

# R&S® SFE100

## Test Transmitter

### Getting Started



2112.4122.62 – 12

This manual describes the following models:

- R&S®SFE100, model .02 (2112.4100.02)
- R&S®SFE100, model .12 (2112.4100.12)
- R&S®SFE100, model .03 (2112.4100.03)
- R&S®SFE100, model .13 (2112.4100.13)

The software contained in this product makes use of several valuable open source software packages. For information, see the "Open Source Acknowledgement" document, which is available for download from the R&S SFE100 product page at [www.rohde-schwarz.com/product/sfe100.html](http://www.rohde-schwarz.com/product/sfe100.html) > "Downloads" > "Firmware".

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

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Mühlhofstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Fax: +49 89 41 29 12 164

Email: [info@rohde-schwarz.com](mailto:info@rohde-schwarz.com)

Internet: [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

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The following abbreviations are used throughout this manual: R&S®SFE100 is abbreviated as R&S SFE100.

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# 1 Preface

This chapter provides safety related information, an overview of the user documentation and the conventions used in the documentation.

## 1.1 For Your Safety

The product documentation helps you to use the R&S SFE100 safely and efficiently. Keep the product documentation in a safe place and pass it on to the subsequent users. Use the R&S SFE100 only in its designated purpose as described in the product documentation. Observe the performance limits and operating conditions stated in the specifications (data sheet).

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

- In the "Basic Safety Instructions", safety issues are grouped according to subjects. For example one subject is electrical safety. The "Basic Safety Instructions" are delivered with the R&S SFE100 in different media and languages: on the CD-ROM, in the printed safety brochure and in the printed getting started manual.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

Always read the safety instructions carefully. Make sure to fully comply with them. Do not take risks and do not underestimate the potential danger of small details such as a damaged power cable.

## 1.2 Documentation Overview

### Getting started

This manual is delivered with the instrument in printed form. It is an excerpt from the user manual (see below) and provides the information needed to set up the R&S SFE100 and start working with it. Also a sample application is described. For instructions on installation, refer to the release notes. The printed getting started manual also includes general information, e.g. the basic safety instructions. In PDF format, it is included in the user manual to allow quick access to the information needed.

### User manual

This manual is delivered with the instrument on CD-ROM. It provides the necessary information to work with the instrument. For additional information on default settings and parameters, refer to the data sheet.

## Help

The help is context-sensitive and provides a quick access to the complete description. To avoid crowding the screen, the screenshots are omitted.

For detailed information on how to use the help, refer to the chapter "Operating Concepts".

## 1.3 Conventions Used in the Documentation

The following conventions are used throughout this documentation.

### Typographical conventions

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialogs, menus, options, buttons, and softkeys are enclosed by parentheses.
KEYS	Key names are written in capital letters.
File names, commands, program code	File names, commands, coding samples and screen output are distinguished by their font.
<i>Input</i>	Input to be entered by the user is displayed in italics.
<a href="#">Links</a>	Links are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by parentheses.

### Conventions for procedure descriptions

When describing how to operate the R&S SFE100, several alternative methods may be available to perform the same task. If possible, the procedure using the front panel is described.

The terms "select" and "press" may refer to any of the described methods, i.e. using a key on the R&S SFE100 or on a keyboard, or a mouse pointer in the display.



## 2 Setting Up the R&S SFE100

### **WARNING**

#### **Risk of injuries**

To avoid injuries to yourself or others, always follow the instructions provided in the following chapters. Furthermore, observe the general safety instructions at the beginning of this manual.

### 2.1 Unpacking the R&S SFE100

The R&S SFE100 is shipped together with its mandatory accessories in a cardboard box.

#### 2.1.1 Inspecting for Shipping Damage

Check the following. If anything is damaged, immediately notify the carrier.

1. Check the shipping container and cushioning material for damage.
2. Unpack the cardboard box (see [Chapter 2.1, "Unpacking the R&S SFE100"](#), on page 9) and check the housing and handle for visible damages or loose parts.

#### 2.1.2 Unpacking the Cardboard Box

Proceed as follows:

1. Open the cardboard box.
2. Remove the accessories packed into the box.
3. Take the R&S SFE100 out of the packaging.
4. Remove the shock protectors attached to the R&S SFE100.



Retain the original packing material. If the R&S SFE100 needs to be transported or shipped at a later date, you can use the material to prevent control elements and connectors from being damaged. Rohde & Schwarz will only accept claims of warranty if the R&S SFE100 is shipped with sufficient packaging.

### 2.1.3 Checking the Accessories

The R&S SFE100 comes with the following accessories:

- Power cable
- Getting started manual
- CD-ROM containing the complete user documentation and firmware

### 2.1.4 Warranty Conditions

For information on warranty conditions for the R&S SFE100 refer to the terms of the delivery documents.

## 2.2 Putting Up the R&S SFE100

The R&S SFE100 is designed for interior use only. The R&S SFE100 can be used in standalone operation or can be installed in a rack.

---

### **NOTICE**

#### **Risk of material damage**

Make sure that the following conditions are met at the operation site:

- The ambient temperature does not exceed the range specified in the data sheet.
- All fan openings are unobstructed and the airflow perforations are unimpeded. The minimum distance from the wall is at least 10 cm.

Failure to meet these conditions may cause damage to the R&S SFE100 or other devices in the test setup.

If necessary, use proper protective equipment to protect DUTs against electrostatic discharge in the event of human contact.

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### 2.2.1 Placing the R&S SFE100 on a Bench Top

The R&S SFE100 is designed for use under general laboratory conditions.

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**⚠ WARNING****Risk of injuries**

If the R&S SFE100 is not set up securely, you or others can be injured.

Place the R&S SFE100 on a stable and level surface. Do not place anything on top of the R&S SFE100, if the R&S SFE100 is not in a level position.

Before folding out the feet at the R&S SFE100 bottom, read the safety instructions for instruments with fold-out feet at the beginning of this manual carefully.

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### 2.2.2 Mounting the R&S SFE100 in a Rack

The R&S SFE100 may be installed in a 19" rack mount by using a rack adapter kit (for order no. see data sheet). Follow the installation instructions that are part of the adapter kit.

## 3 Interfaces and Connectors

This chapter describes the front panel and the rear panel of the R&S SFE100, including all status displays and connectors. See the data sheet for information about permissible levels on the inputs and output levels on the outputs.

If you use the interfaces and connectors, take care to avoid electromagnetic interference. For details see [Chapter 4.1, "Preventing Electromagnetic Interference"](#), on page 23.

### 3.1 Front Panel

This chapter provides an overview of the controls and connectors on the front panel. Each control or connector is briefly described along with a reference to the chapter(s) containing detailed information about its usage.



**Figure 3-1: Model 02, 03**

- 1 = Hardkeys
- 2 = Status display LEDs
- 3 = Cursor keys
- 4 = Display
- 5 = USB interfaces
- 6 = RF output



**Figure 3-2: Model 12, 13**

- 1 = Status display LEDs
- 2 = USB interfaces
- 3 = RF output

#### 3.1.1 Hardkeys



Only provided by the models 02 and 03.

See (1) in [Figure 3-1](#).

For information on corresponding keys of an external keyboard see [Table 4-1](#).

During remote operation, you can use the virtual keys that are not available on the front panel. For details see the user manual or the help system.

#### **BACK**

- Deletes the character to the left of the cursor.
- Navigates back in the tree pane.

#### **OK**

- Displays the next menu level.
- Activates the editing mode for the selected numeric/alphanumeric parameter.
- Completes the data entry.  
The new value is accepted. For numeric parameters, the unit is also displayed.
- Switches the marked status parameters on/off (State On/Off).
- Confirms (OK) and closes message windows.

#### **RF ON/OFF**

Switches the RF output on or off.

#### **LOCAL**

Switches from remote control or remote operation (e.g. using Remote Desktop) to manual operation (using the front panel).

### **3.1.2 Status Display LEDs**

See (2) in [Figure 3-1](#) or (1) in [Figure 3-2](#).

The basic state is indicated by LEDs.

#### **RF ON**

Displays the status of the RF output.

- LED off: RF output is switched off.
- LED green: RF output is switched on.

#### **POWER**

Displays the power supply status.

- LED off: No power is supplied. R&S SFE100 is switched off.
- LED green: Power is supplied.

#### **REMOTE**

Displays the remote control status.

- LED off: R&S SFE100 is not used for remote control.

- LED yellow: R&S SFE100 is remote controlled.

### 3.1.3 Cursor Keys



Only provided by the models 02 and 03.

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See (3) in [Figure 3-1](#).

UPARROW/DNARROW keys:

- In a list in editing mode, increases or decreases the parameter value.
- In a list, table, window or dialog box, scrolls vertically to select a parameter.

LEFTARROW/RIGHTARROW keys:

- In editing mode, moves the cursor in the input fields forward and back.
- In a list, table, window or dialog box, scrolls horizontally to select a parameter.

For further details see user manual or the help system.

### 3.1.4 Display



Only provided by the models 02 and 03.

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See (4) in [Figure 3-1](#).

For details on using the front panel display see the user manual or the help system.

For information on the graphical user interface see the user manual or the help system.

### 3.1.5 RF OUT

N (50R mechanics) connector. Used to output the RF signal.

