DHCP_AUTO

See [chapter 2.9.1.1](#) for more information on the LAN configuration mode.

Select the menu function >Configure >TCPIP and the following dialog is opened:



The dialog box is titled "IP Address Configuration" and contains two tabs: "DHCP_AUTO" and "STATIC". The "DHCP_AUTO" tab is selected. It has three input fields: "IP address:" with value "0.0.0.0", "Subnet mask:" with value "0.0.0.0", and "Gateway:" with value "0.0.0.0". Below these is a horizontal separator line. Under the separator, there are two more input fields: "Set static IP address:" with value "192.168.48.147" and "Set static subnet mask:" with value "255.255.255.0". At the bottom are two buttons: "Apply" and "Cancel".

The upper half of the dialog shows the last used DHCP address and the actual static IP address.

A new user defined static IP address can be entered together with a subnet mask.

Changing of IP address



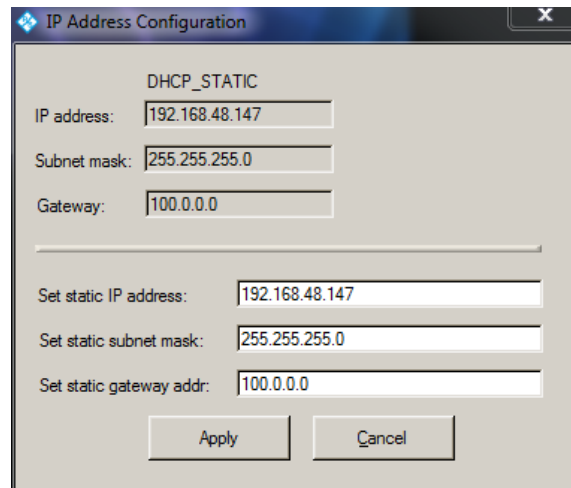
Whenever the IP address is changed via the OSP Panel and the previous one was used for OSP Panel communication, you must disconnect the OSP Panel, change the address in the OSP Panel menu and connect to the device again.

The OSP Panel outputs a corresponding message to the operator when changing the static IP address.

3.3.3.2 LAN configuration mode DHCP_STATIC

See [chapter 2.9.1.2](#) for more information on the LAN configuration mode.

Select the menu function >Configure >TCPIP and the following dialog is opened:

The image shows a dialog box titled "IP Address Configuration". At the top, it says "DHCP_STATIC". Below this, there are three input fields: "IP address:" with the value "192.168.48.147", "Subnet mask:" with the value "255.255.255.0", and "Gateway:" with the value "100.0.0.0". Below these fields is a horizontal separator line. Under the line, there are three more input fields: "Set static IP address:" with the value "192.168.48.147", "Set static subnet mask:" with the value "255.255.255.0", and "Set static gateway addr:" with the value "100.0.0.0". At the bottom of the dialog are two buttons: "Apply" and "Cancel".

The menu allows to specify the static address together with the gateway address.

3.3.4 General Actions of R&S OSP Panel

There are several general actions which can be done from the OSP Panel.

With the menu function >Configure >Reset all switches in the connected R&S OSP are set to their default positions.

The functions >Configure >Select all Switches and >Configure >Deselect all Switches define the starting point when collecting the settings for a path configuration. See [chapter 3.4](#) for more details.

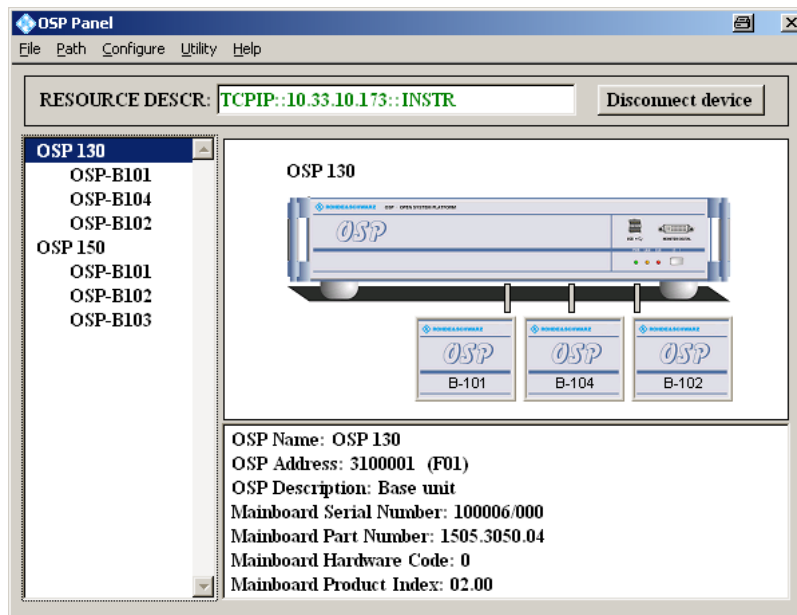
The menu function >Utility > Re-Initialize Frames and Modules will re-establish the communication link between the R&S OSP and its modules as well as to all extension units OSP150. Switch settings are not changed.

Other actions are described in the various parts of [chapters 3.3 to 3.5](#).

3.3.5 Addressing R&S OSP Modules

If the OSP Device is correctly registered (see previous chapter), all R&S OSP modules available are displayed in the OSP Panel dialog. To control the R&S OSP modules, the following ways are possible:

22. Select the required module displayed in the left field of the OSP Panel dialog.
or
23. Select the diagram of the required module in the upper right field of the OSP Panel dialog.



By double-clicking the required R&S OSP module, a window is opened which shows all the setup functions available for the selected module. The title line of that window also indicates the slot where this module is placed, or both slots if the module has double width (see also [chapter 5.1.2](#)). See the following chapters for the dialogs of the different R&S OSP modules.



R&S OSP module configuration

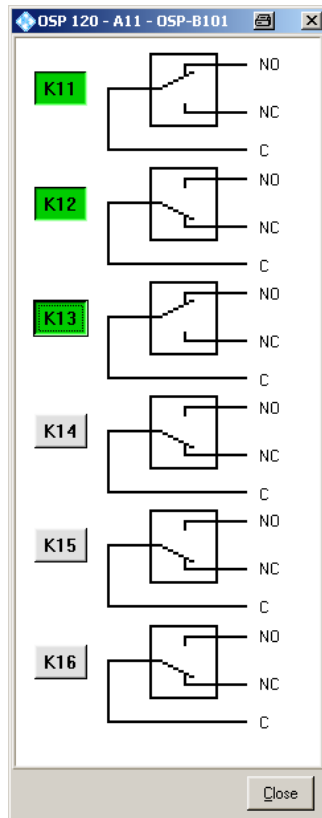
If modules are configured in the R&S OSP but no modules are detected by the OSP Panel (indicated in blue), please check that the R&S OSP device is registered correctly. Refer to [chapter 3.3.2](#) to register the R&S OSP device.

3.3.6 Controlling the R&S OSP-B101/-B106/-B107/-B111/-B127/-B132

The module R&S OSP-B101 contains six RF switches of SPDT type.

After selection of the R&S OSP-B101 module the following dialog is opened.

The module R&S OSP-B101 contains six RF switches of SPDT type, which is shown in the OSP-B101 dialog.



Clicking to the symbol of the relay, the position of each relay can be toggled individually.



SPDT switch

Note that the terminal NC assigns the Normally Closed position. When the relay is not activated, terminal NC is connected to terminal C.

The terminal NO is the Normally Open position. If the relay is activated, the terminal NO is connected to terminal C.

The buttons K11 up to K16 are not required for manual operation of the switches, but for defining a path configuration.

K12

Any button K11 up to K16 in grey color indicates that this relay is not selected. A non selected relay is not considered when defining a path configuration.

K11

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the relay buttons required. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are

taken over into a path configuration.

Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.

Relay configuration



OSP-B101 dialog

When the dialog for operation of the R&S OSP-B101 module is opened, the actual relay setting of this module is read back from the hardware and displayed.

The dialog as described above applies to further options of the R&S OSP as far as the option has got a similar relay configuration. It will apply to the following modules:

Option	Relay configuration
OSP-B106	3 x SPDT relay with N connectors, 12 GHz, 3 x SPDT relays with BNC connectors, 900 MHz / 2 A
OSP-B107	6 x SPDT relay, solid state, 6 GHz
OSP-B111	6 x SPDT relay, 40 GHz
OSP-B111UL	3 or 6 x SPDT relay, 50 GHz
OSP-B111VL	3 or 6 x SPDT relay, 67 GHz
OSP-B127	6 x SPDT relay, solid state, terminated, 10 GHz
OSP-B132	6 x SPDT relay with N connectors, 12 GHz



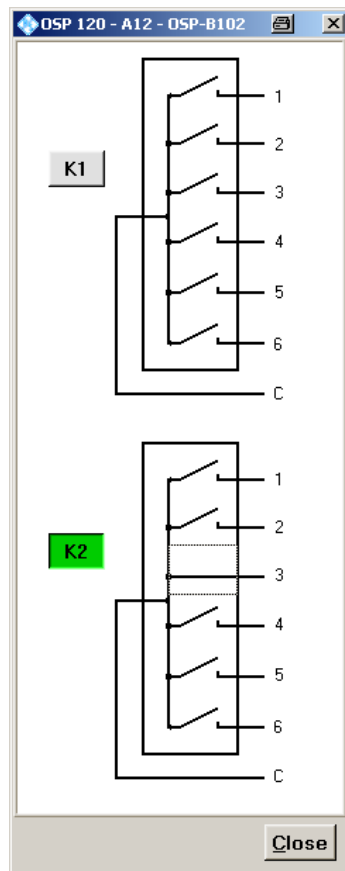
Relay numbering

Please note that for the module OSP-B106 the relays are numbered from K1 to K6 but from K11 to K16 for all other modules.

3.3.7 Controlling the R&S OSP-B102/-B112/-B128

After selection of the R&S OSP-B102 module the following dialog is opened.

The module R&S OSP-B102 contains two RF switches of SP6T type, which is shown in the OSP-B102 dialog.



Clicking on any of the six positions of the two relays, this relay will switch to the associated terminal. Clicking on a closed position will open it and reset this relay.



SP6T switch

Note that for this type of relay only one terminal (1 of 6) can be activated at the same time. If no terminal is activated, the relay is in open position.

The buttons K1 and K2 are not required for manual operation of the switches, but for defining a path configuration (see [chapter 3.4](#)).

K1

A button K1 and/or K2 in grey color indicates that this relay is not selected. A non selected relay is not considered when defining a path configuration.

K2

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the relay buttons required. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are taken over into a path configuration.

- Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.



OSP-B102 dialog

When the dialog for operation of the R&S OSP-B102 module is opened, the actual relay setting of this module is read back from the hardware and displayed.

The dialog as described above applies to further options of the R&S OSP as far as the option has got the same relay configuration. It will apply to the following modules:

Option	Relay configuration
OSP-B112	2 x SP6T relay, 40 GHz
OSP-B128	Up 3 x SP6T relay, solid state, terminated, 10 GHz
OSP-B122H	1x SP6T relay, terminated, 40 GHz
OSP-B133	1x SP6T relay, N-connectors, 12.4 GHz

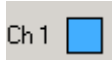
3.3.8 Controlling the R&S OSP-B103/-B158

After selection of the R&S OSP-B103 or the R&S OSP-B158 module the following dialog is opened.

The module R&S OSP-B103 contains two parallel ports, one with 16 output lines and one with 16 input lines. The OSP-B103 dialog shows both ports:

3.3.8.1 Setting the Output Pattern

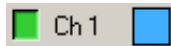
Clicking on one of the channel buttons in the output pattern field, the status of the output channel can be changed.



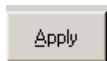
24. An output channel marked in blue color indicates that the output channel is switched to low level (GND). Switching is performed on an active low signal, therefore the blue color indicates the active state.



25. An output channel marked in white color indicates, that the output channel is in high impedance state. This is also the default after reset.



26. To take over particular channels of the output port into the path configuration, the button left to the channels of the output pattern must be selected by clicking on each button of the required outputs. The selected output channel is displayed in green color. All output ports with selected (green) buttons are taken over into a path configuration.



27. Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.
28. Pressing this button sets the OPS-B103 outputs to the defined output pattern.
29. The actual setting of the R&S OSP-B103 outputs now is displayed in the output pattern field (Ch1 to Ch16).
30. The hexadecimal representation of the output pattern is displayed in the OSP-B103 dialog, too. Ch1 corresponds to the lowest bit, having the value 1, whereas Ch16 is the highest bit, having the value 8000.

OSP-B103 dialog



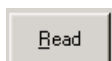
When the dialog for operation of the R&S OSP-B103 module is opened, the actual output pattern setting of this module is read back from the hardware and displayed.

I/O ports

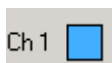
Note that for I/O ports the hardware specification must be observed when connecting external equipment. Refer to the operating manual for further information.

3.3.8.2 Reading the Input Pattern

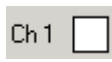
The input pattern of the R&S OSP-B103 can be read by one click.



31. Pressing this button reads the input pattern of the OPS-B103
The status of each input now is displayed in the input pattern field (Ch1 to Ch16).
The hexadecimal representation of the input pattern is displayed in the OSP-B103 dialog, too. Ch1 corresponds to the lowest bit, having the value 1, whereas Ch16 is the highest bit, having the value 8000.



32. An input channel marked in blue color indicates that the input channel reads high level.



33. An input channel marked in white color indicates that the input channel reads low level.



OSP-B103 dialog

When the dialog for operation of the R&S OSP-B103 module is opened, the actual input pattern of this module is read back from the hardware and displayed.

The module R&S OSP-B158 is similar to the R&S OSP-B103 module. For controlling this module, see [chapter 3.3.8](#).

The R&S OSP-B158 module contains a checkbox *Display AU600 panel design*. After selecting the checkbox, the user is prompted to close the actual panel and to open it again. After opening the OSP-B158 panel again, a special interface for controlling the AU600 antenna system appears.

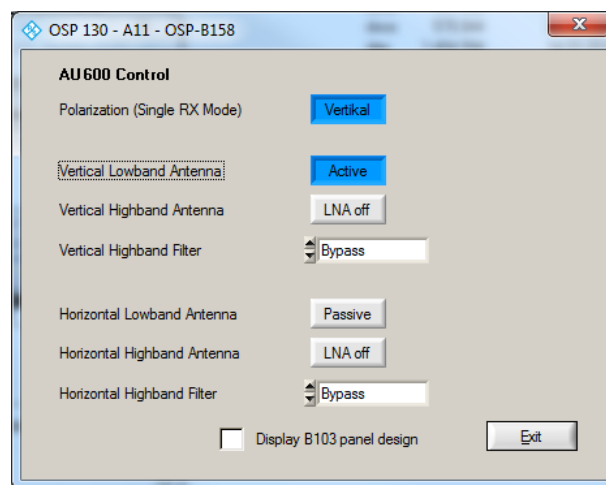


Figure 3-4: AU600 panel design



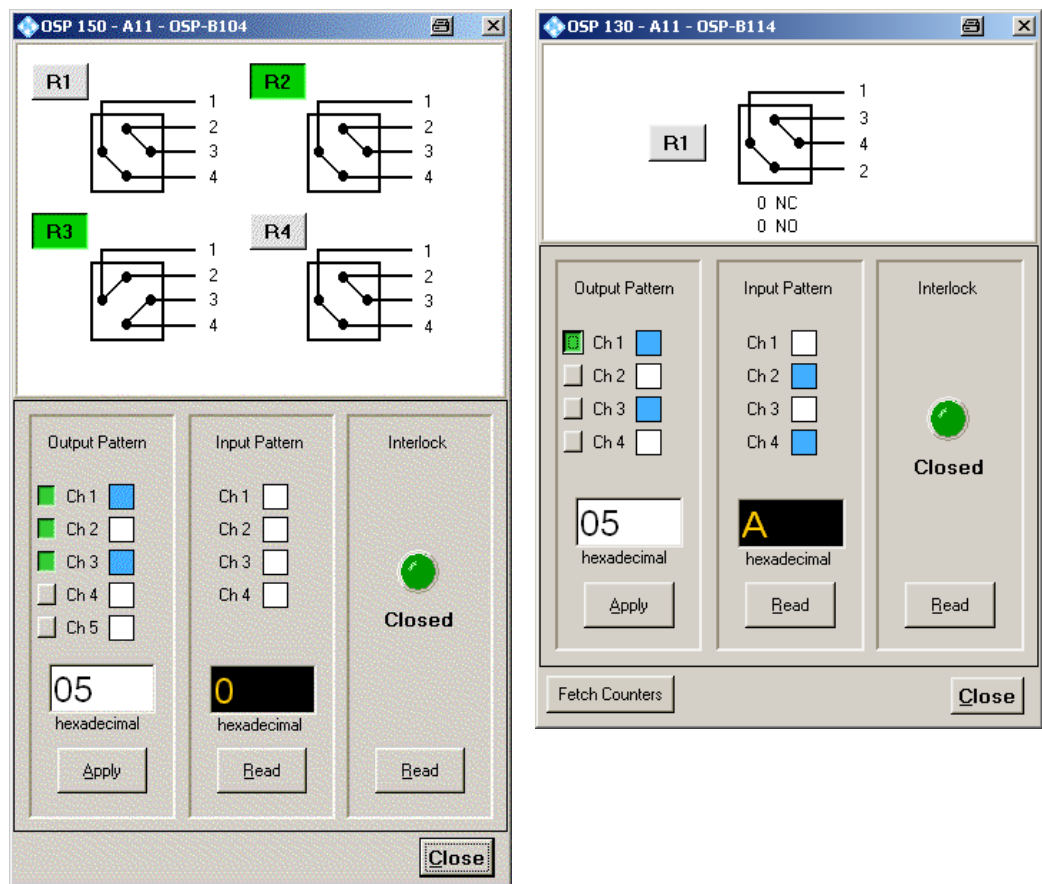
AU600 panel design

The special AU600 panel design is explained in detail in the R&S AU600 manual.

3.3.9 Controlling the R&S OSP-B104/-B114

After selection of the R&S OSP-B104 module the following dialog is opened.

The module R&S OSP-B104 contains control for up to four external power relays. Furthermore, five output lines and four input lines of I/O ports are available, and there is some specific interlock functionality. The OSP-B104 dialog shows all these elements:



See also in the operating manual for a detailed description of the interface.

The module R&S OSP-B114 only contains one built-in DPDT relay and offers four output lines. The other functions are the same as for the OSP-B104 module.

3.3.9.1 Setting the Transfer Relays

Clicking to the symbol of the relay, the position of each relay can be toggled individually. In one position the connections are made between connectors 1 and 2 and between 3 and 4. In the other position the connections are made between connectors 1 and 4 and between 2 and 3.

The buttons R1 up to R4 are not required for manual operation of the switches, but for defining a path configuration (see [chapter 3.4](#)).

R1

Any button R1 up to R4 in grey color indicates that this relay is not selected. A non selected relay is not considered when defining a path configuration.

R2

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the relay buttons required. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are taken over into a path configuration.

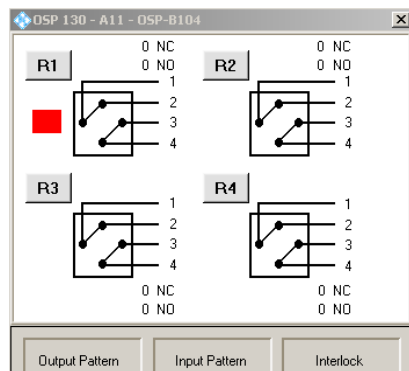
Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.

OSP-B104/-B114 dialog



When the dialog for operation of the R&S OSP-B104 module is opened, the actual relay setting of this module is read back from the hardware and displayed. The information from the relay status is used, therefore also manual operation of the relay is recognized.

As mentioned above, the actual status of the relays is read back from the relays itself via an additional contact (position contact). If this contact is not wired or does not close, the “faulty” status of a relay is marked by a red field at the relay number concerned. See following example.



OSP-B104 relay status / delay time

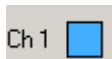


The LAN configuration can be setup using the OSP Panel application. Seeback of the relay status on the OSP-B104 fails and is marked by a red field, the relay position contact and/or cabling needs to be checked.

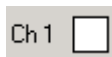
Note that the OSP-B104 relay delay time must be set in accordance to the relay data specification. If the delay time is too short, the relay status also may be shown as faulty. See [chapter 5.2.4](#) for further information on the relay delay time.

3.3.9.2 Setting the Output Pattern

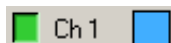
Clicking on one of the channel buttons in the output pattern field, the status of the output channel can be changed.



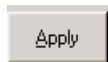
An output channel marked in blue color indicates that the output channel is switched to low level (GND). Switching is performed on an active low signal, therefore the blue color indicates the active state.



An output channel marked in white color indicates, that the output channel is in high impedance state. This is also the default after reset.



To take over particular channels of the output port into the path configuration, the button left to the channels of the output pattern must be selected by clicking on each button of the required outputs. The selected output channel is displayed in green color. All output ports with selected (green) buttons are taken over into a path configuration. Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.



Pressing this button sets the OPS-B104 outputs to the defined output pattern. The actual setting of the R&S OSP-B104 outputs now is displayed in the output pattern field (Ch1 to Ch5).

The hexadecimal representation of the output pattern is displayed in the OSP-B105 dialog, too. Ch1 corresponds to the lowest bit, having the value 1, whereas Ch5 is the highest bit, having the value 10.



OSP-B104/-B114 dialog

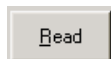
When the dialog for operation of the R&S OSP-B104 module is opened, the actual output pattern setting of this module is read back from the hardware and displayed.

I/O ports

Note that for I/O ports the hardware specification must be observed when connecting external equipment. Refer to the operating manual for further information.

3.3.9.3 Reading the Input Pattern

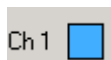
The input pattern of the R&S OSP-B104/-B114 can be read by one click.



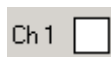
34. Pressing this button reads the input pattern of the OPS-B104

The status of each input now is displayed in the input pattern field (Ch1 to Ch4).

The hexadecimal representation of the input pattern is displayed in the OSP-B104 dialog, too. Ch1 corresponds to the lowest bit, having the value 1, whereas Ch4 is the highest bit, having the value 8.



35. An input channel marked in blue color indicates that the input channel reads high level.



36. An input channel marked in white color indicates that the input channel reads low level.

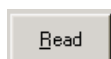


OSP-B104/-B114 dialog

When the dialog for operation of the R&S OSP-B104 module is opened, the actual input pattern of this module is read back from the hardware and displayed.

3.3.9.4 Reading the Interlock State

The interlock state of the R&S OSP-B104 can be read by one click.



Pressing this button reads the interlock state of the OPS-B104

The status of the interlock, i.e. if there is a connection between pins 7 and 15 of the IN / OUT connector, is indicated. A green signal shows a closed interlock, a red signal an open interlock. If the interlock is closed, a relay also closes a contact between pins 8 and 14 of the IN / OUT connector.



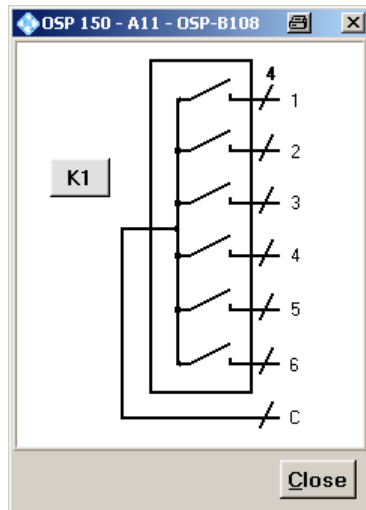
OSP-B104/-B114 dialog

When the dialog for operation of the R&S OSP-B104 module is opened, the actual interlock status is read back from the hardware and displayed.

3.3.10 Controlling the R&S OSP-B108

After selection of the R&S OSP-B108 module the following dialog is opened.

The module R&S OSP-B108 contains one switches of 4P6T type, which is shown in the OSP-B108 dialog.



Clicking on any of the six positions this relay will switch to the associated terminal. Clicking on a closed position will open it and reset this relay.



4P6T switch

Note that for this type of relay only one terminal (1 of 6) can be activated at the same time. If no terminal is activated, the relay is in open position.

