



ROHDE & SCHWARZ

Test and Measurement
Division

Operating Manual

DC Power Supply

R&S FSP-B30

1155.1158.02

Battery Pack

R&S FSP-B31/32

1155.1258.02 / 1155.1506.02

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Republic of Germany

Contents

Techn. Information
 Safety Instructions
 Certificate of Quality
 EU Certificate of Conformity
 Support Center Address
 List of R&S Representatives

1 Option R&S FSP-B30 - DC Power Supply.....	5
Rear Panel.....	5
Installation of DC/DC Converter	6
Putting into Operation	7
DC Connector	7
Operation	7
2 Option R&S FSP-B31/B32 - Battery Pack	8
Rear Panel.....	8
Installation of Battery Pack	9
Putting into Operation	10
Charging the Battery Pack.....	10
Use	12
Operation from an External DC Voltage Source.....	12
Removing and Inserting Batteries.....	13

Technical Information



R&S FSP-B30, R&S FSP-B31

DC Power Supply and Battery Pack
for R&S FSP Spectrum Analyzer and
R&S ESPI Test Receiver

Features

- Spectrum Analysis and EMI testing in the field without AC power
- For all R&S FSP and R&S ESPI models
- Operating time up to 2 hours (typical)
- Recharge time only 5 hours
- Adds only 4.3 kg to the analyzers weight
- Built in charge control protect from overcharging
- DC power supply allows to use other DC power sources e.g. car battery
- Available spare battery pack expands operation time

Specifications

R&S FSP-B30 DC Power Supply

Input voltage range	10 VDC to 28 VDC 25 A to 12.5 A
Output voltage	120 VDC to 360 VDC / 300 W
Current consumption ($V_{DC} = 12V$, FSP without options, Preset settings)	
FSP3	typ. 6 A
FSP30	typ. 8 A
Temperature range	0 °C to +50 °C
Storage temperature range	-40 °C to +70 °C
Dimensions	145 mm x 154 mm x 65 mm
Weight	0,6 kg

R&S FSP-B31/-B32 Battery Pack

NiMH-Battery Pack with integrated charge controller for all R&S FSP and R&S ESPI models with options R&S FSP-B1 and R&S FSP-B30

Input external battery	10 VDC to 28 VDC
Input Power supply (battery charge)	24 VDC / max. 3 A
Output voltage	10 VDC to 28 VDC / 10 A
Battery operation	13.2 VDC / 200 Wh
Bypass operation	10 VDC to 28 VDC / 10 A
Typical operation times (FSP without options)	
FSP3	2 h
FSP30	1.5 h
Charge Time	5 h at 25 °C
Temperature range (discharge)	0 °C to +50 °C
Temperature range (charge)	+10 °C to +40 °C
Storage temperature range (< 1 year)	-20 °C to +35 °C
Storage temperature range (< 1 month)	-20 °C to +55 °C
Dimensions	400 mm x 134 mm x 42 mm
Weight	3.7 kg

AC adapter (FSP-B31 only)

Input voltage range	100 VAC to 240 VAC \pm 10 %
Input frequency range	50 Hz to 60 Hz \pm 5 %
Typical input power	140 VA
Output voltage	24 V
Output current	3 A
Temperature range	0 °C to +50 °C
Storage temperature range	-20 °C to +70 °C
Dimensions	132 mm x 58 mm x 30 mm
Weight	0,3 kg

Order Designation

DC Power Supply for FSP Spectrum Analyzer	FSP-B30	1155.1158.02
Battery Pack for FSP Spectrum Analyzer ¹⁾	FSP-B31	1155.1258.02
Spare Battery Pack for FSP Spectrum Analyzer ²⁾	FSP-B32	1155.1506.02
Rugged case, carrying handle (factory fitted)	FSP-B1	1129.7998.02

¹⁾ requires FSP-B1 and FSP-B30

²⁾ requires FSP-B31





ROHDE & SCHWARZ

Kundeninformation zur Batterieverordnung (BattV)

Dieses Gerät enthält eine schadstoffhaltige Batterie.
Diese darf nicht mit dem Hausmüll entsorgt werden.

Nach Ende der Lebensdauer darf die Entsorgung nur über eine Rohde&Schwarz-Kundendienststelle oder eine geeignete Sammelstelle erfolgen.