The level range can be extended upwards by installing the power amplifier option (R&S SFE100-B90). With this option installed, the output is located on the rear panel.

---

#### **NOTICE**

##### **Do not overload the RF output**

See the data sheet for the limits for the DC voltage and reverse RF power. Do not exceed these limits. Exceeding these limits can cause instrument damage.

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### 3.1.6 USB Interfaces

See (5) in [Figure 3-1](#) or (2) in [Figure 3-2](#).

Two USB (universal serial bus) interfaces of the type A (host USB) are provided. Use the interfaces to connect external devices like a keyboard, mouse, printer, memory stick ([Chapter 4.3, "Connecting External Devices"](#), on page 24), or to perform a firmware update.

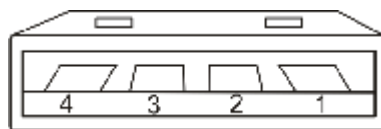


Upper connector = port 1  
Lower connector = port 3



Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, make sure that the following conditions are met:

- Use suitable double-shielded cables.
- Do not use USB connecting cables exceeding 1 m in length.
- Use only USB devices that remain within the permissible EMI limits.



**Table 3-1: Pin assignment**

Pin	Abbreviation	Signal
1	PWR	+ 5 V / + 0.5 A max!
2	D-	Data -
3	D+	Data +
4	GND SHIELD	Ground

## 3.2 Rear Panel

This chapter provides an overview of the controls and connectors on the rear panel. Each control or connector is briefly described along with a reference to the chapter(s) containing detailed information about its usage.



### 3.2.1 AC Power Supply Connector and Switch

The IEC 320 / EN 60320 AC power supply connector and the AC power switch are combined (type C14).

A fuse holder is integrated.

The AC power switch is located on the right of the AC power connector.



Switch positions:

- I: The R&S SFE100 is in operation.
- O: The entire instrument is disconnected from the AC power supply.

For further information:

- See [Chapter 9.2, "Replacing the Fuses"](#), on page 53
- See [Chapter 4.2, "Connecting to the AC Power Supply"](#), on page 23
- See [Chapter 5, "Switching On or Off the R&S SFE100"](#), on page 28

### 3.2.2 TS1 IN / TS2 IN

BNC connector. Used to feed in a serial MPEG2 transport stream.

These inputs handle a serial signal with one of three formats:

- ASI (asynchronous serial interface)
- SMPTE 310 (Society of Motion Picture and Television Engineers)
- ETI (TS2 IN only)

To select the input, select "DIGITAL TV" menu, "INPUT SIGNAL", "INPUT". For further details see the user manual or the help system.



For the T-DMB / DAB transmission standard, TS2 IN is used as an external ETI input (ensemble transport interface). TS1 IN is not used for T-DMB/DAB. TS2 IN is conform to the ETS 300 799 specification. ETI NI (network independent) and ETI NA 5592 or ETI NA 5376 (network adaptation) signals are accepted.



### 3.2.3 VIDEO IN

BNC connector. Video input for the ATV transmission standards.



### 3.2.4 AUDIO AUX

9 pin SUB-D connector for multi purpose input.

- Audio IN
- BTSC IN
- NICAM IN
- REF FREQ OUT / Trigger OUT

A signal is present on the reference frequency output pin (TRIG / REF OUT) if it is activated.

For further details see user manual or the help system.

When using an internal reference, the frequency generated by the internal reference oscillator of the R&S SFE100 is made available. If an external reference is activated, the signal applied to REF IN is also available on REF OUT pin. It is buffered and filtered.



**Table 3-2: Pin assignment**

Pin	Description
1	Ground
2	Ground
3	AF2 - (Audio IN)
4	AF2 + (Audio IN)
5	BTSC IN
6	AF1 - (Audio IN)
7	AF1 + (Audio IN)
8	REF FREQ OUT / Trigger Out
9	NICAM IN

### 3.2.5 MONITOR

HDMI interface to connect an external monitor. For further details refer to [Chapter 4.3.4, "External Monitor"](#), on page 26.



### 3.2.6 100 BASE-T

1 Gigabit LAN interface (100 Base-T).

Used to connect the R&S SFE100 to a local network for remote control, remote operation, printouts and data transfer. The assignment of the RJ.45 CAT5 connector supports twisted pair category 7 UTP/STP cables in a star configuration (UTP stands for "unshielded twisted pair", and STP for "shielded twisted pair").





Do not connect or disconnect the network cable until the instrument is switched off. Otherwise, the network connection cannot be reliably detected.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, use category 7 cables.

For further information:

- See [Chapter 7, "Operating the R&S SFE100 in a LAN"](#), on page 40
- See user manual or the help system for remote control using the Ethernet

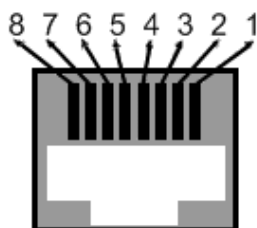


Table 3-3: Pin assignment

Pin	Abbreviation	Signal
1	TXD+	Transmit data, positive
2	TXD-	Transmit data, negative
3	RXD+	Receive data, positive
4, 5	R0	Termination, 75R
6	RXD-	Receive data, negative
7, 8	R1	Termination, 75R

### 3.2.7 DIG I/Q

Requires the extended I/Q input option (R&S SFE100-K80). Used to receive digital I/Q signals from another R&S instrument with the same interface.

For further details see the user manual or the help system.



#### 3.2.7.1 DIG I/Q IN

Digital I/Q input of the R&S SFE100.

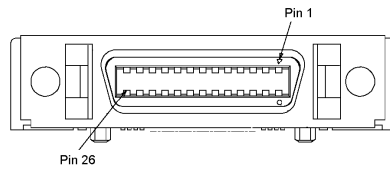


Table 3-4: Input pin assignment

Pin	Name	Signal
1	DIG_IQ_CLK2+	Data clock 2 (control signal)
2	GND	Ground (control signal)
3	DIG_IQ_IN_D0+	Data bit (LSB), OUT/IN 0 line (I/Q signal)
4	DIG_IQ_IN_D1+	Data bit, OUT/IN 1 line (I/Q signal)
5	DIG_IQ_IN_D2+	Data bit, OUT/IN 2 line (I/Q signal)
6	DIG_IQ_IN_CLK1+	Data clock 1 (I/Q signal)
7	DIG_IQ_IN_SCLK	Serial clock (control signal)
8	+U5V2	+5 V (control signal)
9	DIG_IQ_IN_D3+	Data bit, OUT/IN 3 line (I/Q signal)
10	DIG_IQ_IN_D4+	Data bit, OUT/IN 4 line (I/Q signal)
11	DIG_IQ_IN_D5+	Data bit, OUT/IN 5 line (I/Q signal)
12	DIG_IQ_IN_D6+	Data bit, OUT/IN 6 line (I/Q signal)
13	DIG_IQ_IN_D7+	Data bit (MSB), OUT/IN 7 line (I/Q signal)
14	DIG_IQ_CLK2-	Data clock 2 (control signal)
15	DIG_IQ_IN_D0-	Data bit (LSB), OUT/IN 0 line (I/Q signal)
16	DIG_IQ_IN_D1-	Data bit, OUT/IN 1 line (I/Q signal)
17	DIG_IQ_IN_D2-	Data bit, OUT/IN 2 line (I/Q signal)
18	DIG_IQ_IN_CLK1-	Data clock 1 (I/Q signal)
19	GND	Ground (control signal)
20	DIG_IQ_IN_SDAT	Serial data (control signal)
21	DIG_IQ_IN_D3-	Data bit, OUT/IN 3 line (I/Q signal)
22	DIG_IQ_IN_D4-	Data bit, OUT/IN 4 line (I/Q signal)
23	DIG_IQ_IN_D5-	Data bit, OUT/IN 5 line (I/Q signal)
24	DIG_IQ_IN_D6-	Data bit, OUT/IN 6 line (I/Q signal)
25	DIG_IQ_IN_D7-	Data bit (MSB), OUT/IN 7 line (I/Q signal)
26	GND	Ground (control signal)

Line pairs have a name that only differs in the last character. For example, the pins 1 and 14 are a pair.

### 3.2.8 USB Interface

USB interface (universal serial bus) type A (host USB). For details see [Chapter 3.1.6, "USB Interfaces"](#), on page 15.



### 3.2.9 REF IN

BNC connector. Used to input the reference frequency.

For further details see user manual or the help system.



### 3.2.10 1PPS / TRIG

BNC connector. Input for the 1 pulse per second signal used in SFN modes.

Input for external triggering of digital modulations standards and ARB.



### 3.2.11 RF OUT

Requires the power amplifier option (R&S SFE100-B90). For details see [Chapter 3.1.5, "RF OUT"](#), on page 14.



## 4 Connecting the R&S SFE100

This chapter describes how to connect the R&S SFE100 to the power supply and external devices.

### 4.1 Preventing Electromagnetic Interference

To prevent electromagnetic interference, the R&S SFE100 must be operated with all shielding covers fitted. Only suitable and shielded signal and control cables may be used.

#### RF/ASI/TRIGGER inputs and outputs

In particular cables that are connected to these inputs/outputs can cause EMC problems. Therefore these cables should have at least 80 dB to 1 GHz shielding. This is usually achieved by means of double-shielded cables.