The buttons K1 is not required for manual operation of the switches, but for defining a path configuration (see [chapter 3.4](#)).

K1

A button K1 and/or K2 in grey color indicates that this relay is not selected. A non selected relay is not considered when defining a path configuration.

K1

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the relay buttons required. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are taken over into a path configuration.

Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.



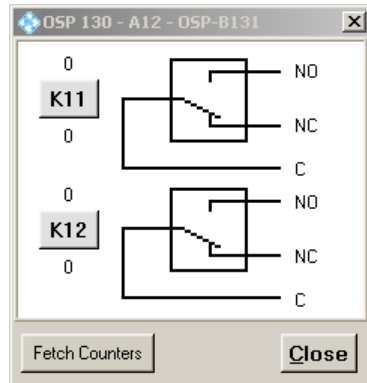
OSP-B108 dialog

When the dialog for operation of the R&S OSP-B108 module is opened, the actual relay setting of this module is read back from the hardware and displayed.

3.3.11 Controlling the R&S OSP-B131

After selection of the R&S OSP-B131 module the following dialog is opened.

The module R&S OSP-B131 contains two SPDT relays.



Clicking to the symbol of the relay, the position of each relay can be toggled individually.

SPDT switch



Note that the terminal NC assigns the Normally Closed position. When the relay is not activated, terminal NC is connected to terminal C.

The terminal NO is the Normally Open position. If the relay is activated, the terminal NO is connected to terminal C.

The buttons K11 and K12 are not required for manual operation of the switches, but for defining a path configuration (see [chapter 3.4](#)).

K12

Any button K11 and/or K12 in grey color indicates that this relay is not selected. A non selected relay is not considered when defining a path configuration.

K11

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the relay buttons required. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are taken over into a path configuration.

Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.

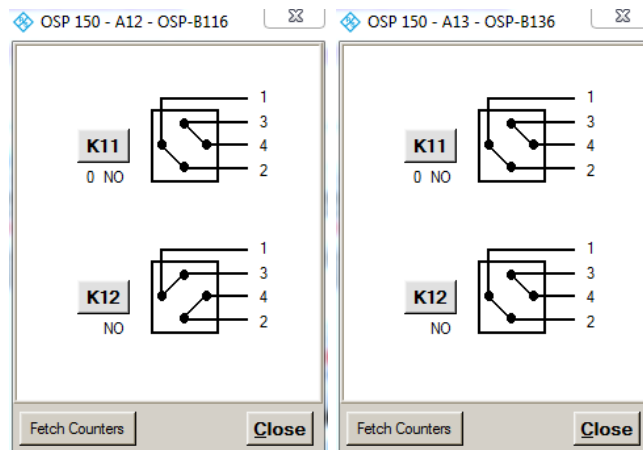


OSP-B131 dialog

When the dialog for operation of the R&S OSP-B131 module is opened, the actual relay setting of this module is read back from the hardware and displayed.

3.3.12 Controlling the R&S OSP-B116/-B136

After selection of the R&S OSP-B116 and OSP-B136 module, respectively, one of the following dialogs is opened.



The modules R&S OSP-B116 and OSP-B136 contain two DPDT relays.

Clicking to the symbol of the relay, the position of each relay can be toggled individually.

DPDT switch



When the relay is not activated, terminals 1 - 2 and 3 - 4 are connected. This is the reset (power on) condition as well. If the relay is activated, the terminal 1 - 3 and 2 - 4 are connected.

The buttons K11 and K12 are not required for manual operation of the switches, but for defining a path configuration (see [chapter 3.4](#)).

K12

Any button K11 and/or K12 in grey color indicates that this relay is not selected. A non selected relay is not considered when defining a path configuration.

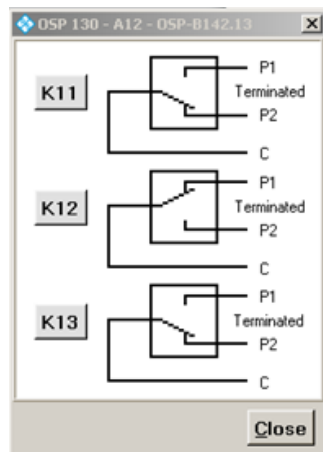
K11

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the relay buttons required. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are taken over into a path configuration.

Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.

3.3.13 Controlling the R&S OSP-B142

After selection of the R&S OSP-B142 module the following dialog is opened.



The module R&S OSP-B142 contains a maximum of three SPDT relays.

Clicking to the symbol of the relay, the position of each relay can be toggled individually.

SPDT switch



When the relay is not activated, port C is connected to port P2. This is the reset (power on) condition as well. When the relay is activated, port C is connected to port P1.

The buttons K11, K12 and K13 are not required for manual operation of the switches, but for defining a path configuration (see [chapter 3.4](#)).

K12

Any button K11, K12 or K13 in grey color indicates that this relay is not selected. A non-selected relay is not considered when defining a path configuration.

K11

To take over particular relays into the path configuration, the relay buttons must be selected by clicking on each of the required relay buttons. The selected relay is displayed with a button in green color. All relays whose relay buttons are selected are taken over into a path configuration.

Pressing the Shift key while clicking on a relay button will toggle between selecting all relays of this module and deselecting all of them.

3.4 Path Configuration

A very comfortable way to define the different switching paths required in a test setup or in a system is the R&S OSP feature “path configuration”. This utility allows to combine several relay positions of different R&S OSP modules in one path information. The path can be named with a suitable name. If path switching is required, only the path configuration is called by its name and the switching is performed more or less by a single command.

The advantage to make use of the OSP path configuration utility is:

The switching is called by logical name from the external application (for example EMC32 software). Using the logical name, the external application does not need to know the R&S OSP hardware configuration.

If the hardware configuration changes, it is sufficient to adapt the path configuration inside the R&S OSP. The external application does not need to be changed.

Choosing a default selection



To obtain the correct switching for a new path configuration, it is recommended to start with a well-defined default selection. There are two possibilities:

If the number of switches to be included in a path is rather small, it is recommended to deselect all switches. This is done by >Configure >Deselect all Switches.

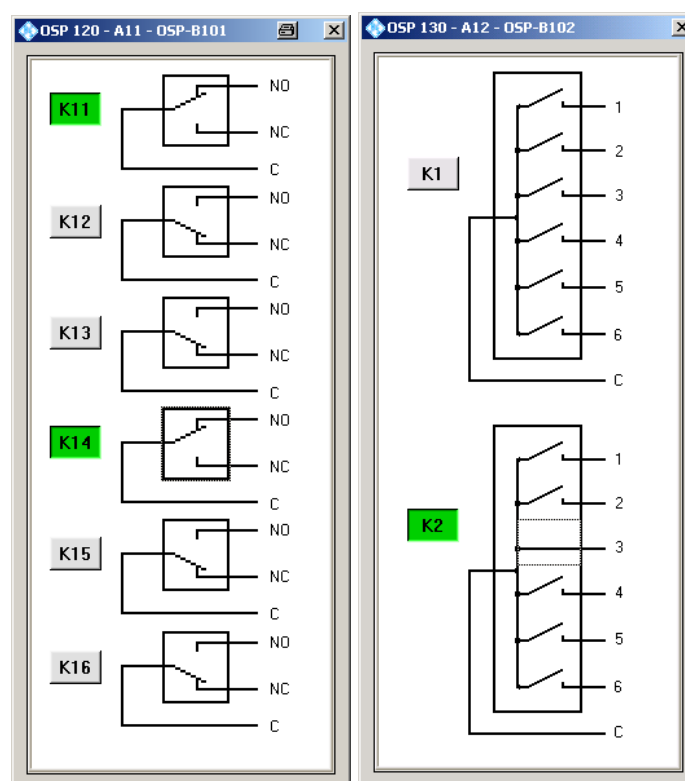
If the number of switches is rather large, use >Configure >Select all Switches instead. Don't forget to select / deselect all switches which are not correctly selected by this default selection.

3.4.1 Save a Path

The path configuration is supported by the OSP Panel application. Refer to [chapters 3.2 and 3.3](#) for the installation and operation of the OSP Panel.

To have a defined condition for the path switching, it is recommended to start with the R&S OSP in Reset condition.

A path configuration may consist out of several relays located on different R&S OSP modules. Please note that the relay buttons in the corresponding dialogs must be selected for all relays which should be taken over in the path configuration.

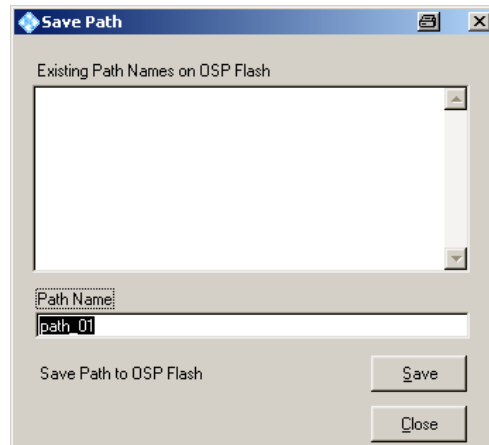


In the above example, the relays K11 and K14 from module R&S OSP-B101 and the relay K2 from module R&S OSP-B102 will be saved as a path.

To define and save the path, proceed as follows:

37. Select >Path >Save Path ... in the OSP Panel.

The following dialog will appear:

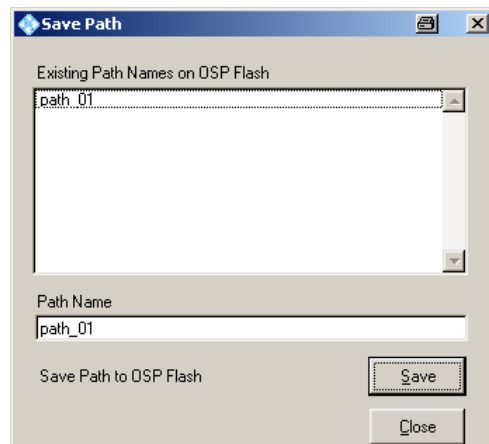


The path configuration is named by default to “path_01”. A new name for the path configuration can be entered by overwriting the default name.

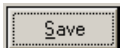


Path Name

The path name is limited to a maximum of 49 characters. OSP Panel does not allow to enter a longer name.



38. Pressing the button Save saves the path in the flash memory of the R&S OSP. The upper data field shows the existing paths which already are stored in the R&S OSP flash memory.



3. Takes over the actual switching into the path and stores the path in the R&S OSP.



Invalid path configurations

When changing the hardware configuration of an OSP it may happen that a previously stored path no longer is applicable. For example, moving a module to a neighboring

position and leaving the previous position empty will make all references to this slot invalid.

Whenever the OSP Panel encounters such an invalid path, it will display some warning message, and in addition the path name will be displayed in blue, giving some bare information about the included switches.



Number of Paths

At least 60 paths can be stored on an R&S OSP.

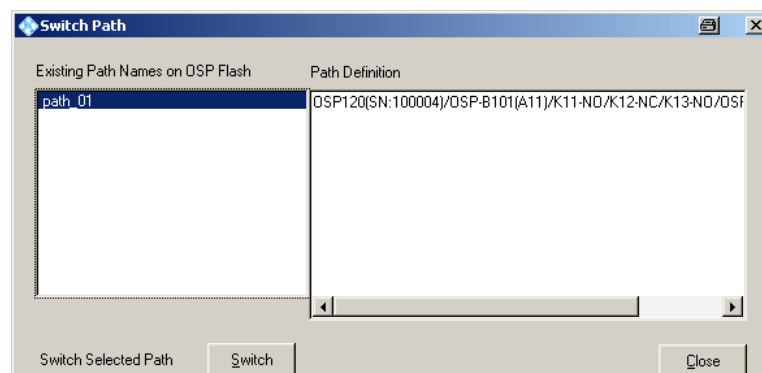
3.4.2 Switch a Path

If a path has been defined as described in the previous chapter, the path can be switched as follows:

39. Start the OSP Panel.

40. Select >Path >Switch Path ... in the OSP Panel.

The following dialog appears:

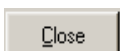
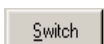


The left field shows the names of all path configurations which already have been defined. The highlighted path configuration will be switched when pressing the Switch button.

The right field Path Definition shows all relays and settings related to the selected path.

The selected path configuration will be switched; i.e. all the relays and outputs, respectively, which are part of the path, will be set to the defined position.

Pressing this button will exit the dialog



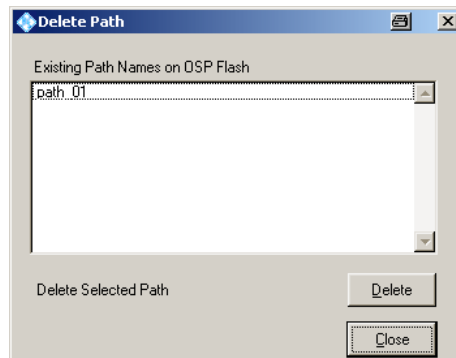
3.4.3 Delete a Path

If a path has been defined as described in the previous chapter, the path can be deleted as follows:

41. Start the OSP Panel.

42. Select >Path >Delete Path ... in the OSP Panel.

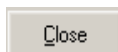
The following dialog appears:



The field shows the names of all paths which already have been defined. The highlighted path configuration will be deleted when pressing the Delete button.



The selected path will be deleted from the flash memory in the R&S OSP. The only possibility to recover a path which was unintentionally deleted is to use the Import Path function, assuming the path has been exported before.



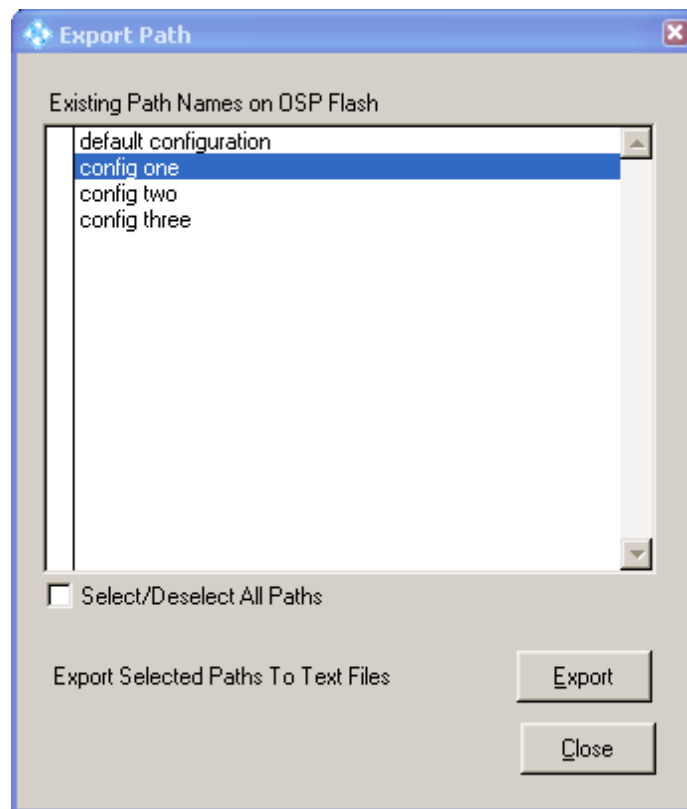
Pressing this button will exit the dialog

3.4.4 Export a Path

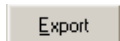
If a path has been defined as described in the previous chapter, the path can be exported to a file as follows:

43. Start the OSP Panel.
44. Select >Path >Export Paths ... in the OSP Panel.

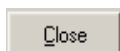
The following dialog appears:



The list of path names contains all paths stored on the flash memory of the OSP. A tick in the leftmost column indicates which paths are currently selected in this dialog. Clicking into a line toggles selection and deselection of the path. By activating the check box below the list all paths can be selected or deselected at once.

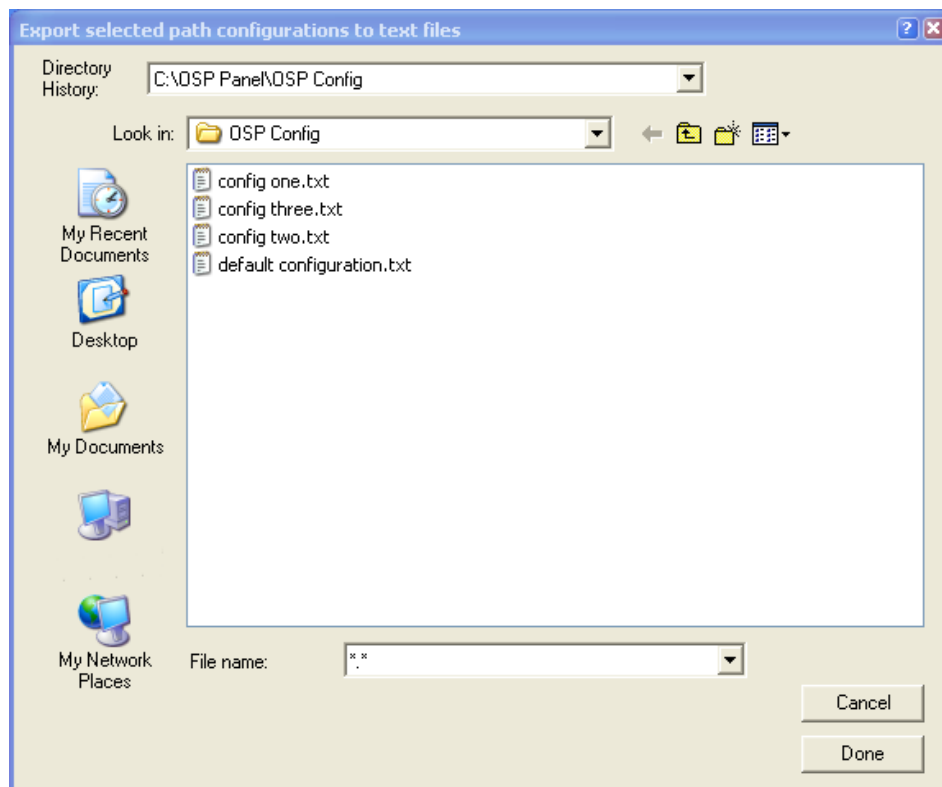


End of path selection, go to the following dialog.



Pressing this button will exit the dialog.

In the next dialog the directory is chosen where the files containing the path information are created.



With the usual Windows operation one can move throughout the files system in order to define the directory. By default the directory is the installation path of the OSP Panel.

The file name selection in the lower part of the dialog has no meaning. Only the directory name in the field at the top of the dialog is used.

Done

The selected paths will be saved as files with the suffix ".txt" to the directory indicated.

Cancel

Pressing this button will exit the dialog

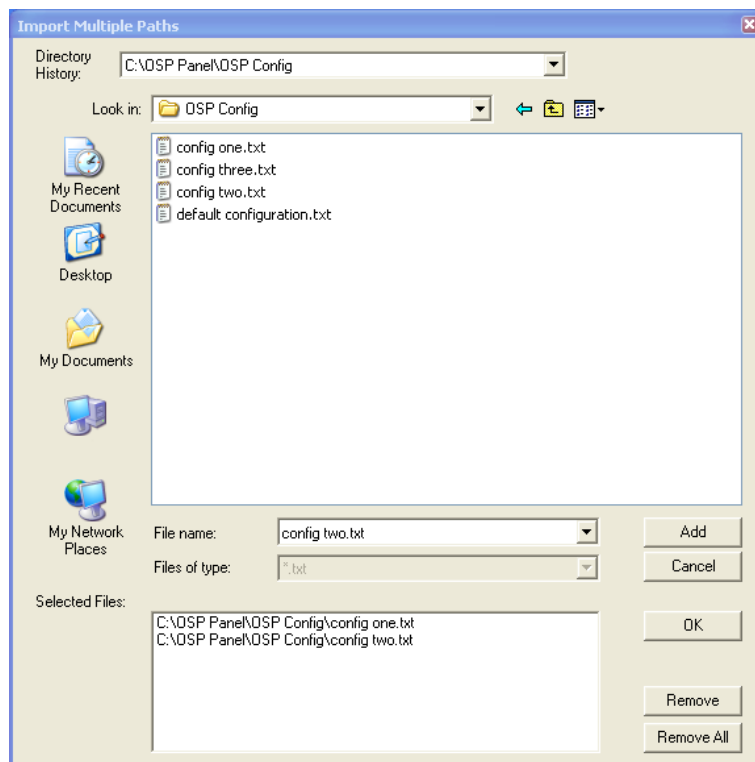
3.4.5 Import a Path

If a path has been exported as described in the previous chapter, the path can be imported again. It is required that the OSP Panel is connected to an instrument.

45. Start the OSP Panel.

46. Select >Path >Import Paths ... in the OSP Panel.

The following dialog appears:



This dialog allows to select all files which shall be imported and saved on the OSP. Once all required files are collected, pressing the OK button will start the import.

Add

Pressing the Add button moves the marked file to the list of selected files. With the standard Windows function a group of files can be selected at once: using the Shift key while clicking on a second file will mark all files between a first file and this one, and using the Ctrl key at the same time will add the second file as a marked one.

Cancel

Will exit the dialog

OK

The selected files will be imported and stored as paths to the R&S OSP flash memory.

Remove

The marked file will be removed from the list of selected files.

Remove All

All files will be removed from the list of selected files.

3.5 Sample Session

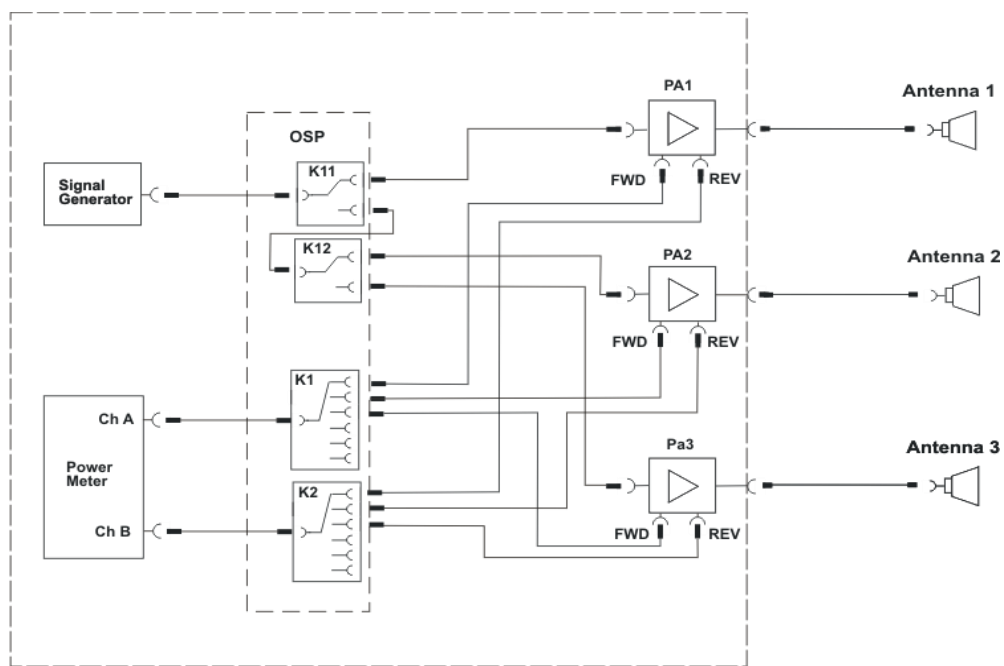
The sample session shows a typical application of the R&S OSP and gives a guidance to the user how to solve the various switching tasks with the R&S OSP.

3.5.1 Example Path Configuration

The following example shows how to set up the path for a Microwave EMS system up to 18 GHz consisting of a signal generator, three amplifiers and a two-channel power

meter. The following signal paths are required and have to be set dependent on the frequency range.

- Generator output to amplifier input
- Amplifier output forward power to power meter
- Amplifier output reverse power to power meter



3.5.1.1 Defining the Path for PA1

To have a defined condition for the path switching, it is recommended to start with the R&S OSP in Reset condition.



Reset

To obtain the correct switching for a new path configuration, it is recommended to reset the R&S OSP. Select in the OSP Panel >Configure >Deselect all Switches.

