

R&S®NRP2

Power Meter

Service Manual Instrument



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The following abbreviations are used throughout this manual:

R&S®NRP2 is abbreviated as R&S NRP2.

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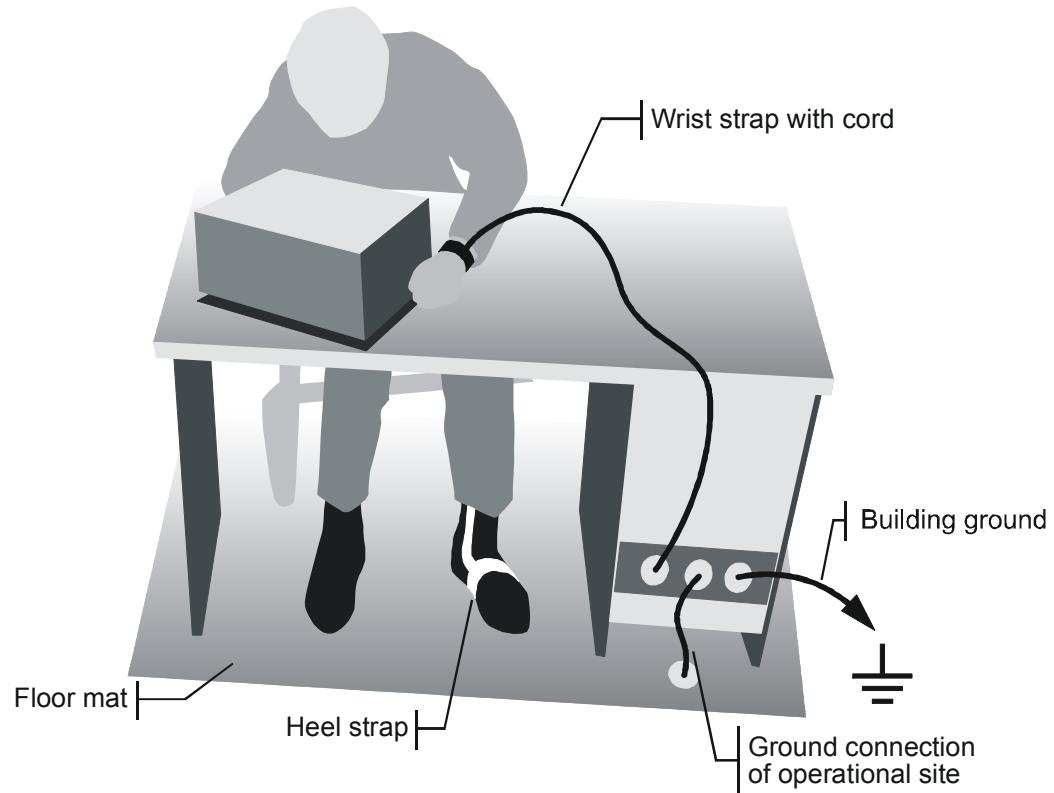
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Instructions for Electrostatic Discharge Protection

NOTICE

Risk of damaging electronic components

To avoid damage of electronic components, the operational site must be protected against electrostatic discharge (ESD).



The following two methods of ESD protection may be used together or separately:

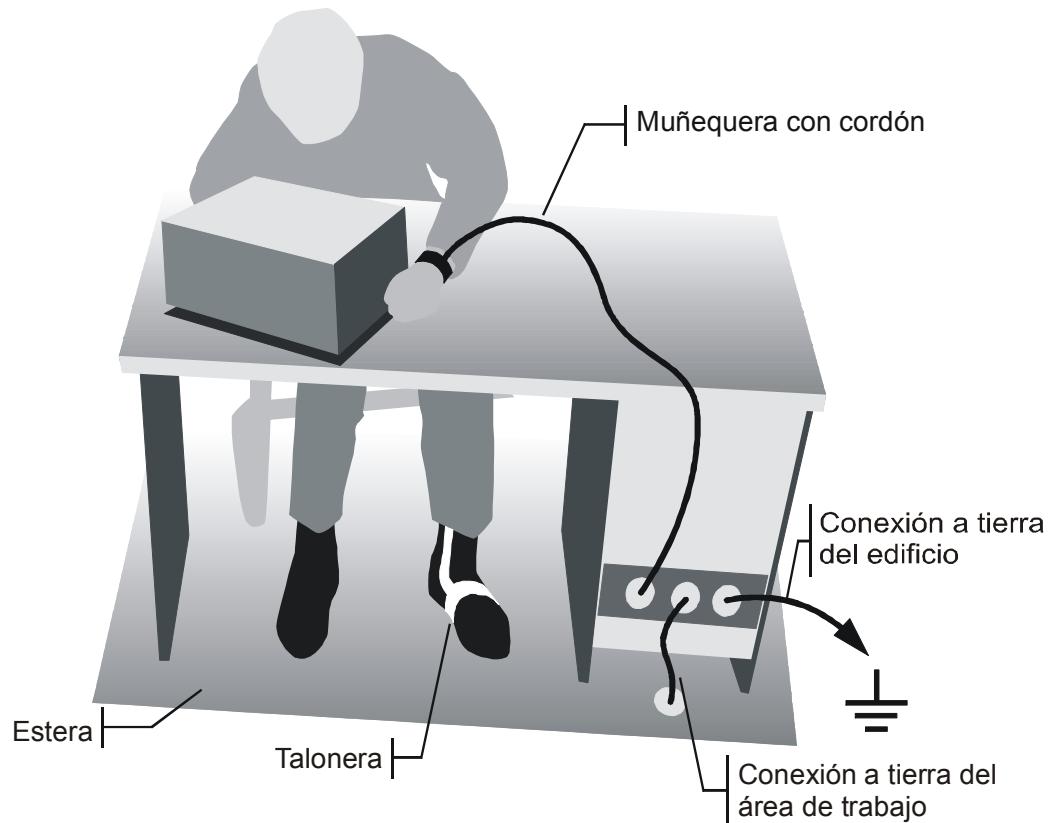
- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

Instrucciones para la protección contra descargas electroestáticas

AVISO

Riesgo de avería de los componentes electrónicos

Para evitar averías en los componentes electrónicos, el área de trabajo tiene que estar protegido contra descargas electroestáticas ESD (electrostatic discharge).



Los siguientes dos métodos de protección ESD pueden ser usados juntos o separados:

- Muñequera con cordón para conexión a tierra
- Combinación de estera antiestática y talonera

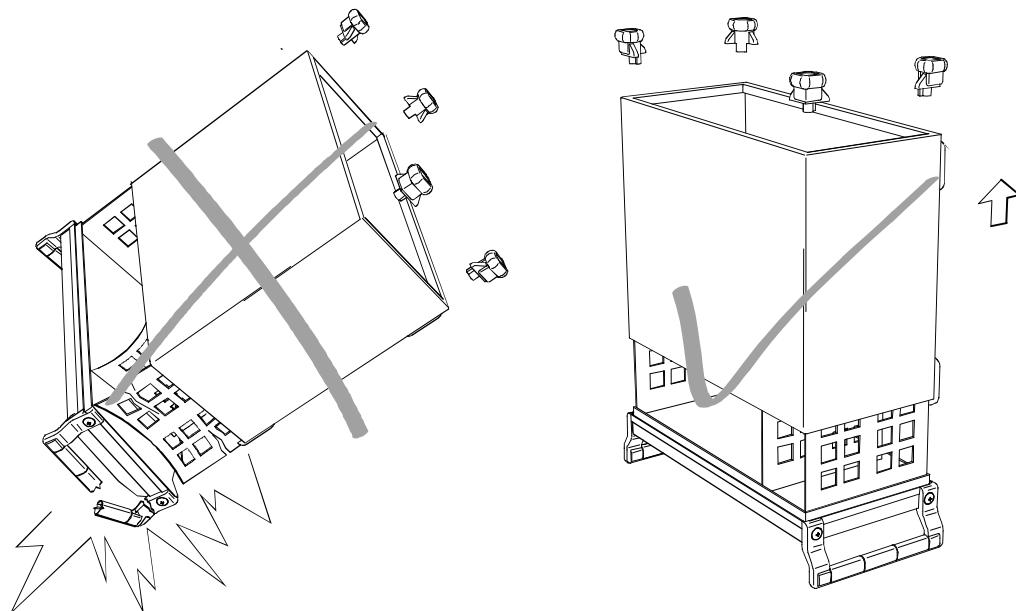
Safety Instructions for Units with Removable Cabinet

⚠ WARNING

Danger of injuries

When removing the rear feet, the unit can slip out of the cabinet.

Put the unit onto the front handles, before removing the rear feet and taking off the cabinet. Thus the risk of personal injuries and damages to the unit is avoided.



When mounting the cabinet take care not to pen in the fingers. Also pay attention not to damage or pull off cables. Screw the rear feet back on immediately after mounting the cabinet. Do not move the unit with the rear feet missing.

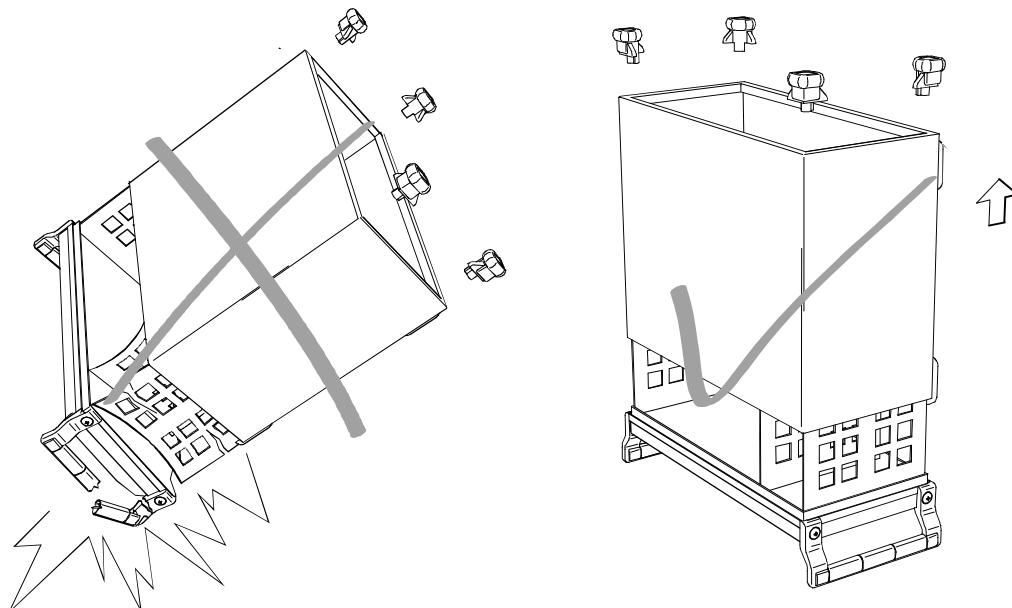
Informaciones de seguridad para aparatos con tubo de quita y pon

⚠ ADVERTENCIA

Peligro de heridas

Al sacar los pies de la pared posterior puede deslizarse el aparato fuera de la caja.

Posicionar el aparato de manera segura sobre las asas delanteras, antes de sacar los pies de la pared posterior y entonces sacar la caja. De esta manera evitarán el riesgo de daños en personas y daños en el aparato.



Existe el riesgo de heridas en el momento de poner otra vez la caja, como por ejemplo posiblemente engancharse los dedos. Por favor tengan además en cuenta de que no se enganchen o desconecten cables. Por favor atornillen los pies de la pared posterior directamente después de poner la caja. No muevan el aparato nunca sin que los pies de la pared posterior estén atornillados.

Procedure in Case of Service and Ordering of Spare Parts

This section contains information on shipping an instrument to your service center and ordering spare parts.

Please contact your local Rohde & Schwarz service center if you need service or repair work of your equipment or to order spare parts. You can find the current address of your representative on our homepage www.rohde-schwarz.com.

Shipping the Instrument

We require the following information in order to answer your inquiry fast and correctly and to determine whether the warranty is still valid for your instrument:

- Instrument model
- Serial number
- Firmware version
- Must the instrument be returned with this firmware?
- Detailed error description in case of repair
- Indication of desired calibration
- Contact person for possible questions

In some countries, an RMA process is available for the return shipment of the instrument. For details, contact your local representative.

When shipping the instrument, be careful to provide for sufficient mechanical and antistatic protection.

- Use the original packaging for transporting or shipping the instrument. The protective caps for the front and rear prevent damage to the operating elements and the connectors.
- If you do not use the original packaging, provide for sufficient padding to prevent the instrument from slipping inside the box. Wrap antistatic packing foil around the instrument to protect it from electrostatic charging.

Rohde & Schwarz offers repair and calibrations of the test systems it produces. The calibration documentation fulfills ISO 17025 requirements.

Shipping Defective Modules

Also when shipping a module, be careful to provide for sufficient mechanical and antistatic protection.

- Ship the module in a sturdy, padded box.
- Wrap the module in antistatic foil.

If the packaging is only antistatic but not conductive, additional conductive packaging is required. The additional packaging is not required if the tightly fitting packaging is conductive.

Exception:

If the module contains a battery, the tightly fitting packaging must always consist of antistatic, non-chargeable material to protect the battery from being discharged.

Ordering Spare Parts

To deliver spare parts promptly and correctly, we need the following information:

- Stock number (see list of spare parts in chapter "Documents")
- Designation
- Component number according to list of spare parts
- Number of pieces
- Instrument type for which the spare part is needed
- Instrument stock number
- Instrument serial number
- Contact person for possible questions

Refurbished Modules

Refurbished modules are an economical alternative to original modules. Bear in mind that refurbished modules are not new, but repaired and fully tested parts. They may have traces from use, but they are electrically and mechanically equivalent to new modules.

Your Rohde & Schwarz representative will be happy to inform you about which modules are available as refurbished modules.

Taking Back Defective Replaced Modules

Defective modules of the replacement program which cannot be repaired are taken back within three months following delivery. A repurchasing value is credited.

Excluded are parts which cannot be repaired, e.g. printed boards that are burnt, broken or damaged by attempts to repair them, incomplete modules, and parts with severe mechanical damage.

Please return the defective replacement modules, together with the accompanying document for returned merchandise, which you received with the spare module. We need the following information:

- Stock number, serial number and designation of the removed part
- Detailed error description
- Stock number, serial number and type of instrument from which the module was removed
- Date of removal
- Name of the engineer/technician who replaced the module
- R&S ordering number
- Service reference number (if available)

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1 Performance Test

This part of the service manual describes the steps for testing the R&S NRP2 base unit and its installed options with respect to function and compliance with specifications.

Test Instructions

- The tests are to be performed at an ambient temperature of 20 °C to 25 °C. The R&S NRP2 base unit must be switched on at least one hour prior to start of testing.
- The test limits used in the following sections are based on the data sheet. However, they are valid only under the conditions defined in the corresponding test step. They are therefore not legally binding as accuracy specifications; only data sheet specifications are legally binding.
- Entries on the Power Meter R&S NRP2 are abbreviated as follows:
[**<KEY>**] Press a key on the front panel, e.g. [**ZERO/CAL**].
[**<SOFTKEY>**] Press a softkey, e.g. [**Sensor**], or select a menu item.
[**<nn unit>**] Enter a value and terminate it with a unit, e.g. [**50 MHz**].
Successive entries are separated by [:], e.g. [**FREQ : 3 GHz**].

Required Measuring Equipment and Accessories

Table 1-1 Required measuring equipment and accessories

Item	Instrument type	Recommended characteristics	Recommended instruments	R&S Order No.	Application
1	Power sensor		R&S NRP-Z11 or R&S NRP-Z21	1138.3004.02 1137.6000.02	Testing of sensor connectors, hardware trigger and analog outputs
2	PC	IEC bus interface, USB host interface, 10/100Base-T Ethernet interface, Windows™ XP or more recent operating system, NI VISA software installed			Controller
3	10/100Base-T Ethernet hub				Testing of Ethernet connection
4	Ethernet patch cable (through-connected 1:1)	CAT 5, RJ-45 connector on both ends			Testing of Ethernet connection
5	Ethernet patch cable (through-connected 1:1)	CAT 5, RJ-45 connector on both ends			Testing of Ethernet connection
6	USB cable	USB connector type A to USB connector type B			Testing of USB device connection
7	IEC bus cable				Testing of IEC bus connection
8	Power calibration system	Calibration uncertainty <0.5 % at 50 MHz	R&S NRVC R&S SMP02 R&S NRVC-B1	1109.0500.02 1035.5005.02 1109.1007.02	Calibration of reference power sensor (item 9)
9	Power sensor	Measurement uncertainty <0.7 % at 50 MHz	R&S NRP-Z51	1138.0005.03	Reference power sensor for testing of R&S NRP-B1 resp. R&S NRP-B7
10	Power meter		R&S NRP or R&S NRP2	1143.8500.02 1144.1374.02	Reference power meter for testing of R&S NRP-B1 resp. R&S NRP-B7 Testing of analog outputs
11	Test generator	1 mW at 50 MHz	R&S NRP-B1 installed in item 10 or R&S NRP-B7 in item 10 (only NRP2)	1146.9008.02 1144.1000.02	Testing of analog outputs
12	Digital multimeter				Testing of analog outputs, Testing of the trigger output
13	BNC adapter for digital multimeter				Testing of analog outputs

Item	Instrument type	Recommended characteristics	Recommended instruments	R&S Order No.	Application
14	BNC cable (2 ×)				Testing of analog outputs, Testing of hardware trigger, Testing of the trigger output
15	BNC feed-through termination (2 ×)	50 Ω	R&S RAD 50	0844.9352.02	Testing of hardware trigger, Testing of the trigger output
16	Pulse generator				Testing of hardware trigger

Putting the R&S NRP2 into Operation

- Test setup: No special setup required
- Setting the DUT: Connect power cable.
Switch off with the [ON/STBY] key.
- Test: The LED (yellow) at right above the [ON/STBY] key is on (power supply operating).
- Setting the DUT: Switch on with the [ON/STBY] key.
- Test: The LED (green) at left above the ON/STBY key is on.
Booting completes without error messages (see following notes).

Notes regarding booting:

The automatic tests check the addressability and function of the internal components but do not allow (except with the Ethernet connection; see below) any conclusions to be drawn about the interfaces to the outside. For example, if the keyboard controller passes the test, this merely means that communication between the keyboard controller and the main processor is functioning, not that the keyboard itself is functioning. Reliable interface tests normally require either additional measurement and testing tools and/or user interaction.

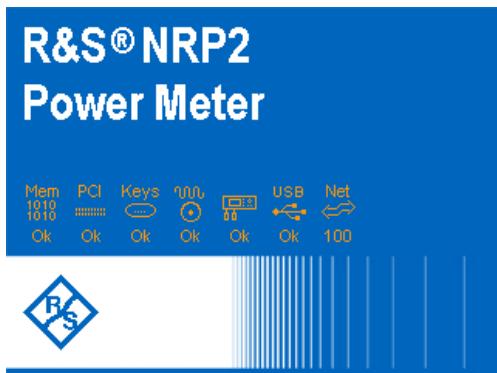


Fig. 1-1 Boot screen

Detected hardware components and options are indicated by symbols in the display (Fig. 1-1). If a test has been completed successfully, *Ok* appears beneath the corresponding symbol. If an error has been detected, *failed* appears instead and the symbol is displayed in inverse video. Table 1-2 provides an overview of the possible symbols.

With the Ethernet connection, a test is performed to determine whether the R&S NRP2 is connected to a network. If this is the case, the number *10* or *100* (rather than *Ok*) will appear under the symbol, where *10* indicates a 10Base-T network and *100* a 100Base-T network. If a network connection is not found within a predefined timeout, *NC* ("not connected") will appear under the symbol.

Table 1-2 Boot symbols

Symbol	Definition
	RAM
	Keyboard controller
	Test generator (option R&S NRP-B1 resp. R&S NRP-B7)
	Sensor connector A
	Sensor connector A on rear panel (option R&S NRP-B6)
	Sensor connectors A and B (option R&S NRP-B2)
	Sensor connectors A and B on rear panel (options R&S NRP-B2/-B6)
	Sensor connectors A to D (option R&S NRP-B5)
	USB device connection
	Ethernet connection

Testing the Display, Keyboard, and Buzzer

Test setup: No special setup required.

Notice:

For these tests, the unit must be rebooted, as they are only available via the Boot menu.

Setting the DUT:

- Switch off with the [ON/STBY] key.
- Switch on with the [ON/STBY] key.
- During booting: [Bootmenu]
- Enter password: [7 : 3 : 9 : 6]
- In the Boot menu: [Service]
- In the Service menu: [Display Test]
- 10 different test patterns can be called up with softkeys 1 to 0:
 1. Black screen
 2. White screen
 3. Red screen
 4. Yellow screen
 5. Blue screen
 6. Vertical stripes with levels of gray
 7. Checkerboard
 8. Checkerboard (inverse)
 9. Diagonal lines (from top right to bottom left)
 10. Diagonal lines (from top left to bottom right)

Test: All test patterns are displayed correctly.

- Setting the DUT:
- To return to the Service menu, press the [ESC] key or lowermost softkey toggle.
 - In the Service menu: [Key Test]
 - Press all keys and softkeys (except the [ON/STBY] key), one after another, in random order.
- Test:
- The message *Test was successful!* appears at bottom of display.
The test is left automatically, and the Service menu appears.
- Setting the DUT:
- In the Service menu: [Buzzer Test]
- Test:
- Acoustic response (short beep) occurs.
- Setting of DUT:
- Press [Exit] twice to leave the Boot menu and reboot the R&S NRP2.

Testing the Display Backlighting

- Test setup:
- No special setup required.
- Setting the DUT:
- [System : Misc...].
 - With the softkey toggle [Brightness], the brightness of the display backlighting can be increased (toggle to the right) or decreased (toggle to the left). All six brightness levels shall be set one after another.
- Test:
- Display backlighting becomes brighter (toggle to the right) or darker (toggle to the left), if not already set to maximum or minimum brightness, respectively.
 - The six brightness levels shall be clearly distinguishable.
- Setting the DUT:
- Press [↴ MENU] twice to return to the main menu.

Testing the IEC Bus Interface

Test setup: Connect the DUT to the PC's IEC bus interface using an IEC bus cable.

- Setting the DUT:
- [System : Remote : GPIB] (Fig. 1-2)
 - For *GPIB Address*, set any value other than 0.
 - For *Command Set*, choose [R&S NRP2].

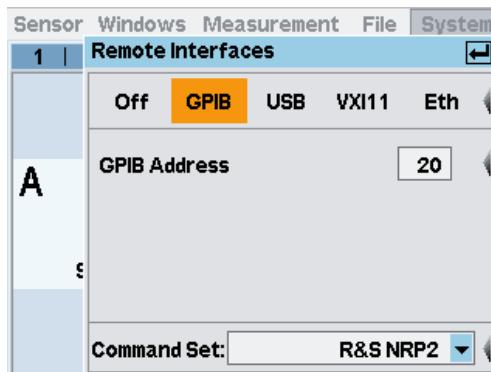


Fig. 1-2 Setting the GPIB parameters

Setting the PC: Start a suitable program for direct communication via the IEC bus, e.g. the *Measurement & Automation Explorer* program that is supplied together with IEC bus cards from *National Instruments*.

If using the *Measurement & Automation Explorer* program, proceed as follows:

- Setting the PC:
- Start *Measurement & Automation Explorer*.
 - In the left display window (*Configuration*) under *My System – Instruments and Interfaces*, mark the IEC bus card by clicking with the left mouse key (if the system has only one IEC bus card, it will bear the designation *GPIB0*) and press button *Scan for Instruments*.
 - A list of instruments connected to interface card *GPIB0* must appear (if the R&S NRP2 is the only instrument on the IEC bus, it will bear the name *Instrument0*). If you mark the list entry for the R&S NRP2 by using the mouse, information about the instrument will appear in the right display window (Fig. 1-3).

