



**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

Printed in the Federal  
Republic of Germany



# Contents

Techn. Information

Safety Instructions

Certificate of Quality

EU Certificate of Conformity

Support Center Address

List of R&S Representatives

<b>1 Option R&amp;S FSP-B30 - DC Power Supply</b> .....	<b>5</b>
Rear Panel.....	5
Installation of DC/DC Converter .....	6
Putting into Operation .....	7
DC Connector .....	7
Operation .....	7
<b>2 Option R&amp;S FSP-B31/B32 - Battery Pack</b> .....	<b>8</b>
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 <sup>1)</sup>	FSP-B31	1155.1258.02
Spare Battery Pack for FSP Spectrum Analyzer <sup>2)</sup>	FSP-B32	1155.1506.02
Rugged case, carrying handle (factory fitted)	FSP-B1	1129.7998.02

<sup>1)</sup> requires FSP-B1 and FSP-B30

<sup>2)</sup> 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)**

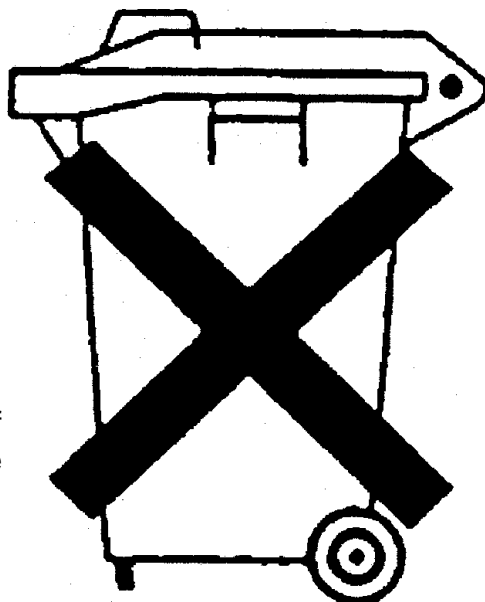
This equipment houses a battery containing harmful substances that must not be disposed of as normal household waste.

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**  
**Mühldorfstr. 15, D-81671 München**

Munich, 2002-07-25

Central Quality Management FS-QZ / Becker





---

# Support Center

**Telefon / Telephone:** (0180) 512 42 42

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

**e-mail:** [CustomerSupport@rsd.rohde-schwarz.com](mailto: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**





**HEADQUARTERS**

	Phone	Fax	E-mail
Rohde & Schwarz GmbH & Co. KG Mühlhofstraße 15 · 81671 München Postfach 801469 · 81614 München	+49 89 4129-0 +49 89 4129-12164	-	-

**PLANTS**

Rohde & Schwarz Messgerätebau GmbH Riedbachstraße 58 · 87700 Memmingen Postfach 1652 · 87686 Memmingen	+49 83 31 1 08-0 +49 83 31 1 08-1 24	-	-
Rohde & Schwarz GmbH & Co. KG Werk Teisnach Kaikenrieder Straße 27 · 94244 Teisnach Postfach 1149 · 94240 Teisnach	+49 99 23 8 50-0 +49 99 23 8 50-1 74	-	-
Rohde & Schwarz GmbH & Co. KG Werk Köln Graf-Zeppelin-Straße 18 · 51147 Köln Postfach 98 02 60 · 51130 Köln	+49 22 03 49-0 +49 22 03 49-3 08	-	-

**SUBSIDIARIES**

Rohde & Schwarz Vertriebs-GmbH Mühlhofstraße 15 · 81671 München Postfach 80 14 69 · 81614 München	+49 89 4129-12007 +49 89 4129-13567	-	-
Rohde & Schwarz International GmbH Mühlhofstraße 15 · 81671 München Postfach 80 14 60 · 81614 München	+49 89 4129-12005 +49 89 4129-3597	-	-
Rohde & Schwarz Engineering and Sales GmbH Mühlhofstraße 15 · 81671 München Postfach 80 14 29 · 81614 München	+49 89 4129-13711 +49 89 4129-13723	-	-
R&S BICK Mobilfunk GmbH Im Landerfeld 7 · 31848 Bad Münder Postfach 2062 · 31844 Bad Münder	+49 50 42 9 98-0 +49 50 42 9 98-105	-	-
Rohde & Schwarz FTK GmbH Wendenschloßstraße 168, Haus 28 12557 Berlin	+49 30 6 58 91-0 +49 30 65 55 02 21	-	-
Rohde & Schwarz SIT GmbH Wendenschloßstraße 168, Haus 28 12557 Berlin	+49 30 6 58 84-222 +49 30 6 58 84-183	-	-