According to the above example, for amplifier PA1 the following paths are required:

Signal path	Required relay position
Sig Gen to PA1 input	R&S OSP-B101 / K11- NO
PA1 Fwd to Power Meter Ch A	R&S OSP-B102 / K1-1
PA1 Fwd to Power Meter Ch B	R&S OSP-B102 / K2-1

Start the OSP Panel and make sure not to take over any undesired relay setting. Select therefore in the OSP Panel >Configure >Deselect all Switches.

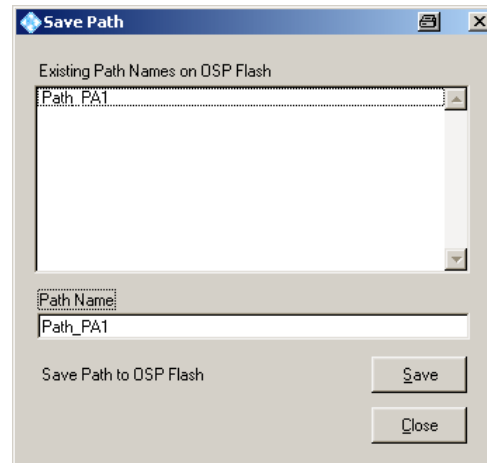
After that, select the OSP-B101 dialog and set K11 to position NO. Do not forget to select the K11 button.

Now select the OSP-B102 dialog and set K1 and K2 to position 1. Do not forget to select the K1 and K2 buttons.

Now start the path configuration as follows:

- Select >Path >Save Path ... in the OSP Panel.

The following dialog will appear:



The upper data field shows the paths which are already stored in the R&S OSP. Type in the path name "Path_PA1" and press the button "Save".

3.5.1.2 Defining the Path for PA2

According to the above example, for amplifier PA2 the following paths are required:

Signal path	Required relay position
Sig Gen to PA2 input	R&S OSP-B101 / K11- NC, K12-NO
PA2 Fwd to Power Meter Ch A	R&S OSP-B102 / K1-2
PA2 Fwd to Power Meter Ch B	R&S OSP-B102 / K2-2

Start the OSP Panel and make sure not to take over any undesired relay setting. Select therefore in the OSP Panel >Configure >Deselect all Switches.

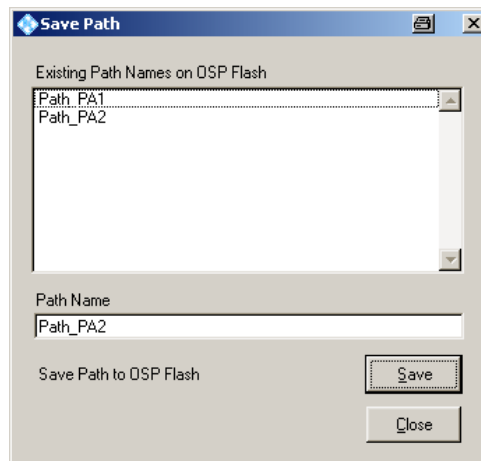
After that, select the OSP-B101 dialog and set K11 to position NC and K12 to position NO. Do not forget to select the K11 and K12 buttons.

Now select the OSP-B102 dialog and set K1 and K2 to position 2. Do not forget to select the K1 and K2 buttons.

Now start the path configuration as follows:

Select >Path >Save Path ... in the OSP Panel.

The following dialog will appear:



The upper data field shows the paths which are already stored in the R&S OSP. Type in the path name "Path_PA2" and press the button "Save".

3.5.1.3 Defining the path for PA3

According to the above example, for amplifier PA3 the following paths are required:

Signal path	Required relay position
Sig Gen to PA3 input	R&S OSP-B101 / K11- NC, K12-NC
PA3 Fwd to Power Meter Ch A	R&S OSP-B102 / K1-3
PA3 Fwd to Power Meter Ch B	R&S OSP-B102 / K2-3

Start the OSP Panel and make sure not to take over any undesired relay setting. Select therefore in the OSP Panel >Configure >Deselect all Switches.

After that, select the OSP-B101 dialog and set K11 to position NC and K12 to position NC. Do not forget to select the K11 and K12 buttons.

Now select the OSP-B102 dialog and set K1 and K2 to position 3. Do not forget to select the K1 and K2 buttons.

Now start the path configuration as follows:

Select >Path >Save Path ... in the OSP Panel.

The following dialog will appear:



The upper data field shows the paths which are already stored in the R&S OSP. Type in the path name "Path_PA3" and press the button "Save".

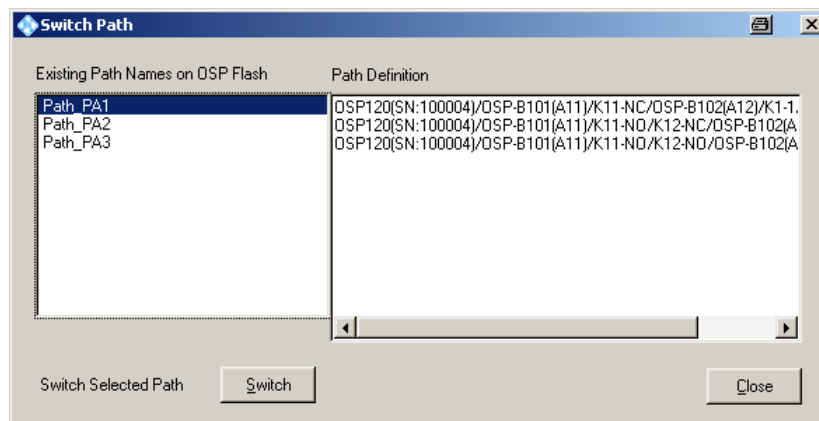
The path configuration now is stored in the OSP flash memory and is available for further use.

3.5.2 Manual Setting of the Paths

To set up the path for power amplifier PA 1, PA2 and PA3, respectively, only a simple step is required.

Select >Path >Switch Path ... in the OSP Panel.

The following dialog appears:



Select the path name Path_PA1, press the button "Switch" and all necessary switching for PA1 is done.

For PA2 and PA3 proceed accordingly.

The field Path Definition shows the relay setting of the selected path.

The path definition also is shown in the OSP Panel system information.

Select >File >System Info ... in the OSP Panel. For the above example, the following information is shown:

```

ospSystemInfo.txt - Editor
Datei Bearbeiten Format Ansicht ?

R&S-OSP SYSTEM INFORMATION

OSP Identification: ROHDE&SCHWARZ, OSP120, 100001, 1.4
OSP Panel Version: 01.11

[F01]
OSP Name: OSP 120
OSP Address: 2100001
OSP Description: Base unit
Mainboard Serial Number: 100004/000
Mainboard Part Number: 1505.3050.02
Mainboard Hardware Code: 0
Mainboard Product Index: 02.00

Module Name: OSP-B101
Description: 6 x SPDT RF relays, DC-18 GHz, 50 ohm
Serial Number: 100011/000
Part Number: 1505.5101.02
Hardware Code: 0
Product Index: 01.00

Module Name: OSP-B102
Description: 2 x SP6T RF relays, DC-18 GHz, 50 ohm
Serial Number: 100004/002
Part Number: 1505.5201.02
Hardware Code: 0
Product Index: 02.02

Module Name: OSP-B103
Description: 16 x digital in/outputs
Serial Number: 100001/002
Part Number: 1505.5301.02
Hardware Code: 0
Product Index: 02.02

[Path List]
Path_PA1:
OSP120(SN:100001)/OSP-B101(A11)/K11-NO/OSP-B101(A12)/K1-1/K2-1/

Path_PA2:
OSP120(SN:100001)/OSP-B101(A11)/K11-NC/K12-NO/OSP-B101(A12)/K1-2/K2-2/

Path_PA3:
OSP120(SN:100001)/OSP-B101(A11)/K11-NC/K12-NC/OSP-B101(A12)/K1-3/K2-3/

```

3.5.3 Remote Control Setting of the Path Configuration

Once the required path configurations are stored in the R&S OSP, they are available by remote control applications like the R&S EMC32 software.

The advantage to make use of the OSP path configuration utility is:

- The switching is called by logical name from the external application (for example EMC32 software). Using the logical name, the external application does not need to know the R&S OSP hardware configuration.
- If the hardware configuration has to be changed, only the path configuration inside the R&S OSP must be adapted. The external application does not need to be changed.

For the above examples, the following strings are to be sent to the R&S OSP:

```

ROUTE:CLOSE "Path_PA1"
ROUTE:CLOSE "Path_PA2"
ROUTE:CLOSE "Path_PA3"

```

Further information on remote control functions and on applications together with the R&S EMC32 software are to be found in the operating manual.

3.6 Path Configuration in virtual mode

With OSP Panel version 2.57 onwards, you can define a path configuration in virtual mode. The advantage of this method is the possibility of preparing any path

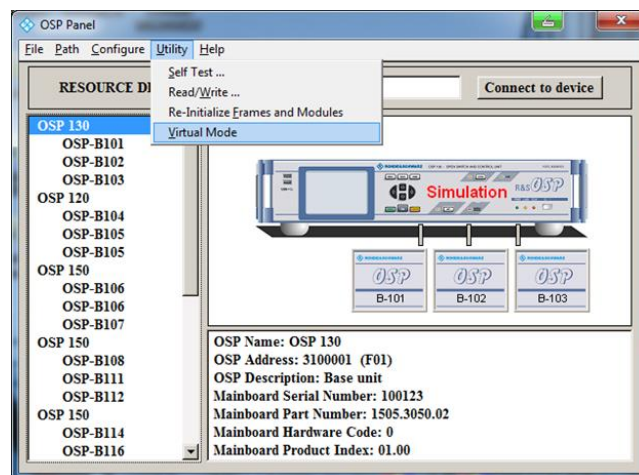
configuration before the hardware is available. For details, see the Release Note for your OSP firmware version.

The following example shows the necessary steps.

3.6.1 Simulated Module Configuration

Before you can configure a path in virtual mode, you must set up the desired configuration.

Start the OSP Panel application, select --> Utility --> Virtual Mode, as shown below:



Note: Alternatively, right-click the OSP configuration structure in the left field.



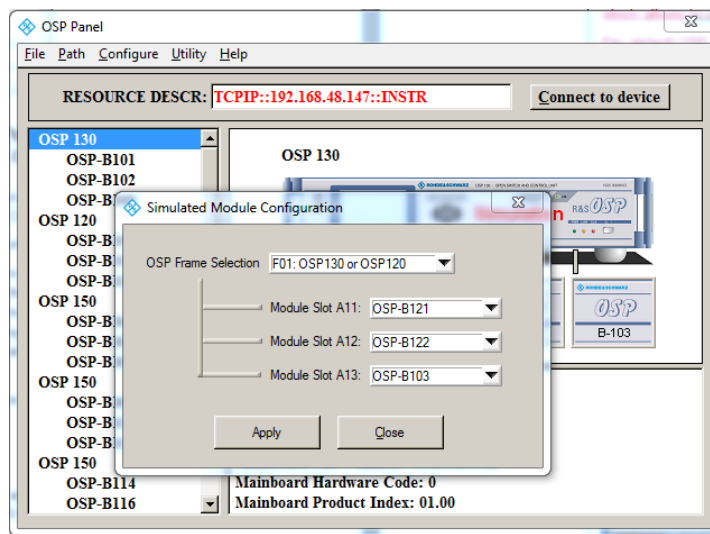
OSP panel and Virtual Mode

No instrument must be connected to run OSP Panel in virtual mode (off-line).

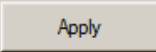
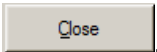
A selection box pops up for setting up the “Simulated Module Configuration”.

Per default, OSP frame F01 is offered, which can either be model R&S OSP120 or R&S OSP130.

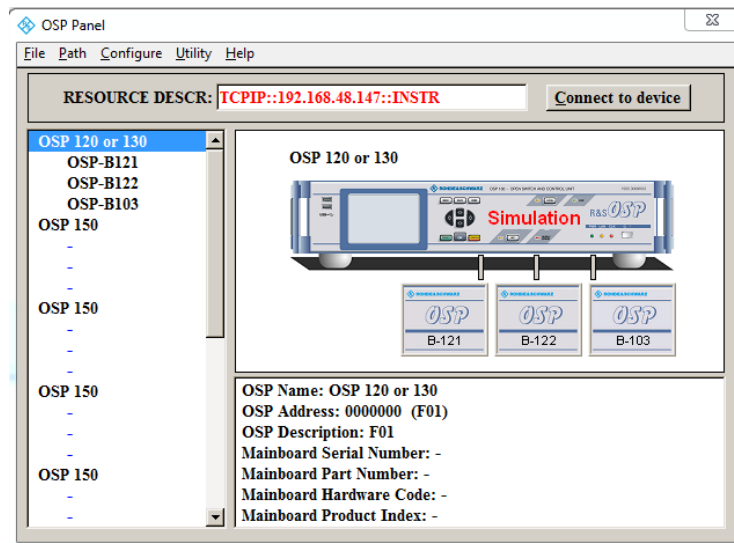
The following three dialogs allow to configure the OSP module slots A11 to A13. See screenshot below for a configuration of module R&S OSP-B121, R&S OSP-B122 and R&S OSP-B103.



If any extension unit R&S OSP150 is used, select OSP Frame F02 and configure the module slots as requested. For any additional R&S OSP150, proceed accordingly.

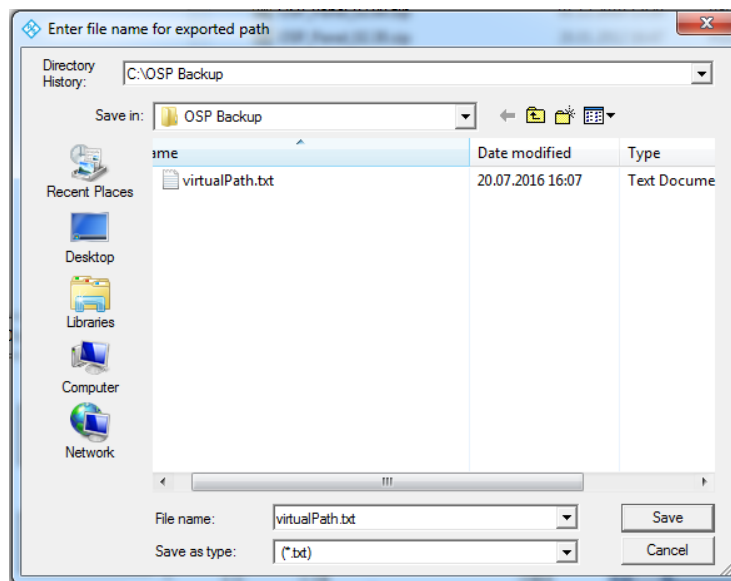
After completing the configuration, press  and .

Then the OSP Panel shows the requested module configuration, only, as shown in the following example menu.



3.6.2 Path Configuration

You can now configure the path as usual (see [chapter 3.4](#)), with the exception that a path can only be exported. Exporting is shown in the example below:

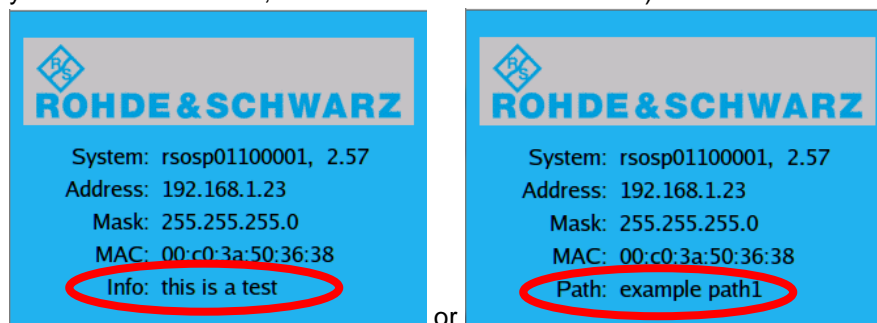


3.6.3 Import of Path Configuration

Once you have generated the path configuration in virtual mode without instruments, you can import it on an R&S OSP120 or R&S OSP130 with the same configuration as used in virtual mode.

3.7 GUI Info Line

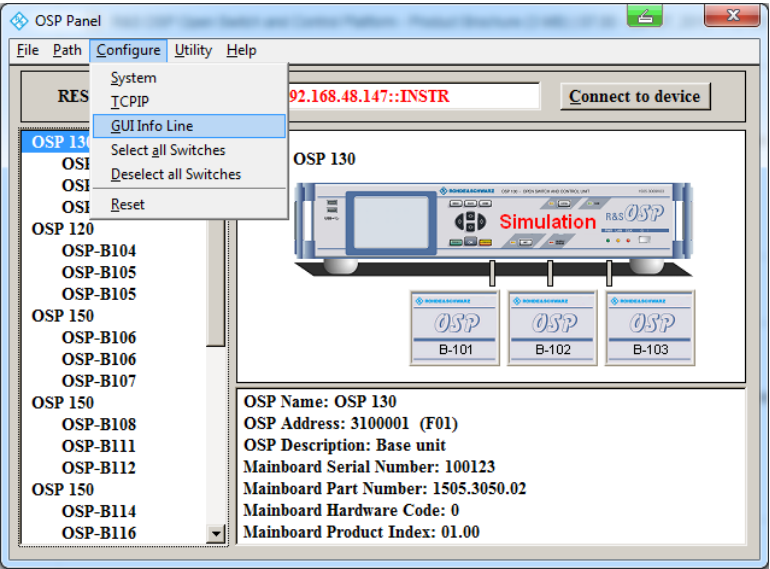
With OSP Panel version 2.57 onwards, you can activate an info line which is shown at the R&S OSP130 built-in display, connected monitor and Web-GUI. (For details on your firmware version, see the related Release Notes.)



Configure the info line either via the OSP Panel application or via SCPI “SYSTEM:OPTION” commands (refer to the operating manual). You can only configure the info line with the instrument connected, i.e. with OSP Panel in physical mode or via SCPI command.

3.7.1 Configuring the GUI Info Line

Start the OSP Panel application and connect the R&S OSP120 or R&S OSP130 to your PC. Now select **Configure** --> **GUI Info Line** , as in the example below:



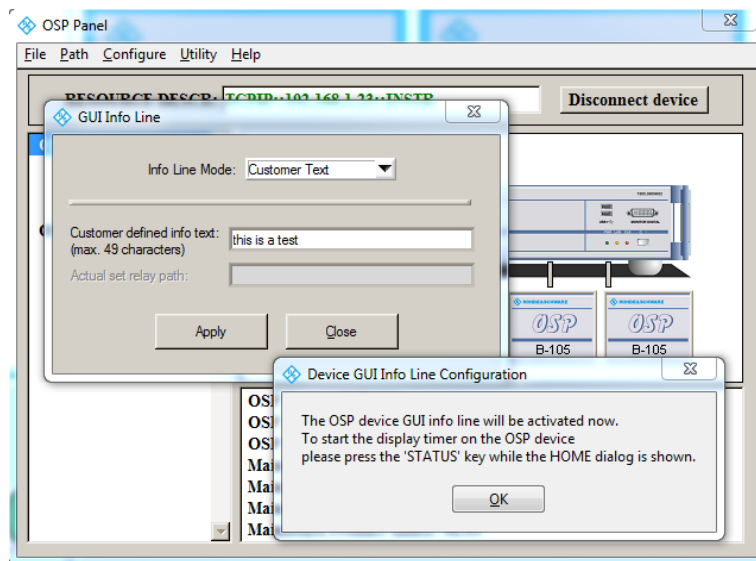
The GUI Info Line menu allows to select the following modes:

•

Info Line Mode	R&S OSP130 display
OFF	No info line is shown
Customer Text	You can define any text to be shown
Actual Path	Shows the name of the currently switched path

To enter a text line with a maximum of 49 characters, select the Info Line Mode

“Customer Text”. After pressing the **Apply** button, you are prompted to press the “STATUS” key on R&S OSP130 front panel for activating the OSP GUI Info line (see screenshot below).



Note that after defining the text or path info, you must update the GUI display. To do so on the R&S OSP130, press the **STATUS** key on the front panel or switch to a different menu and back. This switching can be done manually or via a VNC mode.

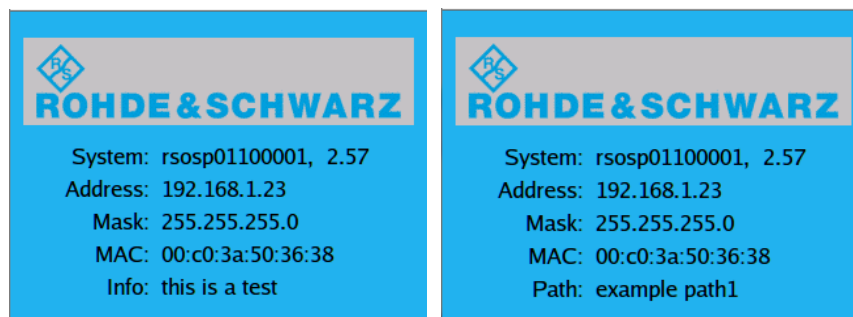
The R&S OSP120 allows activation or deactivation in the same way or via a connected keyboard and monitor (or VNC).



When powering OFF/ON the R&S OSP130, the GUI info line remains active, but:

- In case of text info, the text is set to the default content. "no customer-defined info text"
- In case of path info, the display may show "no pre-defined path", if the current path has become invalid. The same happens after any manual switching.

The following screenshots show the GUI display with the custom text info line "this is a test" or with the path info line "example path1", respectively.



To deactivate the GUI info line, select the Info Line Mode "OFF".

An activated GUI info line is updated every two seconds.

4 Manual Operation

The model R&S OSP120 is the version in the R&S OSP family which is operated remotely controlled. There are no keys and display on the front panel for manual operation. If an R&S OSP150 is connected to this R&S OSP120, it is also controlled from there.

The model R&S OSP130 is equipped with both display and front panel keys for manual operation.

R&S OSP model	Manual operation ...	see Chapter
R&S OSP120 without display	... with monitor and keyboard (GUI)	5.3.1
R&S OSP130 with display	... direct control via front display and panel keypad	5.3.1
R&S OSP120 and R&S OSP130	... via LAN from a separate laptop or PC (Web-GUI via VNC)	4.1 and 5.3.1

See the next chapter for manual operation modes.

4.1 Manual Operation of the Modules

“Manual operation” of the instrument functions is achieved by the OSP Panel or using the graphical user interface (GUI) of the R&S OSP via Web-Browser (all models of the R&S OSP family).

The model R&S OSP130 can be operated using the GUI together with a display and keyboard.

The application OSP Panel runs on an external computer with Windows Operating System. The external computer is connected to the R&S OSP via LAN network.

See [chapters 3.2](#) and [3.3](#) for installation and operation of the OSP Panel.

Information how to run the GUI via Web-Browser are provided [chapter 5.3](#).

Details to the manual operation of the R&S OSP130 are given in [chapter 5.3](#).

4.2 R&S OSP Setups

All setups which are necessary to perform in the Linux operating system, which is integral part of the R&S OSP120 or OSP130, are to be done via external keyboard and external monitor (not for OSP130).

See [chapter 2.7.2](#) and [2.7.3](#) of this manual for how to connect these accessories.

[Chapter 2.10](#) gives an example for Linux related actions.

5 Instrument Functions

The following chapter describes the instrument functions of the R&S OSP. The basic instrument R&S OSP is the Platform for Switching and Control Purpose which is completed by several options. The function of the instrument depends on the options (R&S OSP modules) which are fitted in the instrument.

As an overview and for better understanding of the instrument function and the configuration possibilities, the following chapter shows block diagrams of the R&S OSP.

Then there is a description of the available modules for the R&S OSP and their function.

Basic instrument functions like selftest and configuration information are described as well.

5.1 R&S OSP Instrument Frame

The R&S OSP is designed as a 19" unit with two height units. The instruments R&S OSP120 and R&S OSP130 can remotely be controlled via LAN interface.

The R&S OSP120 contains no front elements for manual operation and is therefore only to be used in remote operation.

The R&S OSP130 can operate as a stand-alone instrument thus not requiring remote control. Front panel keys and a display allow local operation. It may also be integrated in remotely controlled systems.

The R&S OSP150 is an extension of the OSP120 or OSP130 allowing more modules to be used. It is connected via CAN bus connected to the rear side of the R&S OSP.