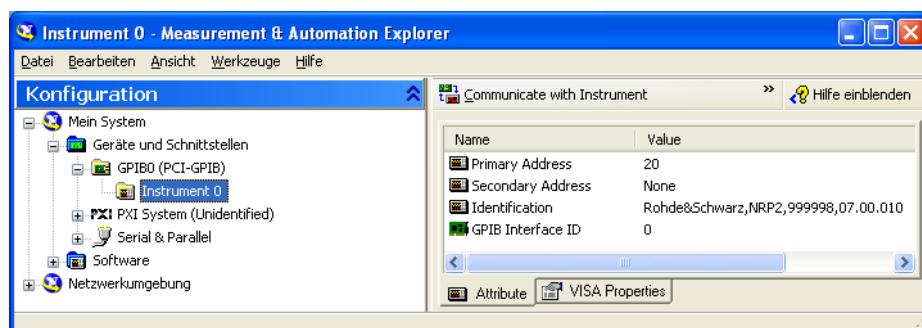


Fig. 1-3 Displaying the identification string in *Measurement & Automation Explorer*

Test: The identification string of the R&S NRP2 must be assigned to the *Identification* entry. The format of the R&S NRP2 identification string is as follows:

Rohde&Schwarz,NRP2,<serial number>,<firmware version>

where *<serial number>* is the serial number of the instrument and *<firmware version>* is the version of the firmware running in the instrument.

If you use a different program, proceed as follows:

Setting the PC:

- Send query *IDN?.
- Receive the data returned by the DUT.

Test: The R&S NRP2 identification string in the format shown above must be received.

Testing the USB Interface

Test setup: Connect the USB interface of the DUT to the USB host interface of the PC using a USB cable.

Setting the DUT:

- [System : Remote : USB] (Fig. 1-4)
- For *Command Set*, choose [R&S NRP2].

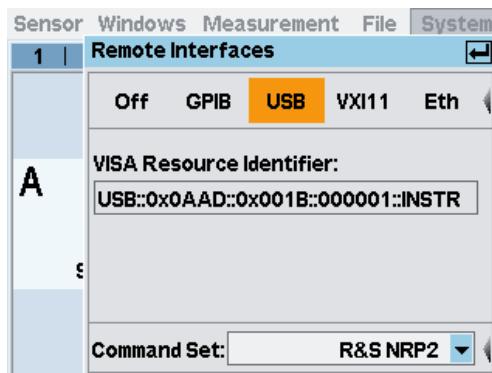


Fig. 1-4 Setting the parameters for USB remote control

Setting the PC: Start a suitable program for direct communication via the USB, e.g. the *Measurement & Automation Explorer* program that is supplied together with IEC bus cards from *National Instruments*.

If using the *Measurement & Automation Explorer* program, proceed as follows:

Setting the PC:

- Start *Measurement & Automation Explorer*.
- In the left display window (*Configuration*) under *My System – Instruments and Interfaces – USB Devices*, view the instruments connected to the USB.
- A list of VISA resource descriptors of the instruments connected to the USB must appear. If you mark the list entry for the R&S NRP2 by using the mouse, information about the instrument will appear in the right display window (Fig. 1-5).

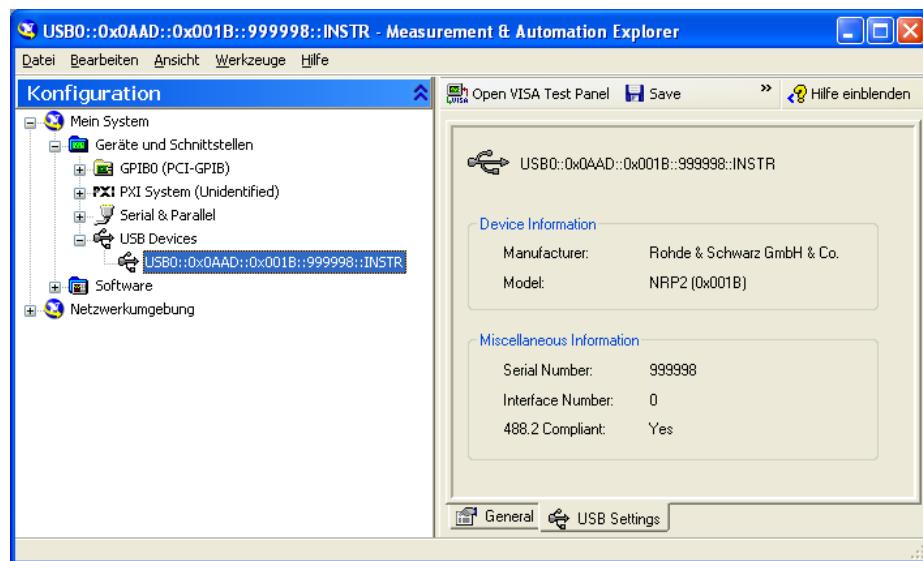


Fig. 1-5 Displaying the information for a USB device in *Measurement & Automation Explorer*

Test:

- The *Manufacturer* entry must read *Rohde & Schwarz GmbH & Co. KG*.
- The *Model* entry must read *NRP2 (0x001B)*.
- For *Serial Number*, the serial number of the instrument must be displayed.

If you use a different program, proceed as follows:

Setting the PC:

- Send query `*IDN?` (function viWrite).
- Receive the data returned by the DUT (function viRead).

Test:

The R&S NRP2 identification string in the format as shown under [Testing the IEC Bus Interface](#) must be received.

Testing the Ethernet Interface

- Test setup:
- Connect the DUT Ethernet interface to the Ethernet hub using an Ethernet patch cable.
 - Connect the PC's Ethernet interface to the Ethernet hub using an Ethernet patch cable.

- Setting the PC:
- Set the IP address for the network card, e.g. 10.0.0.1 (needs to be set only once).

- Setting the DUT:
- [System : Remote : Ethernet]
 - If 0.0.0.0 is set as an IP address, enter a meaningful value, e.g. 10.0.0.2.

Notice:

When testing several R&S NRP2 instruments in succession, enter a different IP address for each one. The IP addresses assigned to the instruments are retained several minutes after the Ethernet connection is broken. If command arp -a still indicates a previously assigned IP address, do not assign this address again.

- Setting the PC:
- Open the command line window: [Start : Execute ... : cmd.exe ↴]
 - Enter command: [ping <IP address of the DUT> ↴],
e.g. [ping 10.0.0.2 ↴]

Notice:

In its standard configuration, the ping program tests the network connection four times in succession and outputs the DUT response times.

- Test:
- The response times must be less than 10 ms in each case.
 - Packet loss is not allowed.

- Setting the DUT:
- If the IP address for the DUT was altered for the test, restore the original state.
 - [System : Remote : GPIB]

Testing the Sensor Connectors, Hardware Trigger, Trigger Output

Test setup: Connect the DUT trigger input (female connector I/O 2 at the rear) to the pulse generator using a BNC cable (if the trigger signal is taken from a $50\ \Omega$ output, insert a $50\ \Omega$ feed-through termination before the trigger input of the R&S NRP2).

Additional test setup¹: Connect a $50\ \Omega$ feed-through termination to the trigger output (female connector I/O 1 at the rear). Connect digital multimeter to the output of the feed-through termination using a BNC cable.

Setting the pulse generator:

- Signal shape: squarewave, 50 % duty cycle, $V_{o,L} = 0\ V$, $V_{o,H} = 3.3\ V$
- Frequency: 800 Hz
- First switch off the pulse generator output signal.

Setting the DUT: Connect the Power Sensor R&S NRP-Z11/-Z21 to sensor connector A.

Test: Sensor must be recognized (the message *Initializing sensors* appears briefly).

Notice:

If no display window is assigned to the sensor connector being used, a query to open a window will appear (e.g. Open new window for attached sensor A?). Confirm with [\leftarrow MENU].

Setting the DUT:

- [(PRE)SET : PRESET]
- [Sensor : Mode... : T'slot Av]
- [No. of Timeslots 1], [Nominal Width 1 ms], [\leftarrow MENU]
- [Sensor : Trigger...]
- Source [External \mathcal{F}], [\leftarrow MENU]

Additional DUT settings¹:

- [System : I/O]
- under I/O 1: Mode [TrigOut]

Setting the pulse generator: Switch on the output signal.

Test:

- The $\blacksquare?$ symbol in the DUT display must disappear.
- Measurement values must be displayed in rapid succession.

Additional test¹: Reading of digital multimeter: $1,0\ V \leq V_o \leq 1,4\ V$

Setting the pulse generator: Switch off the output signal.

Test:

- The $\blacksquare?$ symbol in the DUT display must reappear.
- Last measurement value must remain on screen.

Additional test¹: Reading of digital multimeter: $-0,004\ V \leq V_o \leq 0,004\ V$

Additional steps: In the case of multichannel DUTs, connect the sensor to each sensor connector in turn and perform the test for each connector (with the exception of the additional settings and tests for the trigger output).

¹ Test of trigger output is only applicable to units with firmware version 07.00 or higher.

Testing the Analog Outputs

- Test setup:
- Connect the Power Sensor R&S NRP-Z11/-Z21 to sensor connector A of the DUT and to the test generator output of the DUT or to a second R&S NRP2.
 - Connect the digital multimeter to connector I/O 1 at the rear.
- Setting the DUT:
- [**CAL/ZERO** : Zero (All)]
 - [**(PRE)SET** : **(PRE)SET**]
 - [Measurement : Relative On]
 - [$\Delta\%$]
- Setting the test generator:
- Switch on RF power [System : Power Ref On].
- Setting the DUT:
- [Relative Reset]
 - [System : I/O]
 - Parameter for I/O 2: [Analog]; set first test case shown in Table 1-3 (enter values for 0 V Equivalent and 3 V Equivalent).
- Test:
- The digital multimeter must show the voltage $V_{O,nom}$ associated with the first test case as shown in Table 1-3.
- Additional steps:
- On the DUT, set each of the remaining test cases shown in Table 1-3 and check whether the digital multimeter shows the voltage $V_{O,nom}$ associated with each test case.
 - After completing the last measurement on Out 1, connect the digital multimeter to connector I/O 2.
- Setting the DUT:
- Parameter for I/O 2: [Analog Out]; set first test case shown in Table 1-3 (enter values for 0 V Equivalent and 3 V Equivalent).
- Additional steps:
- Same as for test of analog output I/O 1.

Table 1-3 Settings for testing the analog outputs

Test case No.	0 V equivalent	3 V equivalent	$V_{O,nom}$ in V ²
1	0 %	100 %	0.0 ± 0.004
2	-100 %	0 %	3.0 ± 0.027

² The tolerances consist of a zero error (4 mV) and a percent deviation (0.75 % from the nominal value, where 0.25 % is from the converter and 0.5 % from the reference voltage source). They are valid when the R&S NRP2 is operated at normal room temperature.

Testing the Test Generator R&S NRP-B1/-B7

There are two test generators R&S NRP-B1 and R&S NRP-B7 available for the R&S NRP2 base unit. The option R&S NRP-B1 comes with power levels 1 mW and 10 µW. The option R&S NRP-B7 comes with an additional power level of 100 µW and a pulse mode.

A reference power sensor with sufficiently small measurement uncertainty is required in order to test the test generator. A Power Sensor R&S NRP-Z51 that has previously been checked using the Calibration Kit R&S NRVC and corrected/adjusted as needed should be used for this purpose.

Test setup:	Connect the reference power sensor R&S NRP-Z51 to the reference power meter and then directly connect it (without adapter or cable) to the test generator output of the DUT.		
Setting the DUT:	<ul style="list-style-type: none"> - Switch off with the [ON/STBY] key. - Switch on with the [ON/STBY] key. - Do the following during booting (Fig. 1-6a): [Boot Menu] - Enter password (Fig. 1-6b): [7 : 3 : 9 : 6] - In the Boot menu (Fig. 1-6c): [Service] - In the Service menu Fig. 1-6d): [Power Ref Calibration] - Enter passwort Fig. 1-6b): [9 : 6 : 0 : 3] 		
a)		b)	
c)		d)	
Fig. 1-6 a-d Calling up the dialog for adjusting the test generator			
Test:	The yellow LED on the test generator output of the DUT must flash.		
Setting the DUT:	In the dialog for manually adjusting the test generator (Fig. 1-7): Switch off test generator with [Power Ref] resp. [Power Reference Off].		

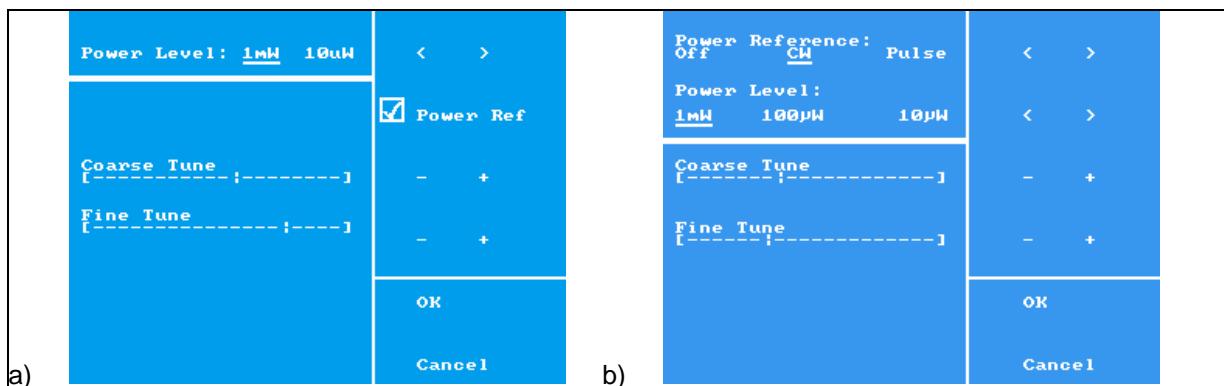


Fig. 1-7 a-b Dialog for adjusting the test generator NRP-B1 a) and NRP-B7 b)

	NRP-B1	NRP-B7
Setting the reference power meter:		Perform zeroing.
Setting the DUT:	[Power Level 1mW] Switch on test generator with [Power Ref].	[Power Level 1mW] Switch on test generator with [Power Reference CW].
Test:	Read the measurement value for power level 1 mW on the reference power meter and compare it with the limit values in the Performance Test Report ³ .	
Setting the DUT:	[Power Level 10uW]	[Power Level 10uW]
Test:	Read the measurement value for power level 10 μW on the reference power meter and compare it with the limit values in the Performance Test Report ⁴ .	
Setting the DUT:	[Cancel : Exit : Exit]	[Power Level 100uW]
Test:		Read the measurement value for power level 100 μW on the reference power meter and compare it with the limit values in the Performance Test Report.
Setting the DUT:		Select [Power Reference Pulse].
Test:		Read the measurement value of average power in the pulse mode and compare it with the limit values in the Performance Test Report.
Setting the DUT:		In the dialog for manually adjusting the test generator (Fig. 1-7): Switch off test generator with [Power Reference Off]. [Cancel : Exit : Exit]

³ The test limits are based on the data sheet specification for uncertainty of the test generator in the temperature range 20 °C to 25 °C and the measurement uncertainty of the reference power sensor.

⁴ Power levels 10 μW and 100 μW are not specified in the data sheet, because they are only used as auxiliary values in the automatic sensor test and their tolerances are not included in the test result.

Note:

Even if the permitted tolerances have been adhered to, a follow-up adjustment of power level 1 mW is recommended since this is the only way to ensure adherence to the specification until the next calibration (chapter 2 and 3).

Performance Test Report

Performance Test

Power Meter R&S NRP2

Stock No.: 1144.1374.02

Name:

Serial number:

Date:

Item	Property	Min.	Actual	Max.	Unit
1	LED (yellow) on when AC supply voltage present.	—		—	
2	LED (green) on after switch-on.	—		—	
3	Booting completed without error messages.	—		—	
4	All display test patterns displayed without error.	—		—	
5	Keyboard test completed successfully.	—		—	
6	Acoustic response occurs during buzzer test.	—		—	
7	Display backlighting becomes brighter by pressing softkey toggle [Brightness] to the right.	—		—	
8	Display backlighting becomes brighter by pressing softkey toggle [Brightness] to the right.	—		—	
9	six brightness levels clearly distinguishable	—		—	
10	Identification string is output correctly via IEC bus.				
11	<i>Manufacturer, Model, and Serial Number</i> entries are displayed correctly or Identification string is output correctly via USB.	—		—	
12	All Ping times less than 10 ms; no packets lost.	—		—	
13	Sensor is detected at connector A.	—		—	
14	Symbol [?] in the DUT display disappears when the external trigger signal is switched on; rapid sequence of measurement values (with sensor at connector A).	—		—	
15	Voltage at trigger output I/O 1	1.0		1.4	
16	Symbol [?] in the DUT display appears when the external trigger signal is switched off; last measurement value retained (with sensor at connector A).	—		—	
17	Voltage at trigger output I/O 1	-0.004		0.004	V
18	Sensor is detected at connector B.	—		—	
19	Symbol [?] in the DUT display disappears when the external trigger signal is switched on; rapid sequence of measurement values (with	—		—	

	sensor at connector B).				
20	Symbol [?] symbol in the DUT display appears when the external trigger signal is switched off; last measurement value retained (with sensor at connector B).	—	—	—	
21	Sensor is detected at connector C.	—	—	—	
22	Symbol [?] symbol in the DUT display disappears when the external trigger signal is switched on; rapid sequence of measurement values (with sensor at connector C).	—	—	—	
23	Symbol [?] in the DUT display appears when the external trigger signal is switched off; last measurement value retained (with sensor at connector C).	—	—	—	
24	Sensor is detected at connector D.				
25	Symbol [?] in the DUT display disappears when the external trigger signal is switched on; rapid sequence of measurement values (with sensor at connector D).				
26	Symbol [?] in the DUT display appears when the external trigger signal is switched off; last measurement value retained (with sensor at connector D).				
27	Voltage at analog output I/O 1 (test case 1)	-0.004		0.004	V
28	Voltage at analog output I/O 1 (test case 2)	2.973		3.027	V
29	Voltage at analog output I/O 2 (test case 1)	-0.004		0.004	V
30	Voltage at analog output I/O 2 (test case 2)	2.973		3.027	V
31	Yellow LED above test generator output flashes when test generator adjustment dialog is opened.	—	—	—	
32	Output power of test generator at power level 1 mW	0,990		1,010	mW
33	Output power of test generator at power level 10 µW	7,0		13,0	µW
34	Output power of test generator at power level 100 µW (CW) (only R&S NRP-B7)	95		105	µW
35	Average power of test generator at power level 1 mW (Pulse) (only R&S NRP-B7)	0,495		0,505	mW

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2 Calibrating the Test Generator R&S NRP-B1/B7

- The test generator module R&S NRP-B1 contains digital potentiometers (with coarse and fine tuning) for adjusting the two power levels 1 mW und 10 µW. The potentiometer settings are stored in internal EEPROMs. The test generator module R&S NRP-B7 contains an additional power level of 100 µW and a pulse mode.
- The option R&S NRP-B1/B7 is adjusted while already installed and within closed housing.
- The adjustment is to be performed at an ambient temperature of 20 °C to 25 °C. The R&S NRP2 base unit, the Test Generator R&S NRP-B1/B7 and the reference sensor must be switched on at least one hour prior to start of adjustment.
- A Power Sensor R&S NRP-Z51 that has already been calibrated with the Calibration Kit R&S NRVC prior to the actual calibration serves as a reference sensor for the different power levels.
- Entries on the Power Meter R&S NRP2 are abbreviated as follows:
 [<KEY>] Press a key on the front panel, e.g. [ZERO/CAL].
 [<SOFTKEY>] Press a softkey, e.g. [Sensor], or select a menu item.
 [<nn unit>] Enter a value and terminate it with a unit, e.g. [50 MHz].
 Successive entries are separated by [:], e.g. [FREQ : 3 GHz].

Required Measuring Equipment and Accessories

Table 2-1 Required measuring equipment and accessories

Item	Instrument type	Recommended characteristics	Recommended instruments	R&S Order No.	Application
1	Power calibration system	Calibration uncertainty <0.5 % at 50 MHz	R&S NRVC R&S SMP02 R&S NRVC-B1 alternatively R&S NRPC18 R&S NRPC-B1	1109.0500.02 1035.5005.02 1109.1007.02 1418.0931.02 1109.1007.02	Calibration of the reference power sensor
2	Power sensor	Measurement uncertainty <0.7 % at 50 MHz	R&S NRP-Z51	1138.0005.03	Reference power sensor for calibrating the R&S NRP-B1/B7
3	Power meter		R&S NRP oder R&S NRP2	1143.8500.02 1144.1374.02	Reference power meter for calibrating the R&S NRP-B1

Manual Adjustment

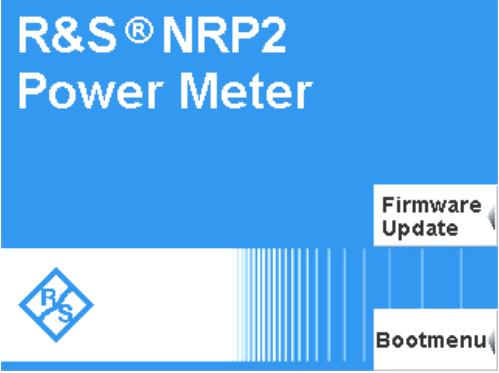
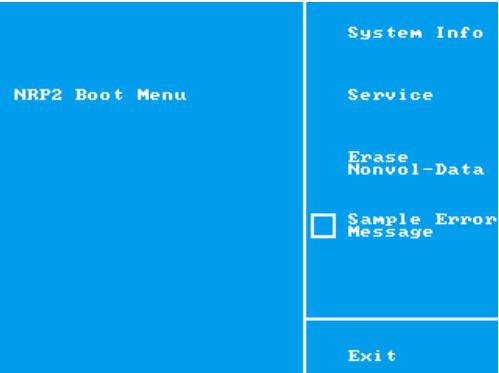
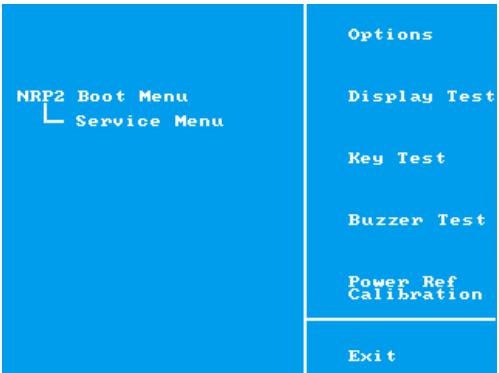
Test setup:	Connect the reference power sensor (R&S NRP-Z51) to the reference power meter and directly connect it (without an adapter or cable) to the test generator output of the DUT.		
Setting the DUT:	<ul style="list-style-type: none"> - Switch off with the [ON/STBY] key. - Switch on with the [ON/STBY] key. - During booting (Fig. 2-1 a): [Boot Menu] - Enter password (Fig. 2-1 b): [7 : 3 : 9 : 6] - In the Boot menu (Fig. 2-1 c): [Service] - In the Service menu (Fig. 2-1 d): [Power Ref Calibration] - Enter password (Fig. 2-1 b): [9 : 6 : 0 : 3] 		
a)		b)	
c)		d)	

Fig. 2-1 a-d Calling up the dialog for adjusting the test generator

	<ul style="list-style-type: none"> - In the dialog for manually adjusting the test generator (Fig. 2-2): Switch off the test generator with [Power Ref].
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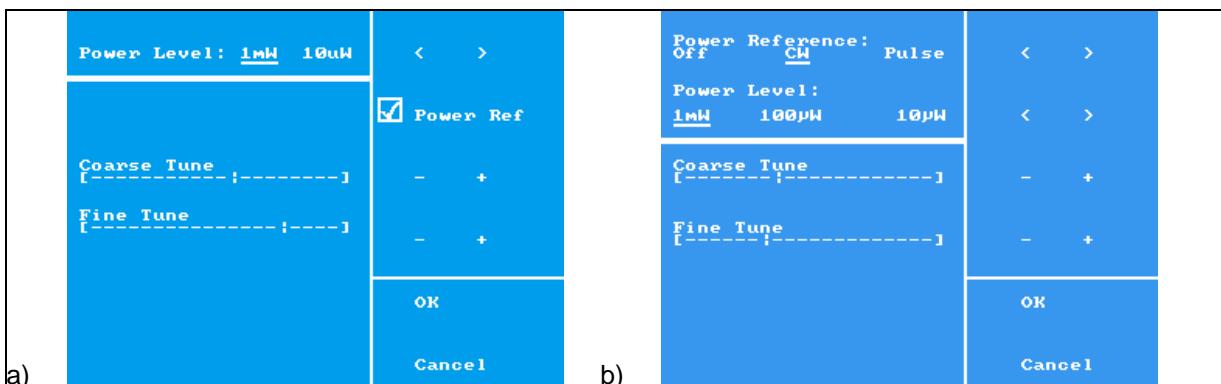


Fig. 2-2 a-b Dialog for adjusting the test generator R&S NRP-B1 a) and R&S NRP-B7 b),

	R&S NRP-B1	R&S NRP-B7
Setting the reference power meter:	Perform zeroing.	
Setting the DUT:	<ul style="list-style-type: none"> - [Power Level 1mW] - Switch on test generator with [Power Ref]. - Set <i>Fine Tune</i> to center position. - Find optimum coarse tuning (<i>Coarse Tune</i>). - Find optimum fine tuning (<i>Fine Tune</i>). - [Power Level 100μW] - Set <i>Fine Tune</i> to center position. - Find optimum coarse tuning (<i>Coarse Tune</i>). - Find optimum fine tuning (<i>Fine Tune</i>). - [OK] 	<ul style="list-style-type: none"> - [Power Level 1mW] - Switch on test generator with [Power Reference CW]. - Set <i>Fine Tune</i> to center position. - Find optimum coarse tuning (<i>Coarse Tune</i>). - Find optimum fine tuning (<i>Fine Tune</i>). - [Power Level 100μW]¹ - Find optimum tuning. - [Power Level 1mW] - Select [Power Reference Pulse] to put the test generator into pulse mode. - Use the fine tune to adjust Pulse Top Power.² - [OK]
Note:		
Clicking [OK] stores the current settings in the EEPROM and exits the adjustment dialog. To exit the adjustment dialog without storing the current settings in the EEPROM, enter [Cancel].		
Setting the DUT:	Switch off with the [ON/STBY] key.	
Additional steps:	Check the Test Generator R&S NRP-B1/B7 again for compliance with specifications as described in chapter 1.	