**ADDRESSES GERMANY**

Rohde & Schwarz Vertriebs-GmbH Mühlhofstraße 15 · 81671 München Postfach 80 14 69 · 81614 München	+49 89 4129-2007 +4989 4129-3567	-	-
Zweigniederlassungen der Rohde & Schwarz Vertriebs-GmbH/Branch offices of Rohde & Schwarz Vertriebs-GmbH			
Zweigniederlassung Berlin Ernst-Reuter-Platz 10 · 10587 Berlin Postfach 100620 · 10566 Berlin	030 34 79 48-0 030 3479 48-48	-	-
Zweigniederlassung Bonn Josef-Wirmer-Straße 1-3 · 53123 Bonn Postfach 140264 · 53057 Bonn	0228 918 90-0 0228 25 50 87	-	-
Zweigniederlassung Hamburg Steilshooper Alle 47 · 22309 Hamburg Postfach 60 22 40 · 22232 Hamburg	040 63 29 00-0 040 630 78 70	-	-
Zweigniederlassung Köln Graf-Zeppelin-Straße 18 · 51147 Köln Postfach 900 149 · 51111 Köln	02203 807-0 02203 807-50	-	-
Zweigniederlassung München Mühlhofstraße 15 · 81671 München Postfach 80 14 69 · 81614 München	089 41 86 95-0 089 4047 64	-	-

Zweigniederlassung Nürnberg Donaustraße 36 90451 Nürnberg	0911 64203-0 0911 64203-33	-	-
Zweigniederlassung Telekommunikation + Mitte Siemensstraße 20 63263 Neu-Isenburg	06102 2007-0 06102 2007-12	-	-

**ADDRESSES WORLDWIDE**

<b>Algeria</b>	ROHDE & SCHWARZ Bureau d'Alger 5B Place de Laperrine 16035 Hydra-Alger	+213 (21) 48 20 18 +213 (21) 69 46 08	
<b>Argentina</b>	PRECISION ELECTRONICA S.R.L. Av. Julio A. Roca 710 - Piso 6 1067 Buenos Aires	+54 (14) 331 16 85 +54 (14) 334 51 11 alberto_lombardi@prec- elec.com.ar	
<b>Australia</b>	ROHDE & SCHWARZ (AUSTRALIA) Pty. Ltd. Sales Support Unit 6 2-8 South Street Rydalmere, N.S.W. 2116	+61 (2) 88 45 41 00 +61 (2) 96 38 39 88 sales@rsaus.rohde- schwarz.com	
<b>Austria</b>	ROHDE & SCHWARZ-ÖSTERREICH Ges.m.b.H. Sonnleithnergasse 20 1100 Wien	+43 (1) 602 61 41-0 +43 (1) 602 61 41-14 office@rsoe.rohde- schwarz.com	
<b>Azerbaijan</b>	ROHDE & SCHWARZ Azerbaijan Liaison Office Baku Azerbaijan Avenue 35 370000 Baku	+994 (12) 93 31 38 u. +994 (12) 98 79 01 +994 (12) 93 03 14 r&s-azerbaijan@artel.net.az	
<b>Baltic Countries</b>	siehe/see Denmark		
<b>Bangladesh</b>	BIL Consortium Ltd. Corporation Office House No: 95/A, Block - 'F' Road No: 4, Banani Dhaka-1213	+880 (2) 881 06 53 +880 (2) 882 82 91	
<b>Belgium</b>	ROHDE & SCHWARZ BELGIUM N.V. Excelsiorlaan 31 Bus 1 1930 Zaventem	+32 (2) 721 50 02 +32 (2) 725 09 36 info@rsb.rohde- schwarz.com	
<b>Bolivia</b>	RIBCO LTDA. Av. Mariscal Santa Cruz # 1392 Ed. Cámara Nacional de Comercio Piso 10, Of. 1010-1011 La Paz	+591 (2) 33 48 05 +591 (2) 39 30 47 gibatta@caoba.entelnet.bo	
<b>Brasil</b>	ROHDE & SCHWARZ DO BRASIL LTDA. Av. Alfredo Egídio de Souza Aranha, 177, 1. Andar - Santo Amaro 04726-170 Sao Paulo - SP	+55 (11) 56 41 12 00 +55 (11) 56 41 78 10 andrea.silva@rsdb.rohde- schwarz.com	
<b>Brunei</b>	GKL- Equipment PTE. Ltd. #11-01 BP Tower 396, Alexandra Road Singapore 119954	+65 (2) 76 06 26 +65 (2) 76 06 29 gkleqpt@signet.com.sg	
<b>Bulgaria</b>	siehe / see Austria		
<b>Canada</b>	ROHDE & SCHWARZ CANADA Inc. 555 March Rd. Kanata, Ontario K2K 2M5	+1 (613) 592 80 00 +1 (613) 592 80 09 cgjrnwarnauth@rsccanada.ca	
<b>Canada</b>	TEKTRONIX CANADA Inc. Test and Measurement 3280 Langstaff Road, Unit 1 Concord, Ontario L4K 5B6	+1 (416) 747 50 00	