Safety Regulations for Batteries (according to BattV)

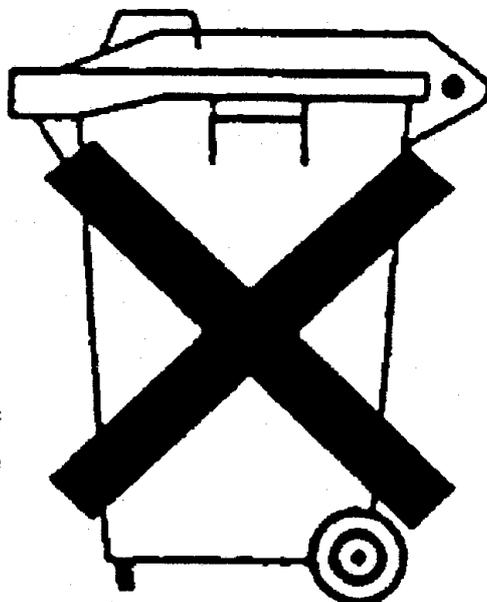
This equipment houses a battery containing harmful substances that must not be disposed of as normal household waste.

After its useful life, the battery may only be disposed of at a Rohde & Schwarz service center or at a suitable depot.

Consignes de sécurité pour batteries (selon BattV)

Cet appareil est équipé d'une pile comprenant des substances nocives. Ne jamais la jeter dans une poubelle pour ordures ménagères.

Une pile usagée doit uniquement être éliminée par un centre de service client de Rohde & Schwarz ou peut être collectée pour être traitée spécialement comme déchets dangereux.

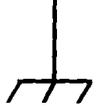
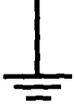


Safety Instructions

This unit has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards.

To maintain this condition and to ensure safe operation, the user must observe all instructions and warnings given in this operating manual.

Safety-related symbols used on equipment and documentation from R&S:

							
Observe operating instructions	Weight indication for units >18 kg	PE terminal	Ground terminal	Danger! Shock hazard	Warning! Hot surfaces	Ground	Attention! Electrostatic sensitive devices require special care

1. The unit may be used only in the operating conditions and positions specified by the manufacturer. Unless otherwise agreed, the following applies to R&S products:
IP degree of protection 2X, pollution severity 2 overvoltage category 2, only for indoor use, altitude max. 2000 m.
The unit may be operated only from supply networks fused with max. 16 A.
Unless specified otherwise in the data sheet, a tolerance of $\pm 10\%$ shall apply to the nominal voltage and of $\pm 5\%$ to the nominal frequency.
2. For measurements in circuits with voltages $V_{\text{rms}} > 30 \text{ V}$, suitable measures should be taken to avoid any hazards.
(using, for example, appropriate measuring equipment, fusing, current limiting, electrical separation, insulation).
3. If the unit is to be permanently wired, the PE terminal of the unit must first be connected to the PE conductor on site before any other connections are made. Installation and cabling of the unit to be performed only by qualified technical personnel.
4. For permanently installed units without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused such as to provide suitable protection for the users and equipment.
5. Prior to switching on the unit, it must be ensured that the nominal voltage set on the unit matches the nominal voltage of the AC supply network.
If a different voltage is to be set, the power fuse of the unit may have to be changed accordingly.
6. Units of protection class I with disconnectible AC supply cable and appliance connector may be operated only from a power socket with earthing contact and with the PE conductor connected.
7. It is not permissible to interrupt the PE conductor intentionally, neither in the incoming cable nor on the unit itself as this may cause the unit to become electrically hazardous.
Any extension lines or multiple socket outlets used must be checked for compliance with relevant safety standards at regular intervals.
8. If the unit has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply.
If units without power switches are integrated in racks or systems, a disconnecting device must be provided at system level.
9. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.
Prior to performing any work on the unit or opening the unit, the latter must be disconnected from the supply network.
Any adjustments, replacements of parts, maintenance or repair may be carried out only by authorized R&S technical personnel.

continued overleaf

Safety Instructions

Only original parts may be used for replacing parts relevant to safety (eg power switches, power transformers, fuses). A safety test must be performed after each replacement of parts relevant to safety.

(visual inspection, PE conductor test, insulation-resistance, leakage-current measurement, functional test).

