R&S®OSP-B200R/B200S2
Satellite System for R&S®OSP
User Manual

ROHDE&SCHWARZ

Make ideas real

This user manual describes the following satellite system models:

- R&S®OSP-B200R Remote Control Module (order no. 1528.3140K02)
- R&S®OSP-B200R Remote Control Module with FOL (order no. 1528.3140K04)
- R&S®OSP-B200S2 Satellite Unit (order no. 1528.3134K02)
- R&S®OSP-B200S2 Satellite Unit with FOL (order no. 1528.3134K04)

It describes also the following satellite system accessories, see Chapter 4.3:

- R&S®OSP-B200P Power Supply (order no. 1528.3205.02)
- R&S®OSP-Z200x 5 m to 10 m Wired Link Cable (order no. 1528.3170.xx)
- R&S®OSP-Z201x 5 m to 40 m FOL Cable, SC/SC (order no. 1528.3186.xx)
- R&S®OSP-Z203xF 0.5 m to 40 m FOL Cable, SC/FSMA (order no. 1528.1690.xx)
- R&S®OSP-Z204xF 0.5 m to 40 m FOL Cable, FSMA/FSMA (order no. 1528.1702.xx)

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®OSP-B200R is indicated as R&S OSP-B200R.

Contents

1 Safety and Regulatory Information

The product documentation helps you use the product safely and efficiently. Follow the instructions provided here and in the Chapter 1.1, "Safety Instructions", on page 5.

Intended use

The R&S OSP-B200R/B200S2 is designated for switching and control applications, including RF switching, in industrial, administrative, and laboratory environments. Use the R&S OSP-B200R/B200S2 together with the R&S OSP base switch units, see Chapter 2, "Key Features", on page 10, and only for its designated purpose.

Observe the operating conditions and performance limits stated in the data sheet.

Target audience

This document is targeted at all users, including installers, operators, and maintenance personnel.

Where do I find safety information?

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

- In Chapter 1.1, "Safety Instructions", on page 5. The same information is provided in many languages as printed "Safety Instructions". The printed "Safety Instructions" are delivered with the product.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

1.1 Safety Instructions

Products from the Rohde & Schwarz group of companies are manufactured according to the highest technical standards. To use the products safely, follow the instructions provided here and in the product documentation. Keep the product documentation nearby and offer it to other users.

Use the product only for its intended use and within its performance limits. Intended use and limits are described in the product documentation such as the data sheet, manuals and the printed safety instructions. If you are unsure about the appropriate use, contact Rohde & Schwarz customer service.

Using the product requires specialists or specially trained personnel. These users also need sound knowledge of at least one of the languages in which the user interfaces and the product documentation are available.

If any part of the product is damaged or broken, stop using the product. Never open the casing of the product. Only service personnel authorized by Rohde & Schwarz are allowed to repair the product. Contact Rohde & Schwarz customer service at http://www.customersupport.rohde-schwarz.com.

Lifting and carrying the product

The maximum weight of the product is provided in the data sheet. To move the product safely, you can use lifting or transporting equipment such as lift trucks and forklifts. Follow the instructions provided by the equipment manufacturer.

Choosing the operating site

Only use the product indoors. The product casing is not waterproof. Water that enters can electrically connect the casing with live parts, which can lead to electric shock, serious personal injury or death if you touch the casing. If Rohde & Schwarz provides a carrying bag designed for your product, you can use the product outdoors.

Unless otherwise specified, you can operate the product up to an altitude of 2000 m above sea level. The product is suitable for pollution degree 2 environments where nonconductive contamination can occur. For more information on environmental conditions such as ambient temperature and humidity, see the data sheet.

Setting up the product

Always place the product on a stable, flat and level surface with the bottom of the product facing down. If the product is designed for different positions, secure the product so that it cannot fall over.

If the product has foldable feet, always fold the feet completely in or out to ensure stability. The feet can collapse if they are not folded out completely or if the product is moved without lifting it. The foldable feet are designed to carry the weight of the product, but not an extra load.

If stacking is possible, keep in mind that a stack of products can fall over and cause injury.

If you mount products in a rack, ensure that the rack has sufficient load capacity and stability. Observe the specifications of the rack manufacturer. Always install the products from the bottom shelf to the top shelf so that the rack stands securely. Secure the product so that it cannot fall off the rack.

Connecting to power

The product is an overvoltage category II product and has to be connected to a fixed installation used to supply energy-consuming equipment such as household appliances and similar loads. Be aware that electrically powered products have risks, such as electric shock, fire, personal injury or even death.

Take the following measures for your safety:

- Before switching on the product, ensure that the voltage and frequency indicated on the product match the available power source. If the power adapter does not adjust automatically, set the correct value and check the rating of the fuse.

- If a product has an exchangeable fuse, its type and characteristics are indicated next to the fuse holder. Before changing the fuse, switch off the instrument and disconnect it from the power source. How to change the fuse is described in the product documentation.