<b>Chile</b>	DYMEQ Ltda. Av. Larrain 6666 Santiago	+56 (2) 277 50 50 +56 (2) 227 87 75	<b>Greece</b>	MERCURY S.A. 6, Loukianou Str. 10675 Athens	+30 (1) 722 92 13 +30 (1) 721 51 98 mercury@hol.gr
<b>China</b>	ROHDE & SCHWARZ Representative Office Beijing Room 602, Parkview Center 2, Jiangtai Road Chaoyang District Beijing 100016	+86 (10) 64 31 28 28 +86 (10) 64 37 98 88 info.rschina@rsbp.rohde- schwarz.com	<b>Guatemala</b>	siehe / see Mexico (EPSA)	
<b>Colombia</b>	FERROSTAAL DE COLOMBIA LTDA. Av. El Dorado No. 97-03 Bogotá, D.C.	+57 (1) 401 13 00 +57 (1) 413 18 06 miguel_canon@ferrostaal.c om	<b>Honduras</b>	siehe / see Mexico (EPSA)	
<b>Croatia</b>	siehe / see Austra		<b>Hongkong</b>	Schmidt Co. (H.K.) Ltd.. 36/F Dorset House, Taikoo Place 979 King's Road Quarry Bay Hong Kong	+852 (25) 07 03 33 +852 (25) 07 09 25 kevinpoon@shk.schmidtgrou.com
<b>Czech Republic</b>	ROHDE & SCHWARZ - Praha s.r.o. Evropská 33c 16000 Praha 6	+420 (2) 24 32 20 14 +420 (2) 24 31 70 43 rohdecz@rsoe.com	<b>Hungary</b>	ROHDE & SCHWARZ Budapesti Iroda Etele ut. 68 1115 Budapest	+36 (1) 203 02 82 +36 (1) 203 02 82 rohdehu@rsoe.rohde-schwarz.com
<b>Denmark</b>	ROHDE & SCHWARZ DANMARK A/S Ejby Industrivej 40 2600 Glostrup	+45 (43) 43 66 99 +45 (43) 43 77 44	<b>Iceland</b>	siehe / see Denmark	
<b>Ecuador</b>	REPRESENTACIONES MANFRED WEINZIERL Guanguiltagua 72 ( 39-93) Urbanización Jardines del Batán Quito	+593 (2) 25 22 51 +593 (2) 25 22 51 mweinzierl@accessinter.net	<b>India</b>	ROHDE & SCHWARZ India Pvt. Ltd. 244, Okhla Industrial Area, Phase-III New Delhi 110020	+91 (11) 632 63 81 (-3 85) +91 (11) 632 63 73 sales@rsindia.rohde-schwarz.com services@rsindia.rohde-schwarz.com
<b>Egypt</b>	U.A.S. Universal Advanced Systems 31 Manshiet El-Bakry Street Heliopolis 11341 Cairo	+20 (2) 455 67 44 +20 (2) 256 17 40 an_uas@intouch.com	<b>Indonesia</b>	ROHDE & SCHWARZ Representative Office Jakarta Menara Rajawali; 24th Floor JL Mega Kuningan Lot # 5.1 Kawasan Mega Kuningan Jakarta 12950	+62 (21) 576 16 02 +62 (21) 576 16 04 sales@rsbj.rohde-schwarz.com services@rsbj.rohde-schwarz.com
<b>El Salvador</b>	siehe / see Mexico (EPSA)		<b>Iran</b>	Islam . Rep. Of Iran ROHDE & SCHWARZ IRAN Ave. Dr. Beheshti/Ave. Pakistan/ 12th Street No. 1 Tehran 15317	+98 (21) 873 02 82 und -54 78 +98 (21) 873 02 83
<b>Estonia</b>	ROHDE & SCHWARZ DANMARK A/S Estonian Branch Office Narva mnt. 13 10151 Tallinn	+372 (6) 14 31 23 +372 (6) 14 31 21 margo.fingling@rsdk.rohde- schwarz.com	<b>Ireland</b>	siehe / see Great Britain	
<b>Finland</b>	Orbis Oy P.O.Box 15 00421 Helsinki 42	+358 (9) 47 88 30 +358 (9) 53 16 04 info@orbis.fi	<b>Israel</b>	EASTRONICS LTD. Messtechnik / T&M Equipment 11 Rozanis St. P.O.Box 39300 Tel Aviv 61392	+972 (3) 645 86 22 +972 (3) 648 66 66 david_hasky@easx.co.il
<b>France</b>	ROHDE & SCHWARZ FRANCE Immeuble "Le Newton" 9-11, rue Jeanne Braconnier 92366 Meudon La Forêt Cédex	+33 (1) 41 36 10 00 +33 (1) 41 36 11 73	<b>Israel</b>	J.M. Moss Engineering Ltd. Kommunikationstechnik/ Communications Equipment 9 Oded Street P.O.Box 967 52109 Ramat Gan	+972 (3) 631 20 57 +972 (3) 631 40 58 jmmoss@zahar.net.il
<b>France</b>	Niederlassung/Subsidiary Rennes Sigma 1 Rue du Bignon F-35135 Chantepie	+33 (2) 99 51 97 00 +33 (2) 99 41 91 31	<b>Italy</b>	ROHDE & SCHWARZ ITALIA S.p.a. Centro Direzionale Lombardo Via Roma 108 20060 Cassina de Pecchi (MI)	+39 (02) 95 70 42 03 +39 (02) 95 30 27 72 ornella.crippa@rsi.rohde-schwarz.com
<b>France</b>	Niederlassung/Subsidiary Toulouse Technoparc 3 B.P. 501 F-31674 Labège Cédex	+33 (5) 61 39 10 69 +33 (5) 61 39 99 10	<b>Italy</b>	ROHDE & SCHWARZ ITALIA S.p.a. Via Tiburtina 1182 00156 Roma	+39 (06) 41 59 82 18 +39 (06) 41 59 82 70
<b>France</b>	Aix-en-Provence	+33 (4) 94 07 39 94 +33 (4) 94 07 55 11	<b>Japan</b>	ADVANTEST Corporation RS Sales Department Shinjuku-NS Building, 4-1 Nishi-Shinjuku Tokyo 163-08	+81 (3) 33 42 75 53 +81 (3) 53 22 72 70 yoshimu@inst.advantest.co.jp
<b>France</b>	Office Lyon	+33 (4) 78 29 88 10 +33 (4) 78 29 94 71	<b>Jordan</b>	Jordan Crown Engineering & Trading Co. Jabal Amman, Second Circle Youssef Ezideen Street P.O.Box 830414 Amman, 11183	+962 (6) 462 17 29 +962 (6) 465 96 72 jocrown@go.com.jo
<b>France</b>	Office Nancy	+33 (3) 83 54 51 29 +33 (3) 83 55 39 51	<b>Kazakhstan</b>	ROHDE & SCHWARZ Kazakhstan Representative Office Almaty Pl. Respubliki 15 480013 Almaty	+7 (32) 72 63 55 55 +7 (32) 72 63 46 33
<b>Ghana</b>	KOP Engineering Ltd. P.O. Box 11012 3rd Floor Akai House, Osu Accra North	+233 (21) 77 89 13 +233 (21) 701 06 20			