¹ There is no need to adjust the power level 100 μW separately because it is already adjusted by tuning the power level 10 μW. However, a check for compliance with specifications described in chapter 1 is recommended.

² With respect to 50 % duty cycle the average power of the pulse mode can be set to -3 dBm. Do not change the coarse tune because it also affects the already adjusted power level 1 mW (CW).

Program-Controlled Adjustment

If the options R&S NRP-B1/-B7 are to be adjusted frequently, the procedure should be performed via remote control. Remote-control commands for reading out, writing to and controlling the digital potentiometers are available for this purpose (Table 2-2 resp. Table 2-4). For quick adjustment, the start values shown in Table 2-3 resp. Table 2-5 should be selected. This table also contains the adjustment sensitivity values of the four digital potentiometers.

R&S NRP-B1

Table 2-2 Remote-control commands for program-controlled adjustment of option R&S NRP-B1

Action	Remote-control command	
Switch on test generator (LED state not affected).	OUTPut:ROSCillator:CALibration:WRITe 1, 1	
Switch off test generator (LED state not affected).	OUTPut:ROSCillator:CALibration:WRITe 1, 0	
Set power level 1 mW (High).	OUTPut:ROSCillator:CALibration:WRITe 2, 1	
Set power level 10 µW (Low).	OUTPut:ROSCillator:CALibration:WRITe 2, 0	
Switch off LED.	OUTPut:ROSCillator:CALibration:WRITe 3, 0	
Switch on LED.	OUTPut:ROSCillator:CALibration:WRITe 3, 1	
Switch LED to flashing.	OUTPut:ROSCillator:CALibration:WRITe 3, 2	
Enable adjustment (cancel write protection).	OUTPut:ROSCillator:CALibration:WRITe 4, 0	
Enter <value> 0 to 255	Coarse tuning of power level 1 mW	OUTPut:ROSCillator:CALibration:WRITe 5, <value>
	Fine tuning of power level 1 mW	OUTPut:ROSCillator:CALibration:WRITe 6, <value>
	Coarse tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:WRITe 7, <value>
	Fine tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:WRITe 8, <value>
Perform calibration: Store current settings in EEPROM, read out again to double-check and restore write protection.	OUTPut:ROSCillator:CALibration:WRITe 9, 0	
Stop calibration: Discard current settings.	OUTPut:ROSCillator:CALibration:WRITe 10, 0	
Read out current (volatile) setting	Coarse tuning of power level 1 mW	OUTPut:ROSCillator:CALibration:READ? 1
	Fine tuning of power level 1 mW	OUTPut:ROSCillator:CALibration:READ? 2
	Coarse tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:READ? 3
	Fine tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:READ? 4
Read out setting stored in EEPROM	Coarse tuning of power level 1 mW	OUTPut:ROSCillator:CALibration:READ? 33
	Fine tuning of power level 1 mW	OUTPut:ROSCillator:CALibration:READ? 34
	Coarse tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:READ? 35
	Fine tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:READ? 36

Table 2-3 Recommended start values and adjustment sensitivity of option R&S NRP-B1.

	Power level 1 mW (High)		Power level 10 μW (Low)	
	Coarse tuning	Fine tuning	Coarse tuning	Fine tuning
Start value	176 = 0xB0	128 = 0x80	120 = 78	128 = 0x80
Adjustment sensitivity	1.06 μW / bit	7.8 nW / bit	54 nW / bit	0.61 nW / bit

R&S NRP-B7

Table 2-4 Remote-control commands for program-controlled adjustment of option R&S NRP-B7

Action	Remote-control command
Switch on test generator (LED state not affected).	OUTPut:ROSCillator:CALibration:WRITe 1, 1
Switch off test generator (LED state not affected).	OUTPut:ROSCillator:CALibration:WRITe 1, 0
Set power level 1 mW (High).	OUTPut:ROSCillator:CALibration:WRITe 2, 1
Set power level 10 μW (Low).	OUTPut:ROSCillator:CALibration:WRITe 2, 0
Set power level 100 μW (Mid).	OUTPut:ROSCillator:CALibration:WRITe 2, 2
Switch off LED.	OUTPut:ROSCillator:CALibration:WRITe 3, 0
Switch on LED.	OUTPut:ROSCillator:CALibration:WRITe 3, 1
Switch LED to flashing.	OUTPut:ROSCillator:CALibration:WRITe 3, 2
Enable adjustment (cancel write protection).	OUTPut:ROSCillator:CALibration:WRITe 4, 0
Enter <value> 0 to 255	Coarse tuning of power level 1 mW (CW and Pulse)
	OUTPut:ROSCillator:CALibration:WRITe 5, <value>
	Tuning of power level 10 μW
	OUTPut:ROSCillator:CALibration:WRITe 6, <value>
Perform calibration: Store current settings in EEPROM, read out again to double-check and restore write protection.	Fine tuning of power level 1 mW (CW)
	OUTPut:ROSCillator:CALibration:WRITe 7, <value>
Stop calibration: Discard current settings.	Fine tuning of power level 1 mW (Pulse)
	OUTPut:ROSCillator:CALibration:WRITe 8, <value>
Stop calibration: Discard current settings.	OUTPut:ROSCillator:CALibration:WRITe 9, 0
Pulse Mode Off	OUTPut:ROSCillator:CALibration:WRITe 10, 0
Pulse Mode On	OUTPut:ROSCillator:CALibration:WRITe 11, 0
	OUTPut:ROSCillator:CALibration:WRITe 11, 1

Action	Remote-control command	
Read out current (volatile) setting	Coarse tuning of power level 1 mW (CW and Pulse)	OUTPut:ROSCillator:CALibration:READ? 1
	Tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:READ? 2
	Fine tuning of power level 1 mW (CW)	OUTPut:ROSCillator:CALibration:READ? 3
	Fine tuning of power level 1 mW (Pulse)	OUTPut:ROSCillator:CALibration:READ? 4
Read out setting stored in EEPROM	Coarse tuning of power level 1 mW (CW and Pulse)	OUTPut:ROSCillator:CALibration:READ? 33
	Tuning of power level 10 µW	OUTPut:ROSCillator:CALibration:READ? 34
	Fine tuning of power level 1 mW (CW)	OUTPut:ROSCillator:CALibration:READ? 35
	Fine tuning of power level 1 mW (Pulse)	OUTPut:ROSCillator:CALibration:READ? 36

Table 2-5 Recommended start values and adjustment sensitivity of option R&S NRP-B7.

	Power level 1 mW (High)			Power level 10 µW
	Coarse tuning	Fine tuning CW	Fine tuning Pulse	Coarse tuning
Start value	150 = 0x96	128 = 0x80	128 = 0x80	128 = 0x80
Adjustment sensitivity	1,75 µW / bit	112 nW / bit	112 nW / bit	20 nW / bit

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3 Repair

This chapter describes the design of the R&S NRP and simple measures for repairing and determining faults as well as the replacement of modules.

The installation of options and the firmware update are explained in chapter 5 of this service manual.

Design and Circuit Description

The design of the instrument is represented in the following block diagrams and in the exploded-view drawings (see also chapter 6).

The block diagram is used for the subsequent circuit description of the instrument.

Block diagram

See also chapter 6, annex and drawings.

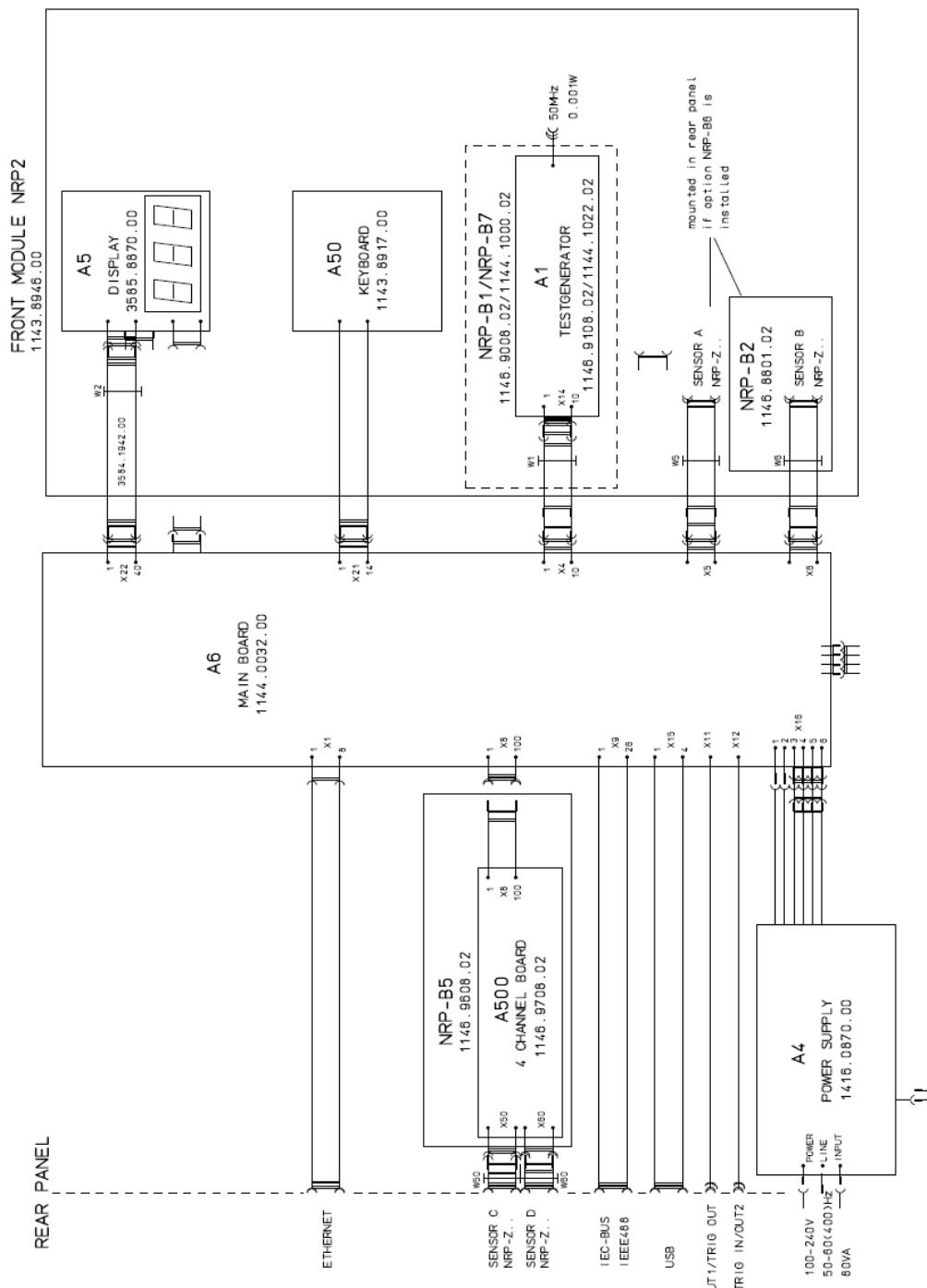


Fig. 3-1 Block diagram R&S NRP2

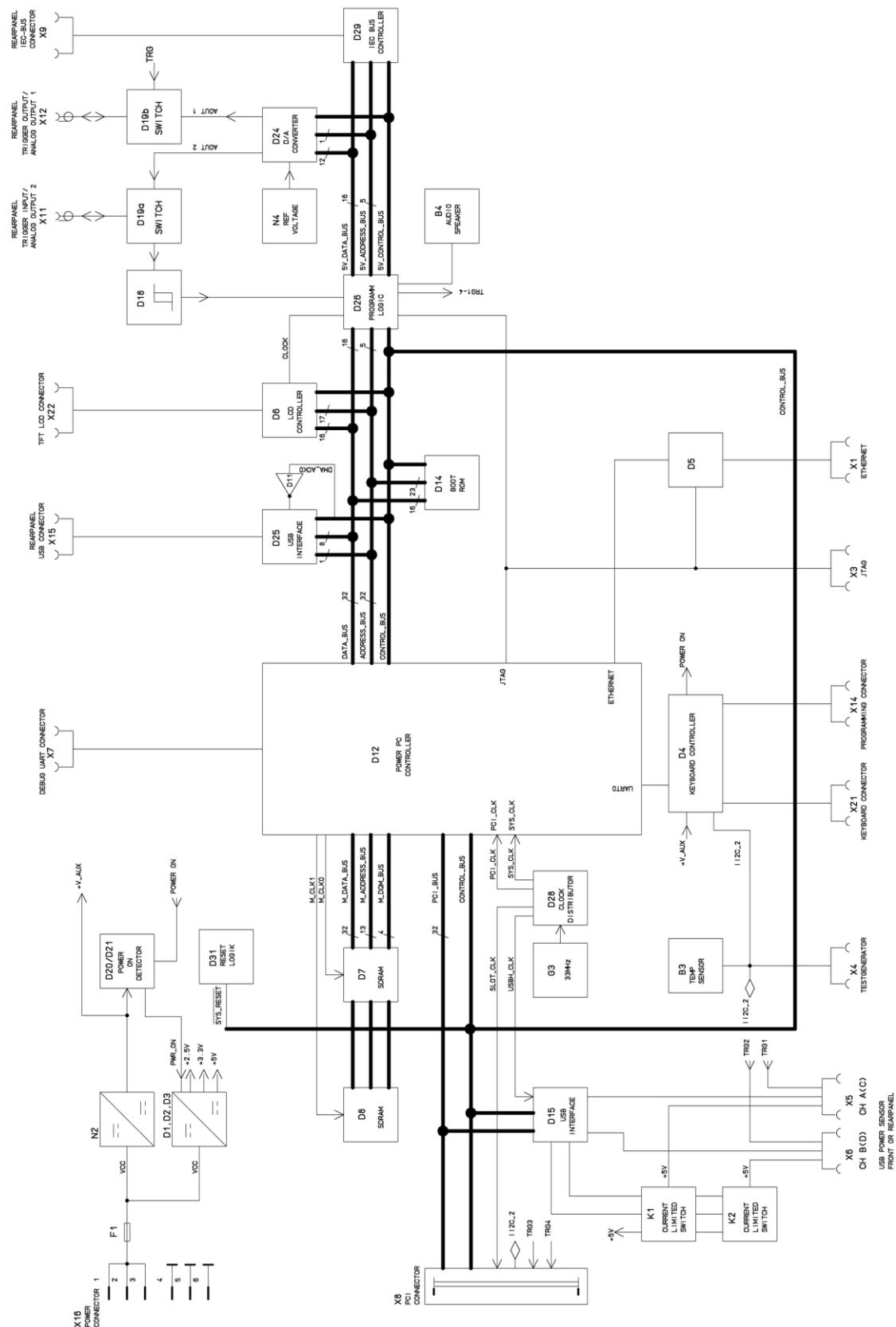


Fig. 3-2 Block diagram of the R&S NRP mainboard 1144.0032.02

Description of the Block Diagram

The R&S NRP2 is the central unit in an RF power measurement system. It provides connectors for up to four power sensors of the R&S NRP-Z family, a display and control unit, an IEC bus interface, a USB interface and an Ethernet interface for remote control, an optional RF test generator for checking the sensors for proper function and the power supply for the entire system via the AC power supply or an optional rechargeable battery.

Mainboard

Voltage transformers

The R&S NRP mainboard contains three voltage converters for providing the regulated supply voltages of 5 V, 3.3 V und 1.8 V. They obtain their input voltage (V_{cc}) from the power supply. The converters are switched off if the instrument is in standby.

There is also a continuously available auxiliary voltage of 3.3 V (regulated by a linear regulator) for supplying the communications processor.

Main processor

The main processor is an AMCC PowerPC 405GPr with 64 Mbyte SDRAM and 16 Mbyte flash memory.

Communications processor

The communications processor is an 8-bit controller of type PIC16LF873. It monitors the keyboard, controls instrument switch-on/switch-off, and operates slow modules such as the test generator, the back-lighting of the display, and a temperature sensor.

Internal interfaces

Power supply (X16)

The 15 V output voltage from the power supply is fed to the R&S NRP2 with protection against reversal of polarity via the four-contact DC input.

Keyboard (X21)

X21 provides the signal voltages for the keyboard matrix and the supply currents for the two LEDs that signal the switched-on/standby state. The current for the green LED is obtained directly from the 3.3 V supply voltage via a series resistor; the current for the yellow LED is likewise obtained from the output voltage of the power supply.

Display (X22)

X22 provides the 3.3 V supply voltage (pins 8, 9, and 10), connections for two LED strings (pins 1 and 3 or 4 and 6, respectively), and signals for controlling the individual pixels.

Sensors A and B (X5 und X6)

X5 and X6, respectively, are used to supply the four standard connectors of the USB (+5 V, D+, D-, GND) and a balanced trigger signal. The 5 V supply voltage is protected via electronic fuses.

4-channel board (X8)

All signals of the internal PCI and I²C bus as well as two balanced signals each for sensor connectors C and D are present at press-in connector X8.

Test generator (X4)

The supply voltages 3.3 V and 5 V as well as the internal I²C bus for control are supplied via X4.

External instrument interfaces*IEC bus and USB device interface*

The above two interfaces meet the IEEE488.1 und USB1.1 standards.

Ethernet interface

The Ethernet interface has a standard RJ-45 connector for 10BASE-T/100BASE-TX according to IEEE 802.3.

and analog output 2

Logic input with Schmitt trigger for standard logic (3.3 V) or analog output 0 to 3.3 V.

Trigger input / analog output 2

Logic input with Schmitt trigger for standard logic (3.3 V) or analog output 0 to 3.3 V.

Analog output 1 / Trigger output

Analog output 0 to 3.3 V or logic output (no-load voltage 5 V, output resistance 50 Ω).

Display

The display module includes the liquid crystal display, the row and column drivers, an auxiliary voltage transformer for the contrast voltage of the display and the cold cathode fluorescent lamp for lighting.

Option R&S NRP-B1

The Test Generator R&S NRP-B1 generates a level-precise and low-harmonics 50 MHz signal which is produced in a quartz oscillator, stabilized with a PIN diode controller and subjected to harmonics suppression in an output filter. The reference voltage of the regulator is set by using a digital potentiometer that contains an EEPROM in which the calibration data is stored.

Option R&S NRP-B2

The hardware for the second measurement channel (B) consists of a female connector for the circular male connector of the sensor. This female connector is connected with connector X6 on the mainboard via a soldered-on membrane cable. Before it can be used, the option R&S NRP-B2 must be software-enabled.

Option R&S NRP-B5

The 4-channel option R&S NRP-B5 is linked to the processor in the R&S NRP via the PCI bus and communicates with the sensors via its own USB host controller with a root hub and two ports. The 5 V supply voltage for the USB is protected via electronic fuses.

Option R&S NRP-B7

Like the Test Generator R&S NRP-B1 the Test Generator R&S NRP-B7 generates a level-precise and low-harmonics 50 MHz signal which is produced in a quartz oscillator, stabilized with a PIN diode controller and subjected to harmonics suppression in an output filter. The reference voltage of the regulator is set by using a digital potentiometer that contains an EEPROM in which the calibration data is stored. Additionally it comes with a power level of 100 µW and a pulse mode.

Module replacement

The following section provides a detailed description of the module replacement. Chapter 6 provides information on how to order spare parts. It includes a list of mechanical parts and drawings illustrating the module replacement.

Tools required

Torx screwdriver	Size	T6	T8	T10	T20
	Thread	M 2	M 2.5	M 3	M 4

NOTICE *The numeric values in brackets refer to the item in the list of mechanical parts and spare parts in chapter 6.*

These items are identical to the item numbers in the drawings illustrating the module replacement.

NOTICE **Remove membrane cables:**
Membrane cables can be removed after unlocking the female connector.

Connect membrane cables:
Observe the contact side and lock the female connector.