#### USB interfaces

To connect the USB interfaces, only use peripheral equipment that does not cause limit violations. For details see [Chapter 3.1.6, "USB Interfaces"](#), on page 15.

#### HDMI interface

To connect the HDMI interface, only use peripheral equipment that does not cause limit violations. For details on the interface see [Chapter 3.2.5, "MONITOR"](#), on page 18.

#### LAN interface (100 BASE-T)

To connect the LAN interface (100 BASE-T), use a suitable cable. For details see [Chapter 3.2.6, "100 BASE-T"](#), on page 18.

### 4.2 Connecting to the AC Power Supply

The R&S SFE100 can be used with different AC power voltages and adapts itself automatically to it. Adjusting the R&S SFE100 to a particular AC supply voltage is therefore not required. Refer to the data sheet for the requirements of voltage and frequency.

**⚠ WARNING****Shock hazard**

Observe the basic safety instructions at the beginning of this manual, especially the instructions on electrical safety.

Take care that the AC voltage lies within the limits printed on the AC power connector of the R&S SFE100 and listed in the data sheet.

- ▶ Connect the R&S SFE100 to the AC power supply, using the power cable that is supplied. The AC power connector is located on the rear panel of the R&S SFE100.  
Since the R&S SFE100 complies with safety class EN61010-1, it should only be connected to a socket with a ground contact.

For further information see [Chapter 3.2.1, "AC Power Supply Connector and Switch"](#), on page 16.

## 4.3 Connecting External Devices

Using the USB interfaces, you can directly connect USB devices to the R&S SFE100. This number can be increased as necessary by using USB hubs.

Due to the large number of available USB devices, there is almost no limit to the possible expansions. In the following, USB devices that can be useful are listed.

- Keyboard for entering comments, file names, etc. or for easy access to Windows XP settings. See [Chapter 4.3.1, "External Keyboard"](#), on page 25.
- Mouse for easy operation of Windows dialogs. See [Chapter 4.3.2, "Mouse"](#), on page 26.
- Memory stick for easy transfer of data to/from a computer (e.g. firmware updates). See [Chapter 4.3.3, "Memory Stick"](#), on page 26.
- CD-ROM drives for easy installation of firmware applications.
- Printer for printing out measurement results.

**To install a USB device**

1. Connect the USB device to the R&S SFE100. You can do this during operation because all USB devices are Plug and Play.  
Windows XP automatically searches for a suitable device driver.
2. If Windows XP does not find a suitable driver, it will prompt you to specify a directory that contains the driver software. If the driver software is on a CD-ROM, connect a USB CD-ROM drive to the R&S SFE100 before proceeding.



### To uninstall a USB device

- ▶ Disconnect the USB device from the R&S SFE100. You can do this during operation.

Windows XP immediately detects the change in the hardware configuration and deactivates the corresponding driver.

## 4.3.1 External Keyboard

Connect the keyboard to one of the USB interfaces (type A). The default language setting is for a UK keyboard. You can change the language and modify other settings such as the repetition rate in Windows XP.

### Changing Regional and Language Settings

1. Open the "Start" menu by pressing the WINDOWS key on an external keyboard.
2. Select "Control Panel" and then "Keyboard" or "Regional and Language Options".

**Table 4-1: Corresponding keys: front panel - external keyboard (model 02, 03)**

Key on front panel	Corresponding key on keyboard	Function description
Cursor keys	LEFTARROW, RIGHTARROW, UPARROW, DNARROW	See <a href="#">Chapter 3.1.3, "Cursor Keys"</a> , on page 14
BACK	BACKSPACE	See <a href="#">Chapter 3.1.1, "Hardkeys"</a> , on page 12
OK	ENTER	"
LOCAL	F3	"
RF ON/OFF	CTRL+F1	"

During remote operation, you can use the following virtual keys provided in the "HARD-KEY" menu. These keys are not available on the front panel.

**Table 4-2: Corresponding keys: virtual keys - external keyboard**

Virtual key	Corresponding key on keyboard	Function description
HELP	F1	Opens and closes the context-sensitive help function. For details see user manual or the help system
ASSIGN	F2	Starts management of favorites. For details see user manual or the help system
LOCAL	F3	Switches from remote control or remote operation to manual operation. For details see user manual or the help system

Virtual key	Corresponding key on keyboard	Function description
PRESET	F4	Sets the instrument to a defined state. For details see user manual or the help system
FILE	F5	Opens the menu for saving instrument settings. For details see user manual or the help system
SETUP	F6	Opens the setup menu for general instrument settings. For details see user manual or the help system
HOME	F8	Resets tree navigation. For details see user manual or the help system
APPL	F9	Selects another application. For details see user manual or the help system

### 4.3.2 Mouse

You can change settings such as the speed of the mouse cursor in Windows XP.

#### Changing Mouse Settings

1. Open the "Start" menu by pressing the WINDOWS key on an external keyboard.
2. Select "Control Panel" and then "Mouse".

### 4.3.3 Memory Stick

The R&S SFE100 has a disk drive. You can exchange data by using a memory stick which you plug into one of the USB interfaces. The memory stick is automatically assigned a free drive letter and you can use Windows Explorer to transfer data.

### 4.3.4 External Monitor

R&S SFE100s with the following serial numbers have a HDMI interface to connect an external monitor with a DVI-D interface:

- Model 02 from serial number 120600
- Model 03 from serial number 130600
- Model 12 from serial number 140000

To connect the monitor, use a HDMI to DVI adapter or a HDMI to DVI cable. For details on the HDMI interface see [Chapter 3.2.5, "MONITOR"](#), on page 18.

If you have used the R&S SFE100 without monitor before, activate the HDMI interface by pressing the CTRL+ALT+F4 key combination, several times if necessary.

For R&S SFE100s without HDMI interface, it is possible to display the screen contents on external monitors by using remote operation on an external computer.

For details on remote operation see the user manual or the help system.

## 5 Switching On or Off the R&S SFE100

### **⚠ WARNING**

#### **Shock hazard**

Observe the basic safety instructions at the beginning of this manual, especially the instructions on electrical safety.

### 5.1 Switching On the R&S SFE100

#### **NOTICE**

#### **Risk of instrument damage**

Before switching on the R&S SFE100, make sure that the following conditions are met:

- The R&S SFE100 is set up as described in [Chapter 2, "Setting Up the R&S SFE100"](#), on page 9.
- Signal levels at the input connectors are all within the specified ranges.
- Signal outputs are correctly connected and are not overloaded. In particular, do not exceed the maximum permissible reverse power allowed at the RF output.

The values are specified in the data sheet. Failure to meet these conditions may cause damage to the R&S SFE100 or other devices in the test setup.

#### **To switch on the R&S SFE100**

1. Make sure that the R&S SFE100 is connected to a power supply (for details see [Chapter 4.2, "Connecting to the AC Power Supply"](#), on page 23).
2. Press the AC power switch on the rear panel into I position (for details see [Chapter 3.2.1, "AC Power Supply Connector and Switch"](#), on page 16).

The R&S SFE100 starts booting:

- The installed BIOS version and some of the computer features are displayed on the screen for a few seconds.
- The Windows XP Embedded operating system is booted, followed by the R&S SFE100 firmware.
- A self-test is performed.

After booting is completed, the main screen of the R&S SFE100 is displayed, and the R&S SFE100 is ready for operation.

If the external monitor remains dark, proceed as described in [Chapter 4.3.4, "External Monitor"](#), on page 26.

The configuration settings that were active before the R&S SFE100 was last switched off are automatically restored.

Use the "FILE" menu to load another instrument setting. For details see the user manual or the help system.

## 5.2 Switching Off the R&S SFE100

### NOTICE

#### Risk of losing data

If you set the power switch to the O position before the R&S SFE100 settings have been saved, the current settings will be lost.

#### To switch off the R&S SFE100

1. Check the status displays on the front panel of the R&S SFE100. If the REMOTE status display on the front panel is on, do not switch off the R&S SFE100. Someone else is using the R&S SFE100 by means of remote control (see also [Chapter 3.1.2, "Status Display LEDs"](#), on page 13).
2. Set the AC switch on the rear panel of the R&S SFE100 to the O position.  
None of the LEDs on the front panel should be lit.

## 5.3 Checking the Provided Options

The R&S SFE100 may be equipped with options. In order to check whether the installed options correspond to the options indicated on the delivery note, proceed as follows.

Connect an external monitor ([Chapter 4.3.4, "External Monitor"](#), on page 26) or use remote operation (for details see user manual).

1. In the "HARDKEY" menu, select "SETUP".
2. In the tree, select "INFO HARDWARE" to display a list showing the currently installed hardware.
3. Check the availability of the hardware options as indicated in the delivery note.
4. In the tree, select "SOFTWARE OPTIONS" and then "ACTIVE OPTIONS" to display a short tabular overview of the enabled software options.
5. Check the availability of the software options as indicated in the delivery note.

For further details see the user manual or the help system.

For an overview of the all options available for the R&S SFE100 refer to the Rohde & Schwarz Homepage.

## 5.4 Turn-On Tests

If an error is detected, an error indication is displayed in the error/warnings line along with a brief description of the error.

- ▶ To obtain more information about the error, press the "ERROR/WARNING DETAILS" softkey.