<b>Kenya</b>	Excel Enterprises Ltd Dunga Road P.O.Box 42 788 Nairobi	+254 (2) 55 80 88 +254 (2) 54 46 79	<b>Norway</b>	ROHDE & SCHWARZ NORGE AS Olaf Helsetts vei 1 0694 Oslo	+47 (23) 38 66 00 +47 (23) 38 84 70
<b>Korea</b>	ROHDE & SCHWARZ Korea Ltd. 83-29 Nonhyun-Dong, Kangnam-Ku Seoul, REP. of KOREA 135-010	+82 (2) 514 45 46 +82 (2) 514 45 49 sales@rskor.rohde-schwarz.com service@rskor.rohde-schwarz.com	<b>Oman</b>	Mustafa Sultan Science & Industry Co. LLC. P.O.Box 3340 Postal Code 112 Ruwi	+968 602009 od. 567744 +968 607066 od. 560599 siteam@omantel.net.om
<b>Kuwait</b>	Group Five Trading & Contracting Co. P.O. Box 26645 Safat 13127	+965 (244) 91 72/73/74 +965 (244) 95 28	<b>Pakistan</b>	TelcoNet Communications & Engineering 42-A, Margalla Road, F-8/3 Islamabad	+92 (51) 226 31 20 +92 (51) 226 32 11 tnc@brain.net.pk
<b>Latvia</b>	ROHDE & SCHWARZ DANMARK A/S Latvian Branch Office Merkela iela 21-301 1050 Riga	+371 (7) 50 23 55 +371 (7) 50 23 60 rsdk@rsdk.rohde-schwarz.com	<b>Papua-New Guinea</b>	siehe / see Australia	
<b>Lebanon</b>	ROHDE & SCHWARZ Liaison Office c/o Haji Abdullah Alireza Co. Ltd. P.O.Box 361 Riyadh 11411	+966 (1) 465 64 28 Ext. 303 +966 (1) 465 64 28 Ext. 229 chris.porzky@rsd.rohde-schwarz.com	<b>Peru</b>	BMP INGENIEROS S.A. Av. José Gálvez Barrenechea 645 Urb. Corpac Lima 41	+51 (1) 225 40 30 +51 (1) 475 15 13 wmlgelrajo@bmp.com.pe
<b>Liechtenstein</b>	siehe / see Switzerland		<b>Philippines</b>	MARCOM INDUSTRIAL EQUIPMENT, Inc. 6-L Mezzanine Suite, Vernida I Condominium 120 Amorsolo St. Legaspi Village Makati City/Philippines 3117	+63 (2) 813 29 31 +63 (2) 817 05 07 marcom@i-next.net
<b>Lithuania</b>	ROHDE & SCHWARZ DANMARK A/S Lithuanian Office Lukiskiu 5-228 2600 Vilnius	+370 (2) 22 46 62 +370 (2) 22 46 62	<b>Poland</b>	ROHDE & SCHWARZ Österreich SP.z o.o. Przedstawicielstwo w Polsce ul. Stawki 2, Pietro 28 00-193 Warszawa	+48 (22) 860 64 94 +48 (22) 860 64 99 rohdepl@soe.rohde-schwarz.com
<b>Luxembourg</b>	siehe / see Belgium		<b>Portugal</b>	TELERUS Sistemas de Telecomunicacoes S.A. Rua General Ferreira Martins Lote 6, 2° B 1495-137 Algés	+351 (21) 412 35 90 +351 (21) 412 36 00 telerus@mail.telepac.pt
<b>Malaysia</b>	DAGANG TEKNIK SDN. BHD. No. 9, Jalan SS 4D/2 Taman People's Park Selangor Darul Ehsan 47301 Petaling Jaya	+60 (3) 703 55 68 +60 (3) 703 34 39 danik@tm.net.my	<b>Republic of Cyprus</b>	HINIS TELECAST LTD. P.O.Box 432 Agiou Thoma 18 Kiti 6304 Larnaca	+357 (4) 42 51 78 +357 (4) 42 46 21 hinis@logos.cy.net