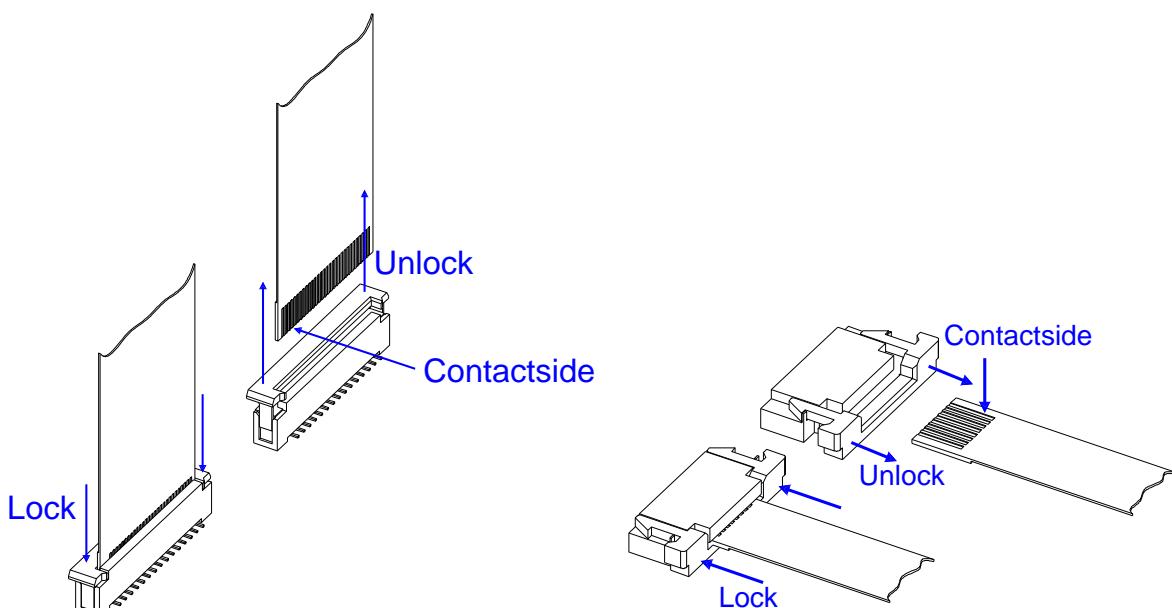


Fig. 3-3 Membrane cables

List of modules

Table 3-1 Overview of module replacement

Identification	Module	Measures after replacement		
		Functional tests and system error correction	Adjustment	Miscellaneous
A4	AC supply	SYSTEM MESSAGES / SELFTEST / CAL		
A5	Display		Contrast, brightness (section 4.2, (operating manual)	
A6	Mainboard			Replacement board is supplied by Central Service Munich with pre-installed serial number and keys for enabling the options.
A50	Switching foil			
R&S NRP-B1 resp. R&S NRP-B7	Sensor Check Source		(chapter 2 resp. 3 (service manual)	
R&S NRP-B2	Second Sensor Input			Can only be installed by Central Service Munich.
R&S NRP-B5	3 rd and 4 rd Sensor Input			
R&S NRP-B6	Rear-panel sensor inputs A and B			

Opening and reassembling the instrument

Opening

- Switch off unit and disconnect from power.
- Pull the carrying handle at the swivel point towards the outside and swivel it towards the top. Put the unit on the front shock protection.
- Undo 2 screws in the fastening hooks and remove fastening hooks.
- Undo 4 screws in rear feet and remove them together with the two feet.
- Remove the enclosure.

Reassembling

- Push the enclosure completely to the front into the groove of the front panel (observe the front shock protection and contact springs).

NOTICE *Observe cables when pushing the enclosure. Cables should be laid properly.*

- Press the screws of rear-panel feet into the threaded holes and tighten them.
- Install fastening hooks.
- After opening the unit always check for electrical safety according to national/international tests (e.g. to VBG4 {Safety Instructions}).
- Switch on the measuring instrument.
- Install the supplied software, if any, according to the enclosed instructions.
- If an adjustment is required for putting the option into operation, it is described in the enclosed installation instructions.

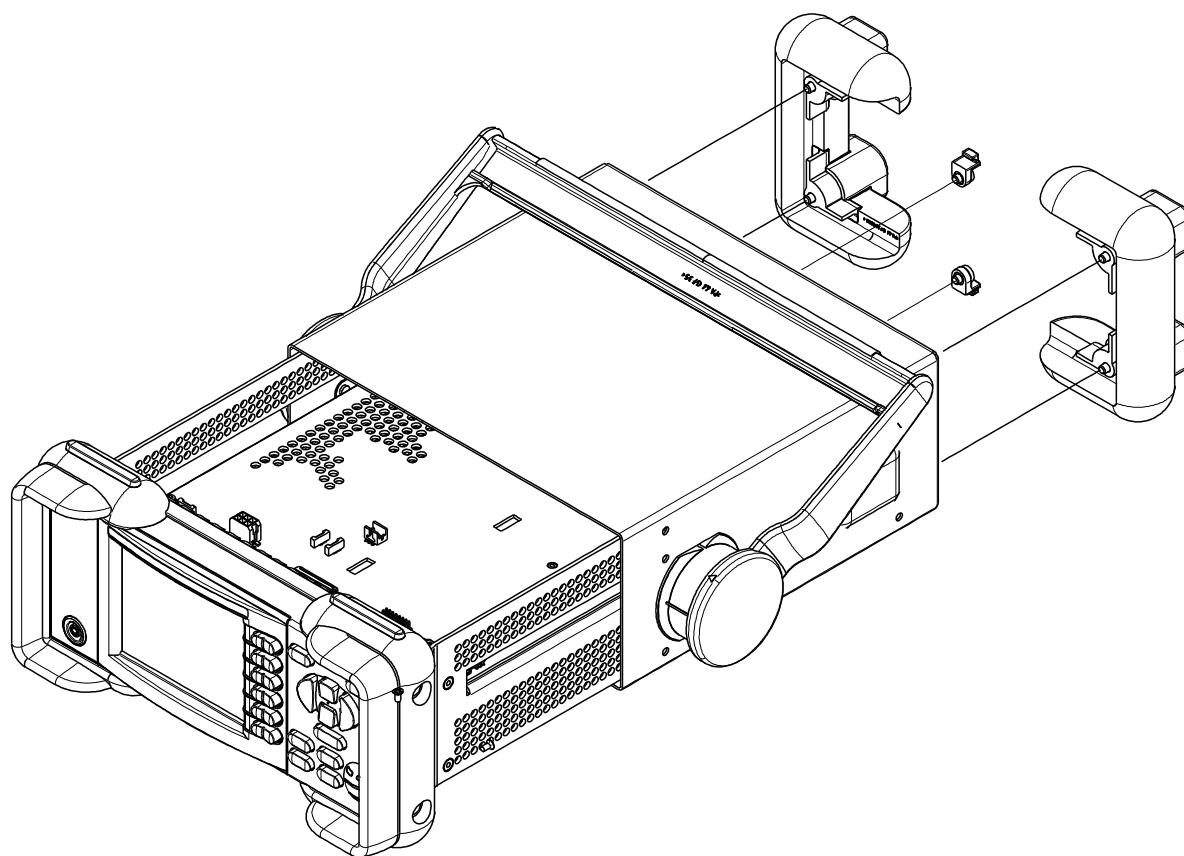


Fig. 3-4 Opening and reassembling the instrument

Front panel (switching foil, silicone mat, display)

Removing the front panel

- Opening the instrument (see page 3.9).
- Put the instrument in the normal operating position. Undo 2 screws on the side of the two front moulded shock protection parts (110 / 120) and remove them together with the front shock protection. Undo the 4 screws (67) on the front side.
- If the option R&S NRP-B1 resp. R&S NRP-B7 (test generator) is installed, also undo one screw (1065) on the side.
- Remove the following cables from mainboard A6:

W2 (display)	from connector X22
W21 (switching foil)	from connector X21
W1 (test generator)	from connector X4 (option R&S NRP-B1 resp. R&S NRP-B7)
- Pull off the front panel towards the front and place it with the keyboard upside down on a clean surface.
- Remove the following cables to remove the complete front panel from the instrument (optional):

W5 (sensor A)	from connector X5 (mainboard A6)
W6 (sensor B)	from connector X6 (mainboard A6)

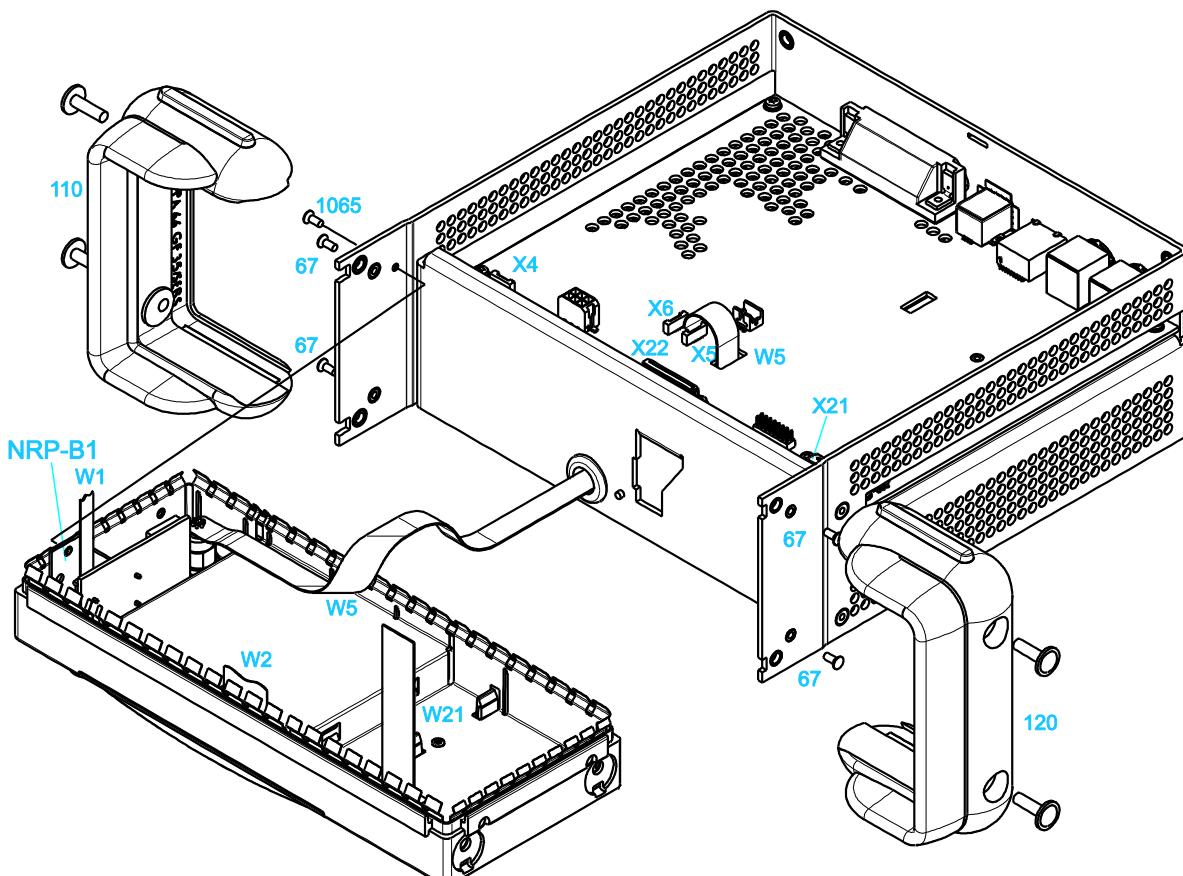


Fig. 3-5 Removing and reassembling the front panel

Removing the different components

- If the option R&S NRP-B1 resp. R&S NRP-B7 (test generator) is installed, remove it first (see [Removing the test generator](#) on page 3.17).
- Remove cable W5 (Sensor A) and, if the option R&S NRP-B2 (second sensor input) is installed, also cable W6 (Sensor B). Remove the union nut and tooth lock washer from sensor connector A and/or B. Remove connector(s) to the front.
- Undo 4 screws (500), carefully unhook shielding trough (90) from the retainers inside the front panel and take it out.
- Bracket (80), switching foil A50, and silicone mat (60) can be taken out now.
- To remove display A5, dust seal (40) and pane (30), remove display cover (20) by releasing the 3 snap fits attached to the display cover.

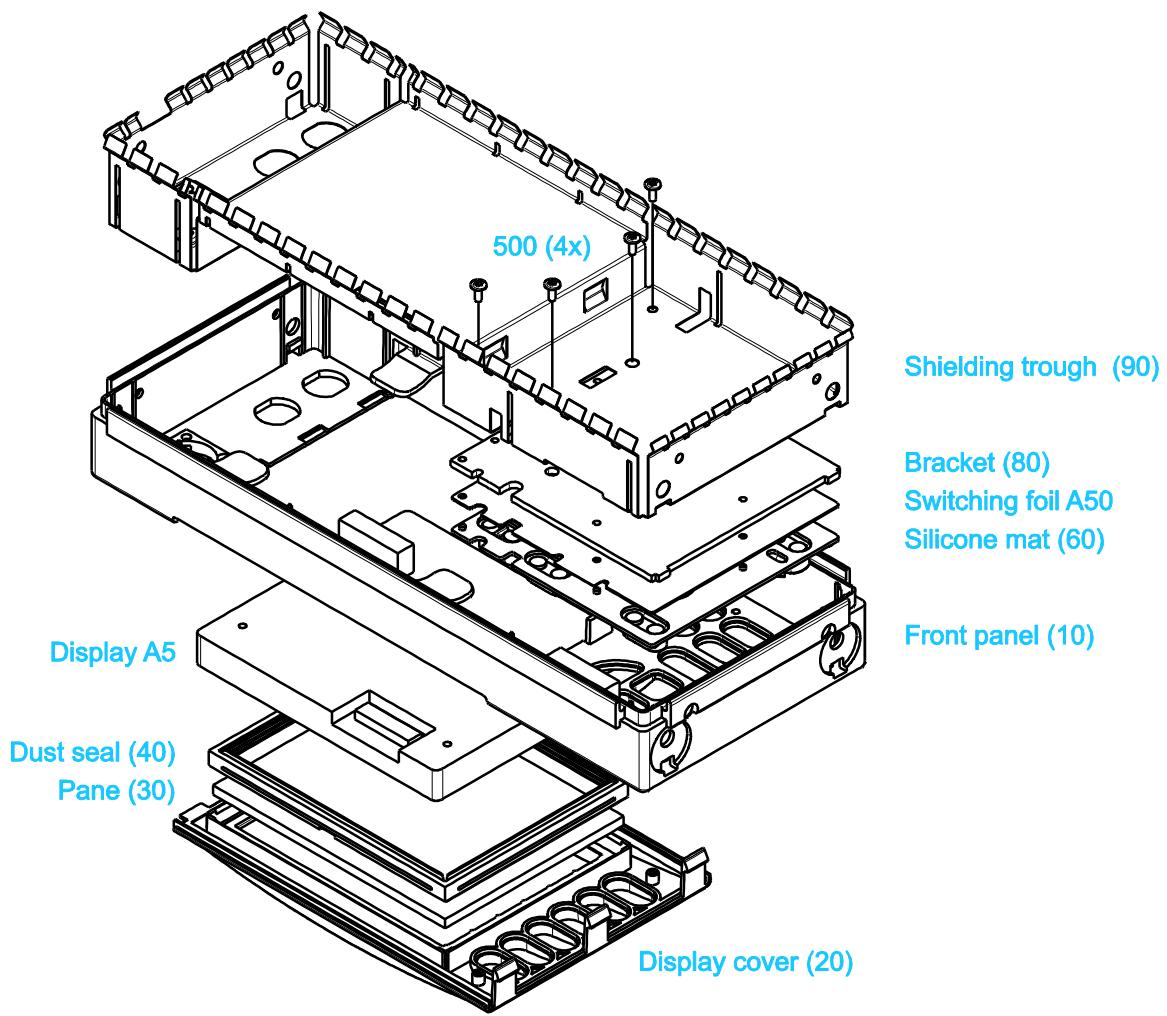


Fig. 3-6 Front panel

Installing the new components

NOTICE *The Display A5 is supplied with a self-adhesive protective film that has to be carefully removed before installation.*

- Install in the reverse order.
- The display cover is snapped into place from below, whereby pane (30) with dust seal (40) put on and display A5 must be stacked on the display cover (20) in the right position beforehand. After locking, check that the dust seal is in the correct position and adjust it if necessary.
- When installing the display A5 and the switching foil A50 ensure that they are free from dust.
- Do not forget the cable connectors.

Mainboard

Removing the mainboard

- [Opening](#) the instrument (see page 3.9).
- Remove the option R&S NRP-B5 (if installed) before removing the mainboard (see page 3.21).
- Remove the following cables from mainboard A6:

W5 (sensor A)	from connector X5
A4 (AC supply)	from connector X16
W21 (switching foil)	from connector X21
W2 (display)	from connector X22
- Optional:

W1 (test generator)	from connector X4	(R&S NRP-B1 resp. R&S NRP-B7)
W6 (sensor B)	from connector X6	(R&S NRP-B2)
- Undo 5 fixing screws (35) and the two locking bolts for the IEC/IEEE BUS connector X9 from the rear panel. Undo the union nut and the tooth lock washer of the two BNC connectors X11 and X12 from the rear panel.
- Lift the mainboard at the front and take it out of the instrument.

Installing the mainboard

- Install the new mainboard and, if available, the option R&S NRP-B5 in the reverse order.
- Do not forget the cable connectors.
- After replacing the mainboard, the serial number of the instrument needs to be restored unless the mainboard was supplied with the right serial number already programmed. You can request Backup Service for providing a patched .nrp file with the right serial number and use the Firmware Update application of the R&S NRP Toolkit to restore the serial number of the instrument. Alternatively, you can advise the serial number of the instrument when ordering the mainboard for replacement. In this case, you will receive a replacement with the right serial number already installed.
- Load the software (see chapter 5, Firmware Update).

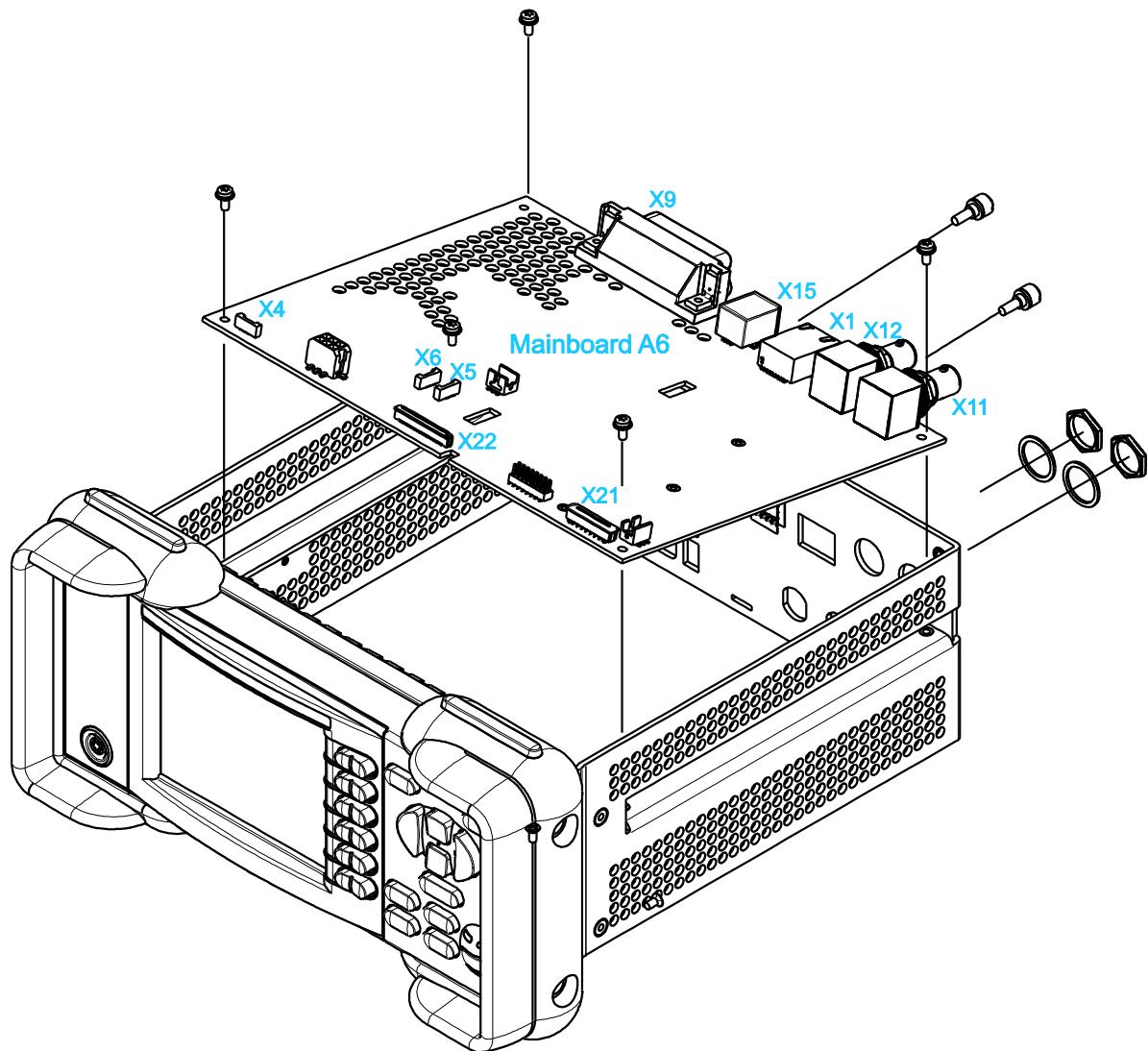


Fig. 3-7 Removing and installing the mainboard

AC supply

Removing the AC supply

- Opening the instrument (see page 3.9).
- Disconnect the AC supply from connector X16 (mainboard A6).
- Turn the instrument upside down (AC supply on top).
- Undo 3 screws (50).
- Take the AC supply out of the instrument and put it next to the instrument.
- Undo 2 screws (46) to detach Z bracket (45).

Installing the AC supply

- Install in the reverse order.

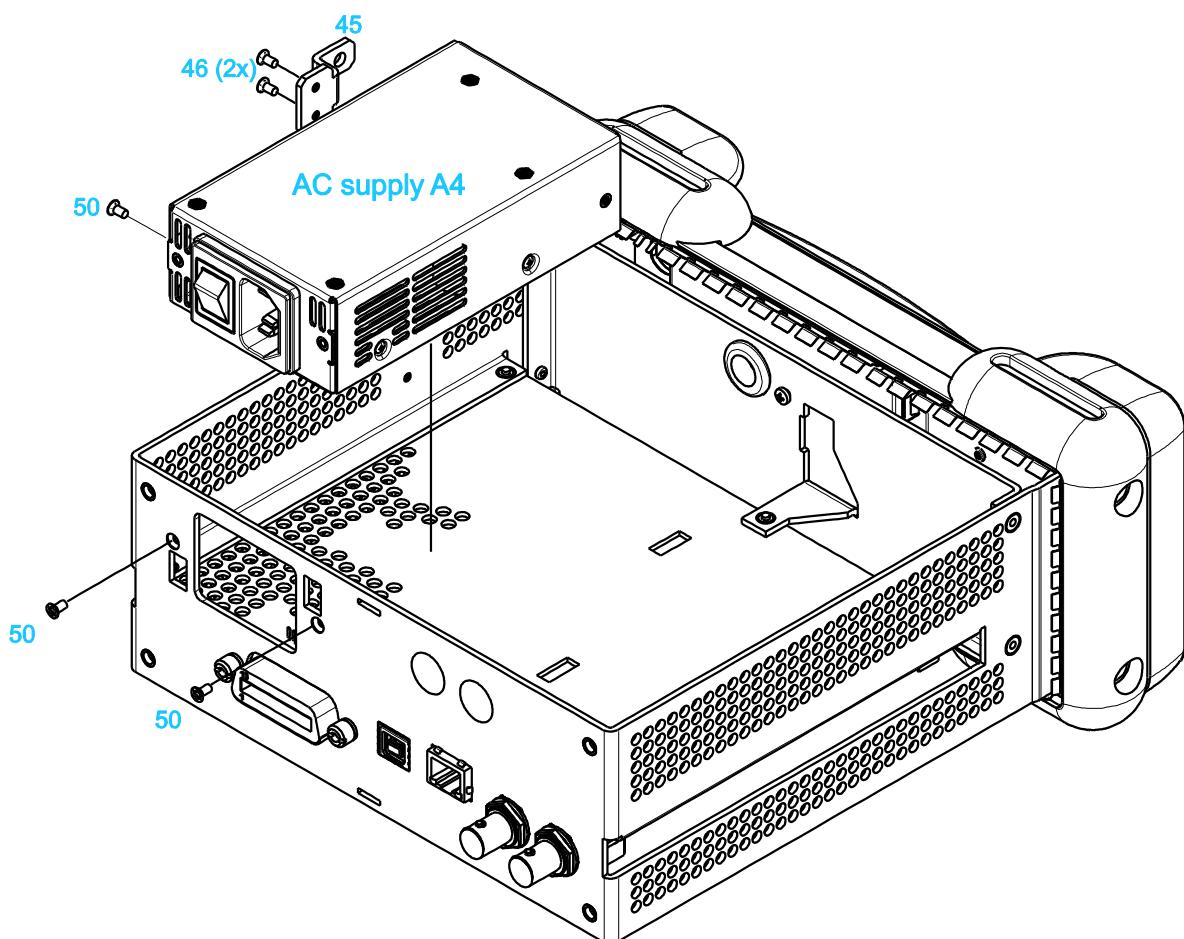


Fig. 3-8 Removing and installing the AC supply

Test generator 50 MHz (option R&S NRP-B1 resp. R&S NRP-B7)

Removing the test generator

- [Opening](#) the instrument (see page 3.9).
- Put the instrument in the normal operating position. Undo 2 screws from the two front moulded shock protection parts (110 / 120) and remove them together with the front shock protection. Undo the 5 screws (67 / 1065) on the front side.
- Disconnect the following cables from mainboard A6:
 - W1 (test generator) from connector X4
 - W21 (switching foil) from connector X21
 - W2 (display) from connector X22
- Pull off the front panel towards the front and place it with the keyboard upside down on a clean surface.
- Remove the following cables to completely detach the front panel from the instrument (optional):
 - W5 (sensor A) from connector X5 (mainboard A6)
 - W6 (sensor B) from connector X6 (mainboard A6)
- Carefully pull off the adhesive label (80) (POWER REF ...) on the left of the front panel. Undo the two screws (1060).
- Remove the option.