The R&S OSP unit has no switching functions as long as no R&S OSP modules are installed.

Depending on the model, the R&S OSP frame unit can consist of the following blocks:

- Computer LPC8 (Low Profile Controller)
- Mainboard
- Power supply
- Interface for USB/DVI
- Front panel with function keys and a color display screen

Switching functions are added to the R&S OSP frame unit by installation of R&S OSP modules. The R&S OSP offers three slots for installation of R&S OSP modules. The modules are installed from the rear side of the instrument. A maximum of three R&S OSP modules can be configured.

5.1.1 R&S OSP Block Diagram

The following block diagram shows the main functional groups of the R&S OSP120.

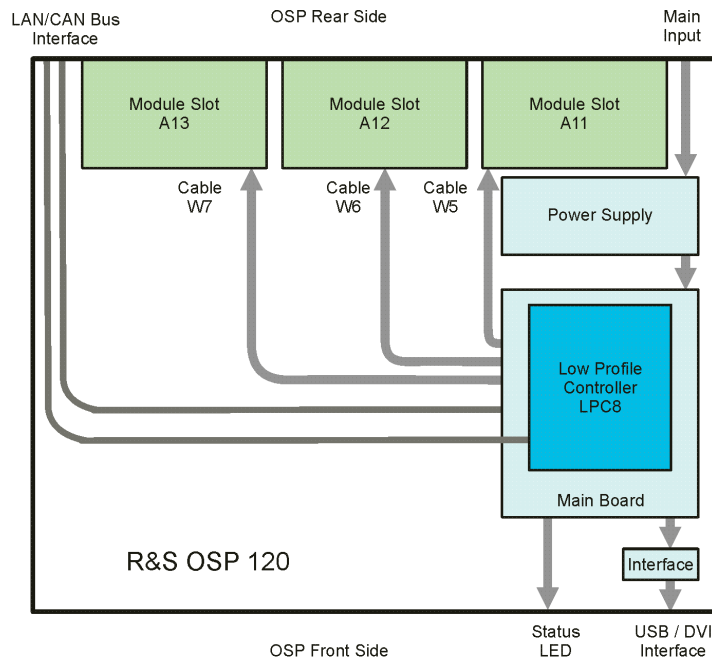


Figure 5-1: Block Diagram R&S OSP120

The central part of the R&S OSP frame is the Low Profile Controller LPC8 with Linux Operating System. The computer handles the external interfaces of the R&S OSP120 such as LAN, USB and DVI. It also serves the internal interfaces in the R&S OSP120 like the control ports for the three slots which can take the R&S OSP modules.

The single board computer is plugged onto the R&S OSP Main Board. The basic component on the mainboard is an FPGA which supplies all necessary interfaces between computer PCI Bus and R&S OSP internal interfaces like the control ports for the R&S OSP modules. The CAN bus which is used to connect further R&S OSP extension units is implemented in the FPGA as well.

The power is supplied by a 175 W switching type power supply. The supply voltage for the R&S OSP modules and their relays is generated by a voltage converter which is placed on the Main Board.

Via a small interface board the connectors of the Low Profile Controller are adapted to the standard interfaces to connect USB devices and the DVI monitor.

The next block diagram shows the main functional groups of the R&S OSP130.

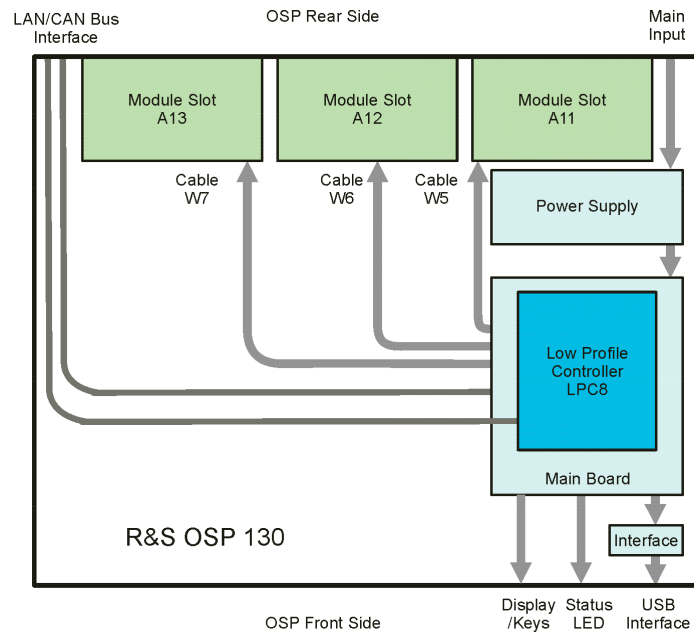


Figure 5-2: Block Diagram R&S OSP130

Additional to the OSP120, in the OSP130 the connection to the front side display unit and keys is available for local operation. No connection to an external monitor is available.

Finally, the block diagram of the OSP150 extension unit shows its main functional blocks:

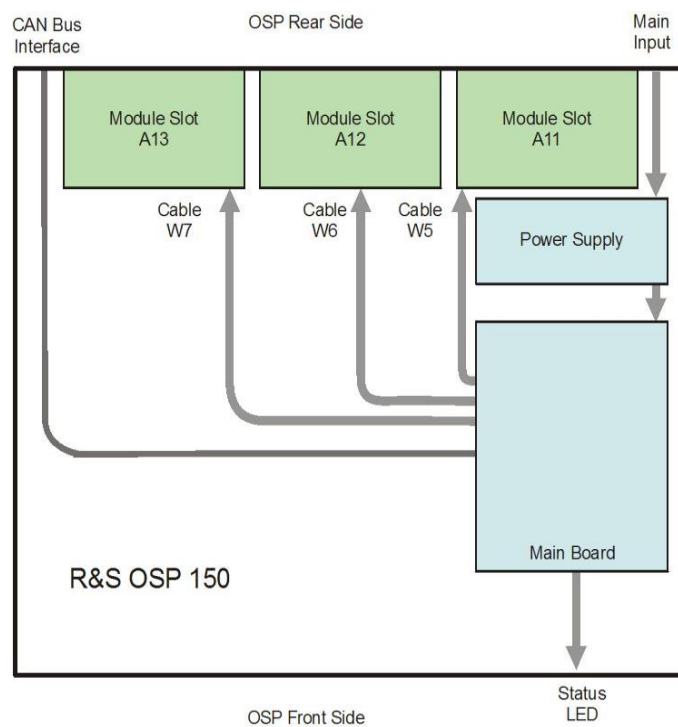


Figure 5-3: Block Diagram R&S OSP150

5.1.2 R&S OSP Module Slots

The R&S OSP offers three slots for installation of R&S OSP modules. The modules are installed from the rear side of the instrument. A maximum of three R&S OSP modules can be configured. If more R&S OSP modules are required, the R&S OSP can be extended by the version R&S OSP150. The extension unit R&S OSP150 is controlled from the R&S OSP120 or OSP130 by CAN bus Interface.

Refer to the operating manual for detailed information on the extension unit R&S OSP150.



Figure 5-4: R&S OSP Module Slots

The slots are designated with A11, A12 and A13. The same order is used when addressing the modules; i.e. R&S OSP module 1 corresponds to slot A11 etc.

In principle the R&S OSP modules can be installed in the slots in any order. A slot which is not occupied will be shown as empty by the OSP Panel application.

NOTICE

Module Slots

The depth of the module slot A11 is limited. Only modules with a depth < 70 mm like the modules R&S OSP-B101, R&S OSP-B102, R&S OSP-B103, R&S OSP-B107, R&S OSP-B111 or R&S OSP-B112 can be operated in this slot! R&S OSP-B106 can be placed in slots A11+ A12 or A12 + A13.

For installation of the modules see the corresponding installation procedures.

5.1.3 R&S OSP120 Version12 and Module Slots

The R&S OSP120 Version 12 is designed with two slots in the front side in addition to the three slots at the rear side as described above.



Slot A12F

Slot A13F

Figure 5-5: R&S OSP120 Version12 Module Slots at front side

Standard Configuration:

The slots in the front side are designated with A12F and A13F. For installation of modules, the following order is defined as standard:

The first module installed from OSP front side always is mounted in slot A13F. From interface point of view it corresponds to slot A13 (connected via cable W7 – see figure below).

The second module installed from OSP front side is mounted in slot A12F. From interface point of view it corresponds to slot A12 (connected via cable W6 – see figure below).

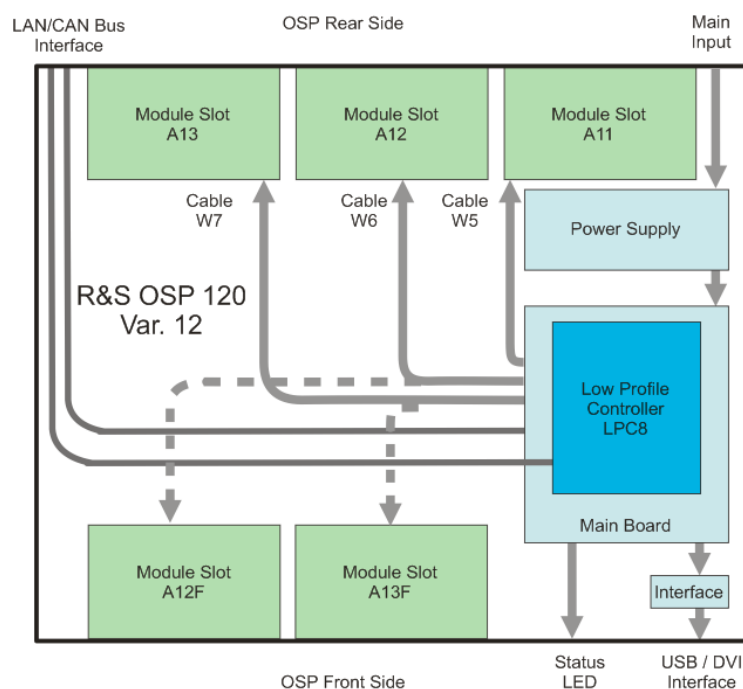


Figure 5-6: Block Diagram R&S OSP120 Var. 12

Configuration of 2-slot modules:

OSP modules with 2-slot size and requiring two interface cables W6 and W7 (like the modules OSP-B105/-B115/-B125/-B126) only can be mounted in A12/A13 or A12F/A13F.

That means with a 2-slot module configured in A12/A13 and one module configured in the OSP front side, only interface cable W5 (corresponding to A11) is left for A13F).

5.1.4 R&S OSP120 Version12 and Modules R&S OSP-B011/-B012

Configuring a system with instruments having the RF connectors at the front panel, the cabling will be made easy having the RF connectors at the OSP120 front side as well. The R&S OSP120 Version 12 is designed with two slots in the front side of the in

addition to the three slots at the rear side. Two slots therefore can be used for mounting the options OSP-B011 and/or OSP-B012. See following diagram.

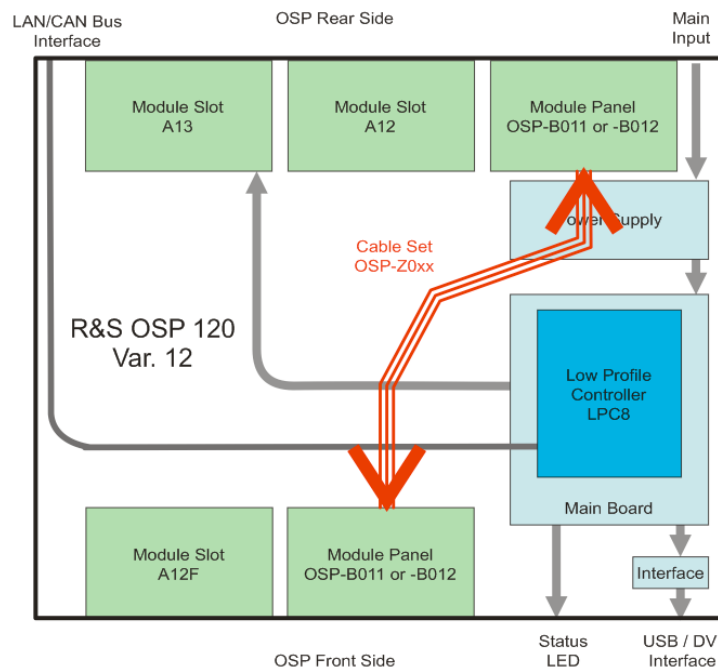


Figure 5-7: Block Diagram R&S OSP120 Var. 12

NOTICE

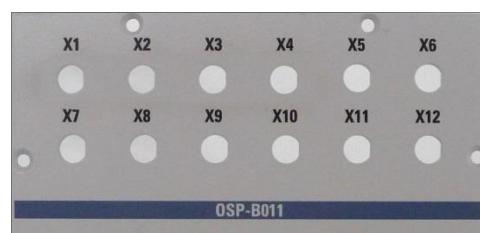
Installation of Module Panels OSP-B011/-B012

Note that the length of the cable sets OSP-Z010/-Z011/-Z012 is limited for a maximum offset of one module only. That means if one Module Panel is mounted in the slot A13F at the OSP front side, a second Module Panel for example can be installed at the OSP rear side in any one of the three available slots (offset ≤ 1 slot).

But it is not possible to mount one Module Panel in the slot A12F at the OSP front side and a second Module Panel at the OSP rear side in slot A11 (offset > 1 slot)!

5.1.4.1 Module Panel R&S OSP-B011

The module OSP-B011 is a panel (1-slot size) prepared to be fitted with up to twelve coaxial feed-through connectors SMA-female; see below picture.



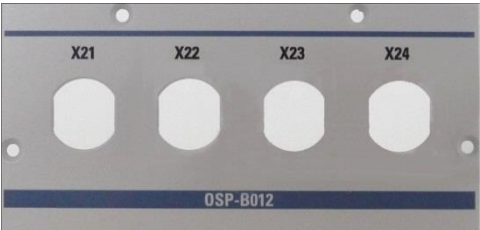
Slot A12F Slot A13F

Figure 5-8: R&S OSP-B011 module panel

For cabling the options OSP-Z11 or Z12 are required. See [chapter 5.1.4.3](#) for details.

5.1.4.2 **Module R&S OSP-B012**

The module OSP-B012 is a panel (1-slot size) prepared to be fitted with up six coaxial feed-through connectors N-female; see below picture.



Slot A12F Slot A13F

Figure 5-9: R&S OSP-B011 module panel

For cabling the options OSP-Z11 or Z12 are required. See [chapter 5.1.4.3](#) for details.

5.1.4.3 **Cable sets R&S OSP-Z010/-Z011/-Z012**

The modules OSP-B011 and/or OSP-B012 can be connected using the cable sets and configurations as shown in the below table.

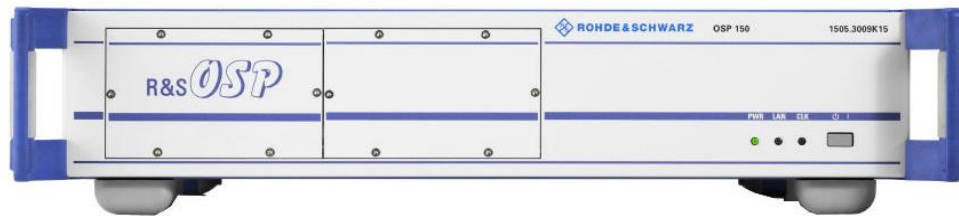
Module Panel 1	Module Panel 2	Required Cable Set	
OSP-B011	OSP-B011	max 3 x OSP-Z010	
OSP-B012	OSP-B011	OSP-Z011	
OSP-B012	OSP-B012	OSP-Z012	

All Cable Sets consist out of four coaxial cables fitted with suitable coaxial connectors. The coaxial connectors are bulkhead connector types with round flange. They are fed through the Module panels from rear-side and fixed with the central screw.

This way it is not required to open the OSP instrument to mount the options OSP-B010/-B011 and/or -B012 together with the related cable sets.

5.1.5 R&S OSP150 Version15 and Module Slots

The R&S OSP150 Version 15 is designed with two slots in the front side in addition to the three slots at the rear side as described above.



Slot A12F Slot A13F

Figure 5-10: R&S OSP150 Version15 Module Slots at front side

Standard Configuration:

The slots in the front side are designated with A12F and A13F. For installation of modules, the following order is defined as standard:

The first module installed from OSP front side always is mounted in slot A13F. From interface point of view it corresponds to slot A13 (connected via cable W7 – see figure below).

The second module installed from OSP front side is mounted in slot A12F. From interface point of view it corresponds to slot A12 (connected via cable W6 – see figure below).

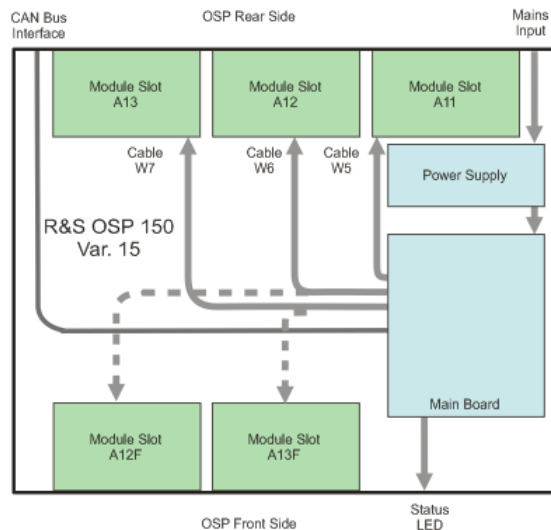


Figure 5-11: Block Diagram R&S OSP150 Var. 15

Configuration of 2-slot modules:

OSP modules with 2-slot size and requiring two interface cables W6 and W7 (like the modules OSP-B105/-B115/-B125/-B126) only can be mounted in A12/A13 or A12F/A13F.

That means with a 2-slot module configured in A12/A13 and one module configured in the OSP front side, only interface cable W5 (corresponding to A11) is left for A13F).

5.1.6 R&S OSP150 Version15 and Modules R&S OSP-B011/-B012

Configuring a system with instruments having the RF connectors at the front panel, the cabling will be made easy having the RF connectors at the OSP150 front side as well.

For configuration and cabling of the modules OSP-B011 and OSP-B012 see [chapter 5.1.4](#).

5.2 Module Functions

As already mentioned, the switching capability is added to the R&S OSP by installation of an R&S OSP module. For the different kind of switching applications, a series of R&S OSP modules is available.

The following chapters describe the function of the R&S OSP modules.

5.2.1 RF Switch Module R&S OSP-B101/-B107/-B111/-B127

The module R&S OSP-B101 and similar as listed above consists of six SPDT switches. All six switches can be operated independently from each other.

The relay is a failsafe type; i.e. an RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain an RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.



Figure 5-12: Module R&S OSP-B101

The relays are mounted directly in the R&S OSP-B101 front panel. All the RF connectors are SMA female types. All relays are soldered into a printed circuit board; this way the module is of compact size and no cabling to the relays is required.

The R&S OSP-B101 module is supplied with power and controlled from the R&S OSP via a single connector on the R&S OSP-B101 printed circuit board. The connection to the R&S OSP is done via a single connection cable.

The R&S OSP-B101 module is equipped with an on-board memory to store the necessary configuration data of the module.

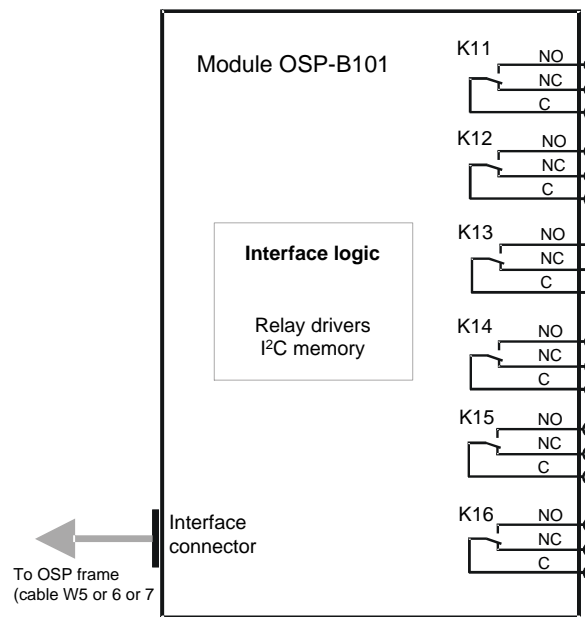


Figure 5-13: Block Diagram Module R&S OSP-B101

When the module R&S OSP-B101 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.6](#) for details.

For remote control operation refer to the operating manual.

Depending on the required switching application, several modules of the R&S OSP-B101 type can be installed in one R&S OSP.

In the R&S OSP frame a maximum of three modules is possible. If more than three modules are required, the extension unit R&S OSP150 must be used. For further information on the extension unit R&S OSP150 refer to the operating manual.

The description above also applies to the following R&S OSP modules that have a similar relay configuration:

Option	Relay configuration
OSP-B107	6 x SPDT relay, solid state, 6 GHz
OSP-B111	6 x SPDT relay, 40 GHz
OSP-B127	6 x SPDT relay, solid state, terminated, 10 GHz

5.2.2 RF Switch Module R&S OSP-B102/-B112/-B128

The module R&S OSP-B102 and similar as listed above consists of two SP6T switches. Both switches can be programmed independently from each other.

The relay is a failsafe type; i.e. no RF connection is provided from the terminal C (Common) to one of the six terminals when no voltage is applied to the relay. To maintain an RF connection between the terminal C (Common) and one of the six output terminals, a continuous voltage is to be applied to the corresponding power terminal of the relay.

Note that always one out of the six terminals of the relays is allowed to be activated at the same time. When operating the R&S OSP-B102 inside the R&S OSP, the R&S OSP firmware takes care for correctly switching the SP6T relay.

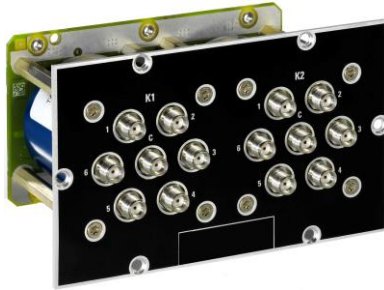


Figure 5-14: Module R&S OSP-B102

The relays are mounted directly in the R&S OSP-B102 front panel. All the RF connectors are SMA female types. All relays are soldered into a printed circuit board; this way the module is of compact size and no cabling to the relays is required.

The R&S OSP-B102 module is supplied with power and controlled from the R&S OSP via a single connector on the R&S OSP-B102 printed circuit board. The connection to the R&S OSP is done via a single connection cable.

The R&S OSP-B102 module is equipped with an on-board memory to store the necessary configuration data of the module.

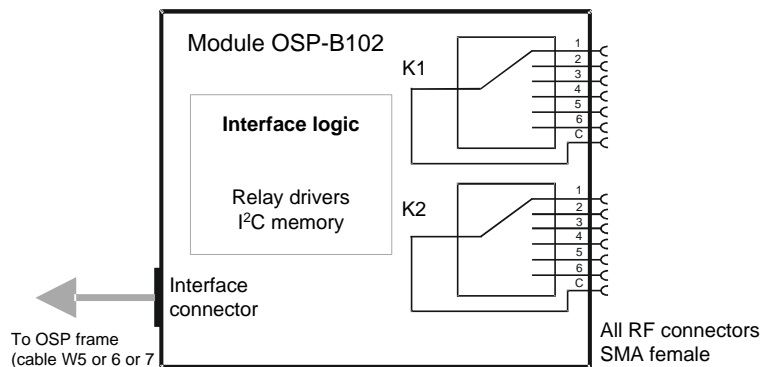


Figure 5-15: Block Diagram Module R&S OSP-B102

When the module R&S OSP-B102 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.7](#) for details.

For remote control operation refer to the operating manual.

Depending on the required switching application, several modules of the R&S OSP-B102 type can be installed in one R&S OSP.

In the R&S OSP frame a maximum of three modules is possible. If more than three modules are required, the extension unit R&S OSP150 must be used. For further information on the extension unit R&S OSP150 refer to the operating manual.