<b>Malta</b>	ITEC International Technology Ltd B'Kara Road San Gwann SGN 08	+356 (3) 743 00 or (3) 743 29 +356 (3) 743 53 sales@itec.com.mt	<b>Romania</b>	ROHDE & SCHWARZ Representation Office Bucharest Str. Uranus 98 Sc. 2, Et. 5, Ap. 36 76102 Bucuresti, Sector 5	+40 (1) 410 68 46 +40 (1) 411 20 13 rohdero@soe.rohde-schwarz.com
<b>Mexico</b>	Electroingenieria de Precision, S.A. (EPSA) Uxmal 520 Colonia Vertiz Narvarte 03600 Mexico D.F.	+52 (5) 559 76 77 +52 (5) 575 33 81 rwwolf@epsa-mex.com	<b>Russian Federation</b>	ROHDE & SCHWARZ Representative Office Moscow Kazachy per. 7 109017 Moscow	+7 (095) 234 49 62 +7 (095) 234 49 63 rohderus@soe.rohde-schwarz.com
<b>Mexico</b>	Tektronix S.A. de C.V. Col. Insurgentes Cuicuilco Del. Coyoacán 04530 Mexico, D.F.	+52 (5) 666 63 33 +52 (5) 666 63 36 jose.delgado@tektronix.com	<b>Saudi Arabia</b>	Mr. Chris Porzky ROHDE & SCHWARZ International GmbH c/o Haji Abdullah Alireza Co. Ltd. P.O.Box 361 Riyadh 11411	+966 (1) 465 64 28 Ext. 303 +966 (1) 465 6428 Ext. 229 chris.porzky@ rsd.rohde-schwarz.com
<b>Netherlands</b>	ROHDE & SCHWARZ NEDERLAND B.V. Perkinsbaan 1 3439 ND Nieuwegein	+31 (30) 600 17 00 +31 (30) 600 17 99 info@rsn.rohde-schwarz.com	<b>Singapore</b>	INFOTEL TECHNOLOGIES LTD. 19 Tai Seng Drive #02-01 HeShe Building Singapore 535227	+65 (2) 87 68 22 +65 (2) 84 95 55 general@infotel.com.sg
<b>Nepal</b>	Abishek Trade Links (P) Ltd. P.O.Box 9700 Kathmandu	+977 (1) 25 69 30 +977 (1) 24 25 73 durbar@hotel.mos.com.np	<b>Singapore</b>	ROHDE & SCHWARZ Support Centre Asia PTE Ltd. 1 Kaki Bukit View #04-05/07 Techview Singapore 415941	+65 (8) 46 37 10 +65 (8) 46 00 29 veronica.tan@rsg.rohde- schwarz.com
<b>New Zealand</b>	Nichecom Level 1, Tawa Plaza 210 Main Road Tawa, Wellington	+64 (4) 232 32 33 +64 (4) 232 32 30 rob@nichecom.co.nz	<b>Slovak Republic</b>	Specialne systémy a software, a.s. Svrčia ul. 841 04 Bratislava	+421 (7) 65 42 25 29 +421 (7) 65 42 07 68 3s@internet.sk
<b>Nicaragua</b>	siehe / see Mexico (EPSA)		<b>Slovenia</b>	ROHDE & SCHWARZ Representation Ljubljana Tbilisjska 89 1000 Ljubljana	+386 (61) 423 46 51 +386 (61) 423 46 11 rohdesi@soe.rohde- schwarz.com
<b>Nigeria</b>	Ferrostaal (NIGERIA) Ltd. P.O. Box 72021 27/29 Adeyamo Alkaija Street Victoria Island Lagos	+234 (1) 262 00 60 +234 (1) 262 00 64 fs-nig@linkserve.com.ng			