Installing the test generator

- Install in the reverse order.
- Do not forget the cable connectors.
- Affix the appropriate adhesive label (1070).
- Carry out performance test as described in chapter 1. No adjustment is necessary if the option was obtained as a new module from Rohde & Schwarz.

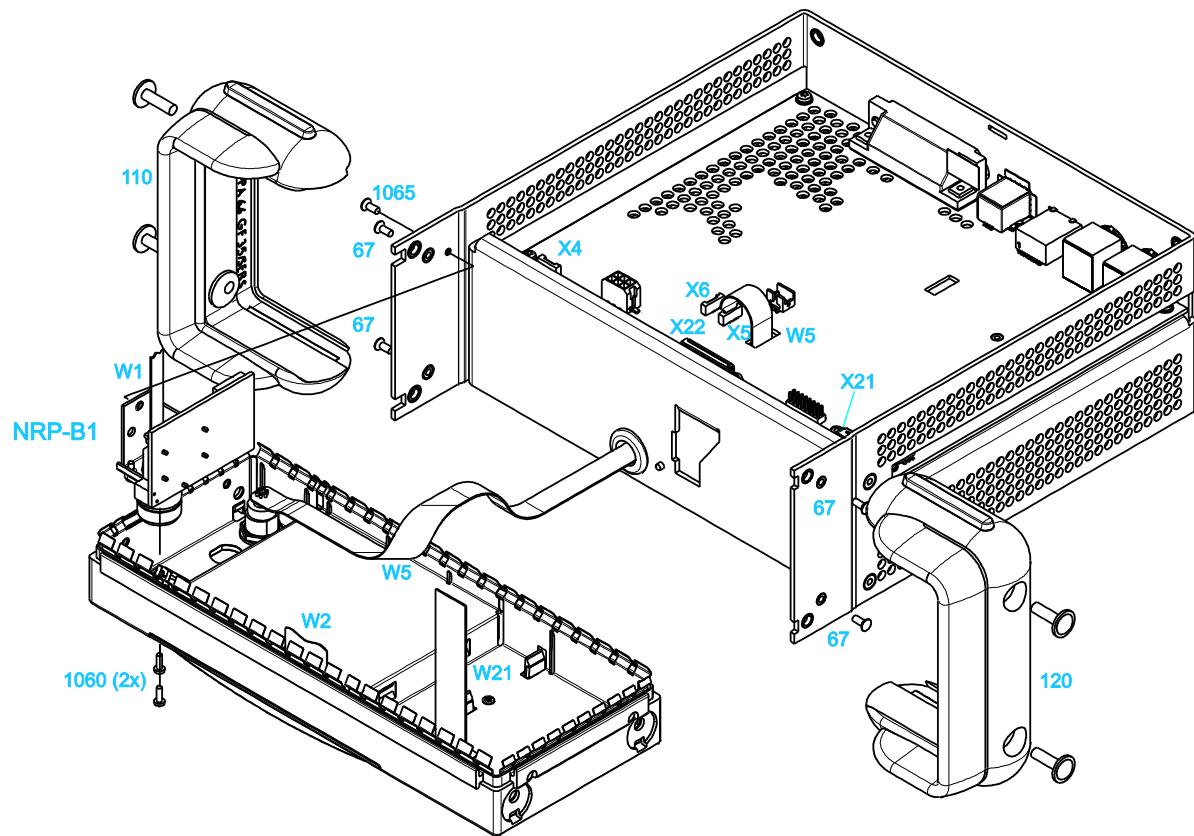


Fig. 3-9 Removing and installing the test generator

Second sensor input (option R&S NRP-B2) or sensor connector A

Removing the second sensor input or sensor connector A

- [Opening](#) the instrument (see page 3.9).
- Put the instrument in the normal operating position. Undo 2 screws from the two front moulded shock protection parts (110 / 120) and remove them together with the front shock protection. Undo the 4 screws (67) on the front side.
- If the option R&S NRP-B1 resp. R&S NRP-B7 (test generator) is installed, also undo one screw (1065) on the side.
- Remove the following cables from mainboard A6:
 - W1 (test generator) from connector X4 (option R&S NRP-B1 resp. R&S NRP-B7)
 - W21 (switching foil) from connector X21
 - W2 (display) from connector X22
- Pull off the front panel towards the front and place it with the keyboard upside down on a clean surface.
- Loosen and remove cable W5 (sensor A) and/or W6 (sensor B) of mainboard A6 from connector X5 or X6 (mainboard A6).
- Remove the union nut and tooth lock washer from sensor connector A and/or B. Remove connector(s) to the front.
- If the option R&S NRP-B1 resp. R&S NRP-B7 (test generator) is installed, proceed as described in section [Test generator 50 MHz \(option R&S NRP-B1 resp. R&S NRP-B7\)](#) on page 3.17.

Installing the second sensor input or sensor connector A

- Mark the new sensor cable end with label W5 (A) for measurement channel A or W6 (B) for measurement channel B.
- Install in the reverse order.
- Do not forget the cable connectors.

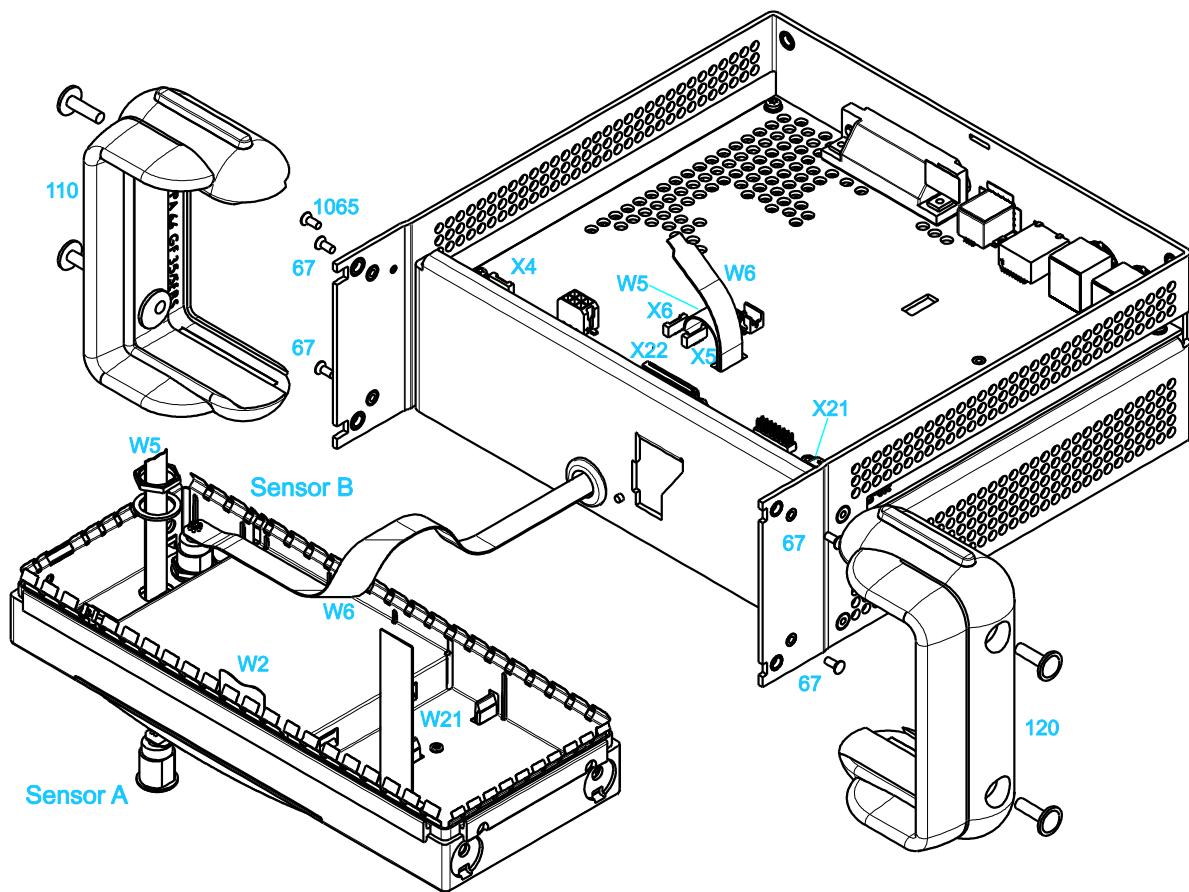


Fig. 3-10 Removing and installing the sensor connectors

Third and fourth sensor input (option R&S NRP-B5)

Removing the third and fourth sensor input

- [Opening](#) the instrument (see page 3.9).
- Disconnect cables W50 and W60 from X50 and X60 (3rd and 4th sensor board A500).
- Undo 3 screws (5060). Take care of the lock washers (5050, 5070).
- Remove the option.
- Detach cable W50 of sensor C and cable W60 of sensor D, if required. Remove cables, union nut and tooth lock washer. Take out the connectors to the rear.

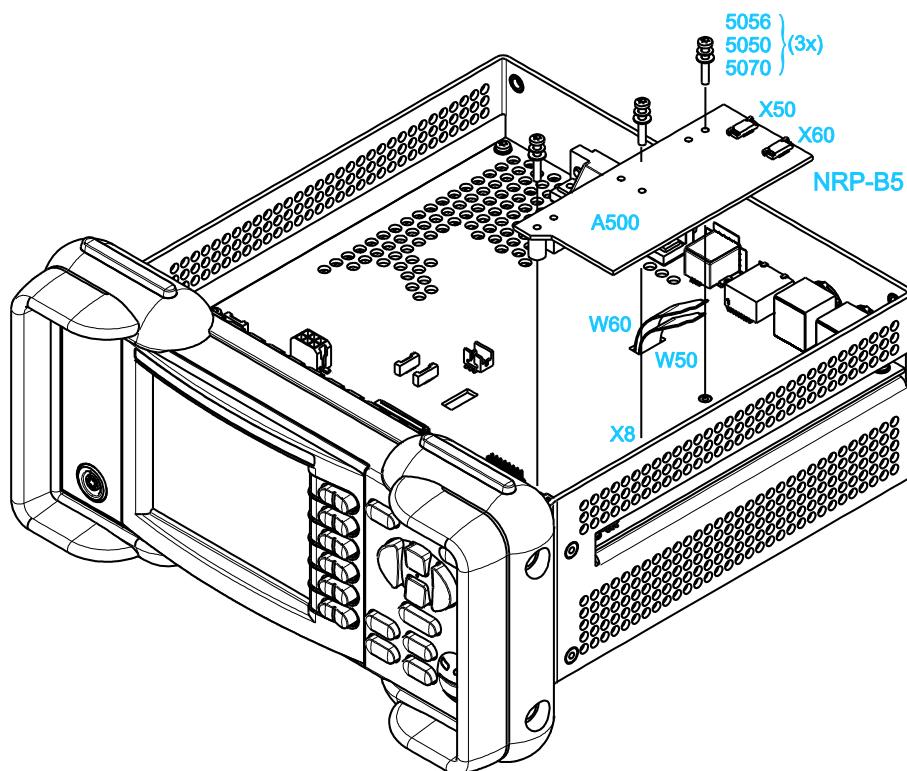


Fig. 3-11 Removing and installing the 3rd and 4th test input (board A500)

Installing the third and fourth sensor input

- Install in the reverse order.
- If required, mark the ends of the new cables with label W50 (C) for sensor C or W60 (D) for sensor D.
- Carry out performance test as described in chapter 1.

NOTICE *The press-on connector X8 has small guide pins that should be inserted into the corresponding boreholes in mainboard A6.*

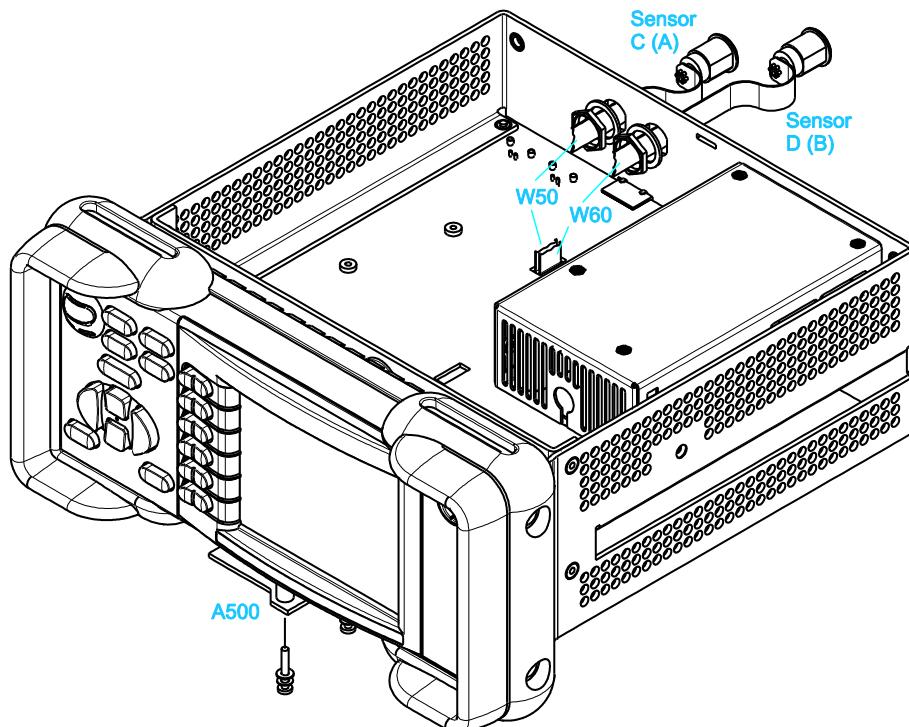


Fig. 3-12 Removing and installing the third and fourth test input (sensor connectors)

Rear-panel test inputs A and B (option R&S NRP-B6)

Removing rear-panel test inputs A and B

- [Opening](#) the instrument (see page 3.9).
- Loosen and remove cable W5 (sensor A) and W6 (sensor B) from connector X5 or X6 (mainboard A6).
- Remove the union nut and tooth lock washer from sensor connector A and B. Take out the connectors to the rear.

Installing rear-panel test inputs A and B

- Mark the ends of the new sensor cables with label W5 (A) for measurement channel A and W6 (B) for measurement channel B.
- Install in the reverse order.
- Carry out performance test as described in chapter 1.

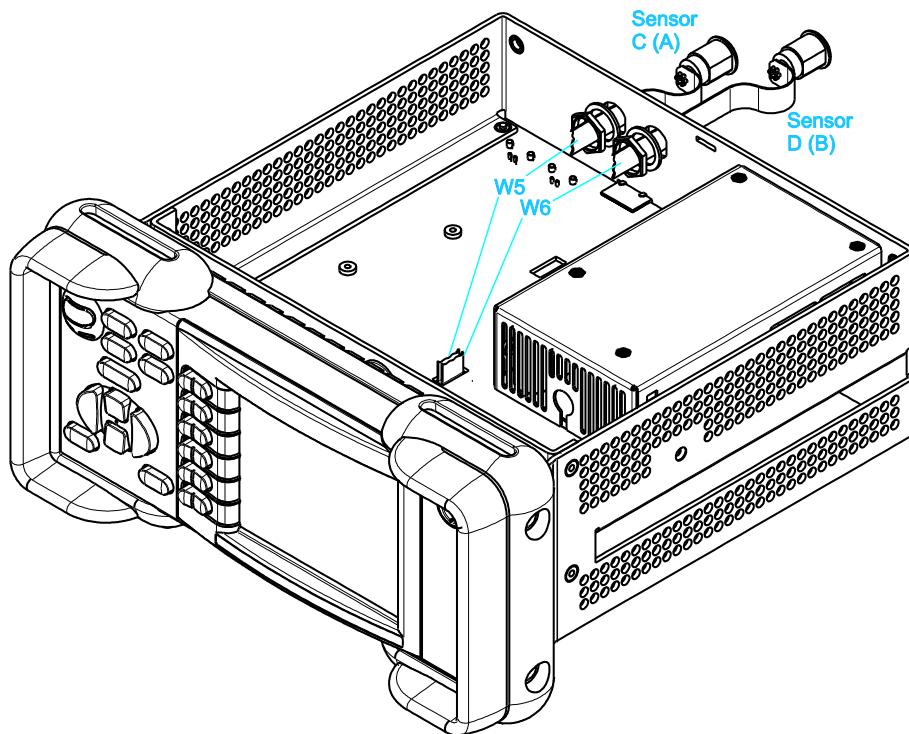


Fig. 3-13 Removing and installing rear-panel sensor inputs A and B

Troubleshooting

Malfunctions may be due to simple reasons but may also be caused by defective components. These troubleshooting instructions will enable you to isolate the error down to the module level. Module replacement and repair should be carried out by our customer service. It is therefore recommended to send the unit to the nearest service center (see list of addresses at the beginning of this manual).

**NOTICE**

Make sure that no voltage is present when removing or inserting modules. When measuring voltages, be sure not to cause short circuits.

The following tools are provided in the R&S NRP to allow easy diagnostics.

- Selftest during booting

NOTICE

If problems occur, first check all connections (cables, connectors of module, etc) to make sure that they are not damaged or improperly connected.

Measuring equipment and accessories

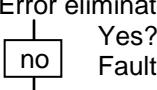
Table 3-2 Measuring equipment

Item	Instrument type	Recommended characteristics	Recommended instruments	R&S Order No.	Application
1	Digital multimeter				To test supply voltages
2	Power sensor		R&S NRP-Z11	1138.3004.02	To test sensor interfaces

Table 3-3 Built-in test functions

Item	Type	Application
1	Orange LED next to (Ø) key.	Indicates presence of output voltage of power supply (connected directly via series resistor).
2	Three SMD LEDs on mainboard next to processor.	After switch-on, they come on in sequence (very quickly) if the processor and its elementary auxiliary chips are functioning.
3	Selftest during booting.	Runs automatically and displays a series of icons as messages.
4	Test program for display test in the Boot menu.	Under Service → Display test. Various test patterns can be displayed.
5	Test program for a display test in the main software.	In the System menu under Test... The test program automatically shows a succession of various test patterns.
6	Test program for a keyboard test in the main software.	In the System menu under Test... The program is described in the operating manual, chapter 5.

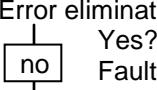
The R&S NRP2 cannot be switched on

- 1 ➤ Apply AC supply voltage.
- 2 **Orange LED on Standby key does not come on.**
Supply voltage of the mainboard at X16 < 12 V?
Possibly a short circuit in the instrument! Refer to step 6.
- 3 ➤ Unlock the female connector for the keyboard membrane cable, lightly jiggle the membrane cable and observe whether the orange LED comes on. Lock the female connector back in place.
- 4 Error eliminated?

 - Yes?
 - no Faulty contacts on the membrane cable: Replace keyboard membrane if necessary.
- 5 The mainboard is probably defective.

6 Procedure in case of short circuit.

- 7 ➤ Disconnect the mainboard from the power supply (disconnect X16).
- 8 ➤ Check the output voltage of the power supply at X16: nominal value 12.2 V.
- 9 ➤ Supply the mainboard with current from the current-limited power supply (12.2 V/500 mA) and check the instrument function (current drain approx. 350 mA).
- 10 ➤ Reconnect the two modules only after verifying that the power supply and mainboard are functioning correctly.

11 Green LED remains dark after the Standby key is pressed.

- 12 ➤ Unlock the female connector for the keyboard membrane cable, lightly jiggle the membrane cable and lock the female connector back in place.
- 13 Error eliminated?

 - Yes?
 - no Faulty contacts on the membrane cable: Replace keyboard membrane if necessary.
- 14 The mainboard is probably defective.

Display is dark or malfunctioning

Prerequisite: Green LED on. Otherwise, troubleshoot as described under ([The R&S NRP2 cannot be switched on](#), page 3.26).

15 Blank screen

- 16 ➤ Unplug membrane cable W2 (to the display) from connector X22 (must first be unlocked), plug it back in and lock the connector.

Screen contents now visible?

- 17 Yes?

Loose connection.

- 18 ➤ After switching the instrument on, check whether the three LEDs next to the processor (mainboard) come on.

- 19 Yes?

Processor is functioning properly.

- no The display is probably defective, although mainboard damage also cannot be ruled out.

20 Processor is not functioning properly; the mainboard is probably defective.

21 Incorrect screen contents

- 22 The test patterns for a display test are located in the Boot menu ([chapter 5, Boot menu – Service menu: Display Test](#)).

23 Display or mainboard defective.

24 Normal screen contents but too bright or dark

- 25 ➤ [System : Misc...], set brightness as preferred with softkey toggle [Brightness].

Image quality better?

- 26 Yes?

The brightness of the display back-lighting was obviously incorrectly set.

Keyboard detection faulty

- 27 A test program for a keyboard test is located in the Boot menu ([chapter 5, Boot menu – Service menu: Key Test](#)).

28 The keyboard membrane or mainboard is defective.

Error during booting

- 29  not A 4-channel instrument shows only two channels when booting.
→ Option R&S NRP-B5 defective, the mainboard defective, or both.
- 30  RAM error
→ Mainboard defective.
- 31  Keyboard controller does not respond.
→ Mainboard defective.
- 32  USB device controller does not respond,
→ Mainboard defective.

Software unstable

- 33 ➤ Completely reinstall the software and update it (☞ section 5.1).
- 34 Erase data memory for nonvolatile data
(☞ chapter 5, Boot menu: Erase Nonvol-Data)
- 35 Problem still present?
→ Mainboard probably defective.

Sensor not detected

- 36 ➤ Check the sensor on another R&S NRP2 or R&S NRP or by using the Adapter R&S NRP-Z3/-Z4/-Z5 on a PC.
- 37 Is the 2-channel option installed and a sensor connected at connector B?
Yes?
- 38 ➤ Check whether symbol  or  is displayed during booting.
- 39 Is  displayed?
No?
 Software option R&S NRP-B2 is not installed! It can only be installed at Central Service Munich.
- 40 Sensor female connector with membrane cable defective or mainboard defective.
- 41 Is a 4-channel board present and a sensor connected at connector C or D?
Yes ?
- 42 ➤ Check whether symbol  or  or  is displayed during booting.
- 43 Is  displayed?
No?
 ➤ Check the 4-channel board for proper contact.
If problem still present ?
The 4-channel board is probably defective, or the mainboard is defective.
- 44 Sensor female connector with membrane cable defective or 4-channel board defective.
- 45 Sensor female connector with membrane cable defective or mainboard defective.