- Only use the power cable delivered with the product. It complies with country-specific safety requirements. Only insert the plug into an outlet with protective conductor terminal.
- Only use intact cables and route them carefully so that they cannot be damaged. Check the power cables regularly to ensure that they are undamaged. Also ensure that nobody can trip over loose cables.
- If the product needs an external power supply, use the power supply that is delivered with the product or that is recommended in the product documentation or a power supply that conforms to the country-specific regulations.
- Only connect the product to a power source with a fuse protection of maximum 20 A.
- Ensure that you can disconnect the product from the power source at any time. Pull the power plug to disconnect the product. The power plug must be easily accessible. If the product is integrated into a system that does not meet these requirements, provide an easily accessible circuit breaker at the system level.

Cleaning the product

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use liquid cleaning agents.

Meaning of safety labels

Safety labels on the product warn against potential hazards.

⚠	Potential hazard Read the product documentation to avoid personal injury or product damage.
⚡	Electrical hazard Indicates live parts. Risk of electric shock, fire, personal injury or even death.
♨	Hot surface Do not touch. Risk of skin burns. Risk of fire.
⏚	Protective conductor terminal Connect this terminal to a grounded external conductor or to protective ground. This protects you against electric shock should an electric problem occur.

Using laser products

☀	Warning: laser beam The product contains a laser.
🚫	Avoid exposure to direct or reflected laser beam.

Lasers are classified according to their potential risk.

Class 1M lasers

Safe for the naked eye. If you look into the laser beam with optical instruments such as binoculars or eye loupes, you risk damaging your eyes.

Class 2 lasers

If you stare into the beam, you risk damaging your eyes.

1.2 Labels on the Product

Labels on the casing inform about:

- Personal safety, see Table 1-1
  and "Using laser products" on page 7
- Product and environment safety, see Table 1-1
- Identification of the product by the label that bears a bar code

Table 1-1: Labels regarding product and environment safety

	Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see "Disposing electrical and electronic equipment" on page 24.
	"Environment Friendly Use Period" (EFUP) according to the China "Restriction of Hazardous Substances" (RoHS) regulations. Here, 25 is the number of years before any of the RoHS substances (lead, mercury, cadmium etc.) are likely to leak out, causing possible harm to health and the environment.

1.3 Warning Messages in the Documentation

A warning message points out a risk or danger that you need to be aware of. The signal word indicates the severity of the safety hazard and how likely it will occur if you do not follow the safety precautions.

CAUTION

Potentially hazardous situation. Could result in minor or moderate injury if not avoided.

NOTICE

Potential risks of damage. Could result in damage to the supported product or to other property.

1.4 Korea Certification Class B

이 기기는 가정용(B급) 전자파 적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

2　Key Features

The R&S OSP-B200R and R&S OSP-B200S2 satellite system is the transparent extension of two R&S OSP module slots via a cable connection or fiber-optic link.

Advantages of this satellite system are:

● You can operate and control RF relays "on-site" at the shortest possible distance from other test equipment, for example in a shielded test chamber
● The non-conductive fiber-optic control link avoids electromagnetic interference
● The fiber-optic cables allow long-distance connections
● The fiber-optic cables easily feed through the shielding of anechoic chambers

Base unit required

You can operate the satellite options R&S OSP-B200R and R&S OSP-B200S2 only in connection with one of the following base switch units:

● R&S OSP120, R&S OSP130 or R&S OSP150 (**1st generation**)
● R&S OSP220, R&S OSP230 or R&S OSP320 (**2nd generation**)

For all information related to these switch units, refer to the R&S OSP user manuals.

This manual describes the satellite options for the R&S OSP family:

● R&S OSP-B200R (order no. 1528.3140K02 / K04)
  Remote control module for one satellite R&S OSP-B200S2
● R&S OSP-B200S2 (order no. 1528.3134K02 / K04)
  Satellite unit with two standard R&S OSP module slots

It describes also the satellite system's accessories, including cables and power supply.

3 Documentation Overview

This section provides an overview of the R&S OSP-B200R and R&S OSP-B200S2 user documentation. Unless specified otherwise, you find the documents on the manual pages of the R&S OSP switch units at:

- www.rohde-schwarz.com/manual/osp (1st generation)
- www.rohde-schwarz.com/manual/osp-n (2nd generation)

3.1 User Manual

Contains the description of all functions of the R&S OSP-B200R and R&S OSP-B200S2. The user manual supports you during the full life cycle of the product, from installation to interfaces. It provides explanations, step-by-step procedures, figures and examples, and information on maintenance.

A printed version is delivered with the instrument. The user manual is also available for download or for immediate display on the internet.

3.2 Manuals of the Base Switch Units

Contain the description of all functions of the 1st and 2nd generation R&S OSP switch units. For general handling of modules and switch units, especially refer to the chapter "Trying Out the Switch Unit". Available for download or for immediate display on the internet.

3.3 Printed Safety Instructions

Provides safety information in many languages. The printed document is delivered with the product.