10. Ensure that the connections with information technology equipment comply with IEC950 / EN60950.
11. Lithium batteries must not be exposed to high temperatures or fire.
Keep batteries away from children.
If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type (see spare part list).
Lithium batteries are suitable for environmentally-friendly disposal or specialized recycling. Dispose them into appropriate containers, only.
Do not short-circuit the battery.

12. Equipment returned or sent in for repair must be packed in the original packing or in packing with electrostatic and mechanical protection.
13. Electrostatics via the connectors may damage the equipment. For the safe handling and operation of the equipment, appropriate measures against electrostatics should be implemented.
14. The outside of the instrument is suitably cleaned using a soft, lint-free dustcloth. Never use solvents such as thinners, acetone and similar things, as they may damage the front panel labeling or plastic parts.
15. Any additional safety instructions given in this manual are also to be observed.

Certified Quality System ISO 9001

DQS REG. NO 1954-04

Qualitätszertifikat

Sehr geehrter Kunde,

Sie haben sich für den Kauf eines Rohde & Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Qualitätsmanagementsystems entwickelt, gefertigt und geprüft. Das Rohde & Schwarz-Qualitätsmanagementsystem ist nach ISO 9001 zertifiziert.

Certificate of quality

Dear Customer,

You have decided to buy a Rohde & Schwarz product. You are thus assured of receiving a product that is manufactured using the most modern methods available. This product was developed, manufactured and tested in compliance with our quality management system standards.

The Rohde & Schwarz quality management system is certified according to ISO 9001.

Certificat de qualité

Cher client,

Vous avez choisi d'acheter un produit Rohde & Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité. Le système de gestion qualité de Rohde & Schwarz a été homologué conformément à la norme ISO 9001.



ROHDE & SCHWARZ



Certificate No.: 99049

This is to certify that:

Equipment type	Stock No.	Designation
FSP3	1093.4495.03	Spectrum Analyzer
FSP7	1093.4495.07	
FSP13	1093.4495.13	
FSP30	1093.4495.30/.39	
FSP40	1093.4495.40	
FSP-B3	1129.6491.02	Audio Modulator AM/FM
FSP-B4	1129.6740.02	OCXO 10 MHz
FSP-B6	1129.8594.02	TV-Trigger
FSP-B9	1129.6991.02	Tracking Generator
FSP-B10	1129.7246.02	External Generator Control
FSP-B15	1155.1006.02	Pulse Calibrator
FSP-B16	1129.8042.02	Lan Interface 10/1000 Base T
FSP-B17	1129.8794.02	On-Line IQ Interface
FSP-B20	1155.1606.02	Extended Environmental Spec
FSP-B25	1129.7746.02	Electronic Attenuator
FSP-B30	1155.1158.02	DC Power Supply
FSP-B31	1155.1258.02	NIMH Battery Pack and Charger
FSP-B32	1155.1506.02	Spare Battery Pack (NIMH)

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within defined voltage limits (73/23/EEC revised by 93/68/EEC)
- relating to electromagnetic compatibility (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

EN61010-1 : 1993 + A2 : 1995
EN55011 : 1998 + A1 : 1999
EN61326 : 1997 + A1 : 1998 + A2 : 2001

For the assessment of electromagnetic compatibility, the limits of radio interference for Class B equipment as well as the immunity to interference for operation in industry have been used as a basis.

Affixing the EC conformity mark as from 1999

ROHDE & SCHWARZ GmbH & Co. KG
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Munich, 2002-07-25

Central Quality Management FS-QZ / Becker

Support Center

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Fax: (++)89) 41 29 - 137 77

e-mail: CustomerSupport@rsd.rohde-schwarz.com

Für technische Fragen zu diesem Rohde & Schwarz-Gerät steht Ihnen ab sofort unsere Hotline der Rohde & Schwarz Vertriebs-GmbH, Support Center, zur Verfügung.

Unser Team bespricht mit Ihnen Ihre Fragen und sucht Lösungen für Ihre Probleme.

Die Hotline ist Montag bis Freitag von 8.00 bis 17.00 Uhr besetzt.

Bei Anfragen außerhalb der Geschäftszeiten hinterlassen Sie bitte eine Nachricht oder senden Sie eine Notiz per Fax oder e-mail. Wir setzen uns dann baldmöglichst mit Ihnen in Verbindung.