Test generator does not produce any signals

- 46 ➤ Check function as described in chapter 1 (Performance Test).
47 Errors occur?
→ Test generator option (R&S NRP-B1 resp. R& NRP-B7), membrane cable or mainboard defective.

LAN interface does not function correctly

- 48 ➤ Check function as described in chapter 1 (Performance Test).
49 Errors occur?
→ Mainboard is defective.

IEC bus does not function correctly

- 50 ➤ Check function as described in chapter 1 (Performance Test).
51 Errors occur?
→ Mainboard is defective.

Analog output, trigger input, or trigger output does not function correctly

- 52 ➤ Check function as described in chapter 1 (Performance Test).
53 Errors occur?
→ Mainboard is defective.

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4 Firmware Update/Installation of Options

Chapter 4 provides information on the software update and the installation of options. Descriptions enclosed with the software update or options can be filed here.

Installation of New R&S NRP2 Software

Use the Firmware Update program module from the R&S NRP Toolkit to load new firmware. The toolkit comes on a CD-ROM and is supplied together with the sensors. It enables you to update the application firmware, the boot loader and the firmware for the keyboard controller. The current firmware versions can be downloaded from the R&S homepage on the Internet, since the CD-ROM accompanying the power sensors contains the firmware status at the time of delivery.

Hardware and software requirements

- PC with free USB port, commercially available USB connecting cable.
- Either Microsoft Windows XP (32 Bit), Microsoft Windows Vista (32 or 64 Bit), Microsoft Windows 7 (32 or 64 Bit), or x86 Linux (with kernel 2.6.8 oder more recent) must be installed as the operating system of the PC. 64-bit versions of Microsoft Windows XP are not supported. Operation with older versions of Microsoft Windows with USB support (especially Microsoft Windows 2000) is normally possible but cannot be guaranteed.
- **The R&S NRP Toolkit software must already be installed on your PC.**
- One of the following files must be selected (depending on the software component to be updated):
 - nrpt_<version number>.nrp Application
 - openbios_<version number>.nrp Boot loader
 - keyb_<version number>.nrp Keyboard controller

The files are available in the \software\firmware\baseunit directory of the CD-ROM.

Preparation

- Connect the R&S NRP2 to the AC supply, but do not switch it on (only the yellow LED at the Standby key must light up).
- Connect the R&S NRP2 to the PC using the USB connecting cable. The flat connector (type A) has to be plugged into the PC and the square one (type B) into the R&S NRP2.
- If a second R&S NRP2 or an R&S NRP-Z power sensor is connected to the PC, unplug these devices from the PC.



- Switch on the R&S NRP2. The picture opposite should appear on the display after a short time.
- In addition, the PC should have identified the new USB hardware and assigned the appropriate driver from the R&S NRP Toolkit to the R&S NRP2 (brief message in a small window).

NOTICE

If you forgot to install the R&S NRP Toolkit software beforehand, Windows will try in vain to find a USB driver for the R&S NRP2. If this happens, the R&S NRP2 is highlighted by a yellow exclamation mark in the Windows device manager. In this case, proceed as follows:

- Abort the dialog for driver installation.
- Install the R&S NRP Toolkit from the CD-ROM.
Then manually assign the USB driver from the toolkit to the R&S NRP2.
- Go to Control Panel – Add/Remove Hardware and start the hardware assistant to search for new components.
- Mark the R&S NRP2 in the list of hardware components and complete the driver installation.
- Switch off the R&S NRP2 and back on.

Updating the application firmware

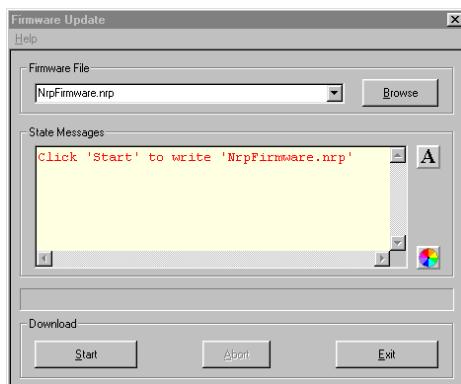


The update can be started as follows:

- Either double-click the icon of the update file named nrpt_<Version Number>.nrp
- Or start **NRP Toolkit – Firmware Update** from the Windows Start menu.



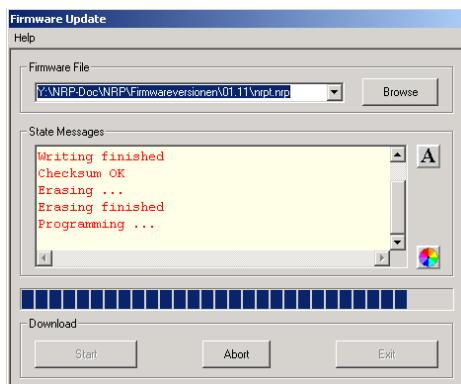
The dialog box on the left is displayed next.



- If the update was started via the Windows Start menu, enter the file name of the application firmware in the **Firmware File** box (or search for the name by using the **Browse** button).
- Click the **Start** button to start the file transfer, which is performed automatically.

NOTICE

- *Do not disconnect the R&S NRP2 from the PC.*
- *Do not switch off the R&S NRP2 and do not disconnect the power plug.*
- *Exit the Firmware Update program only after it has been completely executed.*



NOTICE

Potential problems

- Error in the compatibility and consistency checks.
In this case, the update is aborted and an error message is output.
- Switch the R&S NRP2 off and back on and start the update again.

Updating the boot loader



openbios_01_02.nrp

The boot loader update is similar to the update of the application firmware (see above).

- Instead of the application, however, you must load the new boot loader named

`openbios_<Version Number>.nrp`

Potential problems

- Program aborted by timeout (R&S NRP2 in measurement mode)
- Switch the R&S NRP2 off and back on and start the update again.

Updating the firmware for the keyboard controller



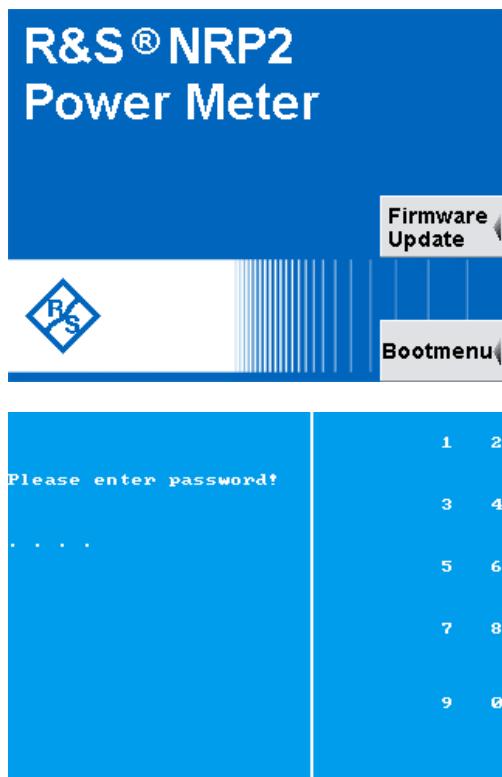
keyb_01_02.nrp

This update is similar to the update of the application firmware (see above).

- Instead of the application, however, you must load the new controller firmware named

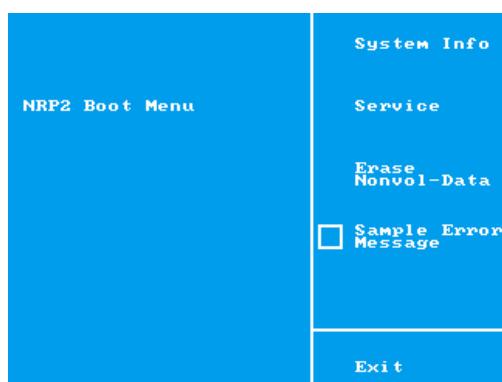
`keyb_<Version Number>.nrp`

Boot menu



To access the Boot menu, press the lowermost softkey immediately after switch-on.

The Boot menu password is „7396“.



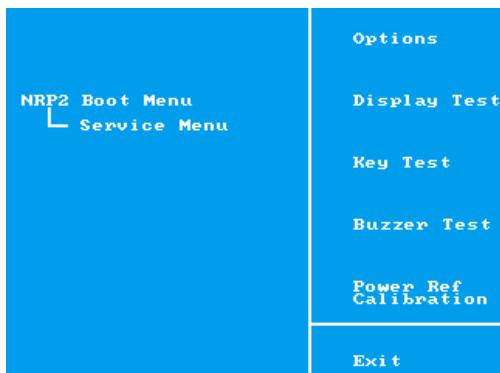
- | | |
|----------------------|---|
| System Info | Submenu, see below. |
| Service | Submenu, see below. |
| Erase Nonvol-Data | Restores the nonvolatile memory to its factory state. |
| Sample Error Message | Activates the display of sample errors for the measurement values.
Sample errors normally do not cause any measurement errors. |

System Info menu



Selected basic data for the instrument is displayed.

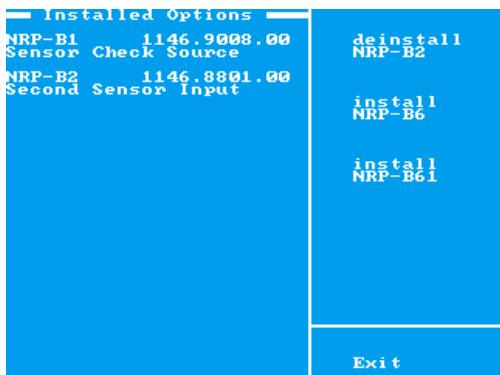
Service menu



The following can be called up from this menu:

- Dialog for installing options (Options),
- Display test (Display Test),
- Keyboard test (Key Test),
- Buzzer test (Buzzer Test), and
- Dialog for manually calibrating the Test Generator R&S NRP-B1 resp. R&S NRP-B7.

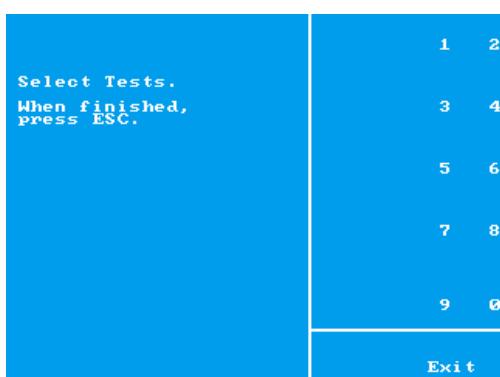
Options dialog



Shows the installed options in the left field.

Options can be installed by entering an enabling code; they can be deinstalled by entering the same code again.

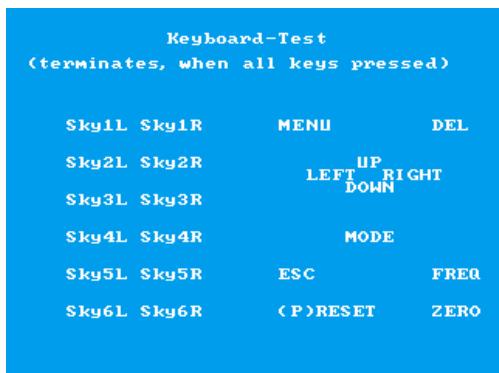
Display Test dialog



10 different test patterns can be called up with the softkey toggles.

To return to the menu, press the (ESC) key.

Key Test dialog



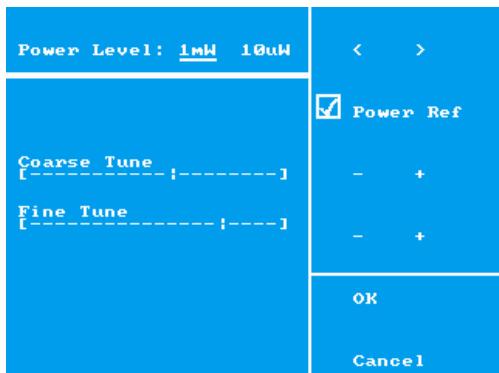
Used for testing the keyboard.

Press all keys and softkeys (except the [ON/STBY] key), one after another, in random order.

The message *Test was successful!* appears at bottom of display.

The test is left automatically, and the Service menu appears.

Power Ref Calibration Dialog (R&S NRP-B1)



Used for manually calibrating the Test Generator R&S NRP-B1.

The password "9603" is required in order to access the dialog.

Two power levels can be calibrated: 1 mW and 10 µW.

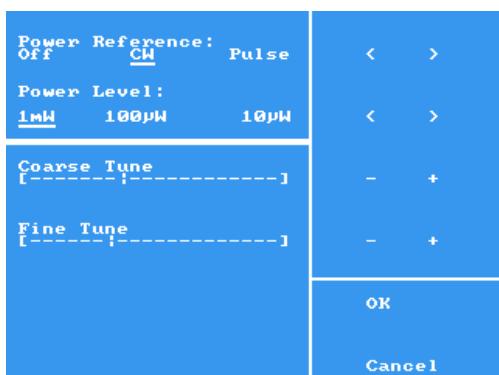
The generator can be switched on and off.

The level for the selected power can be adjusted using the Coarse Tune and Fine Tune settings.

The data can be stored in the calibration data memory of the option by pressing the OK key.

The action can be aborted at any time by pressing the Cancel key. The previous calibration data will then be retained.

Power Ref Calibration Dialog (R&S NRP-B7)



Used for manually calibrating the Test Generator R&S NRP-B7.

The password "9603" is required in order to access the dialog.

Two power levels can be calibrated: 1 mW and 100 µW. There is no need to adjust the power level 10 µW separately because it is already adjusted by setting the power level 100 µW. Additionally the power level 1 mW in pulse mode can be adjusted.

The generator can be switched on and off.

The level for the selected power can be adjusted using the Coarse Tune and Fine Tune settings.

The data can be stored in the calibration data memory of the option by pressing the OK key.

The action can be aborted at any time by pressing the Cancel key. The previous calibration data will then be retained.

Installation of Options

- The following options can be added to the Power Meter R&S NRP2:
 - Option test generator R&S NRP-B1 1146.9008.02
 - Option second test input
This option can only be retrofitted by Central Service Munich. R&S NRP-B2 1146.8801.02
 - Option third and fourth test input R&S NRP-B5 1146.9608.02
 - Option rear-panel sensor inputs A and B R&S NRP-B6 1146.9908.02
 - Option test generator R&S NRP-B7 1144.1000.02

The installation of the option is described in the enclosed instructions related to the option. The installation instructions supplied with the option can be filed in this chapter.

Contents

5 Documents	5.1
Spare Parts.....	5.1
Power cable	5.1
List of Mechanical Parts and Spare Parts	5.2

Tables

Table 5-1	Available power cables	5.1
Table 5-2	List of spare parts for the R&S NRP2	5.2
Table 5-3	List of spare parts for options.....	5.3

5 Documents

This chapter contains the spare parts list and the documents for the complete R&S NRP2 unit. For general information about spare parts for our products please refer to the sheet "Procedure in Case of Service and Ordering of Spare Parts" at the beginning of this manual.

Spare Parts

The stock numbers necessary for ordering replacement parts and modules can be found in the component lists further down.

Power cable

Table 5-1 Available power cables

Stock No.	Length/angle	Safety plug connector	Used in
0006.7013.00	2 m angular	BS1313 acc. to BS 1363/A	Great Britain
0006.7020.00	2 m straight	type 12 acc. to SEV-standard 1011.1059, standard sheet S 24 507	Switzerland
0006.7036.00	2 m straight	type 498 G acc. to NEMA 5-15	USA/Canada
0006.7107.00	2 m straight	type SAA3 10 A, 250 V, acc. to AS C112-1964 Ap.	Australia
0025.2365.00	2,0 m angular	type VII acc. to CEE (7) VII, IEC60884	Europe (without Switzerland)
0041.6232.00	2,3 m straight	type 498 GJ acc. to JIS C 8303	Japan
0041.4752.00	2,5 m gerade	type PRC/3 acc. to GB2099, GB1002	China

List of Mechanical Parts and Spare Parts

The Power Meter R&S NRP2 is designed in accordance with the R&S concept 2000.

Housing size: 2E 1/2 T250

Overall dimensions: W x H x D: 274 mm x 114 mm x 268 mm

Table 5-2 List of spare parts for the R&S NRP2

Item No.	Designation	Electrical identification	Stock No.
20	Mainboard	A6	1144.0032.02
30	Sensor cable	W5	1144.0103.03
40	Set of adhesive labels for sensor cable		1144.0149.00
50	AC supply PS75	A4	1416.0870.00
60	Front panel		1144.1180.00
70	Display cover		1144.1197.00
80	Pane		1143.8798.00
90	TFT Display 3,8"	A5	3585.8870.00
95	Flexstrip 40-contact pitch 0.5mm	W2	3584.1942.00
100	Switching foil	A50	1143.8917.00
110	Silicone mat		1143.8923.00
120	Staubdichtung		1143.8775.00
131	Type label		1143.8769.00
141	Enclosure		1143.9020.00
145	Fastening hook		1096.4796.00
150	Schutzeck vorn links		1096.6301.00
160	Schutzeck vorn rechts		1096.6318.00
170	Schutzeck hinten		1096.6299.00
180	Side cover		1096.2558.00
190	Carrying handle		1143.9007.00
200	Set of labels (6 parts)		1143.8675.00

Table 5-3 List of spare parts for options

Item No.	Designation	Electrical identification	Stock No.
1146.9008.01 (R&S NRP-B1 test generator) is replaced by 1144.1000.01 (R&S NRP-B7 Test Generator) in R&S NRP2 with firmware version ≥ 07.09.			
1040	Test Generator	A1	1144.1022.02
1055	Flexstrip 10-contact pitch 0.5mm	W1	1300.4470.00
1060	Screw 7985/ISR-M2X6-A4 for test generator A1		1148.2700.00
1065	Screw 965/ISR-M2.5X5-A4 for test generator A1		1148.2752.00
1070	Set of labels (6 parts)		1143.8675.00
1146.8801.01 (R&S NRP-B2 second sensor input)			
2020	Sensor cable	W6	1144.0103.02
2040	Set of labels (6 parts)		1143.8675.00
2050	Set of adhesive labels for sensor cable		1144.0149.00
1146.9608.01 (R&S NRP-B5 third and fourth sensor input)			
5020	Third/Fourth Sensor Board	A500	1146.9708.02
5040	Set of adhesive labels for sensor cable		1144.0149.00
5050	Washer A2.7 DIN125 for sensor board A500		0082.4663.00
5060	Screw 7985/ISR-M2.5X16-A4 for sensor board A500		1148.2869.00
5070	Curved washer A2.6 DIN137 for sensor board A500		0005.0280.00
5080	Sensor cable	W50, W60	1144.0103.02
5090	Set of labels (6 parts)		1143.8675.00
1146.9908.01 (R&S NRP-B6 rear panel sensor input)			
6040	Set of labels (6 parts)		1143.8675.00

Spare Parts Lists

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Pos.-Nr. ItemNo	Menge Quantity	ME Unit	EI.Kennz Ref.Des.	Benennung / Bezeichnung Designation	Z	Sachnummer Stock No.	Ersatzteil Subst.part	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG +EXPLANATION OF VARIANTS *VAR02=GRUNDAUSFUERUNG +VAR02=BASIC MODEL					
5 0	S			ZS ERSATZTEILLISTE VORHANDEN SPARE PARTS LIST AVAIL ID.Nr.: 1144.1439.00		0999.9684.00	M O		
20 1	S			ZM CHASSIS NRP2 CHASSIS NRP2	Z	1143.8952.00	M P		
25 2	S			MP ABDECKK. RD11.1/9.9 COVER		0009.9217.00	B O		
30 1	S	A6		ED MAINBOARD MAINBOARD	Z	1144.0032.02	X M P		
35 5	S			VS 6900/ISR-M2.5X6-A2 COMBI SCREW 6900/ISR-M2.5X6-A2		1148.3059.00	B T		
36 2	S	X11.1		FJ MUTTER HEX 14 1/2 -28UNEF HEX 14 NUT 1/2 -28UNEF fuer BNC-Buchse		3583.1561.00	B O		
37 2	S	X12.1		FJ FAECHERSCHEIBE SERRATED LOCKWASHER fuer BNC-Buchse		3583.1578.00	B O		
38 2	S	X12.2		FJ MUTTER HEX 14 1/2 -28UNEF HEX 14 NUT 1/2 -28UNEF fuer BNC-Buchse		3583.1561.00	B O		
40 1	S	X12.3	A4	NJ PSU-0251-02 PSU 1X 75W 12.2V 6.15A AC/DC POWER SUPPLY UNIT		1416.0870.00	X B T		
45 1	S			ZN BEFESTIGUNGSWINKEL MOUNTING BRACKET	Z	1143.8998.00	M P		
46 2	S			VS 965/ISR-M2.5X5-A4-PA 965/ISR-M2.5X5-A4-PA		1148.2752.00	B T		
50 3	S			VS 965/ISR-M2.5X5-A4-PA 965/ISR-M2.5X5-A4-PA		1148.2752.00	B T		
60 1	S			ZM FRONTMODUL NRP2 FRONT MODULE NRP2	Z	1143.8946.00	M		
65 1	S	W5		DX USB SENSOR KABEL USB SENSOR CABLE	Z	1144.0103.03	X M P		
66 1	S			OS Klebesch. Sensor Kabel Label Sensor Cabel		1144.0149.00	M P		
67 4	S			VS 965/ISR-M2.5X5-A4-PA 965/ISR-M2.5X5-A4-PA		1148.2752.00	B T		
70 2	S			DZ FLBDK.HALTER 14/13 DZ FLAT CABLE HOLDER		0254.2055.00	B O		
80 1	S			OS SCHILDERSATZ NRP 2X LABEL NRP 2X		1143.8681.00	B V		
100 1	S			MZ BW2 TUBUS 2E1/2T250 NRP2 BW2 TUBE 2HU1/2D250 NRP2	Z	1143.9020.00	X M O		
110 1	S			KR BW2-SCHUTZECK VO.LI.2E SHOCK MOUNT.FR.LR.2HU	Z	1096.6301.00	X B V		
 ROHDE & SCHWARZ		Benennung/Designation NRP2 POWER METER NRP2 POWER METER					Sprach/Lang de en	A.I. / C.I. 12.00	Blatt/Sheet 1 of 2
NRP2		Datum/ Date	2014-04-10	Abt. / Dept.	MTEK	Name / Name	EI	Dokument Nr. / Document No. 1144.1374.01 ST	

Pos.-Nr. ItemNo	Menge Quantity	ME Unit	E.I.Kennz Ref.Des.	Benennung / Bezeichnung Designation	Z	Sachnummer Stock No.	Ersatzteil Subst.part	BA	VH
120	1	S		KR BW2-SCHUTZECK VO.RE.2E SHOCK MOUNT.FR.RI.2HU	Z	1096.6318.00	X	B	V
130	1	S		KR TRAGBUEGEL 2E 1/2 HANDLE	Z	1143.9007.00	X	B	V
140	2	S		KR BW2-ABDECKUNG SEITLICH COVER LATERALLY		1096.2558.00	X	B	V
150	2	S		KR BW2-SCHUTZECK HI. 2E SHOCK MOUNT.REAR 2HU		1096.6299.00	X	B	V
170	2	S		KR TUBUSBEFESTIGUNGSHAKEN ATTACHMENT HOOK		1096.4796.00		B	V
500	1	S		HS OSE-COMPONENTS-LIZENZ LICENSE DOCUMENT		4060.4595.00		B	O
510	1	S		HS LIZENZSCHEIN BETR.SYS. LICENSE DOCUMENT		1144.1316.00		B	O
520	1	S		HS USB HOST RUNTIME-L. LICENSE DOCUMENT		1144.1322.00		B	O
530	1	S		HS SOFTWARE NRP2_FLASH_E SOFTWARE NRP2_FLASH_E		1144.1174.00		M	
540	1	S		OS KC SCHILD NRP LABEL KC NRP geklebt auf Rueckwand		1143.9036.00		M	P
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NRP2		Datum/ Date	2014-04-10	Abt. / Dept.	MTEK	Name / Name	EI	Dokument Nr. / Document No. 1144.1374.01 ST	