3.4 R&S OSP on the Internet

The websites www.rohde-schwarz.com/product/osp (1st generation) and www.rohde-schwarz.com/product/osp-n (2nd generation) provide:

- Key facts, features and options for the family of R&S OSP switch units
- Rohde & Schwarz contacts for information, quotes, demos & calibration services
- Technical documentation (manuals for R&S OSP switch units)
- Brochures and data sheets
- Application notes

- Drivers
- The switch unit's current firmware version with OSA and release notes
- Related documents and articles
- News and information on firmware updates

3.5 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S OSP-B200R/B200S2. It also lists the firmware applications and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

For data sheets and brochures of the R&S OSP switch units, including descriptions of the optional modules, see www.rohde-schwarz.com/brochure-datasheet/osp and www.rohde-schwarz.com/brochure-datasheet/osp-n.

3.6 Application Notes, Application Cards

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

3.7 Drivers

Instrument drivers are available for download at www.rohde-schwarz.com/driver/osp.

3.8 Release Notes and Open Source Acknowledgment

Release notes list new features, improvements and known issues of current firmware or software versions and describe the installation. The open source acknowledgment (OSA) document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/osp

and www.rohde-schwarz.com/firmware/osp-n

and www.rohde-schwarz.com/software/osp

4 Hardware Description

4.1 Remote Control Interface Module R&S OSP-B200R

The interface for operating the satellite unit R&S OSP-B200S2 is the one-slot remote control (RC) module R&S OSP-B200R. It must be installed in one of the base switch units listed in Chapter 2, "Key Features", on page 10.

Figure 4-1: Remote control interface module R&S OSP-B200R, here model K04

Two versions of the R&S OSP-B200R remote control module are available:

Model No.	Description	Characteristics
1528.3140**K02**	Remote control (RC) interface module for one satellite unit R&S OSP-B200S2	Electrical interface (wired link)
1528.3140**K04**		Fiber-optic and electrical interface (FOL and wired link)

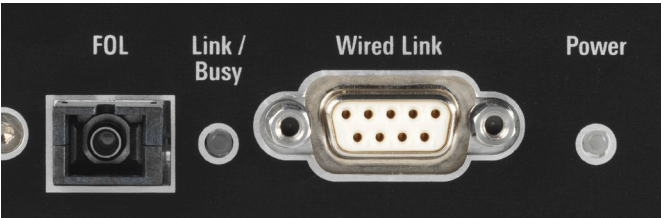**Connectors in the R&S OSP-B200R**

Figure 4-2: Interface connectors and LEDs in the RC module's interface panel

FOL   = Fiber-optic link, see Figure 5-5
Wired Link   = DC interface, see Figure 5-4
Link / Busy, Power = Status LEDs, see Table 6-1

4.2 Satellite Unit R&S OSP-B200S2

The module R&S OSP-B200S2 is the satellite unit for the R&S OSP family. It offers two slots for standard size (one-slot) switch modules:

Figure 4-3: Front view of R&S OSP-B200S2 satellite with two modules (R&S OSP-B128 and -B102)

Figure 4-4: Rear view of R&S OSP-B200S2 satellite unit with interface connectors, here model K04

Two versions of the R&S OSP-B200S2 satellite unit are available:

Model no.	Description	Characteristics
1528.3134**K02**	R&S OSP-B200S2 satellite unit	Electrical interface (wired link)
1528.3134**K04**		Fiber-optic and electrical interface (FOL and wired link). Requires 28 V DC power supply R&S OSP-B200P.

For the meanings of the labels, see "Using laser products" on page 7 and Chapter 1.2, "Labels on the Product", on page 8.
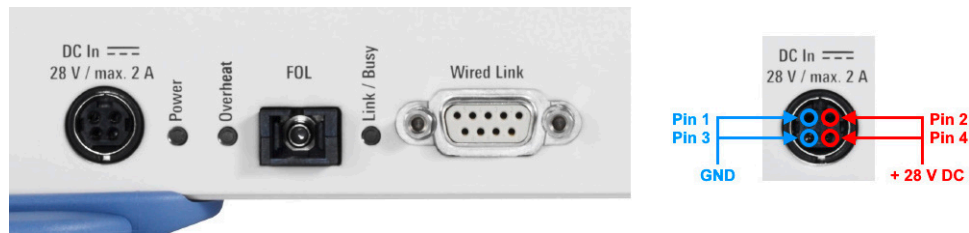
Connectors in the R&S OSP-B200S2

Figure 4-5: Interface connectors and LEDs in the satellite unit's rear panel

DC In	= Power input, only for FOL operation (far right: pin assignment)
FOL	= Fiber-optic link, see Figure 5-5
Wired Link	= DC interface, see Figure 5-4
Power, Overheat, Link/Busy	= Status LEDs, see Table 6-1

NOTICE

Risk of equipment damage

Connect **[Wired Link]** to the R&S OSP-B200R remote control interface module, **only**. Connecting it to any other equipment can cause damage.