A description of the error(s) or warning(s) is displayed.

For further details see the user manual or the help system.

Besides automatic monitoring of instrument functions, the R&S SFE100 also offers the following way of ensuring proper operation.

### System adjustment

Use the SETUP menu to carry out an internal adjustment. This is a way of obtaining the best possible level accuracy, for example.

1. In the "HARDKEY" menu, select "SETUP".
2. In the tree, select "ADJUSTMENT".

For further details see the user manual or the help system.

## 6 Sample Application

The following example involves the following main steps:

- Feed an MPEG2 transport stream to the R&S SFE100 using the serial interface 1 (TS1 IN, see [Chapter 3.2.2, "TS1 IN / TS2 IN"](#), on page 16) on the rear panel.
- This MPEG2 transport stream undergoes channel encoding and modulation for transmission in compliance with the DVB-C specification. To achieve this, perform the following step-by-step instructions. The involved settings are summed up in [Table 6-1](#).
- The result is output as an RF signal on the RF output.

**Table 6-1: Involved settings**

Parameter	Value
Center frequency	330 MHz
Level	-20.0 dBm
Transmission standard	DVB-C
Constellation	64 QAM
Symbol rate	6.9 MS/s
Roll off	0.15

If you connect an external monitor, keyboard and mouse (see [Chapter 4.3, "Connecting External Devices"](#), on page 24) or operate the R&S SFE100 using an external computer, you can use the graphical user interface. The following step-by-step instructions describe how to perform the sample application. If your R&S SFE100 provides a display and keys on the front panel (models 02 and 03), you can also use those for operation. The involved steps are described in [Chapter 6.1, "Using Display and Keys on the Front Panel"](#), on page 36.



If your model provides a display and keys on the front panel, you can alternatively proceed as described under [Chapter 6.1, "Using Display and Keys on the Front Panel"](#), on page 36.

An explanation of the graphical user interface and information on how to select items, open lists and enter parameters are provided in the user manual or the help system.

### Selecting the transmitter application (TX)

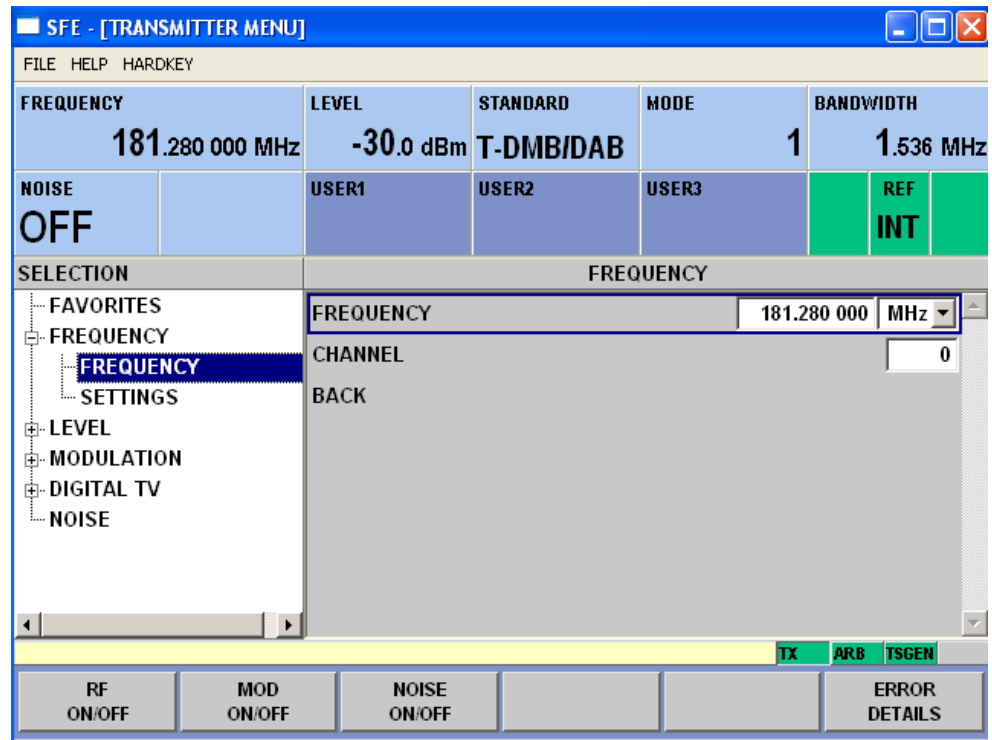
1. In the "HARDKEY" menu, select "APPL".
2. Select the TX application (DVB-C transmission is a transmitter application).
3. Press the ENTER key.  
The TX application is displayed.

### Setting the output frequency

1. In the tree, select the "FREQUENCY" menu.

- Press the ENTER key.

The tree is expanded and the "FREQUENCY" submenu is displayed.



- In the tree, select the "FREQUENCY" submenu.
  - Press the ENTER key.
- The focus is set on the work view.
- Set a frequency of 330 MHz.
    - Select the "FREQUENCY" field.
    - Enter 330.
    - Press the ENTER key.

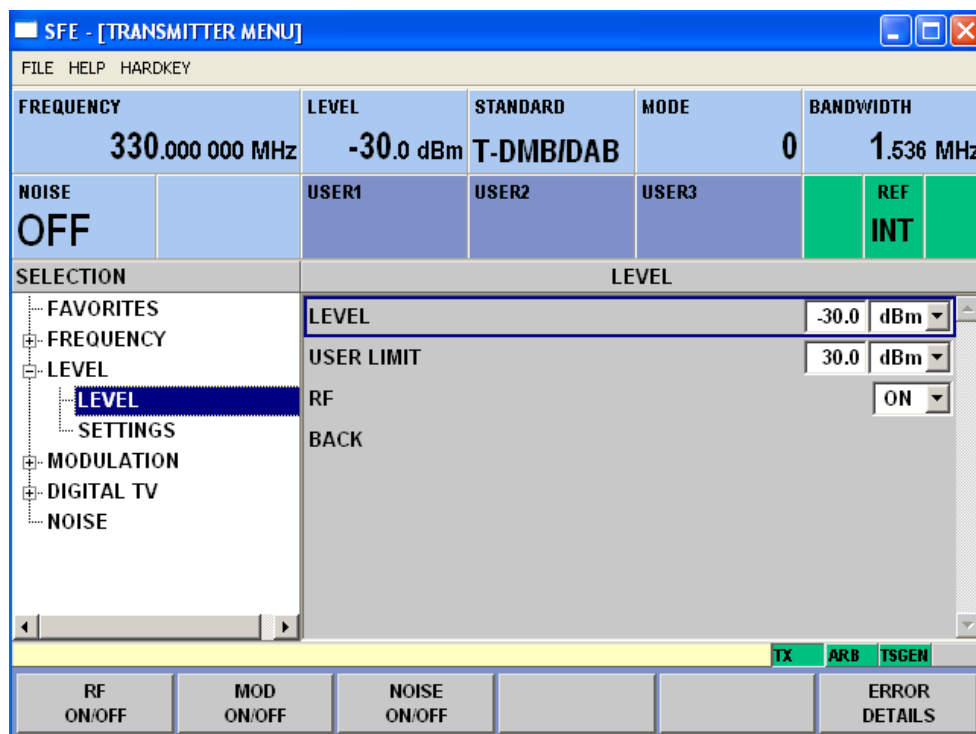
The entered frequency is displayed in the info area.

### Setting the output level

- In the tree, select the "LEVEL" menu.
- Press the ENTER key.

The tree is expanded and the "LEVEL" submenu is displayed.



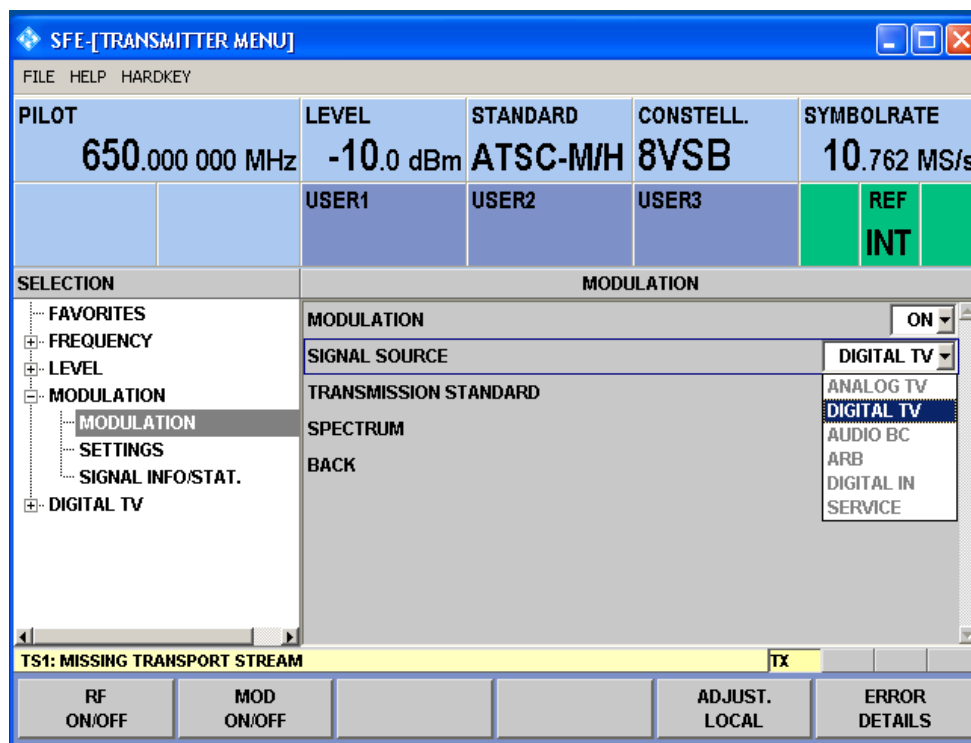


3. In the tree, select the "LEVEL" submenu.
4. Press the ENTER key.  
The focus is set on the work view.
5. Set a level of -20 dBm.
  - a) Select the "LEVEL" field.
  - b) Enter -20.
  - c) Press the ENTER key.
  - d) If you want to enter the level in a different unit, change the unit in the "LEVEL" menu, under "SETTINGS" / "LEVEL UNIT" first (see user manual or help system).