The description above also applies to the following R&S OSP modules that have a similar relay configuration:

Option	Relay configuration
OSP-B112	2 x SP6T relay, 40 GHz
OSP-B128	Up to 3 x SP6T relay, solid state, terminated, 10 GHz

The module R&S OSP-B128 can be configured with up to three SP6T relays. The relay configuration is with all SMA connectors in-line (flat relay design). See the following picture.



Figure 5-16: Module R&S OSP-B128

The actual number of SP6T relays fitted in the OSP-B128 can be read from the module via I2C interface. The R&S OSP automatically recognizes the actual configuration.

Please note that the relays always must be configured starting from position K1 onwards. In the above picture two relays are fitted; the openings for K3 are covered by a sheet metal strip.

5.2.3 I/O Module R&S OSP-B103

The module R&S OSP-B103 is a digital I/O module consisting of a 16 bit input and a 16 bit output port.

The input ports are available on the upper D-Sub connector. The input port can be read at any time. Each input is protected with low-pass and diode against transients.

The output ports are accessible on the lower D-Sub connector. Each output channel is designed as a FET driver switching to GND when activated. Each output is protected with diode against transients which may occur when switching inductive loads such as relay coils.

All output lines can be programmed independently from each other.



Figure 5-17: Module R&S OSP-B103

The R&S OSP-B103 module is supplied with power and controlled from the R&S OSP via a single connector on the R&S OSP-B103 printed circuit board. The connection to the R&S OSP is done via a single connection cable.

The R&S OSP-B103 module is equipped with an on-board memory to store the necessary configuration data of the module.

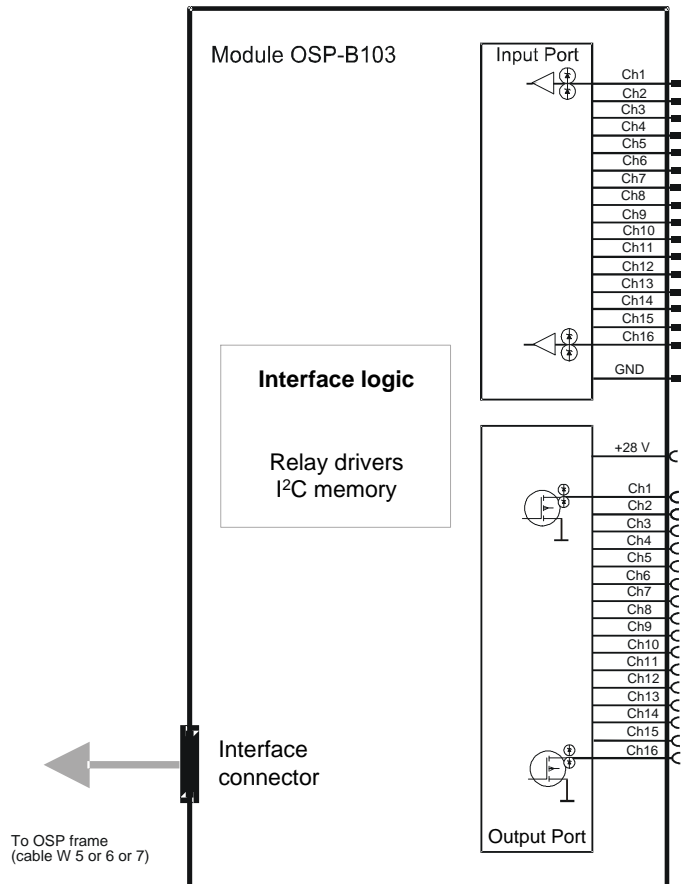


Figure 5-18: Block Diagram Module R&S OSP-B103

When the module R&S OSP-B103 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.9](#) for details. For remote control operation and for details on the connector pin assignments, refer to the operating manual.

Depending on the required application, several modules of the R&S OSP-B103 type can be installed in one R&S OSP.

In the R&S OSP frame a maximum of three modules is possible. If more than three modules are required, the extension unit R&S OSP150 must be used. For further information on the extension unit R&S OSP150 refer to the operating manual.

5.2.4 I/O Module R&S OSP-B104

The module R&S OSP-B104 is a digital I/O module for special applications in EMS measurements.



Figure 5-19: Module R&S OSP-B104

It consists of input / output ports allowing control of up to four external power transfer relays, models Spinner BN 51 26 70 (7-16 connectors) or BN 64 00 75 (EIA 1 5/8" flange connectors). In addition, some lines of the ports are made available at an IN / OUT connector.

Transfer switch



The transfer relays are switched by control lines exhibiting a pulse rather than a constant level. For that reason two lines are required to set the switch to each position. Note that the state of the switch does not change state when the R&S OSP is turned on (reset condition).

The Spinner transfer relays support the "carrier safety contact" concept. While turning from one position to the other, this contact opens. If included in the interlock, the power amplifier connected to the interlock control will be deactivated while the relay is turning. In the final position the carrier safety contact closes again, thus closing the full interlock chain. The power amplifier then can also be put into operate mode again.

The relays have a contact indicating the position. This line is read from the module and used to display and verify the current status.

Delay time for Transfer switch



The transfer relays may have a settling time which cannot be neglected. Per default a delay time of 100 msec is set up for the OSP-B104 module. The delay time allows the relay to reach it's final position before the new position is read back. Refer to the operating manual for further information on how to change the delay time for the OSP-B104 relays.

In the lower part of the module, on the outside of the lower RELAY connectors, there are four LEDs labeled PWR 1 to PWR 4. If an LED shows a green light, the power is OK. If the LED is off, there is a problem with the power on the corresponding connector. In such a case, please turn off the OSP, try to correct for a possible fault in the cabling or connected relay, turn the OSP back on and check the LED again.

In the middle between the lower RELAY connectors there are two more LEDs. The upper of the two is labeled PWR I/O and gives a status information on the power for the I/O connector. If the LED shows a green light, the power is OK. If the LED is off, there is a problem with the power on the corresponding connector. In such a case, please turn off the OSP, try to correct for a possible fault in the cabling or the connected device, turn the OSP back on and check the LED again.

The LED below indicates the status of the interlock (pins 7 and 15). If there is no connection between these two pins, or if any of the RELAY connectors does not connect its pins 3 and 4 (bridge at the connector or carrier safety status of the connected relay), the LED will show a red light indicating an open interlock. The LED being off indicates that the interlock is closed.

The input ports are available on the upper D-Sub connector IN / OUT. The input port can be read at any time. Each input is protected with low-pass and diode against transients.

The output ports are also accessible on the upper D-Sub connector IN / OUT. Each output channel is designed as a FET driver switching to GND when activated. Each output is protected with diode against transients which may occur when switching inductive loads such as relay coils. All output lines can be programmed independently from each other.

The R&S OSP-B104 module is supplied with power and controlled from the R&S OSP via one supply and one control connector on the R&S OSP-B104 printed circuit board. The connection to the R&S OSP is done via those two connection cables.

The R&S OSP-B104 module is equipped with an on-board memory to store the necessary configuration data of the module.

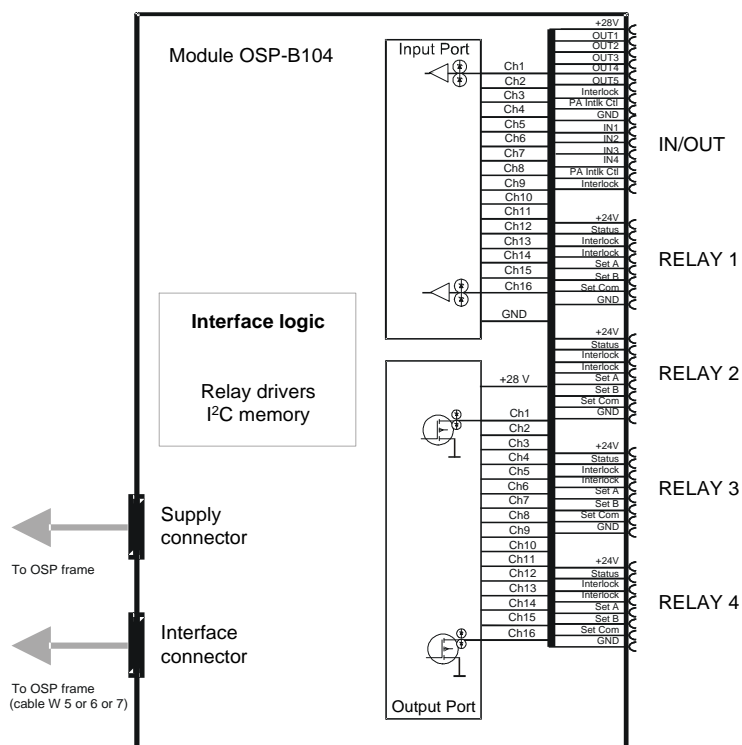


Figure 5-20: Block Diagram Module R&S OSP-B104

When the module R&S OSP-B104 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.9](#) for details.

For remote control operation and for details on the connector pin assignments, refer to the operating manual.

Depending on the required application, several modules of the R&S OSP-B104 type can be installed in one R&S OSP.

In the R&S OSP frame a maximum of two modules is possible, due to the size of the module it only can be installed in slots A12 or A13. If more than two modules are required, the extension unit R&S OSP150 must be used. For further information on the extension unit R&S OSP150 refer to the operating manual.

5.2.5 RF Switch Module R&S OSP-B106/-B132

The module R&S OSP-B106 consists of three SPDT switches with N connectors and three SPDT switches with BNC connectors.

All six switches can be operated independently from each other.

The relays are a failsafe type; i.e. an RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain an RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.



Figure 5-21: Module R&S OSP-B106

The relays are mounted directly in the R&S OSP-B106 front panel. Three of the relays (K1 to K3) have N type connectors and are suited for frequencies up to 12 GHz. The other three (K4 to K6) have BNC connectors and may be used up to 900 MHz or for DC currents of up to 2 A at a maximum voltage of 30 V. There are no additional RF cables inside the module.

The R&S OSP-B106 module is supplied with power and controlled from the R&S OSP via a single connector on the R&S OSP-B106 printed circuit board. The connection to the R&S OSP is done via a single connection cable.

The R&S OSP-B106 module is equipped with an on-board memory to store the necessary configuration data of the module.

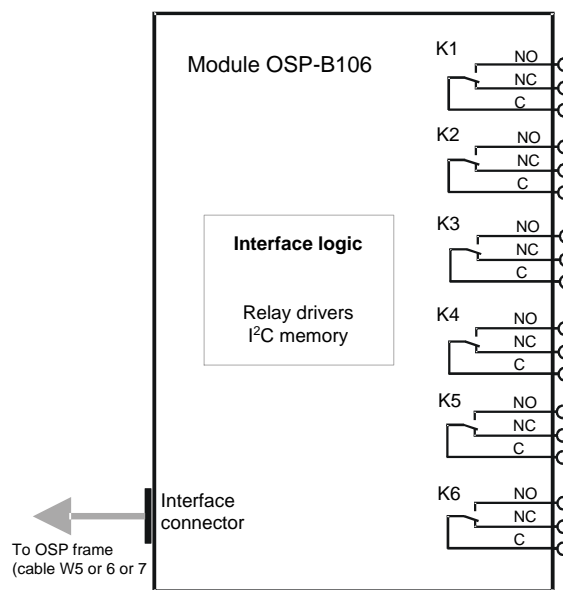


Figure 5-22: Block Diagram Module R&S OSP-B106

When the module R&S OSP-B106 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.6](#) for details.

For remote control operation and for details on the connector pin assignments, refer to the operating manual.

The module OSP-B106 has a double width. Therefore only one module can be installed in one R&S OSP frame. If more than one module is required, the extension unit R&S OSP150 must be used. For further information on the extension unit R&S OSP150 refer to the operating manual.

The description above also applies to the following R&S OSP modules that have a similar relay configuration:

Option	Relay configuration
OSP-B132	6 x SPDT relay with N-Connectors, 12 GHz

5.2.6 DC MUX Module R&S OSP-B108

The module R&S OSP-B108 is a four pole one to six multiplexer for DC. It is controlled equivalent to first Relay K11 of R&S OSP-B102.

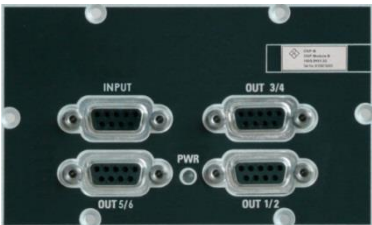


Figure 5-23: Module R&S OSP-B108

The R&S OSP-B108 module is supplied with power and controlled from the R&S OSP via a single connector on the R&S OSP-B108 printed circuit board.

5.2.7 RF Switch Module R&S OSP-B121 and R&S OSP-B121H

The module R&S OSP-B121 is designed as a universal switching module using terminated RF relays. The OSP-B121 contains the following relay configuration:

3 x SPDT switches (terminated)

The module is designed for independent control of all relay.

The relay is a failsafe type; i.e. a RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain a RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.



Figure 5-24: Module R&S OSP-B121

The relays are mounted directly in the OSP-B121 front panel. All the RF connectors are SMA female types. All relays are connected via a short cable to a printed circuit board; this way the module is of compact size.

The OSP-B121 module is supplied with power and controlled from the OSP120 via a single connector on the OSP-B121 printed circuit board. The connection to the OSP120 is done via a single connection cable.

The OSP-B121 module is equipped with on board memory to store the necessary configuration data of the module.

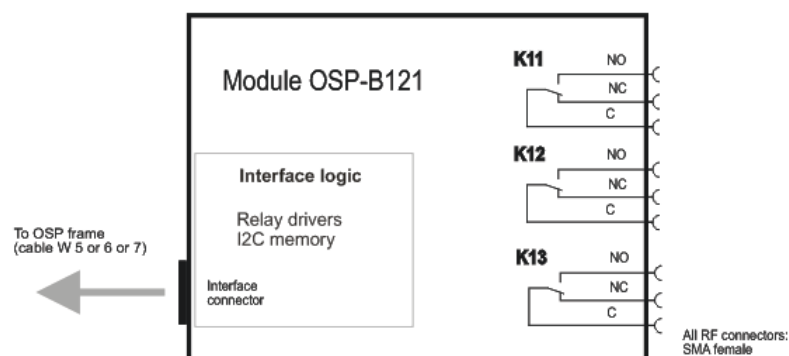


Figure 5-25: Block diagram Module R&S OSP-B121

When the module OSP-B121 is configured within the OSP120, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3](#) for details.

For remote control operation refer to the operating manual.

Depending on the required switching application, several modules of the OSP-B121 type can be installed in one OSP120.

In the OSP frame a maximum of three modules is possible. If more than three modules are required, the extension unit OSP150 must be used. For further information on the extension unit OSP150 refer to the operating manual.

The description above also applies to the following R&S OSP modules that have a similar relay configuration:

Option	Relay configuration
OSP-B121H	3 x SPDT relay with SMA 2.9 Connectors, 40 GHz, terminated

5.2.8 RF Switch Modules R&S OSP-B122, OSP-B122H and OSP-B133

The module R&S OSP-B122 is designed as a universal switching module using terminated RF relays. The OSP-B122 contains the following relay configuration:

1 x SP6T switch (terminated), SMA connectors, maximum frequency 18 GHz

The relay is a failsafe type; i.e. no RF connection is provided from the terminal C (Common) to one of the six terminals when no voltage is applied to the relay. To maintain a RF connection between the terminal C (Common) and one of the six output terminals, a continuous voltage is to be applied to the corresponding power terminal of the relay.

Note that always one out of the six terminals of the relays is allowed to be activated at the same time. When operating the OSP-B122 inside the OSP, the OSP firmware takes care for correct switching of the SD6T relay.



Figure 5-26: Module R&S OSP-B122

The relay is mounted directly in the OSP-B122 front panel. All the RF connectors are SMA female types. The relay is connected via a short cable to a printed circuit board; this way the module is of compact size.

The OSP-B122 module is supplied with power and controlled from the OSP120 via a single connector on the OSP-B122 printed circuit board. The connection to the OSP120 is done via a single connection cable.

The OSP-B122 module is equipped with on board memory to store the necessary configuration data of the module.

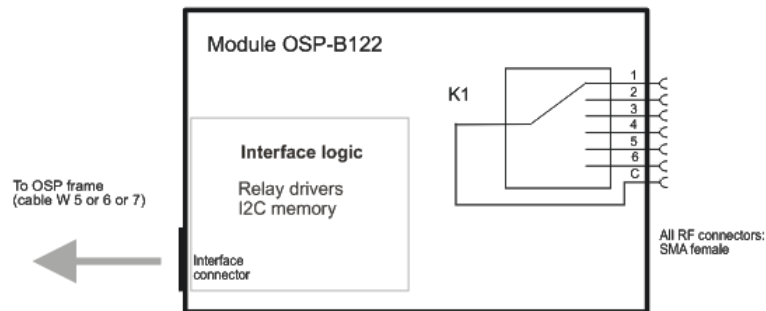


Figure 5-27: Block diagram Module R&S OSP-B122

When the module OSP-B122 is configured within the OSP120, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3](#) for details.

For remote control operation refer to the operating manual.

Depending on the required switching application, several modules of the OSP-B122 type can be installed in one OSP120.

In the OSP frame a maximum of three modules is possible. If more than three modules are required, the extension unit OSP150 must be used. For further information on the extension unit OSP150 refer to the operating manual.

The description above also applies to the following R&S OSP options (modules) that have a similar relay configuration:

Option	Relay configuration
OSP-B122H	1 x SP6T relay with SMA 2.9 Connectors, 40 GHz, terminated
OSP-B133	1 x SP6T relay with N Connectors, 12.4 GHz

5.2.9 RF Switch Module R&S OSP-B123 and R&S OSP-B124

The module R&S OSP-B123/124 is designed as a universal switching module using terminated RF relays. The OSP-B123/124 contains the following relay configuration:

OSP-B123

6 x SPDT switches (terminated)

1 x SP6T switch (terminated)

OSP-B124

3 x SPDT switches (terminated)

2 x SP6T switch (terminated)

The module is designed for independent control of all relay.

The relay is a failsafe type. In case of the SP6T relay, no RF connection is provided from the terminal C (Common) to one of the six terminals when no voltage is applied to

the relay. To maintain a RF connection between the terminal C (Common) and one of the six output terminals, a continuous voltage is to be applied to the corresponding power terminal of the relay.

In case of the SPDT relay, a RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain a RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.

Note that for the SP6T relay only one out of the six terminals is allowed to be activated at the same time. When operating the OSP-B123/124 inside the OSP, the OSP firmware takes care for correct switching of the SD6T relay.



Figure 5-28: Module R&S OSP-B123



Figure 5-29: Module R&S OSP-B124

All relays are mounted directly in the OSP-B123/124 front panel. All the RF connectors are SMA female types. All relays are connected via a short cable to a printed circuit board; this way the module is of compact size.

The OSP-B123/124 module is supplied with power and controlled from the OSP120 via a single connector on the OSP-B123/124 printed circuit board (OSP-B123 has got two boards). The connection to the OSP120 is done via one (OSP-B123) or two (OSP-B124) connection cables.

The OSP-B123/124 module is equipped with on board memory to store the necessary configuration data of the module.

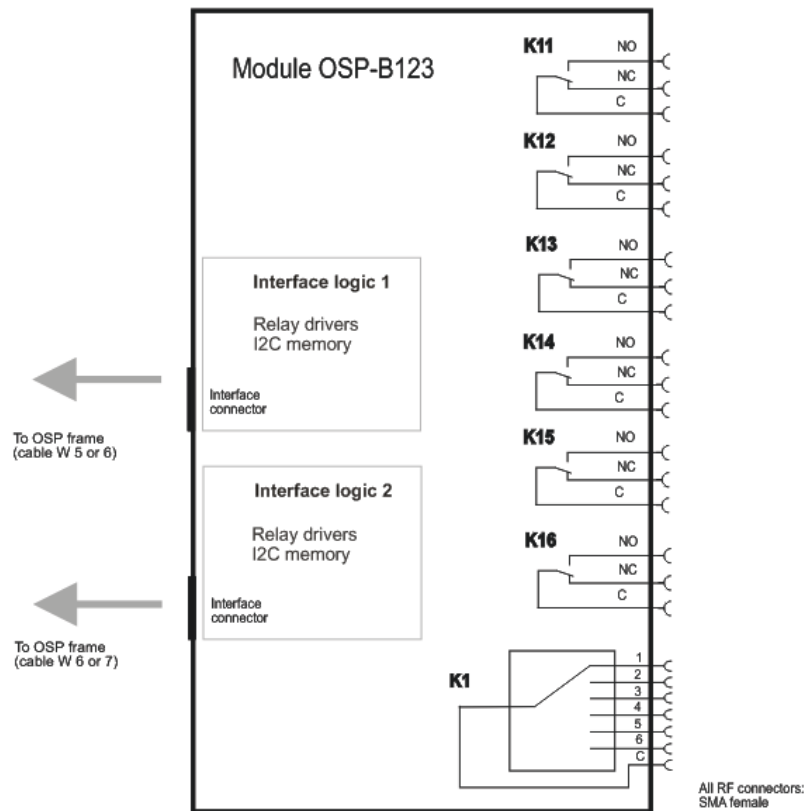


Figure 5-30: Block diagram Module R&S OSP-B123

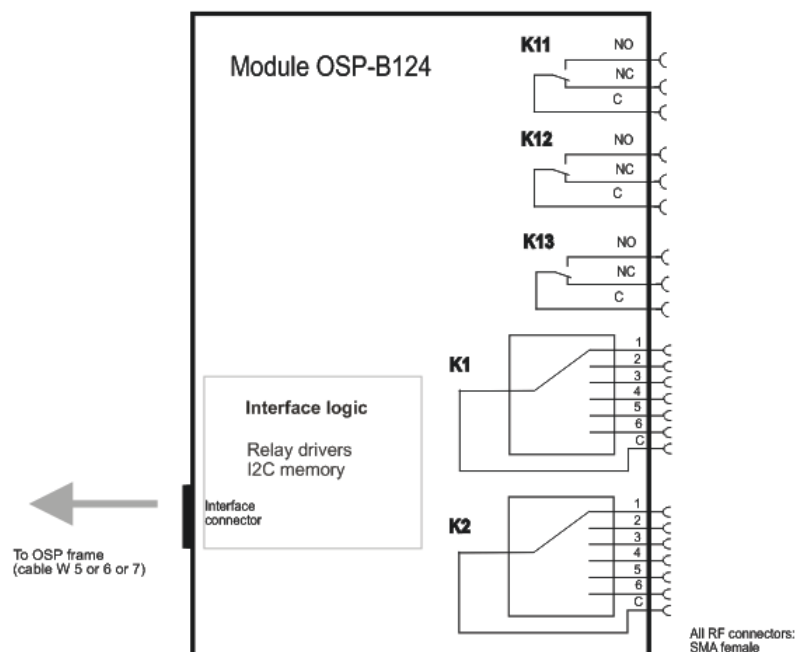


Figure 5-31: Block diagram Module R&S OSP-B124

When the module OSP-B123/124 is configured within the OSP120, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3](#) for details. For remote control operation refer to the operating manual.

The OSP-B123/124 is a two-slot module. Within one OSP120 only one module of this type can be installed.

The OSP frame offers a maximum of three slots. If more than one OSP-B123/124 are required, the extension unit OSP150 must be used. For further information on the extension unit OSP150 refer to the operating manual.

5.2.10 RF Switch Module R&S OSP-B125 and R&S OSP-B126

The module R&S OSP-B125/126 is designed as a universal switching module using terminated RF relays. The OSP-B125/126 contains the following relay configuration:

OSP-B125

6 x SPDT switches (terminated)

3 x SP6T switch (terminated)

OSP-B126

3 x SP6T switch (terminated)

The module is designed for independent control of all relay.

The relay is a failsafe type. In case of the SP6T relay, no RF connection is provided from the terminal C (Common) to one of the six terminals when no voltage is applied to the relay. To maintain a RF connection between the terminal C (Common) and one of the six output terminals, a continuous voltage is to be applied to the corresponding power terminal of the relay.

In case of the SPDT relay, a RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain a RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.

Note that for the SP6T relay only one out of the six terminals is allowed to be activated at the same time. When operating the OSP-B125/126 inside the OSP, the OSP firmware takes care for correct switching of the SD6T relay.