4.3 Accessories for the Satellite System

The following accessories are available for your satellite system applications:

Table 4-1: Accessories

Type	Description	Length	Order no.
R&S OSP-Z200A	LAN-type cable (wired link) with 15-pin D-Sub connectors on both ends.	5 m	1528.3170.02
R&S OSP-Z200B	Used for direct connection of satellite and RC module. Suited for K02 and K04 models.	10 m	1528.3170.04
R&S OSP-Z201A		5 m	1528.3186.02
R&S OSP-Z201B	Single-mode fiber-optic link (FOL) cable, yellow.	10 m	1528.3186.04
R&S OSP-Z201C	Suited for K04 models, only. SC connectors on both ends.	20 m	1528.3186.06
R&S OSP-Z201D	Used for direct connection of satellite and RC module, only.	30 m	1528.3186.08
R&S OSP-Z201E		40 m	1528.3186.10
R&S OSP-Z203XF		0.5 m	1528.1690.02
R&S OSP-Z203YF	Multi-mode fiber-optic link (FOL) cable, orange.	1 m	1528.1690.03
R&S OSP-Z203ZF	Suited for K04 models, only. SC connector on one end, FSMA connector on other end.	3 m	1528.1690.04
R&S OSP-Z203AF	The delivery includes an FSMA-to-FSMA adapter.	5 m	1528.1690.05
R&S OSP-Z203BF	Used for feedthrough via FSMA connection point (CP). This usage requires **two** SC-FSMA cables.	10 m	1528.1690.10
R&S OSP-Z203CF		20 m	1528.1690.20

Type	Description	Length	Order no.
R&S OSP-Z203DF		30 m	1528.1690.30
R&S OSP-Z203EF		40 m	1528.1690.40
R&S OSP-Z204XF		0.5 m	1528.1702.02
R&S OSP-Z204YF		1 m	1528.1702.03
R&S OSP-Z204ZF	Multi-mode fiber-optic link (FOL) cable, orange.	3 m	1528.1702.04
R&S OSP-Z204AF	Suited for K04 models, only. FSMA connectors on both ends.	5 m	1528.1702.05
R&S OSP-Z204BF	The delivery includes an FSMA-to-FSMA adapter.	10 m	1528.1702.10
R&S OSP-Z204CF	Used as extension between two R&S OSP-Z203xF cables, or between multiple FSMA connection points.	20 m	1528.1702.20
R&S OSP-Z204DF		30 m	1528.1702.30
R&S OSP-Z204EF		40 m	1528.1702.40
R&S OSP-B200P	Power supply, required only for satellite with FOL (model K04 of R&S OSP-B200S2). Input: 90 VAC to 264 VAC, 47 Hz to 63 Hz, output: 28 V DC, max. 3.75 A.		1528.3205.02

The previously available R&S OSP-Z20**2**xF single-mode FOL cables (yellow) are replaced by the R&S OSP-Z20**3**xF multi-mode FOL cables (orange) listed above.

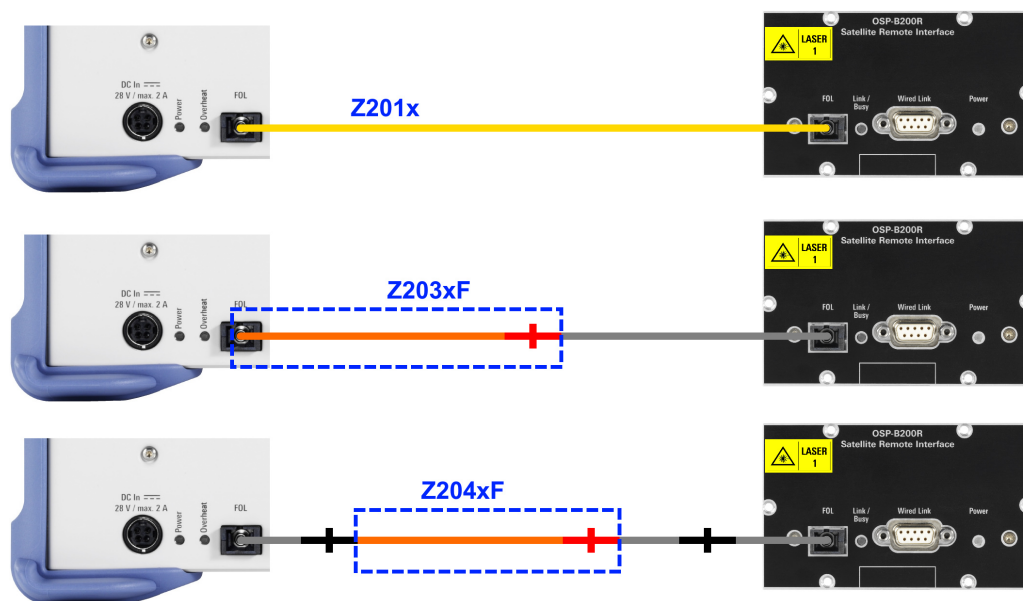**Do not combine single-mode FOL cables with multi-mode FOL cables.**