 Möchten Sie über Neuerungen und Updates zu einem bestimmten Gerät informiert werden, senden Sie bitte eine kurze e-mail unter Angabe des Gerätes. Sie erhalten dann regelmäßig die aktuellen Informationen zugesandt.

Should you have any technical questions concerning this Rohde & Schwarz product, please contact the hotline of Rohde & Schwarz Vertriebs-GmbH, Support Center.

Our hotline team will answer your questions and find solutions to your problems.

You can reach the hotline Monday through Friday from 8:00 until 17:00.

If you need assistance outside office hours, please leave a message or send us a fax or e-mail. We will contact you as soon as possible.

 If you wish to receive the latest news about and updates for a specific instrument, please send us a short e-mail indicating the instrument. We will then send you up-to-date information on a regular basis.



ROHDE & SCHWARZ

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1 Option R&S FSP-B30 - DC Power Supply

When the DC Power Supply R&S FSP-B30 is installed, the R&S FSP/ESPI can be operated from a DC voltage of 10 V to 28 V.

The option comprises a DC/DC converter which converts the input voltage to a DC voltage between 120 V and 360 V. This voltage can be handled by the instrument power supply.

Rear Panel

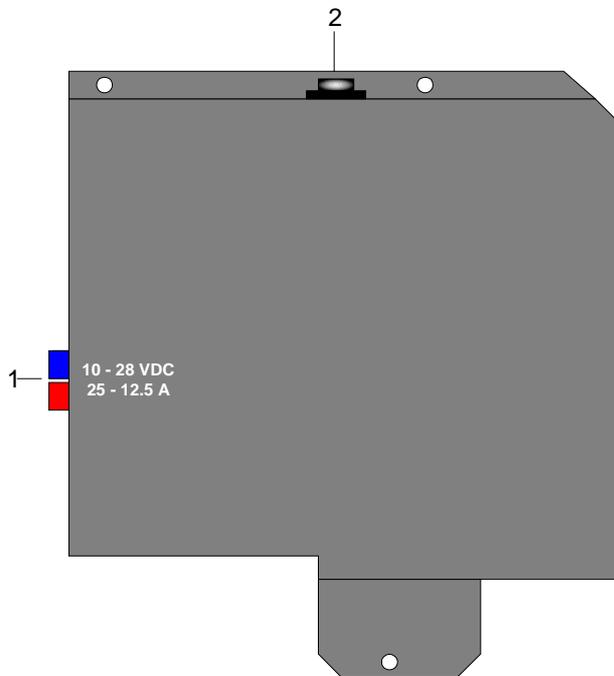
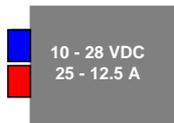


Fig. 1-1 Rear view of R&S FSP-B30

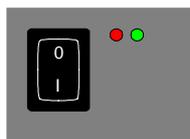
1



DC connector

See page 1.3

2



On/Off switch

See page 1.3

Installation of DC/DC Converter

The DC/DC converter (1) is mounted to the rear instrument panel.

**Caution!**

Because the unmounted DC/DC converter is a "Open Frame" module, ensure that the installation is carried out only by technical personnel (see No. 9. Safety Instructions).

Before the installation of the DC/DC converter, ensure that the DC voltage source is disconnected.

To do so disconnect the power cable and undo three screws (2) in the rear panel. Plug the converter to the rear power connector. The power switch is automatically actuated when the DC/DC converter is connected. Affix the DC/DC converter to the rear panel by means of the three screws.

If option R&S FSP-B1 (rugged case) is used, the right foot of the rear panel must be replaced by the foot supplied with the option to ensure sufficient ventilation of the power supply.