Pos.-Nr. ItemNo	Menge Quantity	ME Unit	EI.Kennz Ref.Des.	Benennung / Bezeichnung Designation	Z	Sachnummer Stock No.	Ersatzteil Subst.part	BA	VH
				ACHTUNG EGB/ATTENTION ESD *VARIANTENERKLAERUNG *EXPLANATION OF MODELS VAR02=GRUNDAUSFUEHRUNG MOD02=BASIC MODEL					
10	1	S	ILP01	DC MAINBOARD MULTILAYER HDI MAINBOARD MULTILAYER HDI		1144.0049.00	M	O	
20	1	S	B3	BJ LM75CIMM-3 TEMP.SENSOR DIGITAL TEMP. SENSOR		2079.7422.00	B	A	
30	14	S	C1	CC 100NF+-10% 16V 0402 X7R CAP CAPACITOR 100NF+-10% 16V 0402 X7R CAP		5003.5792.00	B	T	
			C2						
			C4						
			C26						
			C36						
			C37						
			C39						
			C40						
			C60						
			C62						
			C77						
			C78						
			C119						
			C120						
40	48	S	C3	CC 100NF+-20% 10V X7R 0306 CAPACITOR 100NF+-20% 10V X7R 0306		1407.3640.00	B	O	
			C5						
			C9						
			C41						
			C44						
			C63						
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			C65						
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 ROHDE & SCHWARZ		Benennung/Designation MAINBOARD MAINBOARD					Sprach/Lang de en	A.I. / C.I. 05.02	Blatt/Sheet 1 of 11
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			C107 C108 C109 C110 C111						
50	2	S	C6 C7	CC 10NF+-10% 50V X7R 0402 CAPACITOR 10NF+-10% 50V X7R 0402		0041.3340.00		B	T
60	3	S	C8 C10 C122	CE 120UF 20% 16V RUND SMD ELECTROLYTIC CAPACITOR		1201.8649.00		B	O
70	8	S	C11 C12 C14 C15 C16 C18 C19 C20	CC 10UF+-10% 35V X5R 1210 CAPACITOR 10UF+-10% 35V X5R 1210		3584.2526.00		B	O
80	4	S	C13 C17 C21 C131	CC 10UF+-10% 10V X5R 1206 CAPACITOR 10UF+-10% 10V X5R 1206		1137.9196.00		B	O
90	3	S	C22 C35 C71	CC 22UF+-20% 6.3V X5R 1206 CAPACITOR 22UF+-20% 6.3V X5R 1206		0794.6240.00		B	O
100	4	S	C23 C24 C27 C28	CC 15PF+-5% 50V C0G 0402 CAPACITOR 15PF+-5% 50V C0G 0402		0041.7651.00		B	T
110	4	S	C25 C48 C72 C123	CC 47PF+-5% 50V C0G 0402 CAPACITOR 47PF+-5% 50V C0G 0402		1153.4437.00		B	T
120	2	S	C29 C30	CC 270PF+-5% 50V C0G 0402 CAPACITOR 270PF+-5% 50V C0G 0402		0041.7639.00		B	T
130	3	S	C31 C32 C33	CC 220PF+-5% 50V C0G 0402 CAPACITOR 220PF+-5% 50V C0G 0402		0041.6978.00		B	T
140	1	S	C34	CC 4.7UF+-10% 6.3V X5R 0603 CAPACITOR 4.7UF+-10% 6.3V X5R 0603		1137.9244.00		B	O
150	3	S	C38 C42 C43	CN 4X22PF 200MA 25V SMD 1206 CAPACITOR ARRAY 4X22PF 200MA 25V 1206		6124.0800.00		B	O
160	3	S	C45 C46 C47	CC 3.3NF+-10% 50V X7R 0402 CAPACITOR 3.3NF+-10% 50V X7R 0402		0041.8158.00		B	T
170	3	S	C49 C130 C132	CC 1UF+-10% 16V X5R 0603 CAPACITOR 1UF+-10% 16V X5R 0603		1137.9273.00		B	O
 ROHDE & SCHWARZ			Benennung/Designation MAINBOARD MAINBOARD				Sprach/Lang de en	Ä.I. / C.I. 05.02	Blatt/Sheet 2 of 11
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180	0	S	C50	CC 100UF +-20% 6.3V X5R 1206 CAPACITOR 100UF+-20% 6.3V X5R 1206 NICHT BESTUECKT NOT FITTED		6141.3710.00		B	O
190	7	S	C51 C52 C53 C54 C55 C56 C57	CC 100UF +-20% 6.3V X5R 1206 CAPACITOR 100UF+-20% 6.3V X5R 1206		6141.3710.00		B	O
200	0	S	C58	CC 100UF +-20% 6.3V X5R 1206 CAPACITOR 100UF+-20% 6.3V X5R 1206 NICHT BESTUECKT NOT FITTED		6141.3710.00		B	O
210	2	S	C59 C124	CC 10PF+-5% 50V C0G 0402 CAPACITOR 10PF+-5% 50V C0G 0402		0041.8135.00		B	T
220	6	S	C61 C125 C126 C127 C128 C129	CN 4X100R-47P 15MA 6V SMD RC FILTER ARRAY		6124.0300.00		B	O
230	3	S	C75 C76 C118	CC 100PF+-5% 50V C0G 0402 CAPACITOR 100PF+-5% 50V C0G 0402		0041.3333.00		B	T
240	1	S	C121	CC 39PF+-5% 50V C0G 0402 CAPACITOR 39PF+-5% 50V C0G 0402		0041.7680.00		B	T
250	3	S	D1 D2 D3	BW LTC1625IGN BUCK CNTRL PWM C- MODE PWM BUCK CONTROLLER CURRENT MODE		6095.1689.00		B	O
260	1	S	D4	BC PIC16LF873-04/SO MICROCONTROLLER PIC16LF873-04/SO MICROCONTROLLER		1144.0484.00		B	V
270	1	S	D5	BA ELLXT971ABE 10/100MBPS PHY TRANSCE. ELLXT971ABE 10/100MBPS PHY TRANSCE.		3584.9495.00		B	O
280	1	S	D6	BC S1D13706F00A LCD CONTROLLER S1D13706F00A LCD CONTROLLER		1143.9613.00		B	V
290	2	S	D7 D8	BR MT48LC16M16A2P-6A:G 256MBIT SDRAM MT48LC16M16A2P-6A:G 256MBIT SDRAM		3588.6810.00		B	B
300	4	S	D9 D10 D13 D17	BL SN74LVC1G125DCK 1-BIT DRIVER SN74LVC1G125DCK 1-BIT DRIVER		4060.4572.00		B	B
310	1	S	D11	BL SN74LVC1G04DCKR 1-INPUT INVERT GATE SN74LVC1G04DCKR 1-INPUT INVERT GATE		0041.4952.00		B	O
 ROHDE & SCHWARZ				Benennung/Designation MAINBOARD MAINBOARD	Sprach/Lang de en	Ä.I. / C.I. 05.02	Blatt/Sheet 3 of 11		
NRP				Datum/ Date 2013-02-22	Abt. / Dept. 1GPK	Name / Name LI	Dokument Nr. / Document No.	1144.0032.01 ST	