Figure 4-6: Available FOL cables for the K04 models of the satellite system

Z201x   = SC-to-SC cable R&S OSP Z201x (yellow)
Z203xF = SC-to-FSMA cable R&S OSP Z203xF (orange), including FSMA-to-FSMA adapter
Z204xF = FSMA-to-FSMA cable R&S OSP Z204xF (orange), including FSMA-to-FSMA adapter

5 Preparing for Use

5.1 Unpacking and Checking

1. Unpack the product carefully.

2. Retain the original packing material. Use it when transporting or shipping the product later.

3. Using the delivery notes, check the equipment for completeness.

4. Check the equipment for damage.

   If the delivery is incomplete or equipment is damaged, contact Rohde & Schwarz.

5.2 Mounting the RC Module into a Base Unit

Mount the one-slot RC interface module R&S OSP-B200R into one of the R&S OSP base switch units listed in Chapter 2, "Key Features", on page 10.

Figure 5-1: Remote-control interface module (here: model K04) mounted in base switch unit

Mounting a module is described in the user manuals of the base switch units.

We recommend connecting both interface cables of the R&S OSP-B200R to 2 internal module busses on the R&S OSP mainboard, to enable using both slots in the satellite unit, see Table 5-1.

ⓘ A 1st-generation R&S OSP base unit provides 3 module busses. Typically, connect the RC interface module to module buses A11 and A12. Note that you can operate only one additional module in a 1st-generation base unit.

5.3 Mounting a Switch Module into the Satellite

If you have ordered the satellite unit R&S OSP-B200S2 together with R&S OSP switch modules, these modules are mounted and tested in the factory.

To mount a switch module in the satellite unit later on:

1. Disconnect all cables from the satellite unit.

2. For mounting your switch module, select a slot, A (left) and B (right), ideally covered by a blank panel.
   If no blank panel is available, consider removing an existing module, instead.

3. Unscrew the six Torx 8 screws from the blank panel or existing module.
   Keep the screws.

4. Remove the blank panel or existing module from the satellite unit.

5. Find the flat-ribbon cable (module bus cable) in the open slot of the satellite unit.
   In each slot, one 26-pin flat-ribbon cable is available. Do not cross-over the cables.

Figure 5-2: Satellite unit with slot B front panel removed

6. **NOTICE!** Avoid bad connector mating. The connector shape serves as protection against reversed (180° rotated) connector mating. See also "Risk of hardware damage due to bad cable connection" in the base unit's user manual.

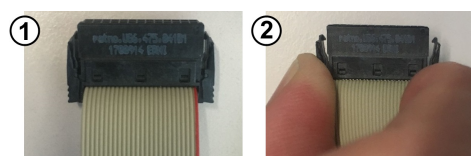   Connect the flat-ribbon cable to the switch module's connector.

Figure 5-3: To attach or release the cable, press the latches on the sides of its connector

7. **NOTICE!** Avoid contact of open cable ends with conductive parts. During operation, a short connection of open live cable ends with the satellite unit's casing can

cause damage. See also "Risk of hardware damage due to open cable ends" in the base unit's user manual.

Clamp any non-connected flat-ribbon cable in the satellite unit, with open cable ends pointing away from the casing.

8. Carefully insert the switch module into the slot.

9. Fix the module with the six screws.

10. Reconnect the cables to the satellite unit.

5.4 Connecting the Satellite System's Components

For the overall satellite system, make the following interface connections:

- Base unit to its integrated RC interface module R&S OSP-B200R, see Figure 5-1
- RC interface module to satellite unit R&S OSP-B200S2
    - By wired link as in Figure 5-4
    - By FOL as in Figure 5-5
- Only if you use FOL: power supply unit (28 V DC) to satellite unit as in Figure 5-5
- Satellite unit to its integrated switch modules, see Figure 5-2

Table 5-1: Details of the satellite system connections

R&S OSP model	Satellite channel	Base unit to RC module	RC module to satellite	Satellite unit to switch module
1st generation (R&S OSP120, R&S OSP130, R&S OSP150)	A	A11 (X2) / A12 (X4) or A13 (X13) to R&S OSP-B200R / X101 Default connection is **A11 to X101**	Use either a connection by D-Sub cable (wired link) or, for K04 models only, a fiber-optic connection (FOL)	R&S OSP-B200S2 / X101
	B	A11 (X2) / A12 (X4) or A13 (X13) to R&S OSP-B200R / X100 Default connection is **A12 to X100**		R&S OSP-B200S2 / X100
2nd generation (R&S OSP220, R&S OSP230, R&S OSP320)	A	M01 (X201) ... M16 (X216) to R&S OSP-B200R / X101 Default connection is **M01 to X101**		R&S OSP-B200S2 / X101
	B	M01 (X201) ... M16 (X216) to R&S OSP-B200R / X100 Default connection is **M02 to X100**		R&S OSP-B200S2 / X100

5.4.1 Satellite System with Wired Link

Figure 5-4: Satellite system with wired link (DC), suitable for K02 and K04 models

For remote operation of the satellite unit across a distance of up to 10 m, use the cable R&S OSP-**Z200**x (see Table 4-1).