The entered level is displayed in the info area.

### Setting the modulation parameters and selecting the transmission standard

1. In the tree, select the "MODULATION" menu.
2. Press the ENTER key.  
The tree is expanded and the "MODULATION" submenu is displayed.



3. In the tree, select the "MODULATION" submenu.
4. Press the ENTER key.  
The focus is set on the work view.
5. Activate the modulation.
  - a) Select the "MODULATION" field.
  - b) Press the ENTER key to display the list.
  - c) Select "ON".
  - d) Press the ENTER key to confirm the selection.
6. Select the "DIGITAL TV" signal source.
  - a) Select the "SIGNAL SOURCE" field.
  - b) Press the ENTER key to display the list.
  - c) Depending on the R&S SFE100 model, if not fixed, select "DIGITAL TV".
  - d) Press the ENTER key to confirm the selection.
7. Depending on the installed options, select the "DVB-C" transmission standard.
  - a) Select the "TRANSMISSION STANDARD" field.
  - b) Press the ENTER key to display the list.
  - c) Select "DVB-C".
  - d) Press the ENTER key to confirm the selection.

The selected standard is displayed in the info area.

The I/Q modulation is switched on, the internal coder is selected as the signal source, and the DVB-C transmission standard is set.

### Selecting the transport stream input and setting the DVB-C transmission parameters

1. In the tree, select the "DIGITAL TV" menu.
2. Press the ENTER key.  
The tree is expanded and the "DIGITAL TV" submenu is displayed.  
(See [Figure 6-1](#).)
3. In the tree, select the "INPUT SIGNAL" submenu.
4. Press the ENTER key.  
The focus is set on the work view.

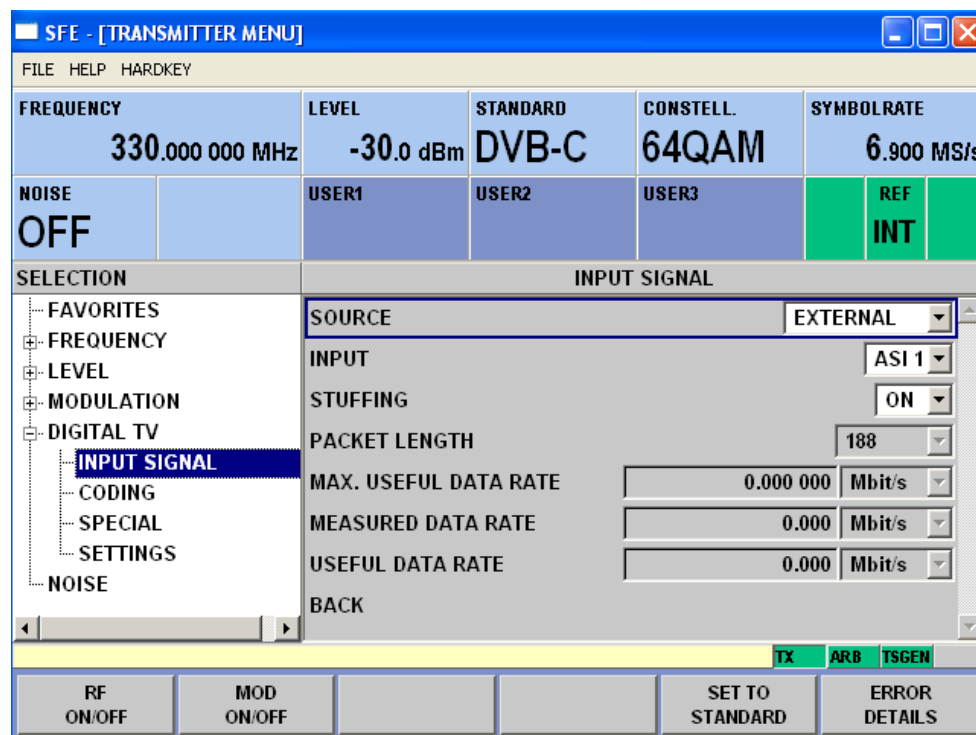


Figure 6-1: DIGITAL TV menu

5. Select the "EXTERNAL" signal source.
  - a) Select the "SOURCE" field.
  - b) Press the ENTER key to display the list.
  - c) Select "EXTERNAL".
  - d) Press the ENTER key to confirm the selection.
6. Select the "ASI 1" input.
  - a) Select the "INPUT" field.
  - b) Press the ENTER key to display the list.
  - c) Select "ASI 1".
  - d) Press the ENTER key to confirm the selection.

7. Make sure that the "STUFFING" field in the work view is set to "ON".  
This ensures that the incoming transport stream will be adapted to the proper data rate of the coder. The data rate of the coder will depend on the transmission parameters. The data stream is padded with null packets to allow adaptation to the transmission parameters.
  - a) Select the "STUFFING" field.
  - b) Press the ENTER key to display the list.
  - c) Select "ON".
  - d) Press the ENTER key to confirm the selection.
8. Select "BACK" and press the ENTER key.  
The focus is set to the tree.
9. In the tree, select the "CODING" submenu.
10. Press the ENTER key.  
The focus is set on the work view.
11. Select a symbol rate of 6.9 .MS/s.
  - a) Select the "SYMBOL RATE" field.
  - b) Enter 6.9.
  - c) If the units field to the right shows "MS/s", press the ENTER key.
  - d) If the units field indicates another unit, select this field. Press the ENTER key, and select the "MS/s" unit. Press the ENTER key twice to confirm the unit and the symbol rate.

The selected symbol rate is displayed in the info area.
12. Select the "64 QAM" constellation.
  - a) Select the "CONSTELLATION" field.
  - b) Press the ENTER key to display the list.
  - c) Select "64 QAM".
  - d) Press the ENTER key to confirm the selection.

The selected constellation is displayed in the info area.

## 6.1 Using Display and Keys on the Front Panel



A display and keys on the front panel are only provided by the R&S SFE100 models 02 and 03.

For details on using the front panel display see the user manual or the help system.

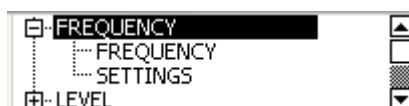
### Setting the output frequency

1. Press OK to enter tree operation.



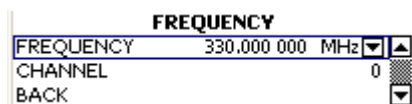
2. Using the UPARROW/DNARROW keys, select the "FREQUENCY" menu.
3. Press the OK or RIGHTARROW key.

The tree is expanded and the "FREQUENCY" submenu is displayed.



4. Select the "FREQUENCY" submenu and confirm your entry with OK.

The work view is displayed.

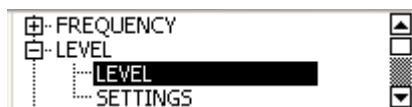


5. Using the UPARROW/DNARROW keys, select the "FREQUENCY" field.
6. Using the LEFTARROW/RIGHTARROW keys, move the cursor to the digit you want to change in the frequency entry.
7. Using the UPARROW/DNARROW keys, change the numeric value to 330 MHz.
8. Press OK to confirm your entry.
9. Press the BACK key to exit the work view and get back to the tree.

### Setting the output level

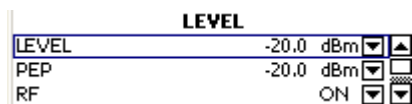
1. Using the UPARROW/DNARROW keys, select the "LEVEL" menu.
2. Press the OK or RIGHTARROW key.

The tree is expanded and the "LEVEL" submenu is displayed.



3. Select the "LEVEL" submenu and confirm your entry with OK.

The work view is displayed.



4. Using the UPARROW/DNARROW keys, select the "LEVEL" field.
5. Using the LEFTARROW/RIGHTARROW keys, move the cursor to the digit you want to change in the frequency entry.
6. Using the UPARROW/DNARROW keys, change the numeric value to -20 dBm.

7. Press OK to confirm your entry.
8. Press the BACK key to exit the work view and get back to the tree.

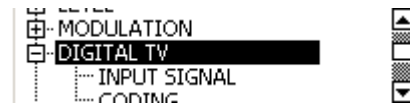
### Setting the modulation parameters and selecting the transmission standard

Depending on the R&S SFE100 model, the signal source and the transmission standard are fixed to "DTV" and "DVBC" under "MODULATION".