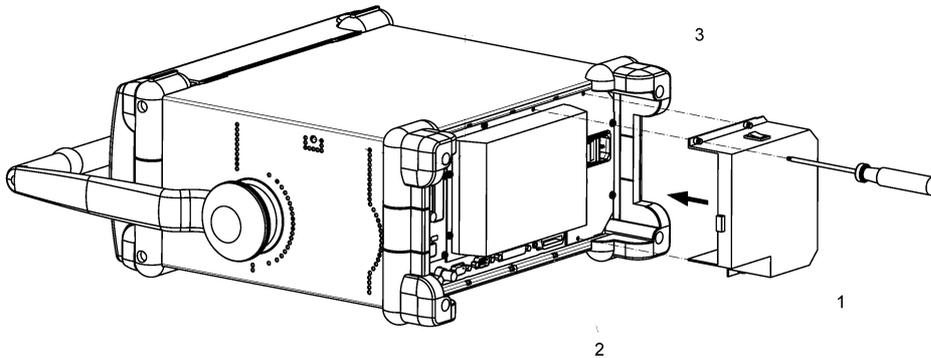


Fig. 1-1 Installation of R&S FSP-B30

Putting into Operation

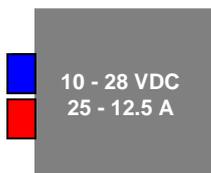


Caution!

For use of external power supplies for supply of equipment with DC low voltage (SELV), the requirements for reinforced/ double insulation for mains supply circuits in accordance to DIN/EN/IEC 61010 (UL 3111, CSA C22.2 No. 1010.1) or DIN/EN/IEC 60950 (UL 1950, CSA C22.2 No. 950) must be fulfilled.

DC Connector

DC connector



- Use the supplied cable to connect the DC/DC converter to the DC voltage source:

red	+ 10 V...+28 V
blue	GND

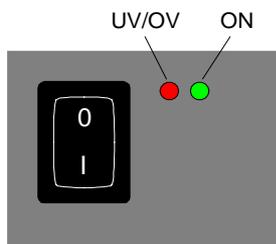


Caution!

We recommend to fuse the voltage source with max. 25 A. Check for correct polarity. Do not plug or unplug battery connector while the power is on.

Operation

On/off switch at instrument top



Position I

Power-up activates the DC/DC converter and the instrument is either ON or ready for operation (STANDBY) depending on the position of the ON/STANDBY switch on the instrument front.

The green LED (ON) is on. The instrument is powered and ready for operation.

In case of overvoltage or undervoltage, the converter is automatically switched off and the red LED (UV/OV) comes on.

Position 0

Switching off deactivates the DC/DC converter.



Caution!

To disconnect the DC/DC converter from the DC voltage source, unplug the input connector.

2 Option R&S FSP-B31/B32 - Battery Pack

If the optional Battery Pack FSP-B31/B32 is fitted, the instrument with FSP-B30 can be operated independently from AC supply. Option R&S FSP-B31 consists of a battery section (NiMH batteries with charger) and an external power supply, R&S FSP-B32 contains only batteries (2nd battery).

Important: The optional battery pack can only be fitted to instruments accommodated in a rugged case (option R&S FSP-B1).

Rear Panel

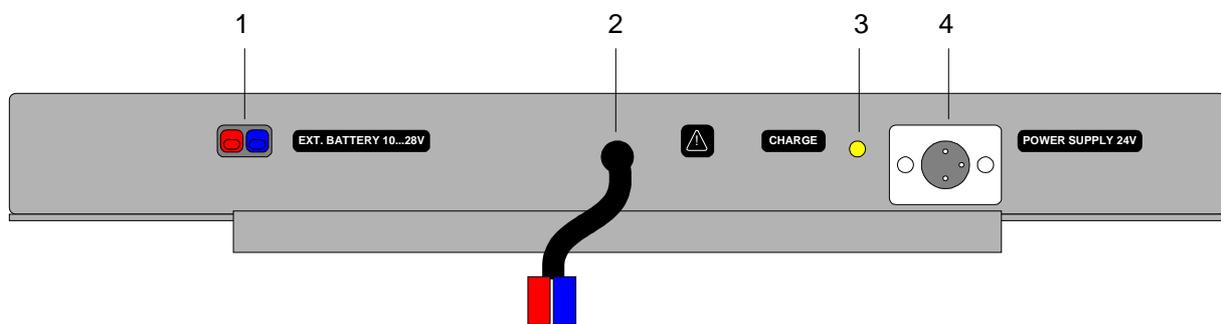


Fig. 2-1 Rear view of R&S FSP-B31/32

1		
	Connector for external battery	See page 1.7
2		
	DC output	See page 1.5
3		
	Charging state	See page 1.6
4		
	Connector for power supply (24 V, 3A)	See page 1.6

Installation of Battery Pack

The battery pack (1) is fixed to the instrument top. Place the pack on top of the instrument, push it towards the front until it engages and fix it to the two side panels using two knurled screws (2). Connect the output cable (3) to the DC/DC converter.