NOTICE

Risk of equipment damage

Connect **[Wired Link]** to the R&S OSP-B200R remote control interface module, **only**. Connecting it to any other equipment can cause damage.

In this configuration, the satellite unit R&S OSP-B200S2 is powered by the R&S OSP base unit via the DC cable. The base unit can supply two switch modules in the satellite unit, each with a maximum of 0.8 A (at 28 V DC).

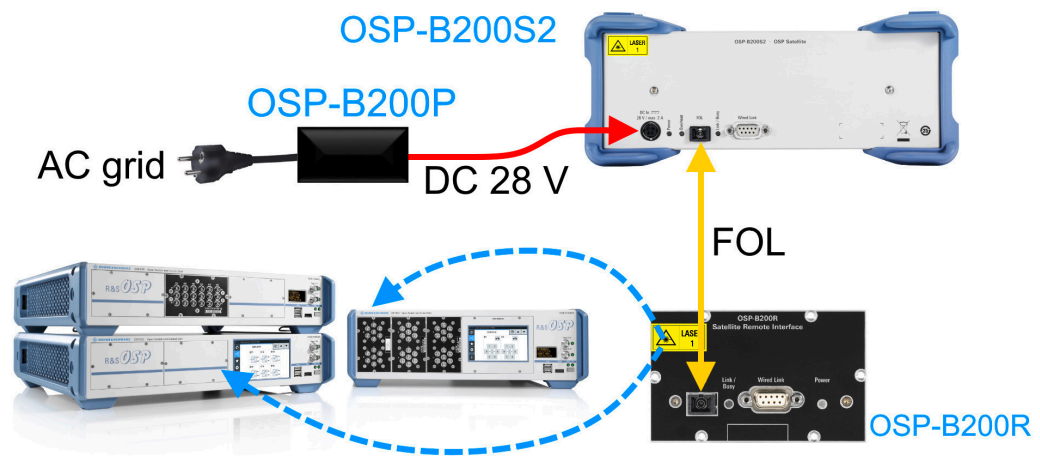## 5.4.2 Satellite System with Fiber-Optic Link

Figure 5-5: Satellite system with fiber-optic link (FOL, K04 models only) and DC power supply

For remote operation of the satellite unit at a longer distance or inside a shielded room, use an FOL cable R&S OSP-**Z201**x or R&S OSP-**Z203**x and optionally with R&S OSP-**Z204**x as extensions (see Table 4-1).

5.4.3 Overview of Interface Connections

Figure 5-6 provides an overview of the interface connections.

The figure shows both connection modes:

- The dashed gray double arrow represents the Wired Link (D-Sub cable)
- The solid black double arrow represents the FOL (fiber-optic cable)

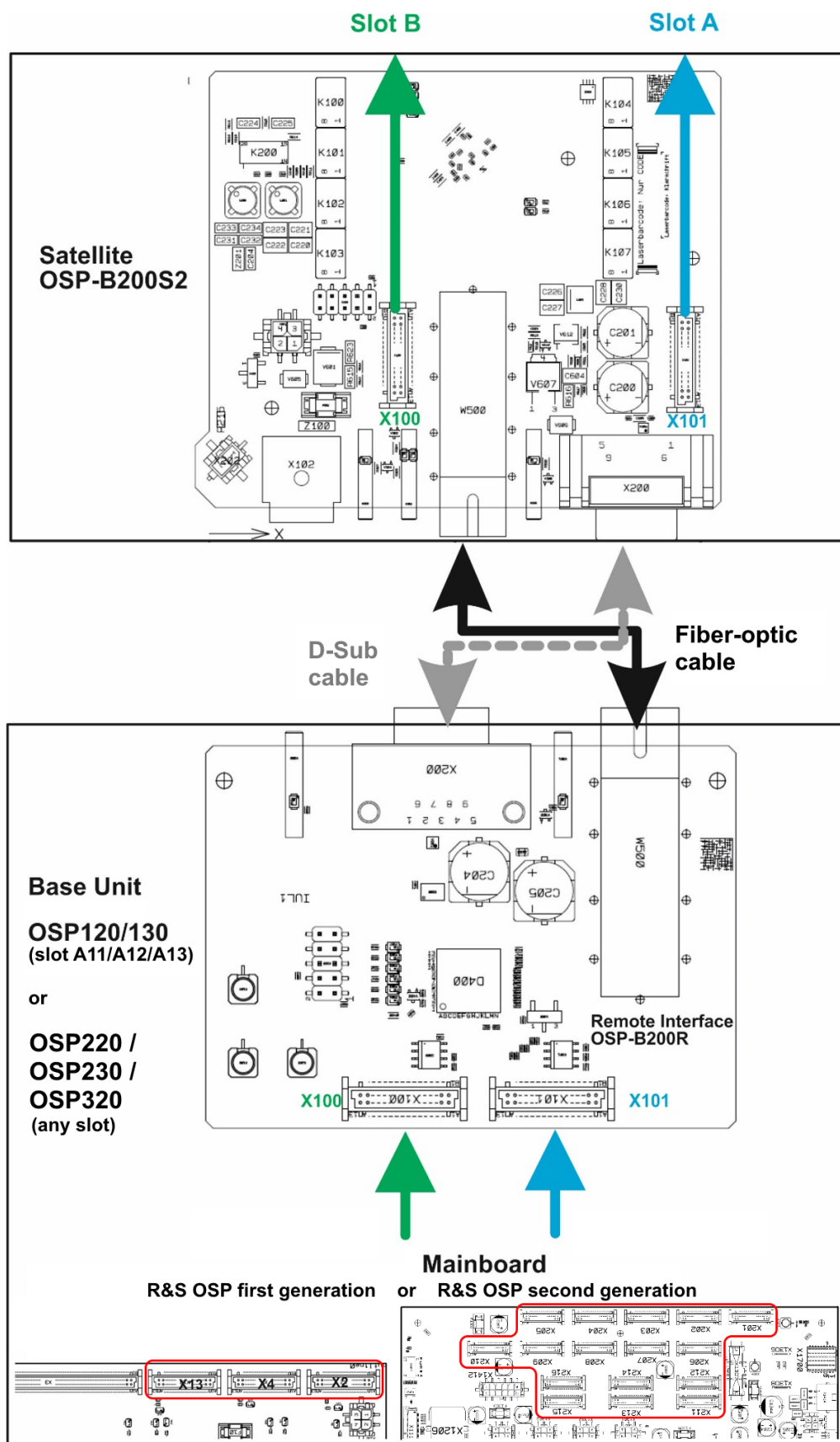However, make sure to **use only one** connection mode at a time, either [Wired Link] or [FOL].