<b>South Africa</b>	Protea Data Systems (Pty.) Ltd. Communications and Measurement Division Private Bag X19 Bramley 2018	+27 (11) 719 57 00 or -57 91 +27 (11) 786 58 91 unicm@protea.co.za or colin.forbes@protea.co.za	<b>United Arab Emirates</b>	ROHDE & SCHWARZ Liaison Office Dubai P.O.Box 5267 Dubai	+971 (4) 394 48 29 +971 (4) 394 47 94 kahmann@emirates.net.ae
<b>Spain</b>	ROHDE & SCHWARZ ESPANA S.A. Salcedo, 11  28034 Madrid	+34 (91) 334 10 70 +34 (91) 329 05 06 rema@rema.es	<b>United Arab Emirates</b>	ROHDE & SCHWARZ Emirates L.L.C. P.O.Box 31156 Abu Dhabi	+971 (2) 631 20 40 +971 (2) 631 30 40 rsuaeam@emirates.net.ae
<b>Sri Lanka</b>	LANKA AVIONICS 658/1/1, Negombo Road Mattumagala Ragama	+94 (1) 95 66 78 +94 (1) 95 83 11 lankavio@sltnet.lk	<b>United Kingdom</b>	ROHDE & SCHWARZ UK Ltd. Ancells Business Park Fleet Hampshire GU 51 2UZ England	+44 (1252) 81 13 77 +44 (1252) 81 14 47
<b>Sudan</b>	SolarMan Co. Ltd. P.O.Box 11 545 North of Fraouq Cementry 6/7/9 Bldg. 16 Karthoum	+249 (11) 47 31 08 +249 (11) 47 31 38 solarman29@hotmail.com	<b>Uruguay</b>	AEROMARINE S.A. Cerro Largo 1497 11200 Montevideo	+598 (2) 400 39 62 +598 (2) 401 85 97 aeromar@adinet.com.uy
<b>Sweden</b>	ROHDE & SCHWARZ SVERIGE AB Flygfältsgatan 15 128 30 Skarpnäck	+46 (8) 605 19 00 +46 (8) 605 19 80 info@rss.se	<b>USA</b>	ROHDE & SCHWARZ, Inc. Broadcast Equipment Comm. Equipment (US Headquarters) 7150-K Riverwood Drive Columbia, MD 21046	+1 (410) 910 78 00 +1 (410) 910 78 01 rsatv@rsa.rohde-schwarz.com rsacomms@rsa.rohde-schwarz.com
<b>Switzerland</b>	Roschi Rohde & Schwarz AG Papiermühlestr. 145 3063 Ittigen	+41 (31) 922 15 22 +41 (31) 921 81 01 marianne.balsiger@roschi.rohde-schwarz.com	<b>USA</b>	Rohde & Schwarz c/o Tektronix Inc. Marketing & Support Center / T&M Equipment 2540 SW Alan Blumlein Way M/S 58-925 Beaverton, OR 97077-0001	+1 (503) 627 26 84 +1 (503) 627 25 65 info@rsa.rohde-schwarz.com
<b>Syria</b>	Electro Scientific Office  Baghdad Street Dawara Clinical Lab. Bldg P.O.Box 8162 Damascus	+963 (11) 231 59 74 +963 (11) 231 88 75	<b>USA</b>	Rohde & Schwarz c/o Tektronix Inc. System Support Center/ T&M Systems & Services 2540 SW Alan Blumlein Way M/S 58-925 Beaverton, OR 97077-0001	+1 (503) 627 33 06 +1 (503) 627 25 65 info@rsa.rohde-schwarz.com
<b>Taiwan</b>	Lancer/System Communication Co. Ltd.  16F, No. 30, Pei-Ping East Road Taipei	+886 (2) 23 91 10 02 +886 (2) 23 95 82 83 info@lancercomm.com.tw	<b>Venezuela</b>	EQUILAB TELECOM C.A. Centro Seguros La Paz Piso 6, Local E-61 Ava. Francisco de Miranda Boleita, Caracas 1070	+58 (2) 12 34 46 26 +58 (2) 122 39 52 05 r_ramire@equilabtelecom.com.ve
<b>Tanzania</b>	Security Systems Tanzania Ltd. P.O. Box 7512 Dunga Street Plot 343/345 Dar es Salaam	+255 (22) 276 00 37 +255 (22) 276 02 93 sstl@twiga.com	<b>Venezuela</b>	REPRESENTACIONES BOPIC S.A. Calle C-4 Qta. San Jose Urb. Caurimare Caracas 1061	+58 (2) 129 85 46 90 +58 (2) 129 85 39 94 incotr@cantv.net
<b>Thailand</b>	SCHMIDT SCIENTIFIC (THAILAND) Ltd. 63 Government Housing Bank Bldg. Tower II, 19th floor, Rama 9 Rd. Huaykwang, Bangkok Bangkok 10320	+66 (2) 643 13 30-9 +66 (2) 643 13 40 kamthon@schmidtthailand.com	<b>Vietnam</b>	Schmidt Vietnam Co., Ltd. Intern. Technology Centre 8/F, Schmidt Tower, Hanoi Cau Giay, Tu Liem, IPO Box 89 Hanoi	+84 (4) 834 61 86 +84 (4) 834 61 88 svnhn@schmidtgroup.com
<b>Thailand</b>	TPP Operation Co., Ltd. 41/5 Mooban Tarinee Boromrajchonnee Road Talingchan, Bangkok 10170	+66 (2) 880 93 47 +66 (2) 880 93 47			
<b>Turkey</b>	ROHDE & SCHWARZ International GmbH Liaison Office Istanbul Bagdad Cad. 191/3, Arda Apt. B-Blok 81030 Selamicesme-Istanbul	+90 (216) 385 19 17 +90 (216) 385 19 18 rsturk@superonline.com			
<b>Ukraine</b>	ROHDE & SCHWARZ Representative Office Kiev 4, Patris Loumoumba ul 252042 Kiev	+38 (044) 268 60 55 +38 (044) 268 83 64 rohdeukr@soe.rohde-schwarz.com			
<b>United Arab Emirates</b>	ROHDE & SCHWARZ International GmbH Liaison Office Abu Dhabi P.O. Box 31156 Abu Dhabi	+971 (2) 633 56 70 +971 (2) 633 56 71 michael.rogler@rsd.rohde-schwarz.com			
<b>United Arab Emirates</b>	ROHDE & SCHWARZ Bick Mobile Communication P.O.Box 17466 JAFZ, PPU ZG-07 Dubai	+971 (4) 883 71 35 +971 (4) 883 71 36 www.rsbeck.de			