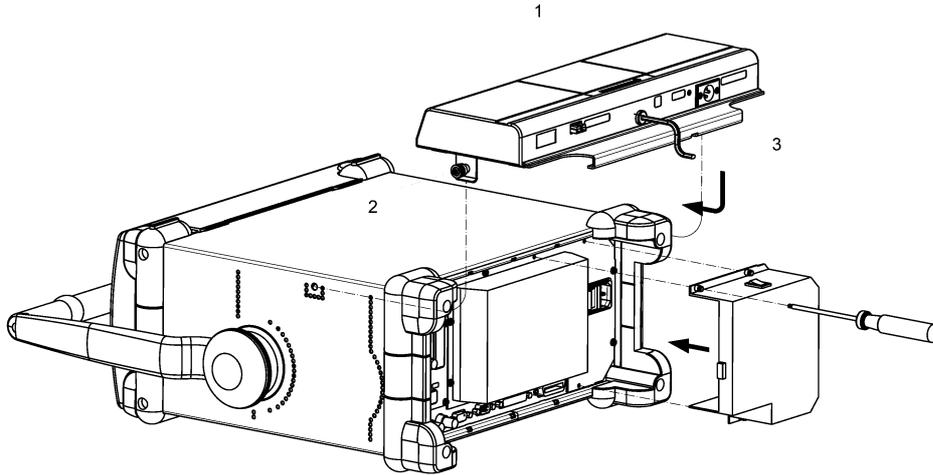


Fig. 2-2 Installation of R&S FSP-B31/32

Putting into Operation



Caution!

For use of external power supplies for supply of equipment with DC low voltage (SELV), the requirements for reinforced/ double insulation for mains supply circuits in accordance to DIN/EN/IEC 61010 (UL 3111, CSA C22.2 No. 1010.1) or DIN/EN/IEC 60950 (UL 1950, CSA C22.2 No. 950) must be fulfilled. The current limitation must be implemented according to DIN EN 61010-1 appendix F2.1.

Charging the Battery Pack

The battery pack with charger is powered from an external power supply. The batteries can be charged at an ambient temperature between +10°C and +40°C. If the temperature is above and below these values, charging is interrupted. If the battery temperature rises above +65°C, charging is stopped altogether.

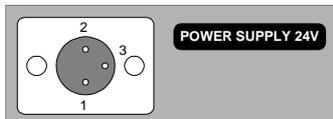


Caution!

The batteries are not charged in the factory. This must be done under all circumstances before the batteries are used for the first time. A new battery or one that has not been used for a long time attains full capacity only after repeated loading and discharging.

- Connect the power supply (24 V, 3 A) to the AC supply by means of the power cable supplied with the option. The power supply must be sufficiently ventilated during charging, i.e. make sure that it is not covered by objects that prevent cooling.

Connector for power supply



- Connect power supply to the connector labeled POWER SUPPLY 24V. Switch off the batteries; the cable of the DC/DC converter (R&S FSP-B30) need not be removed.

Pin 1: +24 V
 Pin 2: GND
 Pin 3: NC

Charging states



The following charging states are indicated:

Charging

The LED is on. Charging is going on.
The LED is off. Charging is completed.

Fault

The LED flashes. The battery temperature is outside the permissible range or the battery voltage is too low (battery overdischarged or defective).

Important:

After charging has been completed (LED is off), trickle charging is performed at reduced current.

Charging is terminated by an evaluation of battery voltage ($-\Delta V$ procedure) and battery temperature (dT/dt procedure). It is limited in addition to approx. 6 h by a timer.

**Caution!**

Charging should be performed at a constant ambient temperature as temperature variations may cause the charger to be switched off too early.

- Disconnect power supply. The battery pack is ready for operation.

Use

- Install battery pack and DC/DC converter.
- Connect the DC/DC converter to the DC output.
- Set the switch on the DC/DC converter to position I. The converter is active, the instrument is ready for operation. Operation is possible for up to two hours depending on the model.

Important: *If the battery voltage drops below 11 V, the DC output is switched off. At a battery voltage of approx. 13.5 V the output is switched on again.*



Caution!

The batteries should be charged every three months even if they are not used.