Figure 5-6: Interface connections in the R&S OSP-B200R/B200S2 satellite system

6 Operating the Satellite System

When the satellite system is correctly installed and interconnected, proceed as follows before switching on the R&S OSP base unit:

To power up the satellite system

1. Connect the RC module R&S OSP-B200R to the satellite unit R&S OSP-B200S2.

2. In an FOL setup (Figure 5-5), connect the power supply R&S OSP-B200P to the satellite unit.

3. **Only then** power up the R&S OSP base unit.

Once powered up, operate modules in the satellite unit as if installed in the base unit.

6.1 System Status

After booting, 2 LEDs in the RC interface module R&S OSP-B200R and 3 LEDs in the satellite unit R&S OSP-B200S2 indicate the system status as follows:

Table 6-1: Status LEDs

Device	[Power] LED	[Link / Busy] LED	[Overheat] LED
RC module	**Green** when power is ON	• **Continuously yellow** when link between remote interface and satellite is established • **Flashing yellow** during data transfer	--
Satellite unit	**Green** when power is ON	• **Continuously yellow** when link between RC module and satellite is established • **Flashing yellow** during data transfer	• **Orange** when fan is switched on • **Red** if overheating occurs

If overheating occurs, indicated by a red [Overheat] LED in the satellite unit, it resets its built-in modules automatically.

6.2 Power Consumption

Both the satellite system and the modules fitted within the satellite unit draw power from the R&S OSP base switch units. However, the additional power consumption required by the satellite system is relatively low:

• Max. 50 mA at 28 V
• Max. 250 mA at 3.3 V

For power consumption data of the various modules, refer to the data sheet of the R&S OSP.

Note that in FOL operation, the R&S OSP-B200P supplies power to the satellite unit and its modules.

7 Transporting, Storage and Disposal

7.1 Transporting

Packing

Use the original packaging material. It consists of antistatic wrap for electrostatic protection and packing material designed for the product.

If you do not have the original packaging, use similar materials that provide the same level of protection.

Transport altitude

Unless otherwise specified in the data sheet, the maximum transport altitude without pressure compensation is 4500 m above sea level.

7.2 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the data sheet.

7.3 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

Disposing electrical and electronic equipment

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its service life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Figure 7-1: Labeling in line with EU directive WEEE

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

8 Maintenance

The product does not require regular maintenance. It only requires occasional cleaning. It is however advisable to check the nominal data from time to time.

If you use a fiber-optic link (FOL) with FSMA connectors, clean these connectors according to Chapter 8.2, "Maintaining Flawless FOL Connections", on page 25.

8.1 Cleaning

How to clean the product is described in "Cleaning the product" on page 7.

Do not use any liquids for cleaning. Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

8.2 Maintaining Flawless FOL Connections

In **FOL** operation of K04 models with **FSMA** fiber-optic connectors (R&S OSP-Z201x cables), keep these connectors **clean** to prevent errors in the communication between RC module and satellite unit.

- Handle all FSMA connectors with great care.
- If disconnected, always cover all open male and female connectors with end caps.