### Selecting the transport stream input and setting the DVB-C transmission parameters

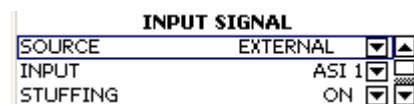
1. Using the UPARROW/DNARROW keys, select the "DIGITAL TV" menu.
2. Press the OK or RIGHTARROW key.

The tree is expanded and the "DIGITAL TV" submenu is displayed.

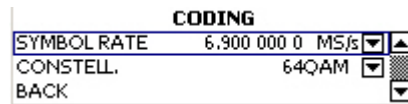


3. Select the "INPUT SIGNAL" submenu and confirm your entry with OK.

The work view is displayed.



4. Select the "EXTERNAL" source.
  - a) Using the UPARROW/DNARROW keys, select the "SOURCE" field.
  - b) Press OK to open the list.
  - c) Using the UPARROW/DNARROW keys, select "EXTERNAL".
  - d) Press OK to confirm your entry.
5. Select the "ASI 1" input.
  - a) Using the UPARROW/DNARROW keys, select the "INPUT" field.
  - b) Press OK to open the list.
  - c) Using the UPARROW/DNARROW keys, select "ASI 1".
  - d) Press OK to confirm your entry.
6. Make sure that the "STUFFING" field in the work view is set to "ON".  
This ensures that the incoming transport stream will be adapted to the proper data rate of the coder. The data rate of the coder will depend on the transmission parameters. The data stream is padded with null packets to allow adaptation to the transmission parameters.
7. Press the BACK key to exit the work view and get back to the tree.
8. Select the "CODING" submenu and confirm your entry with OK.  
The work view is displayed.



9. Select a symbol rate of 6.9 MS/s.
  - a) Using the UPARROW/DNARROW keys, select the "SYMBOL RATE" field.
  - b) Using the LEFTARROW/RIGHTARROW keys, move the cursor to the digit you want to change in the frequency entry.
  - c) Using the UPARROW/DNARROW keys, change the numeric value to 6.9 MS/s.
  - d) Press OK to confirm your entry.
10. Select the "64QAM" constellation.
  - a) Using the UPARROW/DNARROW keys, select the "CONSTELLATION" field.
  - b) Press OK to open the list.
  - c) Using the UPARROW/DNARROW keys, select "64QAM".
  - d) Press OK to confirm your entry.

All parameters listed in [Table 6-1](#) are now set.

If no further keys are pressed, after a short time, the info area is redisplayed.

## 7 Operating the R&S SFE100 in a LAN

The R&S SFE100 is equipped with a network interface and can be connected to an Ethernet LAN (local area network). The network card operates with 100 MBit Ethernet IEEE 802.3u. The TCP/IP network protocol and the associated network services are preconfigured.

To be able to exchange data within a local area network (LAN), every computer or instrument that is connected must have a unique IP address or a unique computer name. Access between different users is managed with access authorizations.

Provided the appropriate rights have been assigned and the Windows XP firewall configuration is adapted accordingly, the interface can be used e.g. for transferring data, printing on network printers, operating the R&S SFE100 from a remote computer.

To use network resources, access must be granted. To share files on the R&S SFE100 with other network users, access to instrument resources, e.g. the hard drives, must also be granted. All these administration tasks are normally performed by a network administrator using the Windows XP Start menu (for details refer to the Windows XP help system). Contact your network administrator for access authorizations.

User name and password of the R&S SFE100 are factory-set. The user name is used for auto login, access authorization and remote operation.

For further information:

- See [Chapter 8.1.1, "Login"](#), on page 44
- See [Chapter 3.2.6, "100 BASE-T"](#), on page 18
- See the user manual or help system for details on remote operation.

### 7.1 Connecting the R&S SFE100 to the Network

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#### **NOTICE**

##### **Risk of network failure/virus infection**

Before connecting the R&S SFE100 to the network or configuring the network, do the following:

- Consult your network administrator.
- 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 SFE100 to the LAN.

Errors may affect the entire network.

Efficient virus protection is a prerequisite for secure operation in the network. Never connect the R&S SFE100 to a network without proper protection against a virus infection, as doing so may cause damage to the instrument software.

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**To connect the R&S SFE100 to the network**

1. Fulfill all prerequisites mentioned above.
2. Make sure that the R&S SFE100 is switched off. This is the only way to ensure that the network connection is reliably detected and any disruptions during the operation of the R&S SFE100 are avoided.
3. Connect the R&S SFE100 to the network using a CAT-5 RJ-45 cable.
4. Switch on the R&S SFE100.

**To disconnect the R&S SFE100 from the network**

1. Make sure that the R&S SFE100 is switched off.
2. Disconnect the R&S SFE100 from the network.

## 7.2 Establishing a Point-to-Point Connection

To set up a single network (a LAN connection between an R&S SFE100 and a single computer without integration into a larger network), an IP address needs to be assigned to the R&S SFE100 and the computer. The IP addresses 192.168.xxx.yyy are available for use here. xxx and yyy can assume values of 1 to 254, and the value for the subnet mask is 255.255.255.0.

- ▶ Connect the R&S SFE100 and the computer with a standard RJ-45 cross-over cable.

## 7.3 Zero Configuration Networking



This service is available in firmware version V02.60 and later.

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The R&S mDNS Service is installed with the firmware. Using this service, you can connect to a network automatically. You do not need to set up services, such as dynamic host configuration protocol (DHCP) and domain name system (DNS), or configure the network settings manually (see [Chapter 7.4, "Configuring the Network Card"](#), on page 42).

## 7.4 Configuring the Network Card

Under Windows XP, network card drivers do not need to be installed separately. If the R&S SFE100 is connected to the LAN, Windows XP automatically detects the network connection and activates the required drivers.

The configuration tasks depend on whether your network has a DHCP server or not. If necessary, ask your network administrator.



If you use the R&S mDNS Service, you do not need to configure at all. For details see [Chapter 7.3, "Zero Configuration Networking"](#), on page 41.

### Networks with DHCP Server

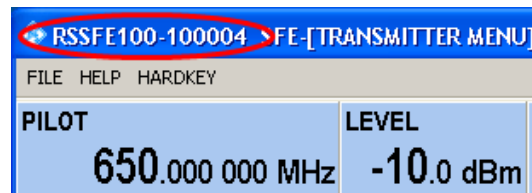
The R&S SFE100 is preconfigured for networks using the dynamic host configuration protocol (DHCP). In such networks, the instrument is automatically assigned a free IP address. Identification in the network is based on the use of a unique computer name.

Every instrument is assigned an individual computer name at the factory. It is displayed as part of the window title of the application.

If necessary, you can change the computer name using the firmware or the Windows XP Start menu (for details refer to the Windows XP help system).

### Querying the computer name using the firmware

1. If the R&S SFE100 has a default computer name, the computer name is displayed as part of the window title of the application.



2. If no default computer name is displayed, do the following.
  - a) Press the SETUP key.
  - b) In the tree, select "COMMUNICATION".
  - c) Read out the computer name from the "FULL COMPUTER NAME" field.

### Networks without DHCP Server

In networks that assign fixed IP addresses, the network administrator usually configures the network card. Contact your network administrator. The IP address is set using the firmware or the Windows XP Start menu (for details refer to the Windows XP help system).

### Entering the IP address using the firmware

1. Press the SETUP key.

2. In the tree, select "COMMUNICATION".
3. Enter the IP address in the "TCP/IP ADDRESS" field.

## 7.5 Firewall Settings

By default, the Windows Firewall is activated to protect the R&S SFE100 from an attack of hostile users and programs. The Windows Firewall suppresses all network communication which is not initialized by the R&S SFE100 itself or which is not defined as an exception.

To enable data transfer or to allow access to the R&S SFE100, define exceptions using the Windows XP Start menu. For details refer to the Windows XP help system or contact your network administrator for support.

## 8 Installed Software

The firmware and the operating system are already installed on the R&S SFE100.

For further information:

- Performing a firmware update: see the release notes.
- Installing software options: see the user manual or the help system.

### 8.1 Operating System

The R&S SFE100 is equipped with the Windows XP Embedded operating system. When the R&S SFE100 is delivered, the operating system is configured for optimum operation. Changes to the system settings are required only if you install peripherals such as a keyboard and printer or if you configure the network and the settings do not conform to the default settings.

#### **NOTICE**

##### **Risk of causing instrument unusability**

To prevent malfunctions and to avoid instrument repair, only install service packs approved by Rohde & Schwarz.

In particular, do not use service packs for Windows XP Home Edition or Professional Edition.

#### 8.1.1 Login

Windows XP requires that you identify yourself by entering a user name and password in a login window. The R&S SFE100 provides a factory-installed auto login function, i.e. login is carried out automatically in the background. The ID used for auto login has administrator rights.



As user name and password, *instrument* are factory-set.

If the R&S SFE100 is connected to a network and if the user name and the password are identical under Windows XP and on the network, you log on to operating system and the network at the same time.

### 8.1.2 Windows XP Start Menu

The Windows XP Start menu provides access to the Windows XP functionality and installed programs. Under "Control Panel", the system settings are grouped. For details refer to the Windows XP help system.