Operation from an External DC Voltage Source

The EXT. BATTERY input allows the instrument to be operated from a external DC voltage source without removing the battery unit. If a DC voltage (10 to 28 V DC) is present at the input, the internal batteries are switched off and the external DC voltage is routed to the output. The batteries are not charged in this mode.



Caution!

For use of external power supplies for supply of equipment with DC low voltage (SELV), the requirements for reinforced/ double insulation for mains supply circuits in accordance to DIN/EN/IEC 61010 (UL 3111, CSA C22.2 No. 1010.1) or DIN/EN/IEC 60950 (UL 1950, CSA C22.2 No. 950) must be fulfilled.



- Connect the input to the DC voltage source using the cable supplied with option R&S FSP-B30:

red	+ 10 V...+28 V
blue	GND



Caution!

We recommend to fuse the voltage source with max. 25 A. Check for correct polarity. Do not plug or unplug the battery connector while the power is on.

Removing and Inserting Batteries

- Disconnect all cables.
- Remove battery pack from the instrument.
- Undo the three screws (1) at the bottom of the pack.
- Withdraw the cover towards the rear.
- Disconnect the batteries (3).
- Remove the batteries (4).
- Insert the new batteries (R&S Ident. No. 1102.5607.02) and connect them.
- Replace the cover; press the batteries down and make sure that no cables are trapped.
- Screw on the cover.
- Charge the battery pack.

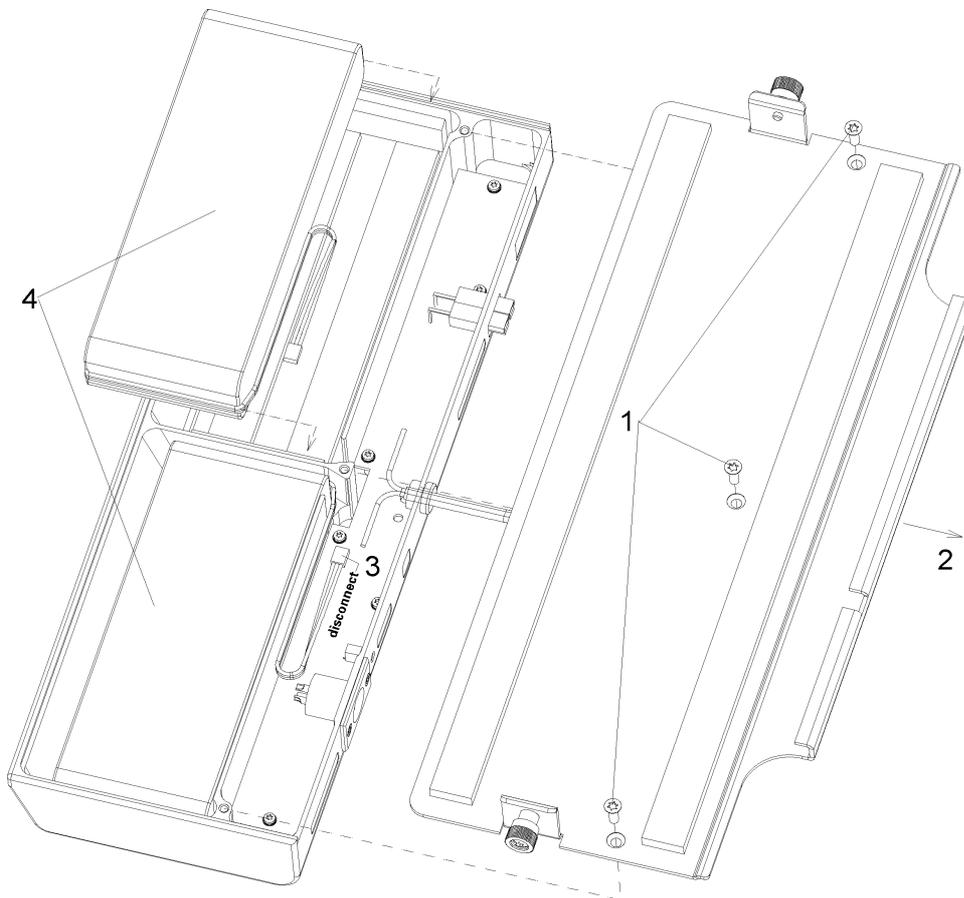


Fig. 2-3 Removing and inserting batteries