# 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

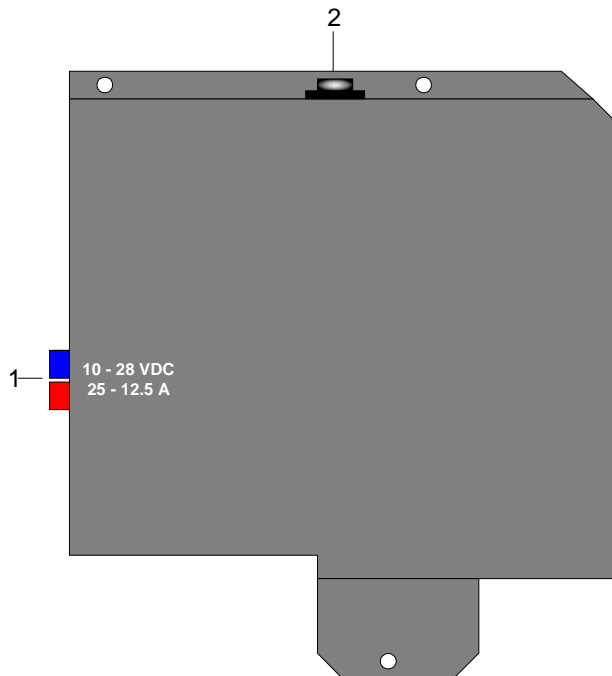
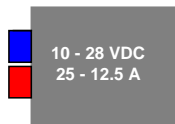


Fig. 1-1 Rear view of R&S FSP-B30

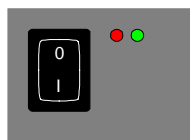
1



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.

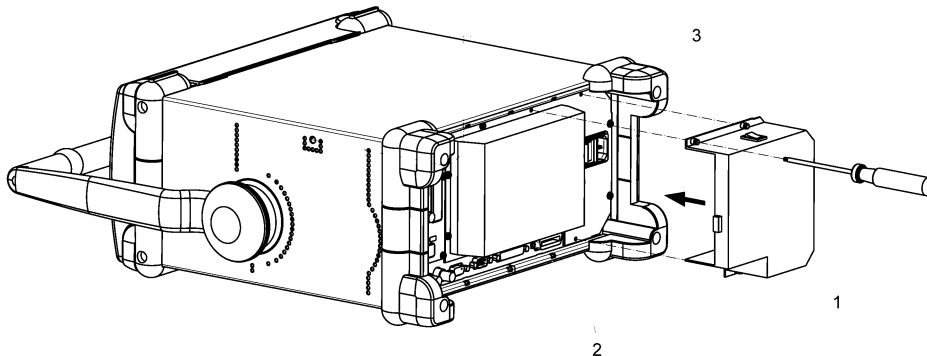


Fig. 1-1 Installation of R&S FSP-B30

## Putting into Operation

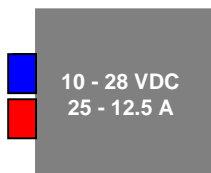


### Caution!

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

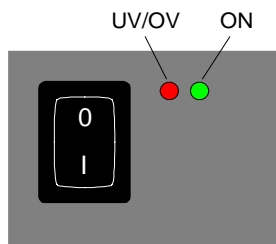


### Caution!

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

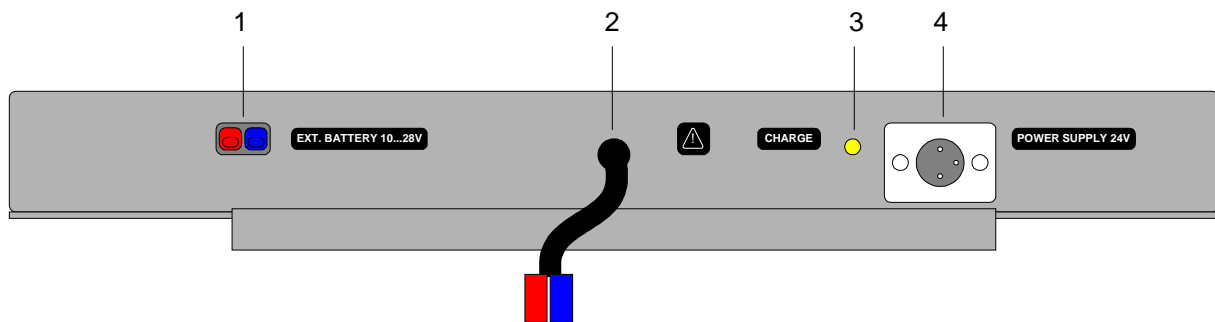


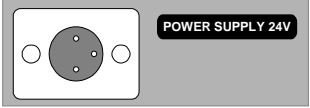


Fig. 2-1 Rear view of R&S FSP-B31/32

<b>1</b>		
	Connector for external battery	See page 1.7
<b>2</b>		
	DC output	See page 1.5
<b>3</b>		
	Charging state	See page 1.6
<b>4</b>		
	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.