**Figure 5-32: Module R&S OSP-B125**



Figure 5-33: Module R&S OSP-B126

All relays are mounted directly in the OSP-B125/126 front panel. All the RF connectors are SMA female types. All relays are connected via a short cable to a printed circuit board; this way the module is of compact size.

The OSP-B125/126 module is supplied with power and controlled from the OSP120 via two printed circuit boards mounted on the OSP-B125/126. The connection to the OSP120 is done via a two connection cables.

The OSP-B125/126 module is equipped with on board memory to store the necessary configuration data of the module.

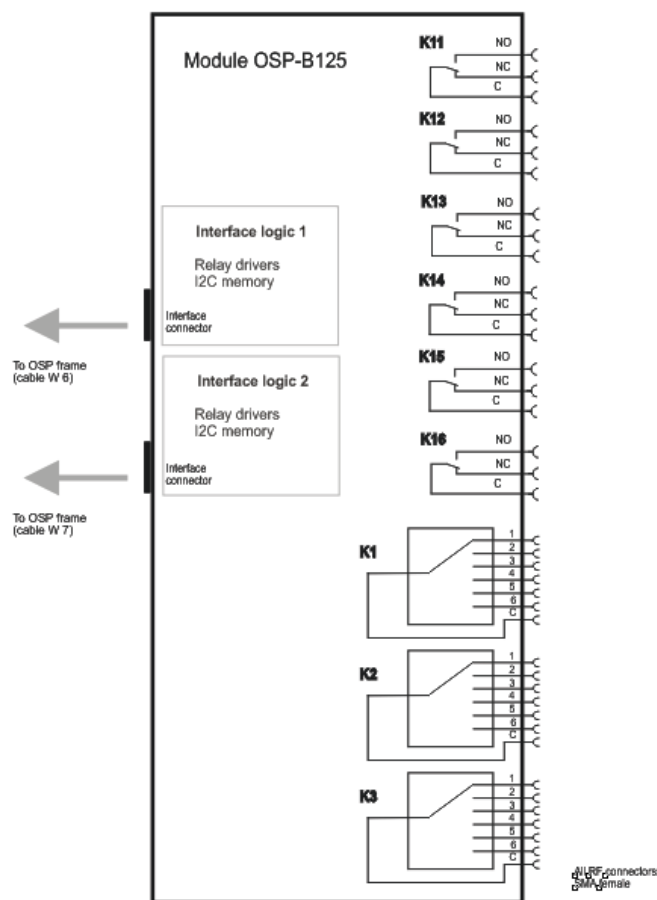


Figure 5-34: Block diagram Module R&S OSP-B125

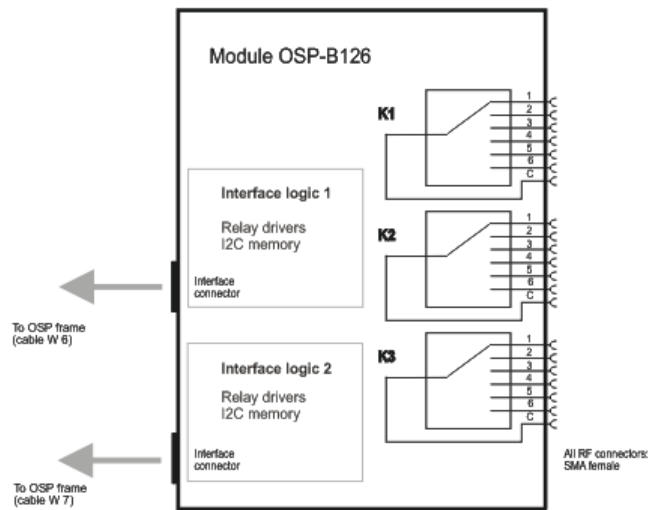


Figure 5-35: Block diagram Module R&S OSP-B126

When the module OSP-B125/126 is configured within the OSP120, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3](#) for details. For remote control operation refer to the operating manual.

The OSP-B125/126 is a three-slot module. Within one OSP120 only one module of this type can be installed.

If more than one OSP-B125/126 are required, the extension unit OSP150 must be used. For further information on the extension unit OSP150 refer to the operating manual.

5.2.11 Module R&S OSP-B114 for EMS application

The module R&S OSP-B114 is intended for applications in small or medium systems for Electromagnetic Susceptibility (EMS). The module fulfills the following tasks:

- Switching of the output of two power amplifiers to one or two transmit antennas (or other kind of transducers).
- Providing the circuitry for an interlock loop with the following functions:
 - monitoring a interlock loop and read/display the actual status
 - power down external amplifiers depending on interlock status
 - disconnect the signal generator from power amplifier (if they cannot be powered down) depending on interlock status
- Four output lines. Can be used to control the polarization of the transmitting antennas
- Four input lines



Figure 5-36: Module R&S OSP-B114

The relay K1 with N-connectors is a DPDT type. When not activated (no voltage applied to the relay) and after Reset, the terminals 1 - 2 and 3 - 4 are connected. When activated, the terminals 1 - 3 and 2 - 4 are connected.

The SPDT relay (K5) with SMA connectors is controlled by the interlock. With interlock loop open, a RF connection is provided from the terminal C (Common) to the position NC (normally closed).

With interlock loop closed, a RF connection is provided between the terminal C (Common) and the position NO (normally open).

The interlock status is shown by the red LED on the module front panel, too.

Red LED switched on → Interlock loop is open

switched off → Interlock loop is closed

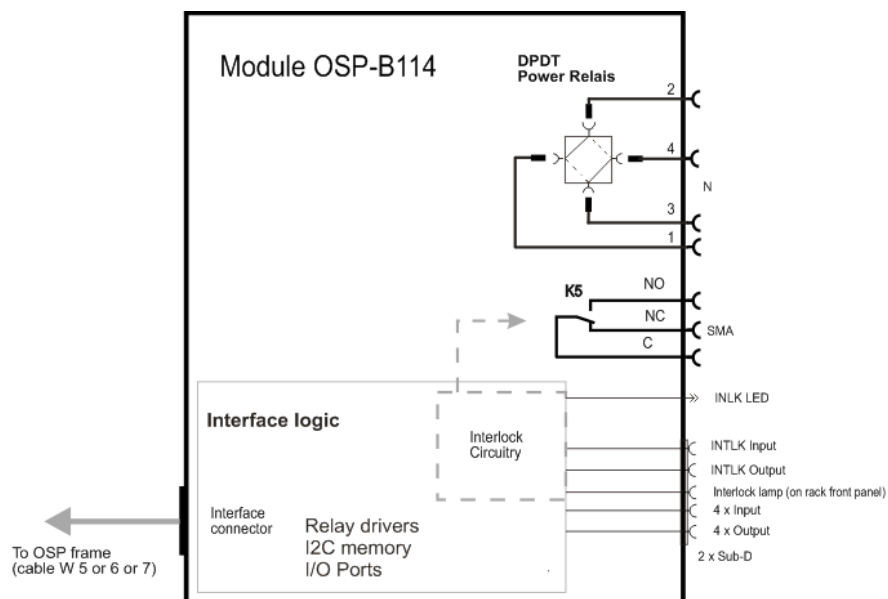


Figure 5-37: Block diagram Module R&S OSP-B114

When the module R&S OSP-B114 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See chapter 3.3.9 for details.

For remote control operation, for details in the application of this module and for the connector pin assignments, refer to the operating manual.

5.2.12 RF Switch Module R&S OSP-B131

The module R&S OSP-B131 is designed for high power RF switching. The OSP-B131 contains the following relay configuration:

- 2 x SPDT switches with N-connectors

The module is designed for independent control of both relays.

The relay is a failsafe type; i.e. a RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain a RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.



Figure 5-38: Module R&S OSP-B131

The relays are mounted directly in the OSP-B131 front panel. All the RF connectors are N female types. All relays are connected via a short cable to a printed circuit board; this way the module is of compact size.

The OSP-B131 module is supplied with power and controlled from the OSP120 via a single interface connector on the OSP-B131 printed circuit board. The connection to the OSP120 is done via a single connection cable.

The OSP-B131 module is equipped with on board memory to store the necessary configuration data of the module.

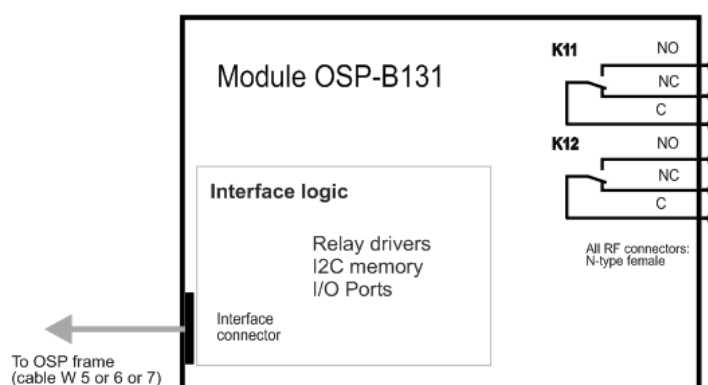


Figure 5-39: Block diagram Module R&S OSP-B131

When the module OSP-B131 is configured within the OSP120, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3](#) for details.

For remote control operation refer to the operating manual.

Depending on the required switching application, several modules of the OSP-B131 type can be installed in one OSP120.

In the OSP frame a maximum of three modules is possible. If more than three modules are required, the extension unit OSP150 must be used. For further information on the extension unit OSP150 refer to the operating manual.

5.2.13 RF Switch Module R&S OSP-B129 and R&S OSP-B119

The module R&S OSP-B129 is designed as a universal switching module using one terminated SP8T relay and two SPDT relays.

The module is designed for independent control of all relay.

The relay is a failsafe type. In case of the SP8T relay, no RF connection is provided from the terminal C (Common) to one of the six terminals when no voltage is applied to the relay. To maintain a RF connection between the terminal C (Common) and one of the six output terminals, a continuous voltage is to be applied to the corresponding power terminal of the relay.

In case of the SPDT relay, a RF connection is provided from the terminal C (Common) to the position NC (normally closed) with no voltage applied to the relay. To maintain a RF connection between the terminal C (Common) and the position NO (normally open), a continuous voltage is to be applied to the relay.

Note that for the SP8T relay only one out of the eight terminals is allowed to be activated at the same time. When operating the OSP-B129 inside the OSP, the OSP firmware takes care for correct switching of the SD8T relay.



Figure 5-40: Module R&S OSP-B119 and R&S OSP-B129

All relays are mounted directly in the OSP-B129 front panel. All the RF connectors are SMA female types. All relays are connected via a short cable to a printed circuit board; this way the module is of compact size.

The OSP-B129 module is supplied with power and controlled from the OSP120 via a single connector on the OSP-B129 printed circuit board. The connection to the OSP120 is done via one connection cable.

The OSP-B129 module is equipped with on board memory to store the necessary configuration data of the module.

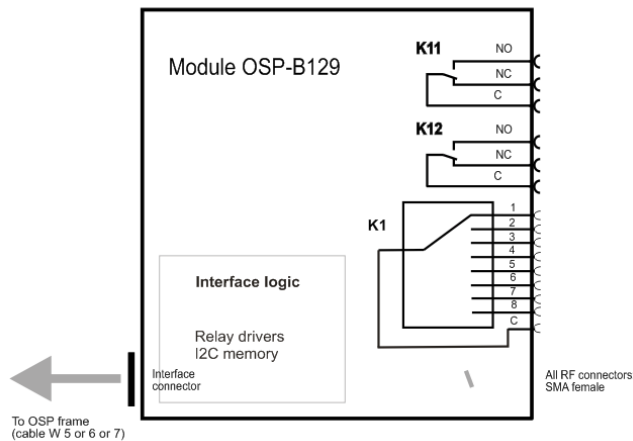


Figure 5-41: Block diagram Module R&S OSP-B129

When the module OSP-B129 is configured within the OSP120, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3](#) for details. For remote control operation refer to the operating manual.

The OSP-B129 is a one-slot module. Within one OSP120 up to three modules of this type can be installed.

The OSP frame offers a maximum of three slots. If more than one OSP-B129 are required, the extension unit OSP150 must be used. For further information on the extension unit OSP150 refer to the operating manual.

The description above also applies to the following R&S OSP modules that have a similar relay configuration:

Option	Relay configuration
OSP-B119	1 x SP8T relay, non terminated 2 x SPDT relay, non terminated

5.2.14 Power Sensor Module R&S OSP-PM-I

The module R&S OSP-PM-I allows to integrate a Power Sensor within the R&S OSP. The module R&S OSP-PM-I includes one N-type feed-through connector and one USB Adapter, both mounted in the modules front panel.

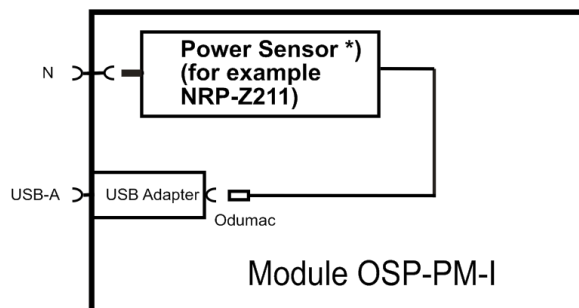
The module needs to be completed with a Power Sensor of the R&S family NRP-Zxx. It is recommended to use a power sensor version with short cable (for example R&S NRP-Z211 with Id. No. 1417.0409.04).

The module R&S OSP-PM-I is designed with base plate, where the Power Sensor together with cable is fitted. The Power Sensor with its N-type connector is directly screwed to the modules N-type feed-through connector. The Power Sensor is controlled via USB interface. The Power Sensors USB connector (Odumac L-series with 6 pins) is connected to the USB Adapter. The USB adapter serves as filter at the same time.



Figure 5-42: Module R&S OSP-PM-I

The module R&S OSP-PM-I just is used as housing for the Power Sensor. There is no connection to R&S OSP internal interface. See following block diagram.



***) Power Sensor is not part of the module OSP-PM-I**

Figure 5-43: Block diagram Module R&S OSP-PM-I

The R&S OSP-PM-I is a one-slot module. Within one R&S OSP120 up to three modules of this type can be installed.

5.2.15 RF Switch Module R&S OSP-B116 and R&S OSP-B136

The module R&S OSP-B116 and B136 are designed as a universal switching modules using two transfer switches DPDT.

The modules are designed for independent control of both relays.

The module R&S OSP-B116 is configured with two transfer relays and SMA connector type, the R&S OSP-B136 with two transfer relays and N connector type.

When not activated (no voltage applied to the relay) and after Reset, the terminals 1 - 2 and 3 - 4 are connected.

When activated, the terminals 1 - 3 and 2 -4 are connected.

Both the modules R&S OSP-B116/-136 module is equipped with on board memory to store the necessary configuration data of the module.configuration data of the module.

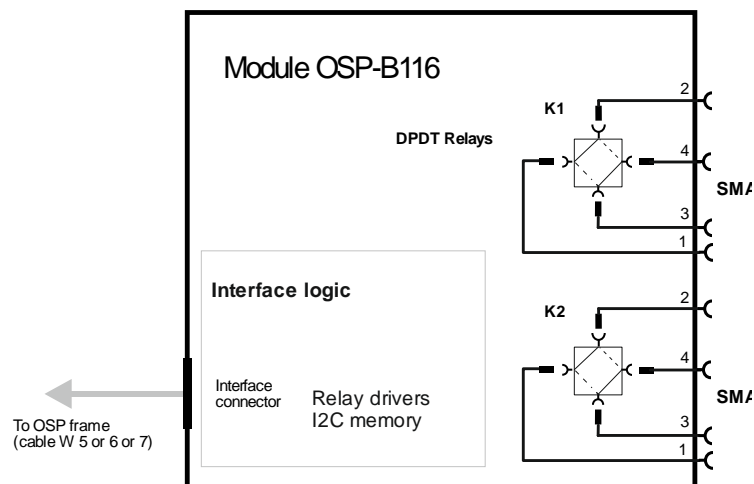


Figure 5-44: Block diagram Module R&S OSP-B116

The module R&S OSP-B136 is equipped with N-connector relays. See following pictures.

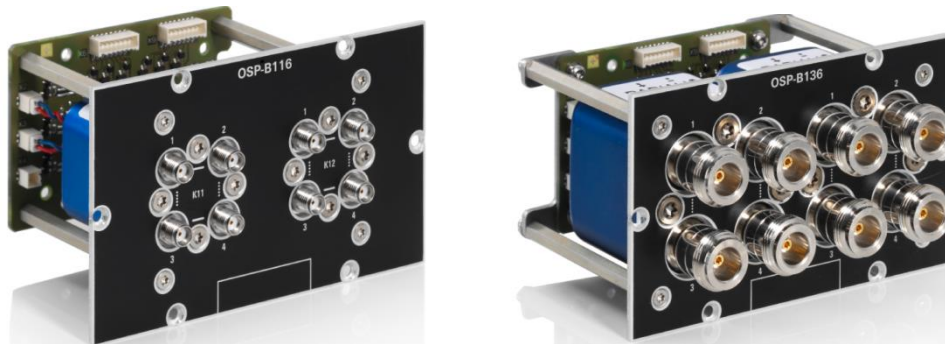


Figure 5-45: Module R&S OSP-B116 and R&S OSP-B136

When the module R&S OSP-B116/-136 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.9](#) for details.

For remote control operation, for details in the application of this module and for the connector pin assignments, refer to the operating manual.

The R&S OSP-B116/-136 is a one-slot module. Within one OSP base unit up to three modules of this type can be installed.

5.2.16 RF Switch Module R&S OSP-B101L/-B111xL and R&S OSP-B102L

The modules R&S OSP-B101L, R&S OSP-B111UL/VL and R&S OSP-B102L are designed as a universal RF switch modules using latched relay types.

The latching relay type will maintain a chosen RF connection whether voltage is maintained or not after switching is accomplished. The relay switching is done by applying a voltage pulse to the relay; after that no energy is consumed by this relay type.

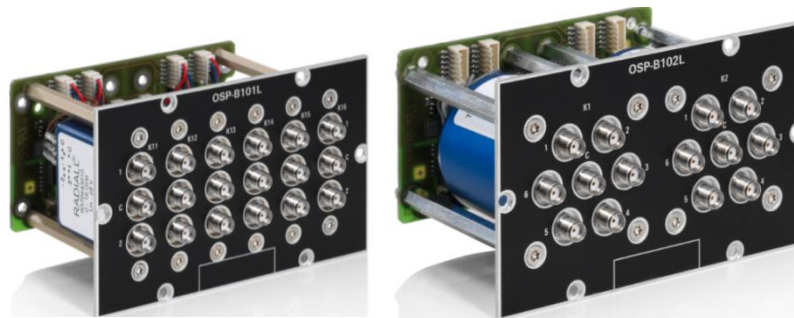


Figure 5-46: Module R&S OSP-B101L and R&S OSP-B102L

The relays are mounted directly in the module front panel. All the RF connectors are SMA female types. All relays are connected via a short cable to a printed circuit board; this way the module is of compact size.

Both modules are supplied with power and controlled from the OSP base unit via a single interface connector on the modules printed circuit board; the connection is just via a single connection cable.

Both the R&S OSP-B101L and R&S OSP-B102L module is equipped with an on board memory to store the necessary configuration data of the module.

Port designation:

In comparison to the module R&S OSP-B101 with monostable relays, the R&S OSP-B101L/-B111xL relays ports are labelled with 1 and 2 since after power off the last relay condition is maintained..

Latched type relays and Reset Condition:

As already mentioned above, the last relay condition is maintained after power off. The OPS firmware foresees two possibilities when powering on the R&S OSP. See following overview:

Power On Mode	Effect	Controlled via SCPI
Reset latched type relays	SPDT relay set to position 2 SP6T relay set to open position	CONFigure:POWerup:RESet "ON"
Keep latched type relay condition	Keep last state	CONFigure:POWerup:RESet "OFF"

⚠ CAUTION**Risk of personal injury due to RF radiation being switched on**

If the R&S OSP is used in a system or application that involves amplified RF radiation, switching on the RF power of a generator or amplifier could lead to personal injuries, if human exposure to this radiation is not prevented.

To avoid this risk, make sure that nobody is exposed to RF radiation, as soon as the power is switched on. It is in the responsibility of the user to define the Power Up condition of the modules R&S OSP-B101L and R&S OSP-B102L. Note the instructions given above.

Per default the Power Up condition for the latched relays is set to `POWERUP:RESET "ON"`.

The current setting can be read via SCPI command `CONFigure:POWerup:RESet?`. Refer to the operating manual for further information on the `CONFigure` commands.

5.2.17 I/O and supply Module R&S OSP-B158

The module R&S OSP-B158 is designed as a power supply and control module. It consists of a 16 bit input, a 16 bit differential RS422 output and a power supply connector. All ports are D-Sub connectors, male for input, female for output and power supply.

On the left side of the module, there are four LEDs, labeled +12 V, -12 V, +10 V and +28 V. If all LEDs show a green light, the power is OK. If one LED is off, there is a problem with the power supply of the corresponding voltage and probably the maximum current is exceeded (see data sheet). In such a case, please turn off the R&S OSP, disconnect any cable connected to the supply connector and turn the R&S OSP back on and check the LED again.

The LED labeled EXT shows a green light, if a 3.3 V voltage is supplied at the input connector pin 17 (AUX-IN), see [chapter 3.3.8](#).

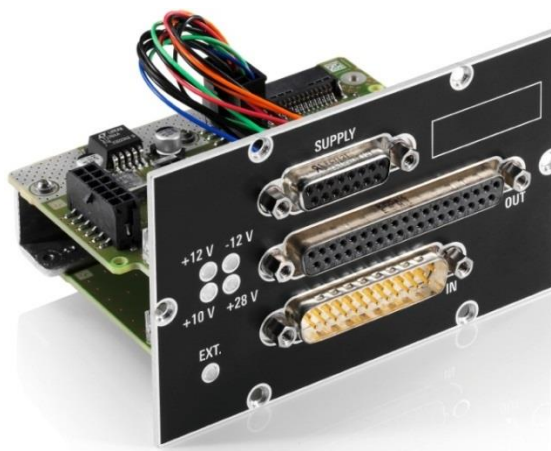


Figure 5-47: Module R&S OSP-B158

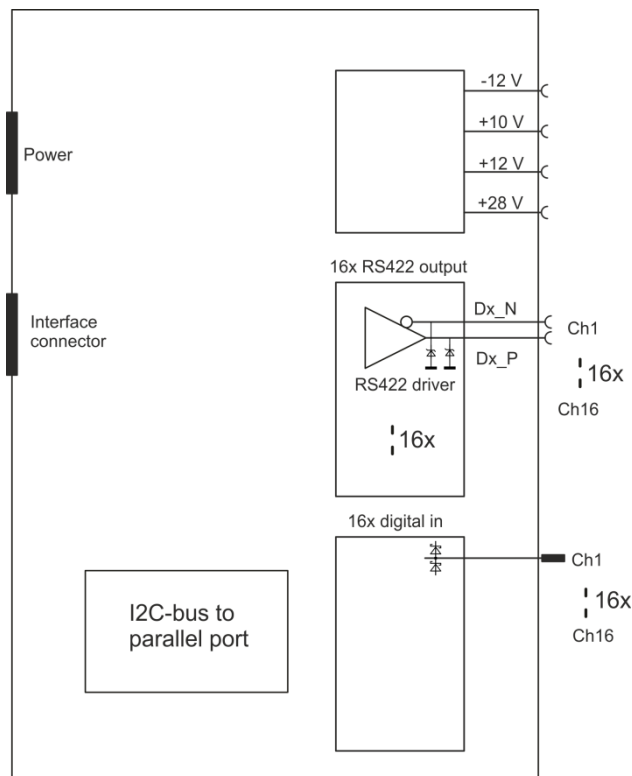


Figure 5-48: Block Diagram Module R&S OSP-B158

When the module R&S OSP-B158 is configured within the R&S OSP, a manual operation of the module can be performed via the OSP Panel. See [chapter 3.3.8](#) for details.

For remote control operation and for details on the connector pin assignments, refer to the operating manual.