## 8.2 Additional Software

### NOTICE

#### Risk of causing instrument unusability

The instrument is equipped with the Windows XP operating system. Additional software can therefore be installed on the instrument. The use and installation of additional software may impair instrument function. Thus, run only programs that Rohde & Schwarz has tested for compatibility with the instrument software.

The drivers and programs used on the instrument under Windows XP have been adapted to the instrument. Existing instrument software must always be modified using only update software released by Rohde & Schwarz.

## 8.3 Windows XP Recovery and Backup Partition

The R&S SFE100 provides a backup and recovery partition. A backup of the factory system partition (C:\) is stored per default and can be recovered in case of a system crash.

Only R&S SFE100 models 12, 13:

In addition, backups of up to 5 firmware versions can be stored on this partition. For example, it is possible to backup the current system partition prior to a firmware update or to provide different system configurations for different environments. When recovered, the system partition (C:/) is deleted, formatted and written newly. The data partition (D:\) is not affected.

### 8.3.1 Performing Backup/Recovery

The suitable procedure for performing backup/recovery depends on your R&S SFE100 model.

- Models 02, 03: use the procedure described in [Chapter 8.3.2, "Recommended Procedure for the R&S SFE100 Models 02, 03"](#), on page 46.
- Models 12, 13: use the procedure described in [Chapter 8.3.3, "Windows XP Embedded Recovery and Backup Partition Dialog"](#), on page 46.

### 8.3.2 Recommended Procedure for the R&S SFE100 Models 02, 03

This procedure is performed by using the hardkeys and display on the front panel that are only provided by the models 02, 03. You do not need to connect an external monitor.

#### To restore the factory system partition

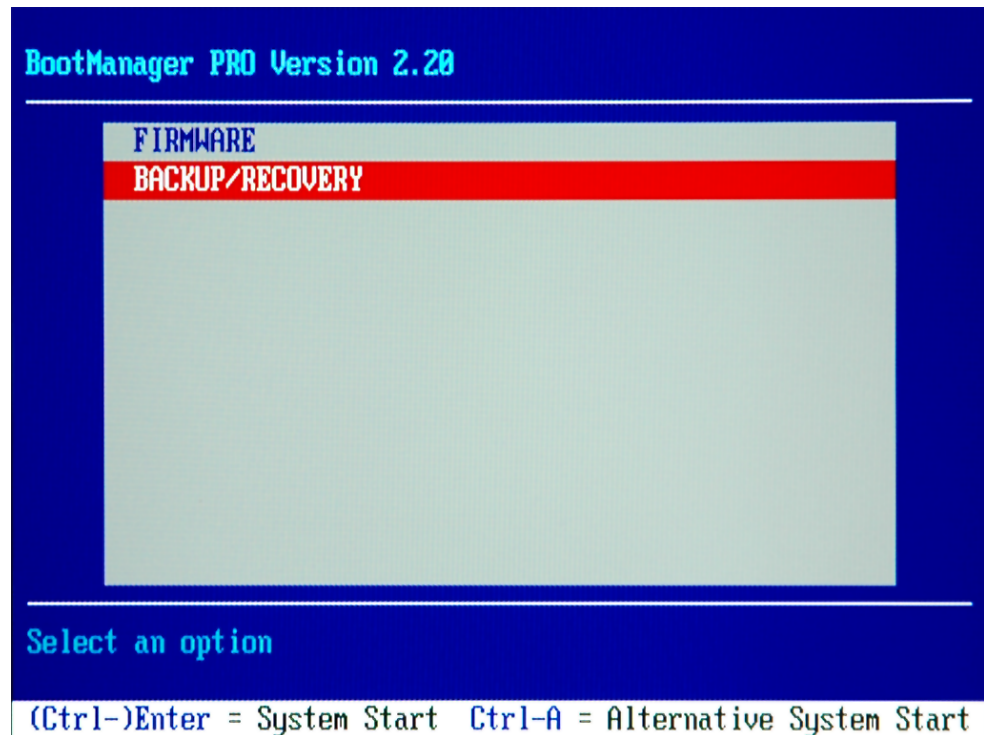
1. Switch the R&S SFE100 off and on again.  
While the boot screen is visible, the three LEDs on the front panel start blinking.
2. If a recovery is needed, press the BACK key within 4 seconds.  
The following message is displayed: "Restore factory default? Press OK to start restore."  
After pressing OK within 4 seconds, the recovery process starts and the following message is displayed: "Restore in progress! Please wait..."  
After the restore process is finished, a "warm boot" is carried out and R&S SFE100 continues with normal operation.
3. Within the next 4 seconds, press OK. Otherwise the restore is skipped and the regular boot process continues.

### 8.3.3 Windows XP Embedded Recovery and Backup Partition Dialog

Recommended procedure for the R&S SFE100 models 12, 13.

#### To display the Windows XP Embedded Recovery and Backup Partition dialog

1. Connect an external monitor, a keyboard and a mouse ([Chapter 4.3, "Connecting External Devices"](#), on page 24).
2. Switch the R&S SFE100 off and on again.  
The boot screen is displayed with the default selection "Firmware". If you do not perform [step 3](#) within 4 seconds, the dialog vanishes and the booting process continues.
3. Select "Backup/Recovery" and press ENTER.



R&S SFE100 models 02, 03:

The recovery of the system partition factory version is started, see "[Important information for the R&S SFE100 models 02, 03](#)" on page 48.

R&S SFE100 models 12, 13:

The "Windows XP Recovery and Backup Embedded Partition" dialog is displayed. It shows the available selections for the recovery and backup partition.

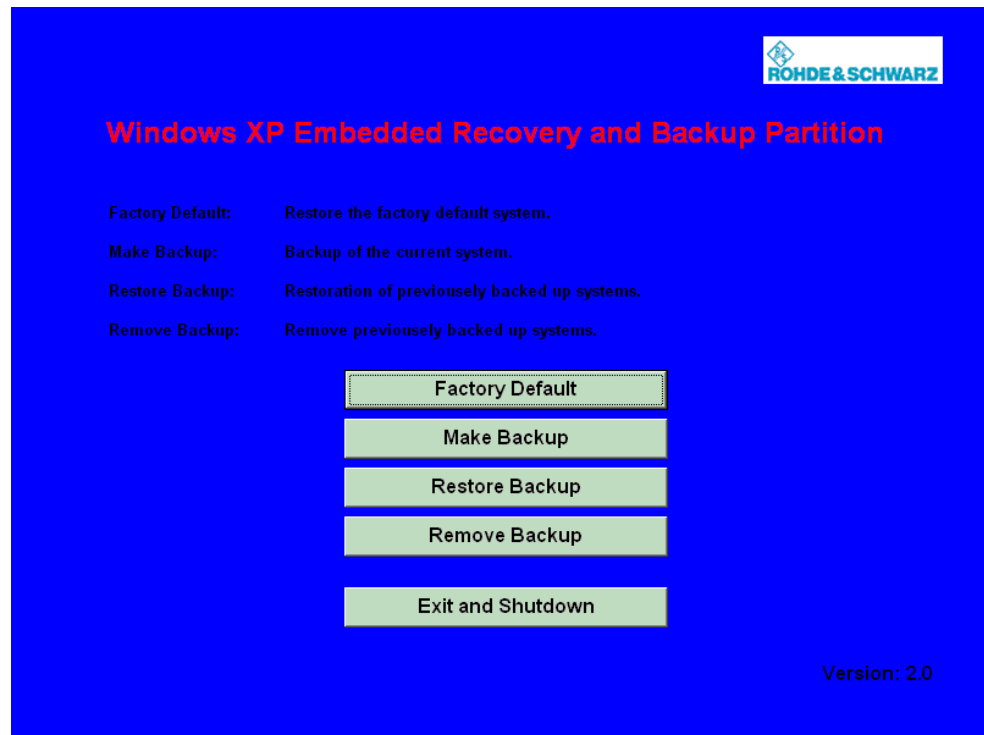


Figure 8-1: Windows XP Recovery and Backup Embedded Partition dialog

## NOTICE

### Important information for the R&S SFE100 models 02, 03

The recovery of the system partition factory version is running in the background (unattended). Do not prompt any actions before this process is completed. If the "Windows XP Recovery and Backup Embedded Partition" dialog is displayed (happens only if the installed image is older than LPCx\_SFE\_0024), you must not select "Factory Default" to avoid problems due to interference with the running background process.

For R&S SFE100 models 12/13, continue as described in one of the following chapters.