Quality of fiber-optic connections

Before mating two fiber-optic connectors, **clean** and **inspect** both connectors.

Even if a connector appears clean to the naked eye, it can be contaminated. Therefore, use a special microscope to inspect the fiber-optic connectors:
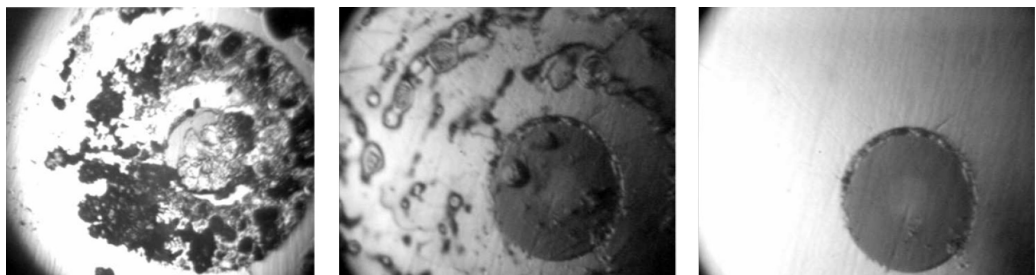

Figure 8-1: Microscopic images show degrees of soiling on the end face of a fiber-optic connector (source: Rosenberger-OSI GmbH)

Left = Connector soiled with dust, unacceptable quality of connection
Center = Same connector after pre-cleaning with alcohol, still unacceptable
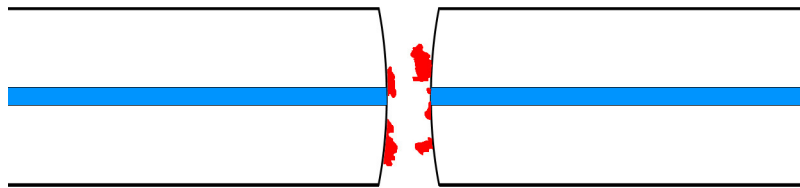Right = Same connector after dry post-cleaning, good cleaning result

Figure 8-2: Schematic view of two opposing fiber end faces with contamination

Blue = Fiber core, typical diameter is 50 µm
Red = Contamination in the contact area

Recommended cleaning equipment

- Dedicated dry fiber cleaning wipes, cards, reels, or tape
- Isopropyl or ethyl alcohol, 90% (vol.). Do not use other cleaning liquids, unless explicitly suited for cleaning fiber-optic connectors.
  To avoid absorption of water in a hygroscopic alcohol cleaning liquid, keep it in a hermetically sealed bottle. Or use alcohol-moisturized wipes from sealed bags.
- Ferrule cleaning sticks, diameter 2.5 mm, for fiber-connector end-face cleaning
- Ultra-clean compressed air from a spray can (optional)

Recommended inspection equipment

- Hand-held microscope for fiber-optic connectors, magnification at least 200:1
  – We recommend using a **video** microscope, because it is inherently eye-safe.
  – If you use a direct ocular microscope, ensure that **no live signal** is in the fiber. Looking into a magnified live beam can damage your eye.
- Optionally, feed the microscope's video output to a computer. Use image-analysis software to check the cleaning results of your fiber-optic connectors.

To clean a fiber-optic connector

1. Remove the end cap from the connector.

2. If the connector's end face is **open**, gently clean it with a dry fiber wipe, card, reel or tape.
   To do so, follow the application instructions of your cleaning equipment.
   If no instructions are available, apply a single linear swipe of the connector's end face across a previously unused part of the cleaning surface.

3. If the connector's end face is inside a **ferrule**, gently clean it with a dry ferrule cleaning stick.
   To do so, follow the application instructions of your cleaning equipment.
   If no instructions are available, insert a previously unused stick into the connector's ferrule with low force. Carefully rotate the stick counter-clockwise by 4 to 5 revolutions. Remove the stick.

4. Gently clean each connector with an **alcohol-moisturized** cleaning tool.
   To do so, follow the application instructions of your cleaning equipment.

If no instructions are available, apply a small amount of alcohol to your cleaning equipment. Proceed as described for dry cleaning (step 2 or step 3).

5. To remove alcohol and contamination from the connector's end face, repeat the dry cleaning procedure.
Alternatively, blow the connectors dry with ultra-clean compressed air.

6. **CAUTION!** Risk of eye damage. If you inspect the cleaning result with a direct ocular microscope, ensure that **no live signal** is in the fiber. Looking into a magnified live beam can damage your eye.

    Visually inspect the cleaning result in an eye-safe microscope (Figure 8-1). Especially the region of the fiber core must meet criteria as specified by standard **IEC 61300-3-35**.

7. If the connector is not clean, repeat the cleaning procedure.

8. Apply the entire cleaning procedure to the opposite connector, too.

9. Mate these two fiber-optic connectors.

10. Repeat the procedure for all connectors in a link.

11. Check this link for flawless fiber-optic communication.

8.3 Contacting Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:

Figure 8-3: QR code to the Rohde & Schwarz support page