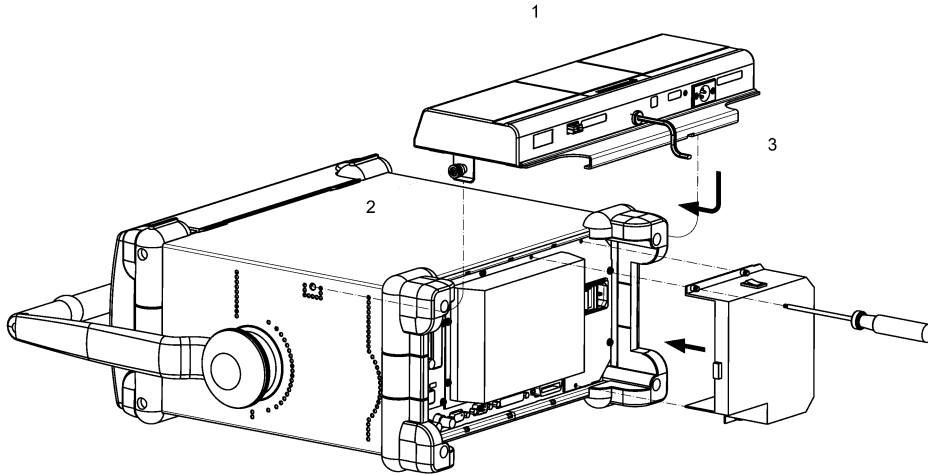


Fig. 2-2 Installation of R&S FSP-B31/32

## 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

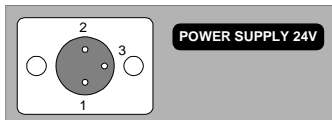
The battery pack with charger is powered from an external power supply. The batteries can be charged at an ambient temperature between +10°C and +40°C. If the temperature is above and below these values, charging is interrupted. If the battery temperature rises above +65°C, charging is stopped altogether.

**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.

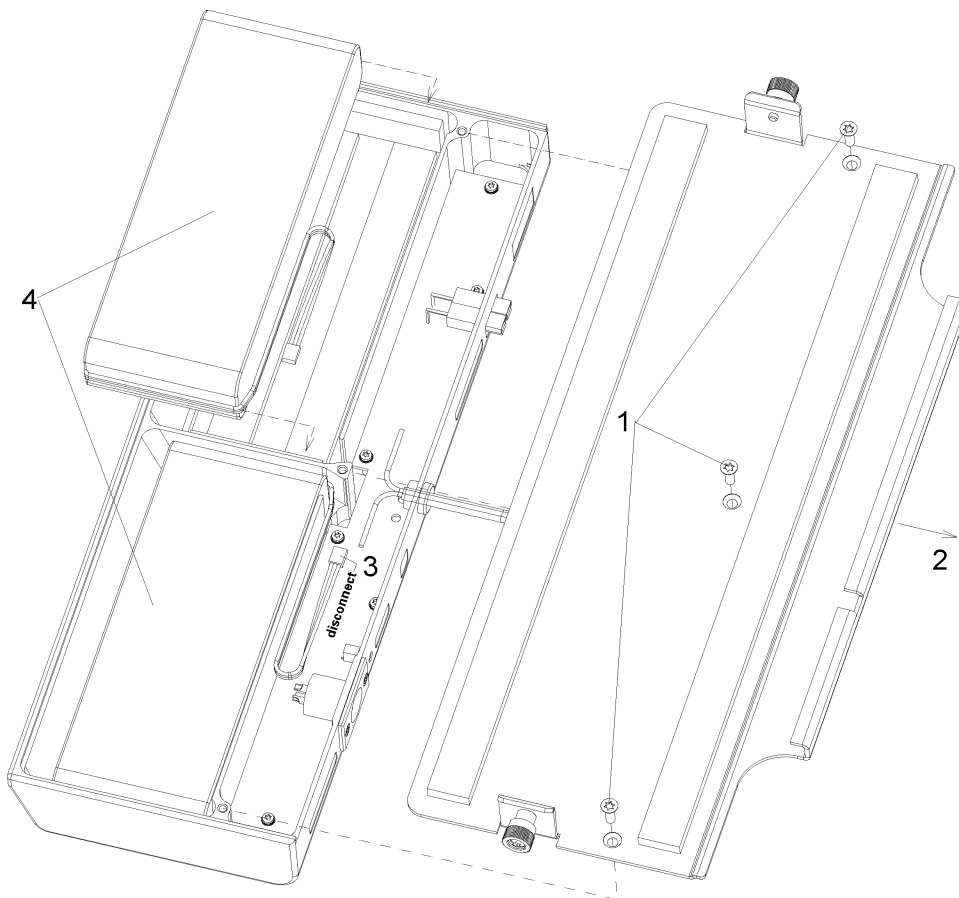


Fig. 2-3 Removing and inserting batteries