5.2.18 RF Switch Module R&S OSP-B142

The module R&S OSP-B142 is designed as a universal RF switch modules using solid state relay types. Depending on the variant it consists of one, two or three SPDT switches or of three DP3T switches. All switches can be operated independently from each other.

The solid state relay allows handling of up to 40 dBm in a frequency range up to 8 GHz.

The relay is a solid state type; i.e. an RF connection is provided from the terminal C (Common) to the position P2 only with power switched on. When the relay is activated, the terminal C is connected to position P1.

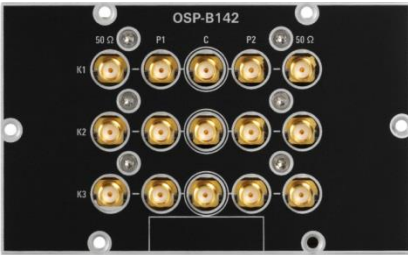


Figure 5-49: Module R&S OSP-B142 (variant .03 with 3 DP3T switches)

The relays are mounted directly in the module front panel. All the RF connectors are SMA female types. All relays are plugged into a kind of backplane; this way the module is of compact size and no cabling to the relays is required.

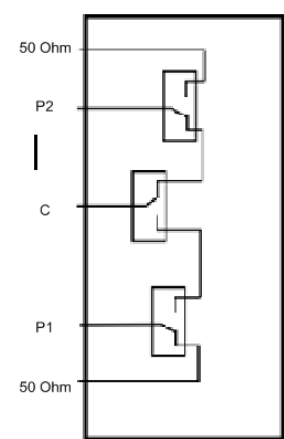
The R&S OSP-B142 module is supplied with power and controlled from the R&S OSP base unit via a single interface connector on the module’s printed circuit board; the connection is done via a single connection cable.

The R&S OSP-B142 module is equipped with on-board memory to store the configuration data of the module.

The R&S OSP-B142 exists in four different variants:

Variant	Relay configuration
OSP-B142 V03	3 x DP3T relay, sold state, w/o external termination
OSP-B142 V11	1 x SPDT relay, sold state, with external termination
OSP-B142 V12	2 x SPDT relay, sold state, with external termination
OSP-B142 V13	3 x SPDT relay, sold state, with external termination

The sketch below shows the details of each DP3T relay. Each of the three DP3T relays is built-up by three individual solid state switches.



5.3 Graphical User Interface

The R&S OSP130 can operate in local mode by means of its integrated operating elements and display screen. This chapter gives details for the operation of the instrument using the graphical user interface (GUI).

The same graphical user interface is available also for the R&S OSP120 when connected to a computer via LAN, and running some browser on this computer.

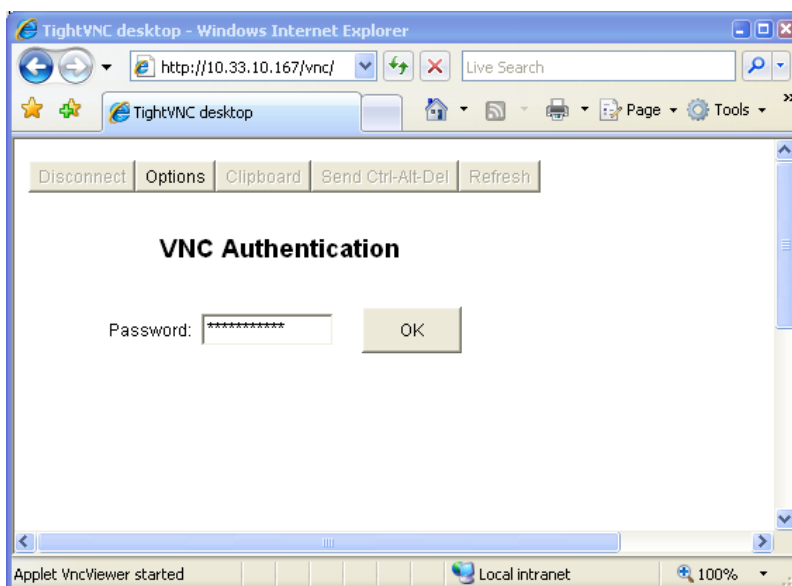
The following sections can help you to make efficient use of the OSP GUI of the R&S OSP. For additional information on using the OSP Panel see [chapter 3.3](#).

5.3.1 Starting the R&S OSP120

Connect monitor and mouse / keyboard to the R&S OSP120 instrument. After power-on, the instrument is in ready state after about 30 seconds. The graphical user interface is available when the R&S OSP120 is connected to a computer via LAN, and running some browser (Internet Explorer or Mozilla Firefox for example) on this computer. Type the following as URL:

<http://192.168.48.147/vnc/> (example with R&S OSP default IP address, see [chapter 2.9](#) for more information on IP address).

In the following dialog you are prompted for a password. Type **instruments** as password.



When finished the start screen displays some information on the equipment, as described in the following section.

The following keystrokes on the external keyboard correspond to the keys on the front panel of the R&S OSP130:


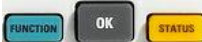
key on R&S OSP130 front panel

corresponding keyboard key



MENU Top level menu

CTRL + M

	BACK up in hierarchy by one menu level	ESC
	HOME Start screen	CTRL + H
	cursor keys	cursor keys or mouse
	FUNCTION switching action, if applicable.	CTRL + F
	OK confirms a selection	Enter, or mouse click
	STATUS status information or changes selection of a switch for path configuration.	CTRL + S

5.3.1.1 Starting the R&S OSP120 GUI without password

For some applications it can be reasonable to start the R&S OSP120 GUI without password, for example if you use the R&S OSP120 within a system that does already feature password protection. Starting the GUI without password is accomplished by a few steps to be entered via the Linux console.

NOTICE

If you disable the vnc password for the R&S OSP, the network access control is in your own responsibility.

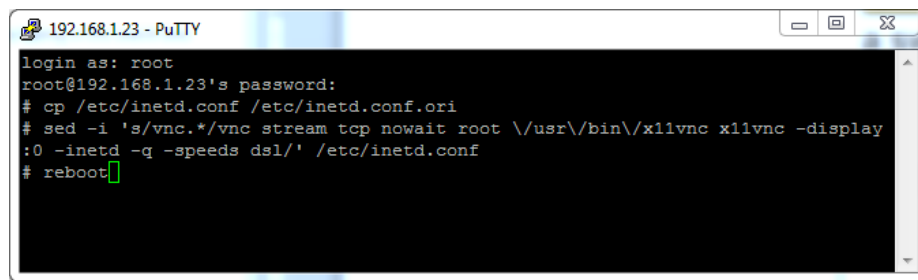
Once the vnc password is disabled, the instrument remains in this state, until the usage of a vnc password is explicitly enabled again.

Disabling the password:

47. Switch on the R&S OSP. The actual IP address must be known.
48. Start an application program (like PuTTY or similar) and connect your PC to the R&S OSP. When asked for the login, use the login name **root** and the password **root**.
49. Type in the following commands:


```
cp /etc/inetd.conf /etc/inetd.conf.orig
sed -i 's/vnc.*vnc stream tcp nowait root \Vusr\bin\vx11vnc x11vnc -display :0 -inetd -q -speeds dsl/' /etc/inetd.conf
reboot
```

This is shown in the following dialog:



```
192.168.1.23 - PuTTY
login as: root
root@192.168.1.23's password:
# cp /etc/inetd.conf /etc/inetd.conf.ori
# sed -i 's/vnc.*vnc stream tcp nowait root \\\usr\\bin\\x11vnc x11vnc -display
:0 -inetd -q -speeds dsl/' /etc/inetd.conf
# reboot
```

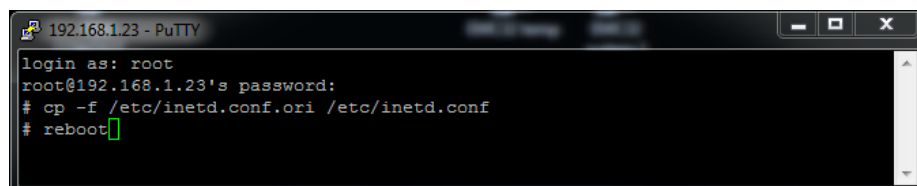
With the password disabled, the R&S OSP GUI is started **without any VNC authentication**.

Enabling the password again:

50. Switch on the R&S OSP. The actual IP address must be known.
51. Start an application program (like PuTTY or similar) and connect your PC to the R&S OSP. When asked for the login, use the login name **root** and the password **root**.
52. Type in the following commands:
cp -f /etc/inetd.conf.ori /etc/inetd.conf

reboot

This is shown in the following dialog:



```
192.168.1.23 - PuTTY
login as: root
root@192.168.1.23's password:
# cp -f /etc/inetd.conf.ori /etc/inetd.conf
# reboot
```

With the password enabled, the R&S OSP GUI is started **with VNC authentication**.

For the password, see [chapter 5.3.1](#).

NOTICE

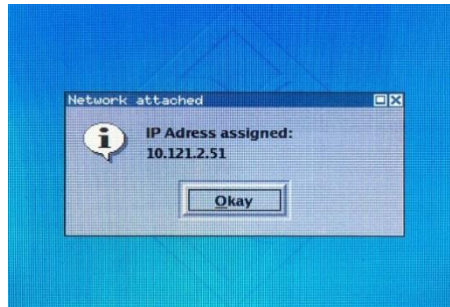
In order to type in the correct commands, we recommend to copy and paste the commands high-lighted in green fields above.

For copying (Windows OS) use CTRL+C, for pasting (using PuTTY) use the right mouse key.

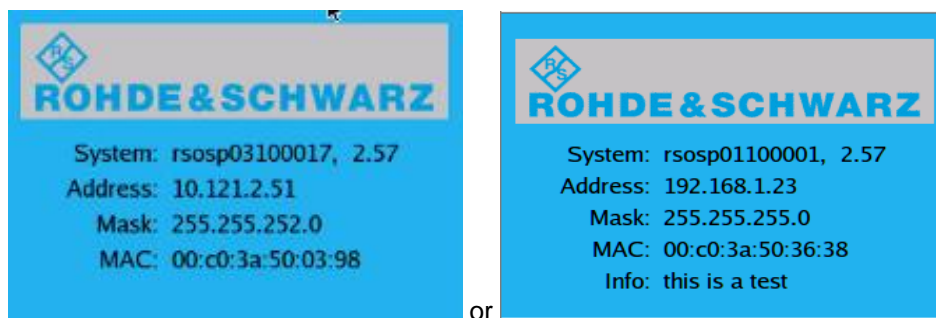
5.3.2 Starting the R&S OSP130

After power-on, the R&S OSP130 instrument is in ready state after about 30 seconds.

If the OSP is connected to a LAN network, the IP address is displayed after booting:



The display shown above disappears after some seconds and the start screen is displayed with basic information on the equipment:



The System field returns the string **rsospvvnnnnnnn, x.xx** where **vv** is the two-digit type identifier (e.g. "03" for R&S OSP130), **nnnnnn** the serial number of the instrument and **x.xx** is the software version.

The Address field indicates the IP address (see [chapter 2.9](#)).

The Mask field shows the subnet mask string.

With MAC the instrument's MAC address is shown.

For the Info field (if activated), see [chapter 3.7](#).

To go to the top level menu (Main menu), press any of the keys

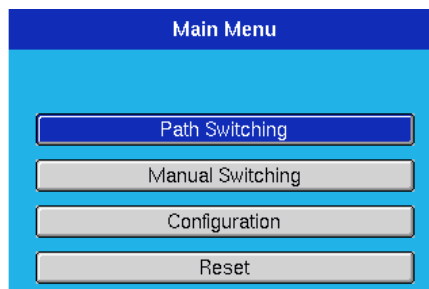
MENU, **RESET** or **OK** while the start screen is displayed.

5.3.2.1 GUI Information Line on R&S OSP130

With firmware version 2.57 onwards, an additional information line can be set up at the R&S OSP130. It either displays any custom text or the actual path set. For configuring the GUI info line, see [chapter 3.7.1](#).

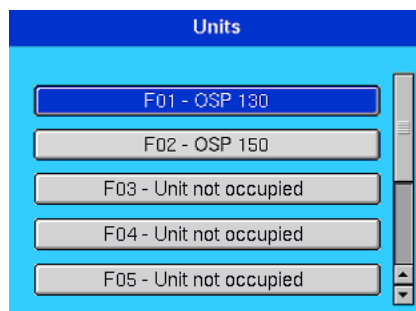
5.3.3 General Navigation Operations

The instruction in this section describe how to access the various menu levels, the modules of the instrument, and some general pieces of information.



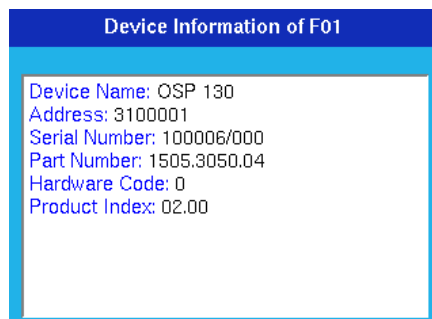
With the cursor keys, the appropriate menu function can be selected.

Selecting Manual Switching and pressing **OK** will display a screen as follows:

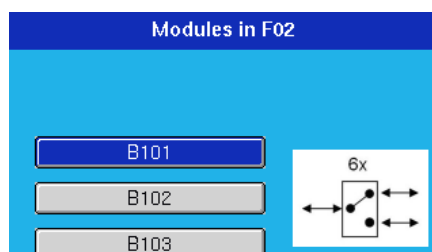


The example here shows an R&S OSP130 connected with a single extension unit R&S OSP150.

If an extension unit R&S OSP150 is located on F02 to F09, it can be selected from this dialog.



While the selection to one of the units is made, pressing the **STATUS** key will display some information on the unit. See the example.



Selecting the unit and pressing **OK** will move into the next dialog.

Depending on the modules fitted to the unit, the available selections will vary. In the example on the left hand side the first slot is equipped with an R&S OSP-B101, the second with an R&S OSP-B102, and the third with an R&S OSP-B103. Next to the selected module some picture visualizes the capability of the module, in the case of the R&S OSP-B101 indicated by a SPDT switch and the count 6x.

Device Information of (F02) A11

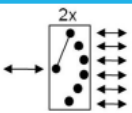
Device Name: OSP-B101
 Description: 6 x SPDT
 Serial Number: 100002/002
 Part Number: 1505.5101.02
 Hardware Code: 0
 Product Index: 02.02

While the selection to one of the modules is made, pressing the **STATUS** key will display some information on the module. See the example.

For completeness, see more examples of module information.

Modules in F02

B101
 B102
 B103

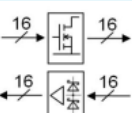


Device Information of (F02) A12

Device Name: OSP-B102
 Description: 2 x SP6T
 Serial Number: 100004/002
 Part Number: 1505.5201.02
 Hardware Code: 0
 Product Index: 02.02

Modules in F02

B101
 B102
 B103

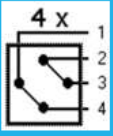


Device Information of (F02) A13

Device Name: OSP-B103
 Description: 16 x IO
 Serial Number: 100001/002
 Part Number: 1505.5301.02
 Hardware Code: 0
 Product Index: 02.02

Modules in F01

B101
 B104
 B102



Device Information of (F01) A12

Device Name: OSP-B104
 Description: 4 x SPDT-IO
 Serial Number: 100008/000
 Part Number: 1505.5401.02
 Hardware Code: 0
 Product Index: 01.00

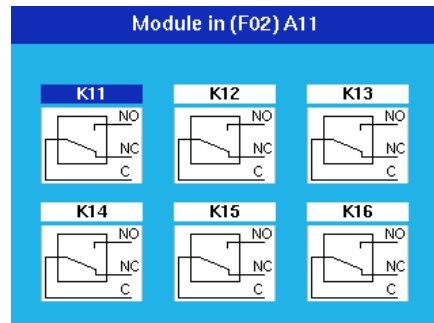
BACK

From any menu level, this key will bring you one level up in hierarchy.

MENU

From any menu level, this key will bring you directly to the Main menu.

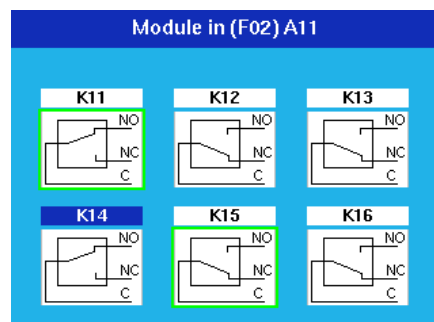
5.3.4 Using the R&S OSP-B101/-B106/-B107/-B111



After selection of the R&S OSP-B101 module this dialog is opened.

With the cursor keys one of the six relays can be chosen, indicated by the blue color in the relay name.

Pressing the **FUNCTION** key toggles the relay from NC to NO and vice versa. The display of the switch in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the relay.

A selected relay (K11 and K15 in this example) is displayed with a green surrounding. All selected relays are taken over into a path configuration.

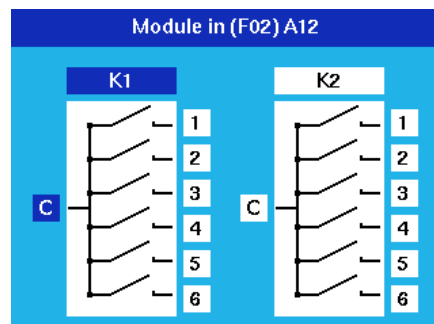
A non selected relay is not considered when defining a path configuration.

The operation as described above applies to further options of the R&S OSP as far as the option has got a similar relay configuration. It will apply to the following modules:

Option	Relay configuration
R&S OSP-B106	3 x SPDT relay with N connectors, 12 GHz, 3 x SPDT relays with BNC connectors, 900 MHz / 2 A
R&S OSP-B107	6 x SPDT relay, solid state, 6 GHz
R&S OSP-B111	6 x SPDT relay, 40 GHz

Please note that for the module R&S OSP-B106 the relays are numbered from K1 to K6 but from K11 to K16 for all other modules.

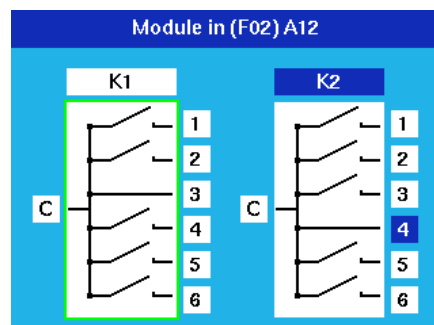
5.3.5 Using the R&S OSP-B102/-B112



After selection of the R&S OSP-B102 module this dialog is opened.

With the cursor left/right keys you can choose either relay, and with the cursor up/down keys any terminal of that relay, indicated by the blue color. In the example this is terminal 1 of relay K1.

Pressing the **FUNCTION** key closes the chosen relay position. With the Common terminal chosen ("C" displayed in blue) the relay is opened. The display of the switch in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the relay.

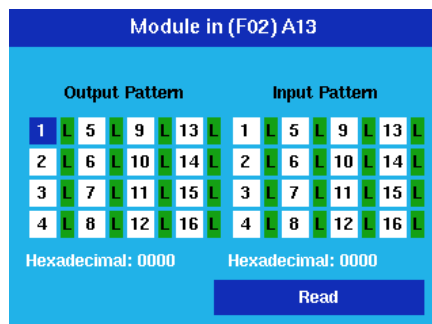
A selected relay (K1 in this example) is displayed with a green surrounding. All selected relays are taken over into a path configuration.

A non selected relay is not considered when defining a path configuration.

The operation as described above applies to further options of the R&S OSP as far as the option has got the same relay configuration. It will apply to the following modules:

Option	Relay configuration
R&S OSP-B112	2 x SP6T relay, 40 GHz
R&S OSP-B108	K1 = K11, DC MUX

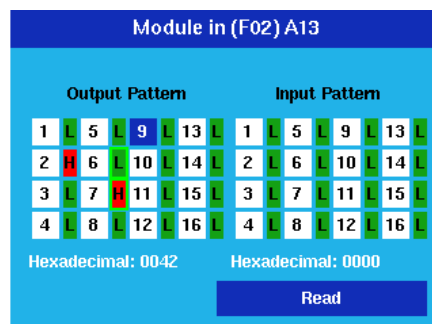
5.3.6 Using the R&S OSP-B103



After selection of the R&S OSP-B103 module this dialog is opened.

With the cursor keys any of the 16 output channels can be chosen, indicated by the blue color. In the example this is channel 1.

Pressing the **FUNCTION** key toggles this channel from low (L, dark green) to high (H, red) and vice versa. The display of the channel in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the channel.

A selected channel (channels 6 and 7 in this example) is displayed with a green surrounding. All selected channels are taken over into a path configuration.

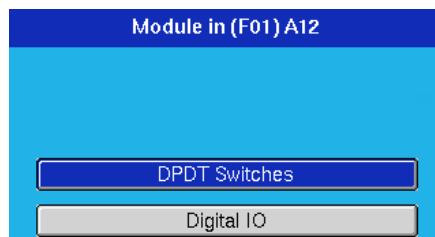
A non selected channel is not considered when defining a path configuration.

In addition to the single channel information a total of all 16 channels is shown as hexadecimal value. Channel 1 corresponds to the lowest bit, having the value 1, whereas channel 16 is the highest bit, having the value 8000.

Pressing the key **OK** will execute a read command reading the status of all input channels. They will be displayed in dark green for low values (L) and in red for high values (H).

In addition to the single channel information a total of all 16 channels is shown as hexadecimal value. Channel 1 corresponds to the lowest bit, having the value 1, whereas channel 16 is the highest bit, having the value 8000.

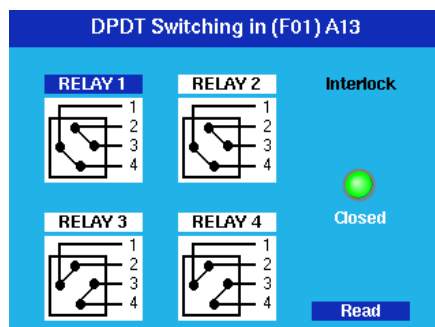
5.3.7 Using the R&S OSP-B104



After selection of the R&S OSP-B104 module this dialog is opened. With the cursor key either option can be selected and activated by pressing the key **OK**.

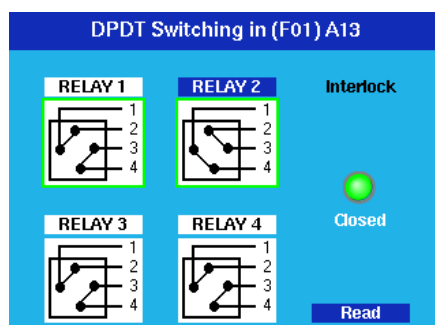
5.3.7.1 Setting the Transfer Relays and Reading the Interlock

In the DPDT Switches case, the following dialog opens.



With the cursor keys any of the 4 transfer relays can be chosen, indicated by the blue color. In the example this is RELAY 1.

Pressing the **FUNCTION** key toggles this relay into the opposite position, indicated by the lines between the connectors. In one position the connections are made between connectors 1 and 2 and between 3 and 4. In the other position the connections are made between connectors 1 and 4 and between 2 and 3.



Pressing the key **STATUS** toggles the selection of the relay.

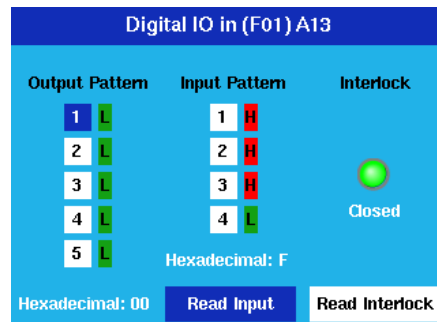
A selected relay (RELAY 1 and RELAY 2 in this example) is displayed with a green surrounding. All selected relays are taken over into a path configuration.

A non selected relay is not considered when defining a path configuration.

Pressing the key **OK** will execute a read command. The status of the interlock, i.e. if there is a connection between pins 7 and 15 of the IN / OUT connector, is indicated. A green signal shows a closed interlock, a red signal an open interlock. If the interlock is closed, a relay also closes a contact between pins 8 and 14 of the IN / OUT connector.