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Pos.-Nr. ItemNo	Menge Quantity	ME Unit	E.I.Kennz Ref.Des.	Benennung / Bezeichnung Designation	Z	Sachnummer Stock No.	Ersatzteil Subst.part	BA	VH
320	1	S	D12	BC PPC405GPR-3JB400 IC POWERPC		2085.3848.00		B	A
330	1	S	D14	BR S29GL128P11FFI020 FLASH MEMORY S29GL128P11FFI020 FLASH MEMORY		3585.4574.00		B	A
340	1	S	D15	BC OPTI82C861LQFP PCI-TO-USB BRIDGE USB INTERFACE		1144.0432.00		B	A
350	2	S	D16 D33	BL SN74LVC2G125DCU 2X 1-BIT DRIVER SN74LVC2G125DCU 2X 1-BIT DRIVER		1167.8281.00		B	O
360	1	S	D18	BL SN74LVC1G14DCKR 1-INPUT INVERT GATE SN74LVC1G14DCKR 1-INPUT INVERT GATE		1134.0898.00		B	O
370	1	S	D19	BS MAX4717EUB+ 2X SPDT SW 4R5 5.5V ANALOG SWITCH		1137.9373.00		B	B
380	2	S	D20 D31	BW ADM6711SAKSZ V-SUPERVISOR 2.93V SUPPLY-VOLTAGE SUPERVISOR		1169.0371.00		B	O
390	1	S	D21	BL 74ALVC74PW 2XD-FF DUAL D-TYPE FLIP FLOP		1144.0555.00		B	V
400	1	S	D24	BJ AD7396ARZ 2X DAC 12BIT DIGITAL-TO-ANALOG CONVERTER		1144.0510.00		B	V
410	1	S	D25	BA USBN9603-28M USB CONTROLLER USBN9603-28M USB CONTROLLER		1144.0526.00		B	B
420	1	S	D26	BF XCR3128XL-10TQG144I CPLD XCR3128XL-10TQG144I CPLD		6099.3234.00		B	V
430	1	S	D28	BA CY2305SXC-1 1:9 CLK BUFFER 133.3MHZ FANOUT BUFFER ZERO DELAY BUFFER		1144.0584.00		B	O
440	1	S	D29	BC TNT4882 GPIB IEEE488.2 CONTROLLER TNT4882 GPIB IEEE488.2 CONTROLLER		1050.0698.00		B	V
450	1	S	D34	BL SN74LVC1G58DCK CON.MULT.-FUNC. GATE SN74LVC1G58DCK CON.MULT.-FUNC. GATE		1137.9250.00		B	O
460	1	S	D35	BW LT3466EDD 2X BOOST CONV DUAL STEP UP SWITCHING REGULATOR		3584.7657.00		B	O
470	1	S	F1	SS SMD-SICHERUNG 3A FF + FASSUNG FUSE 3A FF + SOCKET		0041.5865.00		B	O
480	1	S	G1	EQ 3.6864MHZ CRY 100PPM 12PF NX1255GB QUARTZ CRYSTAL UNIT		1137.6574.00		B	V
490	1	S	G2	BW REF3033AIDBZ VREF 3.3V 50PPM VOLTAGE REFERENCE		3542.2757.00		B	T
500	1	S	G3	EO 33MHZ PXO 3.3V 100PPM 15PF SG8002JF PROGRAMABLE CRYSTAL OSCILLATOR		1144.0778.00		B	V
510	1	S	G4	EO 40 MHZ XO 5V 100 SMD QUARTZ CRYSTAL OSCILLATOR		1078.3133.00		B	A
520	1	S	G5	EO 48MHZ PXO 3.3V 100PPM 15PF SG8002JF PROGRAMABLE CRYSTAL OSCILLATOR		1144.0761.00		B	B
530	1	S	G6	EQ 24.000MHZ CRY 30PPM 20PF FA-365		0048.9895.00		B	V
 ROHDE & SCHWARZ		Benennung/Designation MAINBOARD MAINBOARD					Sprach./Lang de en	Ä.I. / C.I. 05.02	Blatt/Sheet 4 of 11
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				QUARTZ CRYSTAL UNIT					
540	1	S	G7	EQ 25.000 MHZ 50PPM GW SMD QUARTZ CRYSTAL UNIT		2083.3057.00		B	V
550	2	S	K1	BW TPS2550DRV ADJ. USB POWER SWITCH		3585.0840.00		B	V
			K2	USB POWER SWITCH					
560	1	S	K3	BW MIC5205YM5 ADJ LN LDO REG 0.15A LOW NOISE LOW-DROPOUT REGULATOR		4055.0643.00		B	O
570	2	S	L1	LD 22UH 20% 4A SMD INDUCTOR 22UH 20% 4A SMT		1144.0455.00		B	O
			L3						
580	1	S	L2	LD 47UH 20% 2.7A SMD INDUCTOR 47UH 20% 2.7A SMT		1144.0478.00		B	O
590	1	S	L4	LD 300-625R/10-50MHZ FERRITE BEAD		1078.3240.00		B	O
600	9	S	L5	LD 600R/100MHZ 0.3A 0402 FERRITE BEAD 600R/100MHZ 0.3A 0402		1137.8919.00		B	T
			L6						
			L7						
			L10						
			L11						
			L12						
			L13						
			L14						
			L15						
610	2	S	L8	LD 33UH 30% 0.58A Q4 SMD CHOKE 33UH 30% 0.58A Q4 SMT		3584.7640.00		B	O
			L9						
620	3	S	P1	AF LYQ971-Z LED GELB LED YELLOW		0041.9219.00		B	T
			P2						
			P3						
630	1	S	P4	EL PIEZOSUMMER 6V 7MA SMD PIEZO AUDIO INDICATOR SMD		1081.0402.00		B	B
640	0	S	R1	RG 470K 1% TK100 0402 SMD RESISTOR 470K 1% TK100 0402 NICHT BESTUECKT NOT FITTED		0041.9448.00		B	T
650	0	S	R2	RG 470K 1% TK100 0402 SMD RESISTOR 470K 1% TK100 0402 NICHT BESTUECKT NOT FITTED		0041.9448.00		B	T
660	1	S	R3	RG 200K 1% TK100 0402 SMD RESISTOR 200K 1% TK100 0402		1137.8777.00		B	T
670	4	S	R4	RG 30R1 1% TK100 0402 SMD RESISTOR 30R1 1% TK100 0402		0041.7039.00		B	T
			R5						
			R6						
			R7						
680	3	S	R8	RG 6K81 1% TK100 0402 SMD RESISTOR 6K81 1% TK100 0402		0041.6878.00		B	T
			R9						
			R10						
690	1	S	R11	RG 5K62 1% TK100 0402 SMD RESISTOR 5K62 1% TK100 0402		0041.7322.00		B	T
700	26	S	R12	RG 10K 1% TK100 0402 SMD RESISTOR 10K 1% TK100 0402 SMD		0041.0170.00		B	T
 ROHDE & SCHWARZ			Benennung/Designation MAINBOARD MAINBOARD				Sprach/Lang de en	A.I. / C.I. 05.02	Blatt/Sheet 5 of 11
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Pos.-Nr. ItemNo	Menge Quantity	ME Unit	EI.Kennz Ref.Des.	Benennung / Bezeichnung Designation	Z	Sachnummer Stock No.	Ersatzteil Subst.part	BA	VH	
710	46	S	R13 R18 R30 R31 R34 R35 R91 R93 R116 R117 R118 R169 R171 R183 R184 R207 R208 R259 R261 R262 R269 R270 R280 R283 R284	RG 3K32 1% TK100 0402 SMD RESISTOR 3K32 1% TK100 0402		0041.6461.00		B	T	
720	3	S	R14 R26 R27 R28 R32 R36 R42 R68 R71 R72 R73 R74 R75 R81 R84 R85 R86 R89 R96 R139 R140 R142 R144 R146 R148 R152 R185 R186 R187 R188 R189 R190 R191 R192 R193 R194 R195 R213 R214 R218 R221 R241 R258 R260 R273 R281	RN 3K3 X4 5% 1206 SMD		1116.7013.00		B	O	
 ROHDE & SCHWARZ		Benennung/Designation MAINBOARD MAINBOARD						Sprach./Lang de en	A.I. / C.I. 05.02	Blatt/Sheet 6 of 11
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			R16 R17 R19 R20 R21 R22 R23 R24 R25 R33 R38 R39 R57 R58 R70 R90 R94 R98 R119 R120 R121 R122 R123 R124 R141 R143 R145 R147 R149 R151 R172 R209 R215 R216 R217 R219 R228 R242 R243 R244 R245 R246 R247 R248 R249	RESISTOR 3K3 X4 5% 1206 RG 1K 1% TK100 0402 SMD RESISTOR 1K 1% TK100 0402		0041.0186.00		B	T
730	43	S	R29 R88 R92	RD 0R BLECH CUZN/SN 1206 JUMPER 0R BLECH CUZN/SN 1206		0041.2143.00		B	B
740	3	S	R37 R115 R176	RG 4R75 1% TK200 0402 SMD RESISTOR 4R75 1% TK200 0402		0041.6684.00		B	T
750	3	S	R40 R56 R59	RN 1K X4 5% 1206 SMD RESISTOR 1K X4 5% 1206		2083.2715.00		B	T
760	3	S	R41 R285	RG 470R 1% TK100 0402 SMD RESISTOR 470R 1% TK100 0402		0041.0257.00		B	T
770	2	S	R43	RG 1K5 1% TK100 0402 SMD RESISTOR 1K5 1% TK100 0402		1137.8848.00		B	T
780	1	S	R44 R45	RG 24R9 1% TK100 0402 SMD RESISTOR 24R9 1% TK100 0402		0041.6510.00		B	T
 ROHDE & SCHWARZ		Benennung/Designation MAINBOARD MAINBOARD				Sprach/Lang de en	A.I. / C.I. 05.02	Blatt/Sheet 7 of 11	
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800	8	S	R46 R47 R48 R49 R50 R51 R52 R53	RN 33R X4 5% 1206 SMD RESISTOR 33R X4 5% 1206		4055.6564.00		B	O
810	2	S	R54 R55	RG 30K1 +- 1% TK100 0402 SMD RESISTOR 30K1 +-1% TK100 0402		0041.6903.00		B	T
820	2	S	R60 R61	RG 110R 1% TK100 0402 SMD RESISTOR 110R 1% TK100 0402		0041.7139.00		B	T
830	1	S	R62	RG 332K 1% TK100 0402 SMD RESISTOR 332K 1% TK100 0402		1137.8825.00		B	T
840	3	S	R63 R64 R65	RG 75R 1% TK100 0402 SMD RESISTOR 75R 1% TK100 0402		0041.7097.00		B	T
850	3	S	R66 R67 R304	RG 0R (0R02) JUMPER 1A 0402 SMD JUMPER 0R (0R02) 1A 0402		0041.0192.00		B	T
860	2	S	R69 R95	RG 20K 1% TK100 0402 SMD RESISTOR 20K 1% TK100 0402		0041.6403.00		B	T
870	2	S	R76 R79	RN 27R X4 5% 1206 SMD RESISTOR 27R X4 5% 1206		2083.2709.00		B	T
880	2	S	R77 R225	RG 100R 1% TK100 0402 SMD RESISTOR 100R 1% TK100 0402		1090.2340.00		B	T
890	2	S	R78 R101	RG 100K 1% TK100 0402 SMD RESISTOR 100K 1% TK100 0402		0041.0240.00		B	T
900	3	S	R80 R286 R287	RG 1M 1% TK100 0402 SMD RESISTOR 1M 1% TK100 0402		0041.8629.00		B	T
910	3	S	R82 R87 R294	RG 511R 1% TK100 0402 SMD RESISTOR 511R 1% TK100 0402		0041.7197.00		B	T
920	3	S	R83 R299 R300	RG 22K1 1% TK100 0402 SMD RESISTOR 22K1 1% TK100 0402		1137.8860.00		B	T
930	0	S	R97	RG 1K 1% TK100 0402 SMD RESISTOR 1K 1% TK100 0402 NICHT BESTUECKT NOT FITTED		0041.0186.00		B	T
940	0	S	R99	RG 1K 1% TK100 0402 SMD RESISTOR 1K 1% TK100 0402 NICHT BESTUECKT NOT FITTED		0041.0186.00		B	T
950	0	S	R100	RG 1K 1% TK100 0402 SMD RESISTOR 1K 1% TK100 0402 NICHT BESTUECKT		0041.0186.00		B	T
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				NOT FITTED					
960	1	S	R102	RG 47.5 OHM+-1%TK100 1206 SMD RESISTOR 47.5 OHM+-1%TK100 1206		0007.5566.00		B	O
970	4	S	R105 R109 R111 R113	RG 14K7 1% TK100 0402 SMD RESISTOR 14K7 1% TK100 0402		0041.7380.00		B	T
980	8	S	R125 R126 R127 R128 R129 R130 R137 R138	RG 49R9 1% TK100 0402 SMD RESISTOR 49R9 1% TK100 0402		0041.6849.00		B	T
990	1	S	R158	RG 13K 1% TK100 0402 SMD RESISTOR 13K 1% TK100 0402		0041.6890.00		B	T
1000	8	S	R161 R162 R163 R164 R165 R166 R167 R168	RG 17K8 1% TK100 0402 SMD RESISTOR 17K8 1% TK100 0402		0041.7400.00		B	T
1010	3	S	R173 R174 R175	RG 200R 1% TK100 0402 SMD RESISTOR 200R 1% TK100 0402		0041.3491.00		B	T
1020	1	S	R226	RG 750R 1% TK100 0402 SMD RESISTOR 750R 1% TK100 0402		0041.6203.00		B	T
1030	2	S	R288 R289	RG 221R 1% TK100 0402 SMD RESISTOR 221R 1% TK100 0402		0041.6432.00		B	T
1040	2	S	R290 R291	RG 90R9 1% TK100 0402 SMD RESISTOR 90R9 1% TK100 0402		0041.7122.00		B	T
1050	1	S	R301	RG 68K1 1% TK100 0402 SMD RESISTOR 68K1 1% TK100 0402		0041.7480.00		B	T
1060	2	S	R302 R303	RG 27R4 1% TK100 0402 SMD RESISTOR 27R4 1% TK100 0402		0041.6749.00		B	T
1070	0	S	R305	RG 0R (0R02) JUMPER 1A 0402 SMD JUMPER 0R (0R02) 1A 0402 NICHT BESTUECKT NOT FITTED		0041.0192.00		B	T
1080	2	S	T1 T2	LD 273NH 2X USB2.0 0.5A 0805-4 CHOKE 273NH 2X USB2.0 0.5A 0805-4		1091.1918.00		B	O
1090	1	S	T3	BO LT1719IS6 1X COMP 4.5NS R2R COMPARATOR		1137.9209.00		B	O
1100	3	S	U1 U2 U3	VS EINPRESSMUTTER M2.5 LL SCREW INSERT M2.5 LL		0088.9250.00		M	T
1110	4	S	V1	AM SI5904DC DUAL N-E MOSFET 20V 2.1A		1144.0503.00		B	T
 ROHDE & SCHWARZ		Benennung/Designation MAINBOARD MAINBOARD					Sprach./Lang de en	A.I. / C.I. 05.02	Blatt/Sheet 9 of 11
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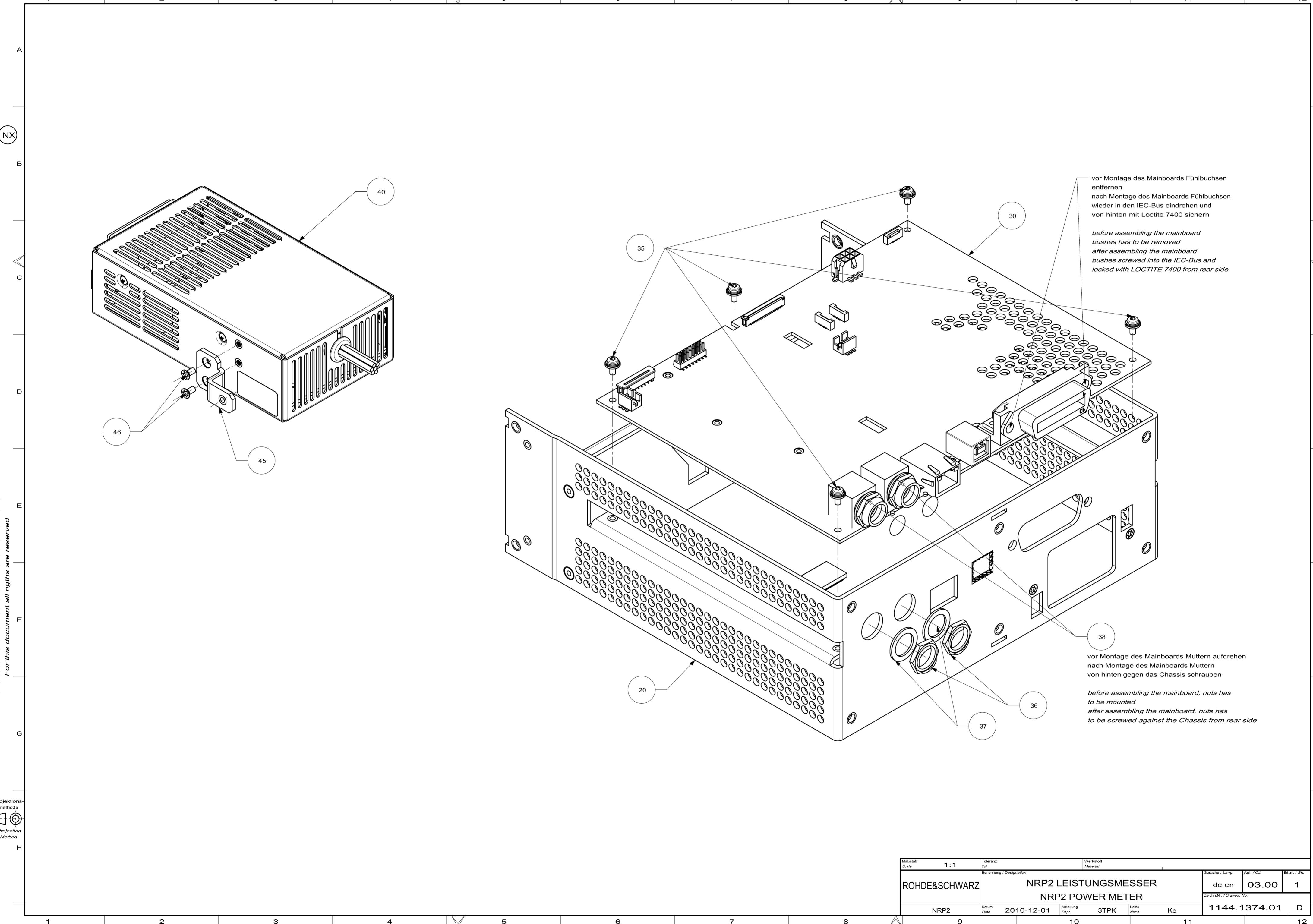
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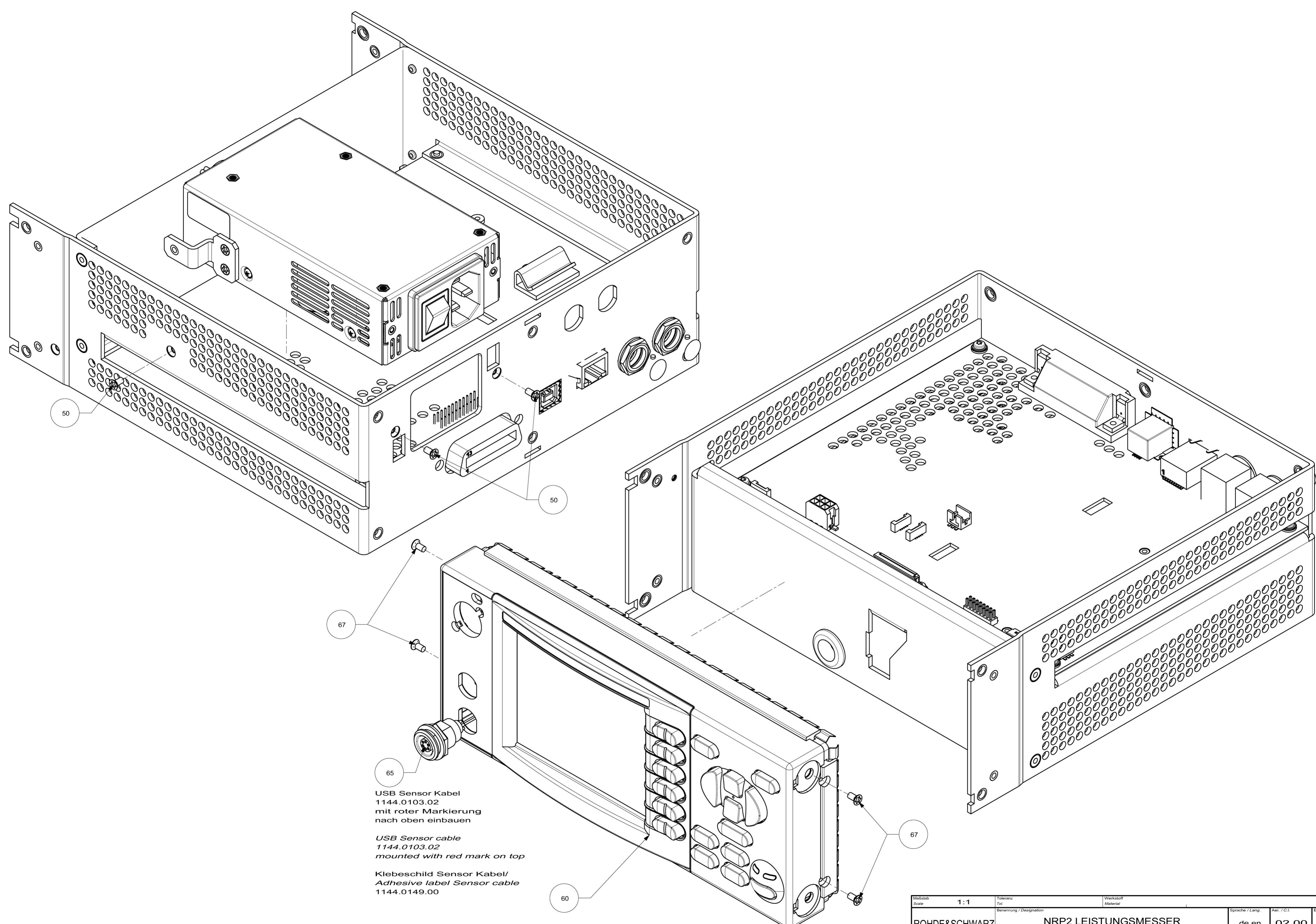
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1120	4	S	V3 V5 V6 V2 V16 V17 V18	DUAL N-E 2.5-V(G-S) RATED AD RCLAMP0504N TVS-DIODE 300W 6V 1MA LOW CAPACITANCE TVS DIODE ARRAY		3584.2878.00		B	O
1130	6	S	V8 V9 V10 V11 V12 V13	AG 1PS74SB23 SCHOTTKY DIODE 25V 1MA SCHOTTKY BARRIER RECTIFIER DIODE		1137.6697.00		B	T
1140	3	S	V14 V29 V36	AM BSS138WH N-E MOSFET 60V 280MA BSS138WH N-E 60V MOSFET		1167.8423.00		B	O
1150	0	S	V15	AM BSS138WH N-E MOSFET 60V 280MA BSS138WH N-E 60V MOSFET NICHT BESTUECKT NOT FITTED		1167.8423.00		B	O
1160	6	S	V21 V22 V23 V24 V25 V26	AE 1PS79SB10 SCHOTTKY DIODE 30V 200MA SCHOTTKY BARRIER DIODE		1144.0490.00		B	T
1170	2	S	V27 V28	AG PMEG2010AEB SCHOTTKY DIODE 20V 6A SCHOTTKY BARRIER RECTIFIER DIODE		3584.2578.00		B	T
1180	1	S	X1	FT RJ-45 MIT MAGN. MODUL RJ-45 MIT MAGN. MODUL		3585.6277.00		B	O
1190	1	S	X3	FP STECKERLEISTE 16P.SMD CONNECTOR		1122.9808.00		B	O
1200	3	S	X4 X5 X6	FP BUCHSENLEISTE 10P.ZIF CONNECTOR		6094.9163.00		B	B
1210	2	S	X7 X14	FP STIFTLEISTE 6P.SMD CONNECTOR		0041.4730.00		B	B
1220	1	S	X9	FM BU 24P SERIE 57 WINKEL M3 FEMALE IEEE CONNECTOR 24P		3588.6632.00		B	V
1230	2	S	X11 X12	FJ WINKELEINBAUBU BNC 50 ANGLE BNC		1051.4380.00		B	V
1240	1	S	X15	FT USB-B WINKELBU.4P PIP USB-B FEMALE CONNECTOR		3585.8228.00		B	O
1250	1	S	X16	FP STECKERL. 6P SMD GER CONNECTOR		2095.3128.00		B	T
1260	1	S	X21	FP 14P.GER R=1 ZIF FFC CONNECTOR		6038.2873.00		B	T
 ROHDE & SCHWARZ		Benennung/Designation MAINBOARD MAINBOARD					Sprach./Lang de en	A.I. / C.I 05.02	Blatt/Sheet 10 of 11
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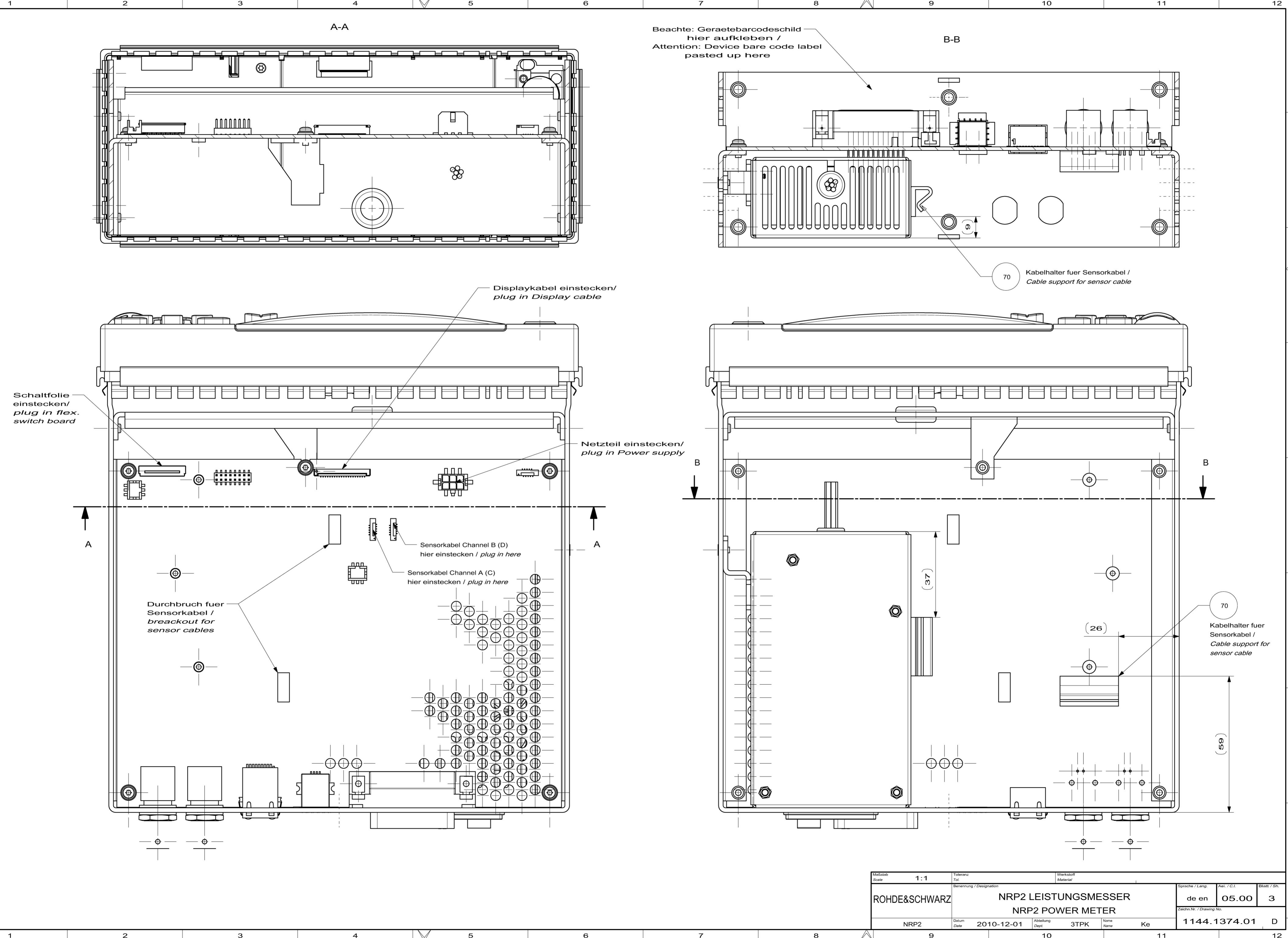
Pos.-Nr. ItemNo	Menge Quantity	ME Unit	EI.Kennz Ref.Des.	Benennung / Bezeichnung Designation	Z	Sachnummer Stock No.	Ersatzteil Subst.part	BA	VH
1270	1	S	X22	FP BUCHSE 40P ZIF GER R=0.5 CONNECTOR ZIF VERTICAL		1169.0420.00		B	O
1280	3	S	Z7 Z8 Z9	CB T-FILTER 4.7NF SMD SMD-FILTER		0041.8812.00		B	T
1290	2	S	X9.2 X9.3	VS 7985/ISR-M3X6-A4-PA 7985/ISR-M3X6-A4-PA		1148.2630.00		B	O
1300	2	S	X9.4 X9.5	VS DIN125-A3.2-A4 WASHER DIN125		0082.4670.00		B	V
1310	2	S	X11.2 X12.2	FJ MUTTER HEX 14 1/2 -28UNEF HEX 14 NUT 1/2 -28UNEF		3583.1561.00		B	O
1320	2	S	X11.3 X12.3	FJ FAECHERSCHEIBE SERRATED LOCKWASHER		3583.1578.00		B	O
1330	1	S	JOS1	OS BARCODE-ETIKETT F.GS BARCODE LABEL		0071.7714.00		B	O
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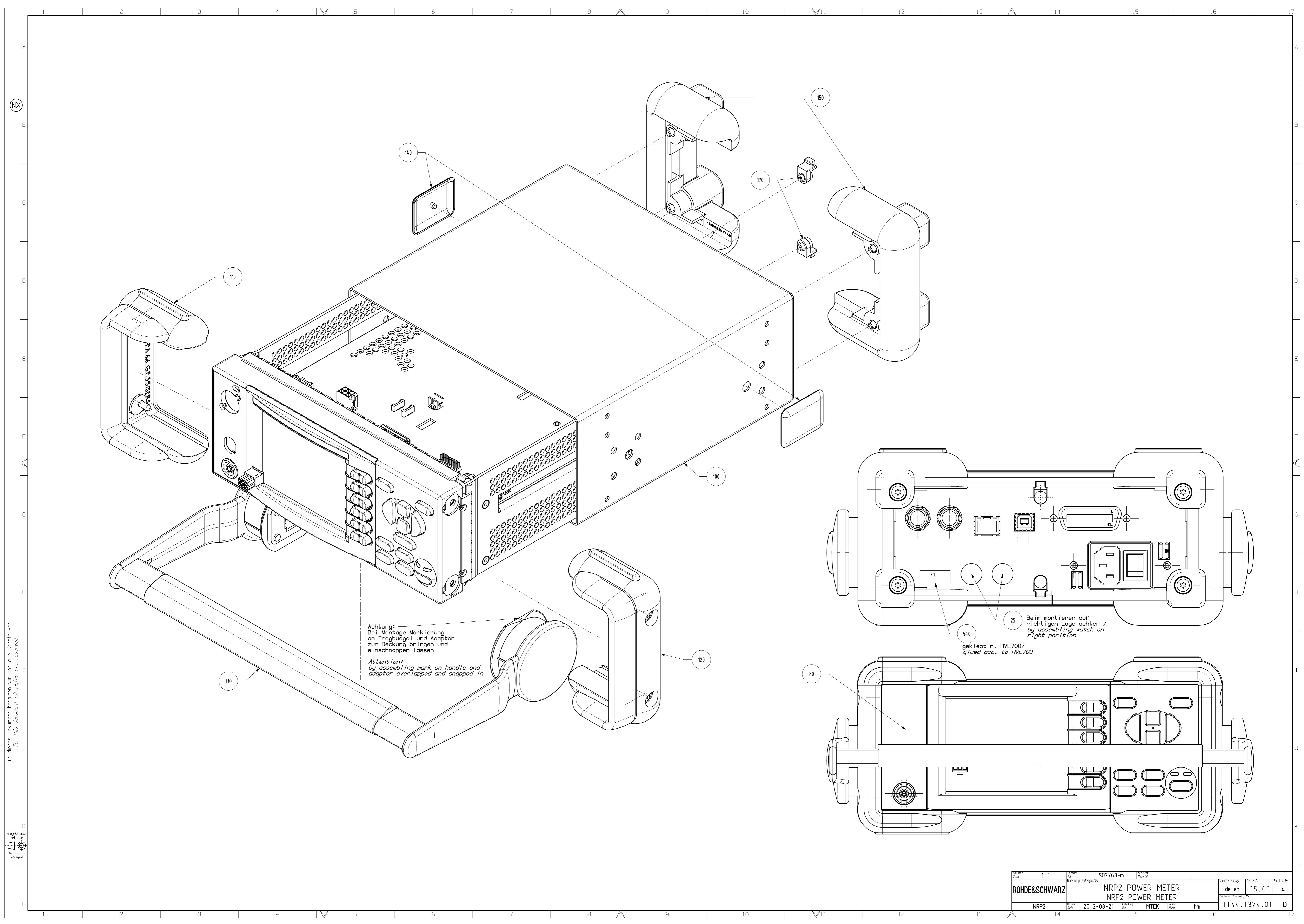
Mechanical Drawings





Maßstab / Scale	1:1	Toleranz / Tol.	Werkstoff / Material
ROHDE&SCHWARZ	Benennung / Designation		
NRP2	Datum / Date	2010-12-01	Abteilung / Dept.
	Zeichn. Nr. / Drawing No.	3TPK	Name / Name
		Ke	
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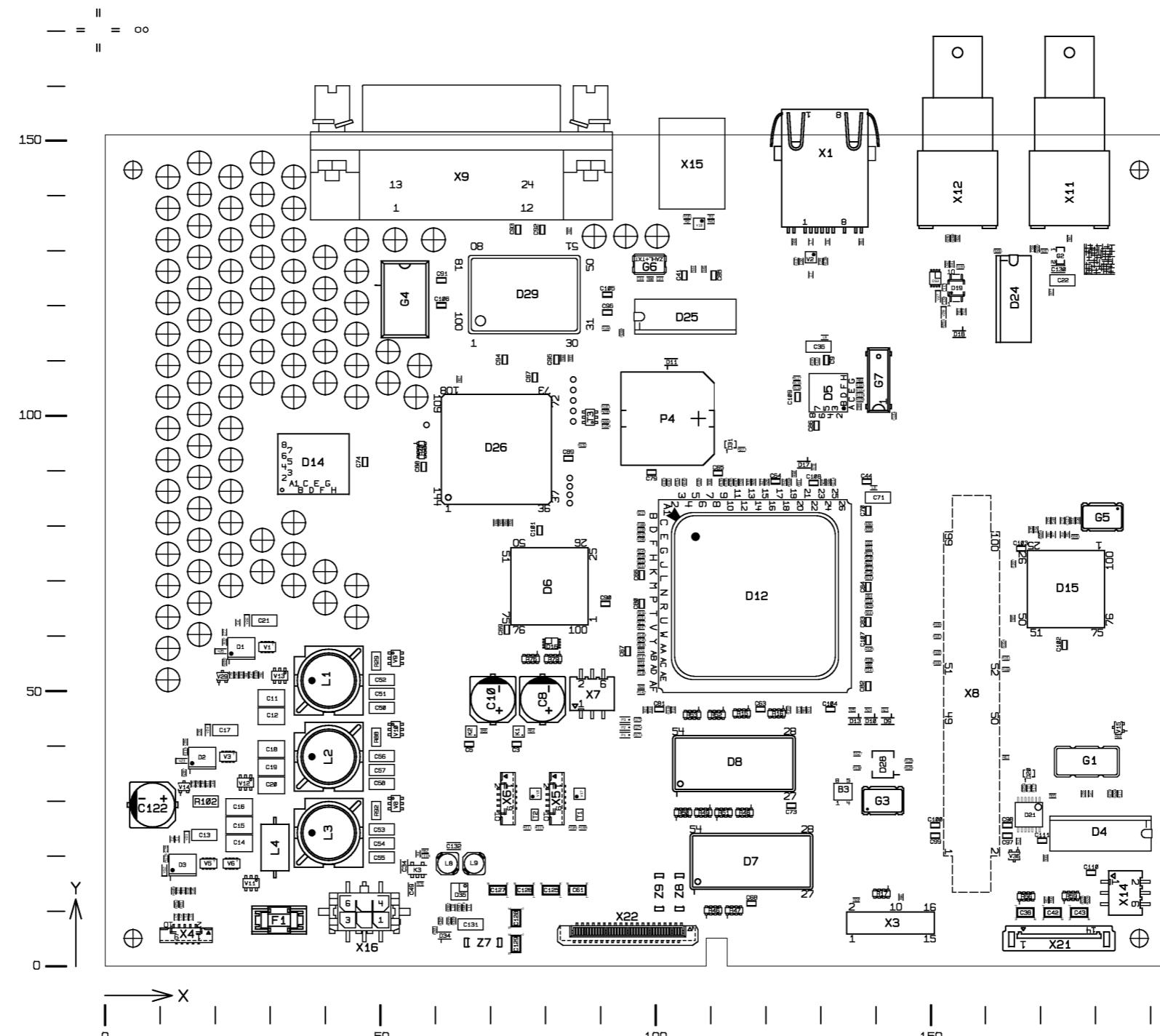
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Darstellung Seite B (Top)
View on Side B (Top)



ACHTUNG: EGB!
Elektrostatisch gefährdete
Bauelemente erfordern eine
besondere Handhabung.
ATTENTION: ESD!
Electrostatic sensitive devices
require a special handling.

Bindende Angaben über Varianten,
Trimmwerte, Bauteilwerte und nicht
bestückte Bauteile siehe SA.

For binding information on models,
trimming, component values and
not fitted components see SA.

ROHDE&SCHWARZ

Benennung / Designation		MAINBOARD		
NRP	Datum Date	Abteilung Dept.	Name Name	Lindin-p
	2013-02-22	1GPK		1144.0032.01 D

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Dokument Nr. / Document No.

Circuit Diagrams

REAR PANEL

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ETHERNET

SENSOR C
NRP-Z..
SENSOR D
NRP-Z..

IEC-BUS
IEEE488

USB

OUT1/TRIG OUT

TRIG IN/OUT2

100-240V
50-60(400)Hz
80VA

A4
POWER SUPPLY
1416.0870.00

NRP-B5
1146.9608.02

A500
4 CHANNEL BOARD
1146.9708.02

A6
MAIN BOARD
1144.0032.00

FRONT MODULE NRP2
1143.8946.00

A5
DISPLAY
3584.1942.00
3585.8870.00

A50
KEYBOARD
1143.8917.00

NRP-B1/NRP-B7
1146.9008.02/1144.1000.02

A1
TESTGENERATOR
1146.9108.02/1144.1022.02

mounted in rear panel
if option NRP-B6 is
installed

W5

W6

SENSOR A
NRP-Z..

SENSOR B
NRP-Z..

	Benennung / Designat.:		Spr.:/Lang.: de/en	Aei.:/C.l.: 10.00	Blatt./Sh.: 1 -
	NRP2 POWER METER	Datum: 2013-11-05	Abteilung: MTEK	Name: eichfeld	Zeichn.Nr.:/Drawing No.: 1144.1374.01 S
	NRP2 POWER METER	Date: 2013-11-05	Dept.: MTEK	Name: eichfeld	