- The [Chapter 8.3.3.1, "Backing Up Current System Partition"](#), on page 48
- The [Chapter 8.3.3.2, "Recovering the Selected Version of System Partition"](#), on page 49
- The [Chapter 8.3.3.3, "Recovering the Factory Default"](#), on page 50
- The [Chapter 8.3.3.4, "Deleting Backups"](#), on page 51

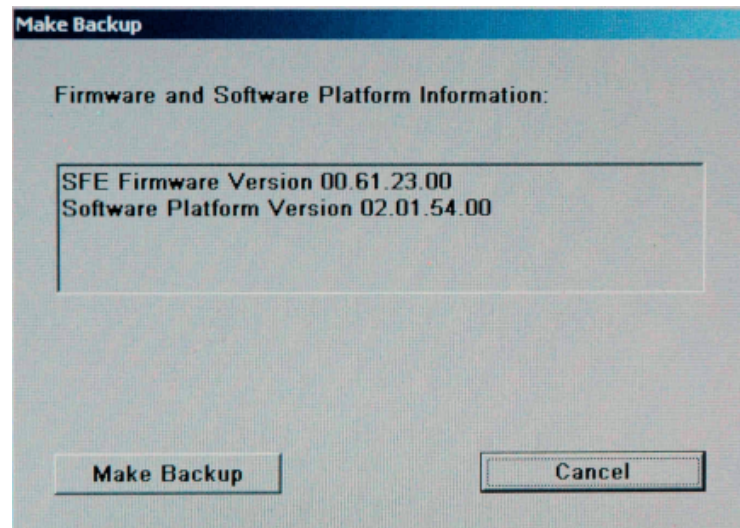
### 8.3.3.1 Backing Up Current System Partition

Only R&S SFE100 models 12, 13.



1. In the "Windows XP Embedded Recovery and Backup Partition" dialog (see ["To display the Windows XP Embedded Recovery and Backup Partition dialog"](#) on page 46), click "Make Backup".

The "Make Backup" dialog is displayed. It shows the current versions of the firmware and the software platform.



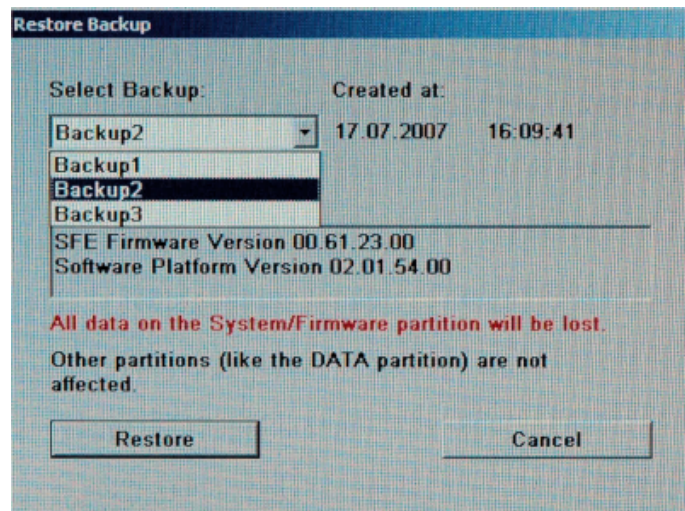
2. Click "Make Backup".  
After the backup, the "Windows XP Embedded Recovery and Backup Partition" dialog is displayed again.
3. Click "Exit and Shutdown".
4. Turn off/on the R&S SFE100 manually.

### 8.3.3.2 Recovering the Selected Version of System Partition

Only R&S SFE100 models 12, 13.

1. In the "Windows XP Embedded Recovery and Backup Partition" dialog (see ["To display the Windows XP Embedded Recovery and Backup Partition dialog"](#) on page 46), click "Restore Backup" to recover a selected version of the system partition.

The "Restore Backup" dialog is displayed. It shows the versions of the firmware and the software platform of the backup displayed under "Select Backup".



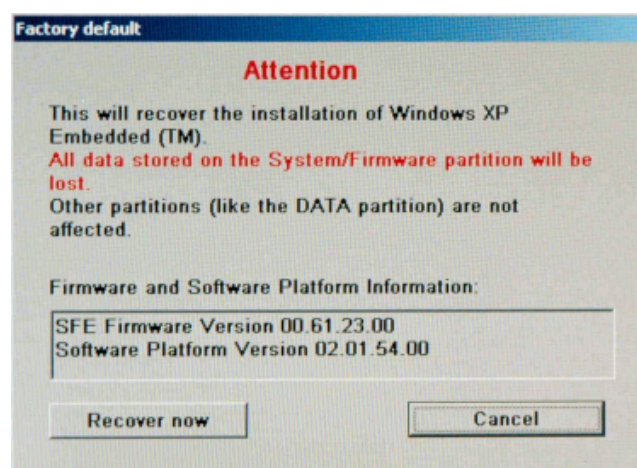
2. Under "Select Backup", select the backup to be restored.
3. Click "Restore" and follow the instructions.
4. After the recovery, turn off/on the R&S SFE100 manually.

### 8.3.3.3 Recovering the Factory Default

Only R&S SFE100 models 12, 13.

1. In the "Windows XP Embedded Recovery and Backup Partition" dialog (see ["To display the Windows XP Embedded Recovery and Backup Partition dialog"](#) on page 46), click "Factory Default" to recover the factory version of the system partition.

The "Factory Default" dialog is displayed. It shows the versions of the firmware and the software platform on delivery.



2. Click "Recover now" and follow the instructions.

3. After the recovery, turn off/on the R&S SFE100 manually.

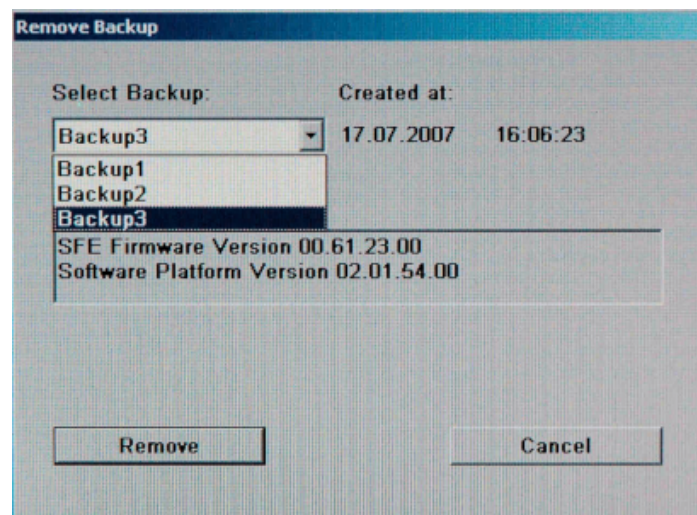
#### 8.3.3.4 Deleting Backups

On the recovery partition, you can store up to five backups in addition to the factory default. To provide space for new backups, you may need to remove older backups. The factory default cannot be deleted.

Only R&S SFE100 models 12, 13.

1. In the "Windows XP Embedded Recovery and Backup Partition" dialog (see ["To display the Windows XP Embedded Recovery and Backup Partition dialog"](#) on page 46), click "Remove Backup" to delete a selected backup.

The "Remove Backup" dialog is displayed. It shows the versions of the firmware and the software platform of the selected backup.



2. Under "Select Backup", select the backup to be deleted.
3. Click "Remove".

After the deletion, the R&S SFE100 returns to the "Remove Backup" dialog as long as backups are still available. If the last backup is deleted, the "Windows XP Embedded Recovery and Backup Partition" dialog is displayed again.
4. Click "Cancel" to return the "Windows XP Embedded Recovery and Backup Partition" dialog.
5. Click "Exit and Shutdown".
6. After the recovery, turn off/on the R&S SFE100 manually.

## 9 Maintenance

The R&S SFE100 does not need a periodic maintenance unless it is operated in dusty areas.

### NOTICE

#### Risk of instrument damage

If the R&S SFE100 is operated in dusty areas, the fans may become obstructed by dust or other particles in the process of time. Make sure to check and, if necessary, clean the fans regularly to ensure they operate properly at all times. If the R&S SFE100 is run with obstructed fans for a longer period, it may become overheated which may cause damage.

Clean the outside of the instrument when necessary and check the rated data from time to time.

If any problem arises, contact one of our customer support centers. The addresses of our customer support centers are provided at the beginning of this manual.

### 9.1 Cleaning the Instrument

#### WARNING

##### Shock hazard

Before cleaning the R&S SFE100, make sure that the R&S SFE100 is switched off and disconnected from all power supplies.

1. Clean the outside of the R&S SFE100 using a soft, lint-free dust cloth.
2. Make sure that vents are not obstructed.

### NOTICE

#### Instrument damage caused by cleaning agents

Cleaning agents contain substances that may damage the R&S SFE100, e.g. cleaning agents that contain a solvent may damage the front panel labeling or plastic parts.

Never use cleaning agents such as solvents (thinners, acetone, etc), acids, bases, or other substances.

## 9.2 Replacing the Fuses

The R&S SFE100 is protected by two fuses (F1/F2: IEC127-T2.0H/250 V) located on the rear panel next to the AC power switch.

---

**⚠ WARNING****Shock hazard**

Before replacing a fuse, make sure that the R&S SFE100 is switched off and disconnected from all power supplies.

Always use fuses supplied by Rohde & Schwarz as spare parts, or fuses of the same type and rating.

---

**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 two fuses.
4. Put the fuse holder back in its slot and close the lid.

## 9.3 Storing the Instrument

The storage temperature range of the R&S SFE100 is given in the data sheet. If the R&S SFE100 is to be stored for a longer period of time, it must be protected against dust.

Repack the R&S SFE100 as it was originally packed when transporting or shipping. The two protective foam plastic parts prevent the control elements and connectors from being damaged. The antistatic packing foil avoids any undesired electrostatic charging to occur.

If you do not use the original packaging, provide for sufficient padding to prevent the R&S SFE100 from slipping inside the package. Wrap antistatic packing foil around the R&S SFE100 to protect it from electrostatic charging.

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