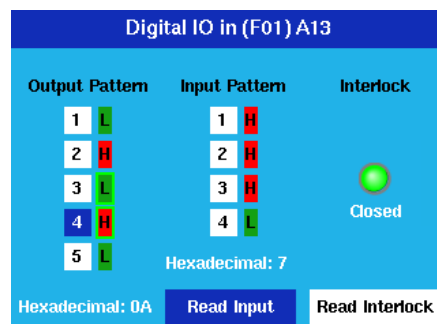
5.3.7.2 Input and Output Pattern

When the Digital I/O had been chosen, the following dialog is shown.



With the cursor up / down keys any of the 5 output channels can be chosen, indicated by the blue color. In the example this is channel 1.

Pressing the **FUNCTION** key toggles this channel from low (L, dark green) to high (H, red) and vice versa. The display of the channel in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the channel.

A selected channel (channels 3 and 4 in this example) is displayed with a green surrounding. All selected channels are taken over into a path configuration.

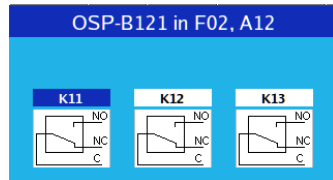
A non selected channel is not considered when defining a path configuration.

With the cursor left / right key either Read Input or Read Interlock can be selected, indicated in blue. Pressing the key **OK** will execute a read command.

In the case of Read Input the status of all input channels is read. They will be displayed in dark green for low values (L) and in red for high values (H). The case of Read Interlock reads the interlock status, see [chapter 5.3.7.1](#).

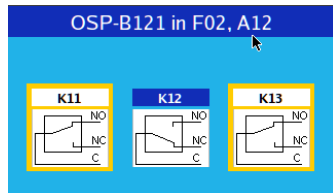
5.3.8 Using the R&S OSP-B121

After selection of the R&S OSP-B121 module this dialog is opened.



With the cursor keys one of the three relays can be chosen, indicated by the blue color in the relay name.

Pressing the **FUNCTION** key toggles the relay from NC to NO and vice versa. The display of the switch in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the relay.

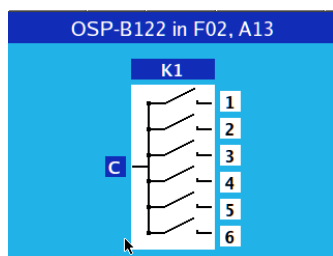
A selected relay (K11 and K13 in this example) is displayed with a green surrounding.

All selected relays are taken over into a path configuration.

A non selected relay is not considered when defining a path configuration.

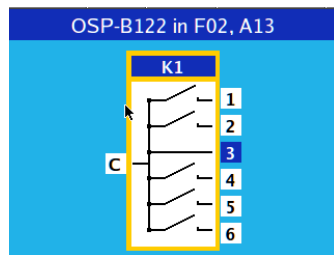
5.3.9 Using the R&S OSP-B122, OSP-B122H and OSP-B133

After selection of the R&S OSP-B122, R&S OSP-B122H or R&S OSP-B133 module, the following dialog is opened.



With the cursor up/down keys you can chose any terminal of that relay, indicated by the blue color. In the above example the common terminal C is selected; all six terminals are open.

Pressing the **FUNCTION** key closes the chosen relay position. With the Common terminal chosen ("C" displayed in blue) the relay is opened. The display of the switch in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the relay.

A selected relay (K1 in this example) is displayed with a green surrounding. All selected relays are taken over into a path configuration.

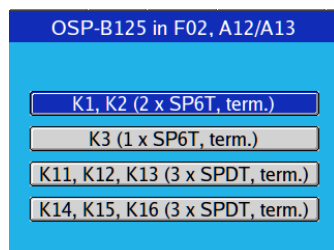
A non selected relay is not considered when defining a path configuration.

5.3.10 Using the R&S OSP-B123 to R&S OSP-B126 and R&S OSP-B129

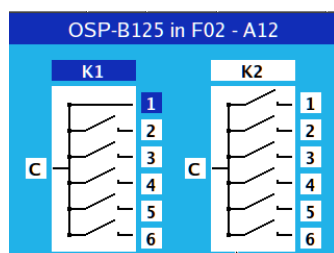
The modules R&S OSP-B123, R&S OSP-B124, R&S OSP-B125 and R&S OSP-B126 combine different numbers of SPDT and SP6T as they are used in the R&S OSP-B121 and R&S OSP-B122 module, respectively.

The module R&S OSP-B129 houses one terminated SP8T and two SPDT switches.

The following example is given for the module R&S OSP-B125. After selection of the this module the following dialog is opened. This dialog shows all the available relays of the module.

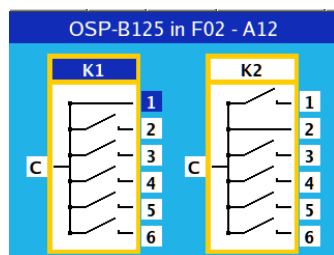


Selecting the first group of relays, a dialog is opened for relay selection and switching.



The operation is as usual. With the cursor left/right keys you can chose either relay, and with the cursor up/down keys any terminal of that relay, indicated by the blue color. In the example this is terminal 1 of relay K1.

Pressing the **FUNCTION** key closes the chosen relay position. With the Common terminal chosen ("C" displayed in blue) the relay is opened. The display of the switch in the dialog is changed accordingly.



Pressing the key **STATUS** toggles the selection of the relay.

A selected relay (K1 and K2 in this example) is displayed with a green surrounding. All selected relays are taken over into a path configuration.

A non selected relay is not considered when defining a path configuration.

The operation as described above applies to the following options of the R&S OSP with similar relay configuration.

Option	Relay configuration
R&S OSP-B123	6 x SPDT relay, 18 GHz, terminated 1 x SP6T relay, 18 GHz, terminated
R&S OSP-B124	3 x SPDT relay, 18 GHz, terminated 3 x SP6T relay, 18 GHz, terminated
R&S OSP-B126	3 x SP6T relay, 18 GHz, terminated
R&S OSP-B129	1 x SP8T relay, 18 GHz, terminated 2 x SPDT relay, 18 GHz

Please note that for the modules R&S OSP-B121 to R&S OSP-B126 and R&S OSP-B129 all relay types SPDT are counted starting with K1 whereas the SP6T types are counted from K11 onwards.

5.3.11 Path Configuration

A very comfortable way to define the different switching paths required in a test setup or in a system is the R&S OSP feature “path configuration”. With suitable dialogs it is easy to combine several relay positions of different R&S OSP modules in one path information. If path switching is required, only the path configuration is called by its name and the switching is performed more or less by a single command.

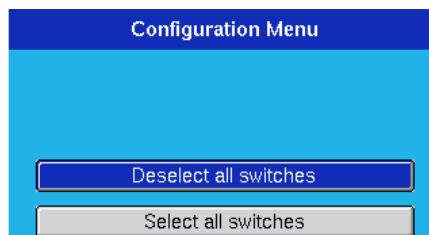
See also [chapter 3.4](#) for another approach to path configurations using OSP Panel.

In this chapter the functions related to path configurations are described based on some example. Refer to the previous chapters for selecting switch positions or output channel values.

Choosing a default selection



To obtain the correct switching for a new path configuration, it is recommended to start with a well-defined default selection. There are two possibilities described in the following paragraph.



Go from the Main menu to the Configuration menu.

If the number of switches to be included in a path is rather small, it is recommended to deselect all switches. This is done by choosing “Deselect all switches”.

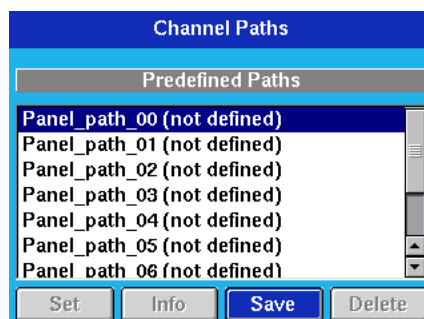
If the number of switches is rather large, choose “Select all switches” instead. Pressing the key **OK** will perform the related action.

Now go back to the Main menu, and from there select “Manual Switching”. In the following steps define all relay and output channel settings you want to include in the path configuration by using the **FUNCTION** key. Don't forget to select these relays and channels using the **STATUS** key if you have started from a deselected switches configuration, or to deselect the ones not required if you have started from a selected switches configuration.

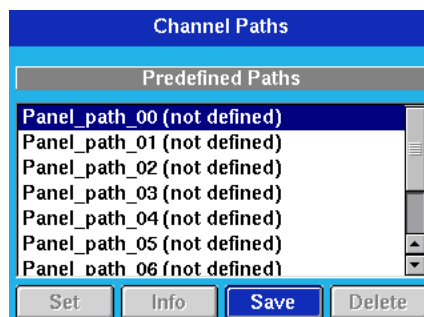
A path configuration may consist out of several relays located on different R&S OSP modules. Please note that the relay buttons in the corresponding dialogs must be selected for all relays which should be taken over in the path configuration.

Perform the settings of the R&S OSP-B101 module as shown in the second screenshot in [chapter 5.3.4](#). This selects K11 to be in NO and K15 to be in NC position.

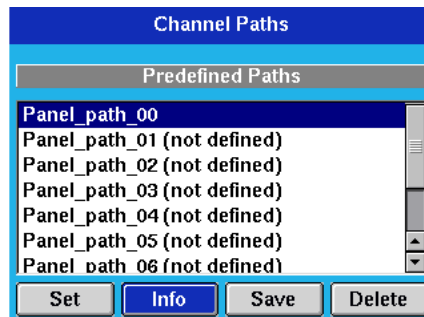
Then go back to the Main menu using the **MENU** key, and select the Path Switching menu.



If no path has been saved so far, the list shown in the dialog only contains undefined paths. By default, on an R&S OSP130 there are ten paths which can be defined (Panel_path_00 till Panel_path_09).

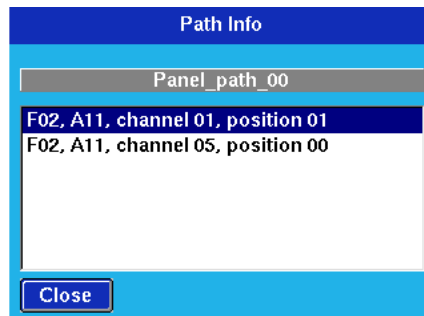


If no path has been saved so far, the list shown in the dialog only contains undefined paths. By default, on an R&S OSP130 there are ten paths which can be defined (Panel_path_00 till Panel_path_09).



After pressing the **OK** key (Save being the only possibility when an undefined path is marked) the path configuration is stored as Panel_path_00.

Now mark the Info button using the cursor keys and press **OK**.



The information displayed thereupon contains the two relays included in the path configuration.

Then go back to Manual switching and select the module R&S OSP-B102.

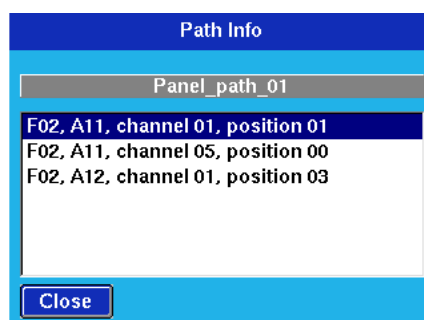
Perform the settings of the R&S OSP-B102 module as shown in the second screenshot in [chapter 5.3.5](#). This selects K1 to be in position 3.

Go now back to the Main menu using the **MENU** key, and select the Path Switching menu.

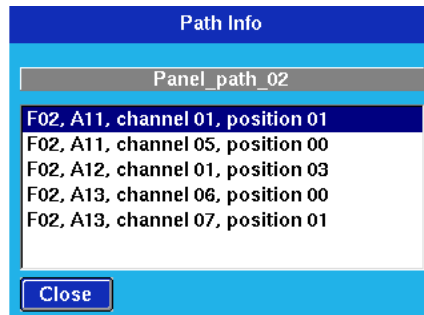
Channel numbers



Note that for some modules there might be an offset to be included either way in order to convert channel numbers to relay names. For example, channel 1 on an R&S OSP-B101 corresponds to K11.



Mark Panel_path_01 with the cursor keys and press **OK**. This saves the configuration. Displaying then the related information will lead to the display shown here. Note that the K1 setting of the R&S OSP-B102 has been added to the previous one since there was no deselect made for R&S OSP-B101. Then go back to Manual switching and select the module R&S OSP-B103. Perform the settings of the R&S OSP-B103 module as shown in the second screenshot in [chapter 5.3.6](#). This selects channel 6 to be low and channel 7 to be high. Save this configuration in a similar way to Panel_path_02 and display the related information.

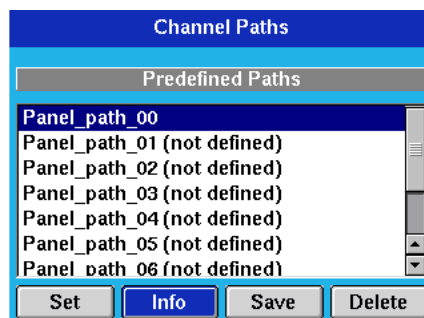


Again, you observe that the new information has been added.

If a new configuration needs to be independent from the previous one, you should use the Configuration menu first in order to deselect or select all switches.

In any case, it is good practice to verify the settings by close inspection of the saved path configuration.

Besides the possibilities for defining a path configuration and to display the information related to this configuration, there are two more actions one can do from the path menu.



When marking an existing path and choosing the Set button, pressing **OK** will switch all relays and channels related to this path configuration.

Note that performing the switching will not change which switches are selected. Only the state of the switches of the path configuration will be set as desired.

When marking an existing path and choosing the Delete button, pressing **OK** will remove this path.

Names of path configurations



As seen in this chapter, the paths which can be chosen for saving path configurations are the fixed ones (Panel_path_01 etc.) provided on the GUI. Using the OSP Panel, see [chapter 3.4](#), free names can be given to configurations. Within the GUI it is possible to save new configurations onto these names as well, and also the other functions like Info, Delete and Set are available.

5.4 R&S OSP Switch Cycle Counter

The R&S OSP is designed with a switch cycle counter. Although the mechanical relays used in the R&S OSP modules are selected with respect to high life time, it is recommended to count the switching cycles to have an overview on the instrument use and to replace the relays in time. Please note that the Switch Cycle Counter function is disabled for all solid state relays.



R&S OSP Switch Cycle Counter

The cycle counter is active for all R&S OSP modules with mechanical relays. For R&S OSP modules with solid state relays the switch cycle counter is not activated.

The information on the switching cycles is stored on each of the R&S OSP modules. This way the modules always keep the actual information even when exchanging a module.

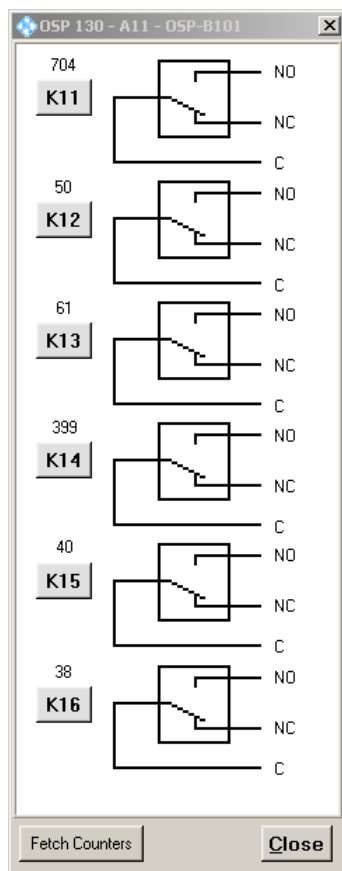


R&S OSP Switch Cycle Counter

The cycle counter state is not continuously saved on the flash memory of the R&S OSP modules but only in regular intervals. The switch cycle counter only is foreseen to be read for maintenance and service purpose.

The Switch Cycle Counter State can be read using the OSP Panel application.

Operating the OSP Panel will show a button “Fetch Counters” for all R&S OSP modules where this function is applicable. See the following example for R&S OSP-B101 module:



The numbers at each relay label (K11 to K16) show the cycles, the relays already have been switched to NO and NC position, respectively.

Fetch Counters

Selecting this button will read the actual state of the switch cycle counter.

Close

Pressing this button will exit the dialog.

R&S OSP Switch Cycle Counter



Note that the OSP switch cycle counter state is stored on the corresponding switch module on-board memory. To reduce the write operations for the on-board memory, the cycles are stored on the following events:

- each 60 minutes
- every 1000 cycles
- on each "Fetch Counters" command (only if counter state has changed)

5.5 R&S OSP Selftest

The R&S OSP provides a basic selftest procedure on module level. The selftest is primarily intended for production and service purposes; it is not needed during normal operation of the instrument. The following description serves as a general overview.

5.5.1 Selftest via R&S OSP Panel

A selftest can be performed for the R&S OSP via the OSP Panel. See [chapter 3](#) for information on the installation and operation of the OSP Panel application.

The selftest result reflects the current instrument status and checks if all the hardware as shown in OSP Panel module catalog is correctly initialized.

The selftest does not execute special hardware tests.

The selftest is started as follows:

- Select **>Utility >Self Test ...** in the OSP Panel.

The selftest is started immediately and with positive result, the following message will appear:



Press OK to exit the Selftest Utility.

5.6 R&S OSP Configuration Check

The R&S OSP and the installed modules all are equipped with on-board memory containing the actual device and module data. These data are primarily intended for production and service purposes.

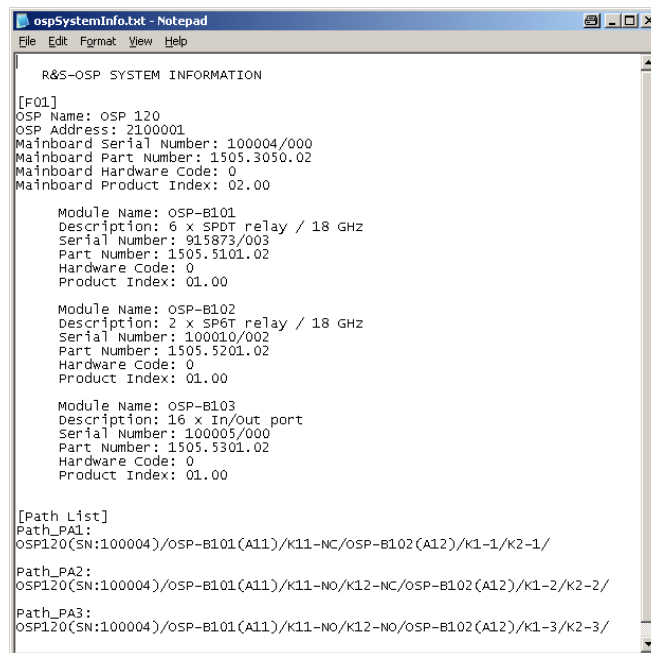
5.6.1 System Info via R&S OSP Panel

The system information can be read out of the R&S OSP via the OSP Panel. See [chapter 3](#) for information on the installation and operation of the OSP Panel application.

The system info can be read as follows:

- Select **>File >System Info ...** in the OSP Panel.

The system information is read from the R&S OSP hardware and the following text file is opened and displayed:



```

ospSystemInfo.txt - Notepad
File Edit Format View Help

R&S-OSP SYSTEM INFORMATION

[F01]
OSP Name: OSP 120
OSP Address: 2100001
Mainboard Serial Number: 100004/000
Mainboard Part Number: 1505.3050.02
Mainboard Hardware Code: 0
Mainboard Product Index: 02.00

Module Name: OSP-B101
Description: 6 x SPDT relay / 18 GHz
Serial Number: 915873/003
Part Number: 1505.5101.02
Hardware Code: 0
Product Index: 01.00

Module Name: OSP-B102
Description: 2 x SPDT relay / 18 GHz
Serial Number: 100010/002
Part Number: 1505.5201.02
Hardware Code: 0
Product Index: 01.00

Module Name: OSP-B103
Description: 16 x In/Out port
Serial Number: 100005/000
Part Number: 1505.5301.02
Hardware Code: 0
Product Index: 01.00

[Path List]
Path_PA1:
OSP120(SN:100004)/OSP-B101(A11)/K11-NC/OSP-B102(A12)/K1-1/K2-1/
Path_PA2:
OSP120(SN:100004)/OSP-B101(A11)/K11-NO/K12-NC/OSP-B102(A12)/K1-2/K2-2/
Path_PA3:
OSP120(SN:100004)/OSP-B101(A11)/K11-NO/K12-NO/OSP-B102(A12)/K1-3/K2-3/

```

If any paths are defined for the R&S OSP, they are listed under [Path List]. The name of the path is indicated together with the relay setting related to the path. Close the Notepad to exit the system info utility.



System Info:

The text file containing the System information is stored with the file name ospSystemInfo.txt in the installation directory of the OSP Panel (default directory: C:\OSP Panel).

Each time the system info utility is started at the OSP Panel, this file is overwritten with the actual data.

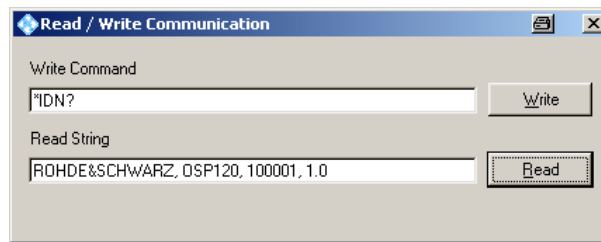
5.7 SCPI Read/Write

As an additional feature, the OSP Panel allows a direct communication with the R&S OSP via SCPI commands. This additional feature is foreseen for debug purpose and requires to be familiar with SCPI commands of the R&S OSP. Refer to the section on remote control of the operating manual for further information.

For direct communication with the R&S OSP via LAN interface proceed as follows:

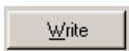
53. Start the OSP Panel.
54. Select **>Utility >Read/Write ...** in the OSP Panel.

The following dialog will appear:



The command to be written to the R&S OSP is entered in the upper text field. The above example sends the identify command to the R&S OSP as soon as the Write button is pressed.

After pressing the Read button, the answer is read from the R&S OSP. In the above example the identification of the R&S OSP is read back and displayed.



Having entered the SCPI command in the text field next to this button, the command is sent to the R&S OSP as soon as this button is pressed.



If the command sent to the R&S OSP is a query command expecting an answer from the R&S OSP, the answer can be read by pressing the READ button.

SCPI Read/Write Commands



This function is not required for operation of the R&S OSP. It is foreseen as additional feature for test and debug purpose. The use of SCPI Read/Write Commands requires knowledge of the R&S OSP remote control commands.

5.7.1 R&S OSP Temperature Read Command

The OSP design with I2C interface and memory on each module has the utility to read the temperature on it's interface.

Read OSP module temperature



Note that this utility makes use of the module interface function. The read-back of the module temperature is just for information and is not specified. This utility may be used for example to examine the temperature conditions of the R&S OSP when the unit is operated inside a rack.

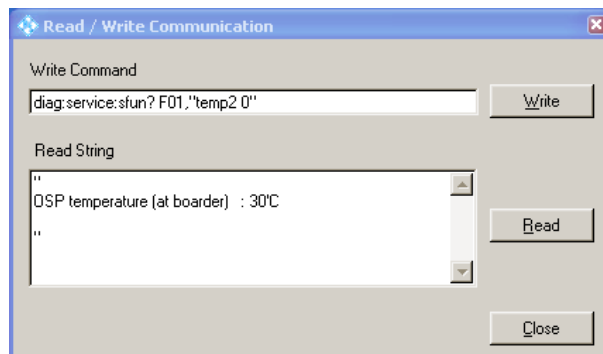
To read the temperature from the R&S OSP modules, the following SCPI command is sent to the R&S OSP: `diag:service:sfun? F01,"temp2 0"`

F01 is the R&S OSP frame 1 and temp2 the command to read the temperature.

The last digit in the above string has the following meaning:

- 0 = OSP Mainboard
- 1 = OSP Module interface 1
- 2 = OSP Module interface 2
- 3 = OSP Module interface 3

The SCPI command can be sent via the application OSP Panel, >Utility >Read/Write as shown in the below example.



Note that for the above function the corresponding module must be configured in the R&S OSP; if the module interface is not available, an error message will